MAY 2022

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HCM Extended Roundabout Capacity Model for enhanced model calibration

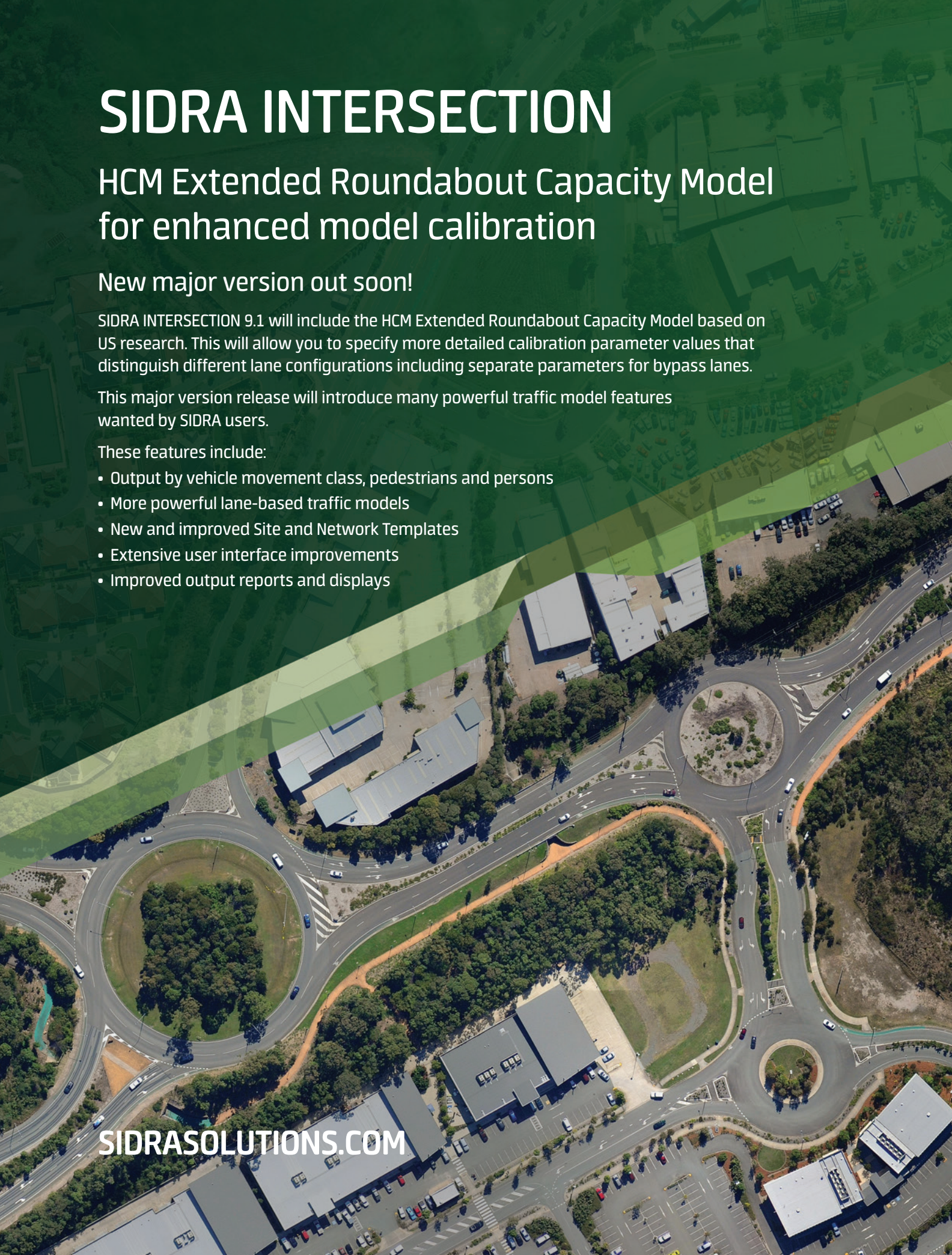
New major version out soon!

SIDRA INTERSECTION 9.1 will include the HCM Extended Roundabout Capacity Model based on US research. This will allow you to specify more detailed calibration parameter values that distinguish different lane configurations including separate parameters for bypass lanes.

This major version release will introduce many powerful traffic model features wanted by SIDRA users.

These features include:

- Output by vehicle movement class, pedestrians and persons
- More powerful lane-based traffic models
- New and improved Site and Network Templates
- Extensive user interface improvements
- Improved output reports and displays



SIDRASOLUTIONS.COM

Our Community

BEVERLY THOMPSON KUHN, PH.D., P.E., PMP (F)
ITE International President

ITE describes itself as a community of transportation professionals that includes engineers, planners, consultants, educators, technologists, researchers, and more. The use of the word "community" is intentional and seeks to include all who work to improve mobility and safety for all transportation system users and help build smart and livable communities.

Merriam-Webster online defines community as either a unified body of individuals, a social state or condition, or society at large. A synonym is "neighborhood," and words related to community include city, commune, hamlet, town, village, denizens, dwellers, inhabitants, residents, citizenry, culture, people, populace, public, and society.

I recently read a series of articles in *Forum* from Phi Kappa Phi that explored the importance of different perceptions and experiences that help make a community.* The subjects of these articles span a diverse array of communities, including small towns, schools, films, a remote tribal village, corporations, health care, and even the animal kingdom. All these communities have an established culture among their residents. They are everywhere and have specific characteristics that make them unique. A common thread among them is a desire to support every member, including newcomers, visitors, and outsiders.

What is your idea of a community? For me, I remember the unincorporated town of my youth. In summer, my sisters and I would ride our bikes to the swimming pool with nary a helmet or bike lane to be found (frightening). When we reached the pool, we would call home on the pay phone (ring once and hang up to retrieve our quarter) to let our parents know we had arrived safely. The teenage lifeguards and most of the adults knew us by name. We might leave and head to a friend's house (cutting through backyards since fences were rare), ride the bike trails we had made in the vacant wooded lots, and more. The family rule? Be home before dinner. If you were within earshot of the homestead, you knew to head home when you heard the ring of the bell hung by the back door. While we were free-range kids, we knew that folks were keeping an eye out for us and would step in if we needed help. We looked out for each other to help achieve the common goal of reaching adulthood intact.

Reflecting on the ITE community, I see two distinct components: the physical space, and those who inhabit or use that space. As transportation professionals, we are what Danny Heitman of Phi Kappa Phi describes as a network of stakeholders who support one another in a common enterprise. That enterprise is helping ensure that the physical community—the space in which we live, play, and work—is as safe, effective, and productive as possible so that the human community can thrive. The ability to accomplish that goal is strengthened when we listen to all voices. As Martha White, the granddaughter of E.B. White stated, "[F]or the most satisfying sense of community, it takes all kinds of people, with a wide diversity of backgrounds, choosing to act in sync."

Do you have a community anecdote or memory to share? Reach out to me on the ITE e-Community or on Twitter: @BeverlyKuhn.

*Phi Kappa Phi, *Forum*, Winter 2021. https://bit.ly/PhiKappaPhi_Winter2021

Beverly Thompson Kuhn, Ph.D., P.E., PMP (F)
ITE International President

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director's message

Our Biggest Challenge

One of the most confounding and unexpected results of COVID-19 has been the dramatic increase in the loss of life on our nation's roadways. If you had told me at the start of the pandemic that travel would drop dramatically during this period, but fatalities would increase significantly, it would be hard to believe. Unfortunately, that is exactly what happened. In 2019, prior to the pandemic, the National Safety Council estimated that there were 39,107 motor-vehicle deaths. That increased to 42,339 in 2020, and again in 2021 to 46,020. Across this same period, the fatality rate increased from 1.20 fatalities per hundred million vehicle miles traveled in 2019, to 1.43 in 2021.

What to do? No single action or solution will reverse this trend. As a community of transportation professionals, this vexing problem requires all the tools in our toolbox. This is the essence of the Safe System Approach. ITE has championed this approach in the United States, which is built around the idea of creating a multifaceted safety net of safer users, safer vehicles, safer roads, safer speeds, and effective post-crash care.

A critical underpinning of the Safe System Approach is accepting the realities that humans will make mistakes, and that speed kills. This does not mean that we should tolerate the egregious driving behavior that's been on the rise. Enforcement is critical to addressing excessive speeds and aggressive driving. But, we also need to accept that the planning, design, and operational decisions we make every day can determine whether a mistake results in a minor crash, or the loss of life. We need to embrace design concepts that help lower speeds and increase survivability in the event of a crash. This proactive, systematic, human-centered philosophy is what distinguishes the Safe System Approach.

It was encouraging to see the U.S. Department of Transportation embrace the Safe System Approach in its recent release of their National Roadway Safety Strategy as outlined starting on page 23. This federal leadership, combined with increased financial resources, are critical for affecting change. The Infrastructure Investment and Jobs Act/Bipartisan Infrastructure Law provides funds and programs that support the advancement of the Safe System Approach. From increases across all categories of federal-aid funding, to increased emphasis on pedestrians and bicyclists as part of the Highway Safety Improvement Program, to significant discretionary funds targeted to local jurisdictions through the Safe Streets and Roadways for All Program, an unprecedented level of resources are available.

ITE is working hard to support our members through our active role in the Road to Zero Coalition, our leadership in advancing Vision Zero and the Safe System Approach, the efforts of Councils and Committees, and the wide array of professional development offerings and technical tools available through our website. Safety will be a key part of this year's ITE Annual Meeting in New Orleans, July 31-August 3, including our Plenary Panel session featuring safety leaders from the federal, state, and local levels.

While federal and national leadership are critical, the safety problem must be solved one street, one neighborhood, and one community at a time. We must do our part if we are going solve our biggest and most important transportation challenge. As always, reach out to me on the ITE e-Community or on Twitter: @JeffPaniatiITE.

Jeffrey F. Paniati, P.E. (F)
Executive Director and Chief Executive Officer

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PEOPLE IN THE PROFESSION

Obituaries

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

Robert D. Caldwell (M) of Nelson Bay, New South Wales, Australia passed away in August 2018. He was a Life Member of ITE.

Edward B. Lieberman, P.E. (M) of Islandia, NY, USA passed away on October 25, 2018. He was a Life Member of ITE.

A. Cecil Jones, P.E. (F) of Birmingham, AL, USA passed away in December 2020. He was a Life Member of ITE.

John R. Jamieson, P.E. (M) of Bondi Junction, New South Wales, Australia passed away on December 3, 2020.

James W. Ford, P.E. (F) of Newtown, CT, USA passed away on January 28, 2022. He was a Life Member of ITE.

Keith E. Fenton, P.Eng. (M) of West Vancouver, British Columbia, Canada passed away on February 11, 2022. He was a Life Member of ITE.

Jose J. Parejo, P.E., PTOE (F) of Caguas, Puerto Rico passed away in March 2022. He was a Life Member of ITE.

Ronald F. Marks (M) of Harare, Zimbabwe passed away at an unknown date. He was a Life Member of ITE.

Harry Rice (M) of Grayson, GA, USA passed away on January 16, 2022. A long-standing active member in the Georgia Section of ITE, Harry had a 40-year career in engineering and was dedicated to helping his clients. He earned a bachelor's in Civil Engineering from Auburn University and a master's in Civil Engineering and Transportation Planning from Georgia Tech, and most recently served as director of traffic engineering and transportation planning at Barge Design Solutions, Inc., where he joined in 2019. Harry enjoyed giving back to the community, including causes such as the Norcross Cooperative Ministries and Operation Christmas Child. **itej**

New Members

ITE welcomes the following new members who recently joined our community of transportation professionals.

Canada

Kanchan Maharaj, P.Eng.
Tamara Soltykevych
Jeff Hunt
Tariq Habib PMP
Jaime Thomas, P.Eng.
Sunny S. Petrujkic CEP
Ashley Donovan
Nirmalan Vijeyakumar
Tammy Lamey, P.Eng.
Heather Pugh, P.Eng.
Matthew Rushton, P.Eng.
Shane Robichaud, PTech
Aaron Jackart, PTech
Andrew Oliver, PTech
Corey M. White, P.Eng.
Roger Kierstead P.Eng.
Taylor Wood, E.I.T.
Charles Parks, PTech
Veronica Pelkey, P.Eng.
Katie Lawlor, P.Eng.
Sheldon M.Illsley, P.Eng.
Jeeshan Ahmed
Rylin Halpin
Gabriella Monagan
Muhammad Miah
Sophie Eckard
Samantha LorraineBennett, E.I.T., RSP1

Florida Puerto Rico

Subhadipto Poddar
Jeff Thompson
Ahsan Khalil
Peter Nguyen, E.I.

Global

Shane A. Turner
Parwez Jahmeerbacus
Moath Mohammad Alomari

Great Lakes

Jay Korros, P.E., PTOE
Alison Boan
James Jeninga
Nora Anderson, P.E., PTOE
Madison A. Carlson
Alan Moran
Wade Gambos
Gregory Sprungle
Duncan Schwensohn
Alejandro Chock
Tim Thomas
Nathynn James Mitchell

Mid-Colonial

Adison E. Zoretic, P.E., PTOE
Bala Akundi
Zakary T. Ruppert
Yi Zhao
Ben Hogan
Michelle Greenberg
Christopher C. Flad, P.E.
Daniel Piatt
Kevin Mullen
Dustin Chickis
Alex Fisher
Vivian Berra Figuereo, P.E.
Michelle Vrikkis, P.E.
Kimberly M. Tran, P.E.

Missouri Valley

Zachary Kane Abrams
Newman Abuissa
Eric J.Reinkemeyer P.E., PTOE
Jenifer Bates
Gary Kretlow
Craig Wood
Roxanne Seward
Bethany Waltersdorf
Brad Lauderman
Chad Lohrer

Mountain

Nick Foster, RSP1
Brian Bern P.E., PTOE
Kent Barnes
Daniel Thurgood
Travis Fast
Eric Tuin
Melanie Turner
Allison Dennett
Caryn Wascovich
Scott Newin
Joshua Barger
Scott Johnson

Northeastern

Kevin A.Williams
Michael Hattershide
Emily Bolt

Southern

Jason Richardson
Nate Prathaftakis
Jennifer Nelson
Shane McKenzie
Ricky Sizemore
Kenny Carrico
Parker Niebauer
Wannetta Mallette, PTP
John Tyler Mills
Kelli Roberts
Melvin Hill
Jeremy Borden, P.E.
Benjamin E. Nichols, P.E.
Ryan T. Roberts
Colin Alexander
Haresh Modi
Mukti Patel
Sunny Desai
Jeffery Jackson
Eric Baskerville
Christina Argo
Eliza Bigham
John Edward Callihan
Jayalakshmi Balaji, P.E.
Scott Thomson
David M.Coley

Texas

Jemal M. Ali
John Fletcher
Lauren Elizabeth Simcic
Kolter Jennings
Amber Christenson
Maysam Kiani, P.E.
Chiara Silvestri Dobrovolny

Western

David Kelly
Orooba Mohammed, P.E., PTOE
Domenic Lupo
Daniel Hendricks
Ellie Jensen
Michael Rooney
Matt Dorado
Eric Nordby
Yoshimitsu Goto
Rohit Ammanamanchi
Yuta Hagiwara
Asha Pai D'Souza
Zhongjie Chen
Jeffrey Suway
Adam Mueller

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.

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 communities beyond transportation through acts of service.

Play in the Streets: Síclovía Community Program

Síclovía is a free, bi-annual event, organized by the YMCA of Greater San Antonio in Texas, USA, that turns city streets into a safe place for exercise and play. The family-friendly event encourages residents and visitors to get out, get active, and explore their city through car-free streets. The YMCA accomplishes this by activating parks, bringing exposure to local businesses, and inviting community organizations. Participants can enjoy walking,

We want to hear from you!

Have you, your Section, or Chapter taken on a community project or provided assistance to a nonprofit 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 300 words) to Pam Goodell for inclusion in a future issue of Community Corner.

ITE Talks Transportation Podcast

New from the Thought Leadership Series

U.S. Deputy Secretary of Transportation Polly Trottenberg – National Roadway Safety Strategy, Bipartisan Infrastructure Law, and More

U.S. Deputy Secretary of Transportation Polly Trottenberg joins the *ITE Talks Transportation* podcast to discuss the Department of Transportation's newly announced National Roadway Safety Strategy, which utilizes the Safe System Approach to achieve zero fatalities and serious injuries on roadways. She also shares the administration's plans and perspective on transportation-related goals for the Infrastructure and Investment Jobs Act, as well as how equitable outcomes are a major priority for implementing this historic legislation.

All episodes available at www.ite.org/podcast/ | Subscribe for free via iTunes at http://apple.co/2hOUz8t

biking, exercise classes, activities for youth, treats for their pets, food trucks, and more. The San Antonio Transportation Department was represented at the event and asked residents what they would like to see change in their neighborhoods to make them more accessible for walking, biking, rolling, and other forms of non-motorized transportation. Since the event began in 2011, more than 1 million people have participated! **itej**

Go Green with *ITE Journal*

Not in the office to get your mail, or would you like to be more "green?" You can choose to stop the mailed delivery of *ITE Journal* by completing a quick online survey at http://bit.ly/ITEJGoGreen. You will still get the emailed version of *ITE Journal* that goes out on the first or second of each month and have full access to the digital edition. **itej**

A Unique Way to Network through the ITE Mentoring Program

Getting involved with professional organizations exposed me to people from all levels of experience in the transportation field ... I had always wondered how could I learn more about their inspirations and get guidance on how to be impactful to my society through transportation. When I found out about the mentoring program, I did not shy away from reaching out to different individuals who inspire me.

A mentor is someone you can talk to about your goals and they can help advise you on several steps towards and during your career. I find the best way to get a mentor is reaching out to people who are doing the things you do or aspire to do. People in the ITE community are always willing to share their experiences and assist students in transitioning to their dream careers. The mentoring program through the ITE community is one great way to reach out to mentors. As a student, I am always looking to learn beyond what we are taught in school. I have learned so much about leadership, communication, professional etiquette, and other soft skills from my mentors. I encourage my fellow students to take advantage of the program.
–Cecilia Kadeha

Read Cecilia's entire blog here: www.ite.org/professional-and-career-development/mentoring/

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

Get involved: www.ite.org/professional-and-career-development/mentoring/

CONGRATULATIONS TO THE NEWEST TPCB CERTIFICANTS!

The Transportation Professional Certification Board, Inc. (TPCB) and ITE congratulate the following 60 new Professional Traffic Operations Engineers (PTOEs), 13 Professional Transportation Planners (PTPs), 76 Road Safety Professionals–Level 1 (RSP1s), and 15 Road Safety Professionals–Level 2 (RSP2s, Behavioral or Infrastructure) who passed certification exams in the February 2022 exam period. To learn more about these certifications and how to apply, visit www.tpcb.org. The next application deadline for the October 2022 exam period is July 20, 2022.

PTOE

Mohammad Badrul Ahsan
Bharadwaj Bommanayakanahalli
Arisse M. Caba
Jason A. Carder
Daniel Carrera
Julia Colman
Kevin Reed Crider
Hidi Marie Criswell
Hamid Dehghan Niri
Caryl J. DeVries
Patrick Downey
Claudio Alberto Figueroa Bueno
Melissa M. Gende
Xiaocen Gui
Robert Halcomb
Zachary Handy
David Hastings
Tyler Austin Houston
Jesus Juarez
Anup Kafle
Aasish Khadka
Easa Khan
William Kresic
Beverly Thompson Kuhn
Michael Larson
Hunter W. Lemley
Adam J. Leslie
Brent David Littlejohn
Jessica Lizza
Redeat Kibret Lodamo
David Lopez
Kurtis P. Mayne
Brandon McCloskey
Garret Menard
Gautam Mistry
Scott Moeller
Orooba Mohammed
Ragab M. Mousa
Shannon Elizabeth Ness
Boniface M. Njoroge
Kristofor David Norberg
Virginia Roach O'Connor
Ameena Salim Padiath
Jaykrushna R. Patel
Milan Patel
Nikesh S. Patel
Lasaro L. Picasso
Bryan Proska
Nathan Rahaim
Erin Cope Ralovo
Amol Ranade
Nikhil Ravindra Sarwate
Michael Keith Scavo
Adam D. Selver
Douglas Philip Smith
Kevin M. Solli
Deepak Somarajan
Liming Sun
Bret Allen Taylor
Ellen Regina Webster

PTP

Lester E. Adkins, III
Robert Monroe Browning, III
Isidro Delgado
Stephen Lawrence Edwards
Rodney Gomez
Trevor Jenkins
Mary Karlsson
Justin MacDonald
Kimberly McDaniel
Corbin Kyle Peterson
Grady Padriac Vaughan
Jiangbo Yu
Daniel J. Zeggelaar

RSP1

Laurell L. Adams
Timothy Adams
Olanrewaju O. Akindipe
Ravi Arora
Tawfik Ashour
Nancy Badeau
Kelly Becker
Samantha Lorraine Bennett
Kush Hitesh Bhagat
Garrett S. Bolella
Gerald T. Bollinger
Shannon Bonilla
Challa D. Bonja
Regina Page Bowman
Steven Bronzell
Paul L. Burton
William Burton
Anagha Chethalamana Krishnan
Wai Tsun Cheung
PilJin Chun
Richard C. Coakley
John Joshua Coburn
Dane S. Coke
Sevim Coskun
David W. Craft
Patra Crenshaw
Shengfeng Deng
Ehsan Doustmohammadi
Ashley Dowell
Stephen Lawrence Edwards
Laurel Eileen Alissa Flanagan
Tahir Hameed
Diane C. Hammonds
John Jeffrey Hess
Alexandra C. Jahnle
Colleen Jaltuch
John Clark Kennedy
Hussain A. Khan
Suhasini Kilim
Paul E. Kornyoh
Xuewen Le
Corrinne Lochtefeld
Graham E. Malone
Emmanuel Marin
Taylor Christopher Marino
Amr Ali Shalkamy Mohamed
Martha L. Moore
Austin W. Obenauf
Robert Paquin
Rahul Pasawala
Amal Pazhanilam Chacko
Joshua Peterman
Kari Pucker
Christopher M. Puglisi
Brett Rice
Matthew D. Ridgway
Dylan Ridsdale
Geoffrey M. Rubendall
Derek Salomonsen
David B. Samba
Gholamreza Sayyadi
Setul Pareshbhai Shah
Jeffrey B. Shaw
Dustin J. Skilbred
Clayton Smith
Jesse E. Smith
Jerod Stanley
Pradeep Thummala
Gregory Dale Trahan
Cole G. Villalobos
Geoffrey K. Warr
Edith Wong
Hong Ming Xia

RSP1 – Saudi Arabia

Abdullah Rashed Aldausry
Ahmed Ali Ahmed AlMohammed
Omar Awadh Alshaban

RSP2 Behavioral

Paige Sophia Martz

RSP2 Infrastructure

Challa D. Bonja
Austin P. Chapman
Richard C. Coakley
Mario Dipola
Emmeth D. Duran
Nora Hallett
Vishal S. Kakkad
Tyson W. King
Francisco R. Klein
Virginia Roach O'Connor
Nathan Michael Shay
Christian R. Sternke
Ivana Vladisavljevic
Darlene Danehy Yellowhair

2022 EVENTS

TEXAS DISTRICT SPRING MEETING
May 4–6 | Corpus Christi, TX, USA

NORTHEASTERN DISTRICT ANNUAL MEETING
May 11–13 | Ithaca, NY, USA

CANADIAN DISTRICT ANNUAL MEETING
May 29–June 1 | Vancouver, BC, Canada

MOUNTAIN DISTRICT ANNUAL MEETING
June 8–10 | Boise, ID, USA

GREAT LAKES DISTRICT ANNUAL MEETING
June 20–22 | Duluth, MN, USA

WESTERN DISTRICT ANNUAL MEETING
June 26–29 | Palm Springs, CA, USA

FLORIDA PUERTO RICO DISTRICT JULY TRANSPO
July 1 | Bonita Springs, FL, USA

2022 ITE INTERNATIONAL ANNUAL MEETING AND EXHIBITION
July 31–August 3 | New Orleans, LA, USA

TEXAS DISTRICT FALL MEETING
September 7–9 | Denton, TX, USA

MISSOURI VALLEY DISTRICT FALL MEETING
October 11–13 | Kansas City, MO, 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**

Get your competitive spirit moving!

ite New Orleans 22

Join the Younger Member Committee for a self-guided adventure by *Navigating to New Orleans*!

For the next few months, leading up to the ITE Annual Meeting and Exhibition in New Orleans, participate in both virtual and in-person ITE activities to earn points and compete with other younger members as we «travel» together to New Orleans.

This is a self-paced challenge. Each ITE activity will be worth a certain amount of points, so make sure to explore the wide range of ITE events offered.

Sign up today at www.surveymonkey.com/r/MG2CPT5

A variety of prizes will be awarded to those who finish with the most points!

Learn more: www.ite.org/events-meetings/navigating-to-new-orleans/

Getting to Know ITE Headquarters Staff

We recently hired two new professionals to join the team at ITE headquarters. Read a little more about them below and get to know ITE's newest staff members.

Adam Martin, CMP, DES

ITE Senior Director of Meetings

ITE JOURNAL: **Tell us more about your professional history as a meeting planner. What drew you to the field, and what were some of your positions prior to ITE?**

MARTIN: As some meeting planners will tell you, I fell into this role by accident. I participated in my first behind the scenes role at an association event in New York City in 2006. There, I helped with registration and interacted with members for the first time. The experience of being a part of something bigger than myself solidified my desire to be in the business events industry. Since then, I have strategized events for associations related to public transportation, federal credit unions, and digital journalism. I even spent a few years supporting corporate members at one of those associations.

ITEJ: **The big Annual Meeting in New Orleans is coming up. What are you most enjoying about the planning process and looking forward to about the meeting?**

MARTIN: I have always enjoyed the "meeting of the minds" approach to planning a conference and the ITE Annual Meeting will be no different. Everyone on the team brings a skillset to the table and puts their energy into creating a wonderful experience for attendees. I'm fortunate to help mold that into something special, with the hopes that folks return and, perhaps, bring some colleagues with them! I'm looking forward to being back in a hotel planning a conference. It has been a long and arduous 3 years for most of us and a return to events, to me, is a return to normalcy that I took for granted in 2019. I want to see people get reacquainted after being apart for so long. That is one of the things that drive me to do this work.

ITEJ: **Outside of work, what are some of your passions/hobbies that you like to be involved in?**

MARTIN: I really enjoy my DC sports teams (except the football one). As a native of Washington, DC, USA, professional sports are ingrained in the local culture, and they've been a favorite pastime for me since I was a child. The photo with the tall gentleman is Gheorghe Muresan, who played several seasons with the Washington Wizards basketball team. At the time, he was the tallest active player in the NBA at 7 feet, 7 inches tall. I'm also fond of catching the next best program on streaming platforms—I love movies, music, and the occasional read. Quality time with my family and friends is my deepest passion. As Guy Lombardo says, "Enjoy yourself, it's later than you think."

Luana Broshears, Ph.D., P.E., PTOE, RSP2I (M)

ITE Planning and Safety Director

ITE JOURNAL: **How did you first get involved in the transportation field and what do you enjoy about being in the profession? Also, tell us about some of your previous positions prior to ITE.**

BROSHEARS: When I was in high school, my family moved to a remote area in Brazil for my dad's work (he was in the Brazilian Army). A new road had just started being built to connect two existing communities in the area. With the road, a new gas station was built, then a new convenience store, then new houses—entire communities were formed. I thought it was amazing how a road brought life to the area, and I knew I wanted to get involved in the transportation field. I went on to get my degree in Civil Engineering and attended graduate school with a focus in transportation. Before joining ITE, I have worked as researcher, an adjunct instructor, a consultant (traffic engineer/project manager), and as a traffic/safety engineer at a state and at a city. What I enjoy the most about being in the profession is how we can save lives by improving safety for all road users.

ITEJ: **Why did you decide to pursue your Ph.D. as well as your certifications? What value did you see in them?**

BROSHEARS: Civil Engineering is so broad—I wanted to learn more and specialize in transportation after graduating. I graduated with my bachelor's degree in Brazil and moved to the United States to attend graduate school. When I was about to finish my master's thesis, I was offered the opportunity to work on a traffic safety project. I then decided to pursue my Ph.D. so I could better understand and make contributions in the safety field. For the certifications, the motivation was similar. I always wanted to stay informed about the most recent trends and developments in transportation. Certifications bring learning and networking opportunities, since the required professional development hours motivate me to attend conferences, workshops, seminars, and other technical events. Also, having a professional certification is a way to show commitment to the profession, as well as knowledge and skills, which can be helpful in achieving career goals.

ITEJ: **Outside of work, what are some of your passions/hobbies that you like to be involved in?**

BROSHEARS: When I am not at work, you will probably see me cheering for Brazil soccer or Auburn University. If not there, I will be at a barre studio attending or teaching a class. I have been part of the barre community since 2015 and an instructor since 2020. Barre brings empowerment, positivity, and a time for me to unplug. My husband and I also love traveling and getting to know different cultures (this photo is from a trip we decided to go last minute after seeing a good deal, we spent a weekend in Greece and it was awesome). **itej**

Safety Scholar

Priyanka Alluri, Ph.D., P.E., RSP2BI (M)
Associate Professor,
Florida International University
Miami, FL, USA

Education
Ph.D., Civil Engineering
Master of Science, Civil Engineering
Clemson University
Bachelor of Science, Civil Engineering
Osmania University, India

Professional Involvement
Member, Committee on Pedestrians (ACH10), Transportation Research Board
American Society of Civil Engineers (ASCE) Young Member, ASCE Transportation Safety Committee

ITE Involvement
Faculty Advisor for the Florida International University ITE Student Chapter
Vice Chair, ITE Safety Council
Member, Professional Development Committee
Member, ITE Coordinating Council Rebrand Task Force
Mentor, *Leadership*ITE Class of 2021

Honors and Awards
*Leadership*ITE Alumna – Class of 2020
ITE District Rising Star – Florida Puerto Rico District, 2020

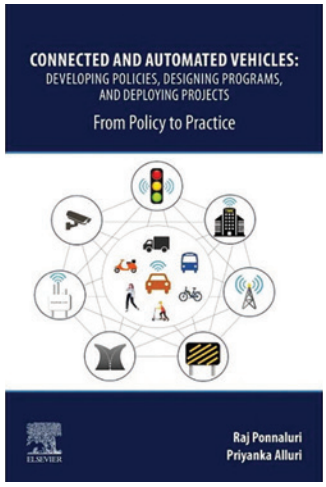
Did You Know?
Priyanka co-authored the book *Connected and Automated Vehicles: Developing Policies, Designing Programs, and Deploying Projects - From Policy to Practice.*

ITE JOURNAL: **How has the teaching of safety evolved over the past 10 years you've been in academics? What are some of the newest and most effective approaches to addressing transportation safety that you convey to your students?**

ALLURI: Traffic safety, just like any other field, has evolved over the last few years. As I reflect on my decade-long academic career, I have personally seen the paradigm shift in thought and how we view and perceive highway safety. We have slowly and systematically moved from being reactive to proactive. We no longer wait for crashes to happen; we now focus on near-misses, traffic conflicts, and predictive analytics. We have moved from blaming the driver to accepting that humans make mistakes. We have begun to truly believe in the Safe System Approach and embrace Vision Zero. We have moved from being defensive about our roadway designs to designing forgiving systems. We have begun to acknowledge the role emerging technologies play in improving safety. We have moved from putting cars at the center of our design to being inclusive of other modes. We have begun to appreciate interdisciplinary perspectives in achieving a safe, efficient, sustainable, and equitable transportation system.

ITEJ: You co-authored a book with Dr. Raj Ponnaluri, P.E., PTOE (M) on connected and automated vehicles (CAV). How do you see the impact of these vehicles shaping safety and the transportation system in the next decade?

ALLURI: I am very excited about the future of our profession, especially the opportunities to improve safety by reducing the frequency and severity of traffic crashes. I believe that we are at the cusp of the next big thing in transportation, particularly in mitigating crashes, improving mobility, driving economic development, and enhancing environmental quality. While the last few decades have seen an increased focus on the traditional transportation engineering practices and safety improvements, I believe that the emerging technologies and CAVs have the potential to provide tangible outcomes, especially with respect to *Safety*, *Mobility*, *Environment,* and *Economic Development* (*SMEEd*). These technological advancements have the potential to equip various road users with the means to help mitigate mobility and safety concerns. More than ever, there is now a need to believe in and explore the deployment of emerging technologies and CAV applications. Now is the time to move in full gear; a safer and more resilient transportation system is closer than we think.



ITEJ: **You've achieved the Road Safety Professional (RSP) certification in both behavioral and infrastructure areas. Why was obtaining these certifications important to you? How do you feel it will advance your career?**

ALLURI: I commend ITE and the Transportation Professional Certification Board (TPCB) for taking such a significant step in recognizing road safety as a profession. The RSP certification, especially Level 2, recognizes the expertise in safety from two broad domains, engineering and behavior. I am honored to earn my RSP2 certification in both behavioral and infrastructure areas. I believe that these certifications helped me ensure that I maintain a high level of knowledge and skill in highway safety. I want to lead by example. As a university faculty member

who teaches a graduate-level safety course, I believe that this certification has kept my professional skills updated, has improved my teaching quality, and raised my self-confidence. As a researcher who conducts research in highway safety, I trust that my credentials are a subtle reminder of my competence and my willingness to continue to expand my knowledge on safety. As a Vice Chair of the ITE Safety Council, I feel that my RSP2BI certification helps me advocate for this certification and practice what I preach. To me, it's a small personal accomplishment.

ITEJ: **You are a *Leadership*ITE alumna, a District Rising Star, and are currently serving as Vice Chair of the ITE Safety Council. What do you enjoy about being a volunteer leader within ITE, and how has being involved in the organization shaped your career so far?**

ALLURI: I was drawn to ITE since I was a graduate student at Clemson University. My involvement with ITE has only continued to grow since then. As Paulo Coelho stated, "… *And, when you want something, all the universe conspires in helping you to achieve it*…." For me, becoming a part of the ITE family did not happen by chance or without any support. I have found several passionate mentors along the way who helped me find my place in ITE. When I felt lost, there was always someone who showed me the path. I have begun to just trust where I am. As I reflect on my journey thus far, I have realized that ITE has given me so much. It has helped me become a better teacher, mentor, professional, colleague, and leader. I sincerely believe that it's time for me to give back, and there is no better way than to serve ITE in whatever capacity I can. **itej**

Fun Fact

Priyanka recently became obsessed with fitness, and recently started running. She already has a couple of half marathons under her belt –and is looking forward to running the 2023 Miami Marathon.

North Central Section of ITE—Supporting Students and Younger Members

The North Central Section of ITE (NCITE), part of the Great Lakes District, understands the value and importance of recruiting and retaining younger members for current and future health of the organization. The Section's Younger Member Committee (YMC) is incredibly active. The purpose of the YMC is to connect young professionals in the diverse field of transportation and create opportunities to build relationships and grow professionally. These opportunities are provided through social and educational events held throughout the year. This committee additionally seeks to fulfill the following goals:

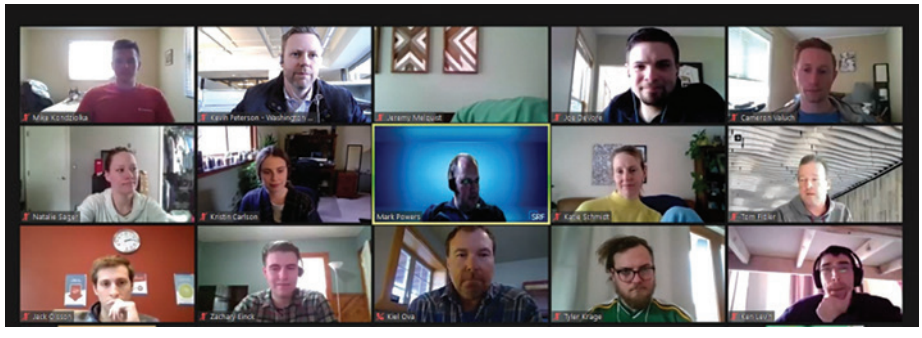
- Promote engagement in the NCITE mentorship program, which aims to assist younger members as they progress through their careers.
- Connect with university students and build relationships with individuals who are potential future members of NCITE.
- Promote engagement in the NCITE Technical Committees to encourage professional development and provide opportunities for younger members to share their ideas.
- Coordinate with the NCITE Membership Committee to promote membership in NCITE and track YMC membership.
- The YMC began a Professional Engineer Exam Study group in 2019 that continues to be active today.

NCITE also supported the Duluth Transportation Student Organization by hosting a Section Meeting at the University of Minnesota Duluth.

Student Chapter activity is also helping to engage student members and recruit new members from this population to the Section. NCITE has three Student Outreach Coordinators. Their responsibilities include managing the student scholarship programs, attending student career fair events, participating in the Great Lakes District Student Activities Committee, and serving as a liaison for ITE Student Chapter groups to coordinate funding opportunities, participation of such groups in District annual meetings, and their interaction with ITE headquarters.

NCITE, by policy, supports student attendance at Section events by offering reduced registration costs. They typically plan to have at least one of their Section meetings hosted by the University of Minnesota's Interdisciplinary Transportation Student Organization (ITSO). This provides students a better opportunity to participate in the meeting and learn about NCITE. To encourage students to become involved in ITE, NCITE annually awards four scholarships valued up to $1,000, and two of those scholarships are dedicated to a student who completed a transportation-related internship.

NCITE Student Outreach Coordinators award a Student Scholarship at the 2021 NCITE Annual Meeting.



Virtual NCITE Section Meeting.

Technical Committees are a unique feature of NCITE and a point of pride for the Section. They allow transportation specialists to bring up-to-the-minute information to their members through committee meetings. Below is a summary of the committees and their roles within NCITE:

Technical Committee	Role	Chair(s)
Geometric Design	Establishes a forum for NCITE members to share, discuss, and explore the traffic operations and safety effects of roadway design elements.	Vacant
Emerging Technologies in Transportation (ETT)	Re-branded in 2021 and formerly known as the ITS Committee, the ETT Committee provides a forum for participants to address technical issues related to developing technology in the industry (ITS, CAV, Big Data, etc.) and to share lessons learned. This Committee works jointly with ITS-MN.	Jake Eisinger (M), Zach Parsons
Intersection Traffic Control	A forum for NCITE members to discuss issues related to traffic signal design and operation.	Benjamin Brasser (M)
Planning Methods & Applications	The purpose of this committee is to discuss and author NCITE standards of practice relating to issues in the transportation planning field.	Krista Anderson, Charles Gorugantula
Complete Streets and Safety (CSS)	A forum for NCITE members to discuss issues related to improving safety and mobility for everyone, with an emphasis on vulnerable road users (VRUs), transit riders, and multimodal transportation systems.	Hannah Johnson (M), Sarah Irmen (M)
Simulation & Capacity Analysis (SimCap)	A forum for analysis methods with the intention of developing best practices for traffic modeling in the region.	Michael Kondziolka, P.E., PTOE (M), Kelsey Retherford (M)
Traffic Operations and Maintenance	A forum for operations and maintenance staff to discuss best practices, tips, and ideas.	Greg Boche

To help fund the Section, NCITE has set up a robust sponsorship program. The Section provides three different advertising packages for their agency/vendor partners. The Bronze package provides the specific sponsor a business card newsletter ad, a company spotlight in the Annual Meeting Presentation, a sponsor logo on webpage with a link to the company website, and one free job posting. The Silver package provides the benefits of the Bronze package but with the addition of a quarterly newsletter article. The Gold package provides the benefits of the Silver package with the addition of a project picture on the NCITE website. The Section's advertising packages are very popular and sell out annually.

When COVID hit, NCITE was extremely well positioned for the switch from in-person to virtual Section meetings, as the group was already live-streaming most events. The Section has found that the switch to being entirely virtual has opened their meetings up to a broader audience, dramatically increasing attendance. To integrate networking opportunities into their virtual meetings, NCITE incorporated 5-minute breakout sessions for introductions and to answer a "question of the day."

North Central Section of ITE

Great Lakes District

Membership

Approximately 500 members

Board Members

President – **Natalie J. Sager, P.E. (M)**
Vice President – **Jeremy M. Melquist, P.E., PTOE (M)**
Secretary – **Philip N. Kulis, PTOE, RSP2I (M)**
Treasurer – **Niklas H. Costello, P.E. (M)**
Past President – **Kevin M. Peterson, P.E. (M)**
Director – **KC Atkins, P.E. (M)**
Director – **Justin D. Sebens, P.E. (M)**
District Representative – **Nicholas J. Erpelding, P.E., PTOE (M)**

Committee Leadership

Advertising – **Nick Grage, P.E., PTOE, RSP1 (M)**
Newsletter – **Cortney Falero (M)**
Website – **Jonah Finkelstein**
Social Media – **Tyler Krage, P.E., PTOE (M)**
Technology – **Jordan Schwarze, P.E., RSP1 (M)**
Membership – **Jack Olsson, P.E. (M)**
Student Outreach – **Ann Stewart (M), Chad Jorgenson, P.E., PTOE (M), Eden Rogers (M)**
MUTCD Liaison – **Joe Gustafson, P.E., PTOE (M)**
Professional Development – **Joe Devore, P.E., PTOE, RSP2I (M)**
Younger Member – **Cameron Valuch (M), Michael Odell (M)**

Special Awards and Scholarships

NCITE annually awards the following: Transportation Professional of the Year, Young Transportation Professional of the Year, and the Project Transportation Achievement Award. In addition, the Section gives out four Student Scholarships.

Student Chapters

NCITE has four Student Chapters: Interdisciplinary Transportation Student Organization (University of Minnesota Student Chapter), University of Minnesota Duluth, North Dakota State University, and South Dakota State University.

Since COVID-19, the Section's first in-person meetings were the 2021 Summer Social at Walker Art Center and 2021 Annual Meeting at Park Tavern, both attended by approximately 55 people. Some of the Section's committees have been meeting in-person as well. NCITE hasn't had an in-person Section meeting since early 2020; however, NCITE planned a gathering for April 2022, hoping to attract members with a hot breakfast at a local restaurant. A virtual option will be provided for all in-person Section meetings to continue to allow flexibility for members.

With an active Younger Member Committee, strong student recruitment and retention efforts, a robust sponsorship program, and plans to continue to offer hybrid event options, NCITE is poised for continued success as they come back from the interruptions of the COVID-19 pandemic. **itej**

ite
A Community of Transportation Professionals

Receive the Emails You Want from ITE!

With the work-from-home environment created by the pandemic and recent malware incursions, many organizations, including ITE, and email providers have increased security and imposed stronger filters. In some cases, this means you may no longer be receiving ITE emails outside of ITE's e-Community. As a result, you may be missing information and updates from ITE. These emails focus on professional development opportunities, new technical resources, upcoming meetings and conferences, and other critical information that helps you stay engaged with ITE and make the most of your membership.

Are You Getting Our Emails? If our emails are not showing up in your inbox, the first step is to check your junk/spam folders. You can search on the email info@ite.org. You can select on one of the emails and indicate it is not junk. Moving forward these emails should appear in your inbox.

If you've checked your inbox and spam/junk mail folders and do not see any email from ITE, it could be that security features are preventing our emails getting through to you. To receive the ITE emails, you can add info@ite.org to your contacts or work with your email provider or with your IT team to whitelist both the email info@ite.org and the IP address 205.201.41.40.

Now That You're Getting Our Emails, How Do You Only Receive What Is of Most Interest to You? We get it. Our job is to make sure we inform our members. But we know that maybe not everything we send is of interest or relevant to you. We have given you two ways to indicate your preferences. (Note: there are certain emails, including dues renewal and critical emails about business operations, that you will receive regardless of your preferences.)

1. **Change your preferences in your profile:**
   - Go to www.ite.org
   - Click on Connect (menu item to the far right)
   - Click on My Profile
   - Log in with your member credentials (*if you need assistance with your credentials, please email membership@ite.org. Do not create a new account.*)
   - Select on the Communication Opt-Out
   - Follow the instructions to select the type of communications you would like to receive

2. **Use the survey at https://bit.ly/ITEemailsurvey to indicate the type of communications you would like to receive.**

How Do e-Community Emails Differ from ITE-generated Emails? If you are part of any e-Community, including All Member Forum, you may receive emails when someone posts to that e-Community. You are able to choose if you receive those emails and when you receive them. Please follow the instructions below:

1. Log into ITE e-Community (if you aren't already in e-Community while reading this message)
2. In the upper right-hand corner, click on the downward-facing triangle
3. Select profile
4. Click on My Communities and select Communities from the drop-down menu
5. Select the Community
6. Click settings (this is to the right of the name of the group)
7. There will be a pop-up that includes email notifications and how you are receiving notifications from that group. The options are real-time (when posts are made), daily digest (emails once a day with all posts to the community), plain text, or no email.
8. Click on your preferred notification mode
9. You will need to do this for each e-Community you have joined

If you have any questions, please reach out to ITE's Membership Team at membership@ite.org.

ite Learning HUB

ITE Partners with McTrans Center

ITE has established a new partnership with the McTrans Center at the University of Florida Transportation Institute (UFTI). The McTrans Center (UFTI) is a unique organization of university and industry partners working to further the goals of safety and reliability in the transportation system through training and education in transportation technology. Its primary mission is to educate professionals in the use of the Highway Capacity Software (HCS) tool.
The ITE and McTrans partnership provides ITE members access to selected McTrans offerings at a 20 percent discount by registering through ITE.

Transportation Equity Certification

The Transportation Equity (TE) Certification training provided by McTrans Center helps transportation professionals, policymakers, and project managers gain an insightful perspective of equity implications, tools to identify implications of inequities and uplift equity, methods to design an inclusive engagement process to collaborate with communities overburdened with health and social inequities, and strategies to mitigate potential adverse impacts.

Transportation Equity III:
Transit Planning for Equity Outcomes
Session 2: May 3, 2022 | 1:00 pm - 5:30 p.m. ET

Transportation Equity I:
Equitable Mobility and Effective Engagement
June 15-16, 2022 |1:00 – 5:30 p.m. EDT

For more information on each of the certification applicable courses, please visit the ITE Learning Hub to learn more and register.

Webinars

Signal Timing Corridor Management – Part 1 (Traditional Synchronization)
Thursday, May 12 | 2:00 – 3:30 p.m. ET **1.5 PDHs***
Led by the ITE Traffic Engineering Council

Strengthening Communication between Consultants and Clients
Tuesday, May 17 | 2:00 – 3:00 p.m. ET **1.0 PDHs***
Led by the ITE Consultants Council

Reminder of New ITE PDH Certificate Policy:
All ITE individual live webinars are free to members to attend. Professional development hours (PDHs) are not included in registration; there will continue to be a $20 processing fee for those seeking professional development hours. Please see the PDH Credit Certificate section on each webinar course page for more information on receiving PDHs.

On-Demand Webinars

COVID Impacts in Australia/New Zealand
Last Day to Register: May 10

Digital Badge Program - Advancing STEM Education Through Transportation Studies (ASETTS)
Last Day to Register: May 31

Roundabout Education and Enforcement of Operations in the United States
Last Day to Register: June 7

The Relationship between Freight Movements and Land Use in Urban Areas
Last Day to Register: June 12

Vehicle Miles Traveled As a Measure of Sustainability
Last Day to Register: June 14

Shutterstock/Pozdeyev Vitaly

National Roadway Safety Strategy:

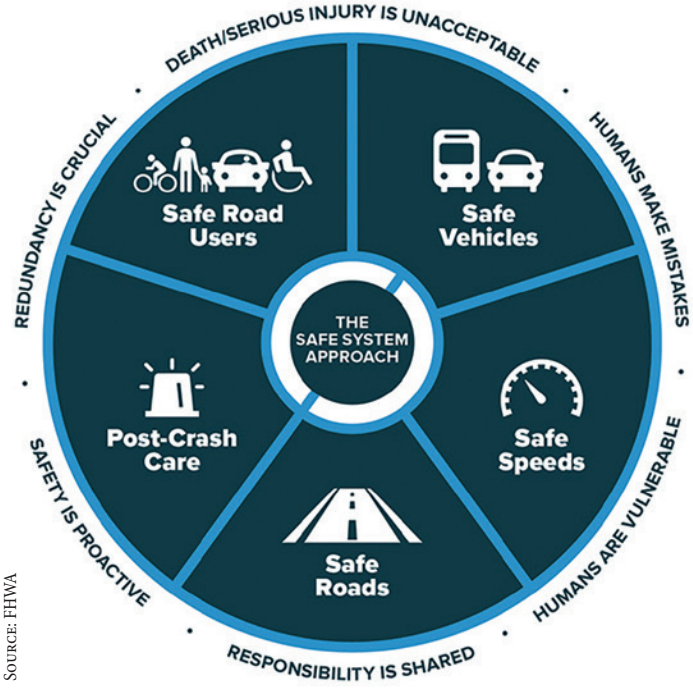
USDOT Adopts the Safe System Approach

In January of this year, the U.S. Department of Transportation (USDOT) announced a major strategy to take meaningful steps over the next few years to reduce the number of fatalities and serious injuries on the America's roadways and move toward achieving the goal of zero roadway fatalities and serious injuries on U.S. road networks by 2050. The National Roadway Safety Strategy (NRSS) is a department-wide adoption of the Safe System Approach that identifies significant actions that USDOT will undertake, working with stakeholders across the country, to achieve the department's vision for roadway safety.

In this article, we provide an overview of the Safe System Approach concepts, the key elements of the USDOT's NRSS, and highlight the resources available from ITE to support the implementation of the Safe System Approach at the state and local level.

Safe System Approach Concepts

Traditionally, responsibility has been placed largely on the user for driving safely (or walking, or biking, etc.), unimpaired and without distractions. The Safe System Approach as shown in Figure 1 recognizes that creating a safe environment requires safer users, safer vehicles, safer roadways, safer speeds, and effective post-crash care.



Source: FHWA

Figure 1. The Safe System Approach principles and elements.

Using a Safe System Approach, specific roadway and vehicle design techniques can be used to help prevent crashes, or reduce the severity of injuries should a crash occur. Embracing a Safe System Approach 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 Approach takes these two concepts and uses them as a basis for providing practitioners with a methodology and tools for applying them in practice.

Summary of the National Roadway Safety Strategy

For the purposes of this article, much of the language below and the graphics are taken directly or indirectly from the NRSS document, available on the USDOT website at www.transportation.gov/NRSS.

At the heart of the NRSS is a vision and goal for the safety of the nation's roadways, adoption of the Safe System Approach principles to guide safety actions, and identification of critical and significant actions USDOT will take in pursuit of five core objectives: Safer People, Safer Roads, Safer Vehicles, Safer Speeds, and Post-Crash Care. The NRSS highlights new priority actions that target what USDOT sees as the most significant and urgent problems, as well as highlights notable changes to existing practices and approaches. USDOT notes in its strategy that the recent passage of the Infrastructure Investment and Jobs Act, or Bipartisan Infrastructure Law, will support the funding, program, and policy provisions described in the NRSS safety actions.

Safe System Approach

In the NRSS, USDOT adopts the Safe System Approach as the guiding paradigm to address roadway safety. The Safe System Approach and this roadway safety policy are inclusive of all road users in all communities and the many people who use roads and streets outside of motor vehicles. Just as the needs of people change and how they move evolves over time, how the department implements the Safe System Approach will be iterative and will adapt to how people use the nation's highways, roads, and streets. The department will work to ensure the goal of reaching zero roadway fatalities and the principles of an integrated Safe System Approach are part of the implementation of all USDOT program activities that affect the nation's roadways.

Opportunities to Simultaneously Address Safety, Equity, and Climate

Safety is and will always be USDOT's top priority. Roadway safety is also a foundational prerequisite to the department's success in addressing two other major priorities: equity and climate.

Equity: To achieve zero roadway fatalities and a transportation system that is safe for all users, all actors in our transportation system must acknowledge and address historic and ongoing inequities. Under the Safe System Approach, efforts to make our roads safer should affirmatively improve equity outcomes. The department will advance equity as an instrumental component of transportation safety and convene key stakeholders—government at all levels, law enforcement, advocacy, community organizations, and the general public—to develop both a better understanding of the intersection of equity and roadway safety, and a comprehensive

approach to incorporating equity into all of the Department's efforts to achieve zero roadway fatalities and serious injuries.

Climate Change and Safety: As climate change continues to reshape our environment, its future effects on roadway safety will need to be taken into account. The climate, health, and other co-benefits of safety improvements on our roadways and in the surrounding environment are substantial, and further support the benefits of a focused roadway safety effort. Improved safety on our roadways is also needed to support one critical component of strategies to achieve transportation greenhouse gas reductions goals: increased use of transit, walking, rolling, and riding. Yet people walking and biking suffer disproportionately from serious injuries and fatalities when a crash occurs compared to people in vehicles. The climate, health, and other co-benefits of safety improvements on our roadways and in the surrounding environment are substantial, and further support the benefits of a focused roadway safety effort.

National Roadway Safety Strategy Core Objectives

In the NRSS, the five core objectives—Safer People, Safer Roads, Safter Vehicles, Safer Speeds, and Post-Crash Care—are each accompanied by a set of key departmental actions that will help USDOT meet the safety goals. These objectives can be viewed on USDOT's website at the links below.

Safer People

The safety of people is USDOT's core mission. Enabling people to be safer includes actions to encourage safer behaviors among the driving public, commercial drivers, and all road users. People generally use the roadway system in a safe manner on any given trip, but mistakes, lapses in judgement, and other more significant risky behaviors still occur. The three most frequent and persistent behavioral safety factors in fatal crashes are people in motor vehicles not wearing seat belts, driving while impaired from alcohol, and speeding. Through the NRSS, the department will focus on using all available tools, including education, outreach, engineering solutions, and enforcement to address persistent behavioral safety issues. A robust and comprehensive approach to influencing human behavior also requires deepening our understanding of underlying causes through research. **View the key objectives at www.transportation.gov/NRSS/SaferPeople.**

Safer Roads

Roadway design strongly influences how people use roadways. The environment around the roadway system—including land use and the intersections of highways, roads, and streets with other transportation modes such as rail and transit—also shapes the safety risks borne by the traveling public. The Safe System Approach emphasizes that redundancy is critical, and safer roadways mean incorporating design elements that offer layers of protection to prevent crashes from occurring, and mitigate harm when they do occur. Through the NRSS, the department will focus on advancing infrastructure design and interventions that will significantly enhance roadway safety. **View the key objectives at www.transportation.gov/NRSS/SaferRoads.**

Safer Vehicles

The role of vehicle safety performance in avoiding or mitigating the harm of crashes cannot be overstated. Seat belts and air bags, for example, prevented an estimated 425,000 fatalities in traffic crashes since they were first required through regulatory requirements called the Federal Motor Vehicle Safety Standards (FMVSS). Enabling safer vehicles also means employing strategies to improve the safety of the commercial motor vehicles that transport goods and carry thousands of passengers locally and across the country every day. Through the NRSS, the department will continue to leverage enhanced motor vehicle safety performance and technologies to improve safety for vehicle occupants, and other road users too. **View the key objectives at www.transportation.gov/NRSS/SaferVehicles.**

Safer Speeds

The department believes it is important to prioritize safety and moving individuals at safe speeds. Speeding increases both the frequency and severity of crashes, yet it is both persistent and largely accepted as the norm amongst the traveling public. Unsafe speeds are now a well-documented and understood factor in death and injury, especially among people outside of a vehicle. In alignment with the Safe System Approach, achieving safe speeds requires a multi-faceted approach that leverages road design and other infrastructure interventions, speed limit setting, education, and enforcement. Roadway design and other infrastructure factors play a significant role in managing speeds and can deter excessive speeding behaviors from occurring in the first place. **View the key objectives at www.transportation.gov/NRSS/SaferSpeeds.**

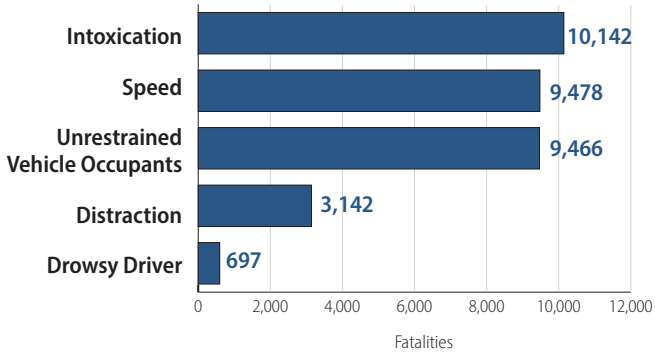
Post-Crash Care

Our ability to save lives does not end when a crash occurs. Caring for people injured in a crash to prevent their injuries from becoming fatal is just as critical. The timing of the arrival of ambulances and emergency responders is a major factor in whether an injured person survives a crash, and crash location is a major determinant of response time. Our ability to save lives does not end when a crash occurs. Caring for people injured in a crash to prevent their injuries from becoming fatal is just as critical. The timing of the arrival of ambulances and emergency responders is a major factor in whether an injured person survives a crash, and crash location is a major determinant of response time. **View the key objectives at www.transportation.gov/NRSS/PostCrashCare.**

Core Objectives

SAFER PEOPLE: Encourage safe, responsible behavior by people who use our roads and create conditions that prioritize their ability to reach their destination unharmed.

2019 Fatalities Involving Risky Behaviors



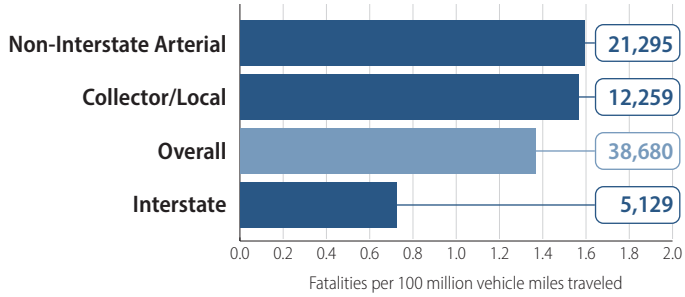
SAFER ROADS: Design roadway environments to mitigate human mistakes and account for injury tolerances, to encourage safer behaviors, and to facilitate safe travel by the most vulnerable users.

Fatality Rate by Roadway Function Class

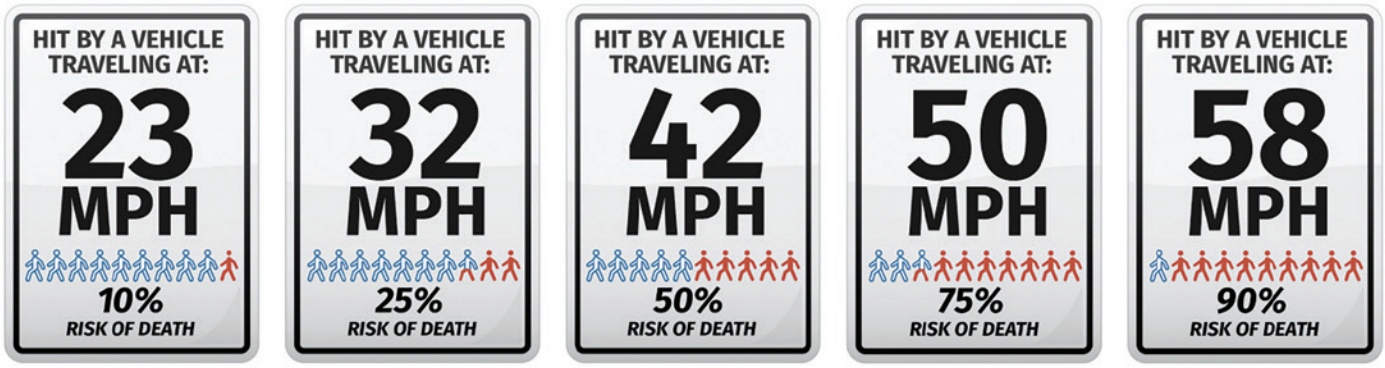
(2020, early estimates)

Total Roadway Fatalities

(2020, early estimates)



SAFER SPEEDS: Promote safer speeds in all roadway environments through a combination of thoughtful, context-appropriate roadway design, targeted education and outreach campaigns, and enforcement.



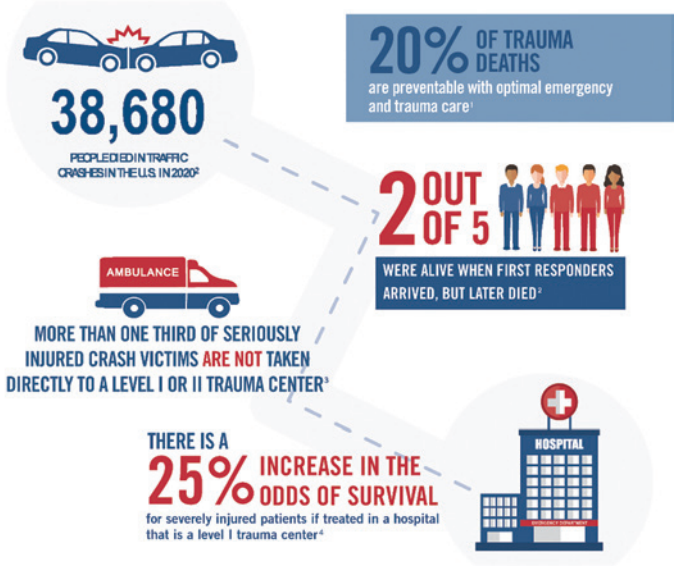
SAFER VEHICLES: Expand the availability of vehicle systems and features that help to prevent crashes and minimize the impact of crashes on both occupants and non-occupants.

Lives Saved by Vehicle Safety Technologies, 1960–2012

FMVSS Number and Topic	Lives Saved, 1960-2012
208/209/2010 Seat belts	329,715
203/204 Energy-absorbing steering assemblies	79,989
208 Frontal air bags	42,856
206 Door locks, latches, and hinges	42,135
201 Occupant protection in interior impact	34,477
214 Side impact protection (incl. side air bags)	32,288
105/135 Dual master cylinders/front disc brakes	18,350
213 Child safety seats	9,891
212 Adhesive windshield bonding	9,853
126 Electronic Stability Control	6,169
216 Roof crush resistance	4,913
108 Trailer conspicuity tape	2,660
226 Rollover curtains	178
301 Fuel system integrity	26
Total	**613,500**

Source: Kahane, C. J. (2015, January). Lives saved by vehicle safety technologies and associated Federal Motor Vehicle Safety Standards, 1960 to 2012 – Passenger cars and LTVs – With reviews of 26 FMVSS and the effectiveness of their associated safety technologies in reducing fatalities, injuries, and crashes. (Report No. DOT HS 812 069). Washington, DC: National Highway Traffic Safety Administration.

POST-CRASH CARE: Promote safer speeds in all roadway environments through a combination of thoughtful, context-appropriate roadway design, targeted education and outreach campaigns, and enforcement.



ITE and the Safe System Approach

ITE applauds USDOT on its announcement of the NRSS, and has been a strong and consistent champion for Vision Zero and a national leader in the advancement of the Safe System Approach. The principles of this approach represent a shift in how transportation professionals think about road-related crashes, injuries, and fatalities. 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.

ITE was a founding member of the Road to Zero Coalition (RTZ), established in 2016 through the leadership of USDOT and the National Safety Council (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 nonprofit organizations. ITE is also a member of the RTZ Steering Committee.

Prioritizing Safety

ITE has guided Coalition efforts to prioritize safety and advanced the Safe System Approach. Under ITE's leadership, a Prioritizing Safety Steering Committee and two working groups were formed—one on Safety Culture and a second on the Safe System Approach. 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. 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.

Safe System Technical Resource Page

The Safe System working group conducted a literature review in 2019 that led to the release of a Safe System Technical Resource page, available at www.ite.org/technical-resources/topics/safe-systems. This page provides resources with initial guidance for implementing the Safe System Approach in the United States. Many of the resources are international documents that have guided success towards reducing serious injury and fatalities on roads in other countries.

Speed Management Resources

In collaboration with the Vision Zero Network, ITE received a RTZ Coalition grant in 2018 to advance speed management within the context of a Safe System Approach in the United States. Through this grant, ITE developed a variety of tools and resources to support a Safe System Approach to focusing on speed as a safety problem, setting appropriate speed limits, measures for managing speed, and developing a speed management program. The resource hub is available online at www.ite.org/technical-resources/topics/speed-management-for-safety. The project included development of a workshop covering these topics that was offered in Austin, TX and Durham, NC during the grant, and in three communities in California in 2021.

Safe System Strategic Plan

ITE partnered with FHWA in developing the *Safe System Strategic Plan*, which provides a roadmap for the advancement of the Safe System Approach in the United States. It describes the Safe System Approach, discusses the process involved in building the plan, outlines how to advance a Safe System mindset, and describes steps necessary to implement Safe System practices within the nation's transportation community. ITE is currently working with FHWA on two follow-up activities focused on Speed Management and the Safe System Approach for the Urban Core.

Recommendations of the Safe System Consortium

In 2021, ITE worked with the Center for Injury Research and Policy at Johns Hopkins University, with support from the FIA Foundation, to make recommendations to Congress and the Biden Administration that can move the United States towards achieving Vision Zero, while supporting a more equitable transportation system. Consortium members identified three areas for change: safety across the system, equity by investment, and progress by design. The results were published in the *Recommendations of the Safe System Consortium* report, which can be accessed at http://bit.ly/SafeSystemConsortium.

Conclusion

Together, we must all strive for zero roadway fatalities. Zero is the only acceptable number of deaths on our highways, roads, and streets. Both USDOT and ITE are committed to taking substantial, comprehensive action to significantly reduce serious and fatal injuries on the nation's roadways. However, no one will reach this goal acting alone. Reaching zero will require all transportation professionals to work with all roadway transportation stakeholders—including the American people—to lead a significant cultural shift that treats roadway deaths as unacceptable and preventable. **itej**

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Vision Zero and Results-Based Financing of Safe System Action Worldwide

By Rob McInerney

Figure 1. Global Plan – Decade of Action for Road Safety 2021-2030 infographic.[2]

The United Nations (UN) will hold the first ever global high-level meeting on Global Road Safety at the UN Headquarters in New York, NY, USA on June 30-July 1 this year.[1] Why? Sadly, road crashes are the largest killer of young people worldwide. An estimated 1.3 million people are killed each year on the world's roads and an additional 50 million people suffer life-altering injuries.[2] The injuries include severe brain injury, quadriplegia, limb fractures, amputations, and degloving that add an estimated $6 billion USD of new lifetime costs to families, as well as to the health, welfare, and insurance sectors every day.[3]

The individuals and families impacted cannot afford the cost of road trauma. Companies cannot afford the impact on their staff, their businesses, and their reputations. Governments cannot afford to let the road safety crisis continue to bleed an estimated 2-7 percent of GDP from their economies.[3] For this reason, global leaders will gather in New York to discuss how mobilizing a Decade of Action and Delivery will ensure that UN Sustainable Development Goal 3.6 to halve road deaths and serious injuries will be met alongside Goal 11.2 to ensure safe and sustainable cities.[4]

The Global Plan for the Decade of Action 2021-2030

The UN General Assembly resolution 74/299 "Improving global road safety" designated 2021-2030 as the second Decade of Action for Road Safety with the target to reduce road traffic deaths and serious injuries by at least 50 percent by 2030. The World Health Organization and the UN Regional Commissions, in cooperation with the UN Road Safety Collaboration, have developed *A Global Plan for the Decade of Action* that recognizes business as usual is not sufficient and new, bold, and decisive action is needed (refer to Figure 1).[2]

The Global Plan calls on all governments and road industry stakeholders to prioritize and implement a Safe System Approach that makes safety a core value and safe mobility a human right. Similar to the recent USDOT National Roadway Safety Strategy, the Safe System Approach defined in the Global Plan is one that:

- "Anticipates and accommodates human errors;
- Incorporates road and vehicle designs that limit crash forces to levels that are within human tolerance to prevent death or serious injury;
- Motivates those who design and maintain the roads, manufacture vehicles, and administer safety programs to share responsibility for safety with road users, so that when a crash occurs, remedies are sought throughout the system, rather than solely blaming the driver or other road users;
- Pursues a commitment to proactive and continuous improvement of roads and vehicles so that the entire system is made safe rather than just locations or situations where crashes last occurred; and
- Adheres to the underlying premise that the transport system should produce zero deaths or serious injuries and that safety should not be compromised for the sake of other factors such as cost or the desire for faster transport times."[6, 2]

As highlighted in the Global Plan, there must be a fundamental shift from designing to standards to designing for desired outcomes. The Safe System Approach and Vision Zero challenge our historical and current thinking, asking us to work across all elements of the system to ensure that no one is killed or injured on our streets, roads, and highways. No child, no worker, no mother, no father. No one from your family, and no one from mine.[7]

The Global Plan recommends actions across a range of transportation elements, including multimodal transport and land-use planning, safe road infrastructure, vehicle safety, safe road use, and post-crash response. The plan also outlines critical areas for implementing safer roadways, including financing, legal frameworks, speed management, ensuring a gender perspective in transport planning, adapting technologies, and a specific focus on low- and middle-income countries. A shared responsibility is recognized, as is the essential need for constant monitoring and evaluation for the plan to be successful.

The Global Road Safety Performance Targets

The Global Plan also outlines 12 Global Road Safety Performance Targets adopted by Member States in 2017. The reference to star ratings below are based on road inspection data and provide a simple and objective measure of the level of safety which is "built-in" to the road for vehicle occupants, motorcyclists, bicyclists, and pedestrians. Five-star roads are the safest, while one-star roads are the least safe.

From the Global Plan, of particular interest to transportation professionals engaged in the road sector are:

- Target 3: By 2030, all new roads achieve technical standards for all road users that account for road safety, or meet a three-star rating or better.

- Target 4: By 2030, more than 75 percent of travel on existing roads is on roads that meet technical standards for all road users that take into account road safety.
- Target 5: By 2030, 100 percent of new (defined as produced, sold, or imported) and used vehicles meet high quality safety standards, such as the recommended priority UN Regulations, Global Technical Regulations, or equivalent recognized national performance requirements.

Vision Zero and Global Safe System Action

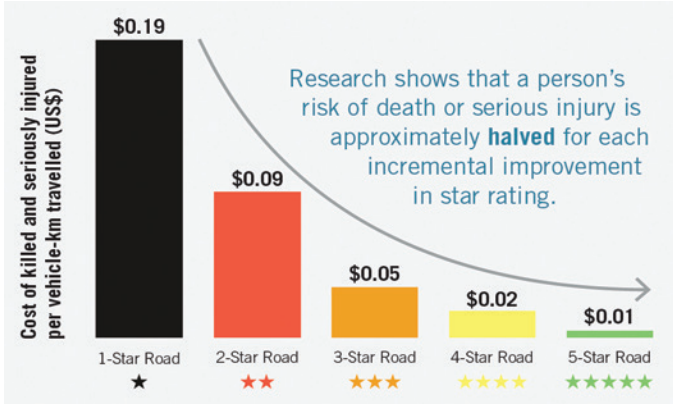
Vision Zero and the Safe System Approach ultimately extend beyond these 2030 targets and call for more ambitious action that ultimately delivers zero road death and injury. Many countries have now officially set Vision Zero targets for 2050 or similar timeframes (i.e., Australia, European Union), and Safe System stakeholders are increasingly working together to design a system where no one is killed.[8-10]

The International Transport Forum of the OECD (ITF) has a long history in leading the call for adoption of a Safe System Approach by all countries. The *Towards Zero: Ambitious Road Safety Targets and the Safe System Approach* report set the scene for global action in 2008, with the 2016 follow-up report *Zero Road Deaths and Serious Injuries* outlining a fundamental rethink of the governance and implementation of road safety.[11] A new ITF Safe System report will be released in 2022 that provides experience-based guidance on implementing the Safe System Approach, particularly in low- and middle-income countries where most road deaths and serious injuries occur. The report will include an analysis of 17 case studies and proposes a framework for defining and assessing Safe System interventions.

Belin, et.al, 2022 provided a valuable summary of Safe System implementation across the world, drawing on examples from Sweden, Australia, and Norway alongside U.S.-based examples of Safe System implementation and opportunities.[12, 13] The study highlighted innovative approaches that included the implementation of 2+1 rural road cross-sections; physical separation of road users and speed controlling treatments in urban areas; new approaches to understanding and managing kinetic energy in the system; and the ultimate showcase of the Norwegian capital of Oslo, achieving zero pedestrian, cyclist, and motorcyclist deaths in 2019.

The Business Case for Safer Roads

In relation to road infrastructure safety, the relationship between the Star Rating of road infrastructure and crash costs per mile traveled were highlighted in the ITF 2016 report, demonstrating that crash costs are approximately halved for each incremental improvement in Star Rating. The related economic analysis and optimization of investment to maximize lives lived undertaken by governments as part of their national Road Assessment Programmes has demonstrated that achieving a 3-star or better standard is viable and



SOURCE: OECD (2016)

Figure 2. The relationship between infrastructure Star Ratings and crash costs.[1]

cost-effective in most cases. Where infrastructure upgrades are not financially viable, speed management solutions can be deployed.

At a global level, the Business Case for Safer Roads analysis investigated the return on investment possible if all countries achieved Global Target 4 for more than 75 percent of travel for each road user to be on the equivalent of 3-star or better roads and found more than $8 of benefits for every $1 invested.[3] Achieving this outcome with public and private results-based financing will result in an estimated 450,000 lives saved a year and 100 million deaths and serious injuries saved over the life of the engineering treatments.[14] But that is still not enough to reach zero.

Safe Systems and 5-Star Performance

To progress beyond a halving of road deaths and injuries and truly achieve Vision Zero, the Safe System Approach must move beyond an acceptable level of deaths and strive for a system where no one dies. As demonstrated in the ITF *Zero Road Deaths* report as road infrastructure approaches 5-star performance, the risk of fatality and the associated costs of road trauma per mile traveled approaches zero.[11] Safety performance and rating systems continue to improve safety—the National Highway Traffic Safety Association (NHTSA) and the Global New Car Assessment Program (Global NCAP) are dedicated toward promoting the universal adoption of the most important motor vehicles safety standards in the United States and worldwide.[15, 16] These new car rating systems demonstrate the reduction in fatality risk associated with 5-star cars. Road user behavior also remains a priority. Through education, enforcement, and new technology, the driver, rider, and road user behavior issues of speeding, impaired driving, fatigue, distraction and mobile phone use, lack of restraint use, lack of helmet wearing, and safe crossing compliance can increasingly be managed as we strive for 5-star road users. Central to all the Safe System elements are the safe speeds to deliver Vision Zero.

The Safe System Approach and Vision Zero may ultimately be achieved when we take a holistic view to the individual crash types that kill and injure road users. Safe System partners, working

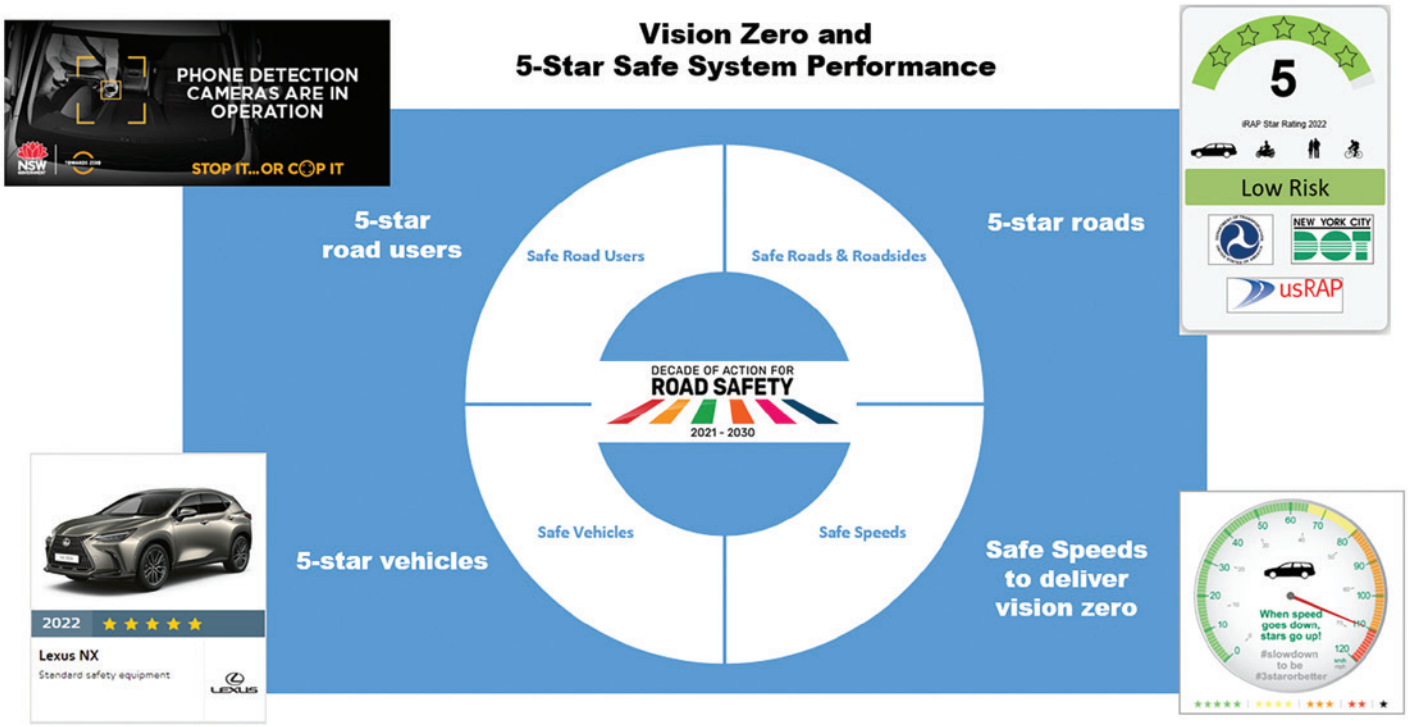


Figure 3. Vision Zero and 5-Star Safe System Performance.

together, can study how the components of the system will ensure the energy in each crash type can be effectively managed for all road users today and in the future. In some cases, one part of the system may do the heavy lifting of fatality prevention up to a certain point, and then another part of the system must take over. Managing these edge-cases is a critical part of Safe System thinking.

- For head-on crashes, undivided roads may suffice at low speeds for similar mass vehicles. As speeds increase, separation and barrier systems may be sufficient to manage fatality risk up to a certain point. At what speeds are vehicle safety features insufficient to minimize harm for vehicle occupants that strike the barrier? What is the impact of different mass vehicles and vehicles with different star-rating performance?
- For pedestrians crossing the road, what vehicle speeds are ultimately needed to ensure fatality risk is zero? What road features are needed when speeds or mass of vehicles exceed tolerable limits for pedestrians? What separation can be introduced? What vehicle pedestrian detection systems are effective and in what circumstances (rain, fog, nighttime)?
- What transport planning provisions can be made to create 5-star journeys for all road users from the beginning? How can both livable and survivable communities become the foundation on which land use is managed?

Outlook

As we work together to define Safe System performance, we must not lose sight of the easy and quick wins for global road safety. Rapid deployment of safe speeds across the system: 20 miles per hour (mph) (32 kilometers per hour [km/hr]) in urban areas where pedestrians and cyclists are active and <50 mph (80.5 km/hr) undivided roads; protection of road-side hazards; installation of roundabouts; banning the sale of vehicles that are not 5-star standard; introducing technology to ensure mobile phones cannot be used by a driver or rider; and the other proven interventions we know already but have not yet implemented on a scale that matters.

This is the bold and decisive action the UN is calling for at the high-level meeting to ensure we do indeed have a Decade of Action and Delivery. This action will ultimately help us reach the 2030 targets to halve road deaths and serious injuries, laying the foundation to ultimately deliver on the moral and financial necessity to reach Vision Zero by 2050 or before. Lives depend on it. Your life may depend on it. **itej**

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Rob McInerney *is the chief executive officer for the international Road Assessment Programme (iRAP), a registered charity with the vision for a world free of high-risk roads. With RAP projects and programs now active in more than 100 countries worldwide, Rob works closely with key development bank, political, and technical leaders from each country to build local capacity and deliver largescale and long-term road safety benefits through the provision of safer road infrastructure as part of their own RAP programs.*

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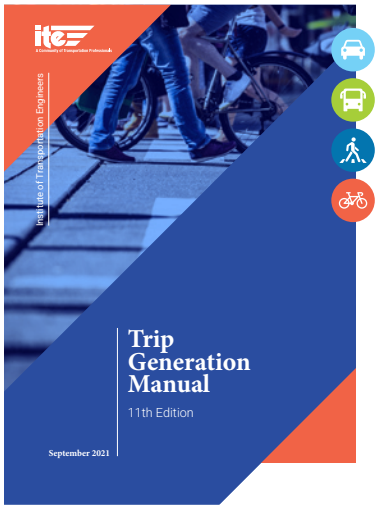

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Fremont Vision Zero Program:

5 Years of Traffic Safety Progress and a Renewed Effort for Getting to Zero

By Hans Larsen, P.Eng. (M) and Matthew Bomberg, P.Eng. (M)

For the past five-plus years, the City of Fremont, CA, USA has achieved a remarkable 45 percent reduction in fatalities and severe injuries caused by traffic crashes. This significant safety accomplishment was facilitated through hard work, leadership, and diligent investment in safety infrastructure and programs. Fremont's intense organizational focus on traffic safety was initiated by the Fremont city council with adoption of a Vision Zero policy in September 2015, and preparation by city staff of a *Vision Zero Action Plan* approved in March 2016.

The City of Fremont has reflected on its past 5 years of traffic safety improvement and prepared a renewed plan for "getting to zero." The new Fremont *Vision Zero report and Action Plan* from May 2021 (Figure 1) includes a "playbook" on past efforts to serve as a resource for transportation professionals. Fremont has also been active in sharing its "safety story" through participation with ITE, the Federal Highway Administration (FHWA), the Vision Zero Network, and others.

Figure 1. Cover for the Fremont Vision Zero Status Report and 2025 Action Plan. Access the plan at https://bit.ly/FremontVision0.

The City of Fremont is a mid-sized city, population 240,000, located in the Silicon Valley area of Northern California. During the 3 years from 2013 to 2105, Fremont experienced a concerning rise in traffic fatalities and severe injury crashes, particularly involving pedestrians, youth, and seniors. The attention on Vision Zero as a traffic safety program in the United States—starting in 2014 by cities like New York, NY; Seattle, WA; and the nearby cities of San Francisco and San Jose, CA—led Fremont officials to consider adopting a Vision Zero program as well.

Fremont already had a focus on traffic safety as an organizational priority and in 2015 was considered better than average with a per capita traffic fatality rate of 4 (per 100,000 population), well below the national and California rates of 11 and 9, respectively. Even so, the Vision Zero approach was a paradigm shift for the city's transportation, police, and public works staff. Rather than accepting that major traffic crashes were inevitable, or the result of mistakes and reckless behavior, the city embraced the "Safe System" approach. The newly embraced perspective was that major traffic crashes were preventable, and that one fatality was one too many.

In the 3 years prior to adopting Vision Zero, from 2013 through 2105, Fremont had 105 major traffic crashes with 22 fatalities and 83 severe injuries. In the most recent 3-year period, from 2018 through 2020, Fremont had 58 major traffic crashes (a 45 percent reduction), with 15 fatalities (down 32 percent) and 43 severe injuries (down 48 percent). This reduction was accomplished during a period when traffic fatalities at a national level have been increasing.

Organizational Collaboration Led by Enlightened and Engaged Engineers

Fremont's Vision Zero success starts with an organization that prioritizes safety and enables quick and coordinated action. The city is guided by a General Plan that establishes a goal of creating Complete Streets and encouraging non-auto modes of travel. The city's transportation engineers, pavement maintenance managers, project design staff, and street maintenance crews are all organized within the public works department, which reduces barriers to collaboration. City staff in public works have achieved a tremendous output of safety projects by leveraging the pavement maintenance program for roadway restriping and by partnering with street maintenance crews to install quick-build projects.

Fremont has also benefited from a supportive environment of planning and funding which has helped to fill in the details of the higher-level Vision Zero Action Plan. The city's staff is empowered to use cutting-edge tools and best practices. The city prioritizes staff training through both external opportunities such as conference attendance and internal peer learning. Transportation engineers make use of the latest design standards including NACTO guidance, examples from peer cities, and even lessons observed abroad.

Timely Data, Deep Analytics, and Police Partnership

The city's police and public works departments have a very close working relationship which supports Vision Zero. Traffic enforcement officers and transportation engineers meet monthly to share information about major crashes with information about where, when, how, and why they occurred, and to discuss perspectives on what can been done to continually improve traffic safety in the community.

Traffic crash report information is combined into a dataset that is used both reactively to address "hot spots" and proactively to address systemic issues. Location data is mapped and monitored to identify a high injury network of streets for focused engineering and enforcement/education countermeasures. It is noted that the Fremont police department largely conducts high-visibility traffic stops to provide warnings and education, rather than issue tickets and fines.

Systemic Implementation of Safe and Complete Streets on Major Arterials

Over the past 5 years, since adopting Vision Zero, Fremont has worked to systematically re-engineer its streets to be "safe and complete," promoting safer speeds for motorists and create safe

Figure 2. Complete Street conversions incorporated into annual pavement maintenance program.

and comfortable streets for people walking, biking, and taking transit. Fremont uses a variety of design tools to create safer streets, including narrowed travel lanes and intersections.

Historically many Fremont streets were built with wide 12 to 14-foot (ft.) (4.3 meters [m]) travel lanes, which is a design standard that promotes speeding and is more appropriate for large trucks traveling at freeway speeds.

Since 2016, Fremont has adopted a 10-ft. (3-m) travel lane standard, which encourages slower speeds by creating a feeling of greater enclosure and friction for drivers. Narrower lanes also free up roadway width for enhanced bike facilities, including buffered and protected lanes. Largely through pavement maintenance projects, Fremont has restriped buffered bike lanes on 50 miles of arterial streets and 13 miles include physical separation posts within the buffer area. Also, road diet projects are implemented to remove lanes considered to be unnecessary or to improve safety.

At intersections, street designs have focused on tighter radii which shorten crossing distances for bicyclists and pedestrians and force drivers to take turns at slower speeds. Fremont has implemented protected intersections, which eliminate weaving maneuvers between bicyclists and vehicles, improve sight lines, and further reduce crossing distances for pedestrians. Intersection improvements have been implemented as both quick-build projects and as full reconstruction with modified and upgraded traffic signal systems as part of major capital and grant-funded projects. Through 2020, Fremont has reconstructed five major intersections as protected intersections, and by the end of last year, a total of 12 protected intersections were completed.

The Walnut Avenue Bikeway project was selected by PeopleForBikes as among the top 10 of "America's Best New Bikeways of 2020." The project includes a 1.2-mile (1.9-kilometer) raised cycle track and four protected intersections.

Safe Routes to Schools and Quick-Build Delivery

As part of a comprehensive Safe Routes to Schools program, implemented with the Fremont Unified School District, school access safety audits were conducted at all 42 Fremont schools. Subsequently, 400 safety improvement actions were implemented consisting of crosswalk enhancements, intersection narrowing, stop controls, and parking restrictions, with most improvements installed quickly by public works street maintenance crews.

Tragically, from 2013-2015, Fremont saw nine major crashes involving youth 15 years of age or younger. This number dropped to just one in the period from 2018-2020. The city's efforts related to planning, project delivery, and positive safety outcomes earned Fremont national recognition in early 2020 as the third ever recipient of the "Vision Zero for Youth" Leadership Award, presented by the National Center for Safe Routes to Schools.

Figure 3. In 2019, Fremont completed its first protected intersection, and 12 were completed by 2021.

Safer Pedestrian Crossings

Fremont's early Vision Zero data analysis showed that crashes involving pedestrians accounted for more than 30 percent of major crashes, with most crashes happening while the pedestrian was crossing a street.

The city's efforts to improve safety of crossings have included installing pedestrian countdown signals at all 220 signalized intersections citywide and installing a suite of short-term and long-term treatments at uncontrolled crossings of major streets.

Fremont has approximately 40 crosswalks on multi-lane, higher speed roadways that are uncontrolled, meaning that there is no signal or stop sign but that motorists must yield to pedestrians. Fremont has sought to enhance these crosswalks with both short- and long-term measures to improve yielding compliance. Short-term measures have included high-visibility crosswalk striping, advance yield signage and markings, and striping and channelizers between travel lanes to prohibit "multiple threat crashes." Multiple threat crashes involve one vehicle attempting to pass another vehicle that has yielded to a pedestrian, and then hitting the pedestrian because the first vehicle has obstructed a sight line. Long-term measures to enhance crossings have included installing rectangular rapid flashing beacons, pedestrian signals, median refuge islands, and bulbouts. Fifteen of the 40 crossings in Fremont have since been upgraded with flashing beacons or pedestrian signals.

Brighter Street Lights

The 2016 Fremont Vision Zero Action Plan identified that approximately 50 percent of the city's fatal and severe injury collisions occurred in the early or late evening period between 6:00 p.m. and 10:00 p.m. In response to this data, the city accelerated an environmental sustainability initiative to upgrade street lighting to achieve immediate safety benefits. The city converted all 16,000 streetlights from "yellow" sodium vapor lights to brighter "white" LED lights. The new streetlight fixtures use half as much energy

and are twice as bright. Before-and-after studies identified a 23 percent reduction in fatal and serious injury crashes occurring in nighttime conditions.

Figure 4. Before (top) and After (bottom): All Fremont streetlights were fully converted to brighter LED lights (16,000 lights).

Speed Management

There are clear relationships between excessive speed, reduced reaction time, and increased crash severity. In Fremont, 70 percent of crashes happen on streets with a speed limit of 40 miles per hour (mph) (64 kilometers per hour [km/hr]) or higher. Because of this, speed management has been an overarching theme of Fremont's Vision Zero work. After engineering streets for safe speeds, the City of Fremont re-surveys streets to see if changed designs have led to lower operating speeds. After speed surveys, Fremont has lowered the posted speed limit on more than 50 street segments since 2015. Fremont has also worked with its police department on targeted speeding enforcement and has installed 45 speed feedback signs. Crashes involving unsafe speed dropped by 44 percent compared to the years before Vision Zero adoption.

While much of the city's efforts around Vision Zero have been focused on higher speed roadways, the city has also undertaken measures to ensure safe speeds in neighborhoods, as part of a balanced program. These efforts have included increasing the number of neighborhood speed humps from 200 to 250 citywide. During the beginning of the coronavirus pandemic in 2020, the city launched a citywide "Drive Slowly, Be Healthy" slow streets program, with a yard sign campaign to promote a 20-mph (32 km/hr) advisory speed on all residential streets.

Community Engagement and Partnerships

Fremont's Vision Zero program also promotes community engagement and partnerships to help create a positive citywide traffic safety culture. This has included staffing booths at community events, creating educational videos, city newsletter articles, and participating as guest speakers for community group meetings. Each year, youth volunteers repaint "LOOK" safety messages at street crosswalks. In 2019, Kaiser Permanente provided a grant to the city to place 130 street banners with traffic safety education messages and to build community support for the goal of "no more traffic deaths."

Commitment to Advancing the Transportation Profession

While the city is working boldly to improve traffic safety in Fremont, there is an equal commitment to share "lessons learned" with other communities and the transportation profession. In this regard, city staff regularly participates in peer exchange opportunities with local organizations that have included the Silicon Valley Bicycle Coalition, Alameda County Transportation Commission, and the Metropolitan Transportation Commission. At a national level, Fremont's Vision Zero program has been featured in publications and at conferences hosted by ITE, the Transportation Research Board, FHWA, National Safe Routes to School Coalition, and Vision Zero Network. **itej**

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Matthew Bomberg, P.Eng. (M) *served as senior transportation engineer for the City of Fremont from 2018-2022. At Fremont, Matt also managed the city's Vision Zero Traffic Safety and bicycle and pedestrian programs and also played a major role in the design and construction of nationally recognized Complete Streets projects. Matt is currently a senior transportation engineer for the Alameda County Transportation Commission. Matt holds master's degrees in Transportation Engineering and Public Policy from the University of California at Berkeley and is a registered Professional Engineer and Traffic Engineer.*

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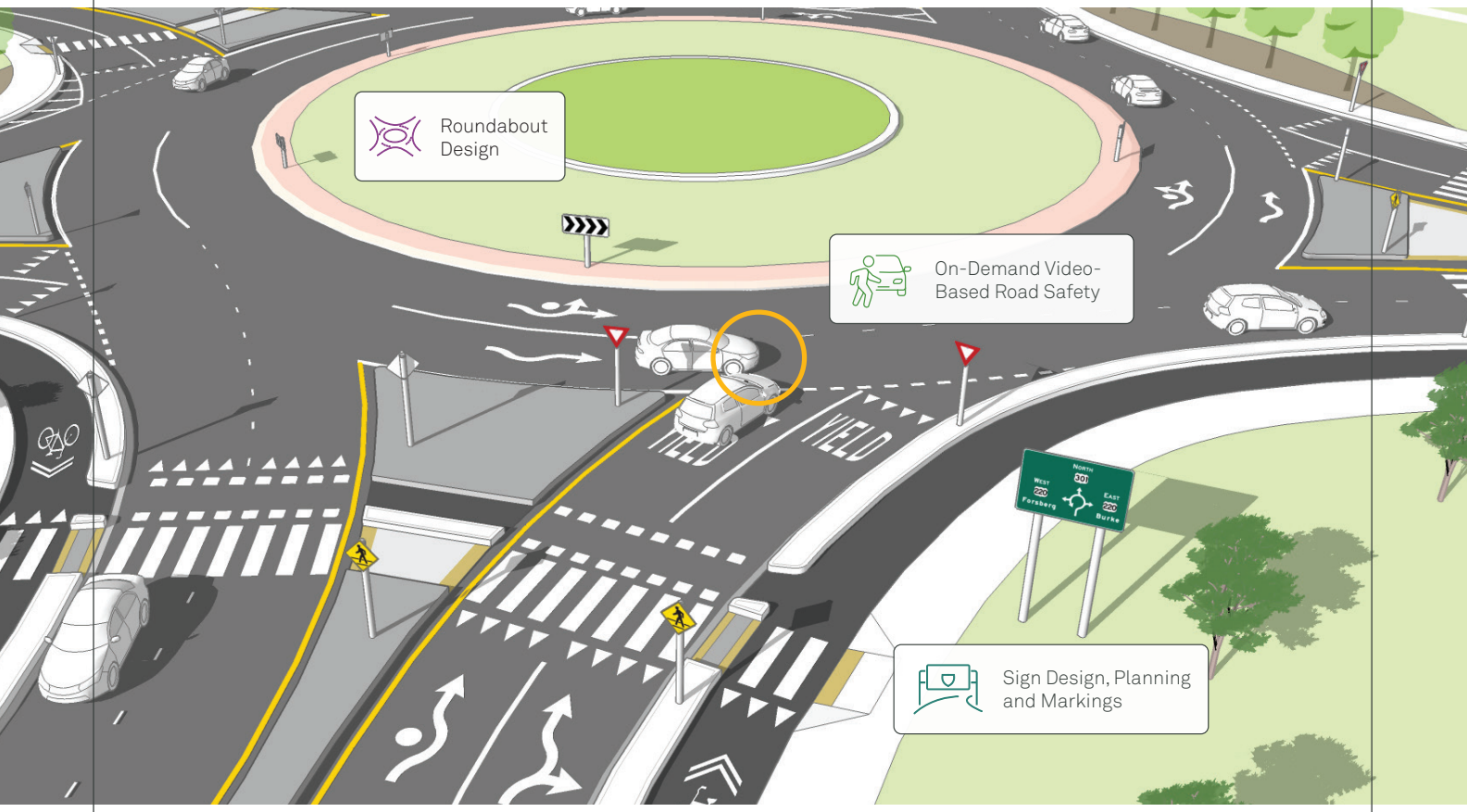

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Analysis of Expanded No Turn on Red Applications in Washington, DC, USA

By Joshua Wolfgram, P.E., PTOE, RSP1 (M), Robin Fish, P.E., PTOE, RSP1, Wasim Raja, P.E. (M), and Rahul Jain, P.E., PTOE (M)

The Vision Zero program in the District of Columbia, USA (the District), aims to eliminate traffic fatalities and serious injuries by 2024 through solutions focused on engineering, education, and enforcement programs. No Turn on Red (NTOR) is one of several engineering solutions identified in the program for rapid design and implementation. Currently, limited federal or local guidance is available to aid in the selection, implementation, and evaluation of right-turn-on-red restrictions on a large scale. Rather, NTOR prohibitions are traditionally evaluated on a case-by-case basis.

In late 2018, the District Department of Transportation (DDOT) selected 100 pilot locations for NTOR implementation to protect non-motorized roadway users such as pedestrians, schoolchildren, and cyclists. The selection process was based on the level of pedestrian activity, proximity to pedestrian generators (such as schools or metro stations), crash history, and geometric or operational characteristics. The project team completed a before-and-after study to quantify and assess the impact of these new restrictions to determine if future expansion of the restrictions was feasible.

NTOR restrictions have previously been implemented in the District based on prior studies and analysis. Therefore, some of the pilot locations had a partial (time of day) or full-time NTOR restriction on one or more approaches in the before condition. However, the partial restrictions were changed into full-time restrictions and the new signs were installed at consistent, highly visible locations at each intersection.

Observations and Analysis

1. Data Collection.

The AM and PM peak hours for the study intersections occurred between 7:00 a.m. and 9:00 a.m. and 4:15 p.m. to 6:15 p.m., respectively. Off-peak hours were defined as 11:00 a.m. to 1:00 p.m. and 7:00 p.m. to 8:00 p.m. for the afternoon and evening periods, respectively. The "before" or pre-evaluation was conducted from February 2019 to March 2019. The "after" or post-evaluation was conducted from April 2019 to May 2019 after an adjustment period of at least 4 weeks following installation of the new NTOR signs. Data was available for both the before and after periods at 74 locations, which were the focus of this study.

Each intersection was surveyed during a peak hour and off-peak hour. Intersections were assigned to either an AM Peak or PM Peak based on the whichever peak had the higher total right turning volumes. Afternoon off-peaks were assigned to AM locations and evening off-peaks were assigned to PM locations.

2. Field Observations and Measurements

The following data were collected for each intersection:

- **Vehicle and Pedestrian Conflicts.** Events where a vehicle failed to yield to the pedestrians crossing were recorded during green intervals and red intervals at parallel and perpendicular crosswalks, respectively. Unsafe turning maneuvers were recorded in both crosswalks to determine if more conflicts will occur during the green interval since vehicles are not permitted to turn right on red.
- **Vehicle to Vehicle Conflicts.** This type of conflict results from a right-turn-on-red maneuver where a vehicle accepts an inadequate gap when turning right. The event was recorded only if this maneuver caused the conflicting through vehicle to brake or take other evasive actions.
- **Crosswalk Encroachment.** Encroachment occurs when right-turning vehicles pull past the stop bar to wait in the crosswalk for an acceptable turning gap during the red interval. This is undesirable as vehicles can interfere with crossing pedestrians and/or cyclists. This event was recorded each time the front tires of a vehicle obstructed the crosswalk pavement markings of a perpendicular crosswalk, regardless of whether there was a pedestrian in the crosswalk. To be counted as an encroachment, the observer had to note the vehicle pausing in the crosswalk for any length of time. Continuous right-turn-on-red movements were not counted as they did not create an obstruction for pedestrians.
- **Compliance with NTOR Signs.** Drivers turning right on red despite NTOR signage were recorded as NTOR violations. This action may or may not have resulted in a conflict with pedestrians or vehicles as described in the sections above.
- **Queue Measurements.** Observers recorded the maximum queue (total stopped vehicles) in the rightmost lane at the end of the red interval of each cycle. At the end of the green interval, the observer recorded the number of vehicles in queue that successfully cleared the intersection.
- **Cycle Failures.** Observers recorded any residual queue that had arrived during the previous red interval and did not clear during the following green interval. Residual queues were labeled cycle failures.

3. Design Approach

The new regulatory R10-11 signs implemented at the 100 pilot intersections followed the *Manual on Uniform Traffic Control Devices* (MUTCD) standards. All existing signs were replaced by standard R10-11 signs with retroreflective white color backgrounds and a diagrammatic "Red Ball" graphic. The new signs were attached to mast arms (if present) or to the pole directly below/above the rightmost signal head to provide maximum visibility. In addition, supplemental near-side NTOR signs were placed on all approaches where the stop bar was greater than 120 feet (ft.) (36.6 meters) from the far-side sign.

Figure 1 illustrates some examples of the existing signs (on the left) that were replaced with new R10-11 "Red Ball" NTOR signs (on the right).

Current DC law prohibits right turn against a red arrow signal display. One of the objectives of this study was to determine if the installation of R10-11(1) "NO TURN ON RED ARROW" signs improved compliance with this law.

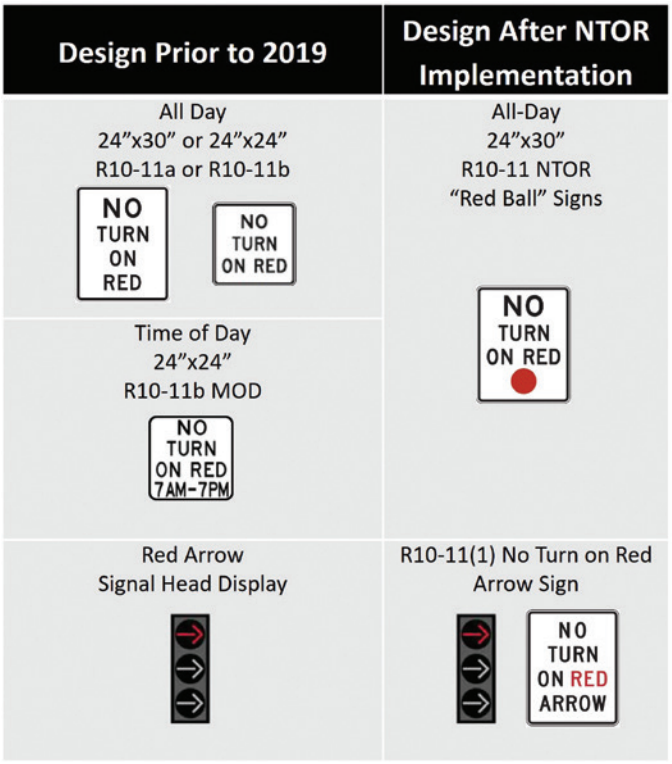

Figure 1. Changes in No Turn on Red Regulatory Signage.

4. Summarized Results

Following the before and after observation periods, the safety, compliance and operational data was evaluated to determine the impacts of NTOR implementation. Safety data for the three undesirable driving behaviors (i.e., failure to yield to pedestrians, crosswalk encroachment, and vehicle-vehicle conflicts) was compared in the before and after conditions. Driver compliance after implementing NTOR was compared to compliance in the before condition at locations with previous time of day or All-Day restrictions, as well as at locations where only a red arrow signal display was present. In addition, maximum queue lengths and residual queues were compared to identify any operational impacts as a result of NTOR implementation. In total, the 74 observed intersections yielded evaluations of 252 unique approaches.

5. Pedestrian and Vehicle Safety

This study evaluated the safety impacts of implementing NTOR restrictions at all times and all applicable approaches of the 74 study intersections based on the performance measures shown in Table 1. These results are aggregated across all approaches and observation periods.

Reductions in failure to yield behaviors were observed during both the green and red intervals. These reductions indicate that NTOR implementation did not increase aggressive turning behavior during the green interval. Instead, the data suggests that since drivers are at a complete stop when the green interval begins, they may yield completely to pedestrians before completing legal right turn maneuvers on green. In addition, Vehicle to Vehicle conflicts were nearly eliminated, showing a 97 percent reduction following NTOR implementation.

Table 1. Safety Compliance Measures.

Performance Measure	Observations Before	Observations After	Percent Change
Vehicle-Vehicle Conflict (Red Interval)	124	4	-97%
Failure to Yield to Pedestrians (Green Interval)	322	132	-59%
Failure to Yield to Pedestrians (Red Interval)	166	13	-92%
Crosswalk Encroachment	604	787	+30%

While the failure to yield behavior metrics showed improvements when aggregated across all 252 approaches, four approaches experienced increases in failure to yield during green behaviors. This suggests that while overall there is a safety benefit to NTOR implementation, there are locations where NTOR implementation may in fact increase conflicts between turning vehicles and pedestrians. Further analysis should be conducted to determine the site-specific characteristics that would lead to these outcomes. A cursory evaluation shows that the locations with increased conflicts are capacity-constrained intersections, suggesting that as drivers become impatient, they will be less likely to yield to pedestrians, even with NTOR.

As shown in Table 1, crosswalk encroachment behavior increased by 30 percent after implementing NTOR restrictions. The combination of this increase with the reduction in failure to yield behavior suggests that many vehicles were accustomed to turning right on red in the "before" condition and began to encroach into the crosswalk. However, upon detecting the new NTOR signs, drivers did not complete the illegal right-turn-on-red movement and therefore remained in the crosswalk. This was confirmed by the field observations. It is possible that subsequent study of these locations could reveal a reduction in the crosswalk encroachment behavior as drivers become more familiar with the new NTOR restrictions.

6. Compliance

The compliance with new NTOR restrictions was evaluated based on the type of restriction in place in the before condition. Table 2 shows this comparison by observation period. Where no restriction previously existed, the percent change is not reported.

The field data shows a reduction in NTOR violations in the three remaining scenarios (i.e., at locations with an existing NTOR restriction in the before condition) when evaluated by observation period. Increased compliance is likely due to better

Table 2. NTOR Compliance.

Pre-Implementation Restriction	Number of Approaches	Violations Before	Violations After	Percent Change	Violations per Hour
AM Peak (7:00 a.m. – 9:00 a.m.)					
None	75	N/A	60	N/A	1.6
Time of Day (7 a.m. to 7 p.m.)	14	10	6	-40%	0.86
All-Day	13	15	8	-47%	1.2
Red Arrow Signal Display	0	N/A	N/A	N/A	N/A
Afternoon Off-Peak (11:00 a.m. – 1:00 p.m.)					
None	75	N/A	43	N/A	1.1
Time of Day (7 a.m. to 7 p.m.)	14	11	5	-55%	0.71
All-Day	13	18	5	-72%	0.76
Red Arrow Signal Display	0	N/A	N/A	N/A	N/A
PM Peak (4:15 p.m. – 6:00 p.m.)					
None	99	N/A	93	N/A	1.9
Time of Day (7 a.m. to 7 p.m.)	32	37	26	-30%	1.6
All-Day	17	16	11	-31%	1.3
Red Arrow Signal Display	2	80	29	-64%	29
Evening Off-Peak (7:00 p.m. – 8:00 p.m.)					
None	99	N/A	70	N/A	1.4
Time of Day (7 a.m. to 7 p.m.)	32	N/A	14	N/A	0.88
All-Day	17	23	8	-65%	0.94
Red Arrow Signal Display	2	41	10	-76%	10

signage visibility when converting to signs with better reflectivity, uniform placement, and consistent messaging. The study recognizes that the minimum adjustment period lasted only 4 weeks and may have contributed to a higher compliance with new regulatory signs, especially where new restrictions were implemented. Also, the sample size for the red arrow signal display category is only two locations. Additional locations should be observed with Red Arrow Signal Displays and supplementary R10-11(1) signs to test the transferability of these results.

7. Queues

Maximum right turn queue lengths were recorded as a measurement for operational performance. Queue lengths in the after condition were compared against the queues recorded in the before condition to identify locations that were adversely impacted due to new NTOR restrictions. The average and maximum number of right turn vehicles queued can be found in **Table 3**.

Table 3. Before-After Comparison of Right Turn Queues (# of vehicles).

Observation Period	Avg. Queue Before	Avg. Queue After	Max Queue Before	Max Queue After
AM Peak	2.78	3.22	20	22
Mid-Day Off-Peak	1.87	2.08	16	20
PM Peak	3.68	3.89	29	36
Evening Off-Peak	1.84	2.37	15	19

No observation period saw an average queue increase greater than one; however, maximum queues increased for all peaks. This suggests that while the magnitude of queueing did not increase considerably, there is potential for greater variation from cycle to cycle and higher maximum queues. The PM peak observation period contained the locations with the highest magnitude of queue increases, with locations ranging from two additional vehicles up to 23 additional vehicles. However, most locations did not see substantial increases in queueing, with 121 approaches (81 percent) having less than two additional vehicles queued in the PM peak.

These minimal impacts to traffic operations were expected, given that the pilot locations were prescreened to identify potential impacts to traffic operations. Similar results showing minimal impacts to traffic operations should not be assumed at future NTOR implementations without conducting similar traffic operations analysis.

8. Cycle Failures (Residual Queues)

Queue increases alone do not necessarily indicate a traffic operations concern if the intersection can still serve the additional queued vehicles during the following green interval. Therefore, in addition to queueing data, discharge rates were recorded to calculate increases in cycle failures (or residual queueing). Of the 504 approaches observed (252 unique approaches observed for two observation periods), 17 unique approaches (3 percent) were found to have additional cycle failures following NTOR implementation. The overall low number of approaches with cycle failures indicates that even where queues increased as a result of NTOR implementation, the majority of intersections had enough capacity to accommodate these queued vehicles. In response to the locations that did experience additional residual queues, the project team used the citywide traffic signal optimization program to evaluate signal timing changes to mitigate residual queue increases.

Conclusions and Findings

Currently, limited federal or local guidance is available to practitioners seeking to expand applications of NTOR. This pilot program and study sought to document the safety, compliance,

and operational impacts of new NTOR installations in an urban environment.

The outcomes of this study indicate potentially positive effects of NTOR restrictions that can serve as a basis for developing a standardized methodology that considers both peak and off-peak vehicle and pedestrian demands. The placement of new NTOR signs decreased overall right turn conflicts between pedestrians and vehicles across the study intersections. In addition, NTOR restriction compliance improved under the new R10-11 signs and uniform standards for installation across all intersections. These improvements came at overall minor impacts to traffic operations. These findings have helped the District identify a low-cost safety tool that will help in its pursuit of Vision Zero.

Figure 2. No Turn on Red Installation at 15th Street and Independence Avenue, SW.

The following recommendations were made:

- Maintain new NTOR restrictions at the 100 pilot locations, with further analysis to be conducted at the 17 approaches that experienced additional cycles failures and the five approaches that experienced increases in vehicle-pedestrian conflicts.
- Evaluate future locations for NTOR implementation using site-specific geometric and operations analysis. The operational prescreening ensured low impacts to traffic operations were observed; similar prescreening will benefit future implementations.
- Future signal designs should incorporate the R10-11 and R10-11(1) signs as a standard where applicable to improve compliance. Future signal designs should also incorporate the sign placement standards used in the designs for the pilot NTOR locations (i.e., installation of NTOR signs on mast arms where feasible, and installation of supplemental near-side signs when the far-side sign is greater than 120 ft. from the stop bar). **itej**

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Wasim Raja, P.E. (M) *leads DDOT's Traffic Engineering and Safety Division (TESD) which focuses on improving District's multimodal transportation system by designing and constructing traffic safety projects. Over the last 12 years, Wasim and his team have implemented more than 500 intersection modification projects to improve safety and mobility of multimodal traffic in DC. Prior to joining DDOT, he oversaw public and private sector projects involving design, construction, maintenance, and operation of multimodal traffic systems; traffic engineering and safety studies; traffic signal optimization; transportation management planning; and transit signal prioritization.*

Rahul Jain, P.E., PTOE (M) *is a senior transportation engineer with the District Department of Transportation. He is responsible for overseeing major transportation projects and engineering contracts to ensure engineering standards and contractual requirements are met at all levels of planning and design. Rahul serves as a technical liaison with internal staff and external stakeholders on planning, analysis, and design aspects of various operational and safety improvement projects.*

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Achieving Vision Zero – One Location at a Time

By Samuel C. Tignor, Ph.D., P.E. (M), Jane Williams, MPA (M), and Ronald W. Eck, Ph.D., P.E. (M)

Vision Zero (VZ) and infrastructure-user errors (IUE) have been discussed in the United States for years, but we still have more than 35,000 fatalities per year.[1,2] In implementing both VZ and IUE, the United States has used a top-down approach where federal, state, and local governments have joined with private organizations like American Association of State Highway and Transportation Officials (AASHTO), National Safety Council (NSC), and others to promote highway transportation safety with a goal of zero fatalities within by 2050.[2] Unfortunately, neither the VZ nor IUE goals have ever been successively pursued and the improved safety levels keep slipping further into the future. So what is the problem? Will we ever be able to achieve a significant decrease in road fatalities? Apparently, we need to modify our approach.

The objective of this paper is to present 10 examples of VZ and IUE problems appropriate for a bottom-up type of project selection. We are not addressing the merits of how funds and projects are approved, but instead present examples of potential small, relatively inexpensive VZ and IUE projects that are often overlooked but are nevertheless part of the safety problem.

Bottom-up Decision Making for VZ

In the United States there are thousands of transportation professionals— i.e., highway designers, planners, traffic engineers, maintenance staff, and others. Some are in leadership positions and others are in support positions whether they be at the federal, state, county, or city level. In total, there are likely 100,000 to 150,000 engineers in the daily support group.[3] An incentive should be created for this pool of educated professionals to become involved in identifying infrastructure-user problems as opposed to waiting for top-down identified projects.

The issue is not that large projects are not justified, but instead the process prevents smaller, less expensive projects from being considered. All functional classes of roads will have VZ and IUE problems, it is just a matter of identifying them. This is especially true for rural two-lane roads which have the largest functional class of United States roads, but they also have the highest fatality rate of all road classes.

There seems to be no incentive or recognition of VZ or IUE problems being identified or eliminated. Small projects, even if inexpensive, will be ignored or have an uphill battle to be approved. The driving public knows where VZ and IUE are prominent, but when not corrected they conclude such conditions must be considered acceptable by the officials. These projects can exist for years and never be approved even after experiencing fatalities. They also represent a significant tort liability exposure for road agencies. Specific examples will be presented later.

As a national objective, neither VZ nor IUE have been given a fair chance of succeeding. Their success needles are stuck and will remain stuck until the process permits more infrastructure-user problems to be identified and eliminated from the highway system.

The focus of this article is to give examples of small projects that can be completed quickly at a low cost. Some infrastructure conditions are conducive to user misunderstanding or unawareness of design and/or traffic control treatments and thus users are led into unintended decisions resulting in fatalities. These IUE are often classical human factors error-induced situations that end in user fatalities, representing a fundamental system failure. As engineers, our challenge is to eliminate VZ and IUE, and they do occur on small projects. Our goal is to present examples of smaller opportunities that should not be overlooked whether they be VZ or IUE projects.

Examples of Opportunities

This section presents various examples of relatively inexpensive types of VZ and/or IUE issues that are good candidates for corrections.

1. **Hidden Traffic Control Devices:** Traffic control devices (TCD) supplement road design with signs, signals, pavement markings, channelizing devices, etc. as needed to inform, guide, and aid all road users. They are only effective if they are visible to road users. For example, a community group's neighborhood beautification project planted a tree in an island blocking the view of a STOP sign (see red arrow). Vegetation blocking of TCD is a continuing challenge to VZ and road user safety, whether in daylight or at night.

Picture by S. Tignor

2. **Misleading Signal and Pavement Markings:** Users constantly make microsecond decisions where geometrics, signals, and pavement markings must be coordinated to prevent system errors. In this example where one intersection approach does not permit through traffic, the pavement marking and signal signing are not coordinated. The right signal/sign combination permits left turns from the right lane but the right lane pavement marking only permits right turns. The inconsistency induces IUE by those in the right lane wanting to turn left, creating potential VZ implications. The cross street is a major arterial with speeds at or above 35 miles per hour (mph) [56 kilometers per hour (km/hr)].

Picture by S. Tignor

3. **Inadequate Interstate Off-Ramp Advance Warning:** This example is a low-cost infrastructure-user human factors type problem. The off-ramp is just beyond an upstream bridge blocking the visibility of the start of the off-ramp deceleration lane (white 1). Traffic in the median lane that wants to exit must find a safe, useable gap within 8 seconds in the right lane and then maneuver to the deceleration lane when traveling at 55 mph (88.5 km/hr). Eight seconds is difficult in daylight and impossible during heavy, night traffic. The gore guardrail (white 2) has been struck and destroyed repeatedly thus a challenging VZ. This problem has existed for many years and the department of transportation (DOT) has taken no action to remedy the problem.

Google Maps photo with illustration by S. Tignor.

4. **Bus Driver Dilemma with Bus Off-tracking into Right Lane:** A transit agency reported a history of numerous sideswipe collisions while turning right from a two-lane eastbound approach into a three-lane southbound arterial.[4] See sketch below. Southbound vehicles (except buses) on the approach lane 2 (curb) were required to turn only into lane 3 of the southbound receiving lane. Buses were initially free to select lane 2 or 3 of the receiving southbound flow lanes. Some bus drivers had a human factors dilemma of which lane on the southbound arterial to select. Some bus operators selected the middle southbound receiving lane 2, resulting in the side of the bus sideswiping vehicles in the side street curb lane from bus off-tracking, as shown in the right picture.

Consultation between the transit safety officer and the local traffic engineer suggested the installation of chevron pavement marking (PM) to delineate for bus operators to turn into arterial lane 1. The PM eliminated the problem until the bus training officer retired and the bus off-tracking problem slightly resumed and continued until the new bus training office was educated by the traffic engineer.

Google Maps Pictures. Sketch by Raid Tirhi City of Bellevue, WA, USA[4]

The issue was from insufficient coordination between the bus drivers, geometrics, signing, and PM. The problem was eliminated when the traffic engineer and bus training official jointly decided to again reinstate the off-tracking bus issue into the bus driver training course.

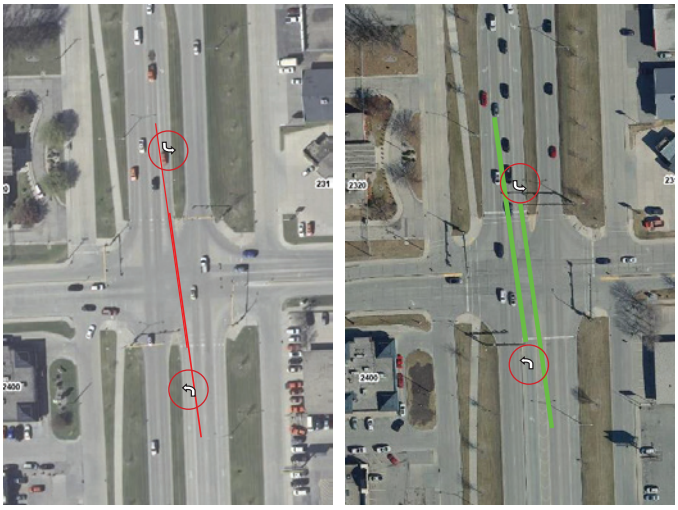
Some engineers may not think this is a legitimate VZ problem. However, it is an excellent example illustrating drivers' dilemma in making short-term decisions. Sometimes injuries occur when what appears initially to be small, near insignificant crashes but somehow a fatality or serious injury occurs. One could imagine a passenger standing on the bus or walking to/from their seat and, after sideswiping a car, the bus operator brakes suddenly and hard, pitching the unsuspecting passenger (who's not holding onto anything) forward such that his/her head strikes the hard back of a seat, causing fatal head or spinal cord injuries. If the example is not a VZ problem, it is most definitely an IUE issue.

5. **Edge of Pavement Drop-Off:** In 2004, there was a fatality on a four-lane divided urban road when the right wheels of the car operated by a young woman were caught in a 150-200 ft. long 4-6 inch rut at the pavement-shoulder edge.[5] In trying to regain the pavement, she overcorrected and lost control of the car, crossed the median, and was fatally struck by a vehicle traveling in the opposite direction. The 4-ft. shoulder material was loose gravel.

Subsequent visits to the location found similar length ruts with one being 8-9 inches deep. Repeated requests to the DOT to install a surface treated shoulder have been unsuccessful. Once it was found, the guardrail near the shoulder edge had been penetrated and damaged. This is an IUE with VZ issue being totally ignored for 17 years. Edge of pavement drop-offs are one of the leading causes of tort claims filed against state and local road agencies, since the resulting crashes are usually fatal or serious or permanent injury crashes.

Picture by S. Tignor

6. **"Negative" Left Turn Offset:** Four intersections experienced 50 crashes and some fatalities in a 3-year period on a major arterial. Previous crashes were from left turning vehicles in both northbound and southbound directions not yielding to oncoming traffic because of the view obstruction caused by the 'negative offset.' The redesigned intersection eliminated the negative offset by removing the median, taking one lane from the northbound direction, and converting it to the left-turn lane. Here VZ was recognized. The red lines illustrate the before left turns and the green lines illustrate the improved left turn sight visibility.



Picture by J. Williams

Before After

Both showing 250' line of sight

7. **Intersection Bulbout Extension:** In this intersection example, the crosswalk is used by school children. After school ends for the day, parents illegally park and block the crosswalk, creating a pedestrian safety hazard. Bulbouts improve safety for pedestrians and motorists at intersections; increases pedestrian crossing visibility and reduces speed of turning vehicles.[6] The VZ solution used a 6-foot (ft.) bulbout, curb extension at the corner free of vegetation and/or street furniture that can prevent drivers from seeing pedestrians on the sidewalk.

Pictures by J. Williams

Vehicle blocking pedestrians with bulbout installed.

8. **Modification of Signal Timing Plans:** Engineers and technicians can implement in 5-minutes computer control for different VZ traffic signal timing plans from any city location. This efficiency is a great advantage during extreme cold weather events for daily operations. Applications are for special park events, holidays, inclement weather, school operations and crossings, change in heavy truck demand during beet and potato harvests, exclusive pedestrian phases, trails, public pools, and pedestrian crossings. Each of the following three modifications promote VZ.
   a) **Harvest times:** During beet and potato harvest times there is a large increase of trucks using major streets. To keep trucks safely moving through town during

harvest time the timing plan has a longer cycle, longer yellow, and all red times.

b) **School plans:** On school days at 3:00 p.m. when school gets out, two intersections have extended time on the minor street. One to get high school students out of the parking lot, and a second for parents to pick up elementary school students.

c) **Exclusive pedestrian phases (EPP):** EPP are used at an intersection near an elementary school twice during the cycle: for N/S, pedestrians and E/W pedestrians. EPP is especially appreciated when the temperature is sub-freezing. Pedestrian timings are preempted by train arrivals.

9. **Trail, School, and Pedestrian Crossings:** Trail crossings can be hazardous when only controlled by signs and crosswalks. Use of solar rectangular rapid flashing beacon (RRFB) on classified two-lane streets is a VZ enhancement to only-used signs and pavement markings. By installing fiber to all school beacons and incorporating them with the signal plans they can be operated remotely all day long. At schools, VZ enhancements were obtained by consolidating cross walks, beacon poles, updated lights and signage, adding illumination, and pedestrian activation. Flashing-times can be changed quickly for school delays, early dismissals, or other needs.
10. **Infrastructure-User Human Factor Deception Example:** Sometimes the visual interpretation of the infrastructure misleads approaching users. This example illustrates that the infrastructure misleads approaching users to make a false decision and lead them unintentionally off the roadway. The left view was taken at ground level with a slight crest prior to the hidden curve which approaching drivers cannot see.[7] The view shows what an approaching driver would experience before determining the straight road alignment was not what they thought. The right picture is a later Google Maps Earth view of the site with arrow signs and vegetation planted on the left side of the road to better illustrate the road alinement turns right. Unfortunately, a motor cycle operator had a night, fatal crash when he lost control trying to follow the road curvature while exceeding the 25 mph (40 km/hr) speed limit.

Summary

Road safety has a been a concern for years in the United States relative to a rise in highway fatalities.[2] According to Treat et al., 27 percent of fatalities are a result of the inconsistent or poor communication between the road infrastructure-user errors (IUE) often called human factor errors (HFE).[8] One-half million fatalities from 1975 to 2017, using Treat's 27-peercent infrastructure-user fatalities, could have been prevented. In the United States, ITE and others have been instrumental in promoting and explaining the virtue and safety goals of VZ starting about 20 years ago. To eliminate all highway crashes is a huge goal, but eliminating the IUE is more easily achieved than deliberate user behavioral decisions and habits, i.e. driving while intoxicated, cell phone distractions, etc. In 2020 the highway fatalities are estimated to be 42,000 in United States making the problem even worse.[9]

The goal of this article was to put together examples of VZ and IUE issues that can be easily and quickly eliminated at a minimum expense. Addressing such problems also reduces agency liability exposure. Our examples, are not exhaustive but hopefully they will encourage engineers and support staff, regardless of their professional position, to identify similar safety issues and to have them removed so the path to zero fatalities can be obtained. The authors suggest ITE promote VZ and the elimination of HFE by offering annual recognition awards for the best, inexpensive safety projects. **itej**

Picture by R. Eck

Google Maps photo.

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Answer to "Where in the World" on page 13: Meteor Crater Road off I-40 in Northern Arizona, USA. Photo submitted by Kohinoor Kar, Ph.D., P.E., PTOE (M).

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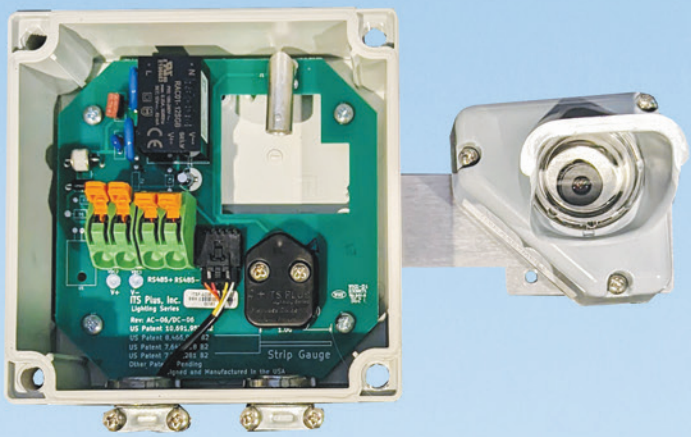

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