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[Image of ITS Plus Vehicle Detection simultaneously performing Advanced Detection, Stop Bar and Vehicle Counts]

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Alternative intersections and interchanges with PTV Vistro

Today's transportation challenges such as funding limitations and constricted rights-of-way push engineers to do more with less. Other influences like aggressive scheduling, increases in congestion, and the need for improved safety, require innovative solutions. PTV Vistro empowers transportation professionals to think outside-of-the-box, analyze, and document project decisions for innovative interchange and alternative intersection designs.

Tested traffic signal optimization workflows and flexible geometry in PTV Vistro provide the necessary building blocks to cost-effectively develop the right solutions. Vistro is versatile to analyze traditional traffic signal operations, complete-streets, and access-management projects. Also, Vistro quickly analyzes advanced alternative intersection designs like RCUTs, SPUIs, Green-Ts, CFIs, DDIs, MUTs, single-loops, thru-turns, and split intersections.

Screening of alternative intersection designs using industry-standard methods
Robust industry-standard analysis methods including the Highway Capacity Manual 6th Edition, the Canadian Capacity Guide, ICU, and the Kimber method are available in Vistro for diverse signalized, stop-controlled, and roundabout configurations. Measures of effectiveness are reported, mapped, and colorfully displayed in the network editor. This makes PTV Vistro an important tool to screen existing conditions and find locations for improvements.

Scenario management and mitigations for an iterative experience
Innovative interchanges and alternative intersection designs are often not straight forward, requiring an iterative development process. PTV Vistro provides you with the tools to explore and optimize your design, as well as identify red flags early. The detailed geometry doubles as a conceptual sketch tool while providing the analytical feedback to your design decisions. Vistro's Scenario and Mitigation managers document all of your tests and tweaks in one file. And, if anything changes in the base model, PTV Vistro will smartly transfer changes to any scenario, resulting in time-savings, a high-quality product, and consistency.

Adaptable network coding and traffic signal controllers
PTV Vistro's user-interface is perfect to analyze alternative intersection designs. The network structure is intuitive to use and highly customizable. Vistro displays the network map and workflow tables together, bringing vital user feedback. For complex intersections with numerous movements, workflows can be sent to additional computer displays, providing multi-layout immersion with full-screen information. Moreover, alternative intersection designs require flexible signal controllers. PTV Vistro enables you to build intricate ring-barrier sequences. Also, multiple intersections can share the same traffic controller. And, to increase readability, PTV Vistro's resilient phase diagram clearly illustrates which phases are in use at each connected intersection.

Do you want to learn more about studying alternative intersections in PTV Vistro? Scan the QR code above to read our in-depth PTV Vistro Knowledge-Base article.

Learn more at ptvtraffic.us/ITE
president’s message

Virtual Meetings to Virtual Streets

Over the last five months, we all have become more familiar with the virtual world. ITE is hosting its first virtual Annual Meeting this month, and a few of our Districts (Midwestern, Western, and Mountain) have jumped in to create virtual events that expanded the sharing of information for our members in new and valuable ways. Members facing travel challenges to attend in-person meetings are now able to attend virtually, saving time and money. In this new virtual world we live in, events have become easier to navigate, creating a new experience—not one that replaces face-to-face, but complements and enhances it.

The virtual world has opened our eyes to new ways of doing things. The pandemic has forced us to consider alternate ways in solving transportation issues. ITE members should be on the lookout this month for guidance on how to deal with traffic counts and studies during a pandemic. Emerging “big data” sources are allowing us to look at data in different ways. These new data approaches are being put to the test in unique ways that will become more applicable in daily analysis. Commute trip reduction through virtual work-from-home practices are altering travel patterns that will be a legacy beyond the pandemic.

Transportation professionals are constantly finding innovative ways to shape our communities. In this edition of *ITE Journal*, you will learn more about roundabout techniques and interchange configurations—the details and context of these designs can improve how people can navigate their transportation system.

Setting speed limits is another area we can help all road users have a better experience. Our streets can be safer if we shed single-track mindedness about 85th percentile speed, opening our eyes to a balanced approach of context, characteristics, users, and the science of speed distribution. Just as we don’t use the exact same science that launches a moon rocket to make a racecar go fast, we should not use the same science for freeway speed studies as we would neighborhood or urban street speed studies. With proper context, both can be great.

This new experience might become more cost and time efficient. Consider the idea of using a few simple facility types with ranges of target speed limits, then using knowledge of context, characteristics, and users to position where in the range the limit should go. For example—

- **Rural Freeway** (65-75 mph)
- **Urban Freeway: Access < 1 mile** (50-60 mph)
- **Rural/State Highway** (45-55 mph)
- **Urban/Suburban Arterials: 5/7+ lanes** (35-45 mph)
- **Urban/Suburban Arterials: 2/3/4 lanes** (25-35 mph)
- **Collector** (25-35 mph)
- **Neighborhood and CBD Local Streets** (20-25 mph)
- **School Zones** (15-20 mph)

**Target Speed Ranges by Facility Type.**

<table>
<thead>
<tr>
<th>Type</th>
<th>Speed Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Zones</td>
<td>15-20 mph</td>
</tr>
<tr>
<td>Neighborhood and CBD Local Streets</td>
<td>20-25 mph</td>
</tr>
<tr>
<td>Collector</td>
<td>25-35 mph</td>
</tr>
<tr>
<td>Urban/Suburban Arterials: 2/3/4 lanes</td>
<td>25-35 mph</td>
</tr>
<tr>
<td>Urban/Suburban Arterials: 5/7+ lanes</td>
<td>35-45 mph</td>
</tr>
<tr>
<td>County Rural Unpaved</td>
<td>30-45 mph</td>
</tr>
<tr>
<td>Rural/State Highway</td>
<td>45-55 mph</td>
</tr>
<tr>
<td>Urban Freeway: Access &lt; 1 mile</td>
<td>50-60 mph</td>
</tr>
<tr>
<td>Urban Freeway: Access &gt; 1 mile</td>
<td>55-65 mph</td>
</tr>
<tr>
<td>Rural Freeway</td>
<td>65-75 mph</td>
</tr>
</tbody>
</table>
Intersection and Street Design

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2020 ITE Annual Meeting and Exhibition, Reimagined

As the COVID-19 pandemic started to unfold, it quickly became clear that we would not have the ability to safely gather together for the 2020 ITE Annual Meeting and Exhibition in New Orleans, LA, USA. As you can imagine, this was very disappointing for both the ITE staff and the wonderful group of volunteers on the Local Arrangements Committee (LAC) supporting us.

Planning for the Annual Meeting starts almost as soon as the prior year’s meeting concludes. By February, we had already assembled an outstanding technical program. Once we knew we could not meet in person, we monitored what other associations were doing and thought through a number of alternatives. Our goal was to bring as much content to as many people for the lowest price possible.

We decided to spread the technical part of the program over the first two weeks in August, staying away from Mondays and Fridays to minimize interference with business and family time. We set the time of the sessions to fall within the business day on both the east and west coasts. We got creative with the structure of our poster sessions and integrated the workshops into the program, making adjustments to explore COVID-19 and its impacts. We put together a great slate of social events including morning yoga and meditation classes, a cooking class with Cacciatore Mike and Luigi Dan, and District-sponsored happy hours.

An online Exhibitor Showcase is available to all attendees, ITE members, and other transportation professionals at no charge (individuals will still need to sign up to participate) from August 4 to 20. You can take advantage of this opportunity to learn about the latest products and services, especially important now as organizations navigate the changes brought out by COVID-19. We created full-, weekly-, and daily-registrations at a low price. All sessions recordings can be accessed through the end of October, providing the opportunity to earn up to 67 PDHs. Public agencies sending five or more staff receive special discounted pricing. To encourage broad participation in our Council and Committee meetings, we moved them to the third week in August. There are no registration requirements or fees for these meetings—see page 15 for more details on how to participate.

While it will not be the same as being together, we hope it is the next best thing. We are excited about the opportunity to reach members that could not come to New Orleans, giving them a sense of what an ITE Annual Meeting and Exhibition is like. I want to recognize all of the hard work and creativity from the ITE staff. Pivoting from an in-person to a virtual meeting while adjusting to working remotely was not an easy task. Also, a big thanks to the Southern District, our LAC Co-Chairs Diane Hammonds, P.E., PTOE (M) and Alison Cattarella-Michel, P.E., PTP, PTOE, RSP1 (F), and all of the LAC members for their support—we will see you in New Orleans in 2022! And a shout-out to our sponsors and exhibitors—particularly our title sponsors—Econolite, Kimley-Horn, and Miovision—thanks to all of you who have stayed with us through the transition to an online meeting. Your support is instrumental to ITE’s success. I encourage you all to check out what this year’s event has to offer, and hope to “see” many of you during the meeting. As always, you can reach me at jpaniati@ite.org or on Twitter, @JPaniatiITE.

Jeffrey F. Paniati, P.E. (F)
Executive Director and Chief Executive Officer
SIDRA INTERSECTION 9

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SI-9 is out now! This is a major new version of our micro-analytical traffic engineering software package. You can now easily configure and analyse complex networks of up to 50 Sites!
Obituaries

ITE recently learned of the passing of the following member. We recognize him for his contributions to ITE and the profession, and send condolences to his family.

Herman Haenel, P.E. (F) of Austin, TX, USA passed away on June 13, 2020. He was a Life Member of ITE. Herman graduated from the University of Texas at Austin in June 1955, and the Yale Bureau of Highway Traffic at Yale University in June 1959. He worked for the Texas Department of Transportation (TxDOT) from 1955 until he retired in 1990. He then worked as a consultant and taught traffic engineering and management courses for the Texas Engineering Extension Service at Texas A&M until 2000. His work primarily involved traffic and transportation operations, management, and safety.

He enjoyed working on the implementation of traffic research. He also served in the United States Army Reserves (Corps of Engineers) for eight years, retiring as Captain. Herman was a member of ITE, serving as the president of the Texas District of ITE (TexITE) from 1989-1990, and served on the Transportation Research Board and the National Committee on Uniform Traffic Control Devices. Among various awards, he especially valued the TxDOT Gibb Gilchrist award for outstanding service.

As Herman’s friend James “Jim” C. Williams, P.E., Ph.D. (F) recalls, “Herman emphasized education. He organized many of schools the district and city traffic engineers. He made every effort to make sure that the traffic engineers in Texas had plenty of opportunities to stay abreast. Herman had a great knowledge and love of the profession. Not just the nuts and bolts of it, but why we were doing what we were doing. He had a significant impact on those who worked for him.”

ITE Journal would like to extend thanks to TexITE for contributing this obituary.

New Members

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

Canadian
Ihtesham Ahmad, P.Eng.
Daphne Wee, P.Eng.
Elysia Leung, MCIP, RPP
Garfield Dales
Dania Lissette Carrillo
Satinder Kaur Pabilia, P.Eng.
Yumeng Chen, EIT, LEED GA
Katerina Bisbicis, EIT
Jacqueline Van Vliet
Justin Godard
Jufiker Hassan, P.Eng.
Titus Joseph
Rahanuma Wafa, P.Eng.
Diana Samson, P.Eng.
Gabrielle Michelle Hogler
Austin Louis
Rayman Singh Dhadda
Jason Neill
Felipe Osorio, CET

Florida Puerto Rico
Seyedbehzad Aghdashi
Ramya Kamini
Bjorg M. Olaf, P.E.
Shawn Ocasio
Constanza Suarez, P.E.
Karl Robert Oliver Hallstrand

Global
Wuyang Chen
Paul Ghan
tous

Great Lakes
Jon R. Buckles

Mid-Colonial
Emily Dalphy

Midwestern
Shihao Pang, E.I.
Steve Frisbee, P.E.
Sunny Farmahan
Katie Biggs
Ehsan Montazeri, P.E.

Mountain
Jesse Gutierrez
Anthony Johnson
Ivana Vladisavljevic, P.E.
Trevor Egan, P.E.
Audrey Stoltzfus
Douglas Ostler
James R. Pettus, E.I.T
Faith Kelley
Donald Garcia

Norththeastern
Michael Lalone
Natasha Fatu, P.E., PTOE
John Lockaby
Marc Mancini
Brandon McCloskey
Colleen Jost
Christopher J. D’Achille
Kelvin Maurice Russell
Jasmine Tiara Brown
David M. Long
Diego Gonsalvez
Jennifer Babowicz
Jay Bertoli
Mark Carlson
Anthony Chorolis
Raymond Culver
Jose Duverge
Fiona Flynn
Dennis Gehring
John Guze
Chuck Harlow
Shraddha Joshi
Katherine Klose
Mike Martula
Jason Quimet
Ken Radziwon
Tyler Rudolph
Ajeet Sandhu

Southern
Clifton Goolsby, P.E., PTOE
Chase Smith
F. Royal Hinshaw, P.E.
Kelly Becker
Allen Parrish
Michael Morgan Falls
Ty A. Tucker, E.I.T.
Kristine T. Czach
Justin M. Rogers
Rebecca McLaughlin

Texas
Matthew Vecheion
Aleah Qureshi
Chris Reyna

Western
Olesya G. Tribukait, P.E.
Monica Krueger
Rachel Junken
Ricardo Light
Andrew Janzen
Joshua B. Bailey
Vin H. Cay, P.E.
Jesse J. Moore
Joanna B. Ortiz
Candido Ramirez, P.E.
John Guze
Chuck Harlow
Shraddha Joshi
Katherine Klose
Mike Martula
Jason Quimet
Ken Radziwon
Tyler Rudolph
Ajeet Sandhu

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.
Eberle Design, Inc. (EDI), leader in vehicle detection, intersection safety monitoring and access control products, announces the launching of its new website (www.editraffic.com) to include a full product line-up for both EDI and RAE (Reno A&E) brands.

As a part of EDI’s ongoing efforts to enhance resource accessibility, the new website allows for visitors, of all experience levels, to navigate with ease while they expand their product knowledge of EDI/RAE brands.

**About Eberle Design**
Eberle Design, Inc., based in Phoenix, Arizona and is a global market leading manufacturer of mission critical intersection safety monitoring, vehicle detection solutions, and peripheral electronics for the traffic control, parking/access, emergency response and rail markets. Products include infrastructure control components that allow transportation and parking/access control professionals to integrate, automate and manage intersections, roads and access points easily, efficiently and safely. Eberle Design has more than five (5) million operational devices deployed worldwide to enhance motorist and pedestrian safety. Eberle Design is ISO 9001:2015 registered, celebrating 40 years of excellence in the traffic industry.

**Quality Products Saving Lives®**

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Sustainable Transportation Technical Brief Released

ITE recently released a technical brief explaining how the transportation profession can incorporate sustainable practices into all aspects of transportation policy, planning, implementation, operations, and maintenance from the Sustainability Standing Committee. The document explores what sustainability means to the profession as a whole, how it affects the transportation professional, and takes a look at the current state of the sustainability practice. To read the entire Quick Bite on Sustainable Transportation: An ITE Technical Brief, visit www.ite.org/sustainabletransportation.

Community Corner

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

Maser Consulting Supports Local Food Banks through Mask Initiative

No one could have anticipated the effects of the COVID-19 virus, or how it would affect our employees and work environment. But once Maser’s employees figured out the important role face masks would play in the coming months, they jumped into action!

Since most of our employees began working from home in March, the initial concern was for our coworkers in the field who would

ITE Talks Transportation Podcast

New from the MaaS/MOD Series

The Impact of Innovation on MaaS/MOD with Vincent Valdes

Vincent Valdes joins the ITE Talks Transportation Podcast to talk about the role of mobility as a service (MaaS) and mobility on demand (MOD) in public transit and how innovation can improve travel for users and transportation networks as a whole. The podcast was recorded while Vince was at the FTA Office of Research, Demonstration and Innovation. This summer, he transitioned roles to become president and CEO of the Southwestern Pennsylvania Commission.

Lynn LaMunyon, P.E., PTOE, IMSA II (F) (right) with her niece modeling masks they made to donate to the cause.

Sustainable Transportation: An ITE Technical Brief

Sustainable Practices in Transportation Defined

Sustainable transportation as an organizing principle considers the ability to provide for society's current needs without compromising the interests of future generations. The ideas of sustainability are not necessarily new but are gaining more traction in recent years due to social, economic, and political climates. In fact, basic ideas surrounding sustainable practices had been formally expressed back in the 1980s. In recent years, "sustainability" has become a buzzword across multiple industries. In a general sense, sustainability refers to a system's ability to continue without failing, and as a practice usually refers to the "triple bottom line" of sustainable economies, equitable societies, and ecological systems. Sustainability emphasizes the integration of human activities and therefore the need for coordinated planning among different sectors, types, and jurisdictions. It expands the objectives, impacts, and options considered in a planning process. This helps ensure that individual, short-term decisions are consistent with strategic, long-term goals.

This technical brief seeks to explain how the transportation profession can incorporate sustainable practices into all aspects of transportation policy, planning, implementation, operations, and maintenance.

Transportation is essential to sustainability and sustainability is applicable to communities of all sizes. The only difference between large and small communities are specific areas of focus. Planning for a sustainable society—specifically sustainable transportation—has secondary benefits for the quality of life for all.

Supporting cycling and walking promotes healthy, active, and engaged communities through programs including walking school buses and Safe Routes, which is focused on young students and their parents. In the long term, this practice is also beneficial for the healthcare system by reducing pressures on other functions such as our health care systems. Where the practice of designing a safe, inclusive space for all ages, the practice of sustainability takes it a step further. This practice not only promotes transportation as a service (MaaS) and mobility on demand (MOD) in public transit but also encourages innovation in the field. The podcast was recorded while Vince was at the FTA Office of Research, Demonstration, and Innovation. This summer, he transitioned roles to become president and CEO of the Southwestern Pennsylvania Commission.

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

ITE Talks Transportation Podcast

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Lynn LaMunyon, P.E., PTOE, IMSA II (F) (right) with her niece modeling masks they made to donate to the cause.
need personal protection. Since commercial masks were becoming scarce, many employees took it upon themselves to begin making masks on their own and donating them to keep our field personnel safe.

But the need became far greater than anticipated and to keep up with the demand, Nicole Armbrust, operations manager, assembled a handful of employees to centralize the mask making efforts and formalize the distribution process. Once the balance of need was reached, they began selling the masks which maintained the level of availability. The sales profits were used for supplies and channeled through the Maser Consulting Foundation for donation to local food banks to assist in their food distribution efforts.

“The COVID pandemic came out of nowhere and unexpectedly affected so many people within our communities,” explains Lynn A. LaMunyon, P.E., PTOE, IMSA II (F), senior principal and discipline leader for Traffic and Transportation Services at Maser Consulting and one of the initiative contributors. “One day they were doing fine, and the next they were wondering how they’d feed their families.”

The Maser Consulting Foundation is a 501 (c)(3) organization established to serve the firm’s charitable efforts in making a direct impact supporting a wide variety of community based causes. What began as an effort to protect their own has turned into a companywide effort to support local communities during the pandemic.

ITE Journal would like to thank Maser Consulting for submitting this Community Corner write-up. itej

Masks come in all shapes and sizes! Here are a few of the models that Lynn and her niece made to donate.

We want to hear from you!

Have you, your Section, or Chapter taken on a community project or provided assistance to a non-profit organization? Large or small, we want to hear about it! Please send photos (300 dpi or higher) along with a write-up (no more than 200 words) to Pam Goodell, pgoodell@ite.org for inclusion in a future issue of Community Corner.
Save Lives Almost Anywhere With Roundabouts

How do roundabouts save lives?

According to the AAA Foundation for Traffic Safety, more than two people are killed every day in the United States as a result of red light running. Roundabouts eliminate that risk by controlling speeds and removing the possibility of higher speeds multi-vehicle collisions. This is just one of the ways installing roundabouts moves us closer to safer roads and to meeting our Vision Zero goals.

ITE issued the first policy on roundabouts in 2012. In April 2020, that policy was revised to read ITE “recognizes the safety, operational, and sustainability benefits of well-designed roundabouts for all users including walking, biking, and driving and recommends the use of roundabouts be considered when intersections are being planned, designed, or modified.”

The ITE Roundabout Standing Committee, part of the Traffic Engineering Council (TENC), stands firmly behind this statement and has brought together an outstanding group of international engineers, planners, practitioners, researchers, advocates, and enthusiasts to help the ITE community with the resources to be able to implement modern roundabouts across the globe. Collectively, we come together with the ultimate goal of helping save lives by accelerating the transition to safer intersections: roundabouts!

Learn and Contribute

The Roundabout Committee works closely with other working groups, committees, and various professional organizations and agencies to continually improve roundabout planning, design, and implementation around the globe. We work to make sure ITE has a voice in helping to develop and improve practices in many aspects of roundabout implementation. The committee also seeks to help identify emerging trends, accelerate the use of roundabouts, and be a resource for practitioners, agencies, lawmakers, developers, and the whole ITE community. To become a member of our online community, please add yourself to the Roundabout Standing Committee’s ITE e-Community.

2020-2021 Vision

The committee’s 2000-2021 vision is to continue to focus on affordable roundabouts, and also focus on the benefits of roundabout corridors. Our other goals are:

- Providing meaningful content. What would be meaningful for you?
- Education
- Dispelling myths
- Removing roadblocks. What are roadblocks you see to planning and designing roundabouts?
- Recognizing those who build roundabouts

Affordable Roundabouts

The committee continues to focus on highlighting well-designed, affordable roundabouts to help dispel the common misconception that roundabouts cost more than signals. The focus of this effort is to highlight projects where roundabouts were designed and constructed at a cost equal to or less than the signalized alternative. If you have not yet read the article that was featured in the March 2018 ITE Journal, take a moment to read it at https://bit.ly/EscalatingRoundabouts.

The Roundabouts Committee hosts two or more webinars a year featuring presentations on low-cost roundabout projects. Be on the lookout for the next webinar! Over the past two years, the committee has seen such great examples of affordable roundabouts, we worked with ITE staff to develop an award for Affordable Roundabouts. The winner will be announced at this month’s virtual ITE Annual Meeting and Exhibition.
National Roundabouts Week
Each year during the third week of September, the Federal Highway Administration and ITE celebrate National Roundabouts Week. During this week, we encourage everyone to flood social media with roundabout information, facts, and examples using the hashtag #RoundaboutsWeek. This year, the committee will again participate by posting content on social media. Please like, share, and comment!

Developing Trends
In January of this year, ITE released the Developing Trends Report, found at www.bit.ly/dtr20, which features two developing trends for roundabouts:

Accelerating Growth of Roundabouts (pg. 23)
Roundabouts are on the rise across North America due to various factors, including their significant safety benefits. Are you ready? As more agencies embrace alternative intersections and implement Intersection Control Evaluation policies, which require one to look at alternative intersection types, we are seeing more roundabouts being included in planning documents and being constructed. This trend highlights the importance of having experienced roundabout professionals on your team to ensure the roundabouts are implemented correctly, especially if they are relatively new to the area, or complex.

Missed Opportunities for Roundabouts (pg. 24)
As we look back on past designs and construction projects, we are seeing more and more unused roadway infrastructure. Facilities were designed to accommodate growth, and due to various factors, that growth did not occur. If a roundabout were constructed instead of the traditional intersection, agencies could have realized significant savings in cost and impacts. The operational advantages that roundabouts provide can result in cost savings and reduction in the footprint of the project, and have considerable positive effects on the traffic and roadway planning aspects of a project with slower speeds and ability to enhance safety and mobility for all modes. Additionally, while they may have wider nodes, they can ultimate result in narrower roads.

Look for the next set of developing roundabout trends in 2021.

Getting Involved
Are you passionate about roundabouts? There are many ways to get involved from small, one-time tasks to larger roles on projects or the committee. Please reach out to the committee at any time to talk about your next opportunity! itej

Contact
To get more involved, or to share feedback on the 2020-2021 Vision outlined in this article, please reach out in the ITE e-Community forum or by contacting the chair, Lindsey Van Parys, at lindsey.vanparys@ghd.com.

1. ITE’s Policies can be found at https://www.ite.org/pub/?id=e1ba044%20d2354%20d714%2053e%209e190b4754b
Communicating Technical Topics to Non-Technical Audiences In-Person and Virtually
An ITE Online Interactive Workshop powered by Shelley Row, P.E., CSP (F)
Shelley Row and ITE have updated this series’ sessions to include information that is helpful to communicate with non-technical audiences virtually!

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

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

Top Management Skills for Technical Managers – a 10-Part Webinar Series
ITE is proud to partner with Shelley Row, P.E., CSP (F) to provide you with access to this valuable webinar series. When you register, be sure to use the special codes specifically for ITE.
Take advantage of working from home to grow your management skills so that your management competence equals your technical competence. Shelley created this webinar series to include the top 10 skills she had to learn when she became a manager. Because, let’s face it, technically skilled professionals don’t have the best reputation as managers. It’s time to change that.
Each webinar includes a live interactive event, recording of the webinar, worksheet, and supplemental articles to support your learning. And the series is priced to be affordable for all. The complete list of all webinars is available at https://ilinstitute.teachable.com/.
Access individual webinars for less than $50! Group discounts also available.

Upcoming Live Webinars
Access Management
August 20, 2:00–3:30 p.m. ET 1.5 PDH credits
Route Guidance Data
August 25, 2:00–3:30 p.m. ET 1.5 PDH Credits
Urban Freight
August 27, 2:00–3:30 p.m. ET 1.5 PDH Credits
#ITE2020 COUNCIL AND STANDING COMMITTEE MEETINGS

If you’re interested in participating in one of ITE’s Technical Councils and Committees, or want to learn more about these groups and their activities, #ITE2020 is the perfect time to get involved! Check out this list of meetings taking place August 18-20. Attendance is free, but RSVPs are required. Visit https://bit.ly/CouncilMeetings2020 for more information.

**Tuesday, August 18, 2020**
- 11:00 am - 1:00 p.m. ET: Coordinating Council
- 1:30 p.m. - 3:00 p.m. ET: Education Council
- 1:30 p.m. - 3:00 p.m. ET: Vision Zero Standing Committee
- 1:30 p.m. - 3:00 p.m. ET: Urban Goods Movement Standing Committee
- 4:00 p.m. - 5:30 p.m. ET: Joint Rail Grade Crossing Standing Committee
- 4:00 p.m. - 5:30 p.m. ET: Transportation and Health Standing Committee
- 4:00 p.m. - 5:30 p.m. ET: Public Agency Council

**Wednesday, August 19, 2020**
- 11:00 am - 12:30 p.m. ET: SlimCap Working Group
- 11:00 am - 12:30 p.m. ET: Ethics Standing Committee
- 11:00 am - 12:30 p.m. ET: Complete Streets Council
- 11:00 am - 12:30 p.m. ET: TSMO/IT Coordination Project Discussion Session
- 1:30 p.m. - 3:00 p.m. ET: Data Driven Safety Analysis (DDSA) Working Group
- 1:30 p.m. - 3:00 p.m. ET: Planning Council
- 1:30 p.m. - 3:00 p.m. ET: TSMO Council
- 4:00 p.m. - 5:30 p.m. ET: Transportation Forensics and Risk Management Standing Committee
- 4:00 p.m. - 5:30 p.m. ET: Consultants Council
- 4:00 p.m. - 5:30 p.m. ET: Younger Member Committee

**Thursday, August 20, 2020**
- 11:00 am - 12:30 p.m. ET: Smart Communities Standing Committee
- 11:00 am - 12:30 p.m. ET: CAV Standing Committee
- 11:00 am - 12:30 p.m. ET: Roundabout Standing Committee
- 1:30 p.m. - 3:00 p.m. ET: Industry Council
- 1:30 p.m. - 3:00 p.m. ET: Transportation Safety Council
- 1:30 p.m. - 3:00 p.m. ET: Sustainability and Parking Standing Committee
- 3:00 p.m. - 5:30 p.m. ET: Traffic Engineering Council
- 4:00 p.m. - 5:30 p.m. ET: Transportation Operations Manual Working Session
- 4:00 p.m. - 5:30 p.m. ET: MaaS/MOD Steering Committee

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**Introducing ITE's Transportation Impact Analysis Training Program**

The ITE Transportation Impact Analysis (TIA) Training Program provides technical guidance for public and private sector transportation professionals with responsibility for the review or preparation of TIAs.

This new blended learning training program consists of eight one-hour sessions providing a full understanding of the practice of transportation impact analysis. Blended learning combines live, online instructor-led sessions and pre-recorded training modules that provide maximum flexibility and educational value.

ITE’s training program includes three sessions (September 16, October 19, and November 9) that are live, instructor-led discussions including real-world case studies and coverage of new and emerging issues. The remaining five sessions are pre-recorded and can be watched at the pace and schedule of the student within the program period. Each participant will be awarded a certificate upon passing a knowledge quiz at the conclusion of the course.

This program is designed for professionals with all levels of experience. Transportation professionals that are relatively new to the field will benefit from the comprehensive coverage of all aspects of the TIA development process. Persons with extensive TIA experience will benefit from discussions on advanced topics and emerging practices (i.e., multimodal analyses, VMT) and general exposure to practices in example jurisdictions throughout the United States and Canada.

**Instructors**
Kevin G. Hooper, P.E., ITE Strategic Projects
Lisa Fontana Tierney, P.E., ITE Traffic Engineering Senior Director

Guest instructors: Subject matter experts with experience in TIA preparation and review

For more information, visit https://www.pathlms.com/ite/courses/21599.
The #ITE2020 Exhibitor Showcase is open at no charge to all #ITE2020 attendees, ITE members, and transportation professionals.

Visit product and service providers that can help you with business solutions to help you do your job better and navigate the impacts of the COVID-19 global pandemic.

**How to Access the #ITE2020 Exhibitor Showcase:**

- Registration is required although there is no charge. Access registration here: www.ite.org/annualmeeting
- Once you are registered, use your login credentials to login into the Exhibitor Showcase here: https://www.pathlms.com/ite/courses/18309
- Use the list of exhibitors by category to find specific exhibitors, or simply click on the logo of specific exhibitors.

**Participating Exhibitors**
(as of July 16)
AAA Foundation for Safety
Bosch Security Systems
Carmanah Technologies
Econolite
ITE
Iteris
Marr Traffic
McTrans Center
Miovision
National Data and Survey Services
PTV Group
Traffic Technology Services, Inc.
Transoft Solutions
Transportation Professional Certification Board
Ucanny Vision

**More Info:** www.ite.org/annualmeeting
2020 EVENTS

Due to the fluid nature of COVID-19, event dates and times are subject to change. For an up-to-date listing of ITE event information, please visit https://www.ite.org/events-meetings/event-calendar/.

ITE INTERNATIONAL ANNUAL MEETING AND EXHIBITION
August 2020 | See page 25 for more information

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

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

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

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

WHERE IN THE WORLD?

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

Help ITE Celebrate 90 Years by Giving $90

In honor of ITE’s 90th anniversary year, please consider donating $90 to support the ITE Legacy Fund. The Legacy Fund helps support our Diversity Scholars, the student-led Student Leadership Summits, LeadershipITE scholarships, the STEM competition, and the Matson and Hammond Mentoring Program. Throughout our 90th anniversary year, members will have several opportunities to contribute to the $90 for 90 campaign. Visit bit.ly/ITE90for90Campaign to give. To see who has already donated, go to bit.ly/90for90Contributors. Make a difference by adding your name to the list today!

bit.ly/ITE90for90Campaign

Our 90th Anniversary is a time to celebrate ITE’s many programs and resources developed to serve our members and colleagues; the COMMUNITY of transportation professionals!

Jenny Grote, P.E., PTOE, PTP
ITE Past President

www.ite.org August 2020 17
Designing Women
Two ITE leaders share more about their experience implementing road design principles, their passion for safety, and the value of professional development in their careers.

Lindsey Van Parys, P.E., QSD/P (M)
Project Manager, GHD

Education
Bachelor’s of Science, Civil Engineering, California State University
Bachelor’s of Science, Health Science and Spanish, California State University

ITE Involvement
Roundabout Standing Committee, Co-Chair
Incoming Coordinating Council Co-Vice Chair, 2021

Professional Affiliations
Transportation Research Board: Standing Committee on Roundabouts
American Society of Civil Engineers
Women’s Transportation Seminar
Young Professionals in Transportation

Fun Fact
Lindsey loves to travel and explore the world and is a yoga enthusiast! Each year, she tries to explore one new place in the United States and one outside of the country, doing yoga all along the way.

ITEJ: You’ve managed several projects from conception to construction. What are some of the key elements to successfully implementing transportation projects?
VAN PARYS: In my experience, the people make all the difference. Having the expertise and experience in navigating the type of project being implemented is invaluable. Having a team that is adept, agile, innovative, and that you enjoy working with, is the key to taking projects from crayon through to concrete. Specifically, two key elements to successfully implementing transportation projects are earning community support and a proactive mindset in all aspects of delivering the project. Being proactive allows you identify, plan for, and be one step ahead of potential risks. As for the community support, even on challenging projects, providing opportunities for the community to be heard can go a long way in the success of the project. Additionally, understanding and leveraging opportunities, as well as challenges, is a vital component to help ensure the success of the project.

ITEJ: What types of innovations are you seeing in the realm of roundabouts and roadway design that excite you?
VAN PARYS: According to the World Health Organization, more than one million people die on roads globally, and more than 20 million (yes, 20 million) are injured. This is unacceptable and avoidable. The innovations that excite me the most are the ones meant to save lives and help us get closer to our global safety goals. Advancements that help identify the root causes of systematic safety issues will help us make fundamental changes in how we plan, design, and implement our transportation networks. This is why I am so passionate about roundabouts! The documented safety benefits of roundabouts make them a fantastic tool in the safety toolbox. Roundabout developments that excite me the most are when they are used to retrofit an existing roadway corridor to repurpose travel lanes into other uses, such as active transportation or water quality. How can roundabout corridors help to repurpose roadways? When used in a series, roundabouts can improve traffic flow to the point where a four-lane signalized corridor can be converted to a two-lane roundabout corridor while meeting the same levels of service. This opens up one travel lane in each direction to be repurposed for other uses. Ultimately, what excites me most is seeing a design in motion that meets or exceeds all safety predictions, saves lives, and improves the community and quality of life for all users.

Lindsey “on top of the world” at Rangitoto Island, New Zealand, practicing yoga.
**ITEJ:** You have been active as a leader at ITE and in other professional organizations. What would you say to encourage others who may be considering joining?

**VAN PARYS:** Being involved in ITE allows you to become an agent for change and advancement by just being a member, and even more so by volunteering to take on a leadership role or micro volunteer opportunities. Involvement in organizations allows us to make a considerable contribution to the way we work together and for our clients. Your involvement also increases your company brand and your personal brand recognition. Typically, leadership roles are held by people who have been engaged for a long time—so now is a great time to start or to recommit. I recommend if you are not already part of a professional organization, get involved today!

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**ITEJ:** As a safety engineer, what is the importance of community outreach and involvement when designing roads? How do individual communities need to be uniquely considered for these designs?

**ISEBRANDS:** Whether it is walking, biking, or driving, every trip we take usually begins and ends at someone’s home. Our mission as roadway designers is to get people home safely. For every project, we need to understand its purpose and strive to uphold the values, vision, and goals of each community. By working with the public, data-driven roadway design alternatives are produced that complement those local values. This also addresses existing and potential safety risks to road users—which is important because, as I said, everyone deserves to get home safely.

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**ITEJ:** Being a woman in the engineering profession may put you in the minority, but there are several inspiring leaders in the field. Who has been instrumental to you in your career?

**ISEBRANDS:** Throughout my career, I’ve been inspired and mentored by many different people in the transportation profession. I worked very closely with some on projects, and others who influenced me from afar. To me, the most important aspect of being inspired by someone is watching how they interact with and listen to others, as well as how they use innovation and their intellect to solve challenges. Some of the biggest inspirations to me are Dr. Marie Walsh, the former director of Louisiana’s Local Technical Assistance Program, American Association of State Highway and Transportation Officials Deputy Director (and former FHWA Acting Administrator) Brandye Hendrickson, and Dr. Eugene Russell, P.E., RSP1 (F), Professor Emeritus of Civil Engineering at Kansas State University and a past chair of TRB’s Committee on Roundabouts.

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**ITEJ:** ITE was excited to learn that you were recently named FHWA’s Engineer of the Year and received the FHWA Administrator’s Award for Engineering Excellence. What did those recognitions mean to you?

**ISEBRANDS:** It is a true honor to be awarded both the FHWA’s Federal Engineer of the Year and FHWA Administrator’s Award for Engineering Excellence. I work with so many talented and dedicated people within FHWA. My colleagues challenge me every day to do the best with the resources and abilities that I’ve got. I am passionate about our work, and believe we can eliminate roadway deaths and serious injuries on all public roads. We are making headway, but there is still a lot of work yet to do.

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Hillary Isebrands, P.E., Ph.D. (M)
Senior Roadway Safety Engineer and Team Lead, Federal Highway Administration

**Education**
Iowa State University:
Ph.D., Civil Engineering;
Master’s of Science, Civil Engineering;
Bachelors of Science, Civil Engineering

**ITE Involvement**
Lane Widths Task Force
(under the Complete Streets Council), Chair
Roundabout Task Force, Past Chair

**Professional Affiliations**
Transportation Research Board
National Society of Professional Engineers
American Society of Civil Engineers

**Honors and Awards**
NSPE Federal Engineer of the Year
Top 10 Finalist, 2020
FHWA Engineer of the Year and
FHWA Administrator’s Award for
Engineering Excellence, 2019
U.S. DOT Secretary’s Safety Team Award, 2019
CalTrans Recognition Award, 2017

**Fun Fact**
Hillary enjoys spending time with her family outdoors, road trips, and roundabouts!
Southern District Administrator

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

Craig Michael Hanchey, P.E., PTOE (F) has been the District Administrator for the Southern District since 2010. After his service as past president of the District, he was approached and asked to take on the newly formed position. The two biggest reasons to create the District Administrator role were to avoid the constant turnover in treasurer functions and to provide leadership continuity on the board. In addition to typical treasurer duties, Hanchey’s responsibilities include handling most administrative functions for the District including elections, tax returns, corporation filings, and insurance, among other things.

“I really just enjoy being active in the District,” Hanchey tells ITE Journal. “The part of the job I enjoy most is working with the various boards each year and serving as their resource, facilitator, and historian. Over the years, we have changed the District’s financial position and have really built up a healthy reserve fund, which I am pleased to have been a part of.”

The Southern District has many notable initiatives, such as the Southern District Leadership Program that began in 2009. Based on membership surveys, senior District leaders developed a 14-module leadership training program that has been used to work with small groups to assist with character building and “starter” skill sets that empower leadership. Each group of workshop alumni is asked to volunteer by conducting similar training to small groups in their Sections. Program costs are controlled by using volunteer facilitators, and the District has provided seed money to each Section to help with any other expenses. The modules are continually being updated and improved and in the 10 years since its inception, 245 District members have completed the training.

Hanchey’s passion for transportation and his desire to pursue it as a career were fueled by some of the educators and early mentors he crossed paths with. “I was fortunate to have two great professors—namely, Dr. Olin Dart at Louisiana State University and Dr. Jack Humphreys at the University of Tennessee—that really inspired me to pursue a career in traffic operations and safety,” he says. “There really wasn’t any question in my mind what I wanted to do after school. Early in my career I had two great mentors in Ed Watt, P.E. (R) and W. Hibbett Neel, P.E. (H) who encouraged me to take advantage of the many benefits of ITE and provided me with opportunities to become active.”

As such, ITE has been a part of Hanchey’s entire 35-year professional career, and he is a Fellow of ITE. He began his involvement with ITE in graduate school where he served a student chapter officer. He is a past president and former Section Representative of the Deep South and Tennessee Sections of ITE and is a past president of the Southern District. He

Craig attending a 1980s theme party, hosted by the Southern District’s Affiliated Business Division.

Craig Michael Hanchey, P.E., PTOE (F)
Neel-Schaffer, Inc.
Executive Vice President
and East Region Manager

Education
B.S. in Civil Engineering, Louisiana State University – 1984
M.S. in Civil Engineering, University of Tennessee – 1986

Professional Affiliations
American Society of Civil Engineers
American Council of Engineering Companies
National Society of Professional Engineers

ITE Involvement
Past President of the Deep South Section – 1991
Deep South Section Representative – 1993-1994
Tennessee Section Representative – 1998-1999
Past President of the Tennessee Section – 2001
Past President of the Southern District – 2008

Awards and Recognition
Deep South Section Outstanding Member Award – 1993
Tennessee Section Edward E. Watt Volunteer Award for Distinguished Service – 2001
Southern District Joseph M. Thomas Young Member Award – 1994
Southern District Marble J. Hensley Outstanding Individual Activity Award – 2003
Southern District Herman J. Hoose Distinguished Service Award – 2014
believe that ITE’s facilitation of professional networking and connecting transportation professionals with colleagues that have similar interests is unlike any other organization. “ITE has also provided opportunities to improve my public speaking skills by making presentations at meetings and to develop leadership skills through service on committees and as an officer,” Hancey says. “Most important to me—I believe because of the culture of ITE—is that the people I have known at the Section and District levels have become some of my longest lasting friends.”

As a transportation professional, he still thrives on the impact of his work. “I am passionate about traffic engineering as a career because it is something that impacts daily life in a real way, like the benefits of retiming a signal system or implementing a safety project. And for the up-and-coming transportation professionals, I say be patient, and enjoy the early roles in your career. As your career progresses, you will miss the days of doing the hands-on engineering work as you move into leadership roles that focus your attention elsewhere.”

Getting to Know
ITE’s Southern District

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<th>U.S. States Covered</th>
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<th>Student Chapters: 25</th>
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<th>District Board Leadership</th>
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<tr>
<td>President – Becky Rogers, P.E., PTP, RSP1 (M)</td>
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<td>Vice President – Cindy Pionke, P.E. (M)</td>
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<td>Secretary-Treasurer – Alison Catarella-Michel, P.E., PTP, PTOE, RSP1 (F)</td>
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<td>Past President – Todd Long, P.E., PTOE (M)</td>
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<td>International Director – Kirsten Tynch, P.E., PTOE, LEED AP BD+C, ENV SP (F)</td>
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<th>Did You Know?</th>
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<td>Annual Meetings and Roll Call – The Southern District is proud of its Annual Meeting and the traditions that go along with it. Those include a roll call of Sections at the opening session: each Section gives a short and often humorous introduction of their members in attendance. The Affiliated Business Division (ABD) is also very active at the meeting, hosting open houses and a must-attend theme party.</td>
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| Traffic Bowl – ITE started its Student Traffic Bowl competition in 2010, but the Southern District has been holding a competition since 2005. The William H. Temple Scholarship Challenge Traffic Bowl is held each year at the District’s Annual Meeting. Prior to that, each Section holds their own competition to select the nine teams for the District competition. The ABD awards the winning team $3,000 and District provides the second and third places teams $750 each. Since 2005, a total of $72,000 has been awarded. |

| Scholarships – The eight Sections within the Southern District all have robust student scholarship programs. Two Sections began awarding scholarships in the mid-1980s and the rest started when the District provided seed money around 1990. Three Sections have provided more than $600,000 combined in scholarships. Last year, the eight Sections in the Southern District awarded $72,000 to 35 students. |

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<th>Historical Perspective</th>
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<td>• The Southern District originated as the Southern Section in 1953, and included the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and all of Virginia that was not included in the Washington, D.C. Section. Arkansas and Florida left in 1960.</td>
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<td>• Virginia was a part of the Southern Section until 1975 when it was issued a charter as its own Section. Virginia rejoined the Southern Section when the transition was made to the Southern District in 1988.</td>
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Looking Back: Transportation through the Decades

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

**1990s**

The 1990s saw a major change in terms of information technology and how information was shared. ITE stepped up to the challenge of delivering information at the speed of light by launching the ITE website, and answered the need for quality training online by launching the Online Learning Gateway. Other ITE Milestones included the formation of the Coordinating Council, the incorporation of the Transportation Professional Certification Board, and the first Professional Traffic Operations Engineer™ (PTOE) exam was held.

**Federal Transit Administration – January 1, 1991**

The Urban Mass Transit Administration became the Federal Transit Administration with the Department of Transportation.

**Transportation Equity Act for the 21st Century – January 1, 1998**

President Bill Clinton signs the Transportation Equity Act for the 21st Century, greatly increasing highway spending.

Gordon Linton, administrator of the Federal Transit Administration, testifying during the Senate Transportation and Infrastructure Subcommittee Transportation Equity Act in 1999.
Interstate Highway System Completed – October 14, 1992

The Interstate Highway System was completed with the opening of the I-70 near Denver, CO, USA. When measured in inflation-adjusted dollars, the system cost three times what was originally estimated.

Traffic on Interstate 405 in Los Angeles, CA, USA, circa 1990s.

ITE Presidents – 1990s

Richard F. Beaubien
1990
Started monthly President Messages in ITE Journal.

Leon Goodman
1993

“Communications skills is one of the most important assets of a transportation professional.”
— Jonathan Upchurch

Jonathan E. Upchurch
1991
ITE developed its first strategic plan.

Marsha D. Anderson
1994
First Woman President of ITE. Women’s Power Lunch was born (now Women of ITE) and digital ITE Journal was launched.

“Leaders are defined by actions. Not position.”

Alan T. Gonseth
1992

1995
Established the Annual Meeting Review Committee and ITE Journal Review Committee.

President Bill Clinton selects Federico Peña as Secretary of Transportation, making him the first Hispanic-American to serve in the role. During his term, which ended on February 14, 1997, he strongly supported investment in highway and transportation projects.

First Hispanic-American Secretary of Transportation – January 1, 1993

U.S. Department of Transportation

shutterstock/ Joseph Sohm

www.ite.org  August 2020  23
ITE Presidents – 1990s

“Anything is possible. Some things just take more time and effort.”

—Brian S. Bochner

Dennis L. Christiansen
1996
Long relationship between ITE and Texas A&M Transportation Institute.

Brian S. Bochner
1998

“It takes vision to make truly great transportation projects such as London’s new subway line, Crossrail, to become a reality.”

—Nazir Lalani

James R. Hanks
1997
Created the ITE Legislative Liaison position and testified to Congress on TEA-21.

Nazir Lalani
1999

“An average chef makes a better meal than the best cookbook.”

—James R. Hanks

Record-Setting ITE Annual Meetings
ITE had record attendance at its 67th Annual Meeting in Boston, MA, USA in 1997; that record was broken in 1999 at the Annual Meeting in Las Vegas, NV, USA, with more than 2,300 registrants.

Traffic Calming State of the Practice – August 1999
This publication by Reid Ewing was published by ITE with funding from FHWA. itej

1. The history of transportation in the United States was compiled with assistance from the U.S. Department of Transportation’s “History of Transportation” webpage, https://www.transportation.gov/50/timeline.
We Appreciate You!

Thank you to the many exhibitors and sponsors of the ITE Districts who financially supported them during the COVID-19 pandemic and the many cancellations or shifts to a virtual meeting.
ITE Congratulates Our New Honorary Member

and recognizes his notable and outstanding achievements to the transportation profession.

Peter T. McCombs, DistFEng NZ, CPEng (H)

Please join us as we recognize Peter during the Opening Plenary on Tuesday, August 4.
Intersection-related crashes contribute significantly to traffic fatality and injury numbers in the United States. Approximately half of all crashes and half of fatal and serious injury crashes occur at or near intersections. In 2018, 8,858 people were killed in intersection and intersection-related crashes.¹ In contrast, there were a total of 46 fatalities at roundabouts built in the United States over the nine-year period spanning 2005 to 2013, a time period in which the total number of roundabouts in the United States grew from a few hundred to a few thousand.² Roundabouts reduce the severity of intersection conflicts by lowering speeds and decreasing conflict angles, principles consistent with the Safe System approach to intersection design.
The turbo roundabout is a roundabout alternative that eliminates conflict points that are associated with lower-severity crashes that sometimes occur in modern 2x2 multilane roundabouts, roundabouts characterized by two entry lanes approaching two circulating lanes. The turbo roundabout was first designed and implemented in The Netherlands in the 1990s. Now there are more than 500 turbo roundabouts worldwide, with more than 370 in The Netherlands.

The turbo roundabout can achieve similar capacities as modern 2x2 multilane roundabouts with potential to enhance relative safety performance. With a limited dataset, an international crash-based safety evaluation concluded that conversion of an intersection from yield-control, signalized, or old-style rotary to a turbo roundabout was associated with a 76-percent reduction in the number of injury crashes. In addition, the geometric characteristics of the turbo roundabout result in operational outcomes that should help address lane selection, lane changing, and entering and exiting behaviors that can lead to the lower severity, multiple-vehicle crashes in 2x2 multilane roundabouts. This paper provides an overview of turbo roundabout features, design considerations, and performance characteristics, along with opportunities for U.S. implementation.

**Key Features**
The most notable differentiators of the turbo roundabout are its perpendicular entry, spiral road geometry, and lane dividers that require drivers to choose the proper lane prior to entering the roundabout in order to leave the roundabout in the desired direction. Figure 2 illustrates nine key turbo roundabout features, several of which are discussed in more detail in this article.

**Design Considerations**
Turbo roundabouts can be considered at any intersection where a roundabout is a potential alternative, particularly where traffic demand indicates the need for a multilane roundabout. Operational performance models for turbo roundabouts have not yet been developed for, or adapted to, the context of a U.S. driving population. However, international research suggests turbo roundabouts have similar capacities as 2x2 multilane roundabouts, and that the roundabout capacity models of the *Highway Capacity Manual* (HCM) are likely to represent reasonable capacity estimates for turbo roundabout approaches with up to two lanes. At modern multilane roundabouts in the United States, the capacity of one entry lane ranges from 300 to 1,100 passenger cars per hour (pc/h), depending on conflicting flow in the circulatory roadway, implying a total approach capacity ranging from approximately 600 to 2,200 pc/h for a two-lane approach.

There are five different types of turbo roundabouts—basic, egg, knee, spiral, and rotor turbo roundabouts—that differ with respect to central island design, number of circulating lanes, and number of approach lanes. The Federal Highway Administration’s (FHWA’s) *Turbo Roundabouts: Informational Primer* contains illustrations and capacity estimates for each of these turbo roundabout types. The selected type is driven by the desired capacity and the number of lanes on the approach roadways. Regardless of the type, there are four unique design elements of turbo roundabouts—turbo block, central island cutout, perpendicular approach geometry, and lane dividers.
The spiral alignment of a turbo roundabout is generated from the “turbo block,” a series of circular arcs with centers located at various points along a reference line known as a “translation axis.” The arcs of the turbo block represent the inner and outer edges of each lane. The inner radius of the turbo block, which represents the radius of the central island, is selected based on the anticipated size of the turbo roundabout. The turbo block and position of the translation axis differs for each turbo roundabout type. The following figure illustrates an example turbo block for a basic turbo roundabout at a four-leg intersection with the major road oriented along the x-axis and the following notation:

TR1: radius of the inside edge of the inside roadway.
TR2: radius of the outside edge of the inside roadway.
TR3: radius of the inside edge of the outside roadway; the difference between TR2 and TR3 is the width of the lane divider.
TR4: radius of the outside edge of the outside roadway.
Δυ: shift for the TR1 centers, equal to the difference between the values used for TR3 and TR1.
Δu: shift for the TR2/3/4 centers equal to the difference between the values used for TR4 and TR2.

Figure 2. Turbo roundabout characteristics.

Figure 3. Example turbo block.
The central island consists of a traversable portion (mountable apron) and a non-traversable portion. The non-traversable portion is typically used for signage, specifically a roundabout directional arrow sign, as well as landscaping and other features that increase conspicuity of the island.

Cutouts in the central island introduce the inside lane of the turbo roundabout on the applicable approaches. There are two developed methods for these cutouts: a curved entry and a flat entry. The curved entry was the original design in The Netherlands. It provides a smooth turning path for approaching vehicles but may result in more circulating vehicles entering the inside lane. The flat entry discourages this movement by circulating vehicles and is the current practice in The Netherlands.

Turbo roundabouts are built with little or no flare or deflection and smaller entry radii. The angle between entering traffic and circulating traffic is closer to a perpendicular entry. These approach features differ from modern multilane roundabouts in the United States, which typically include flare to gain some capacity increase and deflection to align entering vehicles “to the right of” the central island in the desired direction of travel. The entry geometry of a turbo roundabout generally does not channelize drivers into the circulatory roadway to the right of the central island, and the splitter islands generally do not have enough curvature to block a direct path of approaching vehicles to the central island. This approach geometry is based on the premise that it will be clearer to drivers that they are approaching an intersection that should be negotiated at lower speeds. Potential disadvantages include drivers errantly hitting the central island, making wrong-way left turn maneuvers to enter the roundabout, and making wrong-way exit maneuvers into entrance approach lanes. International literature emphasizes the importance of a roundabout directional arrow sign, placed in the central island in the line of sight of approaching drivers, that directs drivers to turn right. It also emphasizes the need for a forgiving design of the central island and sign in the case that either is struck.

A final key feature of the turbo roundabout is a lane divider between each circulating lane. In The Netherlands, this lane divider is raised but mountable, designed with little vertical profile and a rather flat slope to provide forgiveness for errant vehicles. The raised lane divider is introduced with a triangular demarcating feature that large vehicles can pass over.

Poland, Germany, and Canada have implemented turbo roundabouts without raised lane dividers, in part due to possible challenges these dividers present to motorcyclists and snow plowing operations. Alternatives to raised lane dividers for turbo roundabouts include striping and colored or textured pavement. While these options do not provide a physical barrier to lane changing, they still communicate this message to the driver. International research showed that turbo roundabouts with raised lane dividers experience lower crash frequencies than those with paint stripes only. However, there were lower severity crash outcomes in both cases. Only 7 percent of crashes in turbo roundabouts without a raised lane divider resulted in an injury compared to 4 percent of crashes with a raised lane divider.

Pedestrian and Bicyclist Considerations
Pedestrian and bicyclist accommodations at turbo roundabouts do not differ from other modern roundabouts. Reference can be made to the Roundabouts Informational Guide and Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities when considering these user groups. Key design considerations for pedestrians include placing sidewalks along the perimeter, separated with a landscaped strip or buffer; convenient crosswalks placed where drivers can be expected to yield and where they are less likely to be blocked by queued vehicles; and a splitter island that accommodates an accessible and comfortable crossing.

Bicyclist accommodation at turbo roundabouts is consistent with guidance in the Roundabouts Informational Guide. Bicyclists can either mix with traffic or utilize separate facilities.
if they are available. Where bicyclists use bicycle lanes or shoulders on the approach roadways, they should be terminated in advance of the circulatory roadway and crosswalks with enough length remaining for bicyclists to merge into traffic (and similarly, reintroduced on exit legs downstream of crosswalks). If bicyclists are required to utilize the sidewalk, sidewalks should meet shared use path width requirements. A pavement-level cut-through of the splitter island can be provided when bicyclists will cross at-grade on approaches.

**Motorcyclists**

While fatal crashes at roundabouts are much less likely than traditional three- and four-leg intersections, motorcyclists are overrepresented in those fatal crashes. The international literature on turbo roundabouts does not currently include insights on motorcycle-involved crashes at turbo roundabouts. There are several roadway features that can have a significant impact on motorcycle safety performance at turbo roundabouts, including the presence and location of raised lane dividers and curbing, surface friction, pavements markings, drainage, sight distance, radii, the roadside environment, and surface conditions. Specific concerns for motorcyclists in turbo roundabouts are the truck apron and lane divider options that are raised. Sloped curbing with minimal vertical reveal can provide a more forgiving environment to motorcycles compared to vertical or rolled curbing. Designers can also provide supplemental signage alerting motorcyclists to these elements of turbo roundabouts. Potential alternatives to the raised lane dividers were identified earlier in this paper.

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The design of some turbo roundabout features is influenced by the physical dimensions and turning characteristics of the larger vehicles that will use the intersection. The lane widths of turbo roundabouts are determined with consideration of the design vehicle, typically the largest vehicle anticipated to regularly navigate the intersection. The inside lane is often wider than the outside lane to compensate for the design vehicle maneuvering a smaller radius. As with other types of modern, multilane roundabouts, the decision to allow large vehicles to track across more than one lane while entering, circulating, and exiting or to stay within their lane considers other lane width-related considerations, such as right-of-way and safety performance for all vehicle types and users.

Turbo roundabouts include central truck aprons to better accommodate larger vehicles that need to navigate the intersection. Aprons can also be provided on the perimeter of the roundabout to provide additional turning space for large vehicles.

**Safety Analysis Methods and Results**

Given the brief history of turbo roundabouts, international safety studies based on an analysis of crash data are limited and not yet available in the context of a U.S. driving population. Dutch research analyzed crash data at seven intersections—including signalized, yield-control, and old-style rotary types—that were converted to a turbo roundabout and found a 76-percent reduction in the number of injury crashes. Polish research found that turbo roundabouts with a raised lane divider experience a lower crash frequency than those with paint stripes only. However, the research observed lower severity crash outcomes in both cases. Only 7 percent of crashes on turbo roundabouts without a raised lane divider resulted in an injury, compared to 4 percent of crashes with a raised lane divider.

Safety surrogate measures resulting from microscopic traffic simulations or field observations (i.e., time-to-collision, vehicle speeds, vehicle conflicts, incorrect movements, and incorrect paths) have also indicated that turbo roundabouts are likely to experience less frequent and less severe crashes than multilane roundabouts, due to the reduction of conflict points within the roundabout and the lower speeds required to navigate the smaller radii.

**U.S. Resources and Opportunities**

Based on international experience, turbo roundabouts are feasible options for U.S. intersections where a roundabout is a potential alternative, particularly where traffic demand indicates the need for a multilane roundabout. International experience indicates that the more direct entry geometry and enhanced delineation of lanes can make it easier for motorists to successfully navigate the turbo roundabout. Though accepted and present throughout Europe, the concept is new to the United States and requires education and outreach for both practitioners and the public. FHWA has released two new publications focused on turbo roundabouts: *Turbo Roundabouts: Informational Primer* and *Advancing Turbo Roundabouts in the United States: Synthesis Report*.

Given the unique geometry and limited knowledge of turbo roundabouts in the United States, traditional public outreach methods for roundabouts will need to be modified for educating the public about turbo roundabouts. In general, an emphasis should be placed on the fundamental characteristics of turbo roundabouts, including the reduction of conflict points and the intuitive lane selection and channelization. Agencies can also emphasize the key differences between multilane roundabouts and turbo roundabouts, including the lane divider and the spiral lane markings. Demonstrated safety performance benefits in the United States will be key to the sustained viability of the strategy. As with other new concepts, obtaining a set of reliable U.S. turbo roundabout crash modification factors will require broader implementation by multiple agencies.

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*The ability to reliably link safety surrogates to crash frequency and severity remains a topic of ongoing research and debate.*
Initial findings will come from surrogate and anecdotal findings, along with crash analyses at early field implementations.

Additional public outreach could include highlighting turbo roundabouts implemented in Europe, demonstrating their positive impact on performance, and creating a greater sense of familiarity with how to navigate the roundabout. These messages can reemphasize the importance of lane selection on the approach and the principle of no lane changing in the circulatory roadway.

As turbo roundabouts are opened throughout the United States, it will be important to incorporate feedback from those projects into messaging on future projects. After installation, agencies can continue providing information on how specific user types are intended to navigate the turbo roundabout.

Turbo roundabouts may appear different at first pass, but the intuitive features of this intersection alternative position it for more widespread consideration in the United States. iitej

References

R.J. Porter, Ph.D., P.E. has 20 years of experience in performance-based planning, programming, and design; road safety; traffic operations; safety data systems; and user behavior. His work has resulted in more than 80 published papers, research reports, and practitioner guidelines documents, and many outreach presentations in the United States and abroad.

Jeffrey Gooch, P.E. works on a mix of technical assistance, research, and instruction in data driven safety analysis. He received both his B.S. and M.S. degrees in Civil Engineering from Penn State University. He most enjoys the application of quantitative highway safety analysis to design decisions.

Catherine Chestnutt joined VHB as a communications specialist in 2018. Through her position, she has facilitated diverse public engagement events and translated detailed research into technical briefs and marketing materials for broader audiences.

Brian Moore’s 21-year career has focused on bike and pedestrian projects. He has been involved with the design of roundabouts since the first one in Ohio back in 2004. At Arcadis, he lends his expertise to staff for the design and review of roundabouts in the U.S. states of Ohio, Georgia, Florida, Louisiana, and Tennessee.

Jaap Tigelaar (M) was born and raised in The Netherlands. After his masters at the Delft University of Technology, he worked for more than 11 years at Arcadis in The Netherlands. Since February 2019, he has worked in the Arcadis Atlanta, GA, USA office, bringing his Dutch knowledge about turbo roundabouts to the United States.

Jeffrey Shaw, P.E., PTOE, PTP, RSP1 (M) serves as the Intersection Safety Program Manager for the Federal Highway Administration, Office of Safety. He is a registered professional engineer in Illinois and has been board certified as a Professional Traffic Operations Engineer and Road Safety Professional.
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Addressing Common Crash Types at Multilane Roundabouts

By Phil Weber, P.Eng., P.E. (M) and Fred R. Hanscom, P.E. (F)

Consistent with experience in other countries, on average roundabouts in the United States have been shown to reduce total motor vehicle collisions at an intersection compared to stop or traffic signal control by 35 percent, and injury collisions by 76 percent.\(^1\) Roundabouts tend to be more efficient than other types of control, especially during off-peak periods, and they can work effectively during power outages.\(^2\)
Single-lane roundabouts, where all entries and exits are one lane, have been very successful in terms of safety. Multilane roundabouts, although they still reduce fatal and injury collisions, do not always reduce total collisions. There are several reasons for this, including higher traffic volumes, higher speeds, and more complexity in design and driver comprehension. The most problematic multilane roundabouts are those where all entries and exits are two or more lanes.

Common Crashes at Multilane Roundabouts
There are several types of collisions that can occur at multilane roundabouts that are not possible at single-lane roundabouts. The two most common are the “left-turn” crash and the “merge-type” crash. Both are low-speed sideswipe crashes and are shown in Figure 1.

Usually at a two-lane roundabout, drivers can proceed straight through from either lane. The left-turn crash (Figure 1, left) occurs when a driver enters in the right lane and travels more than halfway around the roundabout, colliding with a driver making a through movement from the left entry lane.

The merge-type crash (Figure 1, right) happens when a driver enters in the right lane and proceeds through, colliding with a driver next to the central island exiting immediately downstream. Here, “merge” is used in quotations because the movement is not a true merge, as neither driver changes lanes.

What is a Roundabout?
In April 2016, the Road Commission of Washtenaw County, MI, USA, circulated an online survey to gain an understanding of driver perception of roundabouts. The impetus was a multilane roundabout experiencing a high rate of left-turn and merge-type crashes. Approximately 4,300 residents responded. The main focus of the survey was a multiple-choice question asking how one should enter a multilane roundabout. The responses were:

- Wait for an appropriate gap in all circulating traffic, 62 percent.
- Merge into circulating traffic, 34 percent.
- Wait for the roundabout to be clear of other traffic, 3 percent.
- Wait for circulating traffic to stop, 1 percent.

Roundabout design in the United States and Canada is based on practice in the United Kingdom, where a roundabout is considered to be one intersection. Proceeding straight through is the equivalent of a crossing movement. This differs from practice in places like continental Europe, where a roundabout is considered to be a series of T-intersections. Proceeding straight through requires a right turn into the roundabout, and then a right turn to exit (see Figure 2).

Since a roundabout in the United States in considered to be one intersection, unless lane designation signs and arrows indicate otherwise, a driver entering in the right lane and traveling more than halfway around a multilane roundabout is making an illegal left turn from the right lane. That driver would therefore be at fault in the event of a collision with someone traveling through in the left lane, since normally both the left and right lanes can proceed straight through (see Figure 1, left). Similarly, a driver entering in the right lane would be at fault in the event of a collision with someone in either circulating lane, since that driver entered an intersection and failed to yield to oncoming traffic (see Figure 1, right).
The possibility that the merge-type conflict can be mitigated through special signage was investigated through sign effectiveness testing carried out with members of the public. The procedure used follows from work undertaken by Hanscom. 5, 6 The testing consisted of evaluating the Yield sign plaques shown in Figure 4.

A series of laboratory conditions were created to test the two countermeasures, plus a case where neither is employed. In order to develop a complete experimental design, the testing also had to show both cases of an approaching driver (left lane or right lane) and all three possible cases of circulating traffic (none, inside lane and outside lane). This resulted in 18 test conditions.

Three stimulus slides were developed for each test condition: 1) an approach to a two-lane roundabout, 2) just upstream of the entry crosswalk, and 3) at the yield line looking left. An example sequence of slides for one of the test cases is shown as Figure 5.

Some possible non-geometric countermeasures include:
- Special signage (to address the merge-type crash). This is discussed in the next section.
- Repeated sets of lane use signs and arrows, possibly overhead (to address the left-turn crash).
- Not installing, or removing, the circulatory road lane lines.
- More public education.

Lane lines in the circulatory road tend to be the exception rather than the rule in countries like the United Kingdom and Australia. They have become commonplace at roundabouts in the United States, although designs in the 1990s and early 2000s did not have them and, interestingly, did not seem to have a prevalence of merge-type crashes. Normally lane lines are not carried through other intersections except to aid certain movements, such as the line extensions placed for double left turns. Their absence at a roundabout may subtly convey the message that it is a single intersection, and cause drivers to hesitate slightly before entering because they have more difficulty determining which “lane” circulating traffic is using.

Possible Countermeasures
There are a number of ways to counter this perception. The most effective reduces the number of lanes in a roundabout. A roundabout where all entries and exits are two lanes (a so-called 2x2 roundabout) is shown in Figure 3 (top left). Depending on traffic volumes and number of lanes on the approaches, the following configurations could be implemented to lessen the chance of a left-turn or merge-type crash:
- A partial two-lane roundabout (or 2x1 roundabout), i.e. two-lane entries and exits east-west, single-lane entries and exits north-south (top right).
- A lane configuration such that a roundabout has two-lane entries but single-lane exits (bottom left).
- A turbo roundabout having raised lane dividers to more definitively convey lane use. The example shown is a “rotor” type turbo roundabout, which has two-lane exits (bottom right). This configuration is shown because it would serve as a replacement for a 2x2 roundabout (top left) at the intersection of two four-lane roads.

Some possible non-geometric countermeasures include:
- Special signage (to address the merge-type crash). This is discussed in the next section.
- Repeated sets of lane use signs and arrows, possibly overhead (to address the left-turn crash).
- Not installing, or removing, the circulatory road lane lines.
- More public education.

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Figure 3. Possible Geometric Countermeasures.

Figure 4. Tested Yield Sign Plaques.

Sign Effectiveness Testing
The possibility that the merge-type conflict can be mitigated through special signage was investigated through sign effectiveness testing carried out with members of the public. The procedure used follows from work undertaken by Hanscom. 5, 6 The testing consisted of evaluating the Yield sign plaques shown in Figure 4.

A series of laboratory conditions were created to test the two countermeasures, plus a case where neither is employed. In order to develop a complete experimental design, the testing also had to show both cases of an approaching driver (left lane or right lane) and all three possible cases of circulating traffic (none, inside lane and outside lane). This resulted in 18 test conditions.

Three stimulus slides were developed for each test condition: 1) an approach to a two-lane roundabout, 2) just upstream of the entry crosswalk, and 3) at the yield line looking left. An example sequence of slides for one of the test cases is shown as Figure 5.

Figure 5. Example Sequence of Stimulus Slides for a Test Case.
The experiment involved presenting the sequence of slides corresponding to each test condition on a screen in front of a number of participants, and asking them to indicate on a form whether they think it was okay to enter the roundabout (yes or no) and how confident they were in their response (very sure, somewhat sure, or not at all sure). For all conditions the correct response was “no,” except when there was no conflicting traffic.

The testing was carried out at the University of Waterloo, Ontario, Canada on two separate dates in 2018. Most participants had at least some familiarity with roundabouts. The first group (58 in total) were presented with the 18 test cases in random order, and then again in the exact reverse order, for 36 cases. The second group (19 in total) were presented with the second set of 18 random cases first, then the first set of random cases second. This sequencing of test conditions counterbalanced the experimental procedure to account for learning effects. The results are listed in Table 1.

In most instances, participants correctly identified when it was okay to enter the roundabout. The exception was where an approaching driver was in the right lane and a circulating vehicle was in the inside lane (test cases 5, 11, and 17). Here the percentage of correct responses was lower than for the other cases by a considerable margin, confirming the perception behind the merge-type crash.

Table 1. Sign Effectiveness Testing Results.

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Approach Lane</th>
<th>Circulating Traffic</th>
<th>Message</th>
<th>Correct Response</th>
<th>% Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Left</td>
<td>None</td>
<td>None</td>
<td>Yes</td>
<td>96%</td>
</tr>
<tr>
<td>2</td>
<td>Left</td>
<td>Inside</td>
<td>None</td>
<td>No</td>
<td>77%</td>
</tr>
<tr>
<td>3</td>
<td>Left</td>
<td>Outside</td>
<td>None</td>
<td>No</td>
<td>97%</td>
</tr>
<tr>
<td>4</td>
<td>Right</td>
<td>None</td>
<td>None</td>
<td>Yes</td>
<td>95%</td>
</tr>
<tr>
<td>5</td>
<td>Right</td>
<td>Inside</td>
<td>None</td>
<td>No</td>
<td>34%</td>
</tr>
<tr>
<td>6</td>
<td>Right</td>
<td>Outside</td>
<td>None</td>
<td>No</td>
<td>95%</td>
</tr>
<tr>
<td>7</td>
<td>Left</td>
<td>None</td>
<td>Yield to Both Lanes</td>
<td>Yes</td>
<td>93%</td>
</tr>
<tr>
<td>8</td>
<td>Left</td>
<td>Inside</td>
<td>Yield to Both Lanes</td>
<td>No</td>
<td>81%</td>
</tr>
<tr>
<td>9</td>
<td>Left</td>
<td>Outside</td>
<td>Yield to Both Lanes</td>
<td>No</td>
<td>99%</td>
</tr>
<tr>
<td>10</td>
<td>Right</td>
<td>None</td>
<td>Yield to Both Lanes</td>
<td>Yes</td>
<td>97%</td>
</tr>
<tr>
<td>11</td>
<td>Right</td>
<td>Inside</td>
<td>Yield to Both Lanes</td>
<td>No</td>
<td>44%</td>
</tr>
<tr>
<td>12</td>
<td>Right</td>
<td>Outside</td>
<td>Yield to Both Lanes</td>
<td>No</td>
<td>99%</td>
</tr>
<tr>
<td>13</td>
<td>Left</td>
<td>None</td>
<td>Do Not Merge</td>
<td>Yes</td>
<td>90%</td>
</tr>
<tr>
<td>14</td>
<td>Left</td>
<td>Inside</td>
<td>Do Not Merge</td>
<td>No</td>
<td>84%</td>
</tr>
<tr>
<td>15</td>
<td>Left</td>
<td>Outside</td>
<td>Do Not Merge</td>
<td>No</td>
<td>100%</td>
</tr>
<tr>
<td>16</td>
<td>Right</td>
<td>None</td>
<td>Do Not Merge</td>
<td>Yes</td>
<td>95%</td>
</tr>
<tr>
<td>17</td>
<td>Right</td>
<td>Inside</td>
<td>Do Not Merge</td>
<td>No</td>
<td>54%</td>
</tr>
<tr>
<td>18</td>
<td>Right</td>
<td>Outside</td>
<td>Do Not Merge</td>
<td>No</td>
<td>98%</td>
</tr>
</tbody>
</table>
At first glance it is evident the Yield sign plaque reading “Do Not Merge” was more effective than the one reading “To Both Lanes” and that both were better than no message at all. McNemar’s Test was used to compare the two countermeasures with each other, and individually with no countermeasure (“None”). This follows from Hanscom.5, 6 The test was done by comparing the proportion of participants who correctly understand the meaning of one treatment (Treatment A) but not the other (Treatment B), and vice-versa. Participants who understood both A and B correctly, or neither, did not count since the outcome was no distinction between treatments. Having established the proportion of each a z-test was then applied to determine the statistical significance.

The greatest observed statistical difference in correct responses was between “None” and the “Do Not Merge” plaque. Both the “Do Not Merge” and “Yield to Both Lanes” plaques produced z-test scores with less than 5 percent level of significance, meaning there was less than a 5 percent chance of no difference between them and “None.” Thus, the clear implication is that either plaque is better than none.

Conclusions and Recommendations
The sign effectiveness testing indicated that installing Yield sign plaques that read “Do Not Merge” might help lessen the merge-type conflict at multilane roundabouts. “Yield to Both Lanes,” although statistically better than nothing, seemed to be a less effective message. It would also need to be modified for roundabouts having more than two circulating lanes. Repeated sets of lane use signs and arrows were not specifically tested but should help address the left-turn conflict.

The merge-type conflict should also lend itself to being mitigated by not installing, or removing, the circulatory road lane lines at most multilane roundabouts. Unless there are double left turns or exclusive movements, lane lines on the entries and exits should be sufficient and a roundabout should not need circulatory road lane lines.

Reducing the number of lanes in a roundabout is undoubtedly the most effective “countermeasure” of all. Where possible, it is recommended that a partial two-lane roundabout be installed instead of one where all entries and exits are two or more lanes (i.e. a 2x1 instead of a 2x2 roundabout), or a lane configuration be introduced that has single-lane exits.

Education and enforcement are needed as well. Both should include making sure police officers are aware of which driver is at fault when a collision occurs, and making sure driving instructors and manuals are providing correct information.

Multilane roundabouts have tremendous safety potential. Unlike single-lane roundabouts, they can be used at high-volume locations and as a replacement for large signalized intersections where high numbers of crashes occur. It is hoped that at least some of the countermeasures presented in this article are reasonable and implementable, and can be used to further the implementation of this important intersection safety treatment in the United States and Canada.}

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References

Philip A. Weber, P.Eng, P.E. (M) has more than 25 years of public and private sector experience as a transportation engineer. He works for CIMA+, a multidisciplinary Canadian engineering firm, in their Toronto, Ontario office. Phil has been involved in roundabout planning and design projects throughout Canada and the United States since 2003, and to-date has seen more than 100 roundabouts through to construction.

Fred R. Hanscom, P.E. (F) is director of the Transportation Research Corporation in Markham, VA, USA. He has more than 40 years of experience in transportation research and has been extensively published in the area of driver responses to traffic control devices, including roundabouts. He was the recipient of the 1975 ITE Past President’s Award.

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

Jen Malzer, City of Calgary & Canadian District Director

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

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

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Trip Generation Manual, 10th Edition Supplement

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

For pricing and purchasing information for the supplement, visit http://bit.ly/TripGenSupplement

Innovative Traffic Management and Control Equipment Procurement Methods

The first publication developed by the ITE Industry Council, this guidance document provides a summary of current practices in the procurement of Intelligent Transportation Systems (ITS) and traffic management and control equipment.

Sustainable Traffic Signal Development: An Informational Report of the Institute of Transportation Engineers

The report provides summaries and examples of sustainable practices in planning, designing, and constructing traffic signals. The report also takes a brief look into the future and the convergence of automated vehicles, wireless communications, alternative energy sources, application of data, and automated performance measurement systems.

Guidelines for Determining Traffic Signal Change and Clearance Intervals

ITE has published guidance on yellow change and red clearance intervals for signalized intersections. The goal of this guidance is to create a consensus methodology for calculating and evaluating traffic signal change intervals that can be consistently implemented by transportation agencies.
unnecessary stops and delays at intersections can be a huge source of frustration to road users. The proposed Flipped Left Diamond Interchange (FLDI) design is a new, simple concept that has the potential to enhance intersection capacity while reducing such stops and delays. As this is a new concept, engineering staff and designers should realize that attention to details is critical for safe operation and maneuverability through the intersection.
options should be evaluated, not only based on the cost and right of way (ROW) availability, but also based on operational flexibility, connectivity, and accessibility factors with short- and long-term effects to the interchange itself, to adjacent properties and intersections.

Unlike DDI and CFI, the Flipped Left Diamond Interchange does not eliminate direct connectivity between frontage roads, and it does not limit access to corner properties. FLDI also provides operational flexibility that is capable of enhancing capacity at the interchange, better handling of fluctuation in traffic demand and patterns, and provides for additional traffic signal phasing sequences that would be crucial for improved traffic signal synchronization along the arterial. This occurs by allowing utilization of left-turn lead-lag or conditional service operation where a left turn can be serviced twice both as a leading and lagging phase.

In order to make this project a success, staff from the Texas Department of Transportation (TxDOT) and the City of Fort Worth, TX, USA met to introduce and review the concept. Following the initial meetings and discussions, conceptual plans were developed and reviewed by different stakeholder groups on a number of occasions. This was to ensure proper design and to minimize the possibility of mistakes, misunderstandings, or

**Roadway Engineer** (Tampa, FL)

Provide design support to Project Managers and Project Engineers during the planning, design and construction phases of FDOT, County and City transportation projects. Experience to include working with FDOT drainage design manuals, Bluebeam, Adobe Acrobat, AutoCAD and Microstation.

Mail resume referencing job code# 320RE to BCC Engineering, LLC, ATTN: Human Resources Manager, 6401 SW 87th Avenue, Suite 200, Miami, Florida 33173.

**Transportation Engineer** (Ft. Lauderdale, FL)

Prepare technical reports and memoranda associated with traffic engineering, transportation planning studies/projects and traffic impact analyses.

Mail resume referencing job code# 520RK to BCC Engineering, LLC, ATTN: Human Resources Manager, 6401 SW 87th Avenue, Suite 200, Miami, Florida 33173.
disobedience by the road users due to lack of a clear design. The design review by stakeholders included selection and placement of traffic control signs, markings, and traffic signal indications, and curb details.

**Project Description**

Loop 820 and Marine Creek Parkway is a conventional diamond interchange in northwest Fort Worth, TX. The off-peak traffic volumes are relatively low in all directions, and the intersection handles the traffic demand with minimal stops and delays. However, while through traffic in all approaches stay relatively low during peak hours, the left-turn volumes get heavy in all directions with long queues. Currently, traffic signal at the intersection operates under the four phase TTI phasing sequence (shown in Figure 1a). The project involves relatively minimal construction that would end up realigning left-turn lanes. Additional modifications include installation of new traffic signal mast arm assemblies and signal indications for the left-turn movements.

**Proposed Intersection**

Flipped Left Diamond Interchange is a new and innovative intersection concept with the potential to minimize daily congestion.

Figure 1a. Existing Roadway Layout: A conventional diamond interchange: Where an operating traffic signal under any phasing sequence beside the four phase TTI phasing sequence depends on level of left-turns volume and storage capacity of the left-turn lanes.

Figure 1b. Existing Roadway Cross Section.
and delays while providing the ability to manage routine traffic more efficiently. At the same time, it can meet public expectations from local and state agencies. It would also enhance the ability to manage traffic flow and much needed capacity, especially during incidents when freeway main lanes are closed and freeway traffic is forced to use the service roads to go through the traffic signal at the crossing arterial.

The concept involves a relatively simple geometric modification of the intersection by simply swapping the left-turn movement lanes with each other as shown in Figures 1a (existing layout), 2a (proposed layout), 1b (existing cross section) and 2b (proposed cross section). The figures illustrate how both eastbound left-turn and westbound left-turn traffic are shifted to the left as they approach the intersection, and then are aligned with what was the westbound left-turn lane and eastbound left-turn lane, respectively, as shown in the figures.

As shown in Figure 3, each left-turn movement would have at least two indications, one at near side intersection indicated as

![Figure 2a. Proposed Flipped Left Diamond Interchange Layout](image)

Figure 2a. Proposed Flipped Left Diamond Interchange Layout: Where left-turn lanes on Marine Creek Parkway in advance of the Loop 820 frontage road intersections are constructed to provide left-turn storage and transition where these advance left-turn lanes will be aligned with the left-turn lanes located in each direction between the Loop 820 service roads as shown in the figure above. Note: This proposed alignment allows for both left-turns to run simultaneously regardless of level of left-turning traffic volume as they do not intersect, cross, or block each other’s path.

![Figure 2b. Proposed Flipped Left Diamond Interchange Cross Section](image)

Figure 2b. Proposed Flipped Left Diamond Interchange Cross Section: this figure represents Flipped Left Diamond Interchange where eastbound left-turn traffic is shifted over to the lane that used to be a westbound left-turn lane, and vice versa for the westbound left-turn traffic.
#1, and one at the far-side intersection indicated as #2. Left-turn traffic would only proceed to go through the nearside intersection once indication #1 turns green to allow moving forward toward the far-side intersection, where they are given the ROW by displaying a protected green arrow or a left-turn flashing yellow arrow, allowing the turn under permitted condition.

This design concept shows about a 40 percent reduction in stops and delays for this specific intersection, since both arterial through movements have light through volume and left-turn movements are relatively heavy and equal, thus allowing running the left-turn movements simultaneously, where this would not be possible under the current geometric layout of the intersection.

The beauty of this concept is that the proposed improvement can be done within the existing ROW, without the need of having additional ROW or building additional lanes.

Flipped Left Diamond Interchange provides an operational efficiency that might not possible by other diamond interchange configurations. FLDI provides this operational efficiency by maximum utilization of arterial green intervals, which is possible by termination of a companion movement in absence of demand and allowing to proceed and to serve the next compatible phase in the sequence where there is demand. This maneuverability might not be possible with other diamond interchange configurations because of either geometric layout, traffic pattern, signal phasing sequence/ring structure, or all. However, just like it is possible at conventional 4-legged intersections, FLDI allows termination of a companion movement with no demand, being either the left-turn or through movement, and then continues to serve the next compatible phase in the sequence—where this might be problematic at conventional diamond interchanges, or DDI. For example, consider signal operation at a diamond interchange under three different types of conventional diamond interchange, DDI, and FLDI.

As shown in Figure 4, for both conventional (TTI 4-phase sequence) and DDI interchanges, left-turn movement (EBLT@NBSR), which is referred to as companion to eastbound through movement at southbound service road (EBT@SBSR) will remain green as long as there is demand on EBT@SBSR. In other words, the duration of green interval for EBLT@NBSR movement is dictated by demand on EBT@SBSR movement, and not by demand on EBLT@NBSR. Obviously, a holding green arrow with no demand will result in increased unnecessary delay for WBT@NBSR movement. However, the FLDI allows termination of EBLT@NBSR movement in absence of demand and then would allow proceeding to serve the next compatible movement (WBT@NBSR) in the sequence where demand exists.

Another potential improvement possible with FLDI is utilization of protected/permitted left-turn display. Due to safety concerns associated with limited sight distance, often left-turn displays at intersections with wide medians are “protected only” type displays, where left-turn movements are allowed only during display of a green arrow, where FDLI makes it easier to implement “protected/permisive” mode left-turn display such as FYA (flashing yellow arrow) due to improved sight distance and reduced number of phases.
Despite lack of demand on EBL@NBSR, it cannot be terminated due to phasing sequence. TTI 4-phasing sequence where outside movements are served sequentially and in clockwise scheme is often implemented to prevent traffic gridlock between service roads due to either heavy left turn volume, inadequate spacing between service roads, or both.

Despite lack of demand on EB@NBSR, the phase can’t be terminated in order to serve WBT@NBSR which has demand. This is due to the fact that the east bound through movement at NBSR conflicts with the next phase (WBT@NBSR) in sequence.

EBL@NBSR can be terminated to begin serving WBT@NBSR movement. However duration of the interval that these two movements can simultaneously run together depends on left-turn volumes, left turn lanes storage capacity, and spacing between service roads. Excessive left turn volume can spill over into through lanes or into intersection causing gridlock.

With FLDI, it is possible to terminate EBL@NBSR and proceed to serve WBT@NBSR. Both eastbound and westbound through traffic can simultaneously run together since storage capacity of the left turns and spacing between service roads are not a concern. This is because these movements are controlled by dedicated signal indications outside service roads preventing left turn traffic to queue up between service roads. As shown in this column, EB left leads, and WB left lags. However, the sequence can easily be changed to lead WB left turn and lag EB left if preferred.

FLDI flexibility allows for signal sequence along arterial to be changed in order to optimize throughput or improve synchronization. As shown in the sequence on this column, both EB and WB lefts are leading. The sequence can easily change to lag both left turns when appropriate.

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Protect/Permitted FYA indication

(1) - Advance green Intervals are only for a few seconds and provide additional green time before next conflicting movement arrives.

(2) - Duration of this type of concurrent intervals depend on volume of left turning movements, spacing between service roads, and storage capacity of left turn lanes.
of lanes and distance to cross. Needless to say, implementation of a protected/permitted display such as the FYA not only has the potential to improve capacity, but also reduces the temptation of running the red light signal, especially during light traffic conditions when there are adequate gaps available in opposing through movement.

The efficiency factor should always be considered as it increases utilization level of green interval(s) and eliminates mandatory holding of a green phase. This holds true even when there is no demand on that movement, and has direct impact on generating unnecessary stops, delays, increased fuel consumption, and negative impact on air quality.

Conclusion

As shown in Table 1, the calculation result indicates that the build scenario will significantly improve the traffic operation at Loop 820 and Marine Creek Parkway. The interchange cycle length can be reduced from 145 seconds to 110 seconds. Average traffic delay will reduce from 84.8 seconds to 52.1 seconds—an almost 38 percent reduction of average delay. Build scenario will improve the level of service from LOS “F” to LOS “D.

This improvement is only accommodated by utilizing an alternative and modified phasing sequence, which is made possible by the geometric modification that allows concurrent serving of both eastbound and westbound left turns together, rather than serving each side at a time or in sequence.

<table>
<thead>
<tr>
<th>Movement</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB</td>
<td>Delay</td>
<td>LOS</td>
</tr>
<tr>
<td>NBL</td>
<td>69</td>
<td>E</td>
</tr>
<tr>
<td>SB</td>
<td>124</td>
<td>F</td>
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<tr>
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<tr>
<td>EB</td>
<td>99</td>
<td>F</td>
</tr>
<tr>
<td>WB</td>
<td>93</td>
<td>F</td>
</tr>
<tr>
<td>Intersection Delay</td>
<td>84.8</td>
<td>F</td>
</tr>
</tbody>
</table>

FLDI is a unique solution that, at a minimum, provides operational flexibility and improved capacity without restricting any movements or impacting accessibility to adjacent properties. In summary, the followings are advantages of FLDI configuration:

- Improved capacity due to the fact that arterial movements become independent of each other, which allows for termination of a companion movement in absence of demand and instead allows serving of the next movement in the signal phase sequence which has demand.
- Providing arterial left-turn movements with permissive indications and permissive intervals would enhance intersection capacity and LOS, reduce unnecessary stops and delays, and reduce the potential of red-light violation, specifically during light traffic demands.

It is worth noting that all modifications at this interchange are being done utilizing the existing lanes. There is no need to add lanes that requires additional ROW or modifying the existing infrastructure.

Roadway designs and constructions are major tasks. They have high design and construction costs; and long-term impacts on those who use them. It is crucial that different alternatives and solutions be evaluated and compared against each other, and against short- and long-term impact to all stakeholders, before the most appropriate solution is chosen. It is highly recommended that besides concentrating on a solution that solely addresses the most common short-term need of additional capacity, long-term factors including operational flexibility, accessibility, and efficiency be considered to ensure a longer lasting solution. It is crucial to understand that solutions which only meet today’s needs and today’s shortfalls might not have the sustainability factor that is adequate to handle fluctuation and changes in traffic demand and pattern. A sound and proper design alternative should be able to withstand unexpected scenarios, as it would be less susceptible to change in traffic volume or change in traffic pattern; and where it would not require modifications that are both expensive and disruptive to the traveling public in the long term.

Ali Mozdbar, P.E., PTOE (F) has more than 35 years of experience in traffic engineering, signal design and operations, signal systems timing development and implementation, intelligent transportation systems applications, communication network design and implementation, development of technical specifications, PS&E (plans, specs, and estimate) development, and bidding and construction phase services. Before joining LJA Engineering, Inc. as senior project manager in Austin, TX, Ali worked for several major cities in Texas as the city traffic signal engineer. He has a bachelor’s degree in Civil Engineering and a master’s degree in Civil Engineering from University of Texas at Arlington. He was the recipient of the ITE Texas District Engineer of the Year Award in 2002, and the Wallace Ewell Award from the Intelligent Transportation Society of Texas in 2019.
Answer to “Where in the World” on page 17: Utah State Route 12, Red Canyon, Utah, USA. Photo Courtesy of Jonathan Upchurch, P.E., Ph.D. (R).
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