PROFESSIONAL DEVELOPMENT:
Engaging in a Digital World
TRAFFIC CONTROL CABINETS

Built by a team of Quality Control experts, and delivered with the fastest lead-times in the industry, Econolite cabinets help agencies improve safety for motorists, cyclists and pedestrians while increasing efficiency with low powered technology. *Raising the “Intersection” Bar!*
Courses

Transportation Impact Analysis (TIA) Training Program
September 27 – November 22
The Transportation Impact Analysis (TIA) Training Program is a new certificate-based, blended learning program that provides students with comprehensive coverage of the technical elements of the TIA preparation and review. Topics include conditions that require a TIA, recommended qualifications for both the preparer and reviewer, definition of the site development characteristics, designation of the study area and description of its characteristics, description of TIA-specific analysis tools, assessment of current conditions and forecast methods for evaluating future conditions, estimation of modal trips generated by site, distribution and assignment of site-generated modal trips, multimodal analysis, safety analysis, evaluation of site access needs, identification of on-site and off-site mitigation alternatives that support TIA recommendations, and preparation and presentation of a complete final report.

New Course Launching Fall 2021!

Designing Signalized Intersections
This program is targeted towards practitioners early in their career with a focus on foundational knowledge and skills necessary for designing traffic signals, from planning to implementation.

On-Demand Webinars Available!
Missed a webinar? No problem! Take a look at the webinars still available to view on-demand on the ITE Learning Hub at https://www.pathlms.com/ite/events/.
president’s message

Professional Development

When I worked in the Traffic Engineering Division at the City of Henderson, my new administrative assistant gave me a copy of a Shel Silverstein poem:

**Signals**

When the light is green you go.  
When the light is red you stop.  
But what do you do  
When the light turns blue  
With orange and lavender spots?

I keep it pinned on the wall at my desk even now that I work in an entirely different department. It is a great reminder that work (and other parts of life) rarely fit neatly into the categories or situations we learned about in school. When hiring staff, we consider the question of experience: does 20 years of experience mean repeating the same thing 20 times, or does it mean 20 years of new situations and growth? That is what professional development offers: a fresh look at how the work can be completed, especially when the situation isn’t quite what you expect. A recent *Harvard Business Review* article offered the following: “Future performance of the individual is just as much a function of high-caliber, systematic, intentional skills development as it is of past achievements and qualifications…” ("Identify — and Hire — Lifelong Learners" by Marc Zao-Sanders, May 13, 2021).

Several years ago, an interviewer asked me what was more important—technical knowledge or management skills. While I don’t remember how I answered the question, I think about that question frequently as I progress through different stages of my daily work and volunteer life. Depending on the moment, the answer differs. Thankfully, ITE offers a wide range of options to suit a professional’s learning needs and style, ranging from traditional coursework, webinars, and articles, to podcasts and Virtual Drop-Ins, to full-blown leadership development programs. Much of the content is available locally at the Section-level, adding to the convenience and accessibility.

Make sure to check out the article in this issue of *ITE Journal* for more information on ITE’s Professional Development program, starting on page 26. The article covers the wide range of career development opportunities available to ITE members, including a robust webinar program, the Learning Hub, partnerships with leading organizations, and more. The article also explores how ITE has adapted to the pandemic to meet member needs, and will continue to remain flexible as we emerge from COVID-19 to a more virtual world. ITE offers other professional development opportunities for volunteers as well, such as running meetings, large and small-scale event planning, maintaining deliverables, managing a volunteer workforce, public speaking, and self-evaluation—all without tangible compensation. Accordingly, the lessons learned are about intrinsic rewards and making the work worthwhile.

Transportation professionals have a passion for the industry and a curiosity that drives the need for new information. The ITE community supports that growth mindset and facilitates information sharing, collaboration, innovation, and feedback. That way we know where to start when the lights aren’t necessarily red, amber, or green.

**ITE International President**
Professional Development: Engaging in a Digital World

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1627 Eye Street, NW, Suite 600, Washington, DC 20006 USA • Telephone: +1 202-785-0060 • Fax: +1 202-785-0609 • www.ite.org
Setting a New Course for the MUTCD

The Manual on Uniform Traffic Control Devices (MUTCD) may be the singular most influential transportation publication in the United States. This Federal Highway Administration (FHWA)-issued publication applies to all roads open to public travel in the United States. From the moment you leave your house—by car, by bike, scooter, or on foot—your travel is influenced by the MUTCD. A number of organizations have been making this point when responding to the current Notice of Proposed Amendments (NPA) to update the Manual for the first time in 11 years, which resulted in more than 25,000 comments to the docket. Compared to the approximately 2,000 responses received the last time the MUTCD was updated, you can sense the elevated level of attention the NPA is getting this time around.

ITE’s response is available on our website at https://bit.ly/ITECommentsNPA-MUTCD. Our Board of Direction, volunteers, and staff have done a masterful job in representing ITE member interests. Our of representatives from the National Committee on Uniform Traffic Control Devices (NCUTCD), key ITE Technical Councils and Committees, ITE staff, and individual members completed a thorough review of the 800 pages of proposed changes, identifying the changes we support and making suggestions for improvement.

Our team highlighted the most important issues at hand, identifying three main themes and more than 20 specific areas of comment. First, we encouraged FHWA to consider the needs of all users. While progress was made in the NPA, we identified a number of opportunities to better meet the needs of pedestrians and bicyclists. Vulnerable road safety must be prioritized over vehicle movement in the selection of traffic control devices. Second, we asked FHWA to provide users of the MUTCD with greater flexibility and opportunities to innovate. The MUTCD should provide sound guidance on minimum requirements for consistently selecting and using traffic control devices, but should avoid being a design guide. In our view, FHWA took a more restrictive approach and missed the opportunity to make the experimentation process easier for jurisdictions to navigate. Finally, we encouraged FHWA to take a forward-looking posture with the Manual. The MUTCD must be a more nimble document, able to adapt to changing conditions, updated practices, and new research results. We also encouraged reexamination of the fundamental underpinnings of the Manual, some of which are decades old.

I have no doubt that this heightened attention to the MUTCD will result in significant changes to the Manual. While we support rethinking what the MUTCD should look like in the longer term, an updated version of the Manual is desperately needed to save lives today. This current spotlight on the Manual will result in wider engagement in the process of defining the future of the MUTCD. It is important that ITE be at the center of this engagement, as we have been throughout this document’s 86-year history.

While we will work hard to represent your interests, it is also important that members participate in the NCUTCD process. Starting on page 37, an article provides an overview of the MUTCD update process and how you can be involved in reviewing proposals for potential changes to the Manual. Please consider sharing your time and expertise. As always you can reach me on the ITE e-Community or on Twitter: @PaniatiITE.

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

For the Traffic & Transportation Engineers of the Future

Teach your students traffic modelling using SIDRA

This comprehensive package is for lecturers to teach the theoretical and empirical basis of traffic models using the SIDRA INTERSECTION software. Through this, students will develop an understanding of the role of intersections and networks in the road transport system and their effect on the environment. They will learn about intersection and network performance analysis for the purposes of transport decision making, planning, traffic control and design.

If you are interested in receiving the SIDRA Academic Package and you are a lecturer at a University or Educational Institution, please visit our website to apply.

To apply, visit sidrasolutions.com/academic-package
New Members

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

**Canadian**
Ahmad Subhani
Owen Plamenco
Jasna Filipovic
Grace Nzanga
Jacqueline Savoie
Rick Allen Kester
Stephen Michael Martin
Christine Hay, E.I.T.
Archie Gillies, P.Eng.

**Florida Puerto Rico**
Istvan J. Virag
Tammer Al-Turk
Cherie Ann Rodriguez

**Mid-Colonial**
Caroline Briggs
Shawna Charleston
Kurt Mihalic
Kathryn L. Roehrhahn
Leslie S. Weintroub
Sarah Ziegler

**Missouri Valley**
Lesley Hoffarth
Mark Van Dyke, PE.
Brad Cooley
Jason Hermann
Todd E. Martin, E.I.T.
Kortney R. Brown, PE., PTOE

**Mountain**
Eric C. Mocko
Eric Jensen
Bret Burkes
Chad Welborn
Gene Ramos
Bob Bonds
Ammon Heier
David Matulac

**Northeastern**
Michelle E. Marshall
Carrie Mcinerney, PE.
Joseph Paul Berger
Chari Botha

**Southern**
Tim Nye, MSCE
Alaa Shams, PE., CMS
Andrea B. Gordon, E.I.T.
Joshua Harris
Joshua Washington
Kathleen Jane Libnau Portner
Daniel Mott
Ryan C. Sager, AICP

**Texas**
Jeff Unsworth
Ziaur Rahman
Margaret Fowler
Clarence Rumanick
Abraham Ramirez

**Western**
Balwinder S. Tarlok, PE.
Said Ismail
Linda N. Sallah
Andrew Kent
Doug Rauschenberger
Jesus Garcia
Victor LaFontaine
Alexis Plancarte

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

ITE’s Jeff Paniati Interviewed on U.S. Transportation Trends for U.K. Magazine

ITE Executive Director and CEO Jeffrey Paniati, P.E. (F) was recently featured as a thought leader in the May 2021 issue of Transportation Professional, publication of the U.K.-based Chartered Institution of Highways & Transportation (CIHT). In the article, Paniati speaks to the most prominent trends influencing the U.S. transportation system’s recovery from COVID-19, including infrastructure and funding, diversity and inclusion, mass transit, and more. To read the article, visit http://bit.ly/CIHT_ITE.

ITE Talks Transportation Podcast

New from the Thought Leadership Series


The Manual on Uniform Traffic Control Devices (MUTCD) from the Federal Highway Administration (FHWA) has been around for nearly 100 years, and is the national standard for regulation of all things signs, markings, and signals in the U.S. transportation system. But how has the Manual changed throughout the years, and how has ITE played a role in influencing those changes? ITE Deputy Executive Director and Chief Technical Officer Jeff Lindley, P.E. (F) joins the podcast to demystify these issues. He also describes ITE’s response to the current Notice of Proposed Amendments issued by FHWA, which is expected to result in a new edition of the Manual, the first to be issued since 2009.

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

www.ite.org | July 2021 | 9
Check Out ITE’s New Career Center!

The ITE Career Center is more than a webpage to find new employment opportunities or recruit new talent. It has numerous resources for everyone at all stages of their career, including:

- Certification
- Mentoring
- Webinars, videos, and podcasts
- Advice and tips on resume writing, networking, interviewing, and maximizing your presence on social media

www.ite.org/jobs

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!

ITE JOURNAL

2021 EVENTS

ITE INTERNATIONAL VIRTUAL ANNUAL MEETING
July 2021 | In conjunction with the Mountain and Western Districts. See page 11 for more information.

GREAT LAKES DISTRICT ANNUAL MEETING
August 30–31 | Columbus, OH, USA

TRANSPO (ITE AND ITS FLORIDA EVENT)
September 27–29 | Bonita Springs, FL, USA

WHERE IN THE WORLD?

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ITE JOURNAL
There is Still Time to Register for the 2021 ITE Virtual Meeting (#ITE2021)

(Technical Program and Networking/Social Events: July 20-24; 27-29; ITE Council and Committee Meetings: August 2–5)

July 20–August 5

U.S. Secretary of Transportation Pete Buttigieg to provide keynote address during Opening Plenary Session, Tuesday, July 20.

This meeting will help you be ready to address the challenges communities face as they recover from the pandemic, and take advantage of emerging opportunities in the areas of funding, technology, and practice.

More information – www.iteannualmeeting.org

2021 Annual Meeting
Implementing the Main Streets Master Plan, the project team is enhancing pedestrian safety and comfort, improving mobility options, increasing green amenities, providing additional street furniture, improving connections to parks and amenities throughout the community, and advancing community destinations that will support local businesses.

By undertaking construction with a coordinated approach, the City of Calgary is renewing aging infrastructure and transforming these streets to have a positive impact on the communities and citizens in the area.

Stoney Trail and 14 Street N.W. Interchange
One of four interchanges being built by the City of Calgary on behalf of the Province of Alberta, the Stoney Trail and 14 Street N.W. interchange will connect adjacent communities in the northwest of the city, alleviate congestion on nearby roadways, and is an important component to support existing and future development in the area.

Main Streets Master Plan
The goal of the City of Calgary’s Main Streets Program is to attract growth and investment in local communities by redesigning both popular and emerging streets that are cultural, social, and economic focal points around the city. Main streets are resilient, adaptable, and attractive places that celebrate community character and create sustainable and vibrant communities that encourage diversity.

With that in mind, the City of Calgary is implementing a process to transform West 17 Avenue S.W. and 37 Street S.W. into areas where people want to live, work, and play through redevelopment and significant infrastructure upgrades.

Public Agency Showcase

As part of ITE’s recognition of Infrastructure Week, we reached out to our public agency members to find out what projects are taking place in our communities.

CALGARY, ALBERTA, CANADA

Improving Accessibility
The City of Calgary in Alberta, Canada successfully completed the 2 Street S.W. Complete Street project in 2020, upgrading facilities for pedestrians and cyclists. Based on public feedback, designs were refined to reflect the needs of those who live, work, and travel in the area. Work included construction of protected and delineated bike lanes on 2 Street S.W. used for cycling, e-scooters, skateboards/rollerblades, and mobility devices (wheelchairs and scooters). Additional improvements include curb extensions, wheelchair ramps, Rectangular Rapid Flashing Beacons, and a new traffic signal. The work also took advantage of planned road resurfacing providing a new smooth riding surface.

There is now a more defined route to access key destinations while linking the river pathway and downtown cycling network, enhancing livability in the Mission and Beltline neighborhoods. Improved safety and accessibility for those walking and wheeling in the area demonstrate the City of Calgary’s commitment to improving multimodal infrastructure.

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In Recognition of Infrastructure Week

The new interchange is anticipated to be completed in July 2021, and includes a four-lane bridge structure on 14 Street N.W. over Stoney Trail, two new merge loop ramps onto Stoney Trail, and tear drop traffic circles instead of traffic signals on the north and south sides of the bridge.

A new asphalt pathway and concrete sidewalk on the east and west side of the interchange will also improve pedestrian and cyclist connections in the area.

Balmoral Circus Park Expansion

As part of the Neighborhood Streets North Hill Area Program, the City of Calgary is expanding Balmoral Circus Park, transforming the intersection at 2 Street and 19 Avenue N.W. from roadway to park space.

Built in 1934 in Mount Pleasant, Balmoral Circus is a series of four landscaped areas surrounding the intersection of 19 Avenue and 2 Street N.W., that join together to form a circle. On completion, the park will:

- Create a quiet outdoor space for community members with potential for community programming
- Decrease short-cutting and reduce volume of vehicles on street
- Provide all-directions access for people walking and wheeling
- Retain vehicle access to all homes

Temporary materials were first installed to understand impacts and effectiveness of the closure prior to permanent changes being implemented in the summer of 2021. The city also engaged with the community to find an appropriate balance between creating a quiet space for passive recreation adjacent to homes and creating an attractive and meaningful community destination.

LeadershipITE 2022 Hybrid Program

LeadershipITE is combining the past and the present by offering a hybrid program. As we begin to emerge from the COVID-19 pandemic, LeadershipITE is proud to announce that in 2022, LeadershipITE will consist of two in-person sessions and nine virtual sessions.

This hybrid approach will allow you to connect with your peers in person to kick off the year, support and balance your professional and personal lifestyle through virtual workshops throughout the year, and end with an in-person graduation and celebration.

This approach combines the best attributes of years past into a comprehensive inclusive program that will enable you to evolve your leadership skills for the future. The virtual workshops will be supplemented by professional and social events which provide participants not only the same content that this program is built on, but also enhancements to provide additional ways to engage with classmates, alumni, and the greater ITE community.

The virtual workshops will not be your average webinars. The curriculum is built around engagement, and each of the nine, 4-hour virtual workshops beginning in January will include interactive and experiential elements. These workshops are led by Shelley Row, P.E., CSP (F), a professional leadership consultant who is also a registered professional engineer with a strong background in transportation. You are in great hands and will undoubtedly benefit from her expertise.

Additionally, small team projects will be conducted addressing real-world issues facing the transportation profession and/or ITE and its members.

Throughout the year, you will have many opportunities to meet new people and grow your networks with intimate social events, sessions, and assignments with LeadershipITE alumni and ITE leadership.

If you’ve been interested in LeadershipITE, and the travel schedule and costs have held you back, 2022 is your opportunity to experience this hybrid interactive and engaging program while minimizing time away from your family and work responsibilities.

To stay up-to-date on the latest LeadershipITE activities, send a note to leadership@ite.org.

For more information and to apply to LeadershipITE, visit www.ite.org/LITE/.

Application deadline for the class of 2022 is September 16, 2021.
CITY OF EDMONTON, ALBERTA, CANADA

Enhancing Longevity

The City of Edmonton in Alberta, Canada is committed to investing in mature neighborhoods to enhance livability and longevity.

Renewal in Strathcona, one of Edmonton’s earliest neighborhoods, began in 2019 and will wrap up in 2021. This project is a “real-life” example, showcasing how new features can be built in retrofit situations to assist with shifting attitudes towards active transportation in Canadian winter cities.

Renewal includes:

• Walking connections – People love to walk in and through Strathcona. They are interested in routes that are direct, complete, safe, and accessible.
• Bike infrastructure – People who bike like to ride on safe, protected routes that provide choices to connect destinations. Residents living on and near bike routes want to be able to easily access their homes.
• Parks, open spaces, and trees – Strathcona residents enjoy living amongst a canopy of mature trees and having local, usable, safe parks and green spaces.

“The design is ground-breaking for Edmonton. We’ve never changed a neighborhood in this city (for the better) like Strathcona will be changed.”
– Strathcona Resident


Before: 100 Street looking north (inset). After: New raised bike lane, no parking, and raised crosswalk.

CITY OF COSTA MESA, CA, USA

Revitalization through Community Outreach

With a $10,000 mini-grant from the local association of governments, the City of Costa Mesa, CA, USA conducted community outreach near a certain problematic street, designed two pop-up traffic circles, and implemented them with cones, plants, and artistic spray chalk. The intent of the whole project was two-fold. First, the city wanted to help pave the way for a new ground-up, participatory, and iterative street improvement process. This project brought together several parties that are interested in street improvement, allowing them to become more familiar with one another. Secondly, the city wanted to demonstrate to the community how relatively simply and inexpensively ways to improve street conditions might be tested. With the slower car-traffic, artwork, and vegetation in the center of the street—and even music a couple of nights—the whole intersection had started to feel like a place to be, rather than a place to just get through.
DELDOT AND DEWEY BEACH, DE, USA

Pedestrian Accommodations

Through a collaborative effort between the Delaware Department of Transportation (DelDOT) and the Town of Dewey Beach, DE, USA, a popular resort town on Delaware’s coastline, pedestrian safety accommodations were implemented to quickly bring to life recommendations from an April 2019 pedestrian safety audit in order to create a safer environment for pedestrians and bicyclists alike. The improvements included curb bump-outs throughout the town limits, seven new rectangular rapid flashing beacons (RRFBs) at uncontrolled multi-lane crosswalks, ADA upgrades for existing signalized crosswalks, and installation of Delaware’s first two-stage left-turn bicycle boxes, complete with in-pavement bicycle detection loops. The improvements were received positively by the community, and next up for Dewey Beach is the installation of a pedestrian barrier system along the median of SR 1—including landscaping and beautification—to deter mid-block crossings and funnel pedestrians to the newly-constructed RRFBs and upgraded signalized crossings.

FORT MYERS BEACH, FL, USA

Complete Streets Improvements

Fort Myers Beach, FL, USA is a major tourist destination in southwest Florida. During the peak traffic season, the traffic volume is more than 27,000 vehicles per day. During past rainstorm events, it was common to have more than six inches of water in the road. Although the area is a high pedestrian area, sidewalks were narrow and would sometimes end in dirt shoulders for short sections. Parked cars would block and back out over sidewalks. Beginning in 2016, Lee County started reconstruction of the road, rebuilding storm drainage, improving sidewalks, and adding bus pullouts. Due to utility conflicts, the drainage was designed to drain to the center of the road through permeable pavers. The 5-foot (1.5 meter) sidewalks were replaced with 8- to 10-foot (2.4-3 meter) sidewalks. By the end of 2022, the entire 6 miles (9.7 kilometers) of Estero will be completed.
Universal Accessibility Improvements

METRO, in coordination with a local consultant, identified the accessibility, pedestrian, and bicycle safety issues within the Hillcroft Transit Center in Houston, TX, USA based on an independent review by a Registered Accessibility Specialist.

The team conducted multiple field visits during the typical peak hours to identify pedestrian traffic patterns within the transit center. These visits helped to identify the gaps in existing pedestrian signage, crosswalk striping, and general safety issues. The team also obtained slope measurements of existing wheelchair ramps, identified the deficient ramps per ADA/Texas Department of Licensing (TDLR) requirements, observed sidewalk conditions, and verified the cross slopes. The deficient conditions were documented with adequate pictures and coordinated among the team, and the remedial actions were discussed and agreed upon.

Incorporating METRO’s Universal Accessibility principles (which exceed ADA requirements) into the facility’s improvements, drawings were prepared showing the redesign of wheelchair ramps, including the addition of truncated domes. The work also included redesign of a parking lot section near the bus bays to include adequate number of accessible parking spots with wheel stops, appropriate signage, and pavement markings meeting the ADA/TDLR requirements. The existing signage for the bus stops was also updated to include braille on the signpost at the minimum suggested height. Design included bicycle racks and a bicycle repair station within the bus facility.

Additionally, METRO collaborated with multiple agencies to obtain permits for designing and installing wayfinding signs on all the major approach roadways to the Transit Center.
In Recognition of Infrastructure Week

MACOMB COUNTY, MI, USA

Mound Road: State-of-the-Art Corridor

Innovate Mound is an initiative to rebuild one of the most important corridors in southeast Michigan and the United States—Mound Road. The corridor connects people, communities, and commerce. It is one of the most densely packed manufacturing regions in the country, supporting more than 200,000 jobs in Macomb County and across the state.

Innovate Mound will build a road that is community-friendly, enabled with smart technology, and enhanced with traffic flow improvements, placemaking, iconic signs and features, non-motorized multiuse paths, and improved pedestrian access and transit stops. The project will be a center for innovation, utilizing intelligent transportation systems, smart traffic signals and signs, connected vehicle pilot projects, real-time speed monitoring, and emerging mobility features. Upon its completion, Mound Road will be a world-class, state-of-the-art corridor that will use the latest technology to create an innovative, efficient, and safer road way for all users.

PUBLICATIONS

Best Practices in Selecting Transportation Consultants
Electronic PDF

This informational report is written primarily for public agency officials responsible for engaging consultants to provide professional services pertaining to the planning, design, construction, maintenance, and operation of transportation systems and facilities. This document will also aid consultants providing these services in better understanding the expectations and nuances of this phase of the public procurement process.

The goal of this informational report is to help public agencies select the best-qualified transportation consultants to assist with its projects. The report is also intended to educate participants on and explain the value proposition of an effective consultant selection process. While applying to all potential assignments in this broad field of professional services, the document focuses on the selection of consultants in the disciplines traditionally described as transportation or traffic engineering and transportation planning being performed for local governments (i.e., towns, cities, counties).

ITE Member Price: Free | Non-Member Price: $50

Micromobility Facility Design Guide – an ITE Informational Report
Electronic PDH

The development of this resource was undertaken by the Institute of Transportation Engineers (ITE) Pedestrian and Bicycle Standing Committee in response to a lack of appropriate guidance on how to design roadways to safely accommodate the widespread growth of micromobility vehicles. Several potential design solutions are identified to mitigate challenges for micromobility vehicles that can be applied across a broad spectrum of locations and contexts.

Micromobility vehicles have proliferated in both large cities and small towns, utilizing existing right-of-way and transportation infrastructure that was not explicitly designed with these micromobility vehicles in mind. Micromobility has provided a far more efficient way of traveling short distances than vehicles and has transformed how people move around cities and suburban areas. The launch of micromobility has exposed significant new challenges that must be addressed through policy, planning, design, and maintenance. Several organizations have addressed policy and planning considerations for micromobility vehicles, but facility design and maintenance guidance for micromobility vehicles remains limited. This document identifies potential design challenges that micromobility users experience as they travel on a typical roadway as well as the challenges other users of the roadway may face caused by micromobility users. Solutions with real-world examples are identified that accommodate micromobility and improve the roadway for all users. This document does not provide best practices pertaining to policy.

ITE Member Price: $50 | Non-Member Price: $75

Preemption of Traffic Signals Near Railroad Grade Crossing, 2nd Edition
Available in Electronic PDF and Hard Copy

ITE prepared this Recommended Practice to reflect the current state-of-the-practice and provide the user with a broad overview of key considerations for the preemption of traffic signals near railroad grade crossings. In these locations the railroad signal control equipment and the roadway traffic signal control equipment should be interconnected and normal operation of the traffic signals controlling the intersection should be preempted to operate in a special control mode when trains are approaching. The report is written primarily for an audience of engineers working for public agencies, railroads, and public transit agencies engaged in signal design and operational timing.

PDF: ITE Member Price: $75 | Non-Member Price: $150
Hard Copy: ITE Member Price: $100 | Non-Member Price $175

www.ite.org July 2021 17
Transportation Task Force Conceives High Capacity Roadway
The Northern Parkway Program concept was conceived by a multiagency transportation task force consisting of the Arizona Department of Transportation (ADOT), Maricopa County Association of Governments (MAG), Luke Air Force Base (LAFB), Maricopa County Department of Transportation (MCDOT), the Flood Control District of Maricopa County (FCDMC), El Mirage, Glendale, and Peoria. It was further developed in the Northern Parkway Design Concept Report (October 2003).

Maricopa County Department of Transportation (MCDOT) is leading final design efforts and is managing construction of the Northern Parkway between Loop 303 and US 60 (Grand Avenue). When completed, Northern Parkway will be a high capacity, limited access roadway with overpasses at major intersections. Proposition 400, the extension of the countywide half-cent sales tax, was passed by voters in November 2004 and provided the regional funding source for the design and construction of the future Northern Parkway.

Hot In Place Recycling
In the spring of 2020, the Maricopa County Department of Transportation (MCDOT) removed old pavement and replaced it with rubberized asphalt using an innovative technology called Hot In Place Recycling, or HIPR. The HIPR process is a cost-effective, environmentally friendly way to repair and resurface roadways utilizing equipment that recycles the existing pavement. MCDOT crews were able to grind up old pavement, heat and mix the millings with new asphalt, then lay it back down as new rubberized pavement all with HIPR. The ride on these roads will now be smoother and quieter.
CITY OF SANTA MONICA, CA, USA

Ocean Avenue Project
The Ocean Avenue project in Santa Monica, CA, USA addressed two urgent needs during the COVID pandemic: creating safe, socially distanced and environmentally friendly ways to get around the city, and creating space for businesses to operate safely outside. The project installed a new two-way protected bikeway along the city’s iconic Ocean Avenue, connecting two of the city’s existing protected bicycle routes. This allows daily visitors, residents, and local commuters to ride a safe, calm route from the Downtown Santa Monica light rail station to the California Incline bicycle path that connects to 22 uninterrupted miles (35 kilometers) of beach bike path. The new connection serves the thousands of residents and visitors that use Ocean Avenue daily. Peak weekend bicycle and scooter ridership has already increased by 19 percent on the route. Additionally, the project repurposed parking spaces to expand sidewalks for pedestrians and allows for thousands of new square footage for restaurant outside dining.

ST. PETERSBURG, FL, USA

40th Avenue NE Bridge Replacement

This project will replace the existing 40th Avenue NE Bridge, a two-lane facility in suburban St. Petersburg, FL, USA. The sidewalks on the existing bridge were each less than 5 feet (1.5 meters) in width. The bridge shoulders that accommodated bicycle lanes were each 4 feet (1.2 meters) in width. The city took a Complete Streets approach to the typical section for the replacement structure. The new bridge will accommodate two lanes of traffic, 7-foot (2.1-meter) wide shoulders/bicycle lanes, and wider sidewalks on each side of the bridge, as well as decorative lighting and window railing. The pedestrian and bicycle accommodations of the new bridge will help the structure serve as a link between the Shore Acres neighborhood to the east, and the Pinellas Trail, which runs along 1st St. N., approximately 1 mile (1.6 kilometers) west of the project location. The new bridge will also feature glass and carbon fiber reinforcement to extend service life.
TEMPE, AZ, USA

Multimodal Roundabout
The City of Tempe, AZ, USA, in partnership with Valley Metro Regional Public Transportation Authority, recently completed construction of the city’s first major roundabout project. The roundabout, located in Tempe’s downtown at the intersection of Rio Salado Parkway and Ash Avenue, accommodates traditional roadway users as well as a new user: the newly constructed Tempe Streetcar.

The roundabout design accommodates a 90-degree left-turn (westbound to southbound) by the streetcar through the center island. As the streetcar approaches the roundabout, traffic is restricted from entering the roundabout by flashing beacons installed on each approach. Once the streetcar has safely cleared the roundabout, the beacons go dark and normal traffic movements resume.

This roundabout serves as an important connection between Tempe Town Lake and the downtown district. The roundabout replaced an existing signalized intersection and its construction closely aligns with Tempe’s multi-modal goals, including Vision Zero and creating a “20 Minute City.”

TENNESSEE DEPARTMENT OF TRANSPORTATION

I-440 Reconstruction
Tennessee’s I-440 project was the state’s most expensive project to date. The contract awarded in 2018 included work around the clock for 20 months and the project addressed capacity, maintenance, and safety issues.

Due to the project’s complexity and need for a quick delivery, a Design-Build contract was utilized. Project innovation included concrete rubblization with an asphalt overlay, which saved a significant amount of time and cost. A gantry system was also used for construction of the I-65 flyover at I-440, where the elevated ramps were more than 1,000 feet (305 meters) in length, at a height of 60 feet (18.3 meters) over I-65.

An incident management plan was incorporated to quickly clear crashes, and Bluetooth units were deployed to track traffic volumes and adjust signal timings on arterial corridors adjacent to I-440 to manage traffic congestion. The project was completed ahead of schedule in July 2020. itej
Thinking.

Inside the box.

Driving Change with a Connected Commute

From high-tech highways to Connected Vehicle technology, Siemens Mobility is driving the transportation revolution. Adaptive traffic control connects vehicles with infrastructure and city control centers to improve every aspect of commuting. From AI-powered collision prevention to rush-hour management. That’s Siemens Mobility — Thinking. Inside the Box

usa.siemens.com/mobility
When examining some of the biggest transportation trends in the United States—safety, equity, sustainability, etc.—which issues are getting the most traction in Australia, and where does the most work need to be done?

PRZYCHODZKI: All of these issues are common within Australia. The transport engineering sector has been focused on reducing road trauma for many years, and most state road authorities utilize a Safe System philosophy—safer drivers in safer vehicles on safer roads. Though we have made tremendous advancements in areas like road safety and asset management, we have yet to resolve new disruptive transport solutions like e-bikes and e-scooters. Unfortunately, many road rules and regulations have failed to keep up with the introduction of these new travel modes. The sector is still trying to address several conflicts with using these modes to travel on footpaths or bike lanes, requirements to wear helmets, and even how are the devices stored (in many jurisdictions, they’re classified as “litter” when not stored in a designated area). If bureaucracy and regulations continue to act as barriers to disruptive transport solutions in Australia, we may fall behind in adopting technologies that can transform sustainability and safety in transport, such as electric vehicles (EVs) and autonomous vehicles. Although EV uptake in the United States and Canada isn’t as high as in Europe, they are well ahead of where we are in Australia. Our modern and consistent road network makes this a perfect place to implement and develop new technologies.

As COVID numbers slow, what does the recovery look like in Australia for the transportation sector, and what government investments are helping boost infrastructure?

PRZYCHODZKI: As with many parts of the world, in certain parts of Australia—predominantly the state of Victoria where I reside—COVID has had a significant impact on the way we travel. While public transit usage has declined due to COVID, there are signs it’s slowly recovering. Traffic volumes in many of Australia’s major cities have increased to above pre-COVID levels. However, this can have a positive impact, as it may assist with driving (pun intended) some users back to public transit modes more quickly. Australian cities have typically grown with high reliance on a single central business district. However, it looks like the pandemic will result in a lasting change in the way many travel for work. The norm is no longer working in the city from 9 a.m.–5 p.m., Monday to Friday. COVID has shown many can work from home, allowing for much greater flexibility with working schedules. We may see progress with the biggest cities like Melbourne and Sydney moving to a more polycentric transport system—which has been part of transport planning policy here for decades.

Both federal and state governments continue to fund significant infrastructure projects, like completing ring roads and expanding heavy rail networks. Investment is heavily focused on stimulating the economy, with the number of jobs created by these projects seen as the big benefit (sometimes more so than any other improved transport outcomes). It’s fantastic to see some great projects being delivered—however, so much happening at once has its drawbacks, with cost blowouts due to increased material and labor costs, and rushed delivery unfortunately evident in some projects.

How do transportation issues differ in Australia versus the United States?

PRZYCHODZKI: Serving on the ITE International Board of Direction, I’ve realized we have a lot more in common than we think, but there are a few obvious differences. We drive on the left side of the road, and like most of the world, we use metric units (meters, kilometers, etc.). There is a major population difference between the United States and Australia (328 million vs. 25 million). Much of this country is sparsely populated, and
distances between major cities can be huge. For example, the distance between Melbourne (capital city of Victoria) and Brisbane (capital city of Queensland) is 1,780 kilometers (1,106 miles). Both are located on the eastern coast, where the majority of Australia population is located—making it a huge logistical task to move goods across such distances. Around 30 percent of the Australian population was born overseas (compared with around 15 percent in the United States). This has a huge impact on community engagement and expectations around transport provision and use. The municipality I work in is the most multicultural in Australia, with residents from 157 birthplaces and 64 percent of its population born overseas (2016 census). This leads to unique issues, including large numbers of recent arrivals who do not feel comfortable driving on Australian roads. In addition, for example, sizeable numbers of immigrants arrive from cultures where women traditionally do not drive—meaning this population can struggle to access jobs and services.

**ITEJ:** How does ITE bring value to its membership in the Australia-New Zealand Section, even in the midst of COVID? What would you say to anyone considering joining ITE in your part of the world?

**PRZYCHODZKI:** COVID has resulted in several positive (and unexpected) benefits for members in the ITE Australia-New Zealand (ANZ) Section. Pre-COVID, access to seminars and conferences was generally limited to the state/country you lived in. Now, it’s significantly easier (and cheaper) to access webinars and events conducted by the various ITE Districts. It’s never been easier for Global District members to access the ITE Annual Meeting and Exhibition or contribute to the professional committees. As highlighted above, there are far more similarities between the United States and Australia than differences when it comes to transport. Best practice examples from either side of the pacific can benefit us all.

Being an ITE member has been tremendously valuable and rewarding. I was extremely fortunate to have a great manager early in my career who encouraged me to become involved. Since 2001, I have served on the ANZ Section Executive Board in the positions of Secretary, Vice President, and President, and I’m currently the ITE Global District Director. Participating in the ANZ Section has allowed me to learn and develop my skills, not only as a transportation engineer, but as a leader of people. The networks I have developed through ITE have greatly assisted my professional development, opening doors to opportunities which may not have been available otherwise. As a member of ITE, you have access to global network of likeminded professionals, something many similar organizations don’t offer. It’s never been easier to connect and participate on a global scale. The networks you develop can greatly enhance both your knowledge and skills, all while improving your marketability as an individual. The more you put in, the more you will get back. *ITEJ*

**Fun Fact**

As an avid gamer (though now more of a casual gamer due to limited spare time), Daniel has collected video games and associated merchandise for several decades. A large portion of his collection is focused on Nintendo and its various consoles over the decades—one of his favorite Nintendo games is *The Legend of Zelda*. He’s been able to share the hobby with his daughters, and they’ve spent many hours of fun together playing games like *Mario Kart*, *Wii Sports* (particularly bowling), *Just Dance*, and *Animal Crossing*. 

Daniel poses with Mario and Luigi at PAX Australia 2019.
The Power of Recognition

Section Awards

Understanding the value of recognition, ITE Toronto offers several awards to express gratitude for member and organizational contributions to the Section and the profession. Annually, ITE Toronto hosts the Project of the Year Award competition, where members can nominate a recently completed project with an abstract and report for consideration. The winner is recognized at the Christmas Luncheon and Annual General Meeting, and gets to host the first event of the following calendar year. The 2020 recipient was the Kleinburg Parking Strategy, nominated by City of Vaughan.

At its Christmas Luncheon and Annual General meeting, the Section also presents an award to the member who attended the most events over the past calendar year to recognize their dedication to ITE Toronto. Likewise, it presents Lifetime Membership Awards to those who have been members for more than 25 years, and recognizes the Past President of the Section for his or her contributions to the executive board. The ITE Toronto Section President also personally selects and presents an award to a member within the Section to recognize his or her contributions throughout the past year.

The Toronto Section of ITE, which covers most of central and northern Ontario, Canada, enjoys a membership of more than 750 transportation professionals. The Section actively engages, recognizes, and supports its membership, including young members. ITE Toronto works closely with its four Student Chapters (University of Toronto, Ryerson University, Lakehead University, and York University) by co-hosting events throughout the year. The Section also offers monetary support to each Student Chapter to help cover the costs of hosting their own events, and offers all students reduced admission costs to all Section activities.

Also in support of its student members, the Section collaborates annually with the Hamilton and Southwestern Ontario Sections to host the Joint Canadian District of ITE (CITE) Section Student Presentation Competition, a unique event to help foster interest in the field of transportation. While technical competence is an important element, the primary focus of the competition is on the ability to present effectively to one’s peers and the public. For the very first time, the 2021 competition was held online. Prizes were offered to the top three presentations within the graduate and undergraduate categories.

ITE Toronto offers its membership a variety of events in different formats that engage attendees on technical subjects while also providing the opportunity for networking. Prior to COVID-19, those included:

- Lectures – One to three speakers presenting on various topics, typically taking place on a weekday morning or evening. Coffee and snacks provided
- Panels – Three to four panelists discussing elements of a single topic, each from a different type of employer within the transportation industry (i.e., private sector, public sector, academic, vendor, not-for-profit, advocacy, etc.) with a focus on discussion and Q&A. Offered during early afternoon, lunch provided
- Workshops – Full day workshops on a technical aspect, lunch provided
- Tours – Onsite tour of a facility, infrastructure or construction site
- Socials – Casual speaking engagement followed by networking and occasionally an activity. Often takes place after an evening lecture
- Luncheons/Annual General Meeting – Combining many of the elements above, consists of a networking session, a lunch, a keynote presentation, and raffles/drawings

During COVID, Toronto continued to offer online events in the form of webinars. Topics included everything from Vision Zero to Transportation Equity. In addition, ITE Toronto has collaborated with the Toronto Chapter of Young Professionals in Transportation (YPT) in the past for a few events. As part of adapting to the virtual environment brought on by the pandemic, the Section most recently co-hosted a virtual TransportationCamp “un-conference,” an informal conference run by the attendees. Prior to the pandemic, ITE Toronto was also planning to co-host an event with the Toronto section of an organization called Bike Minds, but it was cancelled due to shutdowns. The Section looks forward to exploring other collaborations in the future.

Elginton Crosstown LRT Tour.
A strong sponsorship program helps support ITE Toronto financially while offering perks for the sponsors. Sponsorship opportunities are offered during the Section’s Spring and Christmas Luncheons, where sponsors can set up a booth during the network sessions. Company logos are displayed prominently during the luncheons and keynote sessions. The fees obtained through these sponsorships are used to provide reduced admission costs to the student members of the Section, allowing students and sponsors to connect with each other during the network sessions.

As part of the CITE District, the Section works with District leadership to stay engaged with District activities and connected to CITE’s overall efforts. The ITE Toronto Section also maintains a liaison within CITE to stay up to date with ITE activities and initiatives at the international level. Amy Jiang, M.Eng., P.Eng. (M), ITE Toronto 2019 President, currently serves as this liaison. The Section also has a working relationship with CITE where the District posts ITE Toronto events on its website and assists the Section in hosting event registrations where payment is required.

As Canada and the world emerge from COVID-19, ITE Toronto looks forward to continuing to provide value for its members while getting back to offering in-person events, all while applying lessons-learned from virtual engagement over the past year and a half.
Prioritizing Professional Development at ITE

ITE’s professional development program has grown and evolved in recent years, transforming into a robust array of offerings for transportation professionals from all backgrounds. While the program is still centered on around an extensive webinar-based program, it also includes LeadershipITE—ITE’s premier leadership development program—certificate-based, blended learning courses, refresher courses for those preparing to take one of the Transportation Certification Board’s (TPCB) exams, and partnership programs offering members to access training developed by others at a discounted price. ITE has also responded to COVID-19 by providing members with a new forum—ITE Virtual Drop-Ins—to share ideas and lessons learned on new technologies, products, and practices.
The following is a look at the professional development offerings from ITE and more information on how members are taking advantage to enhance their careers and develop both their technical and non-technical skills.

**Learning Hub.** ITE developed the Learning Hub as a one-stop shop where members can manage all of their professional development opportunities. The platform is a searchable engine where you can choose a category on a topic you’d like to view or type in a keyword, and any resources that are relevant and available to register for will show up. This includes webinars (live and on-demand), certificate programs, certification refresher courses and practice exams, registration for partnership learning, and the recent virtual Technical Conference and virtual Annual Meetings. The ITE Learning Hub had 13,000 active users in 2020 (including repeat attendees).

Most ITE professional development offerings provide continuing education credits in the form of professional development hours (PDHs). As part of the Learning Hub, ITE members have access to a convenient way of tracking and managing their professional development record-keeping.

**Webinars.** ITE’s webinar program has experienced tremendous growth during recent years, providing attendees with the opportunity to hear directly from experts on topics of interest to their careers. Speakers hail from a range of backgrounds and include prominent leaders in the transportation field. More than 9,000 attendees participated in ITE’s webinars in 2020 (including repeat attendees), and approximately half of those webinars were offered at no charge to ITE members. For 2021, 75 webinars have been held or are scheduled to take place.

The following is a look at the professional development offerings from ITE and more information on how members are taking advantage to enhance their careers and develop both their technical and non-technical skills.

**LeadershipITE: Developing Tomorrow’s Leaders, Today**

ITE prides itself on helping develop today’s transportation professionals into tomorrow’s leaders. As part of ITE’s professional development offerings and to help individuals build their leadership traits, the LeadershipITE program was launched in 2014. Since then, LeadershipITE scholars have been empowered to rise up as industry leaders through group projects, networking, workshops, and more.

With the completion of the 2021 class, there have been 191 graduates of the LeadershipITE program since it began in 2014. This powerful network helps set the direction for ITE, the profession, and our industry. Some examples of how our LeadershipITE scholars are making an impact:

- Leading ITE: International Board of Direction Members (past and present)
- Leading our Councils and Initiatives
- Leading our Committees including STEM, Women in ITE, and LeadershipITE
- Leading the industry: entrepreneurs, presidents, leaders of our city agencies, DOT’s, and federal agencies (FHWA)
- Countless leaders of ITE Districts and Sections
- Leading the future of the profession (at universities, working with students)
- Award winners: Young Leaders to Follow, Rising Stars, Young Member of the Year winners

For 2021, the program was modified to a virtual format for COVID-19. In 2022, the program will be a hybrid of both virtual and in-person formats, with two in-person sessions and nine virtual sessions, allowing students to better balance their personal and professional lives.

Applications for the 2022 LeadershipITE Class are due September 15, 2021. For more information and to apply, visit www.ite.org/LITE.
personal branding, distraction management, and difficult people and performance.

**Certification Refresher Courses and Practice Exams.** In partnership with the TPCB, ITE offers refresher courses and practice exams for those wishing to take the exams to earn the following certifications:
- Professional Traffic Operations Engineer (PTOE)
- Professional Transportation Planner (PTP)
- Road Safety Professional (RSP Level 1)
- Road Safety Professional (RSP) Level 2: Infrastructure Specialty
- Road Safety Professional (RSP) Level 2: Behavioral Specialty

These courses and practice exams are designed to help prepare participants for the rigor of these certification exams.

**Transportation Impact Analysis Training Program.** This new certificate-based, blended learning program provides students with a comprehensive coverage of the technical elements of the Transportation Impact Analysis (TIA) preparation and review.

Topics covered include:
- Requirements for when a TIA is required
- Recommended qualifications for both the preparer and reviewer
- Definition of the site development characteristics
- Designation of the study area and description of its characteristics
- Description of TIA-specific analysis tools
- Assessment of current conditions and forecast methods for evaluating future conditions
- Estimation of modal trips generated by site
- Distribution and assignment of site-generated modal trips
- Multimodal analysis
- Safety analysis
- Evaluation of site access needs
- Identification of on-site and off-site mitigation alternatives that support TIA recommendations
- Preparation and presentation of a complete final report.

Three live, instructor-led discussion sessions also provides real-world case studies and address new and emerging issues such as impact fees and special assessment districts, and the impacts of COVID-19 on traffic impact analysis. Individuals who successfully complete this training program will receive an ITE Training Program Certificate.

Since launching in fall 2020, the TIA course has proved extremely popular. The first program sold out in just two weeks, and ITE responded by adding a second session. Going forward, this course will be offered twice a year in the spring and fall.

Registration for the Fall 2021 Program opened in June. For more information and registration, visit ITE’s Event Calendar online.

**Partnerships**

ITE has expanded its professional development opportunities in more blended and engaging ways through new partnerships.

**Consortium for Innovative Transportation Education.** ITE has established a partnership with the Consortium for Innovative Transportation Education (CITE) at the University of Maryland. As a unique organization of university and industry partners, CITE believes in furthering the goals of safety and reliability in the transportation system through training and education, independent study courses, blended learning courses, and certificate programs. Topics have included traffic signal operations, managing a corridor, and transportation cybersecurity. This partnership provides ITE members access to CITE’s comprehensive offerings at a discounted price and the opportunity to partner on the development and delivery of new content for these educational opportunities. On CITE courses, ITE Members receive a 20 percent discount, Professional Development Bundles, and Certificate Programs by registering through ITE.

**The NEXT Education.** ITE and The NEXT Education are partnering to administer a NEXT/ITE Technician and Installer Credential program, which will focus on intelligent transportation and new mobility for technicians and installers. Through its

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**Congratulations to the Recipients of the Fall 2020 TIA Training Program Certificate**

Abdulai Abdul-Majeed
Layden Akasaki
Suzan Akpinar
Abdul Amer
Thomas Austin
Michael Austin
Winston Bautista
Isaac Blue Eyes
Jason Brecht
Michael Brereton
Jennifer Brown
Elizabeth Carpenter
Keyan Cody
Brad Crossland
Daniel Danicic
Devon Dezort
Josafath Dominguez
Omid Ebadi
Alan Fournier
Nelson Galeano
Daniela Guthrie
Jiho Ha
Karolina Haggerty
Mary Hamann
Alan Heathcoat
Evan Kanak
James Kay
John Kingsley
Angela Kowalewski
Lynn Kroll
Virpi Kuukka-Ruotsalainen
Julie Luna
Brendan McPhee
Garret Menard
Denick Millican
Saeed Moradi
Maddison Murch
Patrick Neal
Randall Okaneku
Nickolas Oliveira
Jonathan Pham
Michael Policastro
Randon Ribble
Jennifer Rice
Becky Rogers
Walter Scattolon
Adam St. Amant
Neal Styka
Martin Vega
Chad Wood
Max Zasada

The Spring 2021 TIA Training Program is coming to a close. Those Certificate Recipients will be announced in another magazine issue.
innovative learning platform, MicroTraX, The NEXT Education has developed a series of video-based and online live instruction classes that provide access to industry subject matter experts for professional development. The NEXT Education has similar alliances with IEEE, American Center for Mobility, Center for Automotive Research, and the Connected Vehicle Trade Association, among others.

Coursework for the NEXT/ITE Technician and Installer Credential program is being developed in collaboration with subject matter experts identified by ITE and delivered through The NEXT Education’s innovative MicroTraX education platform. As the credentialing body, ITE will issue a Certificate of Competence to those who qualify to confirm their understanding of concepts and applications, as well as their comprehension of appropriate technologies and best practices for their application.

Pandemic Related Changes and Growth
With the onset of the COVID-19 pandemic, ITE looked for innovative ways to assist members by offering a variety of pricing discounts. As a member-only benefit, ITE introduced the Live Webinar Group Pricing Discount. When an ITE member registers for a webinar at list price, they are given the opportunity to register additional people at discounted pricing. A minimum of four additional people is required to qualify for group pricing. To offset any financial constraints caused by the pandemic, ITE Public Agency members have a flat reduced fee when registering for at-cost webinars.

ITE also launched Virtual Drop-In Sessions in March of 2020, a free, largely unstructured forum for members who want to engage “virtually” with colleagues and fellow practitioners on cutting-edge industry topics and challenges. These sessions begin with a short presentation by a member, followed by a presenter-led discussion. Topics range from Complete Streets and crosswalk design to traffic management centers and innovative data collection. In response to popular demand, Virtual Drop-Ins continue in 2021 and are ongoing. For the latest list of upcoming sessions and to participate, visit www.ite.org/events-meetings/virtual-drop-in-sessions.

As a leader in professional development, ITE has expanded and evolved its program to adapt to new work environments and demands, all while continuing its tradition of helping members hone their technical and interpersonal skills. From webinars and certificate programs to partnerships with leading institutions, ITE is truly a leader in the realm of professional development for transportation, offering its members a wealth of resources to enhance their careers, allowing them to effectively contribute to the mobility and safety of all users in their communities. itej

Join ITE!
Gain Access to a World of Ideas, People, and Resources

Find Out What Works
ITE is your source for a wide range of technical tools and solutions to the challenges you face every day.

Build Your Network
When you join ITE, you gain opportunities to connect locally, regionally, and internationally, virtually, and in-person.

Stay Ahead of Industry Trends
ITE’s suite of communication channels not only keeps you in the know, but helps you sort out fact from fiction.

Join more than 16,000 transportation professionals who are passionate about improving the communities they live and work in. Gain access to the critical ideas, people, and resources you need to get your job done. Join ITE Today!

Go to www.ite.org to join.
Bridging the Gap
Between the Skills You Have and the Skills You Need

By Shelley Row, P.E., CSP (F)

The Story of Engineer Emily and Engineer Enrico

Smart. Gifted. It’s what everyone said. At some point, the strong math skills caused someone to say, “You could be an engineer!” Majoring in engineering meant tough courses, lots of homework, and staying in on a Friday night to crack open a book when everyone else was at a party. The hard work paid off. Emily graduated, felt proud, and got a good job. Same for Enrico. He’s ready for work with his technical skills. What are the attributes that got them to this point? Problem solving, logic, attention to details, rational thought processes, and critical thinking.
Emily works on interesting technical projects, and these skills allow her to succeed in the work world. Enrico continues to grow technical skills and problem-solving abilities to take complex problems, break them into pieces, and wrestle that problem to the ground. It’s going so well that his boss says, “Congratulations, we want you to lead this team.” “Wow,” Enrico thinks, “That’s great!” Suddenly, he’s a manager. The next day, people look to him for direction. He must delegate to and motivate people who have different skills, backgrounds, and interests. In short, they aren’t like him. Emily, too, gets promoted. Overnight, Emily and Enrico’s worlds shift. Lacking a different approach, they continue their detailed, problem-solving approach. But, for some reason, staff don’t seem to respond to meticulous, analytical oversight and a facts-only approach. Emily knew the rules for success as an engineer but now, she’s puzzled, frustrated, and stressed.

Emily and Enrico’s staff and bosses experience frustration, too, when the newly minted manager can’t find his or her footing. Productivity, morale, retention, and ultimately organizational success are at stake. While the details vary, this is the story of many technical professionals as they progress to management. It isn’t a new problem, but it is an important problem. Now more than ever, we need more of these logical, level-headed, pragmatic professionals in leadership roles. These are the very people who can tackle the complex problems we face. However, we drastically underestimate the shift that is required of them. In that underestimation, we miscalculate the type and level of professional development needed to support the shift into management. We need to understand the problem more deeply to craft informed solutions to grow leadership talent.

The Gap
To gain more insight, 18 leaders in the transportation and construction industries were interviewed. These leaders (many of whom are engineers) come from consulting firms, public agencies, and associations in technical fields. They see Emily and Enrico’s story play out. Their responses, results from surveys of several technical groups, and personal experience (collectively referred to as the contributors) form the basis of the following analysis.

The analysis identifies the natural attributes of technical professionals, the attributes of good managers, and examines the differences that characterize The Gap. From there, a professional development system is constructed that establishes a logical framework for understanding the foundational skills needed to bridge The Gap.

Attributes of Technical Professionals
What skills do technical professionals naturally bring to the table? (Of course, this is generalized, although certain traits tend to characterize those who choose technical professions.)

<table>
<thead>
<tr>
<th>Table 1. Attributes of technical professionals</th>
<th>Table 2. Attributes of good managers: “How” they do their job</th>
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<tbody>
<tr>
<td>• Analytical</td>
<td>• Trustworthy</td>
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<tr>
<td>• Detailed</td>
<td>• Good listener</td>
</tr>
<tr>
<td>• Problem solvers</td>
<td>• Empathetic</td>
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<tr>
<td>• Fact-based</td>
<td>• Encouraging</td>
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<tr>
<td>• Practical</td>
<td>• Fair</td>
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<tr>
<td>• Level-headed</td>
<td>• Communicator</td>
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<tr>
<td>• Clear thinkers</td>
<td>• Collaborative</td>
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<tr>
<td>• Get the right answer</td>
<td>• Compassionate</td>
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<tr>
<td>• Knowledgeable</td>
<td>• Respectful</td>
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<td>• Dedicated</td>
<td>• Patient</td>
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<td>• Competent</td>
<td>• Understanding</td>
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<td>• Critical thinkers</td>
<td>• Positive</td>
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<tr>
<td>• Process oriented</td>
<td>• Resilient</td>
</tr>
<tr>
<td>• Get the right answer</td>
<td>• Humble</td>
</tr>
</tbody>
</table>

The contributors were asked What are some of the attributes of technical professionals? Summary responses are in Table 1 and selected quotes are below.

Analytical and able to organize information in a way that’s very powerful. (Engineers are) leveraging the left-brain skills at a very sophisticated, impactful level and are conveying information, facts, and good organization. —Steve Dilts, HNTB

I think a natural resource that engineers have is our attention to details. We’re not going to let details slip through the cracks. —Erin Flanigan, Cambridge Systematics

I think one thing that engineers are naturally good at...is the fact that we are very thorough in our need for information and data. —Yung Koprowski, Y2K Engineering

I think (engineers have) strengths in terms of problem solving and having a structure to think through what the problem is, what the potential solutions are, and then identifying the best path forward. —Katie Turnbull, Texas A&M Transportation Institute

Most engineers are problem solvers by nature. If you put an engineer in a room and there’s a problem, most want to figure it out. It’s just in our DNA. —Adam Allen, Colliers Engineering & Design

You may think, “I already knew that,” because you probably did. What’s important is to appreciate the level of depth to which these attributes are embodied within technical professionals. Let’s detour into neuroscience to understand the significance. Neurons in the brain form connections that are solidified when frequently used and rewarded. When repeated connections are made, there are bursts of “positive” neurochemicals. For Emily and Enrico, they
behave logically, it works, and they are rewarded. Over time, their brains “wire” in analytical, logical, problem solving behaviors as the preferred approach. The “wired” pathway is easy, takes little energy, and becomes their default behavior.

Figure 1 represents the baseline competencies of technical professionals and is the first element of our professional development system.

Attributes of Managers

Consider the managers you admire and for whom you want to continue working. What attributes makes him or her a good manager? The top answers from contributors are in Table 2 with selected quotes.

I think having some humility is incredibly important, because when you walk into a room and you act like you know everything, there’s no better way to lose credibility. —David Thatcher, Stantec

“Engineers are analytical. They can look at a situation, analyze it and come up with solutions. However, they may be uncomfortable with changes to their role in life and on the job. The lack of comfort comes from the lack of understanding of soft skills.” —Maurice Rached, Colliers Engineering & Design

I think it comes down to (your staff) feeling like they’re real human beings to you, and that you can talk to them as a colleague, rather than as a manager. —Keith Hall, Colliers Engineering & Design

You’ve got to really listen, listen deeper to what’s going on with that person. —Alan Mooney, Criterium Engineers

You’re the technical whiz and you know all the rules. All of a sudden now you have people to take care of. —Brian Moen, City of Frisco, Texas

Comparing Tables 1 and 2 reveals a striking difference. How would you characterize that difference? When asked, contributors described the difference as:

- Technical skills versus people skills
- Task versus people
- Process versus people
- Cerebral versus emotional
- Data versus human

| Table 3. Functions of managers: The “what” roles they play.
- Delegate
- Evaluate
- Make decisions
- Hire/Fire staff
- Performance reviews
- Provide feedback
- Motivate
- Develop others
- Supervise
- Plan
- Manage workload
- Coach
- Evaluate
- Discipline

Table 3. Functions of managers: The “what” roles they play.

- Problem-solving versus people management
- Being robotic versus having feelings

This difference between the attributes in the tables is “The Gap,” and The Gap in attributes is considerable. Not only did the rules of the game change, but the entire game also changed. Analytical problem-solving works well for technical problems. Humans are not an analytical problem to be solved. Motivating, relating to, and inspiring humans requires a markedly different skill set.

Bridging The Gap requires substantial personal change for Emily and Enrico. Recall that their technical skills are “wired in” based on years of practiced behaviors. To characterize this as a mindset shift dramatically underestimates the effort needed to bridge The Gap, as technical professionals moving into management must literally rewire their brains. They must modify behaviors that provided a strong sense of self-worth. Emily must challenge her beliefs and thinking. Enrico must reset, reframe, and rewire behaviors that served him well for years. Rewiring is doable, and it is no small feat.

What skills, specifically, are needed to bridge The Gap?

Bridging the Gap

Managers have specific functions they must perform. These functions are “what” managers do that is unique to their management role. A summary of the “what” roles are in Table 3, as defined by the contributors. We add these skills to the professional development system in Figure 2. Emily and Enrico were expected to jump from their technical skills and immediately perform these management “what” functions. But it is not enough for Emily and Enrico to perform these functions indiscriminately. There is a missing element that is discoverable by returning to the attributes of good managers (Table 2). Notice that the attributes of good managers describe “how” they do their management functions, such as with empathy, understanding, or trust.
“How” the management role is executed determines the quality of the “what” functions. The “how” attributes such as empathy and listening made managers good at “what” functions like delegation, decision-making, and motivation. For example, Emily performs the “what” role of delegation with no thought to her staff, their interests, or skills. She doesn’t listen and she communicates brusquely. On the other hand, Enrico delegates, but he does it with empathy and understanding. He listens to his staff and attempts to tailor assignments to their needs. He does the same “what” role as Emily, but “how” he does it makes him a more desirable manager. To function well as a manager, Emily must embody the “how” attributes of management. Now consider the specific skills needed to bridge The Gap to create the “how” attributes.

Groups of contributors arrived at the same three skills every time as illustrated in Figure 3. Interpersonal communication skills are consistently the top choice. Self-awareness and developing relationships vie for second and third. These three skills are foundational skills for managers.

**The Foundational Skills**

The foundational skills (interpersonal communication, developing relationships, and self-awareness) support the “how” attributes which enable technical professionals to successfully bridge The Gap into management. Many technical professionals who transition into management struggle with the “what” skills (i.e., delegation, decision-making, motivation) because they lack the foundational skills that create the “how” attributes. Therefore, the foundational skills are the necessary layer in the professional development model upon which management functions are successfully performed (Figure 4). This professional development model is the core of the Blue Fjord Leadership System.

**Interpersonal Communication**

It is not surprising that interpersonal communication is a foundational skill. Every “what” function depends on the ability to effectively communicate but we don’t always communicate well.

__Jeff Paniati, P.E. (F),__ Executive Director and CEO of ITE, notes that communications in a leadership capacity requires “relating to people on a human level as opposed to on a technocrat level.”

(Engineers) want to be so technically accurate and correct that it gets in the way of expressing ideas in a way that is adapted to the audience. (Engineers) are trying to problem solve constantly and they're not always listening to the folks that are talking to them.

—David Thatcher, Stantec

Technical professionals tend to work with other technical people and have limited exposure to people with differing styles of thinking. That is not the case for managers.

When you rise to your first supervisory position, you start having different kind of disciplines under you. In transportation it takes more than engineers to develop a transportation project. So, the communication in my mind becomes very different. Because it has to. It has to be broader.

—Carlos Lopez, HNTB

We are working on these multidisciplinary approaches to solve problems because problems are getting more complex. (We need) to have the ability to communicate to somebody who’s in a different discipline than engineering.

—Brian Moen, City of Frisco, Texas

**Developing Relationships**

One word surfaced in almost every interview: empathy. Many of the “how” attributes rely on empathy—an ability to understand, appreciate and relate to others.
What are the skills needed to bridge that gap?

1st: Self-awareness
2nd: Communication
3rd: Develop Relationships
4th: Manage Difficult Situations
5th: Motivation
6th: Adapting for Others
7th: Delegation
8th: Presentation
9th: Networking

Figure 3. Skills Needed to Bridge The Gap.
To me, (empathy) unlocks everything that comes deeper…listens well, develops others, trusted, self-awareness, courage, loyalty, judgment, vision. All those things are unlocked by having empathy. And if you don’t, you’re stuck. **Empathy is foundational.** —Steve Dilts, HNTB

Jeff Paniati reflects on his journey from engineer to manager. Early in my career I felt like chatting around the watercooler was a waste of time. You learn that taking the time to have empathy for what others are dealing with in their lives factors into being able to understand them. That’s not wasted time, that’s invested time.

I think it comes down to how you treat people. I just feel like people need to know that the people they’re working for respect them, listen to them, have their backs, and appreciate them. Do you say, ‘Hey, I can’t do this without you. You’re part of a team?’ That’s where the empathy part comes in. —Mary Erchul, MJB Consulting Group

From a business perspective, I think it’s more and more about people who are just good humans, who show kindness and are humble and empathetic. You can’t fake that kind of stuff. —Adam Allen, Colliers Engineering & Design

You have to be able to look at your employee and realize that they’re also a person, just like you. You have to be there for people. **Empathy is a fundamental quality of any leader.** —Sandy Otto, FHWA, retired

Self-Awareness

There was surprising agreement from contributors that self-awareness is key for management success.

It’s humility. It’s empathy. It’s understanding people. It is being transparent. It’s being confident while being humble. It’s about **being the best human being that you can bring to work.** It’s knowing who you are, knowing your strengths, owning your strengths, and owning your weaknesses. —Dan Berler, Battelle

Thus, the professional development system (Figure 4) includes the foundational skills of self-awareness, developing relationships, and interpersonal communication as necessary **prerequisites** for management functions like delegation, decision-making, and more.

Space does not permit exploration of the most problematic “what” functions for technical managers. That is for a future article.

Closing The Gap

The Gap is deep and wide between the wired skills of technical professionals and the skills needed for management success. Shifting to behaviors that are in alignment with desirable management “how” skills requires rewiring the brain. It is not easy, but it is achievable. While some have made this shift seemingly through on-the-job experience, the success rate improves with conscious training, skill development, and practice.
Emily and Enrico’s struggles have been discussed, belabored, and bemoaned for decades. The problem is still here. The level of professional development that is typically provided falls short given the magnitude of The Gap and the behavior shift needed. To better understand the science of what’s needed, we must consult adult learning principles and neuroscience—but, alas, that, too, must wait for another time. We can, however, summarize three common pitfalls.

- Undervaluing “soft” skills (which are not soft at all)
- Underestimating the complexity and entrenchment of The Gap
- Underinvesting in the type of professional development that produces sustained behavior change.

Emily and Enrico started with strong technical skills that will remain valuable to them as managers. However, this research and analysis illustrates that Emily and Enrico need foundational skills in communication, developing relationships, and self-awareness. With these, they have the foundation they need to perform the “what” functions at a high level. It is the integration of technical and foundational skills that makes for success. Mary Erchul of the MJB Consulting Group sums it up this way:

I think taking the expertise, the knowledge, and the problem solving or logical part, and combining it with the soft skill side—which is being able to communicate, being able to listen, being able to be empathetic—when you get those two things to merge, I think that’s when you get powerful leadership.

Shelley Row, P.E., CSP (F) is the founder and CEO of Blue Fjord Leaders. Shelley is an engineer and former government and association executive. She is an Inc. Magazine top 100 leadership speaker and Certified Speaking Professional. Blue Fjord Leaders engineers leaders to see beyond the data by providing a framework of foundation skills that support decision-making, delegation, teaming, dealing with difficult people, and more. Shelley uses neuroscience to transform touch-feely interpersonal problems into science-based technique. She provides virtual workshops, training, keynotes, consulting, and coaching. Follow Shelley at Blue Fjord Leaders on LinkedIn, Twitter, and Facebook. www.bluefjordleaders.com.

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Looking Back, Look Forward: Manual on Uniform Traffic Control Devices
By Jeffrey A. Lindley, P.E. (F) and Sarah Abel (M)

At the turn of the 20th century, the dawn of the automobile ushered in a new age for transportation in the United States. This technology was heavier, faster, and more dangerous than other forms of transportation at the time, but no uniformity existed around how the automobile should operate. Motorists were largely left to fend for themselves, causing hazardous situations for drivers and pedestrians alike. Out of this desire for safe and orderly movement of the car arose the need for traffic control devices—signs, traffic signals, and pavement markings.
As traffic agencies began developing these signs, signals, and markings, there was wide variation in how these devices looked, how they were used, and where they were placed. Take, for example, the STOP sign. Today, transportation professionals and drivers alike recognize this traffic sign as a red, octagonal shape with the word STOP clearly demarcated in white. However, in the 1920s, this critical sign had several variations in color, shape, and placement, leading to possible confusion and safety issues.

First MUTCD

In an effort to create uniformity around signs, signals, and markings, the Manual and Specifications for the Manufacture, Display, and Erection of U.S. Standard Road Markers and Signs was released by the American Association of State Highway Officials (AASHO) in 1927. This manual became the basis for the first traffic signs guidebook. However, this guidebook only addressed use and design for signs on rural roads.¹

The Manual on Street Traffic Signs, Signals, and Markings was later published to address urban traffic control devices, but the use of two separate manuals for rural and urban roads proved confusing. To issue a guidebook that was more comprehensive, AASHO and the National Conference on Street and Highway Safety formed the first Joint Committee on Uniform Traffic Control Devices in 1931, and the first edition of the Manual on Uniform Traffic Control Devices (MUTCD) was published in November 1935. The document, less than 200 pages long in its original format, would become the national standard for guidance and standardization of the transportation system as we know it today. The Institute of Traffic Engineers—now the Institute of Transportation Engineers—became part of the Joint Committee in 1942.

National Committee

The first Joint Committee on Uniform Traffic Control Devices would eventually become the modern National Committee of Uniform Traffic Control Devices (NCUTCD). The purpose of the NCUTCD is to assist in the development of standards and guidance around traffic control devices.² This body makes recommendations on proposed revisions and interpretations to the MUTCD, along with other accepted national standards, to the Federal Highway Administration (FHWA) and other appropriate agencies. The NCUTCD also develops public and professional awareness of the principles of safe traffic control devices and practice.

The National Committee is supported by 21 sponsoring organizations, each of which appoints one or more “Members” and “Associate Members” who constitute the delegates to the NCUTCD. Various technical committees within the NCUTCD focus on specific portions of the MUTCD and are organized in the same fashion as the Manual, allowing for expert input and a diversity of voices to influence content. For example, there is a Committee on Signs, a Committee on Traffic Signals, etc. Today, ITE holds one of the largest delegations within the NCUTCD—16 members total, with eight voting members and eight non-voting members—and plays a prominent role in the work of the National Committee (see sidebar below).

Current MUTCD

The transportation landscape has evolved dramatically since the first edition of the MUTCD in the early 1930s, and with that evolution have come changes to nearly every aspect of signs, signals, and markings. The Manual has likewise gone through a number of changes and iterations to keep pace with modern times. Now nearly 1,000 pages in length and in its 10th edition, the current Manual was...
Chronology of the Manual on Uniform Traffic Control Devices

November 1935 – First MUTCD
The American Association of State Highway Officials (AASHO) was founded in 1914, and a 1927 AASHO report became the basis for the first traffic signs guidebook, Manual and Specifications for the Manufacture, Display, and Erection of U.S. Standard Road Markers and Signs. However, this manual addressed only use and design for signs on rural roads. The Manual on Street Traffic Signs, Signals, and Markings was published in 1930 to address urban traffic control devices, but the use of two separate manuals for rural and urban roads proved confusing. In November 1935, AASHO and the National Conference on Street and Highway Safety formed the first Joint Committee on Uniform Traffic Control Devices, and the first edition of the Manual on Uniform Traffic Control Devices (MUTCD) was published.

November 1942 – The War Emergency Edition
Because of the war’s many restraints on highway travel and traffic control in the United States, the Joint Committee on Uniform Traffic Control Devices reconvened in May 1942 to consider revisions to the original MUTCD. The committee agreed to a manual with emergency standards for traffic control devices adapted to existing and foreseeable wartime conditions.

1948 Edition
After World War II, traffic engineers recognized they had a unique opportunity to quickly adopt the standards of a new MUTCD as a result of wartime limitations on traffic control devices. The Joint Committee on Uniform Traffic Control Devices began meeting in 1944 to prepare a new edition of the manual that would incorporate all the lessons learned since 1935.

1961 Edition
The 1961 MUTCD was the first new edition to come out since 1948. This edition “provided greater uniformity by eliminating many of the alternatives permitted in the previous edition and by replacing them with a single standard.” The Bureau of Public Roads also required that all traffic control devices used on federal-aid highways should conform to the new manual, marking the first time compliance with MUTCD standards was tied to receiving federal highway funds.

1971 Edition
More than half the changes made to the MUTCD in the 1971 edition were in the signing part of the Manual. New symbol signs were provided as alternatives for word signs. The option of using a black-on-white color scheme for guide signs on conventional roads was eliminated, and a new requirement that all guide signs be white-on-green was added.

Continued on Page 40

ITE has periodically requested that FHWA issue Interim Approvals for issues affecting vulnerable road users, including bicycle signal faces and red-colored pavement for transit lanes.


Revising the Manual. Because the MUTCD is required to be used on all roadways open to public travel, making changes to the Manual is a complex undertaking, one that requires use of the federal rulemaking process.

As the owner of the document, the FHWA Office of Operations has a team responsible for all-things MUTCD. This office answers questions, makes interpretations, provides technical assistance and training, and is responsible for updating or revising the content in the Manual.

To issue such revisions and updates, FHWA must go through a public process of describing what’s being proposed, what changes it’s seeking, why those changes are being proposed, and what the likely impact of those changes are—both positive and negative. For example, when the 2009 Manual was adopted, more than 2,000 public comments were received that identified around 15,000 issues. All of those comments had to be addressed by FHWA before the new version of the MUTCD was finalized.

In between new editions of the MUTCD, FHWA can support advancements in traffic control devices and practices through Interim Approvals (IAs) and interpretations, which allow the devices to be approved for use until they can go through the
formal rulemaking process. In making decisions on IAs, FHWA uses results from research and approved experimentation.

In recent years ITE has periodically sent letters to FHWA requesting that FHWA consider issuing a number of IAs on topics like the use of red paint designating transit lanes, allowance for bike boxes at signals, and other changes focused on improving safety, particularly for vulnerable users. Subsequently, IAs were granted for a number of these proposed changes. IAs are not subject to the same complex process when initially approved, but do go through the full public comment process as part of the next update to the Manual.

When the MUTCD is updated, the process is started with the issuance of a Notice of Proposed Amendments (NPA) outlining proposed changes to the current edition of the Manual and asking for public comment. The NPA process, though long, is designed to be transparent, with plenty of opportunity for public input on any new edition or revisions of the MUTCD. Since changes to the Manual affect anyone touched by the transportation system, this public comment period is crucial for making updates in the interest of all road users.

After receiving public input, FHWA must explain how it considered those responses to finalize the new version of the MUTCD, adding to the length of the overall NPA process.

ITE’s Response to the Recent NPA. When a much-anticipated NPA was issued on December 17, 2020 for an 11th edition of the MUTCD, with comments due by May 14, 2021, ITE began working on submitting a formal response to FHWA. Because ITE wants to ensure the broadest perspective of its membership is represented in the process of contributing to and suggesting changes to the MUTCD, member input was carefully gathered through both the National Committee delegation as well as outreach efforts by ITE staff and volunteers. ITE also solicited input from its Technical Councils and Standing Committees that have an interest in traffic control devices. Taking all of the responses into consideration, the ITE International Board of Direction approved an organizational response which was submitted to FHWA and to the Federal Register docket for the NPA.

ITE identified more than 20 high-level issues of greatest importance and organized them under three main themes: 1) meeting the needs of all users; 2) supporting flexibility and innovation in practice; and 3) taking a forward-looking approach to the Manual. First, ITE clearly stated in its response that a new edition of the Manual should focus equally on all road users. Though the Manual was born around the same time as the automobile became commonly used, the current transportation system accommodates many different users beyond motorists. ITE included in its comments that there should be a separate section of the Manual for bicycle facilities were added.

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on traffic control devices that apply to pedestrians (a separate section on bicycle facilities already exists).

The second issue ITE’s comments touched on was the need for additional room for flexibility and innovation within the MUTCD. In simple terms, the Manual is largely comprised of standards statements and guidance statements—standard statements being what you must do in terms of design and placement of traffic control devices, and guidance statements being things you should do. With more than 1,000 standards statements in the current MUTCD, ITE believes there are too many cases where the application of traffic control devices is more nuanced and potentially influenced by local conditions, without a need for absolute uniformity in all cases.

The third emphasis from ITE is that the MUTCD needs to be a forward-looking document. Since the release of the most recent Manual more than a decade ago, much has changed in the transportation system. Likewise, much will change in the decade to come. ITE believes the Manual should be able to adapt to those changes in a more nimble fashion than the existing rulemaking process allows, and called on FHWA to begin a full re-evaluation of the MUTCD’s content and structure, remove unnecessary material, increase flexibility, and identify a more streamlined and timely process for updating the MUTCD.

For nearly a century, the MUTCD has served as the public well of information on all-things signs, signals, and markings, and has continued to evolve to meet the needs of changing times. Today, the Manual must again evolve to meet the needs of all users of the transportation system, and keep up with advanced technologies like connected and automated vehicles as they become more widespread. ITE is committed to being a leader in this space, working in partnership with FHWA to bring safety and mobility to all.

To read ITE’s full letter and comments to FHWA on the MUTCD NPA, visit https://bit.ly/ITECommentsNPAMUTCD.  

How Can I Get Involved?

ITE is looking for volunteer reviewers to participate in our ongoing process with the NUCTCD. If you are interested in and have experience working on traffic control devices, consider being an ITE member reviewer for when NUCTCD proposals come to sponsoring organizations for comment, typically on a semi-annual basis in February and July. If you are in ITE member interested in volunteering for this role, email Sarah Abel at sabel@ite.org with “NUCTCD Reviewer” in the subject line. Please include your resume and a description of why you want to be a reviewer.

References


Jeffrey A. Lindley, P.E. (F) serves as Deputy Executive Director and Chief Technical Officer for ITE, where he leads the development and delivery of technical activities focused on serving the needs of the organization’s 16,000+ members. Prior to joining ITE in October 2016, he completed a 31-year career with the Federal Highway Administration, serving in a variety of technical and leadership positions, including California division administrator, associate administrator for safety, and associate administrator for operations. Jeff holds a bachelor’s degree in Civil Engineering from Virginia Tech and a master’s degree in Transportation Engineering from the University of Maryland. He is a registered engineer in the state of Virginia.

Sarah Abel (M) is Transportation Planning Director at ITE, working primarily in transportation planning, complete streets, vulnerable road user safety, and MaaS/ MOD. She serves on the National Complete Streets Coalition Steering Committee, the National Committee on Uniform Traffic Control Devices (NCUTCD) Bicycle Technical Committee, and is a panel member for NCHRP 17-96 Traffic Safety Culture Research Roadmap. Prior to joining ITE in November 2018, Sarah was the Planning Director for the Town of St. Michaels, MD, USA and the Community Design Manager/Director at the ESLC Center for Towns on the Eastern Shore of Maryland. Sarah is a former President of the Association for Community Design and an Accredited Professional in Social Economic Environmental Design (SEED).
Estimating Fundamental Diagram for Signalized Intersections Using Connected Vehicle Data

By Xiaoyu Guo (S) and Yunlong Zhang P.E., Ph.D. (M) (Advisor)

The fundamental diagram (FD) is to describe the macroscopic relationships between traffic flow and density. It is widely used in the traffic analysis for freeways and urban streets.1-3 In previous studies, the aggregated empirical measurements from detectors are commonly applied to fit the diagram.4, 5 However, this detector-based method has data quality issues related to detector installation or the deterioration of the pavement, and a methodology issue because the detectors at fixed locations cannot fully capture vehicle dynamics.5 In this study, a set of connected vehicles (CV) trajectory data is considered to construct a FD (i.e., flow-density relation) at a signalized intersection based on the traffic states.
With the development of Intelligent Transportation System (ITS), higher resolution data (i.e., probe vehicle data) became available.\textsuperscript{7–9} Probe vehicle data are usually collected in research to find critical points in a FD for capturing the traffic states. With the emergence of CV technology, this line of research can be moved one step forward.\textsuperscript{10, 11} On one hand, the data collected in CV trajectories provide more information. Beyond fixed-point data collector systems (i.e., loop) or roadside collector system (i.e., radar), CV trajectory is continuously available in time and space. On the other hand, the CV trajectory is defined as higher-resolution event-based data, which include information like vehicle interaction status and network communicated driving status, along with those traditional probe vehicle data (i.e., location, speed, and acceleration).\textsuperscript{12, 13} Moreover, compared to probe vehicle information—which focuses on the mobility of the detection for ITS traffic management purposes—CV not only provides this information, but also obtains network-wide data via communications with other CVs or the infrastructure. For instance, in this study, Signal Phase and Timing (SpaT) messages are incorporated into the trajectory of CVs.

Given that collected data are from microscopic detections and the FD is a macroscopic level demonstration, shock waves play as a connection between two representations.\textsuperscript{14–16} That is to say, in this study, shock waves are the transition zones between traffic states that move through a traffic region.

By 2025, more than 400 million vehicles on our roadways will have basic connected technology onboard (i.e., adaptive cruise control).\textsuperscript{17} It is meaningful to take advantage of their massive trajectory data and explore a method to build a macroscopic FD from microscopic data (i.e., CV trajectory data). Hence, the primary objective of this study is to estimate a FD using CV trajectory at a signalized intersection. This study is designed to reveal traffic flow dynamics for signalized intersections through the vehicular interactions. A CV trajectory method constructs a FD with three-step, data filtering and categorization, critical point extraction and state identification, and shock wave formation. The method is then validated through an experimental design with VISSIM trajectory data to prove the concept. The potential applications of this study with emerging connected vehicle technologies will benefit traffic flow modeling and the development of traffic management strategies.

**Method Development**

This proposed trajectory-based method is to reveal traffic flow dynamics for signalized intersections by constructing a FD using CV data. With the development of CV technologies and the increasing market penetrations of CV on road, CV trajectory data is collectible by either roadside units or a traffic operation center, or both. This study explores eight dynamic properties/states of traffic at a signalized intersection:

1. **Approaching State**
2. **Queue Formation State**
3. **Stopped Queue State**
4. **No Vehicle State**
5. **Queue Dissipation State**
6. **Capacity State**
7. **Following State**, and
8. **Free Flow State**.

These macroscopic states of traffic are continuous and bounded by shock waves. The Queue Formation State and the Queue Dissipation State, are essential to describe traffic flow at an intersection, but they have been simplified or neglected in the previous research.\textsuperscript{18, 19} In this study, the authors aim to observe only a portion of the trajectory data (i.e., CV trajectory data at a certain penetration rate), form a shock waves through those observed CV interactions, and estimate a FD.

At a single intersection, the authors first assumed that a set of connected vehicles approach the intersection where traffic flow is under-saturated. Each connected vehicle is then assumed to provide GPS coordinates, time step, speed, acceleration, and driving status from its trajectories. The variables—GPS position, timing, and speed—have been used widely in previous research.\textsuperscript{20, 21} Driving status is a relatively novel variable in the study of vehicle trajectory sets. In this study, the authors took the recommendation in the 2010 *Highway Capacity Manual* (HCM) and set the driving status as a binary variable.\textsuperscript{22} That is, the driving status is “in queue,” when the speed of a vehicle is lower than 5 miles per hour (mph) (8 kilometers per hour [km/hr]); otherwise, the driving status is not “in queue.” In this CV trajectory method development section, the method includes the following steps, 1) data filtering and categorization, 2) critical point extraction and state identification, and 3) shock wave formation and structure formation of FD.

**Step 1 - Filtering and Categorization**

A prior filtering process is needed on CV trajectory dataset, and the process applies the following assumptions within the analysis zone:

- Single vehicle type, that is passenger car only,
- No turning vehicles,
- No lane changing, and
- No flow interruptions turning from minor streets before, after and at the intersection.

After trajectory filtering, the method then categorizes vehicle trajectory data into queued and non-queued vehicle sets based on the driving state (i.e., “in queue” or not). It is important to categorize as queued and non-queued vehicle sets, rather than other factors (i.e., green duration, red duration, etc.) This is because vehicle trajectory is not bound by time and space. It is a continuous record of an individual vehicle in the analysis zone. Once one vehicle’s trajectory identifies itself as queued or non-queued, it is then assigned into its belonged cycle by its starting time as entering the analysis zone (i.e., about 750 feet [228.6 meters] upstream from
the stop bar). Since the intersection approach is assumed to be under-saturated, the vehicle approaching the intersection is passing through it within the same cycle.

**Step 2 - Critical Points Extraction and State Identification**

As introduced earlier, eight traffic states are considered in this study. They are plotted in the space time diagram in Figure 1 below. A shock wave (i.e., dash lines in Figure 1) separates one state from its next state in traffic flow; and a critical point indicates the changing point between states for each vehicle's trajectory. In the previous research on vehicle trajectory, the critical point extraction is based on speed and acceleration. However, speed and acceleration are sensitive to change in driving. For instance, when a driver slightly accelerates during a deceleration process, such change in acceleration may cause a false critical point extraction. To overcome such difficulty in critical point extraction from vehicle trajectory data, previous literature added thresholds or ranges around identified critical point for verification. For instance, Cheng et al. introduced a method to identify the data points representing the changes in vehicle dynamics by establishing thresholds on speed, and acceleration to extract critical points. The authors adopted a similar approach in this study.

**Step 3 - Shock Wave Formation and Structure Formation of FD**

After extracting critical points and identifying traffic states, backward forming shock wave ($\omega_{BF}$), frontal stationary shock wave ($\omega_{F}$), backward recovery shock wave ($\omega_{GR}$), and forward forming shock waves ($\omega_{FA}$, $\omega_{SA}$, $\omega_{SB}$, $\omega_{SC}$, $\omega_{SD}$) are illustrated by different colors in Figure 2.

**Simulation Design**

The proposed method in this study was then evaluated using CV trajectory data generated with VISSIM. This allowed the authors to compare the estimated fundamental diagram with the one built from (assumed) ground truth values (i.e., outputs from link performance evaluation in VISSIM).

In order to obtain the individual vehicle’s trajectory, a signalized intersection located between Kensington Avenue and Bailey Avenue in Buffalo, NY, USA is coded in VISSIM as shown in Figure 3. The traffic counts for this signalized intersection are in Table 1 and were based on PM peak (5:00 p.m. to 6:00 p.m.) provided by the Modern Traffic Analytics and Greater Buffalo Niagara Regional Transportation Council through the open-source Traffic Count Database System. The intersection was with a $\nu/c$ ratio of 0.76 for the northbound approach of the intersection. The intersection implemented a two-phase pre-timed signal timing plan with permitted left turns. The cycle length was set at 80 seconds. The green time for Kensington Avenue (minor street) was 28 seconds, and 42 seconds for Bailey Avenue (major street). The yellow and all-red intervals were 3 seconds and 2 seconds. The timing plan was recorded from a field study.

With this established VISSIM simulation network, a composition of regular vehicles and CV in different MPRs (i.e., 10% and 100%) was evaluated.
Figure 3. Kensington Ave & Bailey Ave intersection layout in VISSIM.

Source: Xiaoyu Guo

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is coded into along with the vehicle input of the northbound. Then, a set of CV trajectory is collected in a 3,600-second simulation (excluding 300-second “warm up” period). With a fixed cycle length, a total of 45 traffic signal cycles were studied. Although a variety of variables are available in a VISSIM trajectory, the collected CV trajectory in this study only includes GPS positions, time step, speed, acceleration, and driving status, which are required variables to construct a FD. Lastly, the SPaT Message (i.e., signal head status report in VISSIM) is also collected at every time step to help the method assign trajectories into their corresponding signal cycles.

**Results**

The results of this study are presented in two parts. In part 1, the proposed CV trajectory method is validated using CV trajectory data to construct a FD under 100% CV MPR. In part 2, the method is evaluated with 10% and 100% CV MPRs to show its effectiveness in a low MPR.

**Fundamental Diagrams with 100% CV MPR**

At each traffic signal cycle, a shock wave is generated by those critical points extracted in CV trajectory, if there were at least two CVs per cycle. Seven traffic states (except No Vehicle State) then are represented by intercept points (i.e., dots in Figure 4) between a forward shock wave/speed and a backward shock wave at a signal cycle. Further, shock waves with their maximum slope values were generated as lines in Figure 4.

The FD formed with CV trajectory in Figure 4 is found similar to those triangular shaped FD at an intersection in previous research.\(^{23,24}\) Moreover, this FD is able to capture and present the Queue Formation State (i.e., cyan dots) and Queue Dissipation State (i.e., magenta dots). In this study, the speed range of the queue status is from 0 mph to 5 mph according to the 2010 HCM. In each cycle, the number of vehicles (i.e., flow) in the queue is different and the corresponding queue backward forming speed is different. Then, per cycle, an intercept point between the brown Backward Forming Shock Wave and the cyan Entering Queue Speed is plotted as a cyan dot (i.e., Queue Formation State) in Figure 4. Similarly, in each cycle, an intercept point between the navy Backward Recovering Shock Wave and the magenta Dissipating Speed is then plotted as a magenta dot (i.e., Queue Dissipation State) in Figure 4. Although the Entering Queue Speed and the Dissipating Speed are set within the same speed range following the HCM guideline, the Queue Formation State spread out within its state (i.e., flow ranges from 100 veh/hr to 800 veh/hr, density ranges from 20 veh/mile/lane to 270 veh/mile/lane) while the Queue Dissipation State centered around a density of 220 veh/mile/lane and a flow of 750 veh/hr. This is because the variety of speeds is wider when a queue is forming than when it is dissipating.

Although the slopes of shock waves depend on the simulation settings of the intersection, the shape of the constructed FD is obvious, and one can easily define different traffic states from the FD. This indicates that the CV trajectory method is applicable to construct a FD.

**Comparison in Different CV MPRs**

After testing the applicability of the CV trajectory method with 100% CV MPR, the next step is to check the effectiveness of the CV trajectory method by evaluating it at 10% CV MPR. The results are shown in Figure 5.

The constructed FDs are overall in a consistent shape regardless of CV MPRs. The slopes of backward recovering shock waves are about -12.9 mph [-20.8 km/hr] in 10% CV MPR, and about -10.3 mph [-16.6 km/hr] in 100% CV MPR. That is, the slope of the backward recovering shock wave becomes larger when the CV MPR becomes larger. With more CVs in the queue, a more complete observation of queue dissipation process is obtained. Furthermore, the center of each state formed by the colored dots are consistent regardless the CV MPRs in Figure 5, while there are fewer dots in each state under a lower MPR. This indicates that a FD constructed with a lower CV MPR is still able to demonstrate traffic states, but with a smaller coverage of each state. This is because under a lower MPR, there are fewer cycles with enough CVs (i.e., at least two CVs in the same queue) to interact and generate shock waves.

Lastly, as the flow and density values collected by the link performance in VISSIM are assumed as ground truth, a comparison of the FDs at 10% and 100% CV MPRs in terms of their capacity and jam density values is studied. Firstly, this comparison to the assumed ground truth shows that estimated
values in flow is more sensitive than those values in density. Secondly, the estimates from the CV trajectory method with 100% CV MPR are likely to overestimate the capacity and jam density at an intersection, whereas the estimates with 10% CV MPR are probably underestimates of those values. Nevertheless, it is remarkable to observe that with only 10% CV MPR, the CV trajectory method can keep the performance of its estimation on the triangular shape up to 86.4% in height and 90.1% in width.

Conclusions
This study proposed a novel method to construct a flow-density FD using CV trajectory by interpreting driving status and shock waves. The method is validated using VISSIM generated trajectory by assigning different CV MPRs. The method shows its efficiency to provide consistency in the estimations of density and flow from 100% CV MPR to as low as 10%. By comparing with the “true” capacity and jam density recorded by VISSIM, the CV trajectory method with a 10% CV MPR highlights its accuracy. The method demonstrates its potential to benefit the traffic management profession by generating an accurate fundamental diagram at relatively low CV MPRs.

The generated FDs in this paper reflect the vehicle movement logic in VISSIM. The shape of a FD will change in response to different vehicle movement logic. Nevertheless, the main purpose of this paper is to demonstrate the effectiveness of constructing FDs with CV trajectory data even at a low MPR. The proposed FD using the field CV trajectory data will be investigated in the future.

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References


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McCain Dynamic Message Signs Recognized for Advanced Technology Program by CTF

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My mentoring experience through ITE was probably different than intended by the creators of the program. Instead of having a full mentorship with one mentor, I had several smaller scale mentor-mentee relationships with professionals across the country. I did this with the aim to learn about new techniques that certain agencies might use in their transportation networks, see how the industry works in their corner, make potential visits, or look into different career development approaches.

The majority of these were short one-time meet-ups; however, two of the mentorships stuck out as recurring discussions and check-ins. These have been likely smaller than the intended mentorship plan (meeting two to three times in addition to emails), but I still got a lot out of the mentorship program, and it helped me gain insight into different areas of the field.

—Tyler Krage, P.E., PTOE (M)

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