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Employee Initiative

Drives Growth and Success

Paving the Road for Zero-Emission Bus Fleets

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Cameras Provide Unblinking Eye

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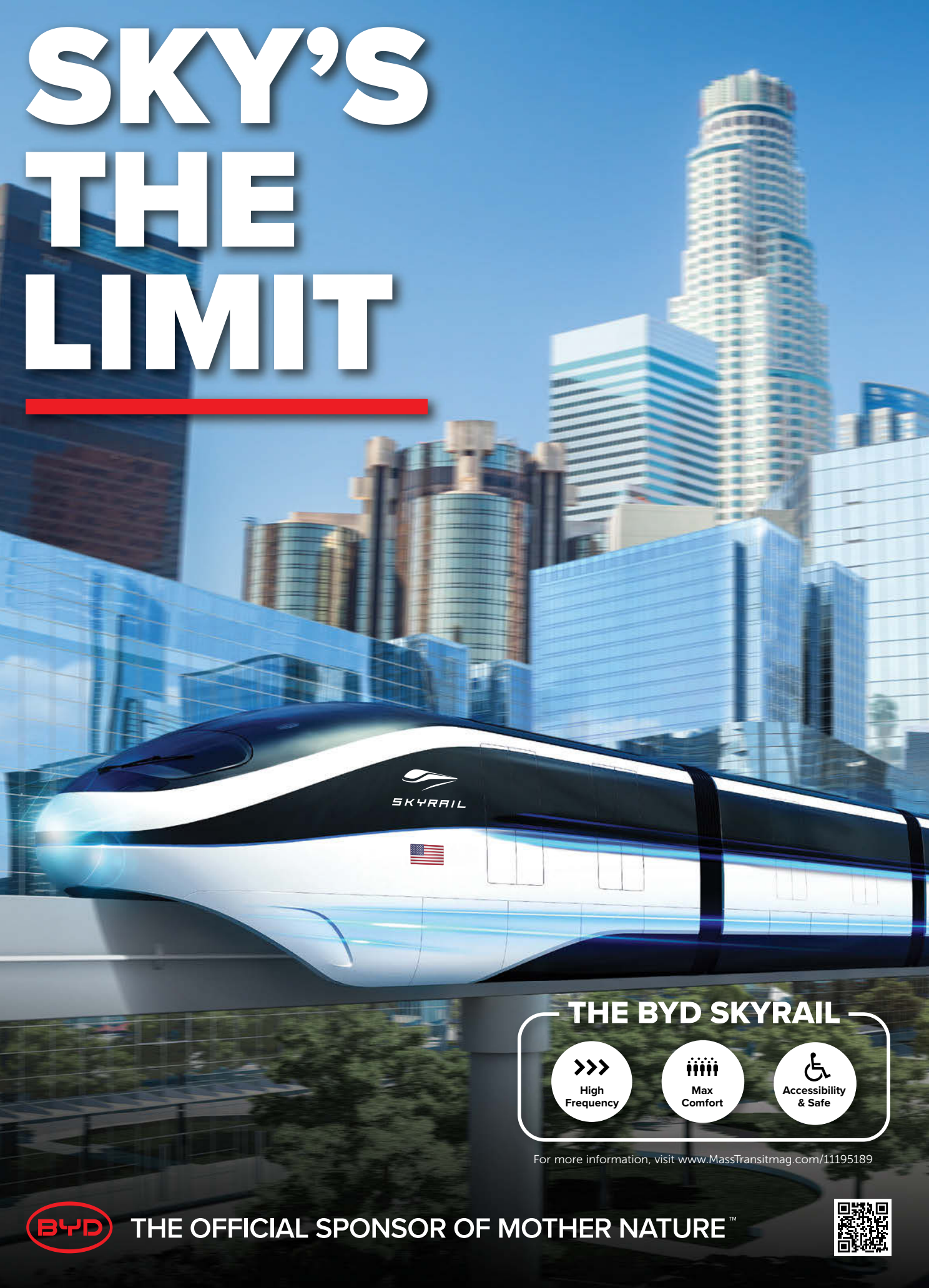
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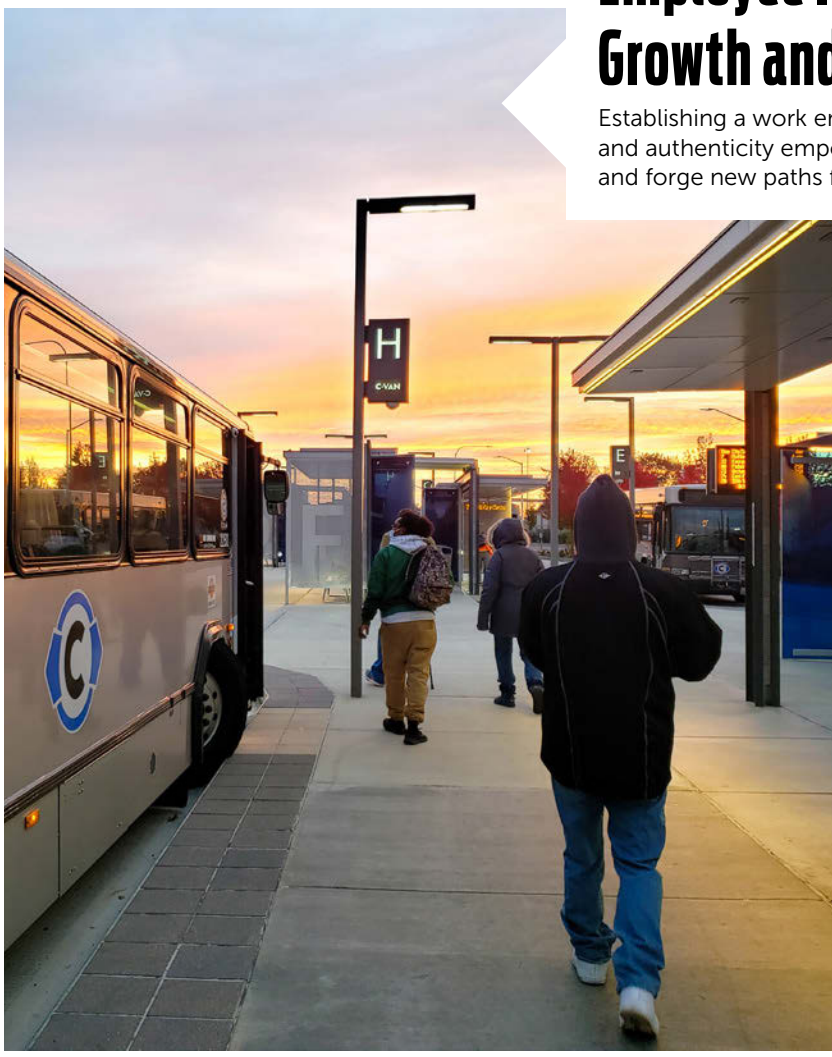

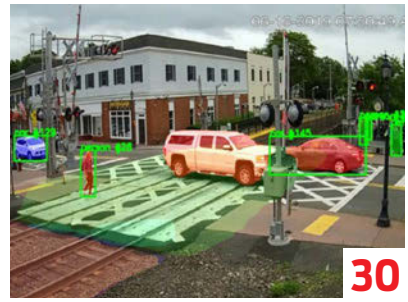

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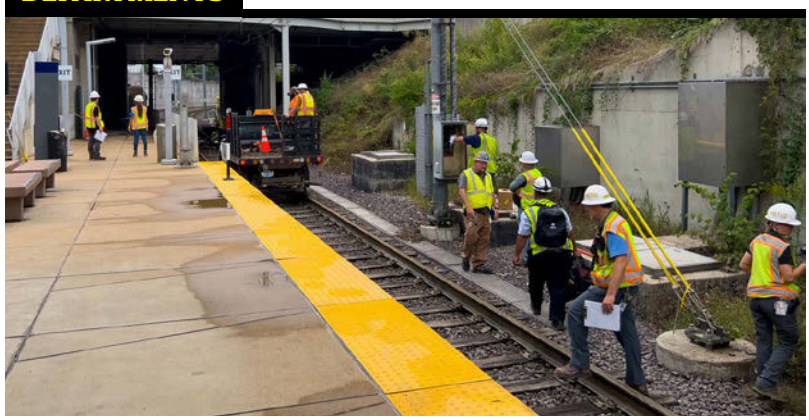

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Best Practices: Motorsport pioneering connectivity innovation for trains and buses

▶ Active Antenna hardware and Fleet Connect software offer a range of benefits not previously available on the commercial market.

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How traffic signal priority technology contributes to increased urban mobility and improved property values

▶ AI/cloud-based TSP are now leading the way in helping cities improve their transit systems to alleviate gridlock and traffic congestion, improve on-time performance and more.

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How fare capping, contactless payments and cash load at retail are enhancing financial inclusion within public transit

▶ These methods are removing barriers and ensuring individuals have easy and affordable access to transit services.

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When things go wrong

A transit project's success isn't always linear, but lessons can be learned in challenges and delays, as well as achievement.

Mass Transit's editorial mission is to serve as a best practices magazine for the North American transit industry. What this means is that our content is heavily focused on sharing the industry's successes. Who doesn't like reading about a group of professionals who banded together to develop a solution that enhanced service, expanded a network or helped bridge a gap between opportunity and need.

A SIGN directing passengers to the Elizabeth Line, which opened in May 2022.

However, a more difficult story to share is one where things don't go as planned. They may flat out fail initially but lessons and value exist in failure just as much as success. And failure may be too strong of a word, merely non-successes.

We've all heard the quote attributed to Thomas Edison that he did not fail to do something 10,000 times, but successfully found 10,000 ways to not do something.

A quick observation of our story analytics this summer would appear to show a surplus of projects that look to have encountered setbacks in their progress. As of this writing, the Hudson River Tunnel project is estimated to be delayed by three years and has reportedly seen its costs increase by $2 billion; the eight-mile Valley Line Southeast light-rail project in Edmonton, Alberta, is delayed because of cracks in 40 percent of the project's elevated guideways and Massachusetts Bay Transportation Authority has been directed by the Federal Transit Administration to get its safety culture and practices in order following a string of high profile incidents. These are by no means failures, but certainly qualify as significant challenges.

What to do when you're in the thick of it? I think back to former Crossrail Limited CEO Mark Wild's speech at APTA Rail in June on his experience in delivering the Elizabeth Line, where he told attendees large projects are not relay races, they are tough mudders. Be prepared to get dirty.

> "...a more difficult story to share is one where things don't go as planned...but lessons and value exist in failure just as much as success."

While Wild admitted there was embarrassment surrounding cost overruns and project delays, he offered attendees several key points on where the Elizabeth Line project could have done better. These lessons learned began with the realization that the project was thought of as sequential when it should have been viewed as an epic systems project. His perspectives included his methods toward addressing risk and uncertainty, leaning toward modularity rather than bespoke elements, system integration work and an approach that promoted transparency and clear governance.

The Elizabeth Line opened in May 2022 and the dissection performed to understand how things could have developed and been executed upon in a smoother fashion is a separate kind of achievement — one I and, I hope, project managers were grateful to learn from.

When things go sideways, while uncomfortable to experience, there can be a valuable learning experience for project stakeholders, as well as the greater industry.

Mischa Wanek-Libman, editor in chief
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FTA AND MATA celebrated the agency receiving a combined $76.3 million in grants at an event Aug. 24, 2022.

FTA awards more than $1.6 billion in funding for clean transit

A total of $1.66 billion was awarded by the Federal Transit Administration (FTA) to 48 states and territories, supporting 150 bus fleets and facilities throughout the United States to invest in cleaner transportation, reduce pollution and meet the Biden-Harris Administration's goal of net zero emissions by 2050. The funding was provided through the FTA's Buses and Bus Facilities and Low- and No-Emission (Low-No) Vehicle grant programs and will support the purchase of more than 1,800 bus vehicles in urban, suburban, rural and tribal communities. Of those vehicles, more than 1,100 qualify as zero emission, nearly doubling the number of zero-emission buses currently on the road. Additionally, for the first time, five percent of this year's Low-No funding will be used to train transit workers on how to maintain and operate new clean bus technology.

MassTransitmag.com/21277567

Edmonton Valley Line Southeast LRT delayed again due to cracks in concrete piers

▶ The 13-kilometer (approximately eight-mile) Valley Line Southeast light-rail transit (LRT) project that runs from downtown Edmonton to Mill Woods has hit another delay. Ronald Joncas, CEO of TransEd Partners, the consortium building the line, told a press conference Aug. 10 that he had hoped to celebrate the opening of the line in September, but instead announced a delay with no definitive timeline for a solution in place. The cause of the delay is the discovery of cracks in about 40 percent of the project's concrete piers that support the elevated guideways. The cracks were discovered in mid-July and affect 18 of 45 piers. TransEd will complete a root cause analysis and then design and implement a solution.

MassTransitmag.com/21277060

Portal North Bridge project starts construction

▶ Federal, state and transportation officials joined together to mark the start of construction of the Portal North Bridge. The start of construction on the project is the culmination of years of collaboration between project partners New Jersey Transit (NJ Transit), the Gateway Program Development Corporation, the Port Authority of New York and New Jersey, Amtrak and the federal government and advocacy efforts of the New Jersey Congressional delegation with support from elected officials in surrounding states. The project calls for constructing a new two-track fixed structure bridge over the Hackensack River using three 400-foot spans. In total, the project will see the construction of 2.44 miles of track infrastructure including 6,200 linear feet of new embankment sections and 6,700 linear feet of bridge and viaduct structure sections. In addition to removing the Northeast Corridor bottleneck, the new Portal North Bridge will allow NJ Transit to increase capacity more than 14 percent with the addition of new multilevel railcars and more service. The new bridge will also span the river 50 feet higher than it currently does, which will allow Hackensack River marine traffic to pass without interrupting rail traffic.

MassTransitmag.com/21276093

OFFICIALS MARKED the start of construction on the Portal North River Bridge on Aug. 1, 2022.

People in the News

Lane Transit District (LTD)

Auten

Jameson Auten will be LTD's next general manager and CEO with a start date in early November. Auten arrives with experience advancing transit initiatives in mid-size urban environments. Auten currently serves as deputy CEO and chief operatoins officer at the Kansas City Area Transportation Authority where he was involved in the integration of systems and networks, the development of microtransit and zero fare transit. Before KCATA, Auten worked with the Greater Richmond Transit System. He currently serves on the American Public Transportation Association Board of Directors and serves in a voluntary role with the National Academies of Sciences. Auten has an MBA from Virginia Commonwealth University and a bachelor's degree from California University of Pennsylvania (PennWest).

MassTransitmag.com/21277936

Greater Lafayette Public Transportation Corporation (CityBus)

Smith

Bryan Smith, a transit professional with nearly three decades of experience, has been named the next general manager and CEO of CityBus in Indiana. CityBus' Board of Directors unanimously approved Smith's contract at an August special meeting. Smith began as general manager and CEO on Sept. 19, 2022. Smith previously served as the deputy CEO of operations at Ann Arbor Area Transportation Authority in Michigan. His career began as a driver at a campus bus service while attending Kent State University. He spent 16 years at Portage Area Regional Transportation Authority before joining Champaign-Urbana Mass Transit District in Illinois as chief operating officer.

MassTransitmag.com/21278864

The Toledo Area Regional Transit Authority (TARTA)

Gettum

Susan Gettum was promoted to TARTA's chief of staff. In her new role, she will work closely with the TARTA management team in critical areas of project management; monitoring and reporting on implementation of the authority's strategic plan; employee engagement; and supporting the work of the TARTA Board of Trustees. Gettum, who has served as customer care manager since her arrival at TARTA in September of 2020, has achieved several accomplishments during her tenure. One of her notable achievements is the creation of the Hub of Hope program to facilitate outreach and give customers easier access to programs and services provided by community organizations. Hub of Hope has gained national attention and Gettum will continue to oversee the effort.

MassTransitmag.com/21275516

For more information, visit www.MassTransitmag.com/21276880

USDOT awards more than $233 million in grants to upgrade intercity passenger rail service

▶ More than $233 million was awarded to 11 projects in eight states by the U.S. Department of Transportation to improve and modernize vital intercity passenger rail service. Funded by the Federal-State Partnership for State of Good Repair Program (Partnership Program), these investments will help replace bridges and tunnels along the Northeast Corridor in New York, New Jersey, Maryland and Connecticut, each of which is more than 100-years old. Additional funds will increase the safety, reliability and sustainability of rail infrastructure in California, Michigan and Massachusetts and make needed improvements to the busiest train station in the Midwest: Chicago Union Station. Administered by the Federal Railroad Administration, the Partnership Program is essential to revitalizing rail assets and bringing railroad infrastructure to a state of good repair.

MassTransitmag.com/21278137

People in the News

Southwest Ohio Regional Transit Authority (SORTA)


Aiello

SORTA selected Andrew Aiello to join its executive leadership team as chief of staff, effective Oct. 10, 2022. In this role, Aiello will support a variety of key cross-agency functions, projects and initiatives in alignment with SORTA's strategic plan. His responsibilities will include oversight of the technology, procurement, project management and board liaison departments. Aiello currently serves as general manager of the Transit Authority of Northern Kentucky (TANK), a role he has held since 2010 overseeing the daily operations of the transit system. His transportation background also includes the leadership roles of deputy general manager and assistant director of communications with TANK, as well as planning roles with the Atlanta Regional Commission and the Georgia Department of Transportation.

MassTransitmag.com/21277236

Central Midlands Regional Transit Authority (The COMET)


Bowers

The COMET has promoted Jackie Bowers to director of operations. Bowers will be responsible for overseeing the day-to-day operations of the prime contractor to ensure service is being delivered every day and she will continue to direct the customer experience department. She will report to LeRoy DesChamps, chief operating officer. In her previous role at The COMET as customer experience and contract compliance manager, Bowers was responsible for providing oversight to the customer service call center along with activities at COMET Central. She also monitored contracted transit operations, acting as a liaison between The COMET and the customer facing contracts held by the organization to identify actions needed to improve overall service quality.

MassTransitmag.com/21276251

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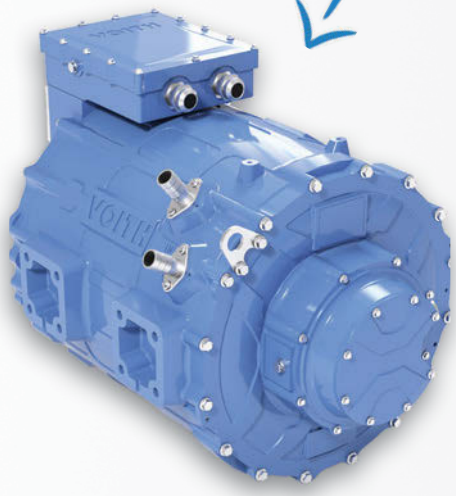

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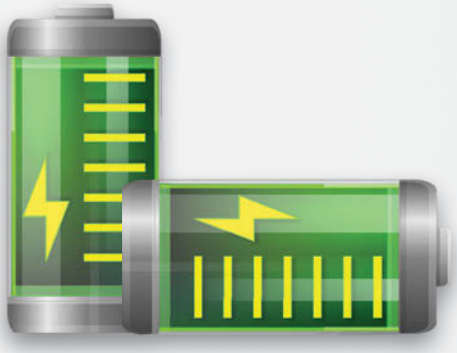

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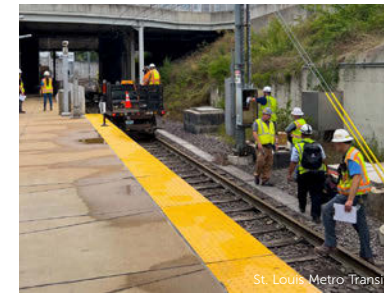
Service resumes on St. Louis MetroLink Blue Line following extreme storms

▶ St. Louis Metro Transit restored full service to its Blue Line MetroLink route on Aug. 22, 2022, three weeks after record rainfall and flooding caused significant damage to parts of its system. The most significant damage occurred on a two-mile section between MetroLink's Forest Park-DeBaliviere Station and the Delmar Loop Station, which includes the total loss of one MetroLink train and the DeBaliviere MetroLink signal house, as well as substantial damage to additional communications and fiber optic systems and equipment. The signal and switching issues left Blue Line MetroLink trains unable to connect at stations with Red Line trains. However, the MetroLink team implemented a modified single track operation that allows trains to serve all stations on the light-rail system, Blue Line as well as Red Line. Preliminary damage estimates were between $18 and $20 million, but those estimates have now doubled to $40 million following a deeper assessment.

➲ MassTransitmag.com/21278086



ST. LOUIS Metro Transit crews working to repair infrastructure damaged by flooding from an end of July storm.

MORE NEWS AT A GLANCE

▶ The Chicago Transit Authority signed an 18-month, $30.9 million contract with Action K-9 to provide up to 100 unarmed guards and 50 canines per day, plus supervision and supporting equipment, to the authority's rail network.

➲ MassTransitmag.com/21278686

▶ The city of Calgary, Alberta, Canada, awarded Advanced Rail Management (Canada) Inc., a Global Rail Trust company, a one-year contract with four option years for rail grinding services on the Calgary Transit Light-Rail Transit system.

➲ MassTransitmag.com/21278944

▶ Cubic Transportation Systems finalized a contract with Sault Ste. Marie Transit Services to deliver the Umo mobility platform as its new transit fare collection system.

➲ MassTransitmag.com/21278540

▶ Nova Bus has been awarded a contract by the city and county of Honolulu for up to 35 Nova Bus Artic vehicles, the 60-foot clean air diesel bus model. The buses will be delivered over a three-year period.

➲ MassTransitmag.com/21278128

▶ The Metropolitan Atlanta Rapid Transit Authority (MARTA) awarded a contract to Wabtec Corporation to supply heating, ventilation and air conditioning (HVAC) units for 56 new Stadler trains.

➲ MassTransitmag.com/21274931

Sponsored by Clever Devices

Changing passenger expectations require transit agencies to get 'Clever' with solutions

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Intelligent transportation systems offer agency's a chance to enhance passenger experiences by delivering more accurate information.

1. Uninterrupted access to real-time information is commonplace in today's world. Thirty years ago, transit providers were expected to transport the public from A to B safely, but riders expect more today. As expectations continue to evolve, how can the rail industry position itself to be sure to deliver, especially when many rail cars are 20-30 years old?

Features like real-time disruption updates, the latest news/sports/weather, information on multi-modal connection points and onboard Wi-Fi that were once options are now expected by customers. Likewise, transit agencies are currently seeking as much operational information as possible with respect to on-board diagnostics, passenger count/loading and schedule adherence throughout various times of the day.

These enhancements are seamlessly included in the technical specifications for new vehicle procurements but addressing train cars currently in service requires a strategic approach. The average life span of a train car exceeds 40 years. Onboard system overhauls are typically scheduled 12-15 years from the point of new vehicle acceptance, often providing at least two opportunities for system upgrades or additions to be addressed. It's important for transit agencies to engage with engineering teams and consultants to define the improvements and upgrades they'd like to make to their aging rail cars three to five years before the vehicle's scheduled overhaul to make the most of each opportunity for upgrades. This allows ample time for the agency to create the necessary technical specifications, system qualification testing, procurement and award timeframes ahead of implementation.

2. Agencies are focused on delivering more features than ever while operating under constrained budgets. What can agencies do to increase their efficiency while providing a more feature-heavy experience to riders?

Agencies operating under a constrained budget may want to take advantage of new improvements in technology like onboard passenger signage, which can now provide a feature-heavy rider experience while generating revenue for the agency.

Infotainment signs can now utilize geolocation and spatial passenger information to display targeted advertisements onboard, creating a new revenue stream for the agency. These signs shift from a direct fixed-cost asset to a revenue-generating source when amortized over a 10-year lifespan. In addition, using digital infotainment signs eliminates the need for wasteful printed advertisement signs, frees up interior room onboard and creates a better passenger experience.

3. There has been an emphasis on increased sustainability throughout the industry. We're now seeing a shift towards battery electric vehicles in particular. How can Clever Devices' experience and technology contribute here?

In bus applications, there are several concerns with battery electric vehicles, including range anxiety, the potential of creating a roadway obstruction due to a stalled vehicle, operator behavior and accurate vehicle diagnostics. Clever Devices understands these concerns and has developed an Electric Vehicle Monitoring System (EVMS) for the bus sector in response to the needs of our customers that are introducing battery electric vehicles.

As rail vehicles with battery-electric technology emerge into the market, lessons learned from developing a bus-centric EVMS solution can be integrated and refined to meet the needs of the rail operating environment. Factors such as vehicle weight, track grade, weather and location-dependent climatic operating environments can significantly affect the vehicle's battery performance. These specific parameters must be considered when designing an electric vehicle monitoring system, as there is no one size fits all solution.

4. How does being a multi-modal ITS provider since 1994 inform Clever Devices' approach to solving some of the pain points in passenger rail today?

Historically, rail and bus have been two very distinct worlds, with only some traditional light-rail entities bridging the gap. Clever Devices has experience with and a deep understanding of each mode of public transportation. This has become increasingly valuable as agencies face a changing passenger demographic demanding seamless road/rail integration and a superior ridership experience. Clever Devices' undisputed leadership in the ITS market in North America, combined with our additional staffing of established rail professionals, makes us well positioned for the revolutionary changes forthcoming in the passenger rail industry. MT

John Santamaria is senior vice president of Rail for Clever Devices. He is responsible for developing and executing short-term and long-term business plans to increase market share in the rail industry.

Employee Drives Growth and Success at C-TRAN

Establishing a work environment that celebrates communication and authenticity empowers employees to **SPARK CHANGE** and **FORGE NEW PATHS** for continued growth and success.

By **Megan Perrero, associate editor**

Photos provided by C-TRAN

Initiative

When C-TRAN CEO Shawn Donaghy got the call C-TRAN had been named the American Public Transportation Association's (APTA) 2022 Outstanding System of the Year, he was feeling a mix of emotions, but surprised was not one of them.

"I was shocked, I was blown away, but I wasn't surprised. If you knew our employees, if you knew [our leadership team], if you knew our board and if you knew our community, you would know that this is just a premier place to live and work," Donaghy said.

C-TRAN, which serves riders in Clark County, Wash., has made great progress over the past three years from the first time it was awarded APTA's Outstanding System of the Year on things like new infrastructure, sustainability, technology investments and workforce development initiatives. This progress is in large part due to employees of all levels having the drive to make the agency better and to provide more than a bus ride to the community because they feel empowered to suggest and make changes. Donaghy and the

"We have the best damn employees in the world and it's pretty easy to be a world class organization when you have such an amazing workforce."

C-TRAN CEO
Shawn Donaghy

executive team concur that honest communication and open-door policies contribute to this positive work environment.

"We have the best damn employees in the world and it's pretty easy to be a world class organization when you have such an amazing workforce," Donaghy said.

New Infrastructure Welcomes Added Service, Planned Expansion

C-TRAN is working on more projects consecutively now than it has in totality over the life of the agency, Donaghy explains, requiring cross-departmental collaboration and frequent communication. One of the biggest projects currently underway is the construction of a second bus rapid transit (BRT) line, The Vine on Mill Plain. Despite the current business climate, construction is moving rapidly and the project hasn't experienced any schedule issues. It was one of the projects that didn't stop during the pandemic, so it is still on track to open in the third quarter of 2023.

"We've seen strong community support for the project since we first began planning and outreach on the corridor back in 2018, and that continues today. I believe that's in large part due to the success of our first BRT corridor [The Vine] on Fourth Plain Boulevard," said C-TRAN Chief Capital Projects and Planning Officer Scott Patterson. "Since 2017, the year The Vine began operating, Vancouver's Fourth Plain corridor has seen roughly 2,000 housing units added within a half-mile of the route and roughly $250 million in development value. We're hoping to build on that success with Mill Plain."

In addition to the second BRT line, C-TRAN began early planning and outreach this year for The Vine on Highway 99, the third BRT corridor. In the future, the agency intends to extend its first BRT line to travel farther east on Vancouver's Fourth Plain Boulevard.

"The growth that we're seeing on those BRT lines forces us to address our campus and right fit it for even more growth," said C-TRAN Deputy CEO Monica Tellez-Fowler.

C-TRAN is addressing this growth by redeveloping its campus while also making overdue changes to a facility it had outgrown years ago. For example, C-TRAN is preparing to break ground on a maintenance facility expansion and a new operations building to expand its campus and prepare for fleet electrification or other alternative fuels. In 2019, C-TRAN's administrative staff moved into a new administration building that had been purchased as part of its overall facilities plan. Some operations and additional staff moved to the new admin building in subsequent years, and in 2022, the old administration and operations modular buildings at the main campus were demolished.

C-TRAN BROKE ground Sept. 28, 2021, on its second BRT corridor, The Vine on Mill Plain.

> "We want people to be very unapologetically themselves."
>
> **C-TRAN CEO** Shawn Donaghy

"[The projects] are moving at pace that can some days be challenging, but I think going back to what we do for employees, we have that open door policy, and we have that open communication," Tellez-Fowler said.

Sustainability Integral to Decision Making

As C-TRAN makes progress on its new facilities and bus infrastructure, sustainability is top of mind when making decisions.

"It's really about finding contractors that are willing to be invested the same way that we are in wanting to solve climate

How Keolis charges one of the largest e-fleets in Northern Europe.

Keolis Norway has implemented cloud-based solutions to monitor and charge its electric bus fleet in Bergen, which is among the largest renewable energy fleets in Northern Europe with 112 e-buses. This Software-as-a-Service (SaaS) project has **saved Keolis the initial investment costs of a purchased system** and guarantees the agency trouble-free operations for the ten years of its concession, as the contract includes hosting of the software and constant updates.

Keolis utilizes the web-based solution, LIVErtpi, for real-time monitoring of its buses. The software is used to **track a vehicle's location, its punctuality, and its current State of Charge (SoC)** to ascertain whether the remaining range will be sufficient to complete the bus run.

INIT's smart charge management system, MOBILEcharge, ensures buses are always available for service on time, properly charged, and pre-heated or pre-cooled. By making ideal use of the available charging periods, MOBILEcharge can **keep the power costs at a minimum**.

"INIT is a key partner for the management of our operation, from the traffic control to the charging management system."

Mona Halvorsen
Bus COO, Keolis Norway

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inequity because that's a huge deal," Donaghy said.

C-TRAN's sustainability efforts have been and continue to be employee led, shares Eric Florip, manager of communications, marketing and customer experience, adding that the Green Team was compromised of employee volunteers that continues to see organic growth. The team has worked to emphasize what the agency and employees can do behind the scenes to reduce their carbon footprint with the idea that every little bit counts. To this extent, C-TRAN is recycling Keurig pods collected around the office and utilizing recycling receptacles for cigarette butts at BRT stations.

On a bigger scale, C-TRAN has been phasing in renewable diesel thanks to a proposal from the maintenance director, who saw it as an opportunity to contribute to a cleaner environment. Tellez-Fowler explains the board was supportive of this phased approach while C-TRAN conducts an alternative fuel study to examine the potential use of hydrogen fuel cell, electric or a mix of alternative fuels for its fixed-route vehicles.

As part of these ongoing green efforts, C-TRAN's board adopted the agency's first sustainability policy. It was drafted by the Green Team with Florip leading the efforts, and then reviewed by each department before ultimately being board approved. The policy captures and preserves efforts already taken while also serving as a framework for decision making.

"What the policy does is that it ensures that it's not dependent on any one person or any group of people who happens to be here now but may not be here in 20 years or 30 years," Florip said.

C-TRAN's commitment to sustainability resulted in it becoming a certified green business through Vancouver's green business program, as well as being awarded the Clark County Green Business of the Year in 2021.

"When we're thinking about [sustainability], [it's] not just on an employee-led scale or just on a social scale; we're incorporating those things into every single decision that gets made throughout the organization," Donaghy said.

Technology Improvements Bring C-TRAN into the 21st Century

The agency has also completed nearly 10 years' worth of technology upgrades in under half that time, with one of the bigger investments being a direct result of a suggestion from Donaghy.

C-TRAN'S EXECUTIVE team makes it a point to be visible and active in community events, such as the Clark County Fair.

While picking up Taco Bell one day, he noticed kids sitting outside the restaurant doing homework. The manager shared that they come to the restaurant every day for the Wi-Fi.

"That resonated with me, so we immediately went back to our board and said we need money to put Wi-Fi at all of our stations, so that [people] can either park near the station or park near one of our BRT stops and utilize that Wi-Fi as a public service," Donaghy said.

Patterson used the Wi-Fi project as a springboard to install almost 11 miles of fiber along the entire BRT corridor that's currently under construction so that it's available throughout multiple neighborhoods. In addition to Wi-Fi and fiber installation, C-TRAN upgraded its radio network, relocated its IT team to the new administration building in 2019, created new IT infrastructure and upgraded the operations system, which has allowed the agency to improve how it does its scheduling, run-cutting, yard management and data for service delivery.

C-TRAN's security chief and head of operations has also been upgrading the security cameras throughout the system.

"One of the best things about our security cameras aren't necessarily that their security cameras at all, it's that our staff's able to use them to evaluate weather at the transit center...or if we have a challenge going on with a bus, we're able to pull that up and look at it quickly," said C-TRAN Chief Operations Officer Inessa M. Vitko.

C-TRAN HAS been phasing in renewable diesel while it studies the potential of using alternative fuels for its fixed-route vehicles.

And that's not all. Earlier this year, the agency launched its on-demand rideshare service, The Current. Passengers can schedule their ride online, by calling or through the mobile app for point-to-point service. This service, along with the rest of C-TRAN's service offerings, has also been connected to the Transit app that provides riders with real-time information and trip planning. While this was one of the easier technology implementations, the executive team believes it was one of the most impactful to customers.

"The Transit App was a pretty simple partnership to enter into with the company, but it's been really impactful for our riders. And that's something we've heard for a number of years—that our riders were interested in having that real-time information available to them," Vitko said.

Workforce Investments

Many of these employee-led initiatives are possible because the workforce not only feels empowered to voice their opinions, but they also bring their full authentic selves to the office. Promoting open, diverse and free thinking allows the agency to be at its best, Donaghy says.

"We tell people all the time that there are a few non-negotiables that you have to bring to work with you and that's you have to be your authentic self at all times, and you have to be able to speak your mind. We want people to be very unapologetically themselves," Donaghy said.

While authenticity and open-door policies have been the norm, C-TRAN Chief Human Resources and Safety Officer Laura Merry explains C-TRAN has recently made great strides in adding diversity to its workforce thanks to new hiring practices put in place. For instance, C-TRAN Manager of Human Resources Jenapher Dues began catering the recruiting process to the individual hiring managers and departments. She became more involved in community hiring events, expanding the places where C-TRAN advertises open positions. The HR department also reworked job descriptions to be intentional and specific about the qualities required in order to expand the applicant pool. Donaghy explains the idea is that the agency can teach aspects of the business, but they can't necessarily teach leadership qualities.

"Instead of looking strictly at things like years of college, years of education, types of certifications, we take a deeper dive into experiential opportunities, and we were able to bring people

on board into positions that we probably wouldn't have looked at historically," Merry said.

Thanks to these practices, within a few years, coupled with changes in the executive team, C-TRAN is seeing "dramatic changes" of its organizational make up.

"We started getting a much more dynamic group of people," Merry added.

As C-TRAN's organizational makeup has evolved over the years, so has its conversation about diversity, equity and inclusion (DEI). As conversations about DEI have naturally grown, a group of managers created a DEI team made up of employee volunteers. Like the Green Team, this group has grown organically to become the PEACE Team, which stands for promoting equity, acceptance, compassion and education. Members include those from all levels, management and non-management, and those who've stepped up and taken on leadership roles may not necessarily have director or manager in their title, but they're seen as leaders throughout the agency.

> "...[DEI] is something that for many years wasn't a piece of who we are, and I think now it is a very defining piece of who C-TRAN is as an agency."
>
> **C-TRAN CHIEF HUMAN RESOURCES AND SAFETY OFFICER** Laura Merry

"[The DEI Team] is very honest and open and very forward about the things that they want to see as not only members of the agency but [as] members of the community," Donaghy said.

Part of this is being intentional with community engagement. C-TRAN is involved in Pride celebrations, Juneteenth events and many members of the executive team are members of other community organizations like the Portland Hispanic Chamber of Commerce and the NAACP.

"It's really exciting because [DEI] is something that for many years wasn't a piece of who we are, and I think now it is a very defining piece of who C-TRAN is as an agency," Merry said.

Generating Success

Much of C-TRAN's success has been made possible by employees of all levels feeling empowered to not only make the agency a better place, but the community a better place. As the agency marks its 40th anniversary this year, it's been less about celebrating 40 years than it is about celebrating the employees and the investments they've made in the community.

"We give people the opportunity to lead...They take it and they run with it and it makes things so amazing when you get to come to work in the morning. And we are who we are because of our employees and our community and that's really the baseline for us," Donaghy concluded. MT

optibus

BREAKING NEWS:

Countries around the world combat climate change by switching to Electric Buses

In the climate fight there are many heroes. There are technologies that aim to clean up the ocean, to minimize reliance on single use plastics, to grow more food in less space and with less waste. Each of these strategies individually make some impact, but combined they become a powerful tool to build a better future for humanity.

That is why so many governments are shifting to low- or no-emission vehicles in their transportation networks. While necessary, these technological shifts often lack visibility into all the necessary components of ongoing operations.

It is well known that charging infrastructure will be required and may not exist across the city with the frequency of diesel refueling stations. Lesser known are the operational differences between manufacturers and even individual vehicles. Two EV buses purchased from the same manufacturer at the same time can result in very different recharge rates if they operate on routes with significantly different elevation changes.

Experienced transit professionals may know to anticipate changes within mixed fleet planning and scheduling to account for electric, hydrogen, and diesel refueling requirements. It is just as important to know that with ongoing supply chain shortages, it is likely that every agency will need to purchase from more than one manufacturer. This means that operational parameters will not have a standardized input format adding to the complexity of optimizing service.

It is critical that these projects succeed, which is why so many agencies work with Optibus to get the most out of their electric vehicle fleet. Antelope Valley Transit Authority (AVTA) in California is the first all-electric bus fleet in North America and recently surpassed seven million miles driven.

"I sincerely believe that the electrification of the U.S. transit fleet is going to accelerate," said AVTA executive director and CEO Macy Neshati. "We do a lot of tours because agencies want to learn about electrification. They're usually blown away by the charging infrastructure."

> **"Optibus is a game changer for us because it helps us maximize our use of that infrastructure to keep our buses on the road for longer."**
>
> — AVTA Executive Director & CEO Macy Neshati

The FTA recently awarded $1.66 billion to 150 projects that will increase the total EV bus fleet in the US by 1800 vehicles. The US joins many other countries that have recently set aside funding to shift to cleaner vehicles.

Abellio in the UK has replaced half of its 800 bus fleet with EVs and is leveraging the data learned from the Optibus platform to combine enhanced digitalization with operational effectiveness. Graham Davies, Head of Abellio UK said he wants **"buses that are well connected for operators to be able to maintain our vehicles at top notch quality,"** a nod to the fact that safety for both travelers and operators is at stake.

Chartered Speed in India (with 350 buses including 40 EVs), Transdev's largest bus operation globally; RedBus Urbano in Santiago, Chile, and Stagecoach UK (whose goal is to have a zero-emission bus fleet by 2035), are just a few transit agencies worldwide that depend on Optibus to maximize the effectiveness of their fleet. Hardware is not the only consideration when electrifying your fleet. It must be paired with industry-leading software that is experienced in the nuances of managing electrification at all stages including planning, scheduling, rostering, and operations — and, for this, Optibus makes it easier than ever before.

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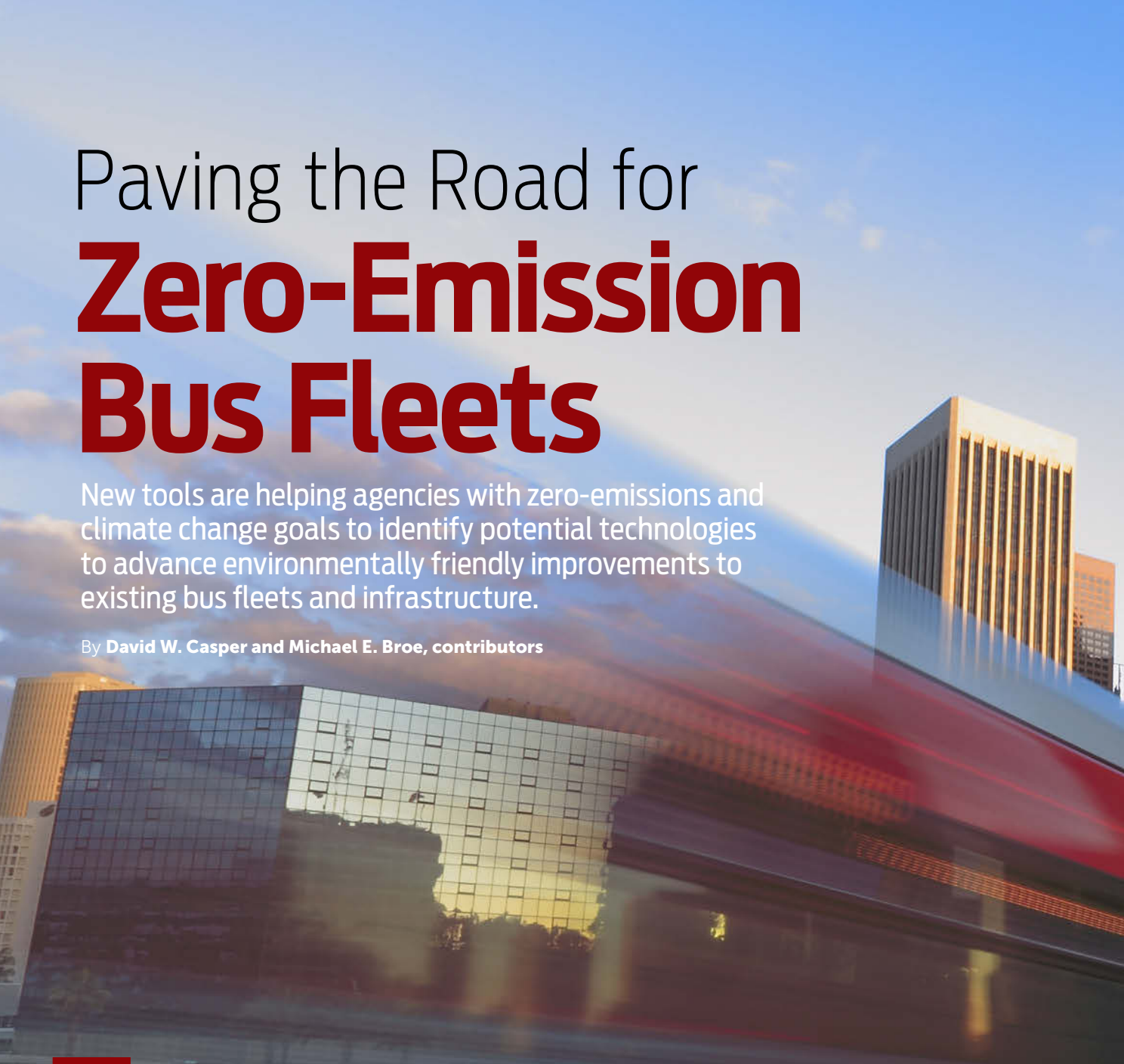
Paving the Road for Zero-Emission Bus Fleets

New tools are helping agencies with zero-emissions and climate change goals to identify potential technologies to advance environmentally friendly improvements to existing bus fleets and infrastructure.

By **David W. Casper and Michael E. Broe, contributors**



This summer, the U.S. Department of Transportation's Federal Transit Administration (FTA) awarded $1.66 billion in grants, funded by the Infrastructure Investment and Jobs Act (IIJA), for the purchase of more than 1,800 new buses, most of them zero emission. This investment in 150 bus fleets and facilities nationwide helps meet the U.S. government's goal of net-zero emissions by 2050.

As part of the global mission to address climate change, the transportation sector has emerged as a key lynchpin in reducing greenhouse emissions. The federal Environmental Protection Agency (EPA) has identified the nation's transportation network as the single largest source of greenhouse emissions in the United States. The California Air Resources Board (CARB) mandated the transition to 100 percent zero-emission bus fleets by 2040. The private sector is helping agencies facilitate this transition to achieve their zero emissions goals.

The Los Angeles County Metropolitan Transportation Authority (L.A. Metro), which oversees the third largest bus fleet in North America, has initiated one of the most significant efforts to date. L.A. Metro plans to transition its entire bus fleet and bus maintenance facilities from compressed natural gas to zero-emissions technology. STV, in joint venture ZEBGO Partners, is providing a range of services to help L.A. Metro achieve these goals, including:

- Assisting in the development of a Zero Emissions Master Plan.
- Evaluating existing infrastructure for integration needs and the

recommended placement for in-route bus chargers.

- Analyzing bus route and schedule.
- Analyzing life-cycle cost for all emerging relevant technologies.
- Investigating potential funding opportunities to support this plan.

A similar effort was performed in San Diego with the North County Transit District (NCTD) to provide planning support for a phased implementation to transition from diesel and compressed natural gas buses to battery electric and hydrogen fuel cell vehicles. The implementation includes modifications to NCTD's facilities, as well as revising the existing bus site layouts and siting potential in-route charging stations across various NCTD bus routes.

Tools of the Trade

New tools are helping agencies with zero-emission and climate change goals to identify potential technologies to advance environmentally friendly improvements to existing bus infrastructure. One of the biggest challenges transit operators may face in the transition to zero-emission buses is aligning achievable vehicle range with the daily sequence of routes that each bus is scheduled to run, what the industry calls a "block." To address this challenge, STV developed a tool that enables project teams to study bus route operating factors in a dynamic model. The Performance Evaluation of Electric bus

Mike Liu/Shutterstock.com

Routes (PEER) tool incorporates the topography of the routes, stops, passenger counts and schedules, along with everything physically impacting what a bus does on a given route.

Transit agencies launching zero-emission initiatives want to know how many buses they can replace immediately without impacting the current schedule. For those that can't be replaced on a one-to-one ratio with battery electric buses (BEBs) currently available on the market, they want to know how many new buses they will need. In the wake of the pandemic, fulfillment of fleet replacement procurements from bus manufacturers can take time and agencies need accurate knowledge about acquisition lead times.

For a block, STV's PEER model derives projected kilowatt-hour per mile, expected total energy usage and state of charge status while in operation to generate data needed to determine how much of the current schedule is completable with today's zero emission bus technology. PEER also determines total energy load required to support each phase of the transition toward a 100 percent zero-emissions bus fleet.

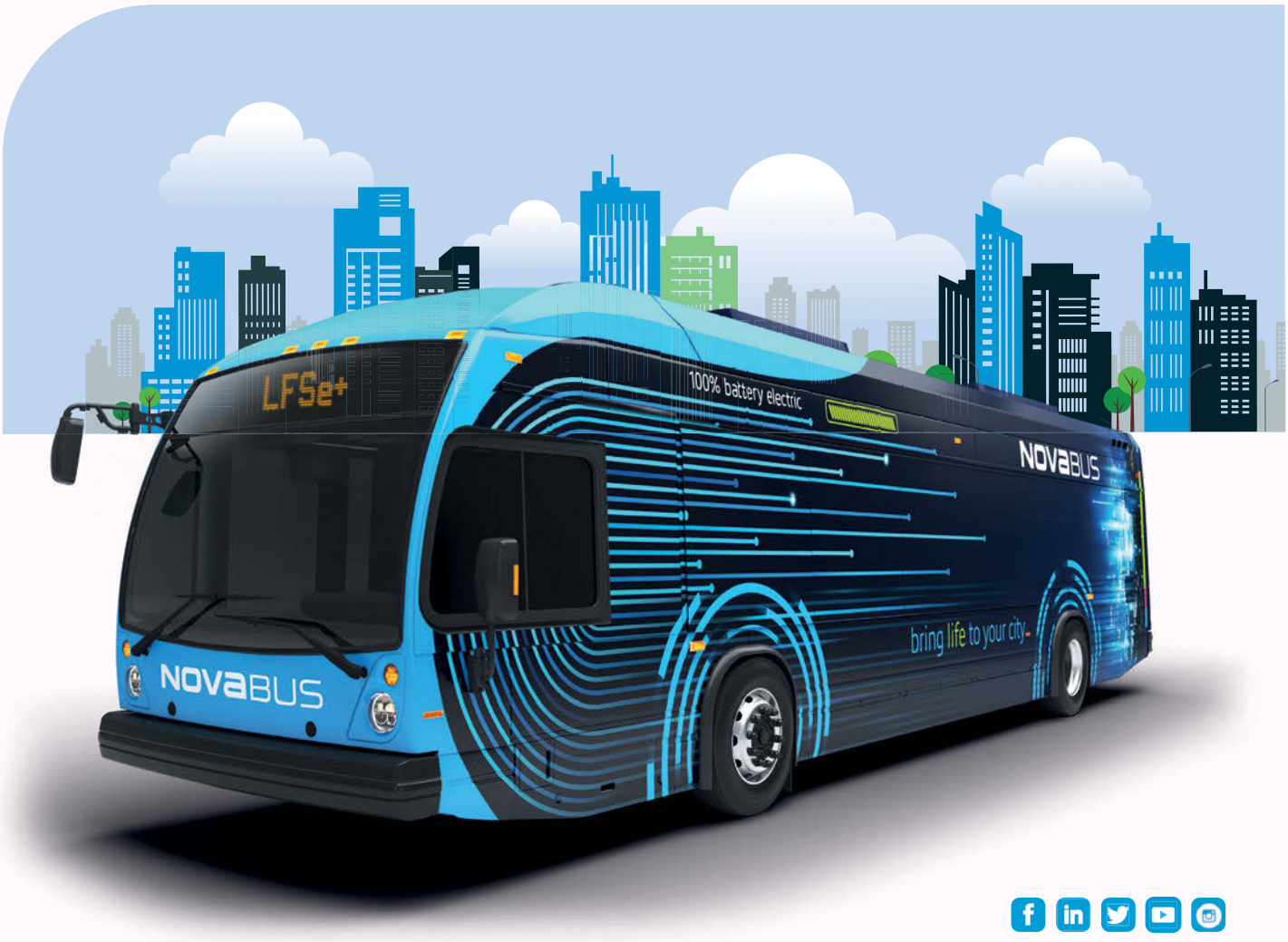
Agencies should consider analyzing existing routes, traffic conditions, climate, topographical conditions, ridership and energy consumption to determine how existing routes can take advantage of this constantly changing environment...

Agencies can also work with the private sector with the development of a fleet replacement plan that defines the agency's conversion to a zero-emission bus fleet over time, following FTA guidelines and accounting for the rate that emerging technology migrates to commercially viable over time.

Sustainable Batteries of the Future

The other moving target that transit operators need to account for to get to zero emissions is adapting to the fact that the green technology is constantly changing and improving.

Agencies should consider analyzing existing routes, traffic conditions, climate, topographical conditions, ridership and energy consumption to determine how existing routes can take advantage of this constantly changing environment, while also evaluating the impact of bus charging interfaces such as plug-in, panto-



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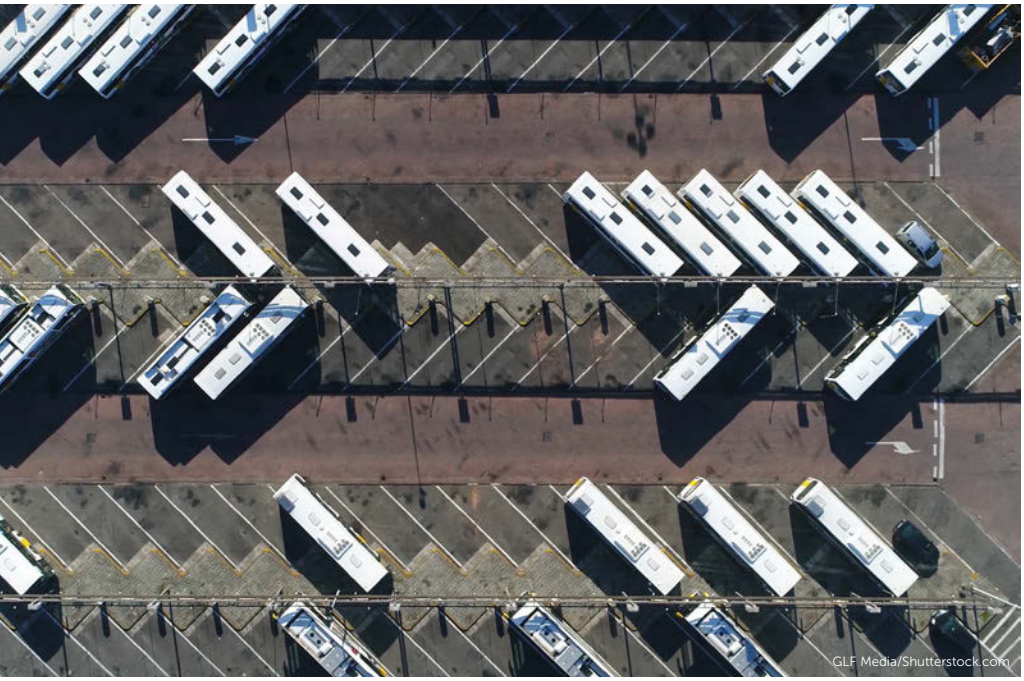
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graph and inductive.

Agencies have come to prioritize integrating BEBs into service because these vehicles provide lower operating and maintenance costs, while also meeting the federal, state and local requirements for zero emissions and sustainability.

A primary objective is to identify the operational risk factors transit agencies may face and what mitigation measure might be able to address service interruption risks, so bus operations and infrastructure modifications will be more resilient to disruption from outside events.

In 2018, 300 BEBs were used throughout the country. But the FTA's Low- or No-Emissions Grant program (or Lo-No) recently awarded funding to 52 projects across 41 states that will greatly expand that number. Additionally, continuous advancements in battery technology are expected to introduce more cost-effective choices for operators. The industry could see at least a five percent increase in batteries' energy density each year for the next decade. For each project, develop a charging infrastructure design and electrical load analysis for a bus facility based on these projected improvements in battery storage energy densities.

When developing a master fleet zero-emission implementation plan, agencies should account for "forward and backward compatibility" – using charging stations that are compatible with older technology, current standards and the more compact and efficient models expected in the future.

Advancements in Fuel Cell Technology

Fuel Cell Electric Buses (FCEB) are another zero-emissions solution that transit agencies across the United States are implementing. Hyundai and Toyota have both initiated construction of fuel cell production facilities here in the United States. This provides a more robust local supply chain and increasingly competitive pricing.

Fuel cell buses continue to advance in design with the latest configurations being the battery dominant fuel cell bus, where the fuel cell is sized to recharge batteries on board the bus. This approach is often compared to talking on a mobile phone with the charger connected: the batteries do not die as quickly, since the battery is being recharged as the phone is used. The same happens with the battery dominant fuel cell bus design, giving the bus greater range than BEBs. Some FCEBs are now capable of achieving more than 300 miles in daily operating range.

Powering the Future: Micro-Grids and Resilience

With the expansion of solar, wind and energy storage options, the adoption of microgrid technology to support BEB deployments is becoming more viable. Energy sources available to integrate into an on-site power generation/emergency backup microgrid include solar photovoltaic, wind turbines, on-site battery storage, fuel cells, conventional turbines, micro-turbines and geo-thermal energy sources. Integration of on-site generated power not only offers the local bus agency the potential for reduced operating costs and improved resilience, but it also can have significant effects (both positive and negative) on the local utility electrical providers' service and rates and the ability of transit providers to continue using their buses as emergency support vehicles.

In order to determine the benefit of the installation of a microgrid, either connected to a grid or autonomous, a number of key factors require evaluation. A primary objective is to identify the operational risk factors transit agencies may face and what mitigation measure might be able to address service interruption risks, so bus operations and infrastructure modifications will be more resilient to disruption from outside events. Another objective is to provide supplemental power during high-demand periods,

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such as extreme weather, when interconnected with the grid. These power-generating and storing technologies are used to reduce the demand from the grid so that the transit agency can avoid demand charges or time-of-use charges that may be imposed by their grid power utility. Demand charges are an increased cost for energy assessed on the transit agency when the transit agency demands higher energy levels to charge buses at peak load times for durations as short as 15 minutes. They can be very costly and make a big impact on fuel costs for the agency. By using an alternative power supply such as those listed here, the agency can reduce its short-term demand on the utility by deploying these various micro-grid technologies.

Affecting Change at a Higher Level

Beyond project work, an important way to make a positive impact is through industry stewardship. We both currently serve as industry advisors to the Society of Automotive Engineers (SAE), a globally active association that since 1904, has been responsible for developing standards and best practices. SAE has proven to be instrumental in cases for the U.S. National Highway Traffic Safety Administration and its recommendations.

Last year, the organization developed a universal charging standard for overhead pantograph charging that established a common vehicle interface design. SAE set the standard for this vehicle interface so that operators aren't beholden to a single manufacturer or require adapters to charge their fleets.

The work being done now in California will continue to spread to other parts of the United States. And as the nation continues to integrate zero-emissions technologies, organizations like SAE are already looking ahead. SAE may next look to set a standard for high power inductive (wireless) charging. MT

Michael E. Broe is a senior engineering operations manager at STV with more than 40 years of experience in vehicle operations and maintenance.

David W. Casper, P.E., is a senior vehicle engineer and program manager at STV with experience directing activities related to the design, manufacturing and introduction of more than 2,000 vehicles into service.

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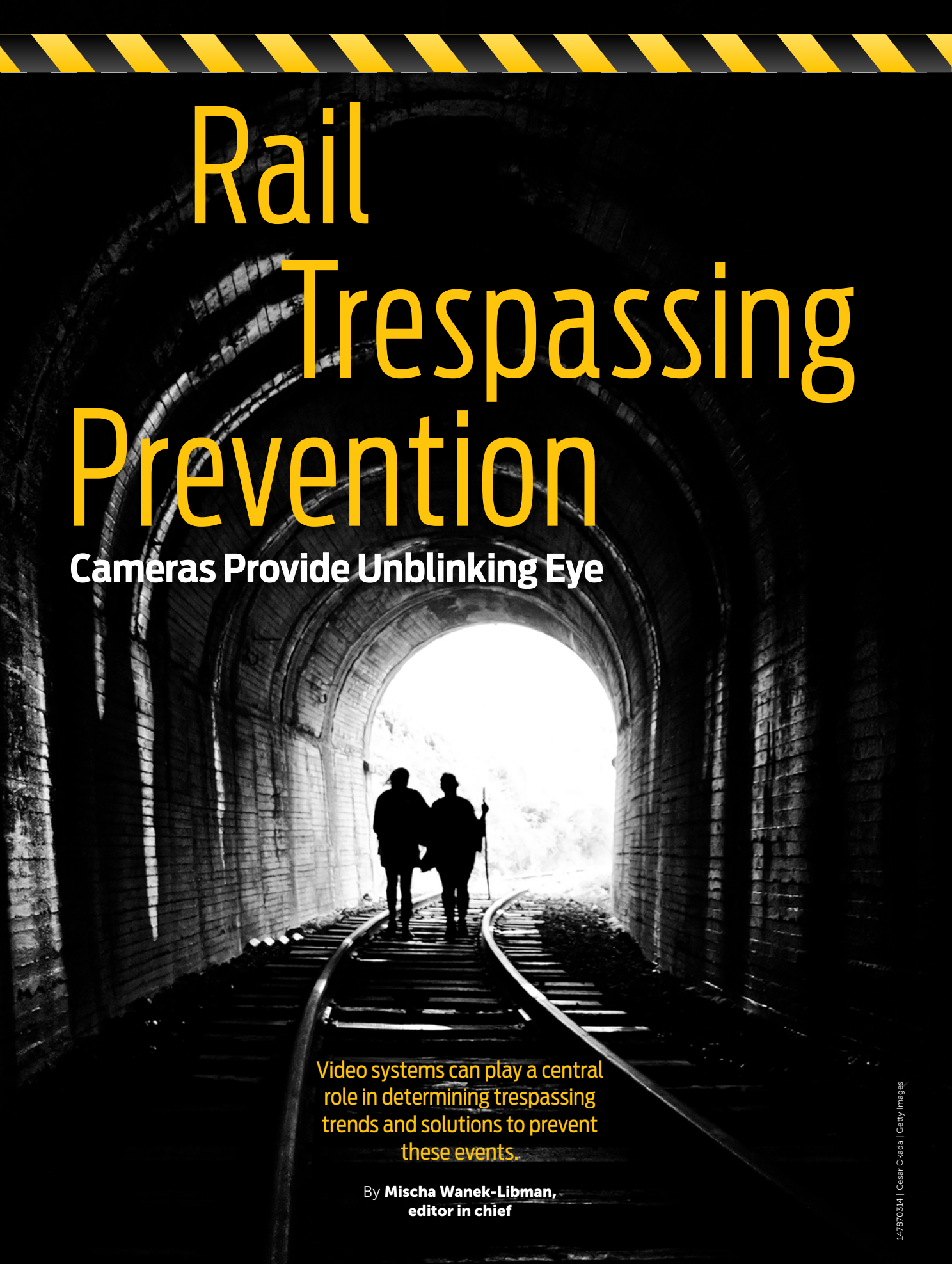


Video systems can play a central role in determining trespassing trends and solutions to prevent these events.

By **Mischa Wanek-Libman, editor in chief**

1478703 14 | Cesar Okada | Getty Images

Rail trespassing fatalities and injuries come with a unique pall of tragedy; one mixed with the heartbreak of loss and the frustration that these incidents are preventable.

The Transportation Safety Board of Canada reports there have been 34 trespassing incidents on Canadian railways between January and July 2022. The rate is pacing slower than the 64 incidents that occurred in 2021, but ahead of incidents in 2020. In the United States, the Federal Railroad Administration (FRA) reports that trespassing on freight, intercity passenger and commuter railroad rights-of-way is the leading cause of all rail-related fatalities. FRA statistics show there were a total of 765 trespassing casualties on railroads in 2011; that number increased to 1,140 in 2021. Between January and May 2022, FRA data shows commuter railroads have experienced 75 trespassing casualties versus 37 during the same months in 2021.

Time and resources have been invested to develop educational initiatives and engineering solutions while partnerships have enhanced enforcement, all with the goal of bringing these statistics down.

One tool with increasing significance in the fight against trespassing incidents is camera technology. With the increased use of video in and around railroad property, cameras and camera vision systems are becoming important tools in amplifying safety messages and collecting data to improve safety programs.

'Silent Witness'

Earlier this spring, Metrolinx released a video, slightly more than a minute long, showing a heart stopping near miss incident that took place on May 20, 2022, between a GO Train traveling on the Milton Line across the Humber River overpass and three young people who came too close to tragedy.

The video's view is facing outward from the locomotive, showing the double track bridge with the train operating along the track on the left side of the screen and a non-occupied track to the right. The video, which Metrolinx has titled the "Silent Witness," first shows a young person wearing a dark t-shirt and shorts standing on the right side of the screen holding the railing of the bridge. As the locomotive passes, the only reaction from the person at the railing is a slight turn of the head – the person is in and out of frame in a little less than three seconds. The video then captures a more unnerving sight: two additional young people, one in a white shirt behind and to the left of a companion wearing a bright blue t-shirt, running between the two sets of tracks. As the train – now well into emergency braking and sounding its horn – approaches the two running figures, the young person in the white shirt inexplicably crosses directly into the path of the train, glances over his shoulder and jumps over the rail and to the left railing barely clearing the front of the locomotive. The envelope of clearance was estimated to be 12 inches by Metrolinx. The third person in the blue shirt veers right and out of frame as the train passes.

In a blog post detailing this video, Metrolinx says the it serves as an appeal to "anyone working with young people to help the agency reinforce the dangers of walking on train tracks."

Metrolinx has invested in rubber anti-trespassing mats at several locations on the Lakeshore East, Stouffville and Lakeshore West lines. Additionally, in known areas where public compliance with rail safety rules can be a challenge, such as the Port Credit bridge where people jump off the bridge into the river, Metrolinx has installed upgraded fencing and boosted engagement and enforcement efforts.

A SCREENGRAB from Metrolinx's "Silent Witness" video shows the moment a young person trespassing on Metrolinx property narrowly clears the tracks as a GO Train approaches.

> **"You** manage what you measure and if you're only measuring fatalities then you're only managing that."
>
> **ASIM F. ZAMAN,** Rutgers University

But the impact of the "Silent Witness" video is significant. Metrolinx Chief Communications Officer David Jang provided the board with a quarterly report in June 2022 in which he said there was an "overwhelming response from media worldwide" to the video. The communications report says the video attracted more than 23,000 views and a strong engagement rate on various social media platforms making it one of the top performing posts.

While the video's engagement statistics are impressive, Metrolinx explains amplifying a message of safe conduct on or near train tracks is the goal.

"Safety campaigns, including the release of this 'Silent Witness' video, is one of the many ways Metrolinx works with the public to educate of the dangers of being on or near train tracks and to empower the public to make safe decisions," explained James Wattie, Metrolinx senior advisor, media and issues, communications. "Every year, Metrolinx works with Operation Lifesaver Canada to promote Rail Safety Week (this year, Sept. 19-25) to stop track tragedies. Our Transit Safety Officers also conduct community rail safety outreach and partner with local police and fire services and other community safety groups to increase rail safety awareness. We continue to work in collaboration with municipalities to improve safety at our grade crossings."

AI-Aided Crossing Trespassing Detection

As the commuter rail and rail transit sectors work to improve

safety compliance around rail property, there is a growing understanding of where and how useful data can be collected. A group of researchers from Rutgers University is looking beyond injury and fatality data and has developed a way to account for all trespassing occurrences, including near miss incidents and events where there are no injuries. The Rutgers team is looking to improve understanding of trespassing trends by utilizing the vast amount of video railroads have and glean insight through artificial intelligence (AI).

The FRA-funded research uses an AI driven computer vision system that analyzes video and collects several key pieces of information on all trespassing events occurring at a given location.

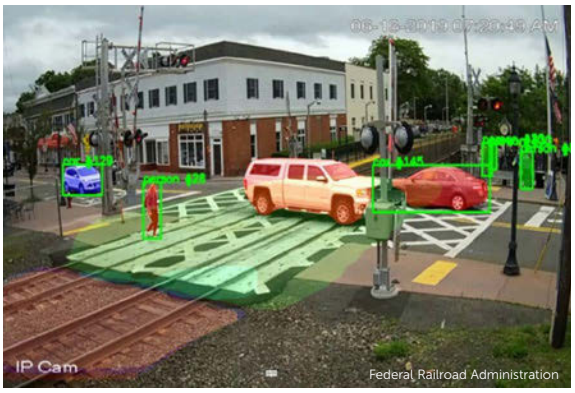
"[We had a hypothesis] that there were many more of these types of trespassing events or violation events occurring, but they just weren't recorded because no one is looking at this big video data and we also thought that AI could tackle this challenge," Asim F. Zaman, project engineer at Rutgers, said during his presentation at the American Railway Engineering and Maintenance of Way Association annual meeting held in Denver, Colo., in August.

The initial research involved two grade-crossings in urban New Jersey and less urban Ashland, Va. Researchers set up a camera aimed at the grade crossing, determined a region of interest, which appears as a green bounding box in a video stream, selected signals to monitor and began AI monitoring.

The crossings were observed during a 13-month timeframe, which produced more than 38,000 hours of live AI analysis with information collected on time, date, the type of infraction, trajectory and several other points on more than 25,000 violation events.

From the data set produced, researchers were able to identify trends, which Zaman explains all tie into the "three E" approach for safety enhancement: engineering, education and enforcement.

For example, Zaman noted in his presentation that the New



A TEAM of Rutgers University researchers undertook an FRA-funded research demonstration project to develop an AI-aided trespassing detection system. The initial research focused on crossings in New Jersey and Virginia.

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Jersey grade crossing saw an increase of trespassing violations on Thursday and Friday nights between 5:00 p.m. and 8:00 p.m. This information can help inform a railroad owner's partners in law enforcement of when to patrol a certain crossing. The data also helped identify violation rates for different categories, such as cars, trucks, bicycles and pedestrians. In another example, Zaman says pedestrians at one crossing had a significantly higher rate of non-compliance with safety rules than other categories, which can help inform actions taken on an educational or engineering front. A third example Zaman pointed to was the information collected on where in the crossing activation cycle violations took place. At one of the observed crossings, most violations occurred as the gates were rising. However, Zaman pointed to a group of violations that took place when the crossing gates were horizontal. He noted this was a group to target with educational efforts as they were most at risk.

"You manage what you measure and if you're only measuring fatalities then you're only managing that," explained Zaman. "[With the AI-aided system] you can manage to a much deeper level."

In addition to the FRA funds, the team was awarded a grant through the Federal Transit Administration to develop the hardware elements of the system and received a Consolidated Rail Infrastructure and Safety Improvements (CRISI) in June 2022. The CRISI grant will see the Rutgers team, researchers from the State University of New Jersey, with support from Amtrak, the Louisiana Department of Transportation and Dover and Rockaway River Railroad, demonstrate the AI-aided monitoring system on five grade crossings in Connecticut, Massachusetts, New Jersey and Louisiana. The CRISI grant will see an enhanced version of the system deployed to review trespassing trends, understand the effectiveness of applied solutions and bolster future trespass prevention initiatives.

Zaman noted the research team is looking to work with new partners on future deployments. MT

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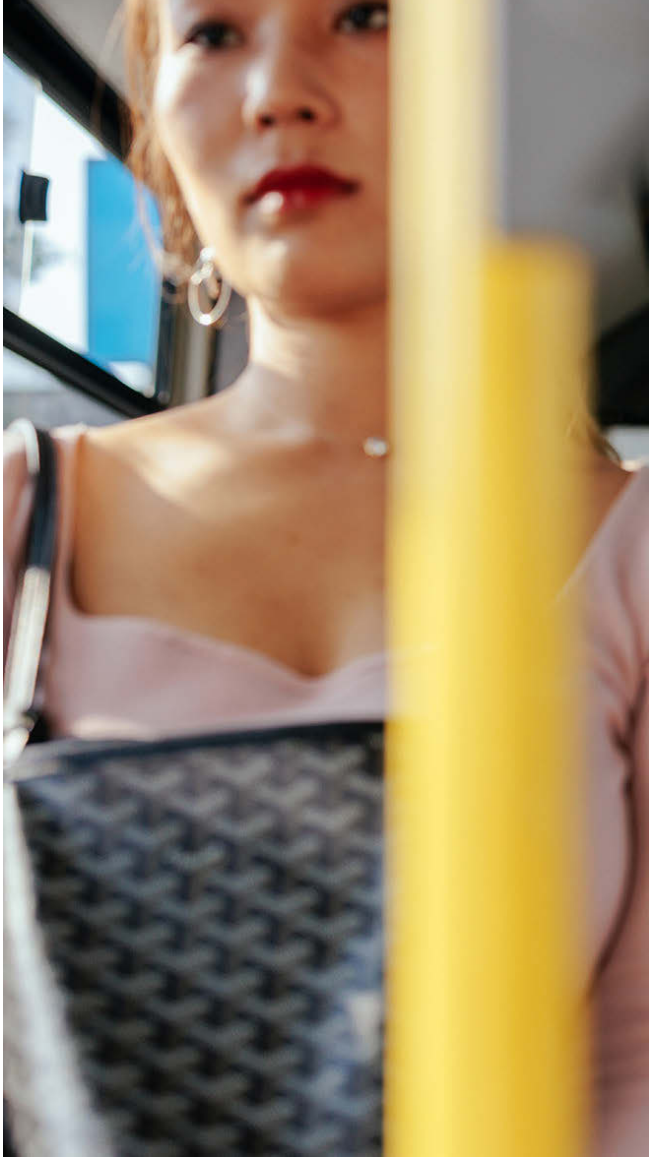
ACHIEVING Equitable Mobility

A flexible fare payment system lays a foundation to provide better service for all customers.

By **Daria van Engelen, contributor**



RIDERS VALUE on-time performance, service frequency and convenient locations more than a free ride.

The most effective way to achieve equitable mobility is better service, not cheaper bad service. An important prerequisite for better service is a fare collection system that provides advanced capabilities at a reasonable price and enables the transit agency to understand its community and tailor solutions to meet the needs of everyone in it, with particular attention to those with limited resources.

Low-income riders represent more than 35 percent of transit riders and are harder hit by transit costs than choice riders. In addition, more than 10 percent of Black and Hispanic people are unbanked and almost 20 percent of Black and Hispanic adults don't have smart phones. A bank account, credit card or smart phone is typically required to take advantage of fare discounts or convenient payment options provided by monthly pass purchases, mobile ticketing or open payments.

Fare Free?

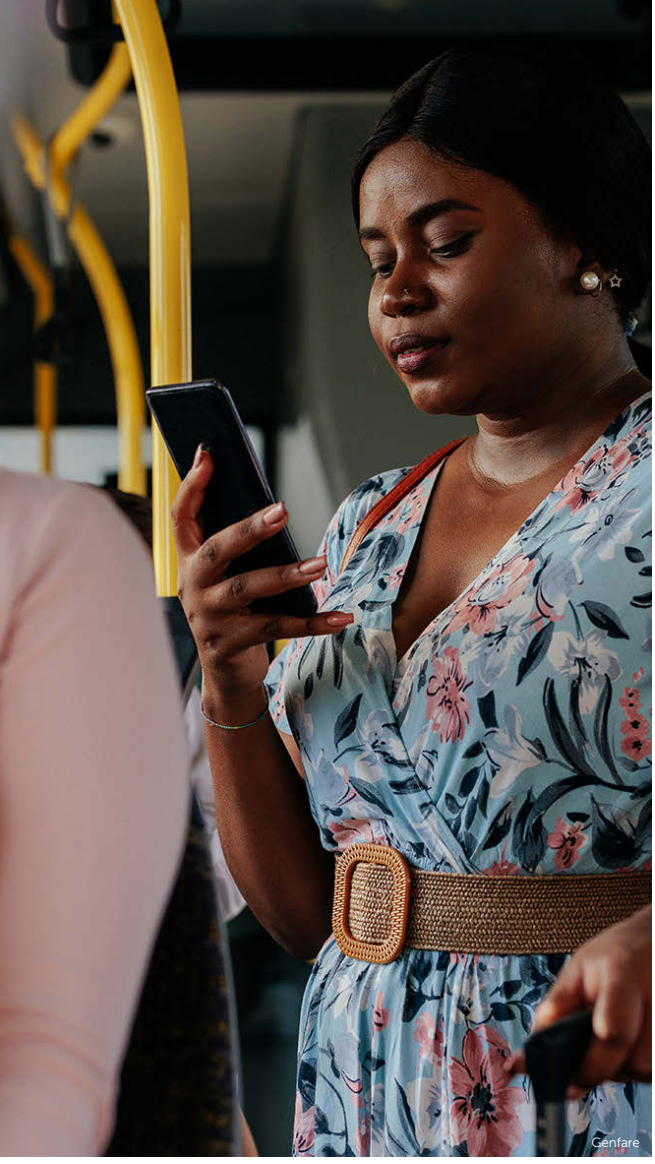
The idea that transit should be a free public service has been around for a long time but gained prominence during the pandemic, when many agencies eliminated fare collection to ensure social distancing between riders and transit workers. The practice was meant to be temporary, but some advocates believe it should be made permanent.

The pandemic showed that transit is an essential public service. Transit-dependent riders earn less than choice riders and spend more of their incomes on transportation. But not everyone believes free fares is the best way to provide equitable mobility. There are many agencies that have faced challenges with vandalism and rider safety due to unruly passengers and an increase in non-destination riders.

This is not to say free transit never makes sense. For small urban areas with modest ridership, large rural areas with low ridership or university-dominated communities, going fare free may work. Clearly there are special cases when optimizing fare policy to meet local needs sometimes means charging no fare at all.

Fare payment is not the impediment to transit use that some portray it to be. On the contrary, it serves several important functions:

- **Generates essential revenue.** For larger agencies, fare collection generates a substantial percentage of the budget which cannot be easily replaced. Given the scale and uncertainty of federal funding that would be needed to make transit free nationwide, it seems likely eliminating fares would necessitate a reduction in service.
- **Provides valuable ridership information.** A modern fare collection system using electronic fare media generates detailed ridership information of value for service planning. The data can be analyzed to determine how many riders use a particular route, where and when they boarded, what routes they transferred to, and – by pairing round trips – where they got off. The transactional database can be analyzed to determine travel patterns, preferred fare media, frequency and other characteristics of use and shifts over time.
- **Serves as a gatekeeping function.** Charging even a nominal fare significantly reduces difficulties arising from problem passengers.


Genfare

When larger transit agencies weigh the advantages of fare collection against the claimed benefits of fare-free operation, they will choose to pursue transit equity within their existing revenue framework.

What is the Best Way to Achieve Equitable Mobility?

The best way to achieve equitable mobility is to improve service while optimizing fares to meet specific community needs through fare discounts for low-income riders and fare capping.

Riders value on-time performance, service frequency and convenient locations more than a free ride. This is as true for transit-dependent riders as it is for choice riders.

A modern fare collection system provides the tools transit agencies need to attain equitable mobility while generating essential revenue in three ways:

- It puts the capabilities needed for a targeted approach within the reach of every agency. Affordable cloud-hosted fare technology can be scaled to the needs of any agency. Today's fare-collection-as-a-service approach means vendors and agencies are active partners throughout the system's service life. Enhanced capabilities are continually introduced in response to evolving technology and market demand and made available to participating agencies.
- It enables agencies to understand their communities. The detailed data recorded for every fare transaction and event, combined with the robust analytical and data visualization tools provided by modern systems, enables agencies to gain a much better understanding of their customers.
- It lets agencies accept any payment medium riders have in their pockets. Coupled with affordable technology and detailed knowledge of the communities they serve, this means transit providers can deliver fare solutions tailored to the needs of all of their riders, including those with limited resources.

Low-income riders represent more than 35 percent of transit riders and are harder hit by transit costs than choice riders.

Here are ways fare collection technology can promote equitable mobility while supporting other important transit goals:

- Creating fare solutions adapted to the needs of different rider groups. For example, eligible low-income riders can be provided with a personalized fare card at little or no charge that they can reload periodically with targeted reduced-fare products using cash or, if the agency chooses, they can ride for free. To avoid requiring applicants to travel to a distant location, agency staff can hold pop-up enrollment events at community centers, public libraries or community events using portable card production equipment.
- Onboard acceptance of cash, the one fare medium readily available to all, is of continuing importance. Some transit riders – many of them minorities protected under Title VI of the Civil Rights Act of 1964 – lack the bank accounts and/or smart phones needed for electronic payment. For the foreseeable future, transit agencies will need to continue to accept cash.
- Offboard cash acceptance enables riders to add value to their fare cards using cash at a ticket vending machine, an agency ticket office or retail sales agent equipped with a point of sale terminal. A partnership with a third-party provider that sells agency-branded fare cards and other preloaded cards at in-store kiosks provides another way for riders to pay with cash.
- Fare capping allows riders to limit their total fare spend based on daily or monthly fare pass maximums. Fare capping can be either card-based, account-based or both.
- Low-cost media for social service organizations. Transit agencies have long sold or given low-cost fare cards to social service agencies for distribution to their clients. With the aid of sophisticated back office systems, transit operators can provide social service agencies with an online portal to make it easier for them to deliver low-cost media efficiently.
- Contactless payment cards for the unbanked. Open payment technology enables fare equipment to read "tap and go" credit and debit cards. Contactless cards configured as reloadable gift cards are expected to be widely available through retailers, where unbanked riders can buy and recharge them using cash. In addition, the cards are likely to be adopted by public agencies distributing unemployment or public assistance payments. That means unbanked riders will be able to pay for transit using a card just as choice riders do.
- Employer transit benefits, in which businesses enable their

employees to use transit at reduced cost, is of value to riders, who can save in two ways – by paying for transit using pre-tax dollars and receiving a subsidy from their employer. The transit benefit also helps businesses to help recruit and retain employees in what are often high-turnover jobs.

Conclusion

The most effective way to achieve equitable mobility is to harness advanced fare collection technology to improve service for all riders – essential workers, low-income and choice riders.

Today's fare processing solutions let an agency do three things to promote equitable mobility: obtain advanced technology at an affordable price; use the data collected by that technology to understand its community; and leverage this insight to tailor fare solutions to meet the needs of all its customers, including essential workers and low-income riders.

The stresses of the pandemic, rising gas prices and inflation mean transit will be increasingly important to a large segment of the public. In addition, reducing automobile use remains an essential strategy in the effort to combat climate change. Transit must accommodate a wide range of riders if it is to address these larger societal needs. Decision makers must also recognize that in a time of political polarization and uncertain federal funding, fares provide a reliable local revenue stream.

The pursuit of equitable mobility must be part of an integrated strategy that takes the needs of all riders into account, including transit-dependent and choice riders. A flexible fare payment system that can meet a wide variety of needs is an important part of this approach. Better service for everyone is the surest way to achieve the goal of equitable mobility – a world in which all can move forward, leaving no one behind. MT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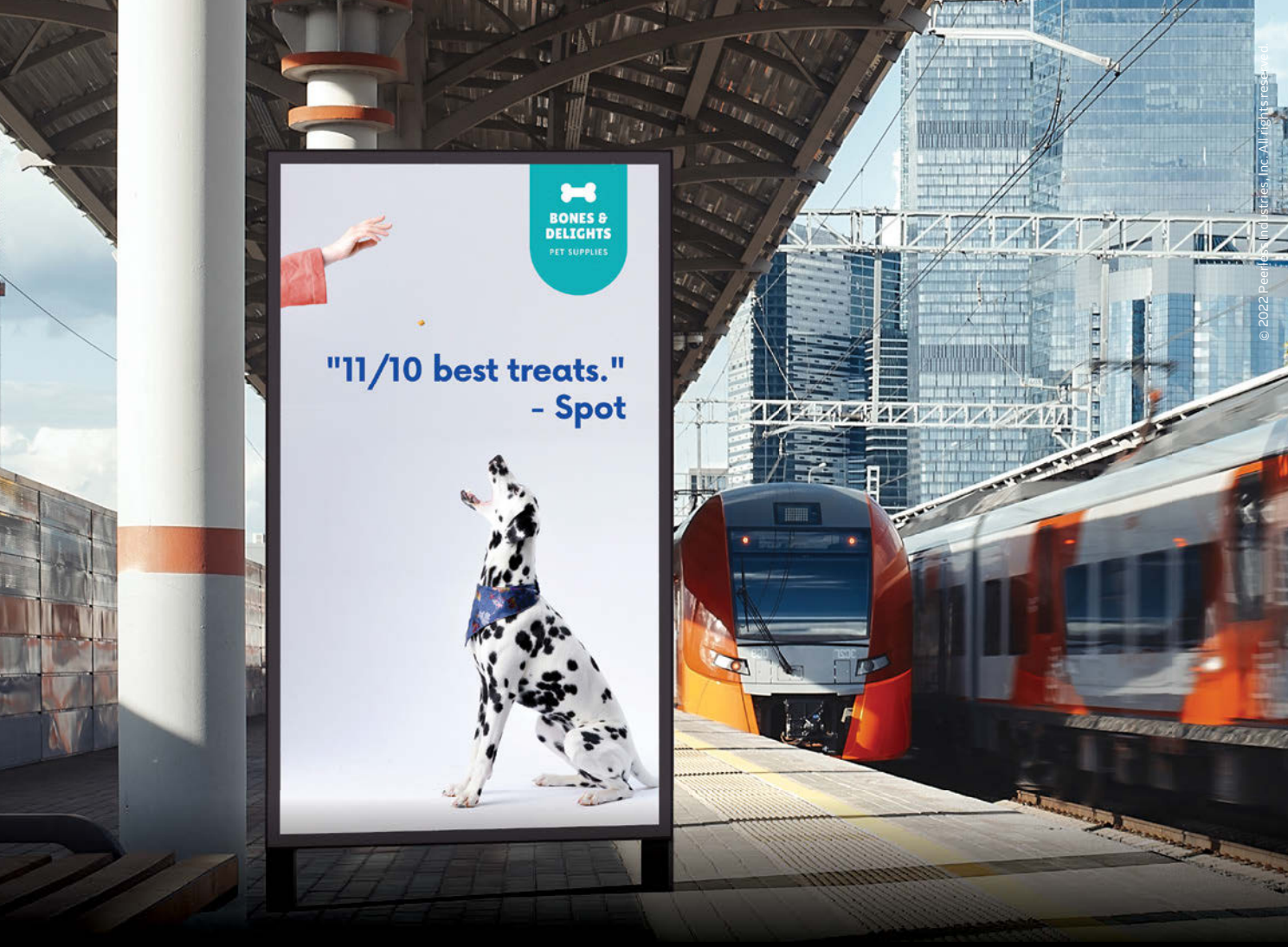
THE PURSUIT of equitable mobility must be part of an integrated strategy that takes the needs of all riders into account, including transit-dependent and choice riders.

Daria van Engelen is chief revenue officer at Genfare.



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Open for All:

The Modular Route to Contactless Open Loop Fare Payments

MONTEREY SALINAS-TRANSIT launched tap-to-pay on its system in May 2021.

Modular components that can be integrated within systems are providing transit agencies of all sizes a more flexible option to leverage contactless payments.

By **Adam McGavock, contributor**

Transit agencies around the world are starting to see an alternative to single vendor contracts when procuring fare collection systems. Modular components, supplied by specialist vendors and integrated within an open architecture, are emerging as a faster, less expensive and more flexible option.

Design and Build Options

Until recently, the market for providing automated fare payments was dominated by big fare collection system vendors. Once contracted, they entered long-term relationships with customers, managing the entire project throughout the design, build, operate and maintain phases. These projects are typically built to detailed specifications, can take years to deploy and can include associated costs that can prove prohibitive to smaller agencies.

While it can be reassuring to have only one vendor to engage with, agencies are locked into contracts for many years, and modernization can become a challenge.

The transit industry has looked to other sectors for an example of a more agile solution. Modular systems, the norm in retail payments for decades, provide a faster, more cost-effective approach, which can be replicated for fare collection.

An Alternative Model

Transit operators and agencies of all sizes are choosing to buy solutions for contactless fare payments in a number of lots, which plug-and-play together through open APIs. This means they engage several vendors who are best in class in a specialist area, such as device hardware, payments processing and merchant services. With tried and tested integrations and standard contracts, a contactless EMV pilot or roll-out can be managed in weeks.

Where the single supplier model can be highly constrained, the modular alternative allows greater flexibility. If an agency prefers a particular payment reader, the option to use it remains. Interoperability,

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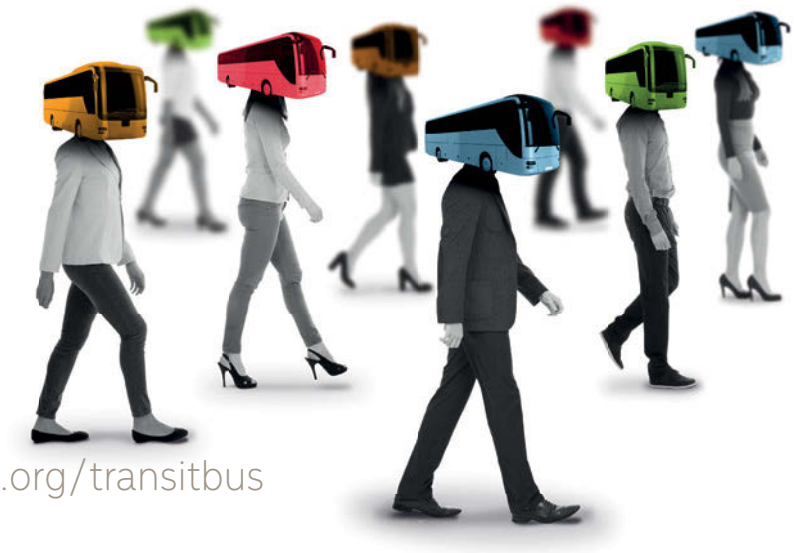

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choice and competition in the marketplace drives costs down, making contactless EMV something that small transit agencies can consider.

Industry Moving Towards Modular

Some of the biggest players in public transit have shown interest in moving towards more modular solutions based on open standards. Transport for London (TfL) has suggested that in a procurement taking place in 2025, it will look to segment its monolithic solution.

Agencies already spearheading this approach include Helsinki Regional Transport (HSL) and TVV lippu- ja maksujärjestelmä Oy (LMJ) in Finland. They rolled out a modular contactless payment system in the capital, Helsinki, and several other cities.

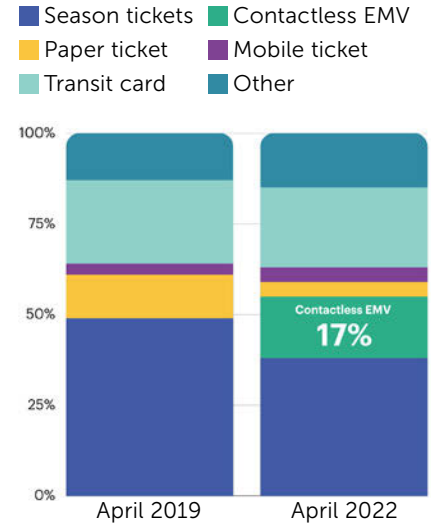
To introduce contactless EMV transit payments, public transit agencies need three components: a validator (payment terminal to accept payment), a payment processor (the integration layer) and an acquiring bank (to settle the payment). In Finland, the payment processor connected Nets, a leading European provider of acquiring services, to several different validators, allowing each city's transit provider to select the hardware that matched their needs.

Because integration and certification were already complete, transit agencies in cities such as Tampere, Oulu and Hämeenlinna were able to quickly get up and running with contactless acceptance.

"We can promise our [transit agency] customers that, six weeks after project ramp-up, we can start production with Mastercard and Visa payments," said Juha Ranta, COO, LMJ.

Strong contactless payments adoption was seen from the outset, with contactless EMV payments gaining a 17 percent share of total transactions in the city of Oulu within 10 months - while paper tickets and season passes saw the greatest decline. This is partly because consumers in the Nordic region already widely use tap-to-pay in settings like retail and hospitality and there was pent up demand for the same experience on public transport.

Fare media share in the city of Oulu



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However, the cities involved also launched dedicated customer-facing marketing campaigns, helping to motivate the significant shift to contactless. Campaigns including billboards, bus wraps and other communications ensured that residents, commuters and tourists knew the system was being introduced and were clear on how to use it.

In the United States, the California Department of Transportation (Caltrans) is also breaking new ground with a mobility marketplace set up as part of the California Integrated Travel Project (Cal-ITP). It has contracted vendors in three categories - payment processors, fare calculation software and fare validators - to supply parts of an open loop fare collection system. Any of the 300-plus transit agencies in the state—and nationwide—can pick three compatible components to buy.

action. Monterey Salinas-Transit (MST) led the way, launching tap-to-pay in May 2021. In a rider survey carried out a year later, the agency found that nearly half (47 percent) of respondents were using the system and found it really convenient.

Lisa Rheinheimer, assistant general manager, MST, said, "Those who use the contactless system are largely happy with it."

In Santa Barbara, a contactless system has been active on the Santa Barbara County Association of Governments' (SBCAG) Clean Air Express commuter route since last July. It has steadily gained users and now 13 percent of riders tap-to-pay.

Whitney Rush, rail and transit project manager, SBCAG, said, "It's been enormously beneficial to step into the future of fare payments. Our customers expect it. They and the drivers have been pleased with the system."

SACRT LAUNCHED its contactless payment option on all light-rail trains September 2021.

It is hoped that in making contactless payments less complex to procure and more affordable for smaller cities, the state of California will work towards a unified transit payments system. Its long-term vision is to achieve seamless, multi-modal travel in the state and beyond, inspiring more people to ride transit rather than using their private car for most journeys.

Early signs are encouraging. Several contactless pilots have gone live in Monterey, Sacramento and Santa Barbara, which demonstrate the modular concept in

Open for All Agencies

Open architecture for payment systems is the way that the industry is headed, making it possible to launch tap-to-ride quickly and less expensively, and enabling agencies to add to or swap elements of a fare collection system without having to start from scratch.

For those without access to a state-led initiative such as Cal-ITP's mobility marketplace, procurement options include issuing separate RFPs for payment devices, payment processing and acquiring services; or working with a payment service provider that has established integrations with a range of devices and acquirers. Following the latter route, it's possible that components of an open loop payments system can be selected and then simply switched on.

The Californian contactless demonstrations are a great example of this. In partnership with Cal-ITP, payment service provider Littlepay teamed up with its ticketing technology and acquiring partners to give agencies a smooth journey to contactless EMV.

The beauty of this type of arrangement, particularly for smaller agencies with limited technical resources, is that there is knowledge and experience on tap. Systems have been deployed many times already and there is a clear and proven roadmap for both pilots and full roll-outs.

Simple and Inclusive Fare Payments

Fast becoming an expectation amongst transit users around the world, contactless EMV payments have been identified as a pillar of the rider experience. These systems allow speedy boarding and the convenience of tapping to pay for trips using the bank card or digital wallet people carry everywhere. Riders simply pay for travel rather than buying a ticket, and enjoy automatic benefits from fare caps or discounts and concessions linked to their card.

As U.S. transit agencies continue to seek ways to improve fare equity and inclusion, this technology is at the forefront of enabling lower income riders and eligible concession groups to access public transit and get the best ticket prices without paying in advance. Modular systems, with minimal capex investment and fast turnaround from contract to deployment, can give transit agencies in smaller urban and rural communities an ace up their sleeve.

Adam McGavock is the business development manager for North America at Littlepay. He served as planning director at the Northern Virginia Transportation Commission and has since gained two decades of transit payments expertise working at Washington Metropolitan Area Transit Authority, IBI Group, Moovel NA and AECOM.

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INDUSTRY INSIGHTS:

Innovating to Address Rising Passenger Expectations

By focusing on safety, innovation and communication, the industry can deliver on higher passenger expectations.

By **Susan Sweat, contributor**

Passenger expectations of public transportation are rapidly evolving and changing. As a society, the experiences of COVID-19 have led us all to re-evaluate what is important to us and that is no different for our passengers. There has been a marked increase in expectations people place on transit: first, for their increased health and safety during the pandemic, but now, for the convenience they expect and the value placed on their time. Many facets of people's lives will not go back to "the way things were" pre-pandemic and increased passenger expectations for public transportation are no exception. As a result, there is additional focus placed on innovation to find new solutions to address these rising demands.

For us, it's been about developing solutions that anticipate the needs of our clients and passengers and then, delivering on them—all while keeping the passenger experience at the forefront.

It Always Starts with Safety First

After the initial phase of the pandemic, there was a need to find new ways to regain passenger trust as people started to go back to work, medical appointments, visiting friends and more. We wanted to ensure that passengers felt confident that the buses were being cleaned and sanitized at regular intervals. And that mask and social distancing guidelines were adhered to in accordance with national, state and local legislation. We ensured that communication was clear, consistent and had four common areas of focus:

1. How we were protecting interactions with passengers.
2. How we were managing social distancing on vehicles.
3. How we were ensuring safe and clean vehicles.
4. How we were following strict protocols for employee health.

This was important information to communicate to passengers who were essential workers and remained on transit throughout the pandemic and for other passengers as they slowly started to come back to public transit.

Not Business as Usual: Innovating to Address Rising Expectations

Providing passengers with a safe, reliable and positive experience remains a critical component of our promise to customers. However, as an industry, we also need to remain committed to developing innovative ways to help increase passenger satisfaction. Everyone is valuing their personal time with new eyes in this unforeseen pandemic era and time spent waiting for and riding public transportation is now being viewed with a different lens.

Communicating Real-time Arrival Information

As an industry, it's been up to us to find ways to improve the rider experience. We have found a renewed interest in self-service arrival information for passengers, so they can better manage their daily travel. One way we have addressed this has been to offer passengers – particularly paratransit riders – real-time updates on the status of their vehicle trip arrival via an app. This technology also allows users to review reservations for current or future trips. And it provides families or caregivers with real-time pick up and drop off information for their passengers, including real-time vehicle location on a map to help them follow along and track the trip. Additionally, in locations where multiple passengers are being picked up or dropped off at the same time, such as a dialysis center or a day program for persons with disabilities, there is a specific app for the facilities to track all pick up, drop off and other ride information from a consolidated view. This allows the cen-

ter's staff to better manage transportation logistics for the people they serve.

Soliciting and Incorporating Passenger Feedback for Continuous Improvement

Actively soliciting feedback and listening to what passengers think of the service is the best way to learn and improve. We realized that monitoring and trending customer complaints and other feedback was an important listening mechanism, but sometimes we needed to learn more about what customers need and want from public transit. We wanted to ensure we were hearing all the feedback and not just the items that may have elevated to a complaint. We wanted to hear general feedback and suggestions on what passengers wanted to see from their transit service. We invested in passenger satisfaction surveys, regularly solicited information from rider advisory councils and deployed our "Meet the Managers" program. The "Meet the Managers" program is a methodical way for managers to interact directly with passengers at visible times to thank them for riding and solicit feedback. Passengers who take the extra time to provide specific comments and suggestions truly feel heard and we receive lots of invaluable suggestions and ideas on what we can do to continuously improve.

Actively Managing Operational Data to Improve Passenger Service Reliability

There is a strong connection between ensuring we have the most current, relevant operational data to establish a consistent, real-time flow of information internally and focusing on the reliability of service experienced by passengers. Passengers expect their vehicle to be reliable, on-time and safe. That's why we have prioritized the implementation and usage of a tool that aggregates key, real-time data for dispatchers from multiple tools and sources into a single, consolidated and well-designed digital workspace. This "command console" dashboard not only allows for real-time updates on vehicle location and status, but also helps us be well-armed to identify, prioritize and solve potential issues quickly and effectively – ultimately improving performance and contributing to the passenger experience.

Our lives have forever changed as a result of the pandemic. However, Transdev's commitment to empowering people every day with freedom and confidence through safe, reliable and innovative solutions hasn't changed. As passengers look for more from their transit system in these evolving times, this commitment to continuous improvement through innovation and technology continues to make a difference for our clients and our passengers, thereby creating a positive impact on the common good. MT

Susan Sweat is chief operating officer at Transdev.

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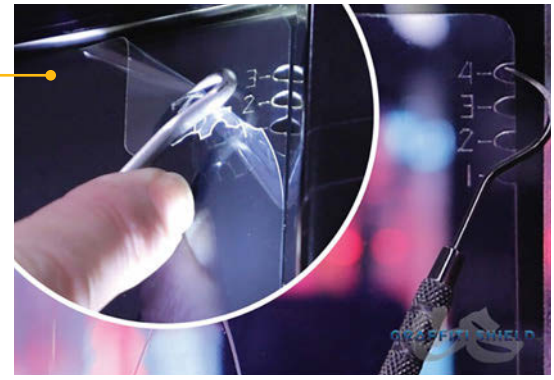

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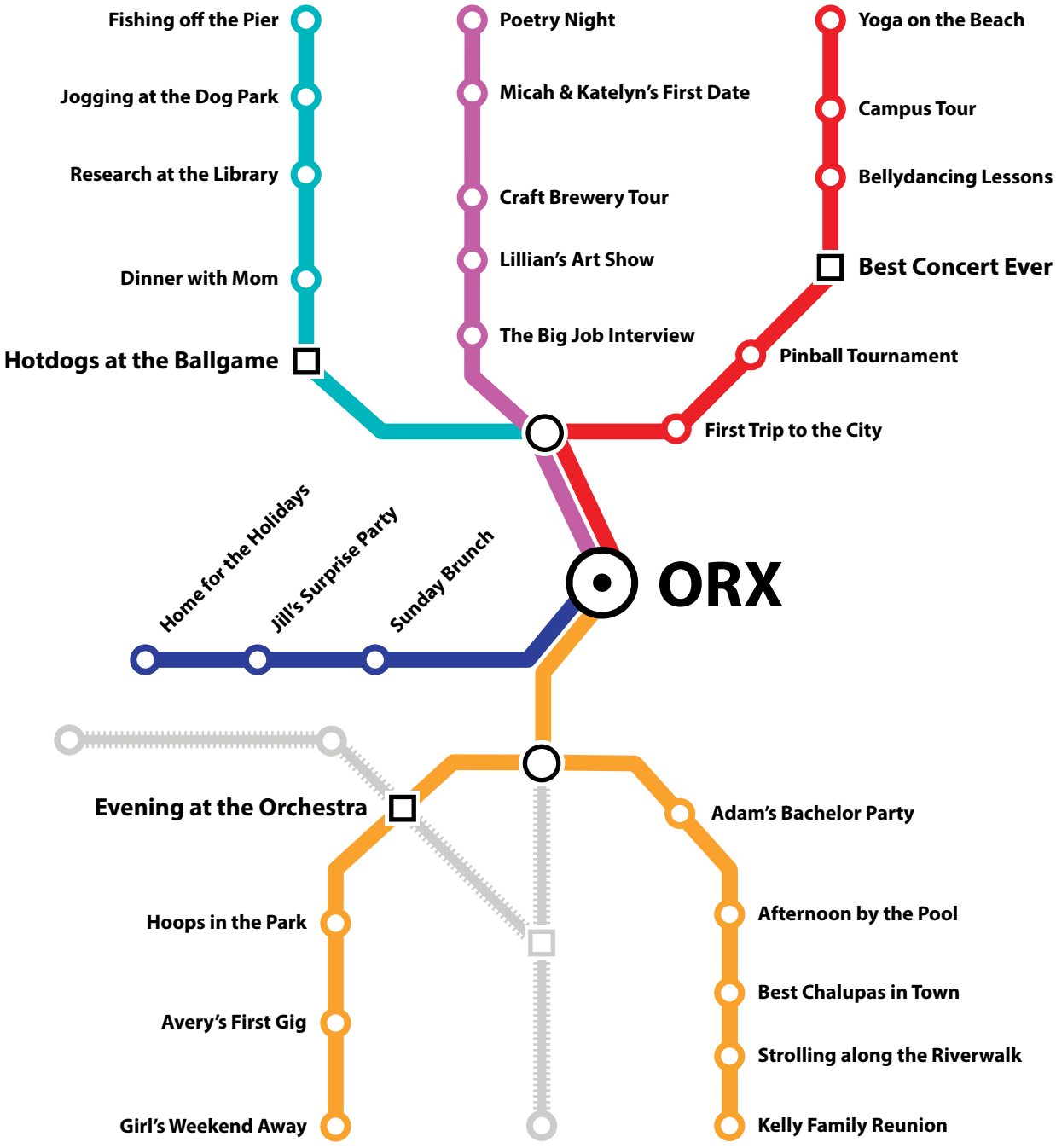

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