MASS TRANSIT

BEST PRACTICES FOR INTEGRATED MOBILITY

REDESIGNING A SYSTEM BY THE PEOPLE, FOR THE PEOPLE

When DASH started a complete network redesign, it asked what the purpose of transit should be for the residents of Alexandria.

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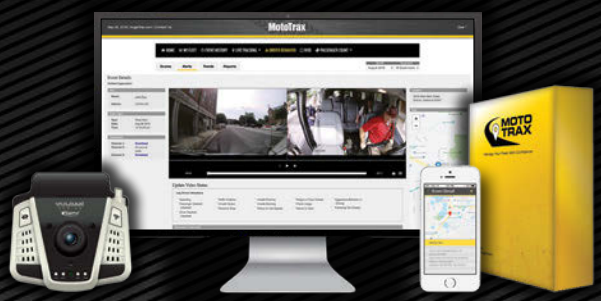
Better Drivers Are Safer Drivers



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ALEXANDRIA, VA

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▶ Santa Clara VTA provided the land where 40 tiny homes will be used as temporary housing for homeless individuals.

➲ MassTransitmag.com/21127641

FY21 CIG project ratings: Which Transit Projects are Eligible for Federal Funding

▶ The Federal Transit Administration released its FY21 funding recommendations and updated project ratings.

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Managing during uncertain times

The ability to respond to various situations can set the industry up for success once the unknowns fade.

How many of you thought you knew how to wash your hands properly prior to the constant reminders of best practices to keep germs at bay? Did you sing "Happy Birthday" twice or give the proper scrubbing attention to your fingertips? Back in January, how many of you thought in eight to 10 weeks, travel plans will be canceled and at every turn, a single term would dominate: Novel coronavirus.

As I write, I wonder if this column may not have a long shelf life. In all honesty, it would be wonderful if, by the time you read this, your reaction would be "oh, that was last month, not now." But now includes a contagious and spreading virus that has reduced the gathering of large crowds including classes at several universities, forced conversations about the option to telecommute and resulted in rush hour trains and buses that are usually packed with people, running half full.

Event cancellations have impacted many industries, including transit, most notably with the cancellation of the American Public Transportation Association's (APTA) Legislative Conference that was to be held in mid-March. APTA is leaving the door open that this event could be rescheduled and given the dialogue surrounding a new surface transportation bill, I hope this comes to fruition.

It would be wonderful if, by the time you read this, your reaction would be "oh, that was last month, not now."

The transit industry's response to this health issue has been transparent and thorough. Transit providers have concentrated on those elements that can be controlled. For example, pandemic flu plans have been implemented and many agencies of all sizes have significantly increased their fleet cleaning regimens.

Information sharing has also been a cornerstone of the transit industry's response. Within days of the alarm sounding to the spread of the virus here in the U.S., APTA developed a fact sheet on the virus, compiled several transit agency responses to the virus for peer-agencies to learn from and organized a webinar for transit providers to share best practices.

As the saying goes, this too shall pass. But until it does, the industry's dedicated and quick response has not only mitigated the spread of the virus but has helped combat and quell anxiety bred from uncertainty among riders and employees.

Mischa Wanek-Libman, Editor
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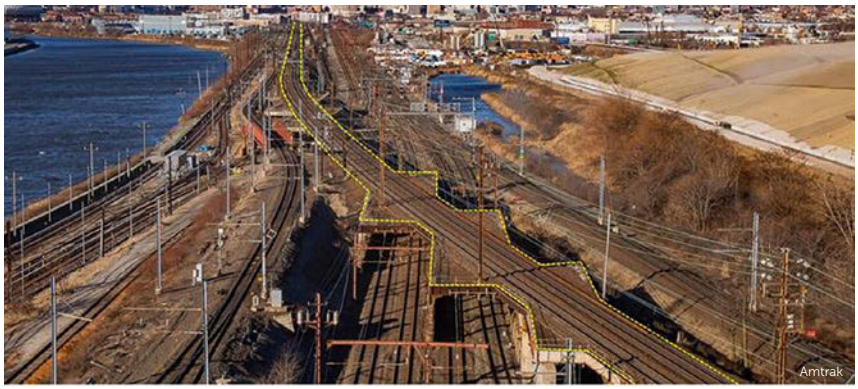


AMTRAK IS planning to replace the Sawtooth Bridges with structures that will support four tracks.

FRA publishes Environmental Assessment of Northeast Corridor's Sawtooth Bridges project

The Federal Railroad Administration published the Environmental Assessment of the Sawtooth Bridges Replacement Project, which aims to replace two aging bridges that carry Amtrak's Northeast Corridor (NEC) trains over New Jersey Transit, Port Authority Trans-Hudson Corporation and Conrail tracks.
MassTransitmag.com/21128652

PTC progress continues in fourth quarter 2019 report, but six passenger railroads labeled "at risk"

▶ The Federal Railroad Administration (FRA) released fourth quarter 2019 Positive Train Control (PTC) self-reported progress by U.S. railroads and, overall, PTC systems govern operations on 96.3 percent of all 58,000 PTC-mandated route miles. Railroads have until Dec. 31, 2020, to implement the complex safety overlay system. On the passenger rail front, PTC is governing operations on 99.8 percent of Amtrak's required route miles and commuter railroads are at 54.7 percent, which is an increase from the 41.9 percent reported in Q3 2019. With 10 months before the deadline, FRA has labeled eight railroads as "at risk" of missing the statutory deadline. They include four commuter railroads, New Jersey Transit (NJ Transit), Metra, TEXRail and New Mexico Rail Runner Express; two railroads with passenger operations, Alaska Railroad and Florida East Coast Railway (including its tenant railroad, Brightline/Virgin Trains USA) and two freight railroads.
MassTransitmag.com/21127543

Quicker transit fixes coming to SFMTA through Muni's quick-build program

▶ The San Francisco Municipal Transportation Agency (SFMTA) Board of Directors approved the Transit Priority Quick-Build Program, clearing a path for improving Muni service quickly on the most heavily used lines and at the biggest hotspots for delay to Muni customers. Modeled on the SFMTA's Vision Zero Quick-Build effort for faster delivery of traffic safety improvements, the Transit Quick-Build Program focuses on reducing needless delay to transit riders using proven, fast-to-implement solutions, according to the agency. Improvements can be implemented following public outreach and a public hearing, without requiring additional approval by the SFMTA Board. This can get projects on the ground months or even years faster than the current process.
MassTransitmag.com/21128112

SFMTA IS looking to speed commutes with a new quick-build program.

JTA WILL retain up to $6.8 million to construct a 1,200-foot bus-only extension of the East Corridor Bus Rapid Transit project.

Trio of transit projects approved to use federal portion of project savings to further project impacts

▶ Two transit projects in Texas and one in Florida will see their federal funding go a bit further following the Federal Transit Administration's (FTA) approval that the project sponsors could use the federal share of project cost savings on additional activities related to the three projects. Trinity Metro in Fort Worth, Texas, Metropolitan Transit Authority of Harris County (Houston Metro) and Jacksonville Transportation Authority (JTA) in Jacksonville, Fla., will be able to use a combined $64.2 million to further invest in their individual transit projects funded through the Capital Investment Grants (CIG) Program. Rather than the federal share of the cost savings coming back to the government, the project sponsors will use the funds to extend rail and bus systems and construct a transit facility. "FTA considers and approves additional project activities using the federal share of a project's cost savings," said FTA Acting Administrator K. Jane Williams. "We encourage project sponsors who deliver complete projects under budget to discuss these options with us to maximize the benefits that cost savings can bring to their communities."
MassTransitmag.com/21127706

Atlanta Regional Commission
Board approves updated regional transportation plan

▶ An updated regional transportation plan aimed at improving mobility in metro Atlanta through 2050 to accommodate population growth and combat congestion was approved by the Atlanta Regional Commission (ARC) Board Feb. 26. ARC says the $172.6-billion Atlanta Region's Plan is a blueprint through 2050 that details the investments, programs and services needed to ensure metro Atlanta's future success by providing world-class infrastructure, fostering healthy, livable communities and developing a competitive economy. "The Atlanta Region's Plan offers a balanced, strategic approach to keep our region moving forward, even as our population continues to grow," said Doug Hooker, executive director of ARC. "This plan will help metro Atlanta remain competitive, with a high quality of life, in the decades to come. ARC forecasts the 20-county Atlanta region will add 2.9 million people by 2050 and the Atlanta Region's Plan is designed to accommodate the expected growth and combat increased congestion tied to population growth.

➲ MassTransitmag.com/21127385

MORE NEWS AT A GLANCE

▶ Alstom is set to acquire Bombardier Transportation after signing a Memorandum of Understanding with Bombardier Inc., and Caisse de dépôt et placement du Québec.

➲ MassTransitmag.com/21125896

▶ Calgary Transit will continue to update its light-rail vehicle fleet with 15 more S200 light-rail vehicles from Siemens Mobility. These vehicles will replace Siemens' original U2 vehicles, most of which have been running for almost 40 years.

➲ MassTransitmag.com/21127257

▶ Vapor Bus International, a member of the Wabtec Bus Solutions Group, will supply electric door systems to Gillig to be used on a 20-bus order for Fort Worth. The order is comprised of Vapor ETO™ front and rear door actuators, Ameriview® door panels and electronic door controls.

➲ MassTransitmag.com/21126563

People in the News

Sarah Feinberg

David Fields

Bill Thomas

Paul Ballard

John Ravasio

New York City Transit (NYCT)

NYCT has named Metropolitan Transportation Authority Transit Committee Chair and former Administrator of the Federal Railroad Administration Sarah Feinberg as interim president of NYCT, effective March 9. Feinberg will oversee the 48,000-person workforce of NYCT, as well as operations for New York City subways, buses, paratransit services and the Staten Island Railway. "...as a transportation professional, there's no greater impact on public service than working with the people responsible for the safe and efficient transportation of eight million New Yorkers every day," Feinberg said.

➲ MassTransitmag.com/21127445

City of Houston

David Fields has been appointed by Houston Mayor Sylvester Turner to be the city's first chief transportation planner, where he will provide strategic leadership for the city's systems-level transportation planning efforts, including connecting transportation with land use to maximize the economic development for both the city and region. Fields will work in the city's Planning & Development Department and will coordinate closely with transportation partners such as Houston Public Works, Metropolitan Transit Authority of Harris County, Texas Department of Transportation and the Houston-Galveston Area Council. His first day with the city of Houston was Feb. 24.

➲ MassTransitmag.com/21126906

Regional Transportation Commission of Washoe County (RTC)

The RTC Board has selected Bill Thomas to be RTC's executive director after conducting a special meeting where the board interviewed five candidates. The board received communications from the community, council members, local government and RTC staff about the attributes and experience the next executive director should possess. The board gave legal counsel direction to begin the negotiation of an employment agreement that will be brought to the board meeting scheduled for March 20. "Bill Thomas successfully received unanimous support from the entire board," said RTC Chairman Bob Lucey.

➲ MassTransitmag.com/21125642

Denver Regional Transportation District (RTD)

The RTD Board of Directors has appointed Paul Ballard as the interim general manager and CEO of RTD, following the retirement of General Manager and CEO Dave Genova. For more than four and a half decades, Ballard has served as a general manager, CEO or president of public- and private-sector transit systems. "My board colleagues and I think that Mr. Ballard will skillfully lead us into RTD's next era while also ensuring that the agency's employees remain focused on their service to the public," said RTD Board Chair Angie Rivera-Malpiede.

➲ MassTransitmag.com/21125290

Cincinnati Metro (Metro)

John Ravasio has been promoted as the chief operating officer (COO) of Metro, where he will oversee operations, fleet and facilities and accessible services. He joined Metro in 2011 and most recently served as director of employee and labor relations/employment law before being promoted to interim COO. While in this role, Metro notes he led efforts that resulted in improved fleet reliability and increased on-time performance above levels not reached in years. He was also instrumental in bringing the Access paratransit service in-house and merging the organization's two call centers for improved customer service.

➲ MassTransitmag.com/21123981

DASH IS working to improve its real-time offerings, such as installing solar-powered, real-time information displays throughout the system.

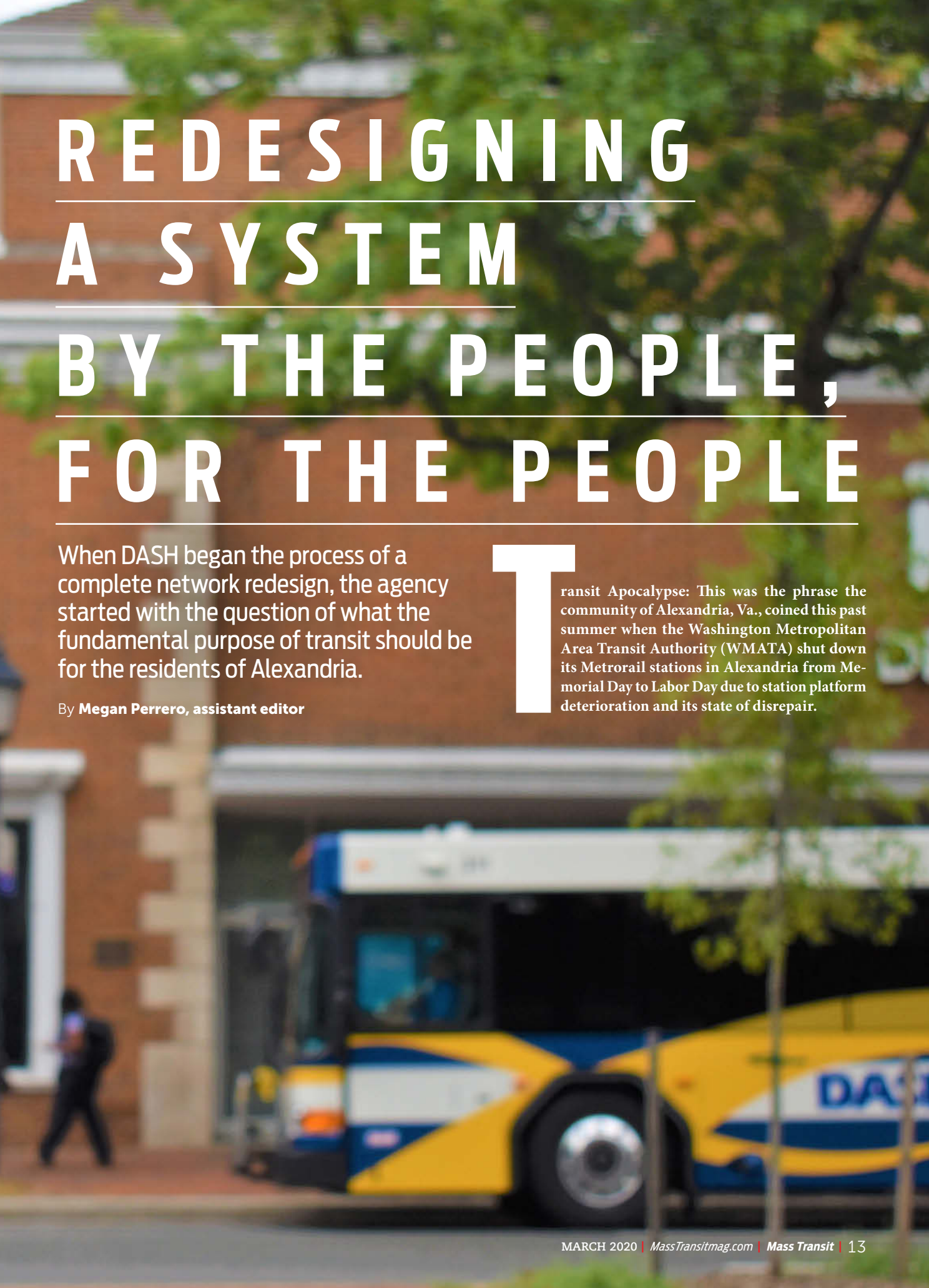
Photos by DASH

REDESIGNING A SYSTEM BY THE PEOPLE, FOR THE PEOPLE

When DASH began the process of a complete network redesign, the agency started with the question of what the fundamental purpose of transit should be for the residents of Alexandria.

By **Megan Perrero, assistant editor**

Transit Apocalypse: This was the phrase the community of Alexandria, Va., coined this past summer when the Washington Metropolitan Area Transit Authority (WMATA) shut down its Metrorail stations in Alexandria from Memorial Day to Labor Day due to station platform deterioration and its state of disrepair.



Alexandria's Metrorail stations averaged 13,355 weekday boardings in Fiscal Year 2019, according to the Northern Virginia Transportation Commission (NVTC). Shutting down access to Washington, D.C., and beyond had a big impact on residents. During the shutdown, the Alexandria Transit Company (DASH) knew it had to be part of the solution.

"We raised our hand and said we're here to help," said DASH CEO and General Manager Josh Baker.

DASH partnered with WMATA to provide a replacement shuttle service for the Metrorail Blue Line. To do this, DASH grew its fleet from 85 buses to more than 130 in the course of about two to three months and increased its workforce from just shy of 200 employees to more than 330. The company recruited people from all over and "scraped" together buses wherever it could.

"Some of the [buses] we got had actually been retired from service, so we rehabilitated them... and reentered service with those," Baker explained.

In just under four months, Baker says DASH provided half a million passenger trips, which equates to about one eighth of the entire system's annual bus ridership.

"We walked away from the project as being recognized as one of the most successful solutions in mitigating the challenges," Baker said. "We've very proud of how that shows how a relatively small transit system [can solve] a community issue on a large-scale basis."

A smaller system with big city needs

Fast forward to today and DASH is still focused on how a relatively small system can best serve a larger urban area. The city is just under 15 square miles with a population of just over 144,000 according to the 2010 Census. Yet, DASH provides about four million passenger trips a year with a fleet that's just under 100 buses, according to Baker. And the city says its population is expected to reach just under 160,000 in 2020, inclining Baker to believe there's a pent-up demand for transit.

"We're attempting to prepare ourselves to support a more densely urban area," Baker said. "I believe there's a pent-up demand. I think we're going to hit a turning point and all of a sudden, we're going to start [to] see the demand significantly increase."

To prepare for this increase, in early 2018, DASH started drafting the Alexandria Transit Vision (ATV) Plan, which includes two phases: one is the short-term, or 2022, network plan that will be implemented starting in summer of 2021 and the second phase is the long-term, or 2030, network plan, which is the final vision of what DASH is building towards over the next seven years.

Martin Barna, DASH's director of planning and scheduling, explains the ATV Plan entailed redrawing the entire bus network with the intention to make the system more useful and to encourage more passenger trips outside of peak periods, which made the network analysis completed at the start of the project quite different from previous analyses.

"We wanted to...have a discussion about what the fundamental purpose of transit should be for Alexandria – not just go in and start designing routes," Barna said. "We had to think at a high level of what the priorities should be."

DASH started the process by collecting community feedback about key tradeoffs to determine if the new system was going to be ridership oriented or coverage oriented, Barna explains. Questions posed to the community determined if they were willing to walk a bit farther if it meant more frequent service or if they'd be willing to make a transfer if it meant a shorter commute. After reviewing input from the community, DASH's transportation commission and its board of directors, it was determined the new system would be ridership oriented.

DASH REBRANDED its AT1 Route to the AT1 Plus with specially-wrapped buses after receiving funding allowing it to improve service.

The new and final network design was adopted by the board in December 2019 and now provides frequent, all day routes that run throughout the entire city, with routes estimated to run every 15 minutes or better, seven days a week.

"It'll be very advantageous for the city as a whole, but especially for our more vulnerable residents [such as] low income, minority and senior residents, [who] will see major increases in access to that highly frequent, highly useful transit," Barna said.

Under the ATV Plan, access to transit will increase to 120,000 residents versus the 40,000 with current access; access to transit for low-income residents will increase from 29 percent to 89 percent; and access to transit for minority residents will increase from 22 percent to 87 percent.

Not only does the ATV Plan increase access for the city's current

residents but it also prepares DASH for the city to become more densely populated and for the upcoming arrival of Amazon headquarters at National Landing. The southern area of National Landing is Potomac Yard, which comes into Alexandria and will include a soon-to-be-constructed Metrorail station.

"There's a whole lot of density that's being built up around that future [Metrorail] station," Barna said. "Before Amazon was announced, we knew there was going to be a whole lot of density there...so we've already been building towards a very frequent service to that area."

The service is expected to come across the city and to the Potomac Yard area, allowing for easy connections up to Crystal City and the Amazon headquarters.

Realizing a long-term vision

In light of this increase in population density, and with more frequent service coming in 2021, DASH is working with the city to implement proposed dedicated transit corridors and dedicated rights of way. As of now, DASH has one bus rapid transit (BRT) corridor in operation, Route 1 or Metroway, with two more corridors included in the ATV Plan. These BRTs aim to provide more frequent and expanded service.

NVTC reports DASH's annual ridership has gradually declined from 14,233 average daily boardings in FY15 to 12,550 average daily boardings in FY19, fairly consistent to FY18 which averaged 12,912 weekday boardings. Baker explains while DASH's ridership decline has started to level off and looks to be on the rebound, this doesn't prevent some push back.

"We've looked at expansion and often take criticism when people say, 'Why are you expanding when your ridership is declining?' The answer is that there's that pent-up demand potentially," Baker said.

But Baker notes demand is only one factor. Better quality service could attract more riders. Part of that quality service translated to improvements on DASH's AT1 and AT9 routes. DASH was able to significantly increase headways on these buses after receiving funding from the Commuter Choice on the I-395/95 corridor, a program administered by the Northern Virginia Transportation Commission and in partnership with the commonwealth of Virginia and the Potomac and Rappahannock Transportation Commission. The funding is generated from a portion of toll revenues collected on the 395 Express Lanes, which began when two high-occupancy-vehicle lanes along an eight-mile stretch on Interstate 395 were converted to three reversible high-occupancy toll lanes.

"The creative way Virginia set up the agreement with the operator of these lanes is that initial revenues beyond the base contract allocations are diverted to alternative transportation projects," Baker explained.

> "I believe there is a pent-up demand. I think we're going to hit a turning point and all of a sudden, we're going to start [to] see the demand significantly increase. Providing higher quality service will draw more people to the system.
>
> **-JOSH BAKER,** DASH CEO and General Manager

DASH HAS received preliminary funding for its planned West End Transitway BRT line, with the service expected to launch in 2028.

This means entities along the corridor can apply for funding to support alternative transportation projects such as bikeway or pedestrian way improvements. DASH applied and received two Commuter Choice Grants which will cover more than $5 million in capital and operating expenses for the AT1 Plus and AT9 routes

for Fiscal Year 2020-2021. Service enhancements on these routes began in October 2019.

The AT1 route was rebranded with specially wrapped buses to the AT1 Plus route thanks to these service improvements, which increased peak headways from 15 minutes to 10 minutes and off-peak headways improved with longer hours of service. Solar-powered, real-time displays were installed to provide bus arrival information.

The AT9 route also saw an increase in peak headways from 30 minutes to 20 minutes and off-peak headways improved with longer hours of service. Funding also allowed DASH to begin a brand-new Sunday service on the AT9 route, which has been averaging more than 250 riders per day.

"The effects of that funding and that expansion of service are a demonstration of the goals of the ATV Plan," Baker said. "[This is the] first step for us in the implementation of the plan and [it has] already shown what an impact that makes on the usability of that service."

And there's more service to come

The AT1 Plus route serves as a precursor to the West End Transitway BRT and is meant to build ridership in the corridor before the BRT is scheduled to open in 2028. This route is planned to run between the Van Dorn Street Metrorail station and up to the Pentagon area with key stops at Landmark Mall/Van Dorn Street commercial areas, Kingstowne, the Mark Center and Shirlington. This route has received preliminary funding and is starting to move forward, according to Baker.

The other BRT corridor, Duke Street, is in the early planning stages and would connect Alexandria to Fairfax County to the west. This corridor would serve the Eisenhower East area, Landmark Mall, Foxchase, Alexandria Commons, portions of Old Town and the King Street Metrorail Station.

Alexandria's inaugural BRT, Metroway, began service in 2014 and is operated by WMATA. This corridor runs between Pentagon City, Crystal City and Alexandria.

Since Metrorail runs along city limits, it's difficult to serve the broader population, and with Alexandria being a densely populated area, DASH needed to identify key areas of where it could provide frequent, quality service to more residents. DASH identified these three BRT corridors in a feasibility study completed in 2012 as the best areas to provide enhanced services in more areas of the city.

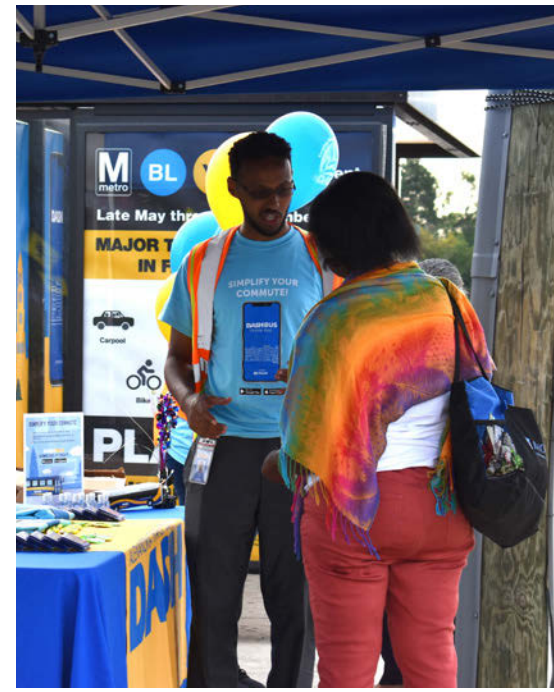
"We have a lot of density [and] the city is growing," Baker said. "We're working hard to try and be focused on the future and being prepared for that."

Providing more than better service

With these service improvements coming to fruition, DASH is working to ensure the community can make use of the system easily and efficiently. Specifically, DASH has diverted resources to improve its real-time offerings to provide more useful information for riders. So far, DASH has installed real-time passenger displays throughout the system at bus stops and transit centers.

"[We're really] trying to reduce the barriers of not knowing when your bus is coming," Barna said. "We're also trying to improve the accuracy of our real-time information [because] if the information is not accurate that can often be a hindrance."

DASH is also expanding into the mobile ticketing realm thanks to a year-long pilot with the DASH bus app, which allows riders to purchase bus fares from their phone. With the mobile ticketing pilot coming to an end, Barna says DASH will look into how it can expand that to a more regional offering and incorporate other rider amenities into the app such as trip planning and real-time information.



A DASH employee explains the mobile app to a rider. DASH piloted a mobile ticketing app for one year and is now looking to add additional rider amenities to the app.

"We are, as far as I know, the first bus agency in our area to do a mobile ticketing app," Barna said.

Building towards a greater transit vision

Whether it's creating a transit system that works for everyone or providing more useful information to make use of said system, DASH keeps the community in mind. From the conceptual design of the network to the individual routes, the community informed DASH of how it wanted to see the service evolve to serve the average rider, not just the nine-to-five commuter.

"Providing higher quality service will draw more people to the system," Baker said. "...We expect a lot of people to locate themselves in Alexandria. It's an easy commute; it's a great community [and] they're going to have to ride DASH and Metrorail to get to work."

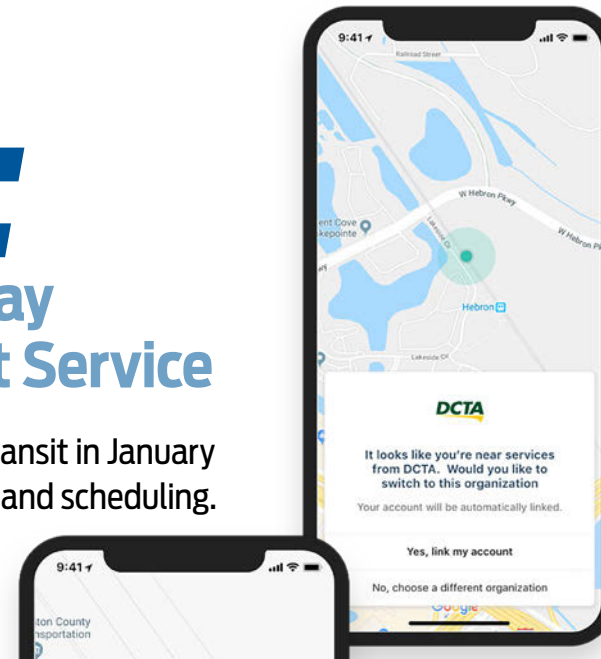
By providing more relevant service and more useful information, DASH is working to provide a system that is by the people and for the people. MT

MaaS Model Success:

DCTA's Lewisville Lakeway On-Demand Microtransit Service

DCTA replaced fixed route service with microtransit in January 2019 that provides flexible routes and on-demand scheduling.

By **Kayla Laird, contributor**



DCTA-BRANDED VEHICLES carry riders within the designated Lewisville Lakeway zone.

DCTA UTILIZES software from Spare Labs to not only provide on-demand service, but optimize this service, as well.

Photos by DCTA

WITH THE RISE IN DEmand for customized, on-demand mobility options, transit agencies across the county are turning to non-conventional and innovative solutions to improve access and mobility for passengers. Nearly 80 percent of commuters see public transit as the backbone of a lifestyle that includes current and future technologies, such as ride-hailing (i.e. Uber and Lyft), bike and car-share, autonomous vehicles (AVs), scooters and other future emerging innovations, according to a study by the American Public Transportation Association (APTA).

As commuter behaviors change and congestion increases, passengers want more seamless, integrated mobility and the Denton County Transportation Authority (DCTA) is adapting to this change. In January 2019, DCTA launched a new on-demand, microtransit service that provides real-time travel options for those needing to access the Lakeway Business Park area in Lewisville – one of DCTA's member cities – and surrounding businesses in the designated zone. This was one of the first times the agency launched a service of this kind with the goal to drastically improve access to an industrial park that has long been underserved by traditional transit.

Replacing fixed-route service with real-time mobilty options

For the past few years, DCTA's Lewisville Connect Route 21, which operates in a prominent business park area, had low-trending ridership and was not cost effective for the agency. DCTA's leadership team took the innovative approach of replacing the fixed route with microtransit service – a trending mobility option that fits within the Mobility as a Service (Maas) model profile that public transit agencies across the country are quickly adapting. This mobility option offers real-time flexible routing and scheduling of vehicles.

DCTA utilizes software from Spare Labs – a company focused on building shared mobility technology – which enables the agency to provide on-demand service for passengers to request a ride in real time and the ability to optimize service. Spare Labs is one of the firms that was selected by DCTA for its new MaaS contract model, which the agency's board of directors approved DCTA to move forward with in May 2019.

"Service innovation is a key priority for DCTA, and the expansion of our microtransit on-demand service in Lewisville is another way we can meet the changing needs of our riders by providing alternative, affordable and convenient modes of transportation that improve mobility for the many communities we serve," said DCTA CEO Raymond Suarez.

Like Uber and Lyft, DCTA-branded vehicles carry a handful of riders at a time within the designated Lewisville Lakeway zone. The vehicles have seating for 12 passengers and are accessible to passengers with a mobility device. The driver has an iPad enabled with GPS showing the shortest route to get passengers to their individual destinations.

The agency's Lewisville Lakeway On-Demand service costs the same as its standard fixed-route service and operates Monday through Friday from 5:30 a.m. to 10:00 p.m., and Saturdays from 8:30 a.m. to 9:30 p.m. Riders can book a trip in the Lewisville Lakeway Zone in real time via the Spare Rider mobile app, which can be downloaded from the Apple and Google Play store or by calling 940-243-0077. Payment is proven by showing the operator a Local Day Pass, AM/PM Pass, Regional Pass or a student ID when a rider boards the vehicle.

The Spare Rider mobile app or a DCTA customer service representative directs riders to the most appropriate stop for pick up and drop off locations. Passenger wait and travel times each average less than six minutes. The service includes a mixture of current physical bus stops, as well as virtual stops within the mobile app. In addition, the Lewisville Lakeway On-Demand zone includes DCTA's Hebron station which serves as a main rail hub to ensure seamless connectivity with the agency's transit system.

How DCTA and riders benefit from microtransit service

DCTA's Lewisville Lakeway On-Demand service was able to solve various challenges for passengers and the agency. One of the main advantages of the service is enhancing the passenger experience by operating a small-scale, on-demand vehicle that provides flexible routes and on-demand scheduling. Below are more ways DCTA's microstransit service is beneficial to the agency and passengers:

BENEFITS TO DCTA:

- Increased ridership in the area because of the flexibility of use and the feel of individual response.
- More cost effective to operate than traditional fixed bus route service.
- Spare Lab software gives DCTA drivers the ability to add a walk up rider and pool trips to ensure booked trips are shared to shorten rider wait times.
- Promo codes can be added to offer passengers free rides or discounts for marketing efforts.

BENEFITS TO RIDERS:

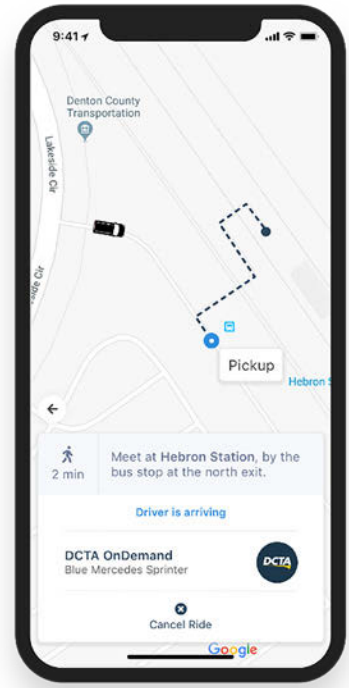
- Customer-friendly mobile app and trip scheduling process.
- Rider ability to book a trip on their own time and track their ride in real time.
- Direct link to other DCTA bus stops and A-train stations.
- Programmed banner announcements within the mobile app for a user to view that can be marked at priority level.

Innovative program leads to successful ridership and positive future outlook

In 2019, DCTA's Lewisville Lakeway On-Demand service carried just under 10,000 passengers in the designated zone with a monthly average ridership of 830 passengers. Within the first few months of the service, DCTA experienced an initial growth of 43 percent and waiting times went down 29 percent. In comparison, the previous Lewisville Connect Route 21 fixed route that served the area frequently showed lower ridership and was not as cost-effective per trip as the new microtransit service.

"There is a changing landscape in the public transportation industry," Suarez said. "Riders want different options beyond traditional fixed-route services and DCTA has become more flexible to meet our community's needs with more innovative mobility solutions."

THE ON-DEMAND service vehicles have seating for 12 passengers and are accessible to passengers with a mobility device.



RIDERS ARE able to track their ride in real time.

Last year, DCTA conducted its biannual Passenger Satisfaction Survey in which the agency received a total of 2,629 responses, which is equal to 20 percent of the average daily ridership for April 2019. Below are positive survey highlights of customer feedback of the agency's Lewisville Lakeway On-Demand service, including:

- 94 percent of respondents rated DCTA's Lewisville Lakeway On-Demand service as "excellent" or "good."
- 83 percent of survey respondents also said they would book a trip via a mobile app, making the possibility for growth accessible and accepted by the community.

Due to the service's success, the agency is considering a potential expansion in the future that could include a wider zone to include more businesses and residential areas in the Lewisville area that would positively impact the community.

"Our Lewisville Lakeway On-Demand service is the next step in DCTA's plan to explore newer, more cost-effective ways to provide service to its customers," Suarez said. MT

Kayla Laird is communications coordinator for DCTA.

BEST PRACTICES: ZERO-EMISSION FLEETS

- Renewable natural gas (RNG)
- Battery-electric technology
- Hydrogen fuel-cell technology

Going Green

Discovering what type of zero-emission technology is best for your transit agency takes time and research on topics such as infrastructure planning, charge management, route planning and driver and maintenance training.

Published by
MASS TRANSIT

Answering questions about zero-emission fleets

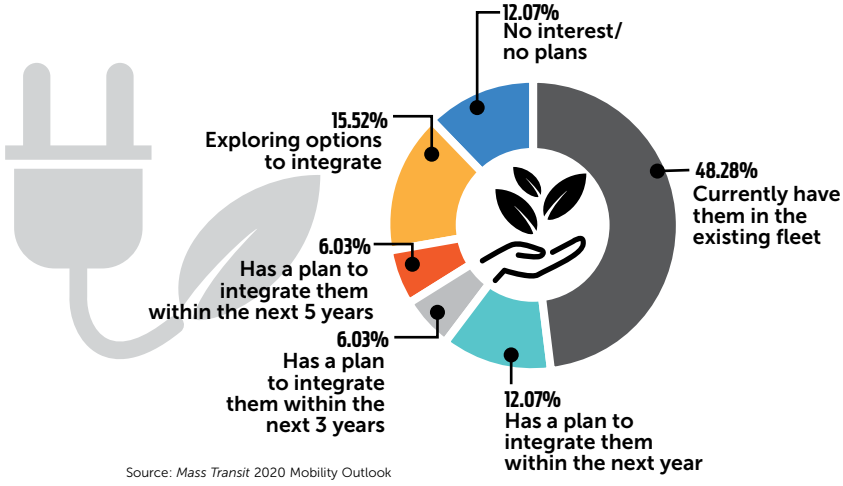
Many transit agencies today are interested in adding zero-emission buses to their fleets for a variety of reasons. A recent survey of our transit agency readers indicated more than 87 percent of respondents currently have low or zero-emission vehicles, have a plan to integrate them or they are exploring the options to integrate.

Different types of fuel and propulsion systems are being developed to achieve zero-emission public transportation, including renewable natural gas (RNG), battery electric technology and hydrogen fuel cell technology. Finding what type of zero-emission technology is best for your agency takes some time and research on topics such as infrastructure planning, charge management, route planning and driver and maintenance training.

Whether it's through a state mandate, an agency-driven plan or an effort to provide a more sustainable future, there are many elements for transit agencies to consider when looking to add zero-emission technology to their fleet. The articles in this supplement will help answer some of your questions as you transition to zero-emission technology for your transit agency.

Emily Guill, Publisher

Regarding low-emission and zero-emission buses:



Source: *Mass Transit* 2020 Mobility Outlook

For full *Mass Transit* 2020 Mobility Outlook report visit MassTransitmag.com/21124387

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CUTRIC is supporting research into electric and hydrogen bus simulation and modelling tools.

CUTRIC partners launch North America's first group of zero-emission bus research projects

The Canadian Urban Transit Research and Innovation Consortium (CUTRIC) has partnered with OCAD University, Ontario Tech University, Queen's University, the University of Windsor, Centennial College, York University and Canadian Nuclear Labs to create North America's first cluster of post-secondary institutions dedicated to researching battery-electric and fuel cell electric buses.

CUTRIC and its members are contributing a total of C$4.2 million (US$3.173 million) in funding over three years with an additional C$551,000 (US$416,390) through the federally-supported Mitacs Accelerate and Elevate programs to fund CUTRIC's National Academic Committee on Zero-Emissions Buses (NAC-ZEB). CUTRIC's NAC-ZEB research will allow federal, provincial and municipal governments to make better decisions when it comes to procuring and deploying zero-emission buses across Canada.

MassTransitmag.com/21125796

Los Angeles will see delivery of 155 electric buses in the next two years

The Los Angeles Department of Transportation (LADOT) is well on its way of converting its entire fleet to zero emissions by the 2028 Olympic and Paralympic Games with an order of 155 buses that will be put into service on its network in the next two years.

The buses are part of the largest single order for electric buses in U.S. history that was originally unveiled last fall. Most of the new vehicles will be BYD manufactured K7M buses, with Proterra manufacturing the remainder of the zero-emission vehicle order.

"The clean transportation revolution is not a distant dream — it's happening on L.A.'s streets right now," said Los Angeles Mayor Eric Garcetti. "Seeing these zero-emission buses rolling down our roads in the years ahead will bring us one step closer to realizing our vision of cleaner air, lower emissions, healthier communities and a more sustainable future for all Angelenos."

LADOT has ordered 155 electric buses.

MassTransitmag.com/21126694

OCTA debuts hydrogen fuel cell buses and nation's largest hydrogen fueling station

The Orange County Transportation Authority (OCTA) debuted 10 new hydrogen fuel-cell electric buses and, what it reports to be, the largest transit-operated hydrogen fueling station in the United States. Both are part of OCTA's continued sustainability efforts.

"We are very happy to be leading the way toward a cleaner and greener future that keeps the residents of Orange County moving, while keeping the air they breathe healthy with zero emissions," said OCTA Chairman and Mayor of Garden Grove Steve Jones.

In December 2018, the California Air Resources Board's approved a regulation that requires the state's transit agencies to transition 100 percent of their fleets to zero emission by 2040. OCTA is also in the process of purchasing 10 plug-in battery-electric buses, which are expected to be in operation beginning in 2021.

MassTransitmag.com/21123872

OCTA's fleet of hydrogen fuel-cell buses.

AVTA electric buses reach two-million-mile mark

The Antelope Valley Transit Authority's (AVTA) 49 electric buses collectively accumulated two million service miles on Dec. 24, 2019. The authority passed the one million service mile mark in May 2019. AVTA says the feat is a step toward its goal to become the nation's first all-electric bus fleet.

"Thus far, approximately 512,821 gallons of diesel fuel have been saved with the new battery-electric fleet. This equates to a net savings of $801,190 in fuel costs after paying for electricity,"

said AVTA Chairman of the Board Marvin Crist. "Even more impressive, those two million all-electric miles represent a carbon footprint reduction of more than 12 million pounds of CO2 and 29,063 pounds of particulate matter."

The buses are charged using wireless inductive charging systems. AVTA says the use of these technologies has created a smarter, greener and more interconnected transit system, which serves the Antelope Valley and areas extending south into the Los Angeles basin and north to Edwards Air Force Base and the Mojave Air and Space Port.

MassTransitmag.com/21121598

AVTA's electric buses have delivered a net savings of more than $800,000 in fuel costs.

CDTA introduces first electric buses in upstate New York

The Capital District Transportation Authority (CDTA) unveiled its first battery-electric buses, with plans to test the technology and charging infrastructure for the four zero-emission buses. The buses were unveiled at a Jan. 10 launch event with a demonstration ride.

CDTA will put the electric buses it purchased from New Flyer of America into service as part of a pilot program. The transportation authority will monitor the range, charging timelines, electricity usage and performance of the vehicles throughout its route network as it looks to expand in the future.

"We take pride in being a leader in innovation," said CDTA CEO Carm Basile. "These buses meet CDTA's goals to reduce the region's carbon footprint. They are part of a progressive platform for clean energy being advanced by Gov. Andrew M. Cuomo. These are exciting times and CDTA continues to be at the forefront of progress in New York State."

MassTransitmag.com/21121006

PSTA begins construction on first inductive wireless electric bus charging station on U.S. East Coast

The Pinellas Suncoast Transit Authority (PSTA) began construction for a new electric bus charging station at PSTA's transfer hub on 34th Street.

The new wireless charging station, with 250-kilowatt Inductive Power Transfer Technology, includes a primary charging plate aimed at reducing wait time for electric buses to be fully charged. PSTA's fleet of two electric buses, with four more expected in fall of 2020, currently charge by using a plug-in charger taking approximately four hours to fully recharge. This new technology would cut the wait-time by more than half.

"This innovative technology is one giant step forward for not only PSTA, but transit agencies across the nation. Being the first electric charging station of its kind in Florida sets the standard of transportation agencies becoming more environmentally-friendly," said Brad Miller, PSTA CEO. "At PSTA, we are committed to reducing our carbon-footprint while still providing the best service possible to our community."

MassTransitmag.com/21124698

Gov. Inslee visits Pierce Transit, discusses possibilities around electrifying public transportation fleets

Pierce Transit received a visit from Washington Gov. Jay Inslee on Feb. 4, where he talked with agency leaders about electric vehicle technology and the pursuit of electrifying the bus and vanpool fleets.

Joining the governor were Pierce Transit Board Vice Chair Marty Campbell, Pierce Transit CEO Sue Dreier, agency leaders and staff from the governor's office and Pierce Transit.

"Pierce Transit has long been a leader on environmental stewardship in public transportation, and these efforts continue their innovative work," Gov. Jay Inslee said. "This is just another example of how Washington is leading the way to a clean transportation system."

Pierce Transit says it already has one of the cleanest bus fleets in the nation, with about 80 percent of its buses running on compressed natural gas and another 15 percent being hybrid-electrics. Just eight percent of the agency's bus fleet runs on diesel, according to Pierce Transit.

Gov. Jay Inslee, second from left, during his visit to Pierce Transit.

MassTransitmag.com/21124909

Champaign-Urbana MTD expands zero-emission mobility with hydrogen fuel cell buses

The Champaign-Urbana Mass Transit District (MTD) has awarded New Flyer a contract for two zero-emission, hydrogen fuel-cell, 60-foot Xcelsior CHARGE H2™ heavy-duty transit buses (for a total of four equivalent units).

According to New Flyer, MTD is the first in the nation to commercially order 60-foot, zero-emission, hydrogen fuel-cell buses. The purchase, supported by the Center for Transportation and the Environment, continues to support MTD's 2014 strategic plan which includes a goal to deliver high quality traditional and innovative transportation services that are safe, reliable, environmentally responsible and user friendly. Since 1993, New Flyer has delivered 175 buses to MTD, and today its fleet is 85 percent hybrid.

MassTransitmag.com/21127452

CALSTART's Drive to Zero program launches online tool highlighting zero-emission commercial vehicle offerings

CALSTART's Global Commercial Vehicle Drive to Zero program (Drive to Zero) has launched an online tool aimed at cataloging models of current and upcoming zero-emission commercial trucks, buses and off-road equipment.

The publicly available platform, the Zero-Emission Technology Inventory (ZETI) tool, creates a foundation for better understanding this developing technology segment. Drive to Zero plans to expand the tool in the coming months into a global index of commercially available zero-emission commercial vehicles.

In addition to global vehicle availability information, ZETI provides users with granular data for current and known future offerings including weight/class, estimated payload/passenger capacity, driving range and energy storage capacity. A timeline feature offers users a sneak peek at new model availability data indicating where and when new models will debut on a commercial scale.

MassTransitmag.com/21128114

Electric Buses – the Time is Now

HASTUS Software Assures Smooth, Efficient Deployment

Electric buses are no longer the wave of the future – they're here and now. To deploy them successfully, transit agencies and private operators must handle new constraints and their implications for planning, scheduling and operations.

How long and over what distance can a bus operate between charges? How long does charging take and where can it be done? How does incorporating electric buses impact on fleet size? These are just a few of the questions to address for optimized service with battery-electric buses. They mean that new approaches to managing depots and resources are required to continue meeting riders' service-quality expectations.

Pioneering agencies deploying electric buses, such as Foothill Transit, are using GIRO's *HASTUS* software to meet these challenges.

The *HASTUS* tools for electric-bus planning, scheduling and operations have been showing their worth at agencies in North America and Europe since 2016, achieving considerable savings when optimizing service. Planners can explore what-if scenarios based on different electric-bus types, charging stations, route topology and operating conditions. Schedulers can optimize schedules and ensure a robust and operable solution by considering vehicle range along with the timing and location of charging activities and the use of multiple charging technologies. Efficient operations flow from new approaches to vehicle assignments, dispatching and yard management, responding to range constraints and daily changes.

Developed in collaboration with bus manufacturers, industry experts, and transit agencies and authorities, the proven tools in *HASTUS* for efficient electric-bus scheduling and operations are the leading-edge solution to manage the transition to zero-emission transit.

If there's one thing Americans agree on, it's clean air

By Frank C. Giradot, Jr.

One state, two states, red states, blue states. Let's face it, across the USA, it's often difficult to find agreement.

In Michigan, that soft drink you're having is probably called a "pop." But, if you had that same drink in California, you'd call it a "soda," while in Georgia, it would be a "coke."

Despite our regional differences, it is safe to say we can all agree that our cities would greatly benefit from implementing cleaner and quieter methods of mass transportation over the next two decades.

House Transportation and Infrastructure Chairman Peter A. Defazio said he will push for a "transformative" infrastructure bill that will aim to eliminate carbon emissions from mass transportation, to make renewable fuels more available to airlines and to increase transit options, including rail.

That said, it hasn't been easy to get traction in Washington DC.

Bills like those sponsored by Sen. Bernie Sanders, D-VT, and Rep. Alexandria Ocasio-Cortez, D-NY, touting a "Green New Deal" have so far failed to gain traction. When it comes to climate resiliency, emission reductions efforts have been rolled back or phased out in recent years. That's left the impetus for change largely in the hands of states and local communities.

It turns out that the recipe for success of a Green New Deal may largely depend on a two-part formula: determining who is making the rules and what works best for any given community will be critical.

In California, the task has largely been guided by legislation that requires the state to be carbon neutral by 2040. It means that transit agencies must begin planning their futures now. Everything from new infrastructure to reconfiguring of traditional bus routes is on the table.

With the 2028 Olympics just around the corner, the Los Angeles area is leading the way. Mayor Eric Garcetti recently announced that the city's Department of Transportation had placed the largest order for electric buses in U.S. history — getting 130 buses from BYD, which will be built in Southern California and delivered over the next two years.

Nearby, the community of Pasadena plans to announce this spring that it will have the largest collection of EV chargers anywhere in the nation. It's a game changer.

Los Angeles World Airports (LAX) is making clean history of its own, purchasing 20 60-foot articulated buses from BYD that will begin to service the vast LAX terminal complex later this year.

Other states are taking the cues, but modifying the plans in ways that make sense for residents and businesses.

In New Jersey, an Energy Master Plan that includes seven key strategies and a greenhouse gas reduction plan to make the Garden State 100% reliant on "clean energy" by 2050 was put into motion by Gov. Phil Murphy in January.

It's going to take some work for our nation to become carbon neutral and resilient as climate change becomes an everyday reality. Mass transit agencies will play a huge role in the battle, shaping Green New Deal policies and implementing them.

The roads to climate resiliency in California, Georgia and Michigan may look different from this vantage point. But in the end, it won't matter if people talk about it differently in different parts of the country. Just like coke, pop or soda — it's all good.

Frank C. Girardot, Jr. is Senior Communications Director for BYD Motors, LLC in Los Angeles California.

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K9S | 35' TRANSIT

K9 | 40' TRANSIT

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C6 | 23' COACH

C8 | 35' COACH

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C9M | 40' COACH

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C10MS | 45' DOUBLE DECKER

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Understanding the requirements of electric vehicles

There are many challenges associated with electric vehicle implementations, but they typically revolve around three areas: range, planning and charging. Understanding the specific challenges you face will help you be prepared. Your goal is to implement an end-to-end solution that covers adapted operational information systems as well as additional new applications.

Charge management

The most important factor when operating electric vehicles is to monitor the current state of charge (SoC) because the actual range of electric vehicles is significantly harder to predict than of vehicles with conventional combustion engines. The route profile, traffic jams, passenger loads, the need for air conditioning or heat, and above all, the driver's individual driving style have a direct impact on total energy consumption.

A reliable charge management system provides predictions of future energy consumption, monitors charging processes, and ensures appropriate charge management and balancing to avoid expensive peak loads.

Range prediction

Range limitations and susceptibility to fluctuation are widely regarded as particular weak spots in e-mobility. Hence, it is not only important to monitor charge levels while vehicles are en route but also to calculate their remaining range as accurately as possible.

You need a range monitoring tool that monitors charge levels while vehicles are en route and also calculates their remaining range as accurately as possible. It should use historical operational data from the energy consumption analysis system combined with state-of-the-art machine learning algorithms to generate a model for an individual vehicle's battery consumption for specific sections of a route.

Smart planning

When integrating electric vehicles to a fleet, agencies must start with planning. An innovative planning tool for e-buses allows you to simulate scenarios using your specific vehicles, charging station types, passenger loads and various temperature ranges. A robust software platform will deliver the most economical plan for helping you implement electric vehicles into your fleet.

Carefully comprehensive

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Transitioning to Zero Emission Technology with WSP

By Cliff Henke, John Drayton, Alva Carrasco and Jim Wensley

In the midst of abundant scientific evidence suggesting that carbon emissions are changing our climate in ways that will damage the environment and create economic distress, public demand for a transition to a zero emission (ZE) world is placing the burden on the shoulders of governments and private businesses around the globe to address this crisis by adjusting their operations.

Public and private transit agencies find themselves on the front lines of this global transition, due largely to their significance and visibility in the everyday lives of people, the extent of government control in many countries, and the industry's legacy of fossil fuel consumption. Accordingly, governments worldwide are focused on the transit industry, embracing a transition to zero emission vehicles (ZEVs) as part of concerted efforts to meet broader climate change mitigation targets. This focus requires coordination and collaboration between numerous stakeholders, including transit agencies, governments, utilities, manufacturers, service providers, and climate activists, with each stakeholder facing a broad range of new challenges in the increasingly cooperative quest to plan, manage, and finance a large-scale transition to ZE technology.

Hundreds of thousands of ZEVs, both battery electric and fuel cell vehicles, are already in service in cities around the world, transporting millions of passengers on a daily basis. Lessons learned from those early adopters go a long way to helping advance the state of-the-art, which continues to evolve at a rapid pace. The emergence of new and more affordable technologies, refined business models, clearly defined policies and legislation, and flexible financing options together contribute to a set of more comprehensive and implementable options for addressing the many challenges of large-scale ZE technology adoption.

Changing the mechanisms by which public transport is delivered and supported can be challenging given the 24/7 nature of transit operations but transitioning to zero emission can be accomplished with careful planning, a comprehensive approach, and expert advice. While early adopters, including several major metropolitan areas, may have greater resources and capacities to move forward with their transitions ahead of smaller urban and rural markets, the latter will benefit in the long run from greater economies of scale, stabilized pricing, and the availability of tested infrastructure and energy solutions.

Harnessing the collective expertise and experiences of its professionals around the world, WSP has prepared a white paper as a blueprint designed to help prepare transit providers for the many challenges ahead, and to highlight areas where expert guidance can help pave the road to a smooth transition. This paper captures the broad complexities of the ZE transition by focusing on four major elements of ZE technology adoption:

1. **Planning** – Accomplishing large-scale adoption requires visionary planning across all phases and all elements of the technology transition.

2. **Procurement** - A broad systems-perspective approach is needed to the procurement process, ensuring interoperability between vehicles, charging systems, and power supplies.

3. **Energy** - One of the most critical components of large-scale Zero Emission technology adoption lies in the ability to secure sufficient, cost-effective, uninterrupted energy to fuel ZE fleets.

4. **Change management** – Transit providers must recognize that managing organizational change; including service planning, scheduling, operations, maintenance and labour, is a key component of any strategy to advance zero emission technology adoption.

Visit wsp.com/zero-emission to download the white paper.

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AWARDS

WHO'S YOUR TOP CANDIDATE?

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ACHIEVEMENT IN HIS OR HER POSITION INNOVATION IN THE FIELD

Featured in the September/October issue of the magazine, **40 Under 40** highlights innovators who demonstrate leadership and a commitment to impacting transit.

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Nominees must be 39 years old or younger as of July 1, 2020, to be eligible.

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UAV Applications *Takeoff*

While the technology is there, regulations are struggling to keep up, creating a need for experts in both railroad operations and rules associated with the use of unmanned aerial vehicles.

By **Megan Perrero, assistant editor**

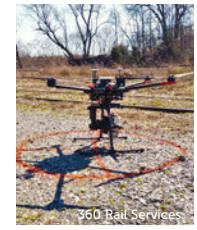
UNMANNED AERIAL VEHI-cles (UAVs) have numerous applications for the rail industry, ranging from track inspections and mapping to detecting trespassers and creating a safer right-of-way. But a successful application requires sound engineering, sound planning and a working knowledge of rules and regulations from multiple federal agencies, including the Federal Railroad Administration (FRA) and Federal Aviation Administration (FAA).

With this in mind, private firms such as 360 Rail Services and Zephyr Rail and regulators, such as FRA, have worked to ensure UAVs fit into solutions that not only gather needed information but ensure safe operation.

Applications to help with maintenance

When it comes to track inspections, 360 Rail Services starts off with understanding what the client needs and where the latest inspections have taken place. From there, the company obtains authority from the necessary supervisors and operational entities and then facilitates a safety debrief meeting – all before the UAV is granted liftoff.

"It's not something where we just throw a drone up in the air and get going," explained Peyton McCain, marketing manager, 360 Rail Services. "There's a lot of planning that goes into it initially to ensure there's the maximum amount of safety possible."


360 Rail Services

360 RAIL Services custom built the payload that is attached to its UAVs.

Once the safety and planning procedures are put in place, the company sends the UAV into the air and flies it over the center line, which can be done on any given track. As the drone flies over the tracks, it collects high resolution imagery, as well as "highly accurate GPS information and highly accurate altitude information," McCain explains.

"This gives us a data set we can feed into an artificial intelligence [program] that will go through and identify a wide range of track defects," McCain said. "For example, because we can so accurately calculate the position in altitude, we can provide gage within a one-eighth of an inch."

Instead of solely relying on a human to walk the track for inspections, a UAV automates this process with machine analysis and acts as a supplemental tool to help mitigate human error. In addition to gage, the UAV can also capture a range of track defects such as tie grading; the presence of or lack of fasteners; if tie plates are cutting in; and track geometry. The company is currently working on using UAVs to assess switch points.

For the artificial intelligence to complete a track assessment, it needs accurate data and high-resolution images. This required 360 Rail Services to build a custom payload – a combination of a computer, an oximeter and a camera – to be attached to the drone. The oximeter, how the altitude is calculated accurately, talks to the camera, that then talks to the computer integrated into the payload, which ultimately talks to the drone and is how the data is captured while the UAV is in flight. The data is then uploaded to the cloud-based artificial intelligence program for assessment.

The artificial intelligence program can accurately pinpoint defects because it was trained over thousands of pictures across hundreds of miles of track, McCain explains. The program was then trained to recognize what would

be considered a defect, such as broken ties, cracked joint bars and wide gage.

"That way we can really be confident in looking at [the data] and having it say this is a defect, this is not a defect," McCain said. "We've done a significant number of ground walkthroughs to go back and say, yeah there's not a false positive, there's not a false negative."

Once the dataset has been compiled, there's a way to screen by defect and by track classification, explains Larry Stockton, CEO 360 Rail Services.

"We're able to filter out some of those defects that may be applicable to a Class 5 track but not applicable to a Class 1 track," Stockton said.

Once the dataset has been compiled according to the clients' needs, 360 Rail Services sends the client a digital folder they log into where they can see a list of the defects. McCain notes this includes a map of the photo so the clients can easily locate defects. Instead of having someone manually scan the tracks, they can send someone to the exact coordinates of where the defect can be found, while also already knowing what the nature of the defect is.

"The intention is in the future to provide a customer portal that will allow them to look at current inspection and past inspection for their specific tracks, and be able to relate that to where problems are starting to come up," Stockton said.

Is a UAV really the best solution?

Marc A. Cañas, vice president and a founder of Zephyr Rail, agrees it's more than flying a drone in the air to capture data, noting there are multi-levels and multilayers at play with technology and regulation that need to come together in order to get a usable and accurate end product.

"It takes a lot of sound engineering and judgement and our years of railroad engineering experience, where we take the information and see if the application of the drone is correct or not," Cañas said.

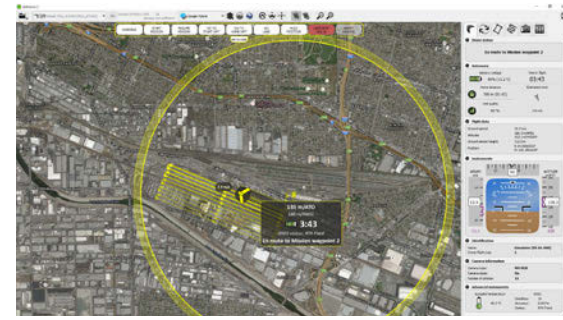
Zephyr Rail was established in 2015 and provides engineering and construction management services. The company's founders first started working with UAVs in 2013 to solve a workflow problem, Cañas says. Specifically, when it came to mapping, the company needed a solution that provided more control, higher resolution and closer-up details for a project it was working on at the time.

"As soon as everybody understands what we can do with drones, they become an [important] piece for workflow in not only engineering but also in workflow for construction management," Cañas said. "So, we rolled them into our regular project cycles and we use them to enhance either design or inspection or construction management. It's really another tool in our toolbelt."

While UAVs are a great tool, it's important to understand when it's an appropriate application. This usually comes down more to regulations than the technology being able to perform the task, such as restrictions on where people can fly UAVs. For instance, operating a UAV in a controlled airspace, such as an active airport, wouldn't be the best solution due to FAA regulations.

"That is not a good spot for a drone because the logistics of being able to get permission to fly in close proximity to an airport because of the controlled airspace issue makes the tool unusable," Cañas said.

Another thing to consider is the time of day when the UAV will be used. When performing mapping or inspection services, the UAV needs to capture video or photos, which requires light. If flying at night, not only is there a lack of light to capture quality images and videos but the FAA also requires a waiver to fly at night. Even if the technology is applicable, it comes down to regulations when considering if a UAV is the correct solution.



A SCREENSHOT of the piloting platform used to monitor a UAV's flight path.
Zephyr Rail

> **"We** need something to keep going forward, otherwise that technology is going to die off or it's going to be over regulated. It's up to us who are in this industry to work with the regulators as much as we can to come up with a middle ground that is going to work."
>
> **-MARC. A.** Cañas, vice president and a founder of Zephyr Rail,

"Usable is not always the only litmus test; you have to go beyond that," Cañas said. "You have to have a working knowledge of what the rail operation requires versus what the air operation requires and how you meld those two together using sound engineering and construction management and inspection experience to bring that together. And then come up with a deliverable with what the client is really needing."

UAVs bring an added level of safety at FRA

Construction management and engineering projects aren't the only applications for UAVs. FRA is testing UAV applications concerning safety, such as evaluating UAVs' effectiveness in detecting trespassers along the railroad right-of-way and creating accurate grade-crossing profile data.

FRA worked to determine the effectiveness of using UAVs to detect trespassers along the right-of-way in partnership with the Brunswick, Maine, Police Department (BPD), explains Francesco Bedini-Jacobini, general engineer, Train Control and Communications Research Division, the results from this project will be published in an upcoming technical report. FRA is also funding Michigan Technological University's (MTU) study using UAVs with artificial intelligence and machine learning techniques to provide real-time detection of railroad trespassers.

"In the BPD project, a UAV was flown at certain times of the day and the camera mounted on the vehicle would transmit video to the operator, who in turn would

take the appropriate action," Bedini-Jacobini said. "In ongoing research, FRA is looking into developing an autonomous method of warning the appropriate authorities of a trespass event as it occurs on a right-of-way. These objectives are part of the research project with MTU."

In another study, FRA explored the use of UAVs to produce accurate grade-crossing profile data. The results were promising, proving that the photogrammetry method produces acceptable results while being more cost effective than the light detection and ranging (LiDAR) method, says Cameron Stuart, general engineer, Track Research Division. Currently, there are two projects exploring how UAVs detect and measure humped grade-crossing conditions while detecting and locating signage and other appliances related to the grade crossing area, Stuart adds.

"Eventually we would like to mature this technology to the point where it can supplement the LiDAR system currently deployed on track-bound vehicles," Stuart said. "Ideally, the UAV-based technology would be adopted by railroads and state departments of transportation to increase the efficiency of grade crossing inspection operations."

While this application is still being tested, the current projects are progressing successfully, notes Stuart.

UAVs and the benefits they provide

Whether it's executing a track inspection, creating an aerial mapping or detecting trespassers along the right-of-way, UAVs provide useful benefits.

DATA COLLECTED by a UAV can be imported into an AI program that can pinpoint track defects.

For example, during track inspections or construction projects, UAVs can pull people off the track and minimize exposure to possible safety incidents. And UAVs allow service to continue as normal.

But while the technology is there and the benefits are proven, regulations still need to be considered, especially because technology is outpacing regulation, explains Cañas.

"Regulation is trying to catch up, but as soon as it [does], the technology is already advancing beyond that, so it's going to be a never-ending race," Cañas said. "We need something to keep going forward, otherwise that technology is going to die off or it's going to be over regulated. It's up to us who are in this industry to work with the regulators as much as we can to come up with a middle ground that is going to work." MT

Managing the Mix

In the first of a two-part series looking at mixed bus fleets, three agencies outline how their strategies and best practices ensure service levels are maintained as they move through their fleet transition plans.

By **Mischa Wanek-Libman, executive editor**

TODAY'S TRANSIT FLEETS consist of vehicles powered by a variety of different systems. The transit industry's focus on sustainability makes the evaluation of battery-electric and hydrogen fuel-cell buses an inevitable outcome while the availability of federal grants for low and zero-emission buses provides funding to aid in the exploration of these and additional technologies. Further pushing the fleet transition are local and state mandates, such as the California Air Resources Board's (CARB) approval of a regulation in December 2018, which sets a statewide goal for public transit agencies to gradually transition to 100-percent zero-emission bus fleets by 2040. Solano County Transit, Orange County Transportation Authority and Foothill Transit are three of California's transit providers working to meet this deadline.

While a fleet's mix can impact how a system manages its operations, it should not impact the service provided. Ultimately, riders want to reliably arrive at their destinations and do not care if the bus that takes them is powered by diesel, compressed natural gas (CNG), batteries, hydrogen fuel-cells or other systems.

SolTrans

Solano County Transit (SolTrans) currently has a fleet that is 44 percent non-diesel vehicles. SolTrans' local service fleet consists of four battery-electric buses, two of which are newly deployed, one CNG bus and 21 diesel-hybrids. It has two CNG and 12 unleaded gas paratransit vehicles and its SolanoExpress fleet contains 16 CNG buses with three additional buses set to join the fleet in summer 2020.

"Our preparation for transition began years prior to our first bus purchase," said Mandi Renshaw, Program Analyst II for SolTrans. "[California] was proposing greenhouse gas emission reductions due to climate change and we knew that we needed to start replacing our diesel commuter buses."

Renshaw says SolTrans hired a consultant to assist with the development of a long-range plan and the agency created a fuel roadmap to first transition its commuter fleet from diesel to CNG and then to electric buses.

"The hybrids used on the local fleet are not due for replacement until 2023, this allowed us to transition to an all-electric local fleet a few buses at a time," said Renshaw. "The board approved the roadmap in February 2016 and we started the implementation immediately by constructing

a CNG fueling facility."

Following the completion of the CNG fueling project, SolTrans began researching electrical infrastructure and met several times with its local utility, Pacific Gas & Electric (PG&E). SolTrans signed a contract with PG&E to participate in its Fleet-Ready Program (the program name at the time) in which PG&E will construct, own and maintain all electrical infrastructure from the supply to the customer's meter.

"We commissioned a preliminary study to determine the electrical load required and the estimated cost," said Renshaw. "We are now in the process of selecting an Engineering Design firm who will interface with PG&E and complete the final design of the charging system to support 60 battery electric buses and 20 electric paratransit buses by 2032."

While SolTrans describes its transition of its fleet as relatively new, it is developing standard operating procedures including operator training on the new vehicles to optimize performance. Renshaw explains training begins with the bus manufacturer to train the trainers on site on all features and maintenance of the buses. Additionally, SolTrans and its contractor use CAD/AVL systems to monitor all buses, regardless of fuel type, and track route performance measures against SolTrans' benchmark.

"We are looking forward to building out our real-time performance monitoring capabilities as more electric buses come online and provide us with a more regular data set for daily tracking," said Renshaw. "Additionally, we have hired a local consulting firm that specializes in electrical usage to monitor our charging system, which entails programming when buses should be charged to ensure they are ready to use when needed but charged at the most cost-efficient time based on our utility rate."

Renshaw notes that as the agency becomes more familiar with the operational characteristics of battery-electric buses, she expects SolTrans to add key performance indicators, such as energy efficiency by operator per mile/service hour and charging schedule adherence, to measure parameters specific to electric buses.

To accommodate the distances different types of buses can handle, SolTrans has been updating its blocking strategy and building in-route changing opportunities to increase range, which Renshaw anticipates will be revisited annually as the fleet composition changes and the agency begins replacing its local fleet of diesel hybrids with battery-electric buses. One element the fleet transition has not impacted has been the overall spare ratio, but Renshaw says SolTrans is monitoring the real-world operational range of the electric buses to make informed decisions about the bus replacement schedule and the potential need for fleet expansion to maintain service levels.

Renshaw notes that the decision to purchase two buses early allowed SolTrans a learning opportunity about operating battery-electric buses.

"The amount of research we did to prepare for this transition also made us ready to apply for funding as it became available," she said.

In the April/May issue, Part 2: Maintaining the Mix

FOOTHILL TRANSIT currently has a fleet that includes 33 battery-electric buses and 340 CNG buses.
Foothill Transit

OCTA

The Orange County Transportation Authority (OCTA) made news in early February when it debuted 10 new hydrogen fuel-cell buses and, what is reported to be, the largest transit-operated hydrogen fueling station in the United States.

"The introduction of hydrogen fuel-cell buses is part of OCTA's ongoing effort to use the latest in zero-emission transportation technology for a balanced and sustainable transit future," explained CEO Darrell E. Johnson. "We are proud to be working with all our partners to set a strong example as a large urban transit operator making a positive impact on the environment."

OCTA retired its diesel-engine buses from service several years ago and in addition to the new hydrogen fuel-cell buses, 500 CNG buses make up OCTA's 510-vehicle fleet. The authority also expects to introduce battery-electric buses to its fleet in late 2021 and is in the process of procuring 10 plug-in battery-electric vehicles.

While Johnson says OCTA is in the beginning stages of operating a mixed-technology bus fleet, he points to a two-year demonstration project, funded through a state grant, to operate a hydrogen fuel-cell bus as providing ample preparation.

"The demonstration program allowed us to test the technology across Orange County and to learn from how it performed in a variety of conditions and on various routes," said Johnson. "We learned a great deal from that program and found, over time, that a hydrogen bus could deliver the range and reliability that maintains the high level of service that our bus riders have come to rely on."

Johnson reports the hydrogen fuel-cell buses can achieve up to 300 miles per day, which meets the demands of OCTA's fixed-bus routes.

OCTA coach operators are receiving specific training to better understand how the hydrogen fuel-cell buses operate and techniques on throttling and braking that can help achieve maximum efficiency with the new technology. Johnson says all of OCTA's more than 600 coach operators will be trained to drive the fuel-cell buses, but notes the transition has been smooth due to the similarities between the new fuel-cell buses and current fleet of CNG buses, which were both manufactured by New Flyer.

A SOLTRANS bus refueling at a CNG station.

> **"The** amount of research we did to prepare for this transition also made us ready to apply for funding as it became available."
>
> **MANDI RENSHAW,** SolTrans

OCTA has developed a system of metrics and is at the beginning stages of analyzing data, including overall range, miles per kilowatt hour, cost per mile and amount of downtime for maintenance. Johnson expects the type of data collected will evolve over time and will be compared to OCTA's CNG fleet to ensure peak performance.

"Fortunately, having a hydrogen fuel-cell bus for a two-year demonstration helped work out many of the early questions that we had about operations and reliability before we introduced more fuel-cell buses into our fleet," said Johnson.

Foothill Transit

Foothill Transit began its transition to electric vehicles in 2010 and currently has a fleet makeup that includes 33 battery-electric buses and 340 CNG buses. Of the 33 battery-electric vehicles, 16 are fast charge buses with the remainder being extended range 440 kilowatt-hour buses.

The current fleet of electric buses is split between Foothill Transit's two bus yards with the fast charge buses at Pomona and the extended range buses at Arcadia, where the agency recently completed installation of 13 plug-in chargers.

Roland Cordero, director of Maintenance and Vehicle Technology at Foothill Transit, has been involved with the agency's transition from the beginning and has experienced the evolution of the electric buses.

"The technology is really changing the way we look at the type of vehicles we are able to deploy in terms of providing public transit and in helping develop a sustainable system that will help the communities we serve," said Cordero.

Foothill Transit will meet the state-mandated deadline to transition its fleet to zero-emission by 2040 and hired Burns & McDonnell to develop an electrification roadmap and analysis to incrementally build the infrastructure to support that transition.

Burns & McDonnell completed its report in September 2019, which included evaluations of several variables including bus routes, the number of stops, passenger loads, topography, temperatures and others to determine the energy needs required to operate electric buses.

Felicia Friesema, director of marketing and communications at Foothill Transit, explains the deep dive provided in the report helped with the logistics and planning necessary for charging a larger electric fleet.

While the report provided needed information to plan for a fleet transition, it also shed light on the cost of that transition, which Cordero explains, didn't just grab his attention, but also the attention of top leadership at Foothill Transit.

"What stood out was the cost of the infrastructure and all the construction related costs to install chargers at our bus yards. It was an eye opener," said Cordero.

Friesema added, "One of the things that this report from Burns & McDonnell prompted us to do was to look at what our alternatives might be. We're now conducting research, looking into hydrogen

fuel-cell vehicles as a possible alternative to the battery-electric buses that would still allow us to meet our zero-emissions requirements. We haven't issued any procurements or made any decisions about that yet, but that research and investigation is ongoing."

In addition to the report, Foothill Transit has been working closely with its electric power provider, Southern California Edison. Cordero says the power company has been able to help Foothill Transit with the design, installation and construction of grid connections, as well as assisting in the development of electric bus rates through the utility's Charge Ready Transport Program.

"Partnership with the utility company is very important. I don't think any transit agency will be able to move forward with a project without getting the utility companies involved," explained Cordero.

For the electric buses already in service, Foothill Transit utilizes a telematic system from Viriciti to monitor bus and bus operator performance.

"We have an expectation of what the efficiency is supposed to be and monitoring the performance is an important part of operating a battery-electric bus," said Cordero. "We're able to monitor in real time how much energy is being used when a bus is being driven, when it's idling, whether its charging at a charging station, how much energy is being charged back and how many miles of range remains."

One aspect that Foothill Transit is not looking to change as part of its transition plan is its spare ratio.

"Our approach in terms of taking in new technology is that it should not make our life more complicated," said Cordero. "Whether it's a battery-electric bus or a CNG bus, it's a bus we provide regular service with and there are no additional elements to add, like increasing spare ratio, because that means it doesn't fit our business model."

> **"We** learned a great deal...and found that a hydrogen bus could deliver the range and reliability that maintains the high level of service that our bus riders have come to rely on."
>
> **DARRELL E.** Johnson, OCTA

Friesema added that not only should technology not complicate agency operations, but it shouldn't negatively impact riders either.

"Customers care if they're getting from Point A to Point B safely and reliably. If we're deploying an electric fleet and we're experiencing breakdowns or we're running out of charge or otherwise not providing the service that they expect, then we've failed," explained Friesema. "I think one of the things we definitely got right with incorporating this interesting and new technology was seamlessly making it part of how we do business in our region." MT

Targeted Advocacy

No one can tell the transit industry's story better than those who work in it everyday.

Success at the ballot box means light rail moves ahead in Phoenix

By Scott Smith
CEO, Valley Metro

PHOENIX, ARIZ. ▪ Proposition (Prop.) 105, a 2019 ballot initiative in Phoenix, Ariz., that would have stopped light rail in its tracks, went down in flames by a margin of 63 percent to 37 percent. As a result, the planned extension of light rail continues with at least 22 more miles of light rail being added to the existing 28-mile system.

Even though voters in Phoenix overwhelmingly approved light rail three separate times in 2000, 2004 and 2015, expansion was being targeted by a local anti-light-rail group, as well as outside influences (aka dark money).

In November 2018, an initiative was filed with the city of Phoenix to amend the city charter to terminate light-rail extensions or any other fixed rail line transit system in Phoenix. Ending light-rail expansion would have serious impacts on the regional public transit system.

The initiative, if passed, would have terminated the construction of all Phoenix light-rail extensions, including work that had already begun on a 5.5-mile line in the city's most culturally historic area. In the past, South Central Phoenix has felt marginalized, if not ignored, in how the city has developed. Light rail is viewed by some as finally giving this often-neglected community its fair share of investment. Besides providing access to higher education and jobs, light rail brings new infrastructure investments including streets, underground utilities and landscaping.

The anti-light-rail proponents also stated that by approving the initiative, dollars to fund light rail would be transitioned over to repair city streets. However, funds from a 2015 voter-approved transportation initiative in Phoenix were enough to pave streets and expand transit.

Months before the August vote, misinformation about Prop. 105 and light-rail expansion proliferated through media and social platforms. Adding to the confusion, a "yes" vote meant an end to light-rail expansion while a "no" vote meant light-rail expansion would continue as planned.

To combat the deception, Valley Metro launched a multi-pronged education campaign targeting key demographics. Recapping rail's 10-year impact to the region, the Quality of Life report (valleymetro.life) was the foundation for developing content to demonstrate the positive impact of the region's investment. Tactics included a digital media buy with organic video testimonies, a light-rail, corridor-specific workforce development initiative for middle and high school students and high-profile community engagement programs.

After defeating Prop. 105, Phoenix Mayor Kate Gallego summed up her support of public transit and light rail in the nation's fifth largest city:

"We are a global city where students, families, visitors and people of all ages and abilities can have assured access to a multi-modal transportation system that connects every corner of our community. Light-rail expansion is not stopping--not today, not tomorrow. This campaign was never about one track of rail. It was about equity for our entire city and voters delivered on that promise."

➲ Read the complete response at MassTransitmag.com/21127849

The importance of the private sector's role in transit industry advocacy and how members can get involved

By Ray Melleady
USSC Executive Vice President, APTA Executive Board Member, APTA RCA Council Chair

EXTON, PA. ▪ Currently in Washington, D.C., there is growing bipartisan interest in advancing the surface transportation reauthorization bill that will fund public transit and highways for the years to come. Business members play a vital role in advocacy efforts for public transportation. The American Public Transportation Association (APTA) Business Member Board of Governors (BMBG) has worked closely with APTA staff and members on reauthorization recommendations and through targeted advocacy efforts that are focused on addressing the shortfall in revenues that support public transportation.

In 2019, this advocacy effort included focus on U.S. Senators in 10 states. The basis for selection was senators with senior committee assignments who have decision authority over transit-related legislation. This outreach included 400 business members

Efforts focus on U.S. Senators in 10 states and include 400 business members representing 266 companies.

representing 266 companies with private sector jobs in the targeted states. Formal letters from these business members and companies with dozens of signatures to each respective senator

were followed by direct visits in Washington and state offices. In the end, each of these senators understood the connection between public transportation investment and private sector jobs. Of the 20 senators included in this effort, only three voted "no" on the Jones-McSally amendment. The amendment protected transit agencies from a $1.2-billion cut to funding in Fiscal Year 2020. In advocacy, progress is incremental.

Building from this effort, in 2020 the BMBG Legislative Committee has identified six states that will be the focus for reauthorization advocacy and where there was a "no" vote on the Jones-McSally Amendment. It is our belief that direct efforts from the business community will favorably influence future transit-related voting. In other words, this is a focused effort by the business community to connect the dots between transit-related programs and private sector jobs within each respective state and especially those states with ranking members on key committees.

Using APTA's Public Transportation Industry Footprint Tool https://www.apta.com/research-technical-resources/industry-footprint/, the BMBG identifies all business members within the targeted states along with a champion to coordinate written communication and in-person meetings with members of Congress. Advocacy efforts will be scheduled during the APTA Legislative Conference in March followed by the Business Member Fly In scheduled for June 3, 2020. The objective of this outreach is to ensure that members of Congress and their staff understand the connection between public transit funding and private sector employment.

Our primary goal as APTA business members is to facilitate the growth of long-term, sustainable and reliable funding for public transportation in the United States. To that end, the BMBG is laser focused on efforts to secure votes in support of pro-transit legislation. The BMBG is a powerful player in advocacy because we are collectively stronger than any individual company and we have an obligation to support the industry from which we all benefit.

Business Members Get Involved

- APTA Legislative Conference, Washington, D.C.: Sun, March 15 – Tues, March 17
- APTA Business Member Fly in Washington, D.C.: June 3

Want to understand public opinion? Here's how data can help

By Scott G. Wilkinson
Founder, AlphaVu

WASHINGTON, D.C. ▪ Public opinion changes with lightning speed, so it's vital you have access to data tools for understanding and affecting public perceptions on a minute-by-minute basis. Fortunately, developments in the neuro and social sciences have given us better insights into human decision making than ever before. This means we have quickly improving measurements to reveal what the public believes and why. Here are a few quick tips to consider when making sure opinions in your market are covered.

1. Pay attention to the non-representative groups. These are small, vocal and active communities. Though often too small to be picked up in a telephone poll, these groups drive media narratives and perceptions of elected officials and other important community stakeholders. It's a mistake to overlook or ignore them as they're often indicators of nascent but growing public opinion. You've no doubt seen these groups online, where they organize most often. You can use Social Network Analysis (SNA) techniques to measure their impact so you know how best to inoculate the public at large from their influence.

2. Use methods to accurately test opinion and message receptivity in real time. The ever-changing opinions and media cycles make it imperative you take the public's opinion temperature on a day-to-day basis. A good place to start is by integrating sentiment metrics (machine learning based sentiment is the best). Trends in positive or negative sentiment among segments of the public who are engaging with you, or are talking about relevant topics, will give you a sense of what is trending over time.

3. Use data that reveals the realities of human decision making. Like it or not, emotion is the overwhelming driver of decision making, no matter how rational we think we are. Knowing this, we should regularly incorporate metrics that reveal what emotions our messages evoke. One basic way to approach this is to normalize your digital engagement metrics across ad campaigns or organic posts. This means dividing the metric of interest (direct engagements, average sentiment, etc.) by the number of people in the target audience and then (if applicable) by the budget of the ad campaign. This results in an engagement metric you can compare across messages, ad groups and time, thus revealing how intensely one audience reacts compared to another. This is a good first step in understanding the connection points between your content and the emotional reactions of your audiences. MT

Read the complete response at MassTransitmag.com/21127847

In Focus: Safety and Security

View more safety and security products at MassTransitmag.com/directory

Vapor Bus International
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Vapor's vShield® Operator Protection Door includes features that address bus operator safety and comfort. Large laminated safety glass is contoured to allow direct visibility to mirrors. The door includes two integrated electric fans and an electrically-operated window. A heavy-duty, dovetail door lock mechanism maintains secured, positive contact and eliminates rattle. The door is custom designed for each vehicle for exact fit.

www.vapordoors.com

Protran Technology
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The Safe Turn Alert System delivers an audible and visual alert to pedestrians and cyclists at crosswalks when a bus is turning. By alerting through an audible and visual warning, pedestrians and cyclists gain additional time to react – which can be enough time to avoid a near-miss or collision. Used in revenue service for more than 10 years at various U.S. agencies, this product addresses safety issues as agencies continue to add quieter, energy-efficient, electric buses to their fleets.

www.ProtranTechnology.com

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PERSPECTIVE

Chatham Area Transit
@ChathamTransit

▶ We would like to give a huge thanks & congrats to Bus Operator Mr. Anthony Campbell who celebrated his 25th CAT anniversary today! Thank you Mr. Anthony for your diligent service and loyalty to CAT.

DCTA
@RideDCTA

▶ We're having a great time showing **@LewisvilleISD** students around our rail facility for **#LISDCareerOut.** Maybe we have some future rail operators 🤔 in the bunch? **#RideDCTA**

She said yes in front of the bus!

Illinois Department of Transportation
@IllinoisDepartmentofTransportation

▶ This Valentine's Day is extra special for Jeff Waxman in IDOT's Bureau of Transit. Waxman, an admitted bus junkie, recently worked with staff at the Huskie Line in DeKalb to pop the question to his girlfriend. Congrats to the happy couple. Who says the bus can't be romantic?

PHOTO OP

DISCUSSION Tweet & Retweet

South West Transit Association
@swtanation

Not on My Bus. Not on My Train. Not in My Community!

Transportation Leaders Against Human Trafficking Pledge was presented by FTA Acting Administrator, K. Jane Williams. **#SWTANation #FTA_DOT #PutTheBrakesOnSexTrafficking**

THE VIEW

BRAD MILLER
@BRADMILLERPSTA

Thank you @wmata 4 the ride tonight! A busy day today. I'm always honored to lead @RidePSTA 2 the next level. Grateful for the PSTA Board's trust in me. #CarfreeDC to attend my research panel @NASEMTRB #NewMobility (**@Uber @lyft** etc)

Have something we shouldn't miss? Tag us or email us at editors@masstransitmag.com.

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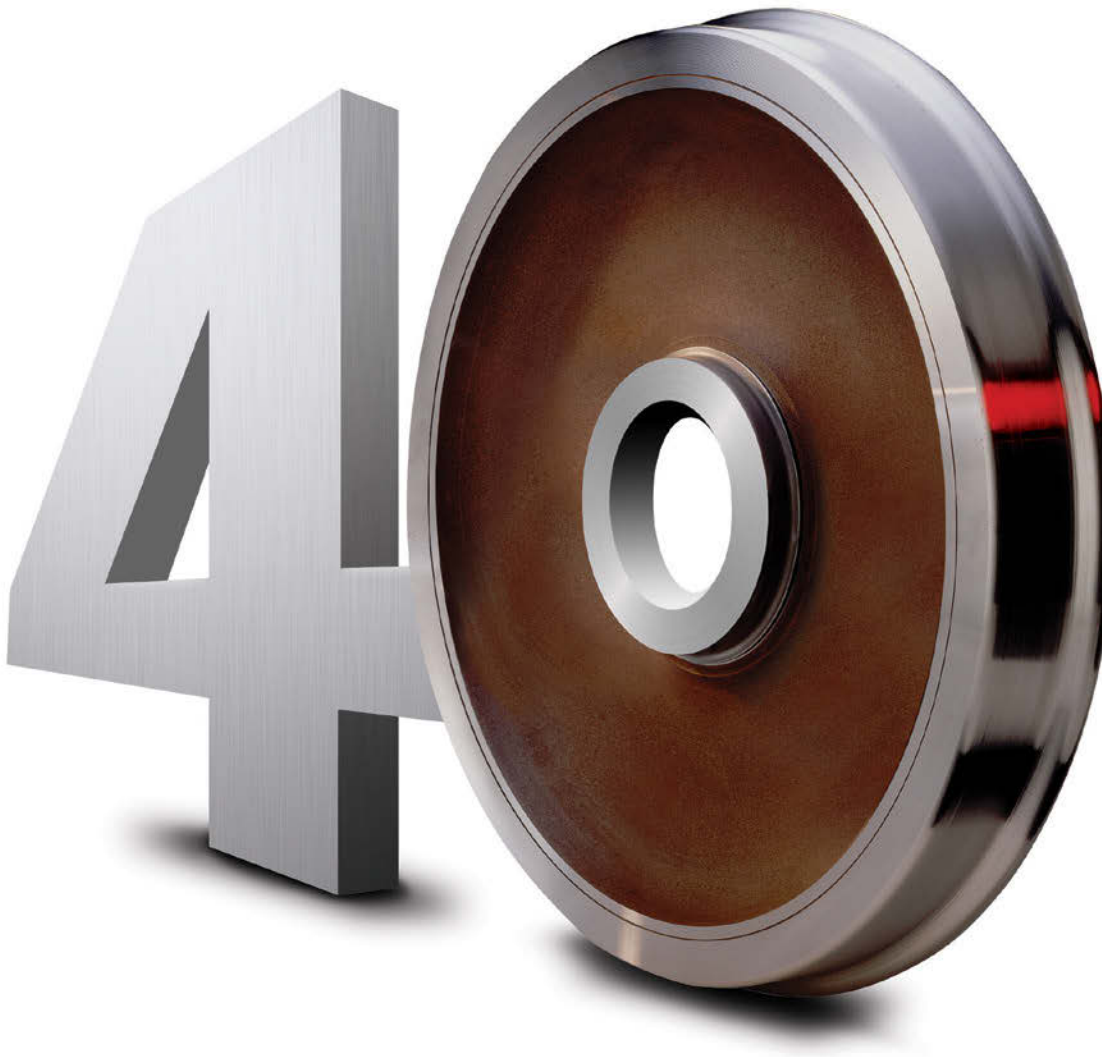
For more information, visit www.MassTransitmag.com/12045920



Lordy, Lordy.

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