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Expanding Diversity

IN AMERICA'S TRANSPORTATION INDUSTRY

COMTO President & CEO Mioshi Moses leads her organization in ensuring a level playing field in the transportation industry.

PAGE 10

A PROVEN FORCE

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THROUGH ITS networks, COMTO provides professional development training opportunities to its members.

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Feria Internacional de Transporte (FITRANS) was held Nov. 18,

in Bogota, Colombia, where attendees gathered to see the latest technology available to improve transit systems in the region.
www.MassTransitmag.com/12141315

MASS TRANSIT

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Preserving the Love

It's refreshing to see the creative ways in which the next generation is being reached and warmed to transit.



Transit agencies are working to keep the wonderment in all of us.

One of my fondest memories from my first job back in high school was going to Trainfest in Milwaukee every November. I worked at a hobby store that sold myriad products, including model trains from Z to G gauge and wooden trains for the youngest of rail fans. It was two days our team got to work off site in a fast-paced and festive environment.

It was massive crowds of people at the event, with the majority falling into two categories: the rail fans that know every line of every rail system and the families with the little ones enamored with trains.

This year was the first year I fell into one of those categories, having a son that spends hours on end playing with his wooden trains, shrieks every time he hears the sound of the freight train at a nearby crossing and would probably watch "Thomas the Tank Engine" 24 hours a day if we would let him.

So we were there, along with 25,000 others that were excited to see trains — more than 70 displays of operating scale railroads — in 230,000 square feet of space.

It almost felt surreal to be there, among the train love, in an area that has lost nearly 25 percent of public transit service in the region since the early 2000s and based on current funding projections, is anticipating a 22 percent additional decline in service.

For many of the kids at Trainfest, the only train they'll be on is the tractor made to look like an engine that pulls along "cars" for the kids to sit on. And as they grow older, their interests go on to other things and they forget about the wonderment they once had.

We see a lot of agencies do different types of outreach in the community to get kids on vehicles and on my Facebook page there are countless photos of my son sitting in the driver's seat of various local transit buses. And, because of that, he shrieks, "BUS!" every time he sees one going down the street.

One of the programs that stands out is Bay Area Rapid Transit's (BART) summer youth program, where this summer about 400 kids in grades K-12 had the chance to see various cultural destinations in the San Francisco Bay area, and ride BART to get there.

Not just getting on a bus or train, but the program gets kids to fun and exciting destinations and they equate public transportation to getting them there. The program is organized by staff from BART's government and community relations departments and partners with local community groups. In addition to going to the zoo or museum, they also learn about BART, trains, public transportation, fare systems and schedules.

As this time of year rolls around, we also see your stories on the holiday trains, stuffed buses and other integral part of the holidays that public transportation providers are in their communities. Read more about BART's program at <http://www.bart.gov/news/articles/2015/news20150804>

Leah Harnack

Leah Harnack, Editor

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VVTA WAS also awarded the coveted Mojave Desert Air Quality Management District 2011/2012 Exemplar Award.

VVTA Facility Earns LEED Gold Certification

Victor Valley Transit Authority earned the Leadership in Energy and Environmental Design (LEED) Gold certification from the U.S. Green Building Council. The High Desert transit agency earned the award for the environmental-friendly design and construction of two separate buildings on its 10-acre facility.

VVTA moved into its 28,820-square-foot administration and operations building and 15,750-square-foot maintenance building in November 2011. The centerpiece of the 10-acre facility is a 1-megawatt photovoltaic solar system, which produces in excess of 100 percent of the electricity used on the campus. The solar canopies double as shaded parking, reducing air conditioning cooling time during daytime bus start up.

Both buildings received high marks for drought-resistant water conservation features due in part to a state-of-the-art underground storm water treatment and retention system.

➔ www.MassTransitmag.com/12132744

New Flyer Announces Acquisition of MCI

► New Flyer Industries Inc. announced that it has entered into a definitive agreement to acquire Motor Coach Industries International Inc. (MCI) from an affiliate of KPS Capital Partners L.P. for cash consideration of \$455 million subject to certain purchase price adjustments. The completion of the transaction is subject to customary closing conditions, including U.S. antitrust and Canadian Competition Act approvals.

Paul Soubry, New Flyer's president and chief executive officer stated, "We

are thrilled to combine North America's No. 1 brand in heavy duty-transit buses with North America's No. 1 brand in motor coaches. We are very proud of our track record that focuses on employee engagement, customer satisfaction and shareholder value. We intend to build on this success with the addition of MCI and view this complementary business as an important step forward to diversification and growth in areas where we can leverage our OpEx, sourcing, manufacturing, parts distribution and service expertise."

➔ www.MassTransitmag.com/12136881



STEVENS ARCHITECTS LLC, of Port Huron, along with the global firm Aecom, designed the project.

Blue Water Transit Opens New Bus Center

► The Blue Water Transit (BWAT) Bus Center opened, which is designed to improve BWAT's downtown bus transfer process.

The new bus center's two buildings, measuring 7,400 square feet, replace BWAT's Quay Street transfer point. Other amenities that improve the passenger experience include heated waiting areas, ticket vending machines and bus schedule displays.

➔ www.MassTransitmag.com/12132728

LA Fund for Public Education and LA Metro Partner to Promote Girls Build LA

► Los Angeles County Metropolitan Transportation Authority (Metro) helped promote the initiative Girls Build LA by placing 200 Girls Build LA displays on Metro buses and rail during the month of October. Metro also hosted an event for high school girls on November 12 to celebrate Girls Build LA.

➔ www.MassTransitmag.com/12132577



TOSHIBA DELIVERS drive and control systems to Kawasaki, who then assembles the rail cars for Metro.

Westermo Awarded Network Equipment Order for Metro Trains

► Toshiba International Corp. has awarded Westermo a \$4.2 million order for the supply of communication network equipment. The Ethernet-based train switches from Westermo will be used to build the communication infrastructure on the new fleet of Series 7000 Rail Cars for the Washington Metropolitan Area Transit Authority (Metro).

➔ www.MassTransitmag.com/12133960

KCATA Experiences Record-Breaking Ridership for Royal Celebration

► Nearly 200,000 rides were provided on the free Kansas City Area Transportation Authority (KCATA) shuttles and regular routes during the Kansas City Royals' celebration, shattering previous ridership records. All of KCATA's 256 buses were dedicated to the shuttle service, supplemented by 125 school buses and 40 Johnson County buses.

KCATA worked with KCMO police to ensure that people remained safe as they moved in and out of the downtown area.

➔ www.MassTransitmag.com/12134580



A QUARTER of the region's population converged on downtown to celebrate the Kansas City Royals.

Metro Transit Launches Maintenance Training Program

► Metro Transit in Minneapolis-St. Paul is launching the Metro Transit Technician Program, which will provide participants college and career readiness training, support toward earning a degree and an internship with Metro Transit's Bus Maintenance Department.

Metro Transit is leading the effort in coordination with Twin Cities RISE and Hennepin Technical College. The Federal Transit Administration is supporting the effort with a \$203,000 grant, part of a larger national effort to address a looming worker shortage in the transportation industry. More than half of Metro Transit bus mechanics are above the age of 50, mirroring a trend seen across the transit industry.

The Metro Transit Technician Program was promoted this year at area schools and a series of employment open houses. Chosen from among hundreds of applicants, a group of 40 program participants will complete college and career readiness training this fall.

➔ www.MassTransitmag.com/12135057



WHILE PURSUING their degree, participants will complete internships at Metro Transit, gaining on-the-job experience while earning competitive wages. Full-time mechanic-technicians start at around \$24 an hour.

Alstom, NTV Sign Contract for Pendolino High-Speed Trains

► Alstom was awarded a \$490 million contract for eight Pendolino high-speed trains and 20 years of maintenance with Nuovo Trasporto Viaggiatori (NTV). The first trains are scheduled to be delivered in 2017. The train will be composed of seven cars accommodating about 500 passengers and will offer additional high-speed journeys to NTV passengers.

➔ www.MassTransitmag.com/12132273

People in the News



Paul Wiedefeld



John Claflin



Matthew M. Murray



Clinton B. Forbes



Veronique Hakim

Washington Metropolitan Area Transit Authority

Paul Wiedefeld was named Washington Metropolitan Area Transit Authority's (Metro) new general manager and chief executive officer.

Wiedefeld will be formally appointed at Metro's next board of directors meeting on November 19. Wiedefeld brings 30 years of public and private sector transportation management experience, formerly serving as CEO of the Baltimore/Washington International Thurgood Marshall Airport, where he managed the operations of an airport that served a (then) record 22.7 million passengers in CY 2012.

➔ www.MassTransitmag.com/12135759

Transdev

John Claflin has been named Transdev's general manager for the Cincinnati Streetcar project that Southwest Ohio Regional Transit Authority (SORTA) will launch in 2016.

Claflin will oversee the management and administration leading up to the launch and all aspects of the ongoing operations and maintenance for the streetcar service thereafter. Claflin's most recent previous experience was as Transdev's project manager and start-up manager for the design/build phase of Metropolitan Transit Authority of Harris County's (Metro) light rail system.

➔ www.MassTransitmag.com/12135844

Stertil-Koni

Stertil-Koni announced that Clinton Forbes has joined the company as technical support manager.

Murray brings nearly two decades of experience in construction and project management, with particular expertise in electrical controls, mechanical system testing, and project oversight, along with the production of technical support documents. Murray is a U.S. Military veteran, having attained the rank of U.S. Army Sergeant. Murray will work out of the company's North American headquarters in Stevensville, Maryland.

➔ www.MassTransitmag.com/12133560

Palm Tran

Palm Tran announced that Clinton Forbes has been selected as its new executive director.

Forbes is a seasoned leader with more than 27 years of experience in the public sector with 20 of those in public transportation planning, directing and senior management. Most recently he served as vice president of operations for the Central Ohio Transit Authority (COTA) overseeing 860 employees. Prior to that he served as president of JAX Transit Management Corp., directing mass transit operations for the Jacksonville Transportation Authority (JTA).

➔ www.MassTransitmag.com/12133356

New York City Transit

Veronique "Ronnie" Hakim was appointed president of New York City Transit, which moves more than 8 million daily customers on subways, buses, the Staten Island Railway and paratransit service.

Hakim returns to the Metropolitan Transportation Authority (MTA) after an earlier 23-year career at the agency. Most recently she was the executive director of NJ Transit, which operates 12 commuter rail lines, three light rail lines, 261 bus routes and paratransit service. She previously served nearly four years as the executive director of the New Jersey Turnpike Authority.

➔ www.MassTransitmag.com/12139832



Diversity in a Cool Industry

By **Leah Harnack**

COMTO president and CEO Mioshi Moses is excited to expand inclusion in the rapidly changing industry of transportation.

GROWING UP IN JACKSON, Mississippi, Mioshi Moses didn't have much experience with public transportation and her perspective, she said, was completely skewed. When she was looking at the opportunity

to lead the Conference of Minority Transportation Officials (COMTO), she did a little research and learned about an industry she experienced daily but never thought about: transportation.

"I feel it's like air," she said. "You don't really think about it until it's gone."

Moses is the president and chief executive officer of COMTO, a non-profit association with a mission to ensure a level playing field and maximum participation in the transportation industry for minority individuals, businesses and communities of color through advocacy, information sharing, training, education and professional development.

A New Opportunity

Moses is a trained attorney with a specialty in tax law and previously worked at Ernst & Young's National Tax Department. She also has experience working for consulting firms, including Booz Allen Hamilton, and focused on change

management, strategic planning and business process improvement.

Most recently Moses was vice president of membership and chief operating officer of Leadership Greater Washington, a non-profit organization which provides professional development for top leaders in the Washington metropolitan region.

"When I met the [COMTO] board, I was looking for a new opportunity," Moses explained. "I was a COO of a non-profit and was looking for an opportunity to lead an organization in a unique position and heard about the opportunity at COMTO."

When doing her background research, she saw how interesting and unique the transportation industry is, particularly at this time.

COMTO

Chapters throughout the United States

39

Types of members

Individuals, agencies, institutions, non-profits and underutilized businesses

Supports **Small, minority-owned and women-owned businesses, and youth**

AT A Garrett A. Morgan Youth Symposium and College Fair, students get the opportunity to learn from top professionals in the transportation industry.



COMTO PRESIDENT and Chief Executive Officer Mioshi Moses.

"There are so many changes happening that this is an exciting time to be in the industry." She continued, "It's fourth in terms of producing GDP [gross domestic product], which is amazing."

While it felt like a huge industry, when she started to learn more about what transit is about, she realized it was very close-knit and thought that was unique. She saw that people move around, everyone knows who it is that's moving and they know the up-and-comers and she liked that. "I think that's a comforting feeling and it's something that's not touted enough," she said.

"That's one of my goals, to shout it from the rooftops how wonderful this industry is."

She said learning more about COMTO and understanding the mission of focusing on expanding opportunities for all minorities in this country and she thought it was such a noble mission, she wanted to be a part of it.

"The whole idea of COMTO being a very diverse organization is because we believe in the fundamental truth that diverse perspectives, people coming together from different experiences and backgrounds, can really come together to solve some of our challenges."

- MIOSHI MOSES, COMTO president and CEO

A Multi-Modal Organization

COMTO has 39 chapters throughout the United States and members include individuals, transportation agencies, academic institutions, non-profits and historically underutilized businesses (HUB). "We are a multi-modal organization," said Moses. "It's pretty unique in the space that we're in."

"Most organizations are focused on one particular industry and what we've found is that we want to be as expansive as possible."



EACH OF COMTO's 39 chapters have various programs that further COMTO's mission and often hold activities that give back to the community, such as COMTO New York's participation in a breast cancer walk earlier this year.

She said they bring people of different modes together and with the conversation being on best practices, it's fascinating to see everyone contributing to the conversation and taking something useful from the conversation.

"I believe diversity of perspective is what results in creative problem solving. You may have someone that's focused on transit and that has been focused on transit and that's what they know. But then you have someone in aviation and you may find they have an interesting, different take on it because they're talking with the aviation people who may see things a little differently," said Moses.

"The whole idea of COMTO being a very diverse organization is because we believe in the fundamental truth that diverse perspectives, people coming together from different experiences and backgrounds, can really come together to solve some of our challenges." She added, "They can come up with creative solutions and really make the country stronger and move forward in a positive way."

When the COMTO board first shared their stories of how they got into transportation in the first place, Moses said a couple of them talked about started out in the bus depot and became GMs of huge transit systems or how they were in college and sort of stumbled in to transportation. "I realized this is something that can really transform someone's life. Transportation can change your station in life; you can change the way you live through an opportunity in transportation."

At the COMTO national meeting, where all of the membership comes together, Moses said it was an amazing experience and she knew it was the right place to be when seeing the passion and excitement. Something else that she felt, was that it was like family. "I could feel that ... and that just solidified my decision."

What they do at COMTO, she further explained, is making sure that their members are aware of the opportunities when they come around and also are prepared in whatever way they need to be to be strong and ready to handle those situations. "That's where we provide support. Professional development training through our networks."

"There's always going to be a challenge when you have large companies. It's learning where the opportunities are and being able to fully take advantage of them," she said. They're continually looking at how they can strengthen their hubs, their small minority-owned and women-owned businesses to be able to be as competitive as possible. "We're going to provide them with the support they need."

Providing Opportunity

Each of the 39 COMTO chapters has a vision of supporting small businesses, minority-owned and women-owned businesses, and bring young people into the industry. Each chapter may do things a little differently but they do a variety of things that further COMTO's mission.

Many, Moses explained, have a Garrett Morgan Day, typically a career fair, in honor of the African



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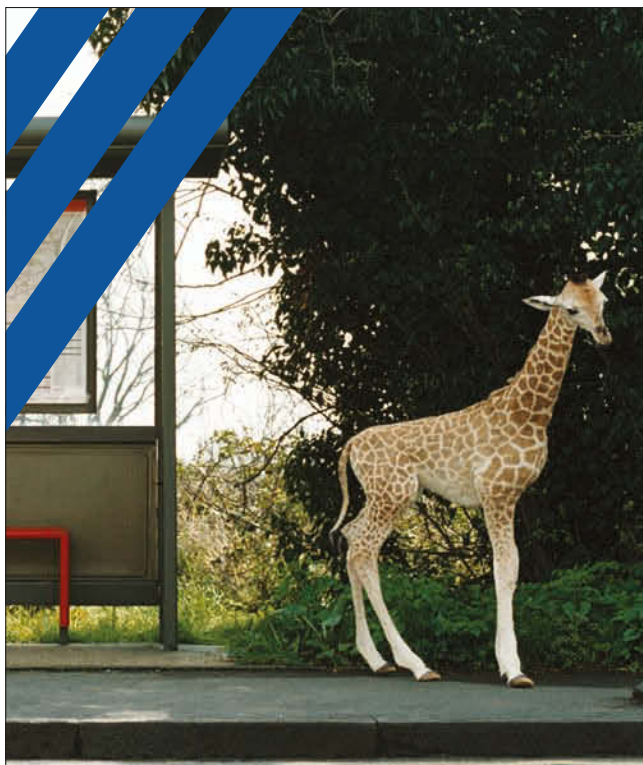
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LEADERSHIP

American engineer Garrett Morgan. There are also luncheons and activities to raise money for scholarships that they provide to young people in the community who are interested in transportation.

There are also workshops and seminars where the chapters bring together local and national leaders in transportation to talk about the issues. Bonding is a big issue for the HUBs right now, Moses said, so a lot of the chapters are having workshops and seminars on those types of issues, assembling local contractors and local entities who are issuing contracts and bringing them together.

"That's what is happening around the country and that is how COMTO is making a national impact," said Moses.

In observance of Women's History Month, COMTO's Women Who Move the Nation celebrates women in



THE COMTO national meeting provides an opportunity for members to get together to share best practices in the transportation industry.

how great this industry is and what the opportunities are."

Women Who Move the Nation 2016 will be March 16 in Washington, D.C. Moses said, "We're going to have our celebratory breakfast and we'll honor 10 to 12 fantastic women across the country."

"The thing that people don't know is that it's a really cool place to be; it's a really cool area to work in."
- **MIOSHI MOSES**, COMTO president and CEO

transportation. This upcoming year will be the fifth anniversary of Women Who Move the Anniversary and it provides COMTO the opportunity to recognize women nationally — all modes of transportation.

"We honor them to really show the world that 1. Women are making great strides in doing great things in this male-dominated society, but also to show our young men and women that there are opportunities for women to really get into the transportation industry," Moses said. "We like to say we bring the uninitiated in to the fold and make them aware, have them understand

A program COMTO has had for many years is its City Intern program, geared toward introducing young people to the transportation industry. "Our members are people who run transit agencies, companies, small businesses. We like to introduce college juniors and seniors to them through an internship program," explained Moses.

The 10-week program runs January to August.

"In the middle of it we take all of the students and bring them to our annual conference," said Moses. "At the conference we want to introduce them to all of the leaders. The idea is they'll



LEADERSHIP

Moses said, “but so much has exploded in all these different ways of looking at transportation and how to move people and things from Point A to Point B.

“I think it’s a challenge and an opportunity during this exciting time.” She added, “I think how our traditional entities manage the rapid pace of change that’s happening, that’s going to be a challenge.”

Moses and COMTO believe diversity and perspective are key to a strong future. “You need diversity of thought. That’s the benefit of having organizations that support minorities ... so that they can sit at the table and provide that diverse perspective, that unique perspective,” she said.

“Women have a very different walk through life than men do and that perspective needs to be had. Bringing all of that together needs to be heard. Bringing all of that together is how we keep this country strong. Everyone needs that. They may not understand it, but we truly believe that it is needed.”

Moses has a younger brother, but when she told him she got this job, he looked at her like she was crazy. “He didn’t understand it.

“Now that I’ve learned more, I’m sharing more and he’s getting engaged and he’s asking questions about different things,” she said. “Little parts of the industry are changing so rapidly; it’s very fascinating.

The thing that people don’t know is that it’s a really cool place to be; it’s a really cool area to work in.

“I think if we can really convey that message, we can get a lot more people thinking about transportation and a lot more people interested in transportation and a lot more people wanting to work in transportation.” **MT**

have the opportunity to meet all of the top leaders in transportation in one setting.”

Moses continued, “We do a buddy mentoring-type program with some of the leaders and some of the interns but what we do, most importantly, is we have a track just for them. We’ll have a youth symposium on the first day and then we go into a full program track with them where they meet different people.

“It’s about understanding transportation, it’s learning how to advocate for transportation issues. It’s a real strong program that we give the students and what we’ve found afterward, it’s a really great way to move young people into the industry.”

Moses also said that a lot of them get a full-time job with the company, organization or agency they interned with or within somewhere else in the transportation industry.

Moses said, “Once you join the COMTO family, we never let you go. We will always help to assure those opportunities.”

Looking to the Future

When Moses came to the transportation industry she said people talked about how it’s been the same for a significant period of time and recently, people have been using the term “disrupted.”

“I don’t really like that term because it sounds negative,”

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ElectriCity: Sustainable

By **Leah Harnack**

The latest technologies make riding the bus easy, comfortable and sustainable in Gothenburg, Sweden.

GOTHENBURG, SWEDEN adopted a long-term strategy to achieve sustainable growth based on comprehensive research: Gothenburg 2020. Key objectives include extension of the infrastructure in the region and doubling the market share of public transportation by 2025.

ElectriCity is a cooperative venture helping achieve that goal through testing new solutions for sustainable public transportation. It is a partnership between 14 different entities, including Västtrafik, the local public transportation provider; Keolis, an operator for Västtrafik; and The Volvo Group, the manufacturer of the vehicles.

ElectriCity brings together industry, research and society in the development and testing of new solutions for next-generation sustainable public transportation.

Västtrafik is responsible for public transportation, including buses, trains, trams and ferries, in the county of Västra Götaland, Sweden. There are 900 routes spread out across Västra Götaland. Västtrafik has about 80 partner companies who operate its routes and sell its tickets. There are about 9,000 employees that run the service, 300 of which are Västtrafik employees.



ElectriCity Collaboration Partners

The Volvo Group is the initiator of ElectriCity and is responsible for development of the electrified vehicles and transportation solutions used in the project.

Västra Götalandsregionen is responsible for public transportation throughout Västra Götaland and it owns Västtrafik.

Västtrafik is the provider of all public transportation within the region of Västra Götaland. The electric buses used on line 55 will be part of the public transportation system.

The city of Gothenburg is growing and developing with the goal of becoming a denser, more sustainable and open city that offers an attractive environment and a rich urban lifestyle.

Chalmers University of Technology's vision is to actively contribute to a sustainable future. Chalmers coordinates the research activities of ElectriCity.

Swedish Energy Agency supports the development of the all-electric buses.

Johanneberg Science Park investigates which areas in the borderland between construction and public transportation, including the issues of urban planning associated with these, that need to be studied, analyzed and development further in order to make an upscaling of ElectriCity possible. It will also examine which steps need to be taken in order to enable an upscaling of silent bus stops.

Linholmen Science Park's emphasis for the project is on generating research and development projects that can be linked to the main project to ensure ElectriCity emerges as a national demonstration platform.

Business Region Göteborg (BRG) works to create sustainable growth in trade and industry in the region.

Göteborg Energi is the energy company for the residents of Gothenburg. They are involved in the project to provide a supply of renewable and sustainable energy power for the electric buses.

Keolis is the company that operates the buses in the ElectriCity project on behalf of Västtrafik.

Älvstranden Utveckling's role is creating a secure, environmentally optimized and comfortable public transportation for next-generation mobility.

Adademiska Hus is a property company that believes public transportation with attractive bus stops is an important matter for society as a whole.

Chalmersfastigheter is Chalmers' property company and ElectriCity enables it to increase the appeal of traveling by public transportation between the two Chalmers campuses. They built the indoor bus stop, which represents an opportunity for research into the energy-efficient, dense cities of the future.

Mobility

VÄSTTRAFIK'S LINE 55 is a demonstration project that started June 15, 2015, and shows what the future of sustainable mobility can look like.



AT ONE end of Line 55 is an indoor bus stop, providing riders protection from the weather and the bus a 6-minute stop to charge.

Lars Backström, Västtrafik CEO, stressed their vision is for customers to choose the service because they

want to, not because they have to. Because of this, there are different forms of contracts, but most are passenger-incentive contracts with bonuses on customer satisfaction. "We want our partners to make money; we don't want them to bid too low."

One of the main objectives of Västtrafik is to have twice the ridership by 2025 while seeing an increase in customer satisfaction. Contributing to a sustainable environment, they intend to have a 95 percent reduction of fossil fuels by 2025, 25 percent less energy consumption overall and a 60 percent reduction in emissions.

Line 55

A central part of ElectriCity is Västtrafik's Line 55, a demonstration project that started June 15. A variety of research is being



Keolis

done with the project that offers a quiet, exhaust-free ride that picks passengers up indoors and is powered by electricity from renewable sources. They are looking to answer questions such as what a silent bus means for safety, how to improve traffic management systems, how the electric supply system should be built and what

RECHARGING OF the vehicles takes place at the two end stops, one being the indoor bus stop.

the best safety concepts are for public transportation.

Keolis recently sponsored a media event in Sweden, which included Västtrafik's Line 55.

Christser Olsson with Volvo explained the route connects two universities and goes from Chalmers/Johanneberg Science Park to Lindholmen Science

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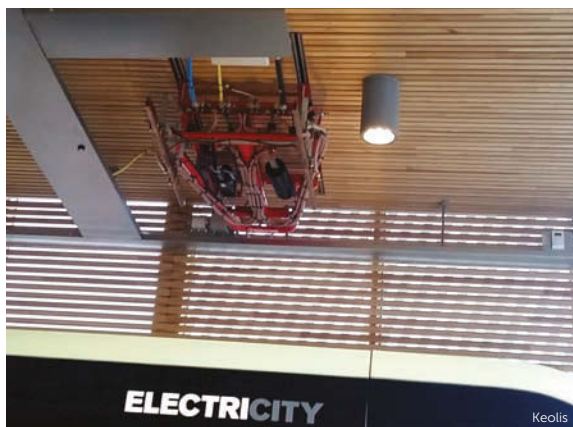
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Park, a 4.7-mile route with 10-minute headways.

Ten buses run on the route, three of which are all-electric and the remaining seven are electric-hybrid. The electricity for the buses is exclusively renewable, coming from wind power and hydro power.

The all-electric bus is a concept vehicle, the first fully electric bus from Volvo. It is quiet, emission-free and 80 percent more energy-efficient than a conventional diesel-powered bus. The all-electric buses are 35 feet and can carry 80 passengers. The electric-hybrids are 39 feet and have the same capacity. As you don't have the heat from the engine like a conventionally fueled bus, there are supplemental heaters inside the bus for passenger comfort.

To increase the overall efficiency, the doors are much wider to allow



TRAINING THE driver to stop in the right position took about two days; there's an 8- to 11-inch leeway for charging.

quick boarding. The vehicles and the stops have Wi-Fi so customers don't have a disruption in connection and the bus even has outlets for charging devices. The regular fixed-route service vehicles are blue, while Line 55 buses are green so they really stand out in the community.

The electric motor is powered by lithium-ion batteries and utilizes regenerative braking. Recharging takes place at the two end stops, though the vehicles could run up to 18.6 miles between

charges. Recharging takes about 6 minutes. Training the driver to stop in the right position took about two days; there's about an 8- to 11-inch leeway for charging. Energy loss during the charge is very low due to the direct contact.

Volvo press officer Jessica Sandstorm said they went with on-route charging because they determined it could be problematic to charge a lot of buses on the grid at one time overnight, plus it puts restrictions on operating hours. She also said that studies by Chalmers University showed it's more cost-effective for the on-route charging because there's not a "massive amount of charging infrastructure" sitting unused for long periods of time.

The energy consumption is very low from the buses; even if all of the vehicles were all-electric, it would be about 1 percent of energy use.



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Olsson said the charging infrastructure, which includes the pantograph, is maintained by the local electric company.

Managing Director of Volvo Group Ulf Magnusson said the future of public transportation will be a mix of hybrid, electric-hybrid and all-electric buses. One of the challenges of converting to all-electric is working with all of the stakeholders. In Gothenburg, he explained, there were 14 stakeholders. He stressed, “Engage multiple stakeholders at the beginning, otherwise this will fail.”

Keolis was contacted by Volvo about this project 1-1/2 years ago and Magnus Åkerhielm, CEO Keolis Sverige, said they strongly believe that electric buses are part of the future.

Comfort Stop

The outdoor stops along the route feature interactive screens, infotainment, Wi-Fi that is also on the bus and AC outlets. At one end of the line, at Teknikgatan Lindholmen, riders can utilize Gothenburg’s first indoor bus stop. The indoor stop provides protection from the weather, is quiet, clean and creates a social meeting place and offers new possibilities.

Route 55 by the Numbers

Opened:

June 15

Length of route:

4.7 miles

Number of all-electric vehicles:

3

Number of electric-hybrid vehicles:

7

Time for a charge:

6 minutes

Number of charging stations on the route:

2



OUTLETS ON the Line 55 buses give riders the opportunity to charge their devices.

One area of research Chalmers is looking at is how control technology can be used to control the climate and minimize energy loss. The bus sends data to the indoor stop, including how many people are on the bus, so the building is prepared and temperature-controlled.

Chalmers will also look at the increased costs with the indoor stop in relation to the potential value added for the passenger experience.

The Future


Jean-Pierre Farandou, president of Keolis, said Sweden is a front runner in both alternative energy and

in growing public transportation. Working toward reducing its own footprint, Keolis is ISO-140001 certified and has goals to optimize its use of energy, water conservation and reduce its fossil fuel use.

As a provider of public transportation service, Farandou said it’s Keolis’ job to help cities become more sustainable and to make public transportation an ideal choice for citizens. “We need to get people to leave their cars at home.”

Backström said Västtrafik conducts 30,000 interviews on board the buses, trains, trams and ferries each year for customer satisfaction. They are seeing that 95 percent of the customers are satisfied with their most recent journey and 79 percent trust Västtrafik to get them to their destination on time.

This past summer, 275,000 journeys were taken on route 55 and six out of 10 riders say the environmentally friendly vehicles make this an attractive choice.

The collaboration partners will continue to research what the future of sustainable public transportation should look like as they test this platform. Not only looking at electric bus operation, the project will help them understand how cities can be planned in new ways. 

AT THE indoor bus stop riders enjoy a social meeting place, as well as protection from the weather.



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WHEN A company's production is unpredictable, the inventory management becomes challenging.

Inventory Management in a Stochastic Demand Environment

By **Michelle Berry**

Consistent review and adjustment of inventory re-stocking parameters through a degree of human intervention will have the greatest impact and allow for a well-managed inventory under unpredictable demands.

IN A STEADY AND PREDICTABLE manufacturing or service environment, determining the correct amount of inventory can be done using historical data and forecasted demand. In transit repair operations, or any other non-repetitive demand business, the correct amount of inventory will be more difficult to determine.

When a company's production is unpredictable, the inventory management becomes challenging. Normal operational requirements must be met and factors that could cause stochastic demand need to be considered. Stock-out situations are amplified, since they

usually occur during a crisis or equipment failure event. There is a way to adapt an existing inventory management database system to better serve the needs of a stochastic operation. During the best of times, inventory management should always consider the "what ifs," however, in a stochastic demand environment, the "what ifs" become more commonplace and inventory management must not only consider them, but plan for those factors which are variable, dynamic and difficult to control.

Research Theories

Research on inventory management relies heavily on mathematical and

The

questions that must be answered by inventory management fall into the categories of demand and lead time. How many and when? Every modification made to create a hybrid system, should make it easier to answer those two basic inventory management questions.

theoretical formulas. The theories appear sound, have much data and conclusions are proven with tables and graphs. These theories are less than desirable when considering a stochastic environment. The research that relies heavily on math also relies heavily on assumptions to make the math work properly.

The assumptions made are for the purpose of creating a more stable and predictable situation on which to test the theory. Some of the assumptions are that there is a constant annual demand rate or that all customers are willing to wait. The problem is, none of these assumptions actually exist in a real-life stochastic demand operation.

Consistent Review

There is a clear link between regular review of the inventory parameters and successful outcomes in a non-repetitive demand shop. Monitoring erratic demands are necessary in order to develop a workable approach that balances service levels and financial concerns. Inventory's response to stochastic demand must be influenced with a scheduled and systematic review of the inventory control parameters. This can fill the gap and create an involved control. Technology has created a situation where production cycles are shorter and inventory management becomes more challenging. There is an inability for traditional database management software to keep up with real-time events and adjust quickly enough to repair based environments.

Stochastic, non-repetitive demand can happen in many environments, including transportation and transit organizations. An output value of a suggested replenishment given to a material planner or analyst for processing demand is the important feature of most inventory management systems. The goal for non-repetitive inventory demand is a signal process "which represents the practice of dynamically estimating the demand and subsequently

updating the parameters of inventory control policy," according to a report by Costantino, Gravio & Shaban. Consistent review of inventory reorder parameters is being shown as the preferred method to better control the inventory management in a stochastic environment. Gaining control of the parameters will improve stability of the entire supply chain.

Game theory gives a basis for setting up the process for consistent review and making adjustments. Game theory, although mathematical in nature, comes down to constant review of the process in real time and interactive decision making. Game theory also shows that some of our decisions depend on the choices of others and that decision situations are interactive. Production and inventory planning in a job-shop environment has this type of intricacy. The decision making relies on shop flows with a tendency for change. Decisions are based on a variety of factors that require continuous monitoring of the system's actual state.


Stochastic demand has a need for human intervention. You must develop a hybrid inventory policy that incorporates continuous review of your actual state. One established inventory management system incorporates the idea of evaluation and revision. Reorder point (ROP) systems continuously review the in-stock quantity against the reorder point quantity. If the activity changes, the system's dynamic adjustments of the replenishment system will catch a surge in usage. However, even this more dynamic system catches the surge after the fact, and adjustments need to be made to both quantity and timing with independent involvement.

A company must identify the volume of the non-repetitive demand processes. Once it is determined that volatile demand exists, there can be an acknowledgement that the operation, or part of the operation, is stochastic. If this

acknowledgement does not occur, an organization will continue to use standard inventory management software and become frustrated that the program is not working well. If the true nature of the organization is honestly identified as stochastic, there can be the realization that no packaged database management system can do everything that is needed. Stochastic inventory policies, models and procedures must include a process to consistently review the inventory management parameters and there must be a method of monitoring and adjusting those parts of an inventory database management system that signals replenishment requirements to the user.

Establish Your Metrics

Whatever inventory system is used, the questions that must be answered by inventory management fall into the categories of demand and lead time. How many and when? Every modification made to create a hybrid system should make it easier to answer those two basic inventory management questions.

Inventory management is complex. Answering the "how many" and "when" questions are difficult. Discouraging the negative perceptions of stakeholders is daunting. As with any important process, metrics should be established. Developing metrics for the key performance indicators should be focused toward a company's specific and anticipated results. These metrics must be regularly reviewed to ensure the new processes are on track and providing the desired outcomes. There should be evidence that the consistent review and adjustments of inventory re-stocking parameters through a degree of human intervention are having a positive impact on the inventory management process. 

Michelle Berry is a manager of inventory with the Greater Cleveland Regional Transit Authority.

3-D Printing Offers Cost-Effective Custom Production

By **Fairen Horner**

Blacksburg Transit is using 3-D printing to produce an in-house solution that keeps its buses on the road and on time.

3-D PRINTING, ALSO known as additive manufacturing, is on the rise and at the center of many controversial debates over its significance and what the future holds for this technology. Although the future scope of 3-D printing is currently unknown, one thing is certain: Blacksburg Transit (BT) is at the forefront of this technology in local government and transit services today. BT is actively solving a problem in its industry, while saving money and paving the way for other systems to follow lead.

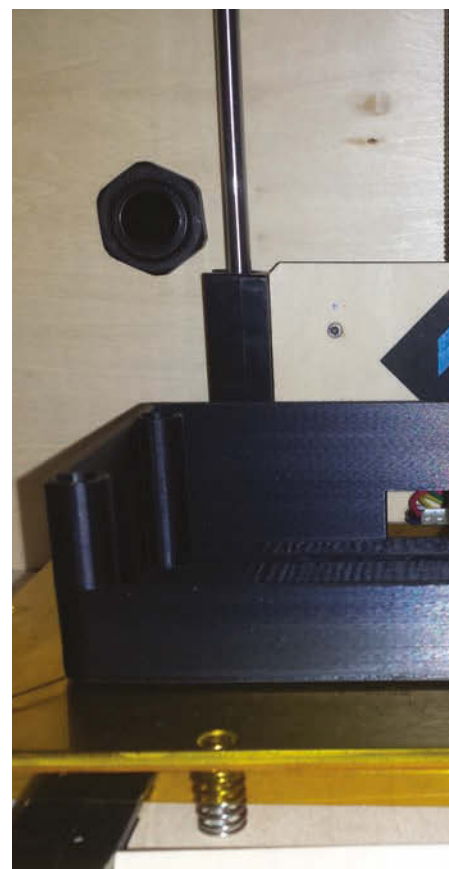
3-D PRINTING a custom solution took an amount of trial and error with machine calibration and even room temperature having an effect on the final product.



Tim Witten, Mike Landers, Aneil Samuel and Ignacio Guerrero, who make up BT's Intelligent Transportation Systems (ITS) Department, did not begin their journey with 3-D printing for fun; they had a problem that needed a more efficient solution. The problem was the process of resetting ITS equipment while a bus was in use on the road. The only way to do so involved a time-consuming operation of sending a person out to find the bus with a malfunctioning system and reset it manually. To alleviate this issue, they assembled a network addressable relay that allows the ITS team to communicate across the Internet and is much like a long-range, electronic light switch in that you can turn it on or off remotely. They were then able to troubleshoot equipment and keep it running smoothly without sending someone out into the field.

In-House Problem Solving

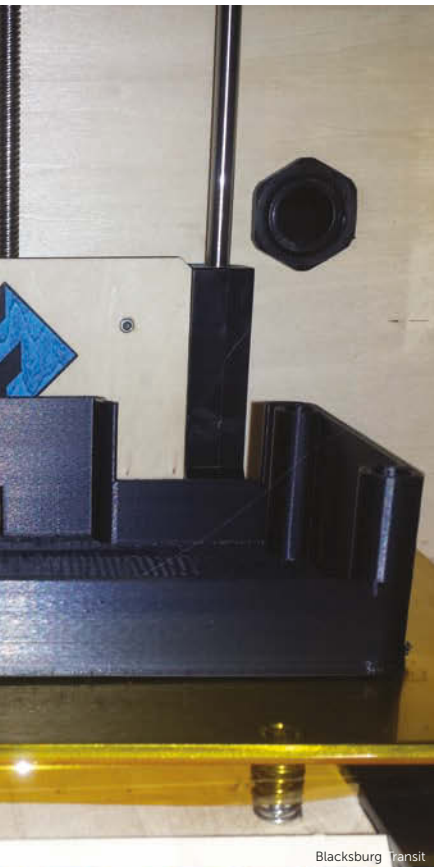
For this solution to work, they now needed a suitable case to house this new device since the option they had was not satisfactory for protection or mounting. Through research, the ITS team discovered that they could print and deploy their cases at 20 percent of the cost to have them produced by an



3-D PRINTING offers the ability to print in different colors and densities.

outside firm. Therefore, the most cost-effective solution would be to create their own. With that, two 3-D printers found a home at BT.

This is a critical fix when you take a look at the big picture; all parts are dependent on what BT is printing. Each electronic remote reset case being made is vital to the functionality of the problem-solving device itself. Without proper housing, the network addressable relay would not work. The equipment that needed to be occasionally reset reports information regarding bus location, schedule adherence and passenger counts. Furthermore, this data is then used to update Blacksburg Transit's BT4U mobile app that many riders



Blacksburg Transit

BLACKSBURG TRANSIT'S ITS department found it could print its own cases at 20 percent the cost of having them outsourced.

rely on for accurate departure and trip-planning information.

Analysis and Experimentation

The road to perfecting the cases using 3-D printers was not without a few potholes. The ITS team tried many different versions of software before coming up with a final model using AutoCAD commercial software application for 2-D and 3-D computer-aided design and drafting. Also, cases could be distorted depending on the machine's calibration and even the temperature of the room, making it no longer usable. The best lesson BT has learned through trial and error with the 3-D printers has been exactly that: finding out that this technology can be successful as long as adequate time is put into working with it.

Overall, the pros outweigh the cons when it comes to 3-D printing at BT. They are making headway with an exciting, emergent technology that not many in local government, transit or the state of Virginia for that matter, can say the same. In addition, BT's use of 3-D printers is cost effective. Why pay high prices for custom production and shipping with a lengthy wait time when you can just create it yourself, with personalized specifications?

With the ability to print in different colors, densities and sizes, the possibilities for future use are endless. **MT**



Fairen Horner is the communications & customer support assistant at Blacksburg Transit.

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From Platform to Landmark

By Joe Petrie

Transit growth in Orange County meant the city of Anaheim needed to look for a long-term solution to upgrade its rail station and create a catalyst to push the city forward for years to come.

WHEN LOOKING AT THE future of transportation in the city of Anaheim, California, rail transit is going to play a major role.

With growth in Orange County Transportation Authority (OCTA) ridership, Amtrak, Metrolink and other modes of transit in the region, Anaheim needed to plan for a future with rail transit. And with the potential southern terminus for the California High-Speed Rail project coming into the city, it meant looking at the future in a big way.

"The city had the idea they really wanted this building to be iconic and to represent rail transportation for the 21st Century," said Ernest Cirangle, design principal with HOK. "They

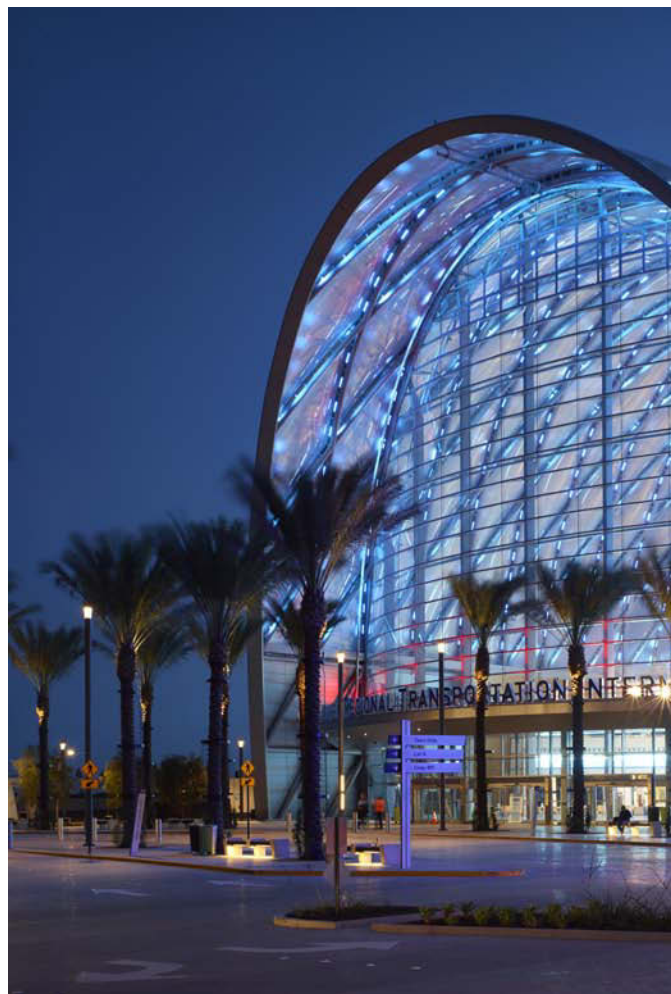
really wanted to make their mark and show California and show the world that they're on the forefront of rail transit. We were energized by their idea and mission."

Anaheim took its big leap forward in addressing future transportation needs and the future of rail transit in the community when it opened the Anaheim Regional Transportation Intermodal Center (ARTIC) in December 2014.

Building a Landmark

Located in the heart of the city near Disneyland, stadiums for the Los Angeles Angels of Anaheim and the Anaheim Ducks, the ARTIC station is designed to be a gateway into the community and coordinate travel into one central location.

GRAND RAILROAD stations of the past and Europe inspired the look of ARTIC's design team.



Joel Zlotnik, manager of public information for OCTA, said previous to ARTIC, the station there was simply a platform in the parking lot of the Angels stadium, which the baseball team wanted for more parking. It also led to very little convenience for bus riders as local buses had to be caught from the street.

The station was primarily funded by revenues from Measure M, which is a half-cent sales tax in Orange County, which goes to pay for transportation improvements. Zlotnik said ARTIC was set forth like all other rail stations in the county, where OCTA helps secure the funds and the local municipality runs the facility.

The area not only unites local bus service, but puts it into a location serving a busy rail corridor. Zlotnik said there are 29 daily trains into the station and 22 Amtrak trips as part of the Pacific Surfliner, which is the second busiest passenger rail corridor in the U.S. behind the Northeast Corridor.



EFTE MATERIAL was used for the ARTIC roof, making it extremely lightweight.

The ARTIC Station replaced the existing Amtrak station in Anaheim, but incorporates more modes of transportation than the old one. Albert Kaneshiro, project manager for HOK, said from early on in the design process the team was working with entities involved with the station to make sure it met their needs.

"Previous to the ARTIC project, all the bus lines stopped all over the area," he said. "It wasn't centralized. The existing Amtrak station had two buses that got close to the station, but never went right up to it and the bus lines were never a feeder to the Amtrak station. There are 13 bus stops at the ARTIC facility, which includes shuttle buses."

Virginia Tanzmann, vice president of WSP | Parsons Brinckerhoff, who leads the company's transportation facilities technical excellence center for the west region, served as project manager during the station construction.

She said more than 20 different firms had to be pulled together for the project, which had been in the planning process for years ahead of time.

In addition to the high-drawing venues adjacent to the new station, it also needed to be something the city could turn to, to keep growth moving in the area.

"That property is part of what's known as the platinum triangle," Tanzmann said. "That's an area designated by the city for further development."

Cirangle said the firm got involved with the ARTIC project during a design competition and saw the excitement what Anaheim was trying to achieve.

"The city took the lead on the designing and building of the station and certainly with the input from OCTA and all our operational folks on how the station integrates the rail system and the buses and the other modes of transit," Zlotnik said. "We certainly worked closely with them."

Cirangle said a big part of the ARTIC plan included development of adjacent parking lots in the future, so the design needed to incorporate those plans.

"The surface parking lot will be made available for a mixed-use function, which will link the station back to the city," he said. "It's basically set up for a bigger TOD opportunity right around the ARTIC station."

Exceeding expectations

Cirangle said coming up with the

design meant looking to the great rail stations, such as in Europe or the old Penn Station, in order to come up with a grand design that creates a civic place.

According to a statement from the city of Anaheim, "ARTIC's design inspires people about public transit. The station provides a stunning setting for the thousands who use it to commute by train and bus, travel on vacation, get to world-class sports and entertainment, stop in while cycling, shoot TV shows and commercials or take personal photos. This is a true community landmark."

"The city has been talking for decades about this project and I think it was conceived about 20 years ago, so there's a lot of history behind it and the people of Anaheim have been planning it for decades all in combination with that excitement of bringing that whole part of town up a notch," Tanzmann said. "There's nothing wrong with that area; it's not a distressed area, it just hasn't been developed like anything this has the potential of doing."

Building for the 21st Century also meant looking to new building materials and creating a large, vaulted ceiling along with bringing in lots of natural light.

Cirangle said the roof membrane is Ethylene Tetrafluoroethylene (EFTE) manufactured and installed by Vector Foiltec, which is very lightweight and about one-hundredth the weight of glass material and it captures natural light.

"When we're talking about the EFTE material, it is a pretty common material in Europe and Asia," Kaneshiro said.

Because it was a new material the city wasn't familiar with, Kaneshiro said there was a lot of discussion on using it, but after bringing all the stakeholders together from various agencies to determine their goals with the project, they were able to bind everyone together in agreement.

"The numbers don't lie," she said. "It weighs a fraction of that of a normal roof assembly and that alone changes a lot of the math on how much structure of the building is needed, so that alone was very appealing."

-VIRGINIA TANZMANN, vice president, WSP | Parsons Brinckerhoff

Tanzmann said there was plenty of discussion about using the roof material but the evidence proved the rationale for its inclusion in the project.

"The numbers don't lie," she said. "It weighs a fraction of that of a normal roof assembly and that alone changes a lot of the math on how much structure of the building is needed, so that alone was very appealing."

Tanzmann said there were technical challenges bringing all the modes of transportation together at the station, including a walking and cycling path located adjacent to the ARTIC along the Santa Ana River. Crews had to work on major projects while accommodating different mass events, such as baseball games.

"The city wanted an icon; they wanted something very, very

special and they wanted it to be on budget and on schedule and we had to overlay that with the baseball schedule," she said.

The design also has to be seismically sound given southern California's proneness to earthquakes while accommodating for moisture and temperature controls within the station. One way it does that, Tanzmann said, is via louvers built in to the station that automatically open to help cool the inside of the station.

ARTIC achieved the U.S. Green Building Council's LEED Platinum certification for the design elements it incorporates. This includes the inclusion of a storm water runoff system, drought-resistant plants, using recycled materials for construction process, low-flow plumbing fixtures, photovoltaic arrays, electric vehicle



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NATURAL LIGHT plays an important role in ARTIC's design.

charging stations and the use of the lightweight EFTE roof membrane structure.

"We did have a budget and we met it and we did have a schedule and we met it," Tanzmann said.

Tanzmann said there were no major design changes during the construction period, however, there were changes in code that needed to be addressed when the Federal Transit Administration (FTA) instituted new rules for level boarding in order to allow better access for disabled riders in the community. Tanzmann said the ARTIC project was a traditional design-bid-build project and during the planning, designers and engineers with all contractors looked through suggestions to create a cost-effective project meeting goals set by the city of Anaheim.

"Value engineering really is misunderstood as just slashing costs when really it's properly engineering and looking for areas where it might be possible to do things more efficiently," Tanzmann said. "It's really a better way of looking at something to see if we've pulled out all the stops and are making this thing as efficient as possible and get the best use of public dollars." Since its opening, the project has already garnered 30 awards.

"Having the right team just makes all of the difference," Tanzmann said. "This was a high-performance team that also had a high level of cooperation and communication, and, of course, the idea of the project totally grabbed everybody."

"Even our contractor going into construction, they were all jazzed about it, too. It wasn't just another project for anybody." **MT**

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FLAWLESS CONNECTIVITY is key to providing high-quality security protection.

The Bandwidth Challenge: How to Enhance Video Surveillance Network Connectivity

By **Itzik Ben-Bassat**

Getting the right surveillance system for protecting the public means taking into account the entire network monitoring the system.

VIDEO SURVEILLANCE has proven to be extremely beneficial to help protect not just buildings and homes, but also lives by combining a wide variety of ever-evolving technologies. In recent years, there has been incredible growth in the video surveillance market with law enforcement agencies, municipalities and transportation centers embracing video surveillance to enhance security and traffic monitoring across cities. This has resulted in the general public feeling more comfortable taking public transit, making purchases at shops, parking their cars and frequenting areas that are well-covered with security cameras.

The use of surveillance technology has increased across multiple markets to protect the world's ports, airports, cities and transportation infrastructure, as well as schools, hospitals, government and other critical environments.

For each of these markets, it is important to capture, analyze and record video. However, in order to achieve the desired results, surveillance systems must contain both hardware and software solutions coupled with a surveillance network, or physical infrastructure to carry video feeds from their point of origin to control rooms or command centers.

One of the prime reasons for deploying video surveillance systems is their capability to provide 24/7 monitoring. Therefore, lost data serves to undermine this primary purpose of the system. To ensure the unfailing operation of these services, highly reliable, scalable and easy-to-deploy networks must be in place. Surveillance networks require connectivity to carry video feeds from multiple deployed cameras distributed over one or more sites, to control rooms for viewing, recording and analysis. Flawless connectivity is the key to providing a consistently high quality

of service assurance and security protection — even more so as video surveillance technologies mature and require more bandwidth with greater transmission speeds.

The Connectivity Challenge

With the rise in global terrorism and resulting increased focus on public transit security, authorities around the globe recognize the numerous benefits of using video surveillance networks for public safety. The number of cameras per area has increased significantly, while at the same time, more and more surveillance cameras are installed in new locations and different environments. Developments in surveillance technology, such as megapixel technologies, enhanced video analytics, and improved pan, tilt and zoom provided today by cameras often surpass infrastructure capabilities and cause network overloads. The demand on these networks to continuously expand is exponential. This can be further complicated with wireless/mesh networks that, in addition to surveillance payload, deliver Internet connectivity to users of mass transit, adding to increased demand for bandwidth.

In the race to maximize system capabilities, the importance of utilizing network components with greater adaptability is becoming more critical. This substantial growth requires surveillance networks to provide even more applications and greater bandwidth, and to support additional law enforcement authorities. Solution architects are constantly seeking technologies to reliably transport ever-growing video data. Taking full advantage of the benefits provided by today's technology and tomorrow's potential, will require making the right choices in the configuration of the network, the heart of surveillance systems.

Maximizing the 'carrying capacity' on the network is crucial and is accomplished through

choosing cost-effective technologies. As today's video payload is IP-based, it is usually provided by a service-provider, and thus its constant payload pattern results in premium fees. Tested and proven (carrier-grade) wireless systems, with sufficient capacity and the essential AES 256, are available and affordable. Also, authority-owned or privately held networks built from existing fiber, combined with the above-mentioned wireless systems, are becoming viable alternatives and adopted in more and more projects.

Building flexible network models will aptly address the network capacity challenge. Emerging surveillance technologies today often surpass the maximum capacities of deployed networks, whether mesh or wireless. Furthermore, surveillance networks typically have a longer life expectancy than the devices (cameras, radars) that connect to them. These facts irrefutably indicate the need for networks to be designed and built with the potential capacity of tomorrow; as much as a tenfold increase on the demand recognized today. Planning for future demand means that a network is well positioned to take advantage of new technical advances. A flexible design facilitates implementation of upgrades and patches in existing technologies. It is also the key to maintaining quality of services, and a consistent supply of adequate bandwidth. Failure to plan could quickly turn network limitations into showstoppers. It is highly desirable that a network be flexible enough to take full advantage of new camera capabilities as they arrive, without needing to replace network infrastructure components, particularly when it comes to trains and bus stations.

Network congestion has become a trend. It occurs when a link or node is carrying so much data that quality of service deteriorates. A fundamental problem is that all network resources are



DEVELOPMENTS IN surveillance technology often surpass infrastructure capabilities and cause network overloads.

Video Surveillance Considerations

- Megapixel technology
- Enhanced video analytics
- Improved pan, tilt and zoom
- Multiple deployed cameras
- Wired or wireless
- Bandwidth

limited, including router processing time and link throughput. To ensure optimal utilization of new bandwidth intensive applications, while avoiding adverse effects on quality of service (QoS) caused by overwhelming capacity demands, transmission technology capabilities must improve. This demand will very soon not be able to be handled, and millimeter wave wireless networking links will have to be implemented between network aggregation and access layers.

Readily Accessible Connectivity Solutions

Selecting a means of connectivity is becoming more and more vital for managing congestion and wirelessly connecting cameras to a network. In today's heavily utilized integrated networks, the wireless portion of the network often functions as a major performance bottleneck. When this occurs, quality of service deteriorates and users experience problems such as queuing delays, packets loss and the blocking of new connections.

Mobile video is consumed today in a number of ways. One method is recording video on trains, for example, followed by offline downloading of the data to a command center; another is recording on trains and downloading the video to a command center at each bus station (semi real-time); and finally there is

real-time streaming from the train to the command center.

While the first option may be supported by low-speed networks, today's market is trending toward the second (semi real-time) option. This requires high bandwidth networks capable of fast downloads of the video surveillance footage recorded on public transit. The recorded video must be transmitted through the network to a command center. This mode of video downloading and transmitting necessitates a substantial amount of capacity, and only extremely high and reliable bandwidths are able to meet this scope of demand.

Several techniques may be used to transmit video feeds from cameras to monitors at command and control facilities. Selection of which video transmission method to use is often based upon a number of factors such as, cost, latency, location and distance of cameras to control rooms, existing available infrastructure, and of course, signal velocity (speed). There are two main technologies for transmitting video.

The first is wired technology, which relies upon copper, coax cables or fiber to transmit the data. Copper and coax cables provide moderate reliability but limited capacity. As a result, this technology is cost effective for short distances. Fiber is often considered a reliable solution because it transmits at high bandwidths and is immune to electromagnetic interference.

Wireless technology, the second technology, relies upon either sub-6GHz frequency or millimeter wave technology. Also known as Wi-Fi, 5GHz or, sub-6GHz is a commonly deployed wireless solution, but growing congestion can hinder stability and speed of the connection. Millimeter wave technology (MMW) uses higher frequencies of 40GHz (most prevalent 60, 70/80GHz), and is considered to be a next-generation solution offering reliability with excellent throughput speeds. It

is the closest alternative to fiber available today.

It is unequivocal that fiber is the optimal connectivity solution. However, fiber is not always available, or practical, due to the heavy investments associated with fiber trenching or fiber leasing. There are two additional wireless alternatives for video surveillance network connectivity.

Sub-6 GHz Spectrum (Wi-Fi)

Sub-6 GHz wireless products are the most widely deployed of wireless appliances today. They utilize the sub-6 GHz spectrum with its underlying technology known as Wi-Fi, and are considered cost effective because they are license-free and there is no need to register or obtain permits from the government for the use of the spectrum.

Even though these products are easy to use, market development has put a severe strain on the scalability of Wi-Fi solutions at both the access and aggregation network layers. As a result, today's Wi-Fi is susceptible to security problems, bandwidth degradation, radio interference and also network latency. Many of these shortcomings are especially noticeable in surveillance networks, where critical voice delivery and constant, high bit rate video delivery applications are heavily at work. These systems lack the core capabilities to keep up with the exponential growth in capacity demand.

Millimeter Wave Wireless Technology >40GHz (most prevalent 60, 70, 80GHz)

A reliable and cost-effective solution for this challenge is millimeter wave wireless technology. As capacity is also dependent on the amount of spectrum (bandwidth) a service utilizes, the huge amount available in these waves inevitably facilitates incredible bandwidth. The technology is future-proof, scalable and provides excellent



VARIOUS TECHNIQUES may be used to transmit video feeds from cameras to monitors.

Video

surveillance networks of today are significantly more intelligent and dynamic than ever before, but smart as they might be, they present their own challenges.

performance. MMW solutions also provide valuable advantages that are comparable to Wi-Fi.

Technological advances have made mmw technology possible for low-cost consumer devices. In addition, it is easy to use through the simple alignment of narrow beam angles, with no spectral analysis required prior to deployment. Its tiny size enables short and simple approval processes for deployments on existing street fixtures.

Because MMW technology provides extended capacity and diminished latency, it ensures that each camera receives the bandwidth necessary to deliver a constant, reliable video stream at the highest possible frame rate. This is of vital importance in securing train and bus stations, and other transportation depots. With ample frequencies available, it provides the widest and most unpopulated spectrum available today to facilitate bandwidth-rich, high-capacity wireless connectivity.

It is notable that MMW technology solutions facilitate a forward-looking architecture and are significantly more modular than their market alternatives. Their flexible topology allows for impressively scalable

configurations, as new small-cell nodes may be added with minimal backhaul planning. MMW solutions are exceptionally secure due to their essentially low-beam widths, and relatively low radio transmit power; guaranteeing little probability of intercept and detection, which is vital for the transference of confidential material.

Using MMW wireless also provides additional benefits, including high-resolution camera support. A greater bandwidth (up to 2Gbps) provides support to multiple multi-megapixel cameras operating at full frame rate. By using an uncongested spectrum, users are assured interference-free performance and bandwidth usage is optimized to enhance connection speed and QoS. The solution is scalable and supports simple bandwidth and deployment expansion in confined spaces, vital to the transportation market.

In a Nutshell: The Importance of Future Proofing your Security Network

Video surveillance networks of today are significantly more intelligent and dynamic than ever before, but smart as they might be, they present their own challenges. Video surveillance has extended from local surveillance to remote surveillance, from indoor places to outdoor places, and from office environments to production environments. These changes make it more difficult to adopt and utilize video surveillance services, as surveillance networks need to adapt to multiple new and complex scenarios.

The high cost of fiber and the need for flexible deployment options make wireless and other solutions very attractive for network operators. However, the vulnerabilities presented by Wi-Fi networks are becoming more and more evident, as surveillance solutions become more widely used and supplementary technology evolves.

Reliable network connectivity is crucial to the success of a network surveillance system, particularly for public transit. Today, people need wireless technology that is reliable and flexible, and that can leverage the components of an existing network, especially as the demand for surveillance systems

bandwidth with greater transmission speeds continues to grow. **MT**



Itzik Ben-Bassat has been managing Siklu communications as its CEO for the last five years and was formerly Siklu's COO and vice president of R&D.

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Johnstown, Penn.



Josh Yoder
Director of
Marketing and
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Cambria
County Transit
Authority
(CamTran)

REVENUE AND FUNDING. TWO words that go hand in hand when talking about transit. In this day and age, transit agencies from all over the country are looking at different outlets and avenues to increase revenue to help fund transit operations and programs throughout their respective organizations. CamTran is no exception.

Over the last five years, CamTran has seen a steady increase in transit advertising revenue, which has helped with general operating expenses and in turn, helps with cost recovery. Advertisers who utilize CamTran buses as an advertising medium range from local non-profits to major corporations. Advertising agencies from all over the country realized CamTran is a viable advertising medium and chose to work with CamTran to enhance their clients' marketing campaigns. While the steady increase in advertising revenue over the last five years has helped, it has not been near enough to help with general operating expenses that continue to grow. CamTran is in the process of exploring options that will open up new revenue streams that will ultimately help fund general operating expenses.

When discussing the various outlets that CamTran has available to use as advertising outlets, a lot of ideas came to the forefront. Naming rights to our transit center, as well as our operations, maintenance and administrative facility, were discussed and will be implemented in the future. CamTran is visible in the community and a partnership with other community-friendly entities would build a stronger community presence for all parties involved. Service vehicles play an important role in our organization and utilizing them as moving billboards will be implemented. Our service vehicles are

on the road at various times throughout the day and are extremely visible, which will be a draw for any advertiser looking to enhance their marketing campaign. Website advertising is something that has been around for quite some time and CamTran is ready to make the move to utilizing our website, which is visited frequently as a viable advertising outlet.

The foundation of transit advertising that has been laid will help spring board our efforts into the future.

Another way CamTran is looking to increase revenue is to utilize our transition into the compressed natural gas (CNG) realm and build a revenue campaign around the conversion of our fleet. The thought is to build an all-inclusive package that incorporates naming rights, bus advertising, website advertising and sponsorships in a multi-year package. The end result will be a steady annualized revenue stream for CamTran coupled with a visible marketing campaign for the advertiser or advertisers who take advantage of a community-based advertising medium.

CamTran is proactive and ready to do business in order to build a steady revenue stream in the future to support the transit agency.

Albuquerque, N.M.



Allyne Clarke
Advertising
Sales Manager
Rio Metro
Regional
Transit District

ABOUT THREE YEARS AGO, THE RIO Metro Regional Transit District (RTD) made the decision to start an in-house advertising program to help with operating costs. Its primary focus was to implement the program on the New Mexico Rail Runner Express. Keeping the program in-house allowed for 100 percent of the revenue to go to the general fund to help offset our transit operation expenses.

The most visible format of advertising with the Rail Runner is the 40-inch digital screens on the train. This platform allows a static ad or a video (no audio) to be displayed on all 44 screens (two per car) simultaneously. In addition, posters in various sizes can be displayed at five different locations inside each car. We also display large posters at each of the 15 kiosks and on the windscreens. As the advertising program continued to grow, multi-media integrated solutions were introduced to help generate additional revenue. This is done by presenting the main product along with digital and social media options. Banner ads on our website give clients an opportunity to engage users. Although challenging to charge for a Facebook presence, the value perceived by clients to reach the Rail Runner's 22,000-plus fans has added weight to an overall campaign.

From time to time we receive a client request for a special train schedule to a major event taking place along the corridor. The additional cost to provide this service is paid by the client/organization. Individuals can also rent a train car for a special occasion, such as a wedding or a birthday party.

RTD operates a small fleet of buses, which allows for external advertising and provides another source of revenue.

Washington, D.C.



Nathan M. Macek, AICP
Principal
Consultant
and Manager,
Transit Project
Development and
Finance
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Project sponsors should consider a number of factors to select funding sources. Revenue yield and growth potential stand

out as top criteria. Another consideration is the nature of approvals required to implement the source. Sponsors should consider whether the funding source can be easily administered, because it can be much easier to piggyback on an existing mechanism than to create one from scratch. Others include equity, nexus between contributors and beneficiaries, and volatility.

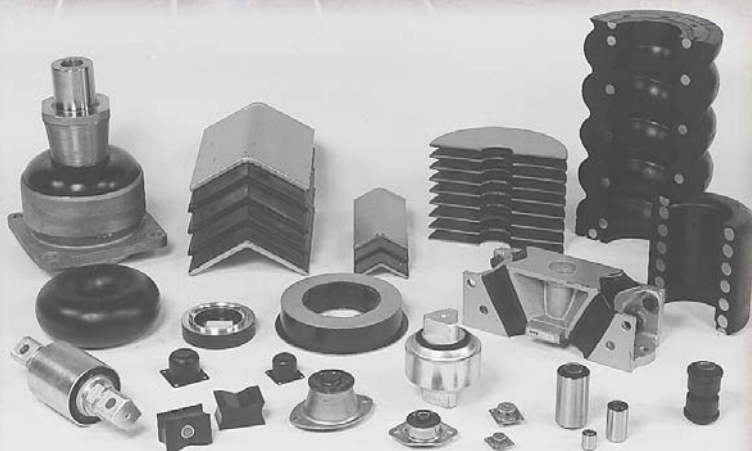
TRANSIT AGENCIES ARE PURSUING A number of creative approaches to fund operations and programs. Traditional approaches to funding transit — including sales taxes, property taxes and fuel taxes — continue to provide the preponderance of revenue for U.S. transit agencies. However, alternative sources are increasingly being relied upon to augment revenues generated by traditional sources and match federal grants. Options include value capture, parking revenues and toll revenues.

Value capture ties project funding to benefits that accrue to property owners from transportation improvements. It includes special assessments, tax increment financing and developer contributions. This approach is advancing the Potomac Yard Metrorail Station in Alexandria, Virginia, an infill station along the Washington Metropolitan Area Transit Authority's Yellow and Blue lines. Value capture is also providing a significant share of the \$2.4 billion extension of the 7 Line of the New York City Subway, as well as the \$1.9 billion Phase 1 cost of the Transbay Transit Center in San Francisco.

Parking revenues collected on-street and at city-owned lots and garages subsidize operations of the San Francisco Municipal Transportation Agency, including Muni bus and rail services. Several cities — including Oakland, Philadelphia, Seattle and Chicago — tax commercial parking lots in the central business district. Sometimes these taxes are charged per space, while other times they are charged as a percentage of gross parking revenues. There is a strong nexus between increasing the cost of parking to fund transit alternatives to driving.

Toll revenues have long provided revenue for transit operations in New York City, including Port Authority Trans-Hudson (PATH) trains and Triborough Bridge and Tunnel Authority toll revenues for Metropolitan Transportation Authority transit services. The Metropolitan Washington Airports Authority applied toll revenue to fund a significant share of the Metrorail Silver Line extension in Northern Virginia. In each case, the toll revenues support transit service in corridors parallel to toll facilities and provide an alternative to paying the toll.

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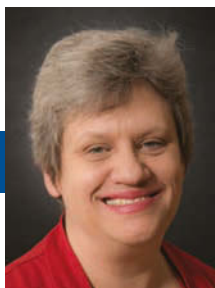
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BEST PRACTICES

Arlington, Va.

VIRGINIA UNDERSTANDS THAT transit connects businesses and riders to economic opportunity. Beginning in 2013, the legislature provided new sources of revenue for regional roadway and transit projects. Though helpful, those funds are not enough. Necessity is the mother of invention when it comes to transit funding in our region. Innovative approaches, novel approaches — such as Interstate tolling, value capture, infrastructure bank loans and public-private partnerships (P3) — are gaining ground.

Tolls from managed lanes on Interstate 66 inside the Capital Beltway will fund multimodal projects, directly benefitting those who travel the corridor. Under a planned partnership with the Virginia Department of Transportation (VDOT), the Northern Virginia Transportation Commission (NVTC) will use excess revenues to fund projects,



Kelley Coyner
Executive Director
Northern Virginia
Transportation
Commission

identified through a competitive process that will move more people through the corridor with greater reliability. Revenues, estimated at \$10 million in the first year, will rise over time as the debt from tolling infrastructure is retired.

On I-66 west of the Capital Beltway, the Commonwealth is exploring a P3 tolling arrangement. In scoping the \$2.1 billion project, VDOT has included the construction and operation of the managed lane facility, as well as support for transportation demand management and transit.

The Commonwealth's ability to toll I-66 stems from its acceptance into the Federal Highway Administration's Value Pricing Pilot Program, which is examining whether and to what extent roadway congestion may be reduced through application of congestion pricing strategies.

One of the region's more successful transit-financing tools is value capture, which taps the growth in property taxes due to proximity to transit. Fairfax and Loudoun counties have used the approach to extend Metrorail along the Dulles Airport corridor. Fairfax established a special tax district that included commercial and industrial properties around the planned stations, all of which were in the county. The tax rate was \$0.22 per \$100 of value. A similar approach is being used by both counties to help cover the costs of Phase 2.

Value capture, as well as a loan from Virginia's Infrastructure Bank, is part of the city of Alexandria's package to finance the Potomac Yard Station, which will be situated along Metrorail's Yellow and Blue lines. In January, the Commonwealth Transportation Board approved a \$50 million loan to jump start the project. The 30-year loan locks in an interest rate of 2.17 percent, lower than that of municipal bonds. No interest or principal payments are required until four-and-a-half years after contract completion.

Bethesda, Md.

WHILE TRANSIT AGENCIES ARE ENJOYING a resurgence in ridership, they face continued funding challenges. Traditional revenue sources, such as federal grants and sales taxes, remain flat or are declining. Many agencies therefore are seeking alternative revenue sources, including increased commercialization at stations and value-capture approaches — inviting new guests to the table to contribute to and partake in transit's Thanksgiving dinner.

Agencies have experimented for years with increased commercialization at union stations, including food courts and shops. Now they offer the conveniences of coffee shops, dry cleaning and ATMs at smaller stations, as well.

Some agencies, allow "domination" advertising displaying messages on every media space within a station. Improved bus shelter advertising has also increased revenues.



Sasha Page
Senior Vice
President
IMG Rebel

Agencies in Cleveland and San Diego have demonstrated there is a market for naming rights to stations and entire lines.

What can really make a difference — covering as much as 20 percent to 30 percent of a project's capital costs — are value capture techniques. When well-planned, these leverage real estate at or around stations and lines, including joint development, assessment districts tax increment financing and parking surcharges.

Agencies must view the search for revenue like a Thanksgiving meal — each family and friend must contribute and new guests need to be invited to share and share alike in transit's harvest.

Traditional and Alternative Revenue Sources

	Direct System Revenues	Other Revenue Sources
Traditional	<ul style="list-style-type: none">• Farebox• Non-farebox: traditional advertising, parking	<ul style="list-style-type: none">• State/Local taxes: including sales and fuel• State and federal grants
Alternative	<ul style="list-style-type: none">• Station-related:<ul style="list-style-type: none">◦ Retail Concessions◦ Innovative advertising◦ Air rights• Naming rights	<ul style="list-style-type: none">• Value capture:<ul style="list-style-type: none">◦ Joint development◦ Assessment districts◦ Tax increment finance◦ Impact fees• Parking surcharges• Tolls

Washington, D.C.

TODAY, GOVERNMENTS AND LOCAL authorities across the country, faced with increasing demands on their resources, are under persistent and growing pressure to justify value from public transit investments. Often times, privatization and alternative sources for funding seem appealing to people across many metropolitan areas and public-private partnership (P3) initiatives, yielding little or no success, continue to be the subject of conversation at multiple levels of government. Whether or not one agrees or disagrees with the feasibility of implementing P3s in the transit world, all of us can agree on the fact that public transit operators need to find alternative funding sources for capital investments and operations.

Historically, public transportation funding sources have included fares, federal grants, state and local general funds, property taxes, sales taxes, fuel taxes, parking pricing and levies, advertising rights and station rents. Some conservatives may argue that some of these taxes and fees are burdensome and regressive; however, if history serves us well, the past 20 years have demonstrated communities across the country are willing to tax themselves as long as the benefits of transit investments are clear. Many of the successful transit stories across the country over the past couple of decades repeatedly point to referendums where people have chosen to fund public transportation initiatives in an effort to alleviate congestion and create a better quality of life.

It appears transit funding for the 21st century must revolve around a strong federal funding program as the backbone, regional and local levies, as well as tangible incentives for private investment.

In regard to federal funding, this is perhaps the most crucial part for transit funding as it lays the foundation for every other part of an effective funding program. A reliable and well-defined federal program would introduce much-needed stability and predictability for the creation of a sustainable long-term transit program. The federal government needs to include clear incentives for states and local jurisdictions to become recipients and good stewards of federal funds and



Jose Bustamante
National Director
of Transit & Rail
RK&K

provide a reliable grants program, including an infrastructure bank for efficient implementation of transit investments.

Communities across the country are facing different challenges and in some cases, levies are just not attractive for a variety of reasons. Those communities committed to sustainable placemaking realize they must act and take the initiative when it comes to transit investment and along the way ascertain the benefits of federal funds. **MT**



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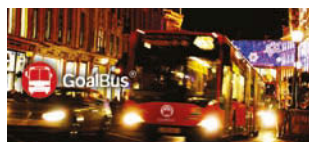
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Argo Inc.		◆								
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Brake Sentry						◆				

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Camira			◆					◆		
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Chetu										◆
CHK America										◆
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Consult Hyperion									◆	
Continental Corp.			◆							
CooCoo										◆
Covestro							◆		◆	
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Curtis Door Systems Inc.								◆		

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CycleSafe Inc.			◆						◆	
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Data Display USA Inc.										◆
Datacard Group									◆	
DataProbe Inc.										◆
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Daytech Limited			◆							
Decision Lens									◆	
Decos Mobile Solutions										◆
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Defenshield Inc.									◆	
Defibtech LLC									◆	
Delcan Corp.		◆								
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Dellner Couplers Group								◆		
Delon Hampton & Associates		◆								
Delphi Display Systems										◆
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Diamond Rubber							◆			
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Diesel Radiator Co.				◆						
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Digital Identification Solutions										◆
Digital Printing Systems Inc.						◆				
Digi International										◆
Dikita Enterprises		◆								
Dilax Systems Inc.				◆						
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Dow Automotive							◆			
Duer Carolina Coil							◆			
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DuPont Coating Solutions							◆			
DuraBrake Co.							◆			
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EMP				◆		◆				
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Engineered Plastics Inc.						◆				
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Enidine Inc.						◆				
ENSCO Rail		◆					◆	◆		
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Enviro-Solutions						◆				
Ergosynch Engineering										◆
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EverGlow NA Inc.			◆							
Evolis Inc.										◆
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Global Finishing Solutions LLC							◆			
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GMT International Corp.				◆				◆		
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Goodall Mfg				◆			◆			
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HDR		◆								
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MJM Innovations										
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Mobilitat Software										
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Motive Power Inc.										
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Moz Designs										
MTM Inc.										
MTS Sensors										
Multimedia LED Inc.										
Muncie-Baker, An ABC Company										
Mustang Dynamometer										
Mutualink										
MV Transportation										
Napa Auto										
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National Express Transit Corporation										
National Railway Supply										
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NCP Coatings Inc.										
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NexGen-Chart										
NextBus, Inc.										
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Nightstick by Bayco Products Inc.										
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Northstar Battery										
Northwest Rail Electric										
Nova Bus										

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Oniqua MRO Analytics										
ORX										
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Peerless-AV										
peiker acoustic, Inc.										
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Penn Machine Company, LLC										
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Penta Corporation										
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Perpetuum										
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Poligon										
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Precision Solar Controls										
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Proheat										
Protectolite Inc.										
Proterra										
Protran Technology										
Proxim Wireless Corp.										
PRP Industries Inc.										
Psomas										
PTMW Inc.										
PTraffic										
Pulsar Advertising										
Pure Power! Inc.										
Q'Straint										
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Quality Two-Way Radios										
Quantum Technical Services Inc.										
Quester Tangent										
Quinte Plastics Ltd.										
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RAD										
Radio Engineering Industries (REI)										
Radio Frequency Systems										

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Building Success from Positive Relationships

A positive industry culture provides stability in workforce development.



The FAST Act will provide \$48 billion on transit projects over the next five years.

In our cover story in this issue about the Conference of Minority Transportation Officials (COMTO), Mioshi Moses, president and CEO of the organization, mentions how the transit industry is big, yet close-knit. There are a lot of transit systems in North America moving a lot of people each day. And it takes a lot of transportation workers to make sure all those systems keep people moving.

Being relatively new to the complete public transportation industry, I agree. Everyone is welcoming and seems to know each other. I also noticed that once someone enters the industry, they tend to stick around for decades.

I wanted to see how big the industry is, so I looked at the APTA 2014 Public Transportation Fact Book. In report year 2012, there were:

- **Employees, operating:** 388,880
- **Employees, Vehicle Operations:** 252,061
- **Employees, Vehicle Maintenance:** 61,993
- **Employees, Non-Vehicle Maintenance:** 35,707
- **Employees, General Administration:** 39,119
- **Employees, Capital:** 12,050
- **Transit Systems:** 7,118
- **Unlinked Passenger Trips:** 10,584,000
- **Passenger Miles:** 57,117,000

Although it's a big industry, Moses mentions how friendly and helpful everyone is. She talks about the City Intern Program and how most interns end up getting a full-time job in the transportation industry. It's good to see young and talented people gravitating to the industry. It's important to keep the positive culture going to ensure this trend continues so we can strengthen transportation leadership for decades to come.



COMTO PRESIDENT and Chief Executive Officer Mioshi Moses.

It's something I'm glad to see as I continue to meet people in the industry. As I look over the 2016 conference schedule, I'm looking forward to meeting more people next year and seeing more of the latest technologies and innovations that will be hitting the streets and improving service for customers in all communities.

Adding to this excitement is the positive news that Congress agreed on the Fixing America's Surface Transportation (FAST) Act transportation bill giving \$48 billion to the transit industry during the next five years. While it's not a perfect bill, it's the first time in more than a decade the industry will see legislation providing stable funding for multiple years. It also provides funds to make much-needed improvements on our national rail system. It establishes a plan to address infrastructure needs in the Northeast Corridor and gets the ball rolling on restoration of passenger rail service between Orlando and New Orleans with the establishment of a Gulf Coast Working Group. This is great news to end the year on and begin a strong 2016.

The staff at *Mass Transit* wishes you a safe and happy holiday season filled with family and friends!

Emily Guill
Emily Guill, Publisher

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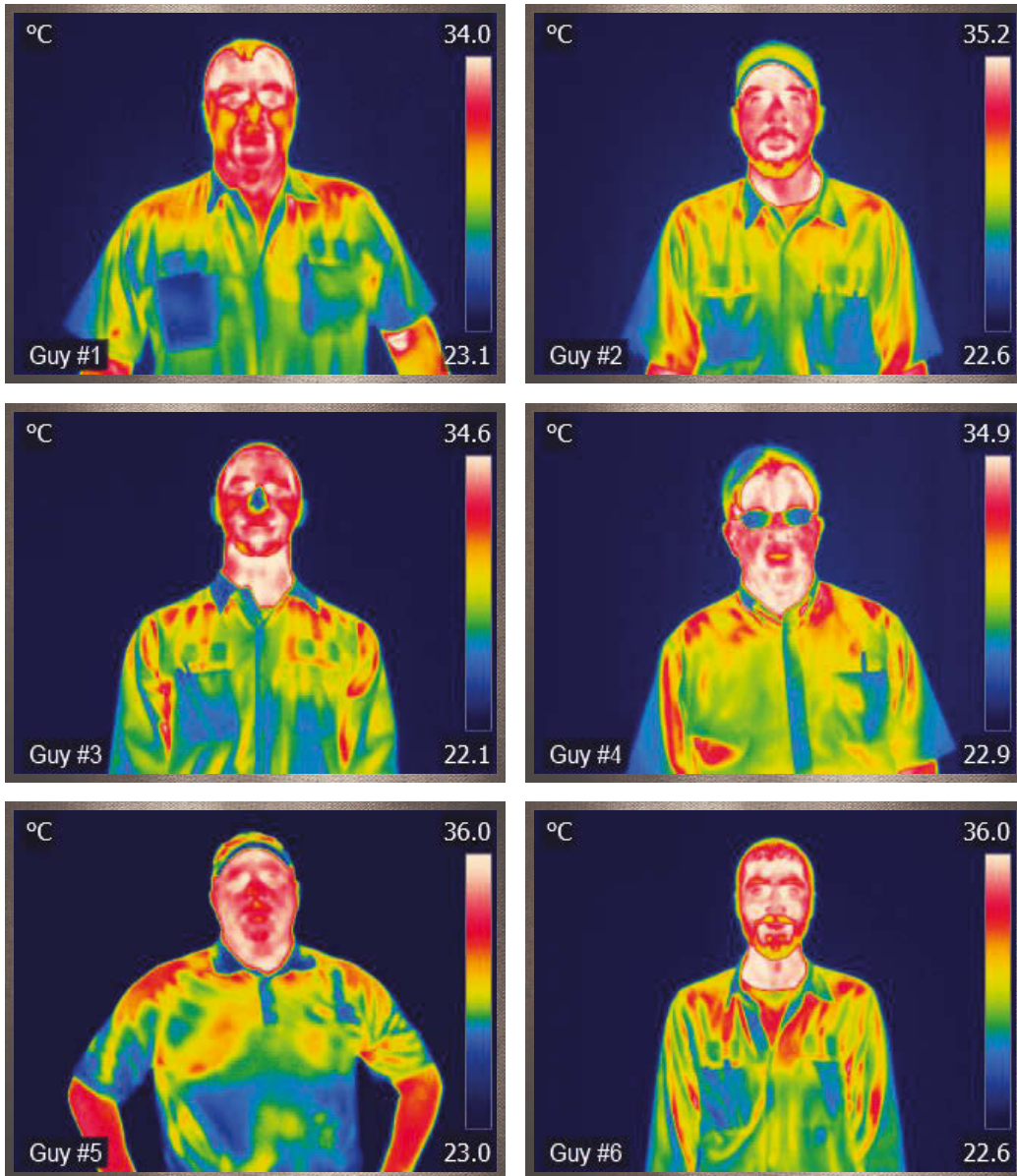


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