High-Speed Intercity Passenger

SPEEDLINES

March 2021
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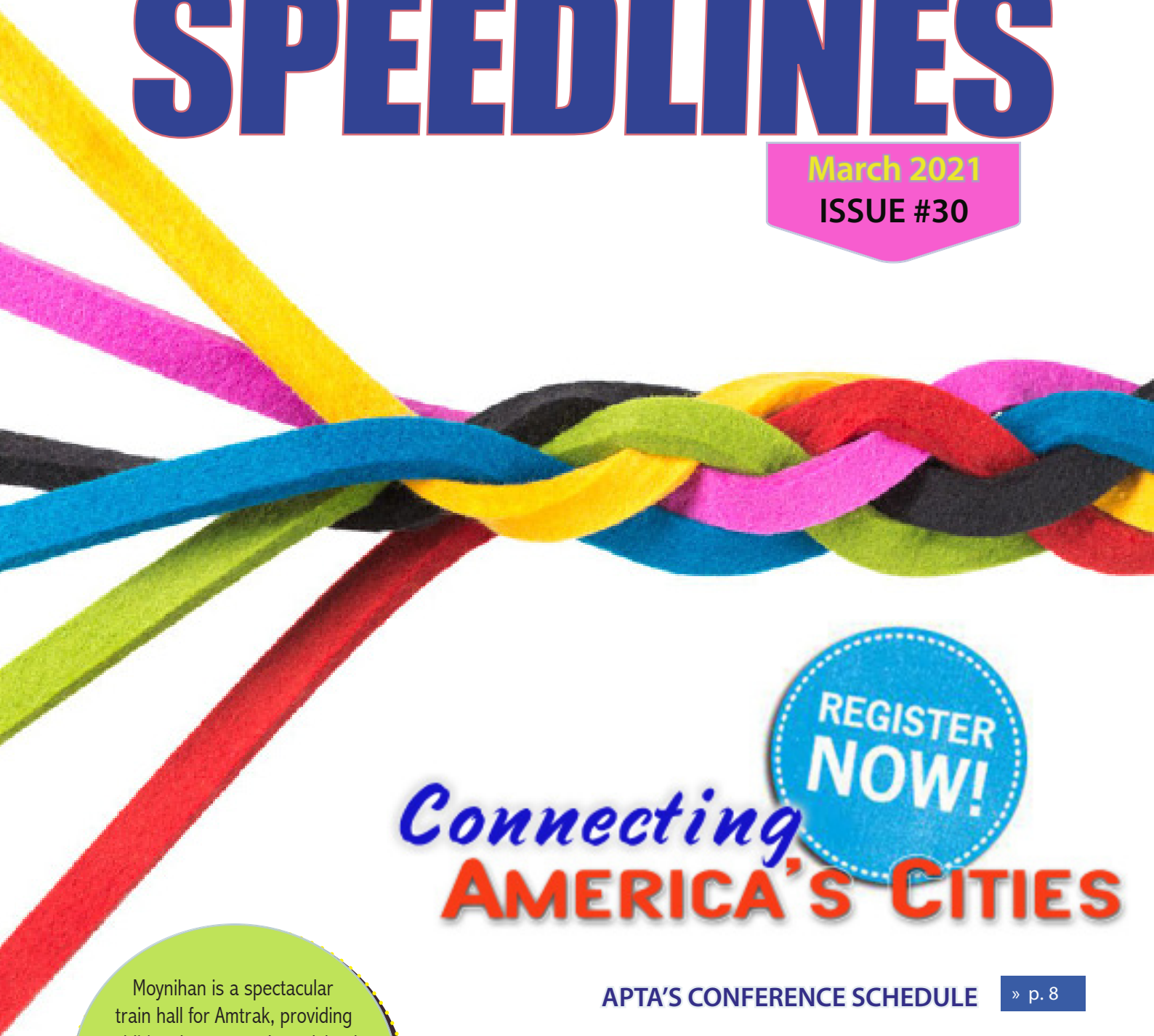

REGISTER NOW!

Connecting America's Cities

Moynihan is a spectacular train hall for Amtrak, providing additional access to Long Island Railroad platforms. Occupying the entirety of the superblock between Eighth and Ninth Avenues and 31st and 33rd Streets.

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SPEEDLINES MAGAZINE

On the front cover:
INVESTING IN ENVIRONMENTALLY FRIENDLY AND ENERGY-EFFICIENT HIGH-SPEED RAIL PROJECTS WILL CREATE HIGHLY SKILLED JOBS IN THE TRANSPORTATION INDUSTRY, REVITALIZE DOMESTIC INDUSTRIES SUPPLYING TRANSPORTATION PRODUCTS AND SERVICES, REDUCE THE NATION'S DEPENDENCY ON FOREIGN OIL, MITIGATE CONGESTION, AND PROVIDE TRAVEL CHOICES.

***ABOVE**: For decades, Penn Station has been the visible symbol of official disdain for public transit and intercity rail travel, and the people who depend on them. The blight that is Penn Station, the new Moynihan Train Hall helps knit together Midtown South with the business district expanding out from Hudson Yards.*

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1300 I Street NW, Suite 1200 East
Washington, DC 20005

HS&IPR Committee & Friends

A letter from our Chair: Joseph Giulietti

With the new year fully underway, I'm more hopeful than ever in the promise of 2021 despite the many real challenges our country, states and industry face. We are at a profound moment in history as we work to contain the pandemic and rebuild our economy (and ridership) in its aftermath. On behalf of the HS&IPR Committee, I'm happy to join our transportation colleagues from across the country in welcoming the new Biden Administration, including nominated Secretary of Transportation, former South Bend Mayor Pete Buttigieg, who has been a supporter of rail and public transportation in his city and beyond. And I can't think of too many past Presidents that have been an outspoken cheerleader for rail like "Amtrak Joe" Biden. From the onset, we know there will be major push by the new Administration for stimulus, infrastructure and climate change—high-speed intercity passenger rail is an attractive solution for all three priorities. We know the transformative impact of high-speed intercity passenger rail that would connect with Amtrak, commuter rail and other transit systems. Now is the time to seize the opportunity to really make our case as the new Administration and Congress gets to work.

Given the constraints of the pandemic, much of our work together will continue to be virtual. Make sure you mark your calendar for the High-Speed Rail Virtual Event April 7-8, 2021! And please enjoy this informative issue of SPEEDLINES, which includes articles providing an excellent overview of what's happening in HS&IPR throughout the country and the world.

Register today!

for APTA's High-Speed Rail Conference:

Connecting America's Cities. This virtual conference will concentrate on what has been called "the second great railroad revolution" — a generational opportunity before us to propel the nation's infrastructure into the future, help solve the climate emergency, and connect people more quickly and efficiently.

APTA CONFERENCE

2021 VIRTUAL CONNECTING AMERICA'S CITIES PRE-CONFERENCE

Contributed by: Jeffrey Wharton

Due to many present unknowns and restrictions, health and safety concerns for large gatherings and conferences, the APTA High-Speed & Intercity Passenger Rail Conference on Connecting America's Cities that was scheduled for April 7-9, 2021 at the Philadelphia Marriott has been postponed. This conference has been rescheduled for March 29-31, 2022 at the Philadelphia Marriott – SAVE the DATE!

However, please note that we have scheduled a new virtual pre-conference on Connecting America's Cities for April 7-8, 2021 – SAVE the DATE!

We have assembled a devoted, energetic and experienced Conference Planning Committee that is in the final stages of program development with subject matter experts. The format will include an opening keynote speaker to kick off the event, followed by three (3) one-hour sessions each day between 12:00 pm to 3:00 pm (Eastern Time). Each session will include 40 minutes of pre-recorded presentations, followed by 10 minutes of live Q&A, with a 10 minute buffer/break between sessions.

We felt that a half-day virtual schedule would allow participants to plan their day between work and conference immersion. And hopefully avoid some of the virtual fatigue that many of us our encountering in our new daily norm.

There are also plans to hold viewing parties across North America for those that are able and interested to meet in small personal gatherings to network during this mini two-day event.

While the session content has not been finalized, subjects that are being considered include:

Economic Recovery and Environmental Future to cover a brief history of why the U.S. does not yet have a national High-Speed Rail network, top level overview of job creation, economic and environmental benefits and how High-Speed Rail can work in concert with the airline recovery.

Building Bipartisan Support through a facilitated discussion with communications, branding and government affairs experts, along with actionable next steps.

Point-Counterpoint Debate that provides differing positions, attitudes and potential misconceptions that need to change among key stakeholders, with a summary of what we learned and what steps need to follow.

Economic Impact and Real Estate discussions between stakeholders, national leadership, partnerships at all levels (Federal, Regional, State, Local) and what incentives will move the needle for private investment as we analyze the return on investment metrics.

Job Creation to Get America Back to Work will dive into how rail creates jobs in rural communities with good paying construction jobs and benefits, what is needed in workforce development, and how an exchange of talent can be accessed between key employment centers.

Equity, Access & Affordability to explain the cost tradeoffs of private investment, locations to build new rail networks and how underrepresented communities would be served with actionable next steps.

The above list is subject to change but provides a general idea of the program topics that are current and applicable in today's climate.

This is sure to pique the interest of transit supporters and those that are on the fence or just unaware of what High-Speed and Intercity Passenger Rail can do for our cities and communities across America.

MOYNIHAN TRAIN HALL

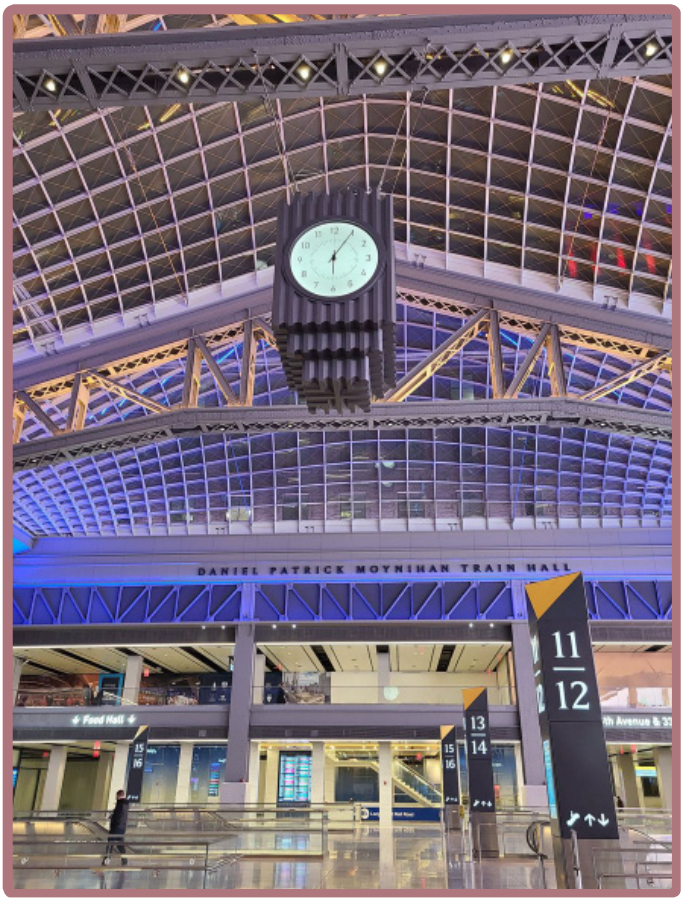
IMPROVED IMPACTS

Contributed by: Wendy Wenner and Mariah Morales

The Moynihan Train Hall expands the nation's busiest train station, Penn Station, New York across 8th Avenue into the historic James A. Farley Post Office Building, part of a mixed-use redevelopment of the entire block. The imposing century-old Post Office Building was designed by the same architecture firm, McKim, Mead, and White, as the original, iconic Pennsylvania Station. The Moynihan Train Hall offers enhanced passenger facilities for Amtrak's Northeast Corridor (NEC) and long distance travelers, including accessibility for passengers with disabilities, all within a grand Train Hall featuring a sky lit atrium approximately the size of the Grand Central Terminal's Main Hall. In concert with the forthcoming renovation of Penn Station, to better serve commuter rail passengers and Amtrak's intercity passenger arrivals, expansion of Amtrak's passenger services into the new Moynihan Train Hall relieves existing station crowding and improve passenger comfort and security.

Moynihan Train Hall was constructed in two phases. Phase I, created the "West End Concourse". The concourse provides new stairs and elevators to boarding platforms, passenger circulation space and a new entrance across 8th Avenue from Penn Station.

Phase II, now complete, created Moynihan Train Hall, a world-class intercity and commuter passenger boarding concourse for Amtrak and MTA-Long Island Rail Road passengers. The facility provides relief to Penn Station's crowded boarding conditions for Amtrak's intercity passengers and MTA-Long Island Rail Road commuter rail passengers. Accommodations include a sunlit atrium boarding concourse, a combined ticketing and baggage unit, a new Metropolitan Lounge, a new reserved customer waiting room, casual waiting space with high top tables and retail and food shops. Expansion of the train shed's emergency ventilation system will also be completed. Moynihan Train Hall opened January 1, 2021.




AMTRAK
Amtrak


STEP INTO
THE LIGHT
Train Hall
Dear New York,

A shining example of how Amtrak is investing in the future of rail. The opening of the Moynihan Train Hall reinforces our ongoing commitment to put our customers first, and we are excited to be able to provide them with this improved space.

ENHANCED CUSTOMER AMENITIES INCLUDE:

-- A grand and spacious train hall featuring a sky lit atrium

-- Dedicated customer waiting areas

-- A combined ticketing and baggage area

-- Improved passenger comfort and security

-- Accessibility for customers with disabilities

-- Complimentary WiFi in all customer spaces

-- Dedicated lactation lounge for nursing mothers

NEW METROPOLITAN LOUNGE

The Moynihan Train Hall will include a Metropolitan Lounge (formerly ClubAcela), a premium lounge space providing travelers with a high-quality experience, including:

-- Priority boarding

-- Expanded food and beverage offerings

-- Family waiting area

-- Dedicated customer service agents

-- Private restrooms

-- Complimentary WiFi

HOURS OF OPERATIONS

Moynihan Train Hall will be open to the public daily from 5 am through 1 am and closed to the public between 1 am and 5 am. Between 1 am and 5 am, all Amtrak operations will be handled at New York Penn Station, including baggage, Red Cap services, access and egress to platforms.

Stay up-to-date on what's happening with the launch of Moynihan Train Hall and be sure to take a minute to take a minute for our NEW virtual tour of the project. We can't wait for you to visit the new Hall!

2021 CONFERENCE SCHEDULE

Connecting America's Cities ..... April 7 - 8

APTA Legislative Conference ..... May 18 - 21

APTA Rail Conference ..... June 6 - 9

APTA Annual Meeting & EXPO ..... August 31 – September 3

Connecting America's Cities Multi-Day Conference ..... March 29 - 31, 2022

An estimated 100 million more people living in the U.S. by 2050, we must get started quickly.

It's time to have a conversation with Congress about the future of passenger train service.

We need to add services in the regions, cities and towns across the nation where other transportation options are constrained and we can provide a competitive service.

Passenger rail service is a practical solution for transit between local Metros and within growing Megaregions.

SHARED USE COULD BE THE ANSWER. . .

TO INCREASING COMMUTER RAIL REVENUES & PUSHING HSR FORWARD IN THE U.S.

Contributed by: John Litzinger, PE, MBA, PMP

High-speed train travel is an emerging transportation solution in the United States. Projects are in various stages of development in California, Florida, Texas and the upper Midwest. Each of these areas is making a sizable investment of time, money and resources to advance their respective programs in hopes of creating more efficient, convenient, reliable travel, connected communities and a greener environment.

While the benefits of high-speed rail are as sizable as its price tag, there could be a way to leverage this new investment even further – particularly when bringing high-speed rail service into densely developed urban centers. Instead of reserving miles and miles of new electrified track, towers, stations, etc., exclusively for high-speed rail, might local and regional commuter rail service benefit from its use as well?

Shared-use infrastructure makes sense in the approaches to major cities, where speeds would be lower for any high-speed rail system. High-speed rail is a costly endeavor that will be built segment by segment as funding becomes available. Couldn't the completed segments be put to greater use if regional commuter rail service was allowed to use them, too? Think of the revenue-generating opportunities a passenger-dedicated facility could create: greater travel time reliability, expanded local and regional service, increased ridership and possibly greater public support and funding opportunities. When planned carefully, shared infrastructure between intercity and regional/commuter rail can provide opportunities to maximize public benefits while leveraging funding from multiple sources.

PUTTING PASSENGERS BEFORE FREIGHT

Americans who have traveled to Europe and visited multiple countries by train often return to the U.S. wondering why our country doesn't have a similar rail network. Geographic size is one reason. Our country is too expansive for coast-to-coast train travel to be an efficient mode of transport. But the bigger reason is track ownership. In Europe, the government or the passenger rail operator owns the track, and their mission to move people takes precedence over moving cargo. In the U.S., the opposite is true. Freight railroads own the rails on which long-distance trains, such as Amtrak, operate. Because freight trains have the right of way, they can, and often do, affect reliable passenger train travel times.

The advancement of high-speed rail has the potential to be a transformative moment for all U.S. rail transportation. As dedicated, grade-separated, electrified high-speed rail track takes root in the U.S., regional rail operators will discover they could run electric trains instead of diesel trains and share the system with high-speed rail – potentially allowing long-distance passenger rail to migrate off of the freight railroads.

CALIFORNIA'S BLENDED CORRIDOR

California's State Transportation Agency, in conjunction with the California High-Speed Rail Authority, is advancing integrated regional rail service with nearly 500 miles of proposed long-distance high-speed rail service that will cut travel times in half from San Francisco to Los Angeles. The state's plan to share

segments of its new high-speed rail infrastructure with Caltrain, a regional commuter service, is among the first in the country.

Under the statewide rail modernization plan 49 miles of the corridor, connecting San Francisco to San José, will be a blended system, supporting both modernized commuter rail service and high-speed rail service. Caltrain contributed existing right of way to minimize impacts on surrounding communities, reduce project cost, improve safety and expedite implementation. The CHSRA contributed more than $700 million in funding to electrify the corridor.

If a similar agreement were reached on the San José-to-Gilroy high-speed rail segment, Caltrain could have even more to consider. Currently, Caltrain service from San José to Gilroy operates on track owned by Union Pacific Railroad. Caltrain's agreement with UP allows three commuter trains to run from the suburbs to the city in the morning, and three trains to operate from the city to the suburbs in the evening. There is no all-day service. But shared use of high-speed rail infrastructure could change that dynamic, allowing Caltrain to expand ridership and revenues by increasing service during peak travel times or adding midday service.

France has used this integrated network approach for years. It gradually connects new cities to the rail network and blends segments of TGV high-speed rail with conventional tracks. As new high-speed tracks are added, the system is built out, and travel times are slashed. For example, the Paris to Marseilles trip – roughly the distance of Nashville to Kansas City, Missouri, or San Francisco to San Diego – took nearly six hours in 1980. Now, it's a three-hour trip.

COMMUNITY ACCEPTANCE

High-speed rail achieves its speed and time savings because it makes fewer stops. There can be 30 miles between stations on some routes. Because of that spacing, some communities along a statewide high-speed rail route will not have a station but could be asked to contribute to the system nonetheless. Explaining high-speed rail's potential to increase regional service answers the inevitable question: What's in this for us?

When citizens learn that high-speed rail offers the potential to increase regional rail service, they often become more interested in and supportive of the high-speed program. Further, when officials understand

how high-speed rail investment could benefit local and regional service, they may be more inclined to support the program and allocate funding for it.

Of course, there will be scheduling and operation complexities to work through between users. But it can be accomplished. Caltrain and the Authority have reached a series of agreements to govern investment and operation of the corridor that could serve as a starting point for others interested in pursuing similar agreements.

OUR GENERATION'S LEGACY

The U.S. passenger rail industry has a once-in-a-generation opportunity to shape the future of service with innovative policy making that encourages shared use of high-speed rail, so that we leverage this new transportation asset to its fullest potential.

When regional service is upgraded and improved to tie in with high-speed rail, demand will reach critical mass, giving rail transportation the momentum to continue improvement and buildout. As we begin to piece the systems together, we begin to leverage and amplify the benefits of each project. After a while, you have a system people can visualize themselves using.

# # #

John Litzinger is group director and senior project manager for HNTB. He has more than 33 years of experience in the successful planning and design of public and private civil engineering projects from conceptual phases through construction. Currently, he is project manager for the team completing the environmental clearance for the San Francisco-San José-Merced sections of California's high-speed rail program. Litzinger also is an adjunct instructor at San José University - Mineta Transportation Institute (MTI), where teaches graduate classes on high-speed and intercity rail engineering and operations. Contact him at (408) 718-0343 or jlitzinger@hntb.com.


STATEWIDE RAIL MODERNIZATION
SACRAMENTO
NEVADA
SAN FRANCISCO
STOCKTON
MILLBRAE-SFO
MODESTO
SAN JOSE
MERCED
GILROY
MADERA
FRESNO
KINGS/TULARE
BAKERSFIELD
PALMDALE
BURBANK
SAN BERNARDINO
LOS ANGELES UNION STATION
NORWALK/SANTA FE SPRINGS
FULLERTON
ANAHEIM
RIVERSIDE
MURRIETA
ESCONDIDO
SAN DIEGO
LEGEND
Phase 1
Phase 2
ACE
Caltrain
Capitol Corridor
Metrolink
Pacific Surfliner
San Joaquin
Proposed HSR Stations
N
0 7.5 15 30 Miles

GLOBAL RAIL PROJECTS

ADVANCED TRANSIT CONNECTIVITY TO WATCH

Contributed by: Wendy Wenner

The global railway market is estimated to continue annual growth despite a decline in 2020 caused by the COVID-19 crisis. The maximum opportunity is in Asia Pacific, followed by the Middle East and Africa, and Europe. With majority of the projects at the planning stage, there is a huge opportunity for consultants, vendors, rolling stock suppliers, fare system equipment technologies, as well as signaling system providers. Given present trends, both passenger and freight activity will more than double by 2050. While rail is among the most energy efficient modes of transport for freight and passengers, it is often neglected in public debate. Most conventional rail networks today are located in North America, Europe, China, Russia, India, Canada and Japan. Today, three-quarters of passenger rail transport activity takes place on electric trains, which is an increase from 60% in 2000 - the rail sector is the only mode of transport that is widely electrified today. This reliance on electricity means that the rail sector is the most energy diverse and economically-friendly mode of transport. This year is expected to see the realization of substantial growth in high-profile rail projects around the world, including UK's long-delayed Crossrail line and many more.

MONTPELLIER – PERPIGNAN TGV

Country: France
Type: High-Speed
Construction Start: N/A
Completion: N/A
Length: 150km
Cost: $US 6.7bn

France is set to launch a public inquiry in autumn 2021 into the construction of the 150km high-speed line between Montpellier and Perpignan, after construction of the line was confirmed as a priority. The missing link in the Paris-Spain high-speed corridor was shelved after President, Mr Emmanuel Macron, came to power. France opened the LGV Méditerranée line from Manduel, east of Nîmes, to Lattes, west of Montpellier, in 2017. The line will be mixed use and will remove around 50 freight trains a day from the conventional route, allowing increases in local passenger services.

MILAN BLUE LINE
Country: Italy
Type: Metro
Construction Start: 2012
Completion: 2023
Length: 15km
Cost: $US 2.2bn

The first section of Milan's 15km Line M4 'Blue Line', between Forlanini and Linate Airport, is due to open in 2021. The full line will run west-east along Lorenteggio Avenue, passing south of the city centre connecting San Cristoforo, Sant'Ambrogio (Line M2), Sforza/ Policlinico, San Baila (Line M1), Dateo, Forlanini and Linate Airport. The line will be completely automated, with no drivers on the 50m-long trains. The stations, which will have platform screen doors, will also be 50m long, compared with 110m on lines M1, M2 and M3. Full automation will permit a train frequency of up to 90 seconds, which would enable the line to transport 24,000 to 28,000 passengers per hour per direction.

AUCKLAND CITY RAIL LINK
Country: New Zealand
Type: Commuter Rail
Construction Start: 2018
Completion: 2024
Length: 3.4km
Cost: $US 3.1bn

Tunnel boring for Auckland's $NZ 4.42bn 3.4km City Rail Link (CRL) underground line begins in 2021. The line, jointly funded by the New Zealand government and Auckland Council, will run from Britomart station, via the Central Business District, to the existing western line at Mount Eden station. The CRL will extend the existing commuter rail line underground to interchange with the western line at Mount Eden Station. The project is due for completion in early 2024.

ZHENGZHOU – XIANGYANG – WANZHOU HIGH-SPEED LINE
Country: China
Type: High-Speed
Construction Start: 2016
Completion: 2021
Length: 818km
Cost: $US 13.5bn

The 818km line will have a design speed of 350km/h and will connect Zhengzhou East station to Wanzhou North, with 18 stations. The 350.8km-long Henan section between Zhengzhou and Dengzhou was commissioned on August 5 2019, with the full line scheduled to open in 2021. China announced plans in August to almost double the size of its high-speed network to 70,000km by 2035. The network, already the world's biggest, currently has a total length of around 36,000km.

TEL AVIV RED LINE
Country: Israel
Type: Light Rail
Construction Start: 2011
Completion: 2021
Length: 24km
Cost: $US 3.1bn

Tel Aviv's 24km light rail Red Line is scheduled to begin commissioning in 2021. The line will link Petah Tikva mainline station with Bnei Brak, Jaffa, and Bat Yam. A further extension to Moshe Dayan interchange in Rishon Lezion is also being considered. The line includes an 11km underground section between Manshiyya/Neve Tzedek and Geha Interchange and serves 34 stations – 24 at grade and 10 underground. The line will become the backbone of the Tel Aviv's transport network and is intended to alleviate the city's most congested areas.

RENNES METRO LINE B
Country: France
Type: Metro
Construction Start: 2014
Completion: 2021
Length: 14km
Cost: $US 1.3bn

Rennes' northeast-southwest Line B is scheduled to open to passengers in 2021. The line will run from Cesson-Viasilva to Saint-Jaques-Gaîte, serving 15 stations, including two interchanges with Line A at Sainte-Anne and Gares, as well as with the city's main line station. The project includes the construction of 8.6km of bored tunnel, 2.4km of cut-and-cover tunnel, and 2.4km of viaduct. The line will be operated using a fleet of 19 Cityval trains supplied by Siemens under a contract awarded in 2013 and is expected to serve around 113,000 passengers per day.

TEXAS CENTRAL HIGH-SPEED LINE
Country: United States
Type: High-Speed
Construction Start: 2021
Completion: 2026
Length: 390km
Cost: $US 20bn

Construction of the $US 20bn Dallas – Brazos Valley – Houston Texas Central high-speed railway will go ahead in the half of 2021, following the release of the final Rule of Particular Applicability (RPA) and Record of Decision (ROD) by the Federal Railroad Administration (FRA) in September 2020. The two federal decisions established federal safety standards for operation and give environmental clearance for the selected alignment. Work will be carried out by WeBuild, Italy, and its US subsidiary, Lane Construction, under a design-build contract awarded in September 2019. The line will have an operational speed of 320km/h, 25kV ac electrification, and an elevated alignment on around 60% of its total length.

RIYADH METRO

Country: Saudi Arabia
Type: Metro
Construction Start: 2014
Completion: 2021
Length: 176km
Cost: $US 24.4bn

The Riyadh Metro project is scheduled to open its first lines in 2021. The 176km six-line Riyadh Metro project is scheduled to open its first lines in 2021, with timetable testing now underway on lines 4 and 6. Line 5 is currently undergoing carousel trials but has not yet reached the stage of replicating the full service. Work on the $US 24.4bn metro project began in April 2014. The network is intended to address extreme congestion in the city, in which around 10 million motorised journeys are undertaken every day. 80% of all journeys are taken by car, and only 2% use public transport. The metro is being developed alongside an integrated city-wide 1900km bus network, as part of an intermodal transport system.

SALVADOR ORANGE LINE

Country: Brazil
Type: Monorail
Construction Start: 2020
Completion: 2022
Length: 19.2km
Cost: $US 429.4m

Salvador's 19.2km Orange Line monorail is scheduled to open its first section in 2021. The line, which will eventually connect the Commerce District with São João island, is expected to carry 172,000 passengers per day. Work on the line began in March 2020 and is being carried out by the BYD-led Skyrail Bahia consortium. The line is one of two monorails planned for the city, alongside the 4.1km São Joaquim – Acesso Norte Green Line. Both lines are currently scheduled to open in 2022.

MAYAN TRAIN

Country: Mexico
Type: Main Line
Construction Start: 2020
Completion: 2023 onwards
Length: 1452km
Cost: $US 1.6bn

The Mayan Train project was launched in June 2020, with contracts awarded for four of the projects seven sections comprising rehabilitation of existing infrastructure and new construction. The first trains are expected to run on the line from 2023. A $US 1.97bn contract for the supply of rolling stock, ETCS, automatic train control equipment, and depots for the first five sections will be awarded on May 26. A BlackRock-led consortium emerged as the sole bidder for section 5, but the bid was voided due to concerns about its financial solvency. Progress on this section is expected in 2021. The 17-station line will run from Izamal via Chichén Itza and Valladolid, Cancun, Playa del Carmen and Bacalar, to Escárcega. The project was originally slated to cost $US 3.4bn, but this has now risen to $US 6-8bn.

CAIRO – 10TH OF RAMADAN CITY INTERURBAN LRT
Country: Egypt
Type: Interurban Light Rail
Construction Start: 2017
Completion: 2021
Length: 66km
Cost: $1.2bn

The 11-station El Salam – 10th of Ramadan City light rail line will open to the public in October, following trial operation on the line starting from August. The line will run via El Obour City, El Shorouk City, Badr City, and 10th of Ramadan City. The line is being constructed by local firm Arab Constructors and is expected to carry around 340,000 passengers per day, reducing traffic on the Cairo – Ismailia highway by around 30%. CRRC Sifang will supply a fleet of 22 six-car EMUs with a design speed of 120km/h for the line and will provide maintenance of the fleet for 12 years.

SÃO PAULO LINE 17-GOLD
Country: Brazil
Type: Monorail
Construction Start: 2012
Completion: 2021
Length: 7.7km
Cost: $US 1.3bn

The monorail project is expected to open 2021. The long-awaited Line 17-Gold is finally slated to open this year. The 7.7km-long, eight station monorail project will connect Congonhas airport, via an interchange with Line 5-Lilac at Campo Belo, to Morumbi on Line 9-Emerald. The original contract for the project was awarded to Monorail Railroad Consortium (CMI), but this agreement was unilaterally terminated by São Paulo Metro following continuous delays. São Paulo Metro signed a Reais 494.8m ($US 96.4m) contract with Constran on January 13 2020 for the resumption of civil works. BYD, China, was awarded a contract worth around Reais 1bn to supply the systems and 14 trains.

LAOS-CHINA RAILWAY
Country: Laos
Type: Main Line
Construction Start: 2016
Completion: 2021
Length: 414.3km
Cost: $US 5.28bn

The 414km standard-gauge single-track electrified line runs south from the China-Laos border at Boten to Luang Prabang, Vang Vieng and Vientiane. The line will connect China's Yuxi – Mohan line with the metre-gauge line from Tha Na Laeng near Vientiane to Nong Khai in Thailand. Civil works were completed at the end of 2019, with civil engineering works including bridges and tunnels now in their final stages. China Railway says it will begin operating international services by the end of 2021.

JOHOR BAHRU – SINGAPORE MASS RAPID TRANSIT SYSTEM

Country: Singapore/Malaysia
Type: Light Metro
Construction Start: 2021
Completion: 2026
Length: 4km
Cost: $US 875.7m

When it opens in late 2026, Johor Bahru – Singapore cross-border light metro will serve around 10,000 passengers per direction per hour. Construction of the 4km Johor Bahru – Singapore cross-border light metro will begin in earnest this month, following a groundbreaking ceremony on November 27. First announced in 2010, the line will cross the Straits of Johor, connecting Bukit Chagar in Johor Bahru, Malaysia, with Woodlands North Station on Singapore's Thomson East Coast Line. The work will be overseen by RTS Operations, a joint venture of Singapore public transport operator SMRT and Kuala Lumpur operator Prasarana, which will operate the line. When it opens in late 2026, it is expected to serve around 10,000 passengers per direction per hour.

SAN FRANCISCO CENTRAL SUBWAY

Country: United States
Type: Light Rail
Construction Start: 2012
Completion: 2022
Length: 2.7km
Cost: $US 1.6bn

The 2.7km Central Subway project is an underground extension of San Francisco's Municipal Railway (Muni) T Third light rail line. The project broke ground in February 2010, with construction now scheduled to be completed in March 2021, when testing is due to commence. The line was originally set to open in late 2018, but has been delayed to spring 2022. The Central Subway will run from downtown San Francisco to Chinatown and includes both at grade and underground sections.

LAGOS – IBADAN RAILWAY

Country: Nigeria
Type: Main Line
Construction Start: 2017
Completion: 2021
Length: 156km
Cost: $US 1.6bn

The 156km Lagos – Ibadan railway is scheduled to open for full passenger services this month, following trial operation which began on December 7. The double-track 1435mm-gauge line connects Lagos, Nigeria's economic hub and most populous city, to Ibadan, regional capital of Oyo state. The $US 1.6bn project was constructed by China Civil Engineering Construction Corporation (CCEC) and will offer an end-to-end journey time of two hours. The Lagos – Ibadan line is the first part of a planned 2733km Lagos – Kano standard-gauge route, with an estimated total cost of $US 11.12bn.

MELBOURNE AIRPORT RAIL LINK
Country: Australia
Type: Commuter Rail
Construction start: 2022
Completion: 2029
Length: 27km
Cost: $US 5.4bn

The Melbourne Airport Rail Link (Marl) will connect the city centre with Melbourne Airport. The Melbourne Airport Rail Link (Marl) will connect the city centre with Melbourne Airport, which is expected to serve 67 million per year by 2038. The Australian federal government and state government of Victoria finalized the route for the line in November, using the existing suburban tracks to Sunshine station, which will become a major interchange, with a dedicated track running from Sunshine to the airport. When completed, trains will run every 10 minutes with an end-to-end journey time of less than 30 minutes. The federal and state governments have agreed to provide $5bn each for the project, which is expected to cost $A 8-10bn.

ISTANBUL METRO M11 AIRPORT LINE
Country: Turkey
Type: Metro
Construction Start: 2016
Completion: 2021
Length: 37.5km
Cost: $US 1.1bn

The M11 Airport Line will connect Gayrettepe on the existing Line 2, with Istanbul's new main airport, which opened in 2019. The line will offer an end-to-end journey time of 35 minutes. Trains will operate automatically (GoA4) at five-minute headways at a maximum speed of 120km/h. The line, which is being built by the Kolin-Senbay joint venture, is envisaged as Phase 1 of a Gayrettepe – Halkali metro line, which will offer main line connections with the Marmaray line.

CALGARY GREEN LINE (PHASE 1)
Country: Canada
Type: Light Rail
Construction Start: 2021
Completion: 2026
Length: 20km
Cost: $US 4bn

Work on the $C 5.5bn 20km Phase 1 of Calgary's Green Line project is scheduled to begin in 2021, following the city administration's approval of the project's alignment and construction strategy in June 2020. Construction was originally scheduled to begin in spring 2020, with a completion date for Phase 1 of 2026. However, the project was delayed, in part due to the outbreak of the coronavirus pandemic. The line, which will be 46km-long when complete, will link Inglewood/Ramsay in the southeast with Crescent Heights/Mount Pleasant in the north, via the city centre. Phase 1 will be constructed in three segments.

EDMONTON VALLEY LINE WEST
Country: Canada
Type: Light Rail
Construction Start: 2021
Completion: 2027
Length: 14km
Cost: $US 1.98bn

Construction of Valley Line West is expected to be completed in 2027. Valley Line West is the 14km second phase of the 27km Valley Line light rail line. It runs from Mill Woods, via the city centre, to 102 Street, with 14 stations, and construction is due to begin in 2021. The project will be designed, built, and partially funded by Marigold Infrastructure Partners (MIP), a consortium of Colas Infrastructure Canada, Parsons, Standard General, Francl Architecture, Fast + EPP, and Stantec, under a public-private partnership (PPP). Construction is expected to be completed in 2027.

BAGHDAD METRO
Country: Iraq
Type: Metro
Construction Start: 2020
Completion: 2025
Length: 22km
Cost: $US 2.5 bn

Construction of the much-delayed Baghdad metro could start early this year with Iraq's government intending to include the project in its 2020 budget. In 2018, a consortium of Alstom and Hyundai submitted a bid for the project backed by a soft loan from a consortium of five foreign banks. The project is projected to take five years to complete.

RAIL BALTICA
Country: Estonia, Latvia, Lithuania
Type: High-speed
Construction Start: 2019
Completion: 2026
Length: 870km
Cost: $US 5.8bn

One of the priority projects of the European Union (EU) Trans-European Transport Networks (TEN-T), Rail Baltica is a joint venture for the construction of an 870km 240km/h mixed-traffic standard-gauge railway from the Estonian capital Tallinn, via Riga and Riga Airport in Latvia, and Panevezys and Kaunas in Lithuania, to the Polish border, with a branch from Kaunas to the Lithuanian capital Vilnius. The project is expected to bring a multitude of socio-economic benefits to the region and be the catalyst for building a new economic corridor. Construction is already underway on the Estonian and Lithuanian sections, with the Latvian section expected to begin this year.

MURCIA – ALMERIA HSL
Country: Spain
Type: High-speed
Construction Start: 2010
Completion: 2022
Length: 184km
Cost: $US 2.8bn

The new line will link the cities of Murcia and Almeria in south eastern Spain and will bridge a gap in the Mediterranean Corridor. The line will include two standard-gauge high-speed tracks for passenger trains with a maximum design speed of 300km/h and an 1668mm-gauge track for freight. The project is being constructed in sections, with some progressing faster than others. Work initially began in 2010. However, political disagreements have held up progress and the project was retendered in the second quarter of 2018, with reconstruction now scheduled to begin this year.

YINXI HIGH-SPEED RAILWAY
Country: China
Type: High-speed
Construction Start: 2015
Completion: 2020
Length: 618km
Cost: $US 11.6bn

The new line will connect Yinchuan and Xi'an and will serve 20 stations. Trains will travel at 250km/h and the line will have capacity for up to 30 million annual passengers. A 618-kilometer passenger dedicated rail line, the Xi'an-Yinchuan high-speed railway is expected to shorten travel time between Xi'an and Yinchuan from approximately a dozen or so hours to just three. Commissioning is expected to take place at the end of the year.

HO CHI MINH LINE 1
Country: Vietnam
Type: Metro
Construction Start: 2012
Completion: 2021
Length: 19.7km
Cost: $US 2.5bn

Ho Chi Minh Line 1 will be the first metro line in the Vietnamese capital when it opens in 2021. The 14-station line will run southwest from Suoi Tien Park to Ben Thanh in the city centre, where it will interchange with Line 2, which is currently scheduled to open in 2026. The line will offer maximum speeds of 80km/h, with a minimum headway of two minutes. The project was originally slated to open in 2018 but has been delayed by three years. Costs have also nearly doubled from an initial estimate of $US 1.4bn to $US 2.5bn.

GRAND PARIS EXPRESS – LINE 18
Country: France
Type: Metro
Construction Start: 2020
Completion: 2027
Length: 35km
Cost: $US 4.3bn

Line 18 will connect Orly airport to Versailles by 2030, serving the Saclay Plateau's Innovation and Research clusters as well as large residential areas, and include a new station at Gare de Massey-Opéra. The line will consist of a 21km underground and 14km elevated section and is part of the Grand Paris Express project to develop four automated lines spanning 200km. Line 18 commissioning milestones:

- 2024: Orly airport / CEA Saint-Aubin
- 2030: CEA Saint-Aubin / Versailles Chantiers

LAS VEGAS – VICTORVILLE HIGH-SPEED LINE
Country: United States
Type: High-speed
Construction Start: 2020
Completion: 2023
Length: 270km
Cost: $US 8bn

The plan to build a high-speed line between Victor Valley and Las Vegas secured state approval in October and will receive $US 3.25bn in bonds from the California Infrastructure and Economic Bank. The funding is a big step forward for the project and construction is now expected to begin this year. Virgin Trains USA is leading the project and there are plans for a future extension to Los Angeles.

BOGOTA METRO LINE 1
Country: Colombia
Type: Metro
Construction Start: 2020
Completion: 2024
Length: 23.9km
Cost: $US 5.1bn

The Bogotá Metro has been a topic of debate since the 1950s when the collapse of Bogotá Tramways left a void in the capital's mass transit system. In October, a consortium of China Harbor Engineering Company and Xi'an Metro Company won a $US 5.16bn contract to design, build, operate and maintain Line 1. Work on the elevated line is expected to begin in April, with construction taking four years to complete.

CHENNAI METRO PHASE 2
Country: India
Type: Metro
Construction Start: 2020
Completion: 2025
Length: 118.9km (total)
Cost: $US 6.3bn

Phase 2 comprises three separate lines spanning 118.9km and serving 128 stations. Construction is expected to begin in the first half of the year and take four to five years to complete. At present, soil tests and detailed design work is underway. To avoid delays by contractors, Chennai Metro Rail Limited (CMRL) plans to carry out station, viaduct and tunnelling work independently.

SHANGHE – HANGZHOU
Country: China
Type: High-speed
Construction Start: 2015
Completion: 2020
Length: 794km
Cost: $US 13.6bn

The new line will connect the cities of Shangqiu, Hefei and Hangzhou, which are located in three separate provinces. The project includes the construction of the 3.6km Taihu Mountain Tunnel. The 400km Shangqiu to Hefei section of the line was commissioned in early December 2019, with the remaining section slated for completion in the first half of 2020.

NORTH BOTHNIA LINE
Country: Sweden
Type: Main Line
Construction Start: 2018
Completion: 2030
Length: 270km (12km under construction)
Cost: $US 3bn

A continuation of the existing Botniabanan, the 270km Norrbotniabanan will create a direct coastal rail link between Umeå and Luleå in northern Sweden. The new line will reduce journey times between towns in northern Sweden, serving up to 1.6 million passengers per year, and permit an increase in the maximum weight of freight trains from 1100 to 1600 tonnes. The 12km Umeå – Dåva section, which began construction in August 2018, is expected to be commissioned later this year.

BAYAN LEPAS LRT
Country: Malaysia
Type: Light rail
Construction Start: 2020
Completion: 2026
Length: 29.5km
Cost: $US 2bn

The Bayan Lepas LRT will be the first light rail transit system in the Malaysian state of Penang. The planned route will connect George Town city centre with the industrial town of Bayan Lepas in the south of the island. Construction of the line was approved in April 2019 and work is expected to begin in mid-2020.

BANGKOK RED LINE
Country: Thailand
Type: Metro
Construction Start: 2013
Completion: 2020
Length: 26.3km
Cost: $US 3.1bn

Commissioning of the first section of Bangkok's elevated Red Line is expected to begin this year. Hitachi is due to complete delivery of 25 new trains for the line in June 2020 and testing on the line has begun, January 2021. The government has assured the continuation of infrastructure and electric rail development projects in Bangkok and adjacent provinces covering a total of 559 kilometres with 336 stations by 2029.

The COVID-19 pandemic has disrupted the global transport sector and the people and businesses that rely on it in unprecedented ways. Across the globe, rethinking mobility is now a priority to build back better, with safer, more resilient and efficient transport systems for all.

The Amtrak Board of Directors appointed Stephen J. Gardner to President, effective December 1, 2020. In this role, Stephen leads the company's day-to-day operations, with an emphasis on regaining and growing customers and partners through the strong delivery of Amtrak's Annual Operating Plan and the company's long-term goals. Stephen is also responsible for modernizing Amtrak's products, services, infrastructure and fleet. As President, Stephen has oversight for Marketing, Operations, Planning and Asset Development, and Government Affairs and Corporate Communications.

2020 AMTRAK WINS METROLINK OPERATIONS CONTRACT

Amtrak announced that Metrolink, Southern California's passenger train service, awarded Amtrak a four-and-a-half-year contract for commuter train operations services that will begin on January 1, 2021 and expire on June 30, 2025. As part of the contract, Amtrak will provide and manage engineers and conductors to operate Metrolink trains, playing a significant role in safety and customer service. Amtrak's proposal was selected from a field of five proposers.

"We are honored to continue serving Metrolink and the communities and residents of Southern California. We look forward to building upon our many years of partnership and helping the agency achieve its bold vision of growth and improvement," said Amtrak President, Stephen Gardner.

Metrolink is an easy and accessible way for families, couples, and individuals to travel, with its spacious double-decker trains and sizeable windows which offer views of the beautiful SoCal scenery — including mountains, ocean, and city views that travelers can often miss while sitting in freeway traffic. Metrolink – combined with other mobility options – is the lifestyle choice for Southern Californians interested in improving the region's air quality and reducing traffic congestion.

BUILDING A NETWORK FROM SEATTLE TO PORTLAND - REALITY?

This fascinating briefing was given in House Transportation Committee. It is a true vision for the region in support of a new railway system across the state of Washington. It is called Cascadia Rail, this is an old idea brought up back in 2018, but conversation is being had about it once again. The proposed rail system would connect Vancouver to Seattle and Seattle to Portland in less than 90 minutes.

CALIFORNIA HIGH-SPEED RAIL AUTHORITY CONTINUES PLANS FOR LINE CONNECTING BAKERSFIELD, MERCED AND FRESNO

California's High Speed Rail Authority reaffirmed its plan to construct a service line from Merced to Bakersfield. The board adopted a revised business plan that expands an electrified service line connecting Merced, Fresno and Bakersfield to 171 miles instead of 119 miles.

A final plan will be submitted to the legislators by April 15, 2021.

U.S. Rep. Seth Moulton (D-Mass.) has introduced the American High-Speed Rail Act just as Congress turns its focus to infrastructure. The bill would invest $205 billion into high-speed rail, create at least 2.6 million direct American jobs over five year, and provide Americans with a new travel option that's safer than driving, cleaner than flying and never delayed by weather, Moulton said in a press release.

Private high-speed rail developer Texas Central is another step closer to starting construction of a $20 billion, 240-mile line connecting Dallas and Houston. The Federal Railroad Administration (FRA) has released the final Rule of Particular Applicability (RPA) and Record of Decision (ROD) that establish federal safety standards for operation and give environmental clearance for the selected alignment, respectively.

Congresswoman Eleanor Holmes Norton (D-DC) sent a letter to Secretary of Transportation Pete Buttigieg asking him to include funding for the Washington Union Station Expansion Project (SEP) in the Biden administration's Build Back Better proposal. As the second most senior member of the Committee on Transportation and Infrastructure, Norton has long championed public transportation and supported expanding Union Station.

"Given that Union Station is federally owned and that President Biden has emphasized the need for greater investment in high-speed rail and infrastructure, the SEP should receive priority consideration," Norton said in the letter. "The SEP is a historic opportunity to ensure that Union Station is a multimodal transportation hub that is seamlessly integrated into a thriving mixed-use neighborhood in the nation's capital. This goal can only be fully realized with federal funding."

Amtrak unveiled a $72 million project adding an electrified third rail to the northeast corridor through Delaware. Elected officials joined The expansion, along with other repairs and updates, are expected to improve on-time performance and reduced delays caused by the two-track bottleneck on that stretch of tracks.

On December 22, 2020, the Federal Railroad Administration published a Notice of Proposed Rulemaking soliciting public comments on its Fatigue Risk Management Program (FRMP). This rulemaking would require each entity that provides intercity rail passenger or commuter rail passenger transportation, defined as a Passenger Rail Operator, to establish and implement a Fatigue Risk Management Program as part of Passenger Rail Operator's System Safety Program Plan (SSPP). This rulemaking would also require railroads to establish and update, at least once every two years, a written FRMP. The inclusion of a FRMP, while a required statutory element of a railroad's SSPP, was deferred in the original Part 270 Passenger System Safety Program rulemaking. The deadline for submitting the Part 270, Passenger System Safety Program Plan remains unchanged at March 4, 2021.

NPRM comments must be filed to the docket by February 22, 2021 using the link in the NPRM. Download the NPRM at this Federal Register link: https://www.federalregister.gov/documents/2020/12/22/2020-27085/fatigue-risk-management-programs-for-certain-passenger-and-freight-railroads. Under this rule, FRA expects railroads to more efficiently use their resources to address safety-critical employee fatigue issues, leading to marginal improvements in fatigue-caused accidents. Based on NTSB accident reports from 2000-2014, there have been 11 rail accidents in which fatigue was a factor, resulting in 116 injuries, 16 fatalities, and $47 million in property damages.

FRICTIONLESS, HIGH-SPEED TRANSPORTATION:

HOW AIR CUSHION VEHICLES (ALMOST) REPLACED THE WHEEL: 1955-1975

JIM COHEN, PH.D., PROFESSOR EMERITUS AND ASSOCIATE DIRECTOR OF RESEARCH INSTITUTE FOR TRANSPORTATION SYSTEMS, THE CITY UNIVERSITY OF NEW YORK

THIS IS AN ABBREVIATED AND MODIFIED VERSION OF A CONFERENCE PAPER PRESENTED AT THE SOCIETY FOR THE HISTORY OF TECHNOLOGY ANNUAL MEETING IN OCTOBER, 2018. IT DESCRIBES FINDINGS FROM THE FIRST PHASE OF A RESEARCH PROJECT ON THE HISTORY OF TRACKED AIR CUSHION VEHICLES (TACV'S) AND PERSONAL RAPID TRANSIT (PRT). IN THE CURRENT PHASE OF THIS RESEARCH, PROFESSOR COHEN'S IS INTERVIEWING PEOPLE WHO PARTICIPATED, DIRECTLY OR INDIRECTLY, IN THIS HISTORY. IF YOU PARTICIPATED IN, AND/OR HAVE RELEVANT INFORMATION ABOUT THIS HISTORY, PLEASE CONTACT JIM COHEN AT: JCOHEN@JJAY.CUNY.EDU

INTRODUCTION

Approximately fifty years ago, a new ground transport technology, called tracked air cushion vehicles (TACV's), was tested in the desert sands near Pueblo, Colorado. It involved high speed vehicles that floated on a cushion of air above a fixed guideway, designed to carry passengers between cities at speeds of up to 300 miles per hour, or between downtown centers and airports at somewhat slower, but still high speed. This was, arguably, the most revolutionary development in ground transportation since the invention of the steam locomotive. (Personal Rapid Transit, or PRT, was a similarly radical system for urban mass transit that was proposed in the 1960's and 70's. This paper focuses on TACV technology.)

In the early 1970's, TACV's appeared to herald a new era of frictionless vehicles gliding noiselessly over land and water. Contemporary scientists, transportation professionals, government officials, and leaders of aerospace and transportation manufacturing corporations predicted that this new technology would replace railroads with steel wheels on steel rails. Being frictionless, TACV's had fewer moving parts than trains. Lacking wheels, TACV's would avoid the "hunting oscillation" problem that trains experienced at speeds above 140 mph, where their wheel flanges hit the rails with increasing frequency, increasing rolling resistance. And the guideways on which TACV's operated would be less complex and, therefore, less expensive both to construct and maintain than infrastructure for steel wheeled trains. In short, a truly radical departure from the past.

HISTORICAL BACKGROUND

The air cushion concept was first developed in the late 19th century by a British naval engineer, John Thornycroft, who discovered that drag on a ship's hull could be reduced "if the vessel were given a concave bottom in which air could be contained between (the) hull and (the) water." However, engineers subsequently were unable to hold the air cushion in place. Then, in the early 1950's, a British scientist, Christopher Cockerell, theorized that if air

is pumped under a moving vehicle, it "would flow towards the center of the vessel, forming an external curtain that would effectively contain the cushion." Cockerell went on to patent air cushion technology and, in 1956, formed a company to exploit its commercial advantages. In 1959, Cockerell's company launched the world's first commercial air cushion vehicle, called a hovercraft.

In the photo above, note how the Hovercraft uses aircraft engines with propellers for propulsion, and, though you can't see it, another engine inside the vehicle is blowing air into the skirts and lifting the vehicle above the water. An earlier version of this particular Hovercraft crossed the English Channel in record time. The British soon thereafter turned to land based applications of air cushion technology.

At this same time, in France, Jean Bertin, an aircraft engineer, incorporated the Aerotrain Company, with the stated intention to "transfer…aeronautical (i.e., aircraft) technology to other industries." In 1963, he demonstrated a miniature model of his Aerotrain, propelled by an aircraft engine, to the French Government, and soon thereafter was awarded public funding to develop land-based, high speed, air cushion vehicles.

In the United States, the concept of air cushion technology found a receptive audience because the rapid growth of superhighways and air transport, population growth, and demographic shifts towards cities and suburbs, was creating a new situation: congested intercity corridors, especially in the Northeast, Midwest, and on the West Coast. Newspapers, books, and television programs bemoaned the rise of "megalopolis" and the artificial cutting off of neighborhoods from one another by superhighways built through city centers. While air transport attenuated this situation somewhat by moving people quickly across medium and long distances, airports faced problems finding land on which to expand, and lack of adequate urban mass transit from city centers to airport terminals lengthened considerably the door to door duration of trips by air. In short, by the mid-1960's, many states and cities in the U.S. were interested in transportation improvements.

This provided the context for a wave of enthusiasm for new forms of high-speed technology in the U.S. For example, the TRW Group, a leading aerospace and transport engineering firm, reported that building an air cushion vehicle that can travel at 200-300 mph was "not particularly difficult…and within the present state of the art…". The New York Times ran headlines about how the British and French were "replacing the wheel," and that "(a) number of government and industry…leaders… envisage virtually silent, pollution free air cushion transit systems swishing between cities at 250 miles an hour…"

In 1964 and 1965, the U.S. Congress enacted Urban Mass Transportation Act and High Speed Ground Transportation Act—both of which funded development of air cushion vehicles—the former for cities, the latter for inter-city transport. The High Speed Ground Transportation Act mandated two major activities: first, research and development (R&D) on both high speed, steel wheeled Metroliners, and on alternative types of high speed transport, such as air cushion vehicles; second, demonstration projects for both Metroliners and new technology.

DEVELOPMENT OF AIR CUSHION TECHNOLOGY IN THE U.S.

Very soon after the HSGT Act was enacted, OHSGT initiated a series of engineering studies, which produced design parameters for air cushion transport sub-systems, including vehicle propulsion, compressors for lift; vehicle suspensions; guideways on which vehicles would operate; safety; communications; and power distribution, among others. Following this, OHSGT contracted with Garrett AiResearch, in 1966, to develop a radically new kind of propulsion. Called a linear induction motor (or LIM, for short), it could replace propellers

or jet engines. By October, 1967, Garret had begun fabrication of a full-scale linear induction motor research vehicle. A photo of the Garrett AiResearch Linear Induction Research Vehicle is shown below.

In early 1967, DOT signed a contract with Jean Bertin's Aérotrain Company in France, and the following year with Tracked Hovercraft of England, to exchange technical information, so that DOT could build upon existing R&D on frictionless technology. At the same time, Bertin sold 60% ownership and licensing rights of its American subsidiary, Aeroglide Systems, Incorporated, to Rohr Industries, an aerospace and transportation manufacturing firm. Partly using Bertin's technology, Rohr subsequently became a contractor for DOT.

In December, 1969, DOT purchased land near Pueblo, Colorado, for a High Speed Ground Transportation Test Center--a major step forward for testing both steel wheeled and alternative technologies. This was the first such facility ever constructed in the U.S.

In March, 1970, Grumman Aerospace began construction of a full scale, tracked air cushion

research vehicle, levitated by onboard air compressors and propelled by an electric linear induction motor. The Grumman vehicle's maximum design speed was 300 mph, and it was intended for service on major intercity corridors throughout the country. Grumman's tracked air cushion research vehicle was completed in March, 1972; then displayed at TRANSPO, a huge, international transportation exposition held near Washington, D.C. in late May, 1972; after which it was shipped to Pueblo, Colorado, for testing at the newly constructed High Speed Ground Test Center.

In March, 1972, Rohr Industries began fabrication of a 150 mph, 60 passenger, air cushion vehicle, levitated by air compressors and propelled by an electric linear induction motor. DOT planned to use this type of vehicle to connect city centers to airport terminals. DOT attempted to implement two demonstration projects, one a 13.5 mile line from the Washington, D.C. suburbs to Dulles International Airport; the other a 16 mile line from the San Fernando Valley area to Los Angeles International Airport. Rohr completed a full scale vehicle in 1973, and shipped it to Pueblo for testing.

From 1972 to '75, the Grumman, Rohr, and Garret vehicles were tested at Pueblo. Rohr's urban air cushion vehicle reached a maximum speed of 145 mph, close to its 150 mph design speed. While Grumman's intercity vehicle reached only a maximum speed of 91 mph, far below its design speed of 300 mph, the linear induction motor research vehicle reached 255 mph on steel wheels. This supported expectations that, with the Garrett LIM, the Grumman ACV would attain its 300 mph design speed. These were considerable accomplishments in a relatively short time period. They showed that air cushion technology was feasible, and that ACV's could potentially travel far faster than steel wheeled trains. Why, then, didn't this technology ever get implemented in a demonstration project somewhere in the country, as called for in the 1965 Act? And, why weren't any aerospace or transport corporations able to commercialize air cushion technology?

The following are some preliminary answers. First, when the 1965 Act went into effect, DOT suggested that British experiments with hovercraft on water, and Bertin's Aérotrain in France, provided a significant technological head start for ACV development

by American companies. That was wrong, since both the British and French technology were in an early stage of development, and faced many technological problems, such as excessive noise from the propulsion and lift engines; difficulty keeping the air cushion under the vehicles; and inability to maintain a smooth ride on guideways. Thus, while the British and French work was helpful, it did not provide sufficient scientific knowledge to assure success of air cushion technology in the U.S.

Not surprisingly, therefore, Grumman and Rohr Industries, the primary American contractors, confronted numerous problems as they moved forward with their R&D. Most importantly, they had trouble figuring out the specific type of levitation subsystem that would work best. As late as 1975, Grumman reported "chronic difficulties in attempting to calibrate the sensors used to measure the operating gap (or hover height)…without (which) it was not possible to determine accurately air-cushion operating characteristics."

In addition, while Grumman and Rohr were smart to choose a linear induction motor (LIM) for their propulsion subsystem--because that technology had reached an advanced stage of development--LIM's still required considerable R&D, such as whether to opt for a single or double sided motor, or a linear synchronous versus linear induction motor. More importantly, by the early 1970's, a relatively new technology, called magnetic levitation (maglev), entered into the mix of choices for propulsion and levitation, and it appeared to be more effective than what Rohr and Grumman were developing. But, by that point in the process, DOT and its contractors were trying to meet unrealistic deadlines for moving their systems to an operational stage; for example, Rohr was planning to actually start operating its 150 mph vehicle as part of a Los Angeles Airport demonstration project by end of 1973 or early 1974. And DOT had been talking publicly about implementing Grumman's 300 mph ACV "by the end of the decade." In the early 1970's, DOT's top officials were boxed in by their commitments in the media and, more importantly, commitments to President Nixon, to show operational results in the not distant future. They did not have the time or money to switch to maglev technology, itself still in an early stage of R&D. Thus, they proceeded forward with their own flawed technology.

Another problem involved testing the new technology. The land for the Pueblo Test Center was not purchased until late in 1969, and construction of its facilities did not begin until well into 1970. As a result, to cite a major example, guideways of sufficient length were not available to test vehicles at their design speeds even as late as 1975. This is just one of many examples where lack of fully developed test facilities interfered with the R&D of DOT and its contractors.

Insufficient funding was a final factor that impeded R&D on air cushion technology. For example, for the first three years of implementing the 1965 Act, Congress authorized $90 million, but only appropriated approximately 67 percent of that amount. This pattern persisted throughout the ten years the Act was in force. Thus, R&D on air cushion technology never received the level of funding needed to fully resolve innumerable technical problems. All of these factors, as well as changes in leadership both in DOT and in the Presidency--Nixon resigned in 1974; Ford took over—led to a decision by the Ford Administration to "redirect" DOT's R&D priorities towards support of "conventional rail problems (with existing) ground transportation," especially for Amtrak and its steel wheeled trains. As of 1976, the R&D budget would contain no further funding for levitated vehicles. Ever since the early 1980's, the only place one can find physical evidence of air cushion technology is in a transport museum in Pueblo, Colorado, where the Grumman and Rohr prototype vehicles are on display.

ANALYSIS AND CONCLUSIONS

The rise and fall of air cushion technology raises a number of questions. First, in the 1950's and 1960's, why were many knowledgeable scientists, engineers, and transportation experts, among others, so highly enthusiastic about the potential for implementing frictionless transport, given the well-known difficulty of developing and commercializing any almost entirely new and untested technology? One reason, I hypothesize, was the great faith in science, at this particular historical moment, to solve any technical problem

pertaining to transportation. The recent invention and commercialization of jet aircraft in the 1930's, 40's, and 50's had revolutionized long distance travel, and both supersonic travel and space exploration were on the horizon. Officials and engineers at Grumman, Rohr, and other American aerospace companies, were proposing that they could develop technology to solve almost any transport problem. Their optimism was enhanced by American competitive nationalism, which is most evident at that moment in the Kennedy Administration's program to overcome the Soviet Union's lead in space exploration, after that nation launched Sputnik. Much of the zeitgeist of the era is captured by President's Johnson's statement when he signed the High Speed Ground Transportation Act in 1965: "(T)he same science and technology which gave us our airplanes and our space probes…could also give us better, faster and more economical transportation on the ground."

A second important question is: why did the Federal Government withdraw so completely from research and development on frictionless ground transport technology, in 1975-1976? In spite of numerous technical problems, progress had been made with air cushion technology. Moreover, significant progress was being made with magnetic levitation technology in the U.S., Germany, and Japan. If the U.S. government wanted to support industrial development, it would have continued R&D on frictionless technology. It did not because, as Judith Stein argues, by the mid-1970's, the so-called "Keynesian consensus" to use government spending to stimulate economic development, had eroded significantly. By the time Gerald Ford became President in 1974, neo-liberal ideology had begun to infuse fiscal policy, which doomed many domestic spending programs.

Finally, did R&D on air cushion technology contribute to the decline of transport manufacturing in the U.S.? Recall that, in the 1950's and early 1960's, the U.S. was a world leader in innovation for steel wheeled trains. The Budd Company and Electro-Motive Corporation, for example, had developed, respectively, lightweight steel alloy railcars and the two stroke diesel engine, innovations that provided the foundation for high speed Streamliners in the U.S., in the 1930's, 40's, and 50's. These innovations were adopted by many other countries, not least Japan, which relied partly on American technology to develop its groundbreaking, very high speed Bullet Train, which began commercial service in 1964.

So, what happened to both the innovative manufacturers of high speed, steel wheeled trains and to the aerospace and transport manufacturing companies, such as Rohr and Grumman, that invested in frictionless technologies? While Grumman stayed in the aerospace business, and even produced some new transport vehicles, Budd was purchased by ThyssenKrupp, a German conglomerate, in the 1980's, and stopped its rail manufacturing work. Rohr Industries merged with Goodrich and then United Technologies, and stopped working in urban and intercity transport. I hypothesize that many U.S. transport manufacturers changed their business priorities partly because the U.S. government stopped funding the R&D that would have helped keep them in that sector. This is only a preliminary hypothesis, which requires further research.

In conclusion, from 1965 to 1975, the U.S. government, working closely with leading aerospace and transport manufacturing companies and the scientific community more broadly, engaged in a major initiative to develop and commercialize high speed, frictionless, ground transport technology. In combination, they made great leaps forward towards those ends. However, they also made unrealistically optimistic predictions and plans about the time it would take to successfully develop an entirely new technology—an optimism shaped by a belief, prevalent in that era, of the ability of American science and technology to solve problems. Also, Congress never appropriated sufficient funds to do the long, difficult work of developing and testing the new technologies. Finally, because of erosion of the "Keynesian consensus" in the American political in the 1970's, government support was ended for research and development of new technologies. As a result, what began in the 1950's and 1960's with high hopes and a belief that American ingenuity could conquer all transportation frontiers, ended with the rapid decline of manufacturing capabilities in this sector in the late 1970's and 1980's.

THAILAND AWARDS HSR PROJECT

EMERGING RAIL HUB RECONNECTING ASIA

Contributed by: James Michel

Virgin Trains USA's proposed high-speed train between STATE Railway of Thailand (SRT) continues to advance the high-speed railway project of 873km from Bangkok – Nong Khai. Construction began in 2018, with the line currently scheduled to open in 2023. A third major contract worth US$249 million for the section Bangkok – Nong Khai was awarded to the SPTK joint venture in October 2020. The line will be operated using Fuxing high-speed trains supplied by CRRC, and will support operational speeds of 250km/h.

The SPTK contract is for the construction of a total of 13.68km of railway along a 12.38km route, as well as the renovation of Nakorn Ratchasima station and the construction of a new station at Phu Kao Lat. The contract also covers the construction of earthworks, retaining walls, piling, noise barriers and drainage, and the implementation of utilities including electricity and water at the stations.

The Thai cabinet has authorized the Ministry of Transport to increase the overall budget for the 252.2km Bangkok – Nakhon Ratchasima high-speed section by $US 380 million to fund a vehicle maintenance depot, a track welding facility, a welded rail and track storage base, and convert to the line to direct-fixation track structure to reduce maintenance costs in the future.

Mariah Morales and R.J. Incandela - Amtrak, Government Affairs

AMTRAK'S CARRY-ON BIKE PROGRAM EXPANDS IN 2021

This fall, Amtrak continued expanding the Carry-on bike program for most Northeast Regional departures. The new racks, retrofit in select baggage towers, allows customers to store their bike inside of the passenger coach in the designated rack space.

Amtrak worked with its various Northeast state partners to offer the program on State-Supported trains including Pennsylvania Department of Transportation (PennDOT) for Keystone Service, the Northern New England Passenger Rail Authority (NNEPRA) for Downeaster trains and the Connecticut Department of Transportation (CTDOT) for Amtrak Hartford Line.

"Bringing your bicycle onboard a train is part of the journey, as it allows our customers to explore the cities they are visiting," said Amtrak Executive Vice President, Chief Marketing and Commercial Officer Roger Harris. "To coincide with the increased popularity of biking in this country, we also wanted to provide our customers with the option of bringing their bike on more trains." More than 232,953 bikes have traveled around the country since the program launched in October 2015. The program has also generated more than $1 million in revenue since its inception.

HOW DOES THE NEW SERVICE WORK ON THE AMFLEET I CARS?

Utilizing newly installed luggage racks that convert to bike racks, the expanded bike program will allow Amtrak to provide storage space for up to two bikes per departure, with additional spaces being added as the rest of the fleet receives these modifications. Standard full-size bicycles may be carried on, as long as the front wheel is removed (as pictured) and stored onboard in bicycle racks and specific reservations are required.

For any Carry-On bicycle service, customers are encouraged to arrive at the station at least 30 minutes prior to departure. All panniers and bags attached to your bicycle need to be removed and consolidated before boarding. After entering the origin and destination when booking a ticket on Amtrak.com or via the Amtrak app, an icon with a number of spaces available will display if bike service is available. Customers should proceed 'Add Ons' step to add bikes to a reservation. Customers can also call 1-800-USA-RAIL to add a bike reservation to an existing reservation.

NEW GEN OF FARE COLLECTION

TRANSIT AGENCIES AROUND THE COUNTRY ARE SHIFTING

Contributed by: Bernard Cohen

In signing the Civil Rights Act of 1964, President Lyndon Johnson called it the next step in "the unending search for justice within our own borders." Title VI of that act directs federal agencies administering financial assistance by way of grants, contracts or loans to guard against discrimination based on race, color or national origin and authorizes them to terminate or refuse to grant financial assistance absent compliance with civil rights requirements. As a result of this landmark legislation, the public transportation industry has long worked to address equitable treatment of the public related to many facets of service delivery, related to affordability, access, connectivity, reliability, and frequency. This article focuses on a more recent equity challenge emerging from the push to make revenue collection and payment as seamless and convenient for customers as possible.

Ticketing systems and payment options have evolved significantly from the days when passengers paid cash for paper tickets (or tokens) and agencies employed armored cars to transport bills from stations to central money counting rooms. Today, consumers have vastly more choices when it comes to accessing travel information, purchasing tickets and paying for the service. And, rail train operating agencies companies also have new choices for managing the process of collecting revenues. Increasingly, transactions for all types of goods and services are taking place by clicking or tapping or flashing, whether by computer, credit card, smart watch or mobile phone. Americans are looking to public transportation for the very same convenient payment options they enjoy for other types of transactions that make up their daily lives. The Covid-19 pandemic has made the advent of contactless payments even more compelling. Many transit agencies see this added element of payment "convenience" as a critical tool for increasing ridership. "Accept whatever is in the rider's pocket" seems to be the new mantra. As a result, agencies are moving rapidly to offer multiple payment options, many of them linked to personal accounts. This e-ticket migration is giving transit agencies better data; more options to partner with multi-modal services (e.g. bikeshare), and greater ability to offer incentives, rewards and pricing options (e.g. fare capping) to their customers. Eliminating cash in the system also helps to speed up boarding and to reduce both cost and risk. However, enjoying this convenience requires that passengers have all of the tools and resources needed to take advantage of electronic fare payment. Not all do. A 2017 study by the Federal Deposit Insurance Corporation. found that 25 percent of U.S. households are either "unbanked" (no bank account) or "underbanked," meaning they have a bank account but still use financial services outside the banking system to make ends meet. Reality check: A sizable percentage of transit users in many parts of the country still buy single-ride tickets and pay with cash every time they ride. A Pew Charitable Trust report published in 2019 stated that 27 percent of Southeastern Pennsylvania Transportation Authority (SEPTA) riders pay with cash. Similarly, a 2019 survey conducted by the Greater Cleveland Regional Transit Authority (GCRTA) showed that more than 20 percent of low income and minority frequent riders use cash to purchase single ride tickets. An additional 25

percent of low-income and minority frequent riders buy all-day passes, according to the survey. Less frequent riders rely even more heavily on cash.

While the rate of smart phone ownership has been climbing steadily over the last decade, nearly 20 percent of Americans still do not have one. "We still get a ton of pennies in our fare system because at the end of the month people are scraping together pennies in order to ride," Gary Rosenfeld, President and CEO of the Memphis Area Transit Authority, said at a recent conference on fare collection sponsored by Global Mass Transit. To comply with Title VI, transit agencies conduct studies to analyze potential disparate impacts of policy changes on minority communities. In addition to Title VI, the FTAederal Transit Administration requires transit providers to also evaluate the impact of fare and service changes on low-income populations. The current trend away from cash and toward contactless card and mobile payments is an emerging equity issue that many transit agencies around the country are grappling with as they move to modernize their fare collection systems. Related potential equity issues associated with e-ticketing include the cost of cards; dollar amount load minimums; gaps in the retail sales network, and concern about having to provide personal information when registering a card. What has become clear to many transit agency leaders is that policy choices need to be carefully thought through well before technology decisions are made. Community engagement, rider surveys, peer reviews, political alignment, and close attention to Title VI and FTA requirements are pre-requisites for moving forward with modern revenue collection systems that eliminate or reduce cash as a form of payment. "When you roll out projects like this, it's the policies and the business rules that are often the most difficult decisions to make," said Al Putre, Vice President and Chief Revenue Officer for MTA New York MTA, City Transit, which is in the process of rolling out a $500 million contactless payment system known as OMNI for the region's subway, bus and commuter rail network. Putre said 12 percent of its New York City Transit's customers are unbanked, and the agency is currently grappling with a number of policy issues related to reduced fare customers. Other agency leaders who also participated in the Global Mass Transit meeting echoed Putre's words of caution. "The need to settle policy ahead of choosing technology is something many of our jurisdictions have struggled with," said "Annnalise Czerny, who heads the Presto payment system, even as the pace of e-ticketing among the 11 Metrolinx agencies using Presto in Canada has accelerated due to the pandemic. Ryhan Schaub Director of Fare Revenue and Administrative Services at Tri-Met in Portland, said, "the question of cash is a long-standing one; we're always focused on it in our industry."

Tri-Met offers the HOP Fastpass, a mobile phone payment option tied to either a virtual Hop card or customer credit/debit card accounts. Shaub said that cash was banned for a while on Tri-Met buses due to Covid-19 but that onboard cash payment is accepted again. "Changing to a permanent (cashless) strategy requires a lot of coordination, regionally and politically, she said. "There are equity concerns you have to take into account." Tri-Met has not yet decided whether to eliminate cash payment onboard buses. So how are some agencies attempting to move away from onboard cash collection? A lot of carrots and potentially a few sticks.

- Phasing out rather than summarily eliminating cash and paper tickets;

- Introducing "fare capping" and lower fares through e-ticketing systems;

- Giving away free blank transit cards (i.e. "gift card") for free (instead of the usual $2 or $3 cost);

- Expanding the network of retail outlets where customers can conveniently load/reload cards using cash;

- Absorbing transaction fees so customers do not have to pay additional costs on top of the transit fare;

- Maintaining cash options at ticket vending machines even as they move to eliminate cash on board vehicles;

- Encouraging the dissemination of data-capable cellphones with free service for low income riders with option to provide only a username and PIN.

In addition, Moovel, the mobility services provider, has announced that customers will be able to use cash to purchase tickets and passes by using a Moovel app on their phones at retail locations across the U.S.

To further incentivize riders to move away from cash, one approach is to charge more for paper tickets. Another is to limit customer transfer discounts to electronic payment media. Cash customers pay full price for the second ride. "For years, Philadelphia riders using cash could transfer for $1. But SEPTA eliminated that option, which involved a paper transfer slip, in August 2018 as part of its transition to the "SEPTA Key card," the Pew Charitable Trust report said. As a result, cash riders who transfer pay more than double the transfer price of customers using a smart card. At MATA in Memphis, plans have been underway for the last 18 months to replace its 25-year old fare collection system. "We were getting ready to finalize the farebox part of it when the question was raised, do we really need to collect cash anymore?" recounted Rosenfeld. "Can we get to 100 percent either mobile pay or tap cards or other technology other than cash?"

Rosenfeld called the topic "controversial," because nearly 27 percent% of the population in Memphis is below the poverty line. In the end, the agency decided to eliminate onboard cash payment.

To mitigate the impact of eliminating cash, MATA is providing cards for free and expanding the use of ticket vending machines at key locations that will accept cash. In addition, it is expanding to 300 the number retail sales locations that accept cash to sell and reload transit fare media. Rosenfeld also mentioned a new partnership with a local utility to accept utility payments at transit TVMs and to sell transit fare media at utility kiosks around the city. "So far, our process has made it through the Title VI review," he said.

In the Los Angeles area, 26 transit agencies have adopted an account-based contactless smart card system called TAP. Customers can still pay with cash on buses but doing so means they don't receive a transfer discount. "If you are loading cash at the bus, you have to pay full fare the next time you get on," (i.e. transfer), said Robin O'Hara, Executive Officer of the TAP smart card fare collection program at LA Metro. Customers using TAP receive the transfer discount and have access to the full array of low income and other discounted fares. Cash loading on Tap cards is available at retail stores, TVMs and bus fareboxes. "The way we did our mitigation for Title VI is we actually gave out a million TAP cards, and in giving out all of those TAP cards…we enabled those folks to be able to load with cash in other places even at the bus farebox. That's how we kind of transitioned everyone to TAP."

Similarly, NY MTA ew York City Transit is expanding transit sales locations from 1,800 to more than 4,000 with the goal of giving customers access to a sales location within ¼-mile radius of where they are located. Right now, according to Putre, the agency is evaluating a number of policy decisions, such as whether to offer credit card and mobile (open-loop) reduced payment options to senior citizens or to maintain the current practice of issuing transit cards with photo identification. The Port Authority of Allegheny County has developed a sophisticated methodology for determining the locations in the Pittsburgh region where cash-accepting ticket vending machines and sales office terminals at retail locations are most needed. Rankings are based on an "Equity Index" that uses demographic data and GIS map layering to track the locations of higher transit need populations living within various distances from a transit station. The wariness about abandoning cash is summed up by Endya Freeman, Revenue Manager at the Jacksonville Transportation Authority and Chair of APTA's Fare Collection Systems Committee. She called it "elitist thinking" that ignores the fact that many transit riders aren't particularly technology savvy and get by without credit cards or cellphone apps. In many cases, she said, "we are not in front of the technology, we are behind the technology."

AUSTRIA

RAIL PASSENGER MODERNIZATION

Contributed by: Ken Sislak, AECOM

Austria is a landlocked East Alpine country in the southern part of Central Europe. It is a beautiful country featured in the movie "The Sound of Music." Austria occupies an area of 32,385 square miles (83,879 km^2) and has a population of a little over nine9 million people, which is about the size of Michigan. Population density is 277 people per square mile (107 per km^2) or a little more than Ohio, which has a population density of 261 per square mile. But unlike Ohio and Michigan, Austria has an extensive integrated rail-based public transportation system.

In 2019, more than 270 million passengers traveled on local, regional and long-distance trains operated by the Austrian Federal Railways (OBB). In the U.S. in comparison, ridership on the national Amtrak system was a record 32.5 million and regional commuter trains operated by transit authorities carried an additional 516.3 million passengers annually with 88.5 percent of that ridership cemanatingoming from Boston, Chicago, Los Angeles, New York City, Philadelphia and San Francisco. On average, Austrians take 30 trips per capita per year on trains while Americans take 1.7 trips per capita per year.

OBB is embarking on a major rail infrastructure renewal and modernization program. Target Network 2025+ is an expansion strategy for developing the rail infrastructure and is part of the "Overall Transport Scheme" for Austria. Target Network 2025+ is a master plan for a long-term, sustainable safeguarding and development of the railway system developed by ÖBB-Infrastruktur AG in close cooperation with the Federal Ministry of Transport, Innovation and Technology (BMVIT) and the Ministry of Finance together with external transport planners. Because of its legally binding nature, the Target Network 2025+ master plan provides a stable basis for planning and network development.

Rail passenger service in Austria is being expanded and modernized with funding of €17.5 billion ($20.7 billion) between 2021 and 2026. This is about €1,944 per capita ($2,300 per capita). This would be the equivalence of an investment of $25.3 billion in Ohio and over $761.3 billion in the US over the same time period. This amount of funding could build a lot of high-speed rail in the US!

The funding will be provided to ÖBB Infrastructure to improve urban, suburban and regional rail services. In order to achieve Austria's goal of a climate neutral rail network by 2035, all major lines will be electrified by 2035. Hydrogen or battery trains will be used where electrification is not technically or economically feasible.

Services will be improved to relieve capacity constraints brought about by increasing urbanization, with the platforms on S-Bahn lines in and around Vienna extended to accommodate longer trains. Services will also operate with a reduced headway of 2.5 minutes, enabling the frequency to be increased from 20 to 26 trains per hour per direction.

The western line in Linz will be upgraded to increase capacity, while stations and lines around Salzburg, Innsbruck and in the central area of Carinthia will be modernized. Graz will benefit from the expansion of the Koralm Railway, the Southern Railway and the Styrian Eastern Railway. Funding has also been allocated to expand regional lines, including modernizing stations and stops, improving safety at level crossings, and installing new customer information systems.

If Austria can do this, why can't we?

TICKET VENDING

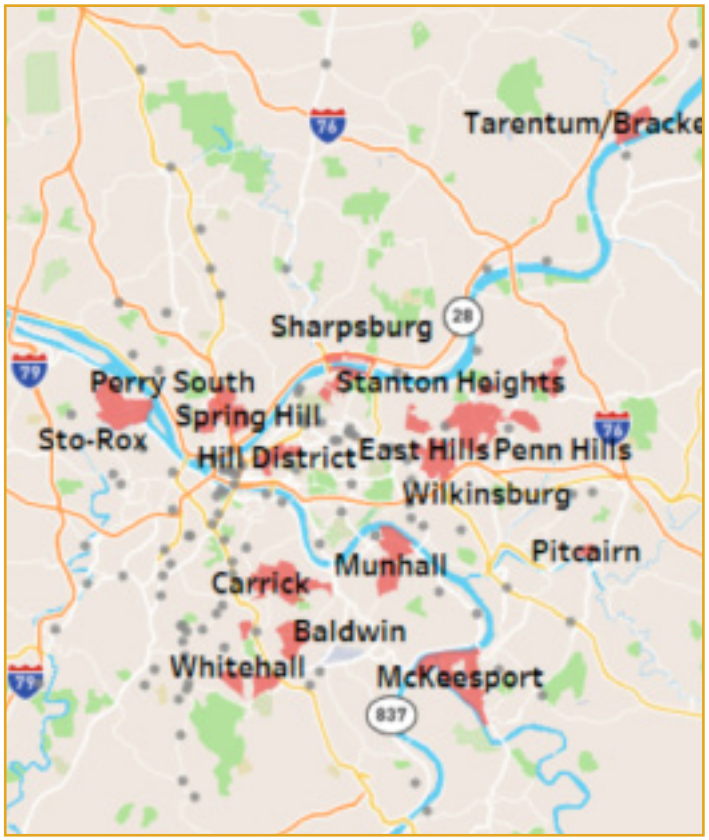
A CASE STUDY IN IMPROVING TRANSIT ACCESS EQUITY

The Port Authority of Allegheny County has developed a policy and methodology to ensure that additional Ticket Vending Machines (TVMs) and Sales Office Terminals (SOTs) are placed in communities where they are most needed. The current fare structure places a higher cost for riders using cash as their payment method on-board transit vehicles. Therefore, the TVM location is especially important for lower income and other demographics who have a higher probability of being transit dependent and may have to reload their card frequently.

To identify higher priority locations for upcoming TVM placement, first a GIS map layer with all current fare purchase locations and a 1-mile walking distance around these locations was developed. Then this layer was compared against The Authority's service walkshed layer, which includes communities within a 5-minute walk of transit stops and a 10-minute walk of transit stations. Areas that fell inside the service walkshed but are outside the current fare purchase 1-mile walkshed were identified. Residents in these areas would be more dependent on a walkable fare purchase location and need to be prioritized. Next, areas with similar demographics that share borders and a regular street grid to allow easy crossing of neighborhood boundaries were grouped together to form 90 unique areas for further analysis.

Population data and equity scores for each unique area were compiled using Port Authority's Equity Index and data from the 2017 American Community Survey. Equity Index is a tool that uses demographic data to measure spatial distribution of mobility need across Allegheny County. The equity score includes the following higher transit need populations: people with disabilities, people in poverty, minority race and ethnicity persons, households without vehicles, older adults, persons under age 18, persons with of limited English proficiency, and single female householders.

To identify higher priority locations for TVM placement, unique geographic areas with less than 2,000 total population and less than 0.3 equity score were filtered out. The equity score, population density, and total population were then ranked from 0-100 for each area. These scores were then averaged to get a final ranking that would prioritize locations for future TVMs and SOTs placement in high-need areas.



TELEWORKING

HOW THE GROWTH MAY IMPACT THE FUTURE OF HIGH-SPEED RAIL

Contributed by: Adam Cohen

COVID-19 is causing changes in travel behavior and residential location decisions, driven in large part by the new flexibility offered by teleworking. Understanding these changes are key because they could impact travel behavior as employees work farther from urban job centers. The growth of telework will likely have widespread implications for land use planning, potentially enabling growth in suburban, exurban, and rural communities. The National Association of Realtors (NAR) recently developed a work from home score estimating the "telework readiness" of counties across the U.S. using metrics that may help predict the growth of telework communities, such as internet connectivity, percent of workers in office jobs, home affordability, and population growth. Generally, the counties that tended to rank high using NAR's metrics were highly suburban and exurban.

What does this mean in the context of high-speed rail? The growth of telework could change the types of trips and use cases? Previously envisioned for both high-speed and commuter rail networks. Pre-COVID-19 planning assumptions often emphasized business travelers and long-distance displaced super commuters seeking affordable housing as core rider markets. While more research is needed to understand the long-term impacts of the pandemic on travel behavior, actual post-pandemic ridership could comprise of a greater share of leisure travelers than previously anticipated as telework, video conferencing, and virtual reality help companies limit in-person engagement.

A new emphasis on reducing CO2 emissions could further reduce suppress business travel as companies try to become more eco-friendly and this could have very practical design considerations for high-speed rail in terms of first- and last- mile connections, parking, waiting areas, baggage handling, and other station and on-board amenities. A greater emphasis on climate change and eco-efficiency could lead to railcar densification and higher revenue. If these trends do play out, we begin to see a high-speed rail product that resembles more like low-cost air travel than a premium product targeting business travel.

COVID-19 HAS ACCELERATED A DIGITAL TRANSFORMATION WHERE CITIES NO LONGER NEED TO BE PHYSICAL PLACES TO FOSTER INNOVATION AND GENERATE ECONOMIC ACTIVITY. HIGH-SPEED RAIL PLANNERS WILL NEED TO CONSIDER CHANGES IN WORK AND TRAVEL BEHAVIOR AS PART OF FUTURE RAIL PLANS.

Some may suggest that the growth of telework undermines the business case for high-speed rail. But it does not. What it does is allow us to reimagine how travelers access stations and use rail systems. And this is something very different. The ability for high-speed rail to serve more cost-conscious leisure travelers could allow rail systems to increase the number of travelers in railcars, enabling reduced ticket prices and increased farebox recovery. This could create new opportunities for public-private partnerships and additional high-speed rail corridors previously thought to be economically infeasible. While post-COVID high-speed rail systems may not be the systems previously envisioned, it creates exciting opportunities to make the service more efficient, cost competitive, and profitable. As the transportation sector recovers from the pandemic, rail planners should carefully consider the range of risks and opportunities associated with anticipated changes in travel behavior.

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Adam Cohen is a senior researcher with the Mineta Transportation Institute of San Jose State University and the Institute of Transportation Studies at UC Berkeley. His research focuses on mobility innovations, such as high-speed rail, shared mobility, mobility on demand, mobility as a service, smart cities, advanced air mobility, and emerging technologies.

APTA'S PHASE 2 ROI STUDY

Contributed by: Charlie Quandel

In 2010, the High-Speed Intercity Passenger Rail Committee of the American Public Transportation Association began a series of studies for the purpose of determining the true ROI to the public "but for" the construction of high speed and intercity passenger rail systems. The committee recognized the need to provide decision makers a business case for investment that is more readily understood than the current evaluation criteria for the High-Speed Intercity Passenger Rail (HSIPR) Program outlined by the Federal Railroad Administration which, in part states that, "the systematic process of comparing expected benefits and costs helps decision-makers organize information about, and evaluate trade-offs between, alternative transportation investments, FRA will consider benefits and costs using standard data provided by applicants and will evaluate applications in a manner consistent with Executive Order 12893, Principles for Federal Infrastructure Investments, 59 FR 4233 (January 31, 1994)"

APTA does not intend to supplant this requirement for states to produce a benefit cost analysis consistent with this directive as outlined above. However, this type of BCA does not make a clear, concise or compelling case to the local, regional, state and national decision makers that decide on whether or not to fund an HSIPR project.

APTA completed a Phase 1 Study in July 2017, which is available on their website. In July, 2020 APTA awarded a $115,000 contract to EBP, US Inc for a Phase 2 Study to produce a "Framework for Assessing the ROI from Intercity Passenger Rail". The Study Team includes Glen Weisbrod and Ira Hirschman of EBP with assistance from the Mineta Transportation Institute. Funding for this Phase 2 Study has been provided by APTA, the APTA Business Members Group, AASHTO, Quandel Consultants, and AECOM. It is anticipated that the Phase 2 ROI Study will be complete by April 2021.

The initial Technical Memorandum developed by EBP clearly outlines the purpose, concept, and challenges for Intercity Rail and the method to move forward to meet this challenges as follows:

Purpose of ROI Study, Phase II: The purpose of this second phase of APTA's Return on Investment (ROI) Study is develop a consistent methodology to account for the full range of intercity rail benefits from multiple spatial, jurisdictional and analytical perspectives. The ROI methodology to be developed can be used by practitioners to make the "business case" for implementation of proposed rail projects and to evaluate completed projects in a manner that is easily

understood by decision makers at the local, regional, state and national levels.

Concept of ROI. Return on Investment (ROI) is a necessary consideration for any person or agency that is considering investing its own money to enable transportation infrastructure and services. The concept of "return" can mean whatever results are deemed desirable and sufficient to justify the investment. For a private organization, that may mean revenue flowing back to the investor. For a public agency, that may mean the value of a broader benefit flowing back to its constituents. There are several ways of measuring ROI; many private organizations look at the internal rate of return, while many public organizations look at some form of benefit-cost or cost-effectiveness ratio as applicable for their agency or constituency.

Challenge for Intercity Rail. Intercity rail has some unique features that make ROI measurement especially challenging, comparted to that involved in doing a similar analysis for other kinds of transportation investment. There are three notable features that distinguish intercity rail investment:

It involves multiple jurisdictions. Intercity rail projects link multiple cities and most often they also link multiple states. They therefore typically need the cooperation of multiple MPOs and multiple state DOTs. This is different from most highway projects that are done under the funding jurisdiction of a single state or MPO.

It concentrates activity at key station areas in a few key cities. While highways may cut across a state and across state lines, they typically have numerous on/off points, so the activity associated with their use is also highly dispersed. Intercity rail services, on the other hand, have a limited number of stations, with passenger activity concentrated at station areas. This tends to create interest and opportunities for urban development at key station sites much more frequently than occurs for highways, and this can generate the involvement of city jurisdictions in shaping intercity rail development, financing and benefit.

It is a service, not just infrastructure. Intercity rail, like urban transit, is a service run by an operator. Thus, the role of the operator and its ROI is another layer of consideration in assessing project feasibility and desirability.

Moving Forward to Meet the Challenge. All three of these features of intercity rail led to an interest in investment and outcomes for many different players - spanning municipalities, state DOTs, the federal government and private operators. This means that the traditional form of benefit-cost or cost-effectiveness analysis done for by state and federal agencies for highway investments is not fully applicable for intercity rail. Furthermore, it creates a specific opportunity to build coalitions of support for intercity rail investment, with investments apportioned among the parties and ROI viewed from the different perspectives of those different investing parties.

This research project will be building prescriptive guidance on how the affected parties can best consider ROI, given the need for multi-level perspectives and apportionment of investment roles.

As previously noted, the HSIPR committee expects that the final report will be completed in April of this year. The next publication of Speedlines will include a summary of the final Phase 2 report.