Appendix L

NEXTransit White Papers

Appendix K represents a collection of white papers the project team authored to take a deeper dive into several topic areas relevant to NEXTransit projects, policies, and programs. These more detailed documents allow for further guidance for Port Authority and its partners as they implement the plan.

While each white paper is intended to cover a specific topic area, they are presented on the following pages as a single collection.

The topics presented (in alphabetical order) are:

- ADA System Access
- Bus Layover Locations
- Bus Network Study
- Bus Stop Balancing Policy
- Carbon Neutrality Policy
- Parking Management
- Sidewalk Accessibility and Pedestrian Safety
- Traffic Signal Prioritization
- Transit Centers
- Transit Oriented Development
- Unbanked Individuals Access Policy
- Vehicle Design and Amenities Policy
- Wayfinding and Signage Policy
- Workforce Expansion

Americans with Disabilities Act (ADA) System Access

Port Authority's Values:
Equitable, Accessible

Overview

Title II of the Americans with Disabilities Act (ADA) of 1990 protects people with disabilities from discrimination in transportation and guarantees them equal access to public transit systems. Both public and private transit must be equally accessible to everyone and meet the ADA's requirements. This includes not only accessible equipment and features on transit buses, but also access to transit and transit stations.

The National Household Travel Survey, performed by the U.S. Department of Transportation, reported that approximately 25 million people have a travel-limiting disability. According to the Bureau of Transportation Statistics, 1% of all Americans — about 3.6 million people — are homebound because of a disability. For persons with disabilities who are not able to use fixed-route service, ADA requires that public transit operators provide complimentary-demand response service. Passenger trips on demand-response services increased from 68 million in 1990 to 209 million in 2019.

Fixed-route systems must provide a complimentary paratransit service as a means of mobility for individuals unable to use the fixed-route transit system. The most flexible paratransit services offer on-demand, door-to-door service from any origin to any destination within the service area.

Allegheny County's paratransit service, ACCESS Paratransit, is a coordinated, shared-ride paratransit service operated by six service providers from seven locations within Allegheny County. It offers the door-to-door approach to the general public with scheduling in advance. It mainly serves people with disabilities, clients of human service agencies, and individuals 65 and older. This service offers several discount programs to the qualifying groups and to the general public at full rate. At an average of 5,000 trips on weekdays and 1.5 million trips annually, ACCESS is among the largest coordinated systems in the country.

The Federal Transit Administration (FTA) is charged with ensuring public transit providers comply with the US Department of Transportation's (DOT) regulations implementing the transportation-related provisions of the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973, as amended. The regulations in 49 CFR Parts 27, 37, 38, and 39 set specific requirements that transit providers must follow to ensure their services, vehicles, and facilities are accessible to and usable by individuals with disabilities.

Analysis

Public transportation accessibility provides mobility to people with disabilities. Transit stops and stations, paths to transit stops and stations, and transit vehicles must all be accessible.

New construction or alterations to all existing transit stops and stations are required to meet accessibility standards established by the USDOT.

- Ramps and elevators need to be installed, where necessary, so that riders can negotiate elevation changes
- Each train station must facilitate access for riders in wheelchairs to be able to board all accessible cars in a train which

are available to passengers without disabilities
    - Stops or stations need to be designed to facilitate level boarding and be equipped with ramps so that riders can negotiate elevation changes
    - Transit vehicles must have level boarding by ensuring train doorways and station platforms are at the same level (gaps between them must be narrow enough passengers can cross without difficulty) – if not using a ramp or lift to provide level boarding, must submit demonstration of equivalent facilitation to FTA
    - Transit vehicles must utilize short bridge plates when necessary to span gaps

In coordination with local stakeholders, polices should be implemented to ensure that paths accessing transit are ADA-compliant. This pedestrian infrastructure may include:

- ADA-accessible ramps with truncated domes/detectable warning surfaces at curb ramps
- Bus boarding and alighting areas
- Location of accessible routes
- Accessible paths of travel:
    - Should be as close to the general circulation path as possible
    - Should be as short as possible while allowing transit riders to negotiate changes in elevation
    - Should be upgraded with curb ramps at affected crosswalks if roadways are being resurfaced or otherwise altered in a bus rapid transit (BRT) system

Bus or rail vehicles that operate along a prescribed route and fixed schedule must accommodate all persons regardless of ability. These services have ADA-mandated vehicle requirements including stop announcements, destination information on vehicles, lifts and ramps, illumination, slip-resistant surfaces, and fareboxes, pull cords, and handrails must be placed in an accessible area, but also so as not to obstruct.

The ADA requires that public transportation services:

- Comply with accessibility requirements in newly purchased vehicles
- Make good faith efforts to purchase or lease accessible used buses
- Remanufacture buses in an accessible manner
- Provide paratransit (assisted transportation) where they operate fixed-route bus or rail systems, unless it would cause an undue burden
- Provide adequate information on services in accessible formats for persons with different types of disabilities, including stop announcements and destination information on vehicles
- Locate fareboxes so that they do not obstruct passenger flow when boarding
- Provide signs on fixed-route systems designating seating for passengers with disabilities, with at least one set of forward-facing seats marked as such
- Provide sufficient maneuvering space within vehicles for wheelchairs and handrails and stop controls should be within reach of wheelchair securement locations
- Provide a boarding device (lift or ramp) within vehicles so that passengers using wheelchairs or mobility devices can reach a securement location onboard (lifts much have a minimum design load of 600 lbs. and must accommodate a wheelchair measuring 30” by 48”)
- Ensure that personnel are trained to operate vehicles and equipment safely

and how to properly assists individuals with disabilities in a respectful, courteous way
    - Riders must also be given adequate time to board and allowed for their service animals to board.

Peer Examples

New York City's MTA

In 2019, MTA unveiled its 2020-2024 capital plan which included the announcement of specific stations getting accessibility upgrades. Altogether 70 subway stations will be made ADA-compliant. Stations were decided based on ridership, demographics, and whether they were major transfer stations or complexes. MTA's website provides station information regarding which stations are ADA-compliant along with street elevator locations and transfers to other modes of transit.

Salt Lake City, UT

A new study co-funded by the Utah Transit Authority (UTA) found a 5.9% increase in boardings after ADA improvements were made at a series of bus stops in Salt Lake City. There was an increase in boardings on scheduled-service buses and a reduction in paratransit use. The improvements included the addition of shelter and seating, as well as stronger ADA-compliance. Improvements included ADA-compliant concrete pads, connecting those pads to surrounding sidewalk networks, and installing various fixtures such as trash cans, benches, and shelters.

Level of Effort for Implementation: High

- Construction and design required on facilities, purchase of new technologies/equipment.
- Training for operators to understand the needs of riders with disabilities and be sensitive to them.
- Coordination with other entities to ensure access to transit stops and stations.

Resources and Notes

U.S Department of Transportation, Federal Transit Administration
National Multiple Sclerosis Society
National Aging and Disability Transportation Center
Metropolitan Transportation Authority
National Institute for Transportation and Communities

At the time of writing (September 2021), the US Senate approved transportation infrastructure legislation allocating funding for legacy rail transit systems to bring stations into compliance with ADA through the All Stations Access Program (ASAP). This funding source, if it enters into law, should be pursued as a funding source to bring non-compliant portions of Port Authority's LRT system into compliance with ADA.

Bus Layover Locations

Port Authority's Values
Efficient, Sustainable, Accessible

Overview
To facilitate scheduled operation of buses, recovery time is built into transit schedules so that if a bus arrives at its end point behind schedule, the driver can begin the next trip on time. The recovery times also provide time for drivers to use comfort facilities between trips, time for changing drivers (if needed), and time to make minor adjustments to equipment. In some agencies, recovery time is also used for quick interior bus cleaning. This recovery time is built to occur at layover locations at various places around the service area. Layover locations at key points within the service area allow for maximum efficiency of operations so that vehicles do not need waste time and/or miles returning to and from bus depots or garages unnecessarily. Where there are multiple public transportation providers, such facilities can also be utilized for buses operated by other carriers.

Layover locations also enhance the ability to maintain bus service during detours or other unplanned events. This includes construction, rallies/marches, street infrastructure failures and other events. Layover facilities also provide locations for staging vehicles to accommodate peak demand during special events or during emergencies.

Many of Port Authority's existing layover locations are legacy facilities established when its major predecessor, Pittsburgh Railways, created loops for streetcars to turn around to be positioned for the return trips. These loops also functioned as recovery facilities and the properties are currently used for bus layover locations. Other layover locations have been set up at parking lots for shopping centers, malls, hospitals, a community college campus and at the Pittsburgh International Airport. Some layovers are sited on local streets. As Port Authority updates its existing passenger facilities, it is building in facilities for layover and recovery functions, such as the one currently under construction at the McKeesport Transportation Center.

Analysis
Port Authority needs additional layover facilities in its direct ownership or with permanent or long-term easements to enable it to continue and advance the scheduling and operation of efficient and reliable transit service. Many locations where Port Authority operations layovers are not in its control and it often is asked to move or vacate facilities on short notice, at the detriment to its operators and patrons. Port Authority should program capital projects to support operations on other private property owners' sites or to acquire its own property, in cases of significant transit activity, to support the values in this long-range plan. In a highly developed urbanized area, such as Allegheny County, dedicating space for transit operations is difficult, but the lack of layover space near the end of routes is a major constraint to the introduction of new or expanded bus service. Port Authority needs places for its buses to layover between trips, preferably in proximity to restrooms which operators can safely access.

Obtaining the required land for layover locations can be challenging, however, especially when factoring route efficiency and proximity to comfort stations. Additionally, some people may oppose any bus layovers in

their communities due to perceptions about air pollution, noise, and aesthetics.

Peer Examples

Washington, DC

The Metropolitan Washington Council of Governments conducted its *Regional Bus Staging, Layover, and Parking Location Study* to analyze the need for bus staging, layover, and parking locations in the District of Columbia (D.C.) and Arlington County and recommend sites for staging, layover, and parking. The addition of curbside layover locations could enable buses to not have to circle downtown blocks or park illegally.

Philadelphia, PA

Philadelphia is a dense city, making it difficult to dedicate space for transit operations. The Southeastern Pennsylvania Transportation Authority (SEPTA)'s lack of layover space for buses is a major constraint regarding exploring the implementation of new routes, redesigning services, and increasing the frequency of existing routes. Layover space is needed for buses to wait between trips, preferably in close proximity to an operator-accessible restroom. In the 2021 Philadelphia Transit Plan, it says the City government can help SEPTA by allocating public space for transit centers or coordinating space with private development to help improve transit. It is also mentioned that layover space planning is a critical component of fleet electrification when it comes to space for charging stations.

Level of Effort for Implementation: Moderate

- Planning, design, and construction of on and off-street layover facilities requires extensive coordination with municipalities and/or property owners.
- Establishment of off-street layover facilities may require land acquisition, planning, engineering, and construction. At a minimum, bus pads would be required to maintain pavement integrity at the facilities.
- For on- and off-street layover facilities, if no comfort facilities are available in nearby buildings, new comfort facilities will need to be installed and maintained. Layover facilities can also be constructed in conjunction with other corridor-related improvement projects.
- Coordination with municipalities, community groups and other local stakeholders is needed.

Resources

Metropolitan Washington Council of Governments

City of Philadelphia

Bus Network Study

Port Authority's Values
Efficient, Equitable, Accessible, Sustainable

Overview
A bus network study entails the planning and implementation of significant changes to the network of bus routes, informed by an evaluation of the whole network structure rather than solely as a collection of routes. A full analysis and redesign of the bus network would align resources based on a thorough public process that accounts for community priorities that weigh the value of network coverage (as service may focus on main arterial roads), frequency, and walking access to and from transit, origins, and destinations.

A focus on a high-frequency network based on transit propensity, origin/destination demand, and employment centers could increase ridership and improve conditions for those with the longest, least-direct commutes by providing less waiting time. However, this must be evaluated in conjunction with fare policies, as providing free transfers or other affordable options makes this type of service change equitable. Furthermore, a network focused on high frequency must be paired with strategically placed/equipped transit centers and stops and effective use of the fixed guideway networks. Another choice in network restructuring is a radially-oriented system with a prime focus on the urban core (such as Downtown and Oakland) versus more crosstown routes allowing people to travel between city neighborhoods and suburban communities without having to go into Downtown Pittsburgh to transfer. This is generally the system which exists at the Authority now, and while it provides a robust system of both coverage and one-seat rides, it also puts pressure on the peak (rush hour) vehicle requirements of the agency and does not align as well with those commuting during non-peak hours, or those taking multiple transit routes already to reach their destinations. A network study should be very intentional with how services are provided to those who need them most, in alignment with the values in this long-range plan.

The bus network study should measure and quantify anticipated and actual improvements from the redesign, which will help obtain support for the plan and with making decisions between different network scenarios. Metrics to consider include service area and coverage, impact on costs, equity implications, ridership, travel times, and transit accessibility. An example of this that many other systems have used is a summary statement comparing current population's access to X jobs within X minutes, versus a new or changed network's increased access to jobs or access to the same jobs but for more people in a similar amount of time. In many cases, the network redesign is used by transit agencies to redefine and better enforce their service standards and design guidelines, such as creating high-frequency routes (better than 15 minutes), and priority or rapid bus network (series of priority treatments such as limited stops, transit signal priority, queue jumps, and/or bus-only lanes).

Typically, network redesigns are conducted in three phases:

Phase 1: Gather Information and Determine Goals. During this initial phase, the transit agency (and usually a consultant) conducts a market analysis; establish or revises bus route

and network service standards; and establishes or revises budgetary, operator, and fleet resource limits. Stakeholder and public input is also critical during this phase to establish overall network goals (such as frequency versus coverage). This can help gauge what the community desires and needs and determine which types of network changes, if any, should be the focus of a redesign or tweaks to the network

Phase 2: Analyze and Recommend. Once the initial data is gathered and goals are set, the transit agency will collect and analyze route and network performance data; compare route and network performance against service standards, and make recommendations for service changes to improve adherence to service standards and stay within resource limits.

Phase 3: Engage the Public. Finally, the transit agency will need to hold public engagement targeted to riders of routes impacted by service change recommendations; revises recommendations based on public input; and implement final service changes.

Peer Examples
Dallas Area Rapid Transit's 2016 *Bus Service Plan*

Halifax Transit's 2016 *Moving Forward Together Plan*

New York City MTA's 2017 *Staten Island Bus Study*

Level of Effort for Implementation:
Moderate

- Will require significant PAAC staff effort, along with cooperation and coordination with local stakeholders.

Resources
Transit Cooperative Research Program
Dallas Area Rapid Transit
Halifax Transit
New York City Transit Authority

Bus Stop Balancing

Port Authority's Values:
Growth, Accessibility, Efficiency

Overview

While placing bus stops close together reduces the distance that travelers need to walk to get to a bus stop, it also increases the amount of time the bus takes to travel the route, therefore reducing how reliably a bus reaches each stop on time. It also increases the need for amenities and maintenance of amenities at stops and decreases ridership as choice riders who do not have to use transit choose other modes such as carpooling or biking.

Transit systems across the United States have been exploring ways to rebalance or optimize the distance between bus stops over the last two decades, as many systems, including those in the Pittsburgh region, have existed since the time of streetcars.

Analysis

Before a transit agency plans a new or updated bus service, it should create guidelines for the following elements based on the goals of the bus route, including optimal stop spacing. frequency, daily span, stop spacing, levels of population density, and ridership. Port Authority first established its own minimum stop spacing guidelines in 2009 in their Transportation Development Plan but did not begin a system-wide stop optimization project until 2017. In 2019, Port Authority published its own "Bus Stop and Street Design Guidelines" to create a document to help guide future local plans and ordinances. A data-driven plan was developed to accomplish this program on two routes with high ridership and closely spaced stops. According to the plan, areas that have a higher population density (over 5,000 residents and jobs per square mile) should generally have more frequent stops. Areas with a lower population density (fewer than 5,000 persons and jobs per square mile) should have fewer stops. By setting these guidelines upfront, transit agencies can better design their service to appropriately meet customer needs as well as have a ready explanation for decisions on bus stop placements based on metrics.

There are times when a slightly longer walk to the bus stop may result in a significantly shorter total travel time. According to a 2016 article in the Journal of Traffic and Transportation Engineering, overall bus reliability is generally affected by dwell time at stops due to the bus stop location, the number of passengers boarding on or off, and the fare payment method. Many riders and potential riders have said that the total travel time (including their walk to the bus) is a major factor in their decision to ride. During a series of public workshops held by New York City Transit in 2018, 63% of Bronx bus riders said they would prefer fewer stops because they had the opinion that close bus stop spacing slows them down.

In many American cities, transit systems are working to rebalance bus stops to find a moderate balance of access, reliability, maintenance, and ridership growth. Transit riders, including those in the Pittsburgh region, have been surveyed to determine that a walk distance of 5 minutes is manageable in most instances, and distances of up to 8 minutes were found to be manageable in areas with more pedestrian amenities. The average adult can walk up to a ¼ mile in 5 minutes. Finding the right balance of stop spacing that allows for a 5-minute walk differs based on the presence and quality of pedestrian infrastructure, the

pedestrian environment, local terrain, typical weather, average population age, etc. Reducing the number of stops also increases travel time reliability by reducing the number of times that a bus might be delayed while navigating to another stop or bus dwell time at the stop. The preference for the trade-off between walking distance and total travel time may change from area to area. While younger Americans tend to favor shorter travel times, older citizens and persons with disabilities tend to prefer negotiating shorter distances to bus stops. Further, Allegheny County has many geographical challenges and physical barriers which impact stop spacing. River crossings, steep elevation changes, and man-made obstacles such as railroad tracks limit pedestrian access from certain directions and necessitate stops being closer together. First- and last-mile connections (sidewalks, bike lanes, and rideshare vehicles) vary throughout the County which means stop spacing may also need to vary. In late 2019, the Authority undertook its first Bus Stop Balancing projects on Bus Routes 16, 48, 51, and 88. The stop spacing on these routes was adjusted, through elimination of less frequently used stops, from 667 average feet to 859 average feet, an increase in spacing of 29% and a reduction of 21% of stops. This increase in distance between stops resulted in an increase in on-time performance of 7% and a ridership increase of 4% for the two routes implemented in November 2019. The other two routes were implemented in March 2020, just as the pandemic hit, and could not be fully assessed.

Transit agencies in cities such as Baltimore and San Francisco improved bus travel times by 6% by slightly increasing stop spacing to 2.5 stops per mile, thereby reducing the total number of stops the bus makes along a route.

Peer Examples

Maryland's MTA

The Maryland Transit Administration (MTA) created a Bus Stop Design Guide that provides guidance on bus stop placement and bus stop design and amenities, incorporating best practices from across the United States and around the world. A table was created addressing appropriate bus stop spacing dependent on the number of residents and job density within walking distance.

San Francisco's MUNI

MUNI released a bus stop consolidation plan in 2010 and since then has slowly been consolidating stops along routes. Metro has improved bus travel times by 6% by slightly increasing stop spacing to 2.5 stops per mile, thereby reducing the total number of stops the bus makes along a route. The decrease occurred because of a ridership survey where 61% of respondents said they would be willing to walk longer distances if it meant a shorter travel time.

Level of Effort for Implementation: Low

- PAAC has already started implementation, though the program was put on hold during the pandemic.
- The program will recommence in 2022 with an additional 4 routes every 12 months as staff capacity ramps up and more intensive routes are completed first.
- The program will continue to adjust its public engagement tactics to be more responsive to the community so that riders feel their voices are heard, and to be more transparent about the effects of the program.

Resources

Journal of Traffic and Transportation Engineering
Maryland Transit Administration
San Francisco Municipal Transportation Agency (MUNI)

Carbon Neutrality

Port Authority's Values:
Equitable, Sustainable

Overview

As greenhouse gas emissions (GHG) contribute to climate change, Port Authority should try to reduce its carbon footprint as much as possible. Where feasible, Port Authority could utilize its properties and facilities to generate renewable energy, and to the greatest extent possible, purchase clean energy credits to offset agency-wide electricity usage.

Transit agencies produce carbon emissions through the operation of their transit vehicles and non-revenue vehicles, as well as from their administrative, maintenance, and operations facilities. Advancements in transit vehicle technology continue to reduce carbon emissions. Many transit agencies are also reducing their emissions by building new facilities or retrofitting existing facilities to Leadership in Energy and Environmental Design (LEED) standards or higher.

According to the definition of the Intergovernmental Panel on Climate Change (IPCC) carbon neutrality refers to achieving net-zero carbon dioxide emissions by balancing carbon dioxide emissions with removal or simply eliminating carbon dioxide emissions. Failing to mitigate climate change could damage transportation infrastructure, lead to service disruptions, lead to service closures, and slow economic growth. Both corporations and the public are increasingly demanding that public agencies act to address climate change. Carbon neutrality can be achieved by calculating a carbon footprint and reducing it to zero through a combination of efficiency measures in-house and supporting external emission reduction projects. The growing voluntary market should foster a more rapid implementation of widespread policy initiatives that will lead to reduced carbon emissions. The goal of carbon neutrality is to ultimately stabilize and decrease the atmospheric CO_2 concentration.

Analysis

An organization that is carbon neutral removes the same amount of carbon dioxide which it emits into the atmosphere in order to achieve net-zero carbon emissions. This is usually accomplished by purchasing carbon offsets or credits from companies that are carbon negative to make up the difference. The transportation sector of the accounts for 29% of carbon emissions in the United States. Medium- and heavy-duty trucks, buses, ships and boats, aircraft, and trains contribute for approximately 40% of the carbon emissions with the remainder being generated by light-duty trucks, passenger cars, and motorcycles. It is aspirational for Port Authority to achieve carbon-neutral status as it would benefit Allegheny County's residents, employees, businesses, institutions and its environment as well as the nation and the overall global community.

Port Authority is a member of the American Public Transportation Association (APTA) Sustainability Commitment initiative, which recognizes members becoming more sustainable in their operations and practices. The Commitment provides transit agencies with a framework that helps define, initiate, and advance sustainability in the public transportation industry. Transit agencies must fulfill the Commitment's core principles:

1. Strategic Objective: Making sustainability a part of the organization's strategic objectives
2. Champion: Identifying a sustainability champion within the organization coupled with the proper human and/or financial resources and mandates
3. Employee Outreach: Establishing an outreach program (awareness-raising and education) on sustainability for all staff of the organization
4. Inventory: Establishing a base-line measurement for the organization of the following indicators:
    - Water usage
    - Criteria air pollutants
    - Greenhouse gas emissions
    - Energy use (electricity, fuel)
    - Recycling levels/waste
    - Operating expense per unlinked passenger trip and vehicle revenue mile
    - Unlinked passenger trips per capita in the service area of operation
    - Vehicle-miles traveled per capita in the service area of operation

In March 2020, Port Authority began operating its first two battery electric buses, which are 40' vehicles. Six more 40' electric buses scheduled to be delivered by the end of 2021. Fifteen 60' electric buses are proposed for the Bus Rapid Transit project. The first two buses as well as the next 21 vehicles are all assigned to the East Liberty Garage to operate on routes in the eastern sector of Port Authority's service area.

Other projects that could assist in meeting this goal include:

- Produce/use renewable energy through solar and wind projects, such as soliciting solar or wind power purchasing agreements and partnerships with Energy Savings Companies (ESCOs) (firms that specialize in implementing energy efficient technologies to provide their partners with energy savings guarantees).
- Reducing energy consumption through energy efficiency projects, such as replacing incandescent lighting with energy-efficient LED lighting on all light rail vehicles and facilities; utilizing wayside energy storage systems (WESS) to capture, store and reuse energy created by braking trains; and designing new structures with solar reflectance index surfaces (SRI) to reflect sunlight and reduce cooling costs.
- Purchasing of credits from carbon neutral organizations. Credits from carbon neutral organizations could be obtained through methods other than purchases such as joint development opportunities, land rights, air rights, or free passage.

Technological advancements will continue to make this goal more feasible throughout the lift of this long-range plan. For example, there is a renewed focus on drop-in alternatives in the transportation industry. Drop-in alternatives include technologies that can be used with existing rolling stock which reduces carbon emissions. Companies are producing fuels from non-fossil sources and from waste products from other industries which can be used in current diesel engines. Advancements such as drop-in alternatives continued enhancements in zero-diesel vehicles, and advancements in power sources for structures will increase opportunities for Port Authority to reduce carbon emissions.

The U.S. Federal government has prioritized the reduction of carbon emissions by organizations that receive federal funding. On April 21, 2021, President Biden announced his administration's target of reducing GHG pollution by 50-52% by the year 2030.

Initiatives that apply to the transportation sector include reducing carbon pollution by reducing tailpipe emissions and increasing vehicle efficiency, providing funding for charging infrastructure, and spurring research, development, and implementation of very low carbon new-generation renewable fuels. Increasing investments in lower carbon modes such as transit is also critical.

Peer Examples

Arlington, VA

In 2019, the Arlington County Board adopted an update to the original Community Energy Plan from 2013. This plan helps Arlington to achieve community carbon neutrality by 2050 by serving as an integrated energy policy and climate action framework. The interim milestones include transitioning to 100% of Arlington's electricity coming from 100% renewable energy by 2035, Arlington County Government operations running on 100% renewable energy by 2025, and energy equity must be considered during the implementation of the plan.

San Francisco, CA

Between 1990 and 2018, the city of San Francisco reduced its footprint by 35%. During the same period, its population increased 22% and economy grew by 172%.

Philadelphia's SEPTA

SEPTA adopted its first-ever Sustainability Program Plan, *SEP-TAINABLE*, in 2011, as a part of the first-generation plan, and recently implemented its second-generation plan, *SEP-TAINABLE 2020*. Achievements during the first generation included publishing an Energy Action Plan in 2012, a Climate Adaptation Plan in 2013, a Cycle-Transit Plan in 2015, and an Environmental and Sustainability Management System (ESMS). SEPTA's early success and comprehensive approach earned it the APTA "Gold" designation. *SEP-TAINABLE 2020* focuses on the encouragement of Transit-Oriented Development through community and regional planning efforts, expanding the ESMS program to additional SEPTA facilities, and creating a Renewable Energy Plan and Stormwater Management Plan.

Level of Effort for Implementation: Low to Moderate

Resources

U.S. Department of Transportation, Federal Transit Administration
American Public Transportation Association
Environmental Protection Agency
Global Carbon Project
Intergovernmental Panel on Climate Change
Arlington County, VA
San Francisco Department of the Environment
Southeastern Pennsylvania Transportation Authority

Parking Management

Port Authority's Values:
Growth, Accessibility, Efficiency

Overview

As of September 2021, Port Authority's park-and-ride network is comprised of 51 park-and-ride locations throughout its service area. Except for the South Hills Village Garage, there are no charges for using the park-and-ride facilities. A modest fee of $2 per day or $22 per month is charged to these garage users. Many of the Port Authority's park-and-ride locations reach their maximum capacity early during the morning peak and remain full throughout the day. This creates a challenge for commuters attempting to find parking as it creates uncertainty in their commute. An effective parking management program may create a more predictable experience for its commuters.

Parking management can also include the efficient use of Port Authority property for car storage, ensuring that park-and-ride facilities are only located where they are most appropriate and that efforts are being made to reduce car trips to access transit through transportation demand management.

Analysis

Parking management refers to strategies that result in more efficient use of parking resources. Strategies can vary widely, but most have modest impacts on individuals. However, the modest individual impacts can reduce parking demand by 5% to 15%. Simple strategies Port Authority could implement to manage parking demand include implementing a small fee for parking in its lots like the modest fee changed for the South Hills Village Garage. The fee could be adjusted over time to manage demand. The revenue from that fee could be dedicated to sustaining parking facilities. That fee could be waived or significantly reduced for monthly transit pass holders. A second strategy includes parking enforcement to ensure users of the park-and-ride facilities are actual users of the transit system and not individuals searching for alternatives to other available parking facilities.

The implementation of a parking fee may slightly increase the overall cost of a transit trip. However, the increased predictability of parking availability should result in a benefit that outweighs the costs. Mechanisms to collect the fee might include monthly passes, daily meters, or parking lot attendants. Each of these has its own benefits and challenges. Monthly passes require the lowest initial capital expenses to implement, though, they require active enforcement.

Port Authority received funding through PennDOT's Transportation System Management & Operations program to implement a mobile app in the future to relay real-time parking space availability at 19 of its park-and-ride facilities. At three of the lots, roadside variable message signs will be utilized. At NEXTransit meetings, project staff have discussed evaluating park-and-ride facilities to determine if maintaining the park-and-ride function is the best use of the property or if greater ridership could be generated through development on the property.

Parking management also includes the efficient use of Port Authority-owned land for car storage. The Transit-Oriented Development (TOD) Guidelines categorized each of Port Authority's fixed guideway

(busway and light rail transit) stations into different typologies based on the characteristics of the surrounding area. One distinguishing factor between these typologies is their suitability for park-and-ride facilities. Some typologies, such as Suburban Development, were suitable for park-and-rides while others, such as Urban Mixed Use, were only suitable for park-and-rides if located at the end of a line. Still others, such as Downtown, were not suitable for park-and-rides at all. When assessing existing facilities through the Station Improvement Program or other planning efforts, it is important to evaluate whether an existing park-and-ride is the most efficient use of Port Authority property at a given location.

Parking management can also mean using transportation demand management (TDM) interventions to reduce the number of people who drive to a given parking facility or development. TDM practices include providing employees, residents, and/or visitors with incentives to make transportation choices that reduce congestion and demand for limited parking. These can include programs like free or reduced-price transit passes, prioritizing spaces for car or vanpool vehicles, and providing amenities such as showers and lockers for bike commuters. TOD by definition is development that is close to high-quality transit, thus reducing the need for car trips and parking. TDM practices at TOD near Port Authority stations can be used to reduce the number of people who drive to the site, resulting in an increase in ridership generated by the TOD in question. Finally, as mentioned in the TOD guidelines, a reduction in car-dependent travel is a major goal of our program. One way to accomplish this is to build less parking for developments near transit. Municipal zoning codes can be a major barrier to accomplishing this goal. Zoning codes often require an overabundance of parking spaces and do not consider a given development's proximity to transit. Amending zoning codes to require less parking can both encourage transit use and make the project more financially feasible.

Peer Examples

Philadelphia's SEPTA

Southeastern Pennsylvania Transportation Authority (SEPTA) owns permitted lots for weekdays and weekends that can only be accessed by permit-holders, but SEPTA also offers parking facilities for non-permitted commuters at most of their Regional Rail and transit stations. The parking fee on weekdays for most stations is $1, except for two of their more popular stations, at $2. Two transportation centers and a garage have their own individual rates, along with municipal lots located near stations. Most SEPTA lots have daily use spaces that are striped and numbered and riders can deposit coins in a slot box located near the platform. On weekends, the parking is free at Regional Rail daily use lots.

Washington, DC's WMATA

Washington, DC's Metro operates parking facilities at 44 Metrorail stations and offers reserved parking for permit-holders at 35 rail stations until 10 am on weekdays. After that time, all unoccupied spaces are available for public use. Permit-holders must pay a daily fee each time they park, in addition to their monthly reserved parking fee of $45-$65.

Seattle's Sound Transit

Sound Transit reserves some parking spots at their busiest park-and-ride facilities for carpool and single-occupant vehicle parking permit holders, only on weekday mornings. Carpool parking permits are free of charge to groups of two or more transit riders who regularly drive together to use public transit. Permit-holders have exclusive access to the reserved parking spots from 4am-8am or 4am-9am, depending

on location. The number of spots reserved for permit-holders varies by facility and month and based on the number of permits issued but will never exceed 50% of the transit parking for a given location. The remaining unpermitted parking spots remain available for the public on a first-come, first-served basis.

San Francisco, CA (Bay Area Rapid Transit)
The Bay Area Rapid Transit (BART) system began nearly 50 years ago as a regional rail rapid transit system designed around an extensive network of park-and-ride facilities to provide station access in suburban locations. Since Bay Area Rapid Transit's transit-oriented development program was established 30 years ago, BART's role has evolved in response to the changing needs of the communities it serves, as well as giving greater weight to driving alternative parking at the station. At some stations, BART is looking to replace the park-and-ride lots with transit-oriented development jointly with station area access improvements. BART recognizes that the park-and-ride lots allow Bay area residents living farther from stations to easily patronize the system, however, because driving alone requires vehicle storage in the station area, it is the least efficient and most costly means of access to BART stations. It costs more than $1 per day per space in operating costs such as cleaning, maintenance, and enforcement, with capital costs being even greater, including the opportunity costs of devoting land to parking that could otherwise be used for revenue and rider-generating development.

San Francisco Transportation Demand Management (TDM) Program
The TDM Program's main purpose is to reduce vehicle miles traveled (VMT) that is generated by new development in the City and County of San Francisco by providing TDM measures. These include providing bicycle parking and amenities, subsidized transit passes, and carshare and vanpool programs to and from the developments.

The TDM program applies to all new residential developments containing at least 10 dwelling units or bedrooms and new commercial developments that span 10,000 square feet or more.

Level of Effort for Implementation: Low

- Port Authority already owns many of the park-and-ride locations and could implement parking management with an internal policy.

Resources

Southeastern Pennsylvania Transportation Authority
Washington Metropolitan Area Transit Authority
Sound Transit
San Francisco Bay Area Rapid Transit

Sidewalk Accessibility & Pedestrian Safety

Port Authority's Values:
Equitable, Accessible, Safety

Overview
"Every transit rider is ultimately a pedestrian, walking at the very beginning or end of their commute. Therefore, pedestrian infrastructure improvements will positively impact users of all modes at some point in their trip." – PAAC First and Last Mile Program Plan

Sidewalk accessibility and pedestrian safety play a critical role in transit. Riders who walk to and from transit stops and stations need access to safe pedestrian connections, ideally on direct paths which maximize comfort. Pedestrian safety involves reducing conflicts between sidewalk users and road users. Improving pedestrian safety increases pedestrian access to destinations by making it easier to get to transit.

The U.S. Congress enacted the Americans with Disabilities Act (ADA) in 1990 to prohibit discrimination against persons with disabilities. This law mandates that all public accommodations must be accessible to persons with disabilities by providing equal access. Once installed, pedestrian facilities must also be maintained, or they will degrade to state where they cannot be used, losing their functionality and ADA-compliance.

Analysis
Transit agencies play a critical role in pedestrian accessibility and safety at and around transit stops. However, because they typically do not own the streets and roads along which pedestrian paths are located, they usually will have to coordinate municipal, county and state governments and other organizations to implement pedestrian improvements.

To best serve persons with disabilities and provide equal access for all, the infrastructure surrounding transit stops, and stations must be evaluated. New pedestrian facilities must meet ADA standards and existing pedestrian structures must be retrofitted with ramps and other accessible improvements. Amenities may include ADA-accessible ramps with detectable warning surfaces, such as truncated domes, at sidewalk intersections. These ramps provide access between the sidewalk and roadway for persons using wheelchairs, walkers, crutches, handcarts, strollers, or who generally have mobility issues. The detectable warning surface pattern serves as an indicator of an adjacent street to persons with visual impairments. Sidewalk and ramp improvements are also highly useful for all segments of the population, such as for deliveries, strollers, luggage, and other wheeled devices.

According to PennDOT's 2019 Pennsylvania Crash Facts & Statistics, Allegheny County had the second largest percentage of traffic-related fatalities after Philadelphia County. Installing certain traffic calming measures can help to reduce traffic accidents and fatalities by protecting pedestrians and reducing speed. Curb bump-outs and medians can help to slow the speed of vehicles as well as improved the pedestrian experience with shortened crossing distances. Curb bump-outs extend the sidewalk or curb into the parking lane, creating a pinch-point on the street. Medians are raised islands that separate opposing lanes of traffic and help to facilitate pedestrian crossing by slowing the speed of vehicles, improving pedestrian crossing visibility, providing a space for lighting, and decreasing crossing distances by splitting into two segments.

Peer Examples

Broward County, FL

In 2013, Florida's Department of Transportation launched a pedestrian and bicyclists awareness program called "Alert Today, Alive Tomorrow." The program was created to educate the public on safety and includes road safety improvements, as well. 2021 marked the seventh year that Broward County's Sheriff's Office has participated in the program. Deputies in the sheriff's office engage in on-street education by informing motorists, bicyclists, and pedestrians about traffic safety laws on County roads. The goal is to reduce the number of traffic crashes and fatalities involving pedestrians and bicyclists by educating the public.

New Brunswick, NJ

The New Jersey Division of Highway Traffic Safety awarded the New Brunswick Police Department a grant to assist with a Street Smart NJ campaign. It includes increased patrols at high-volume crosswalks and intersections, high-visibility signage throughout the city, and community education within schools, churches, and community agencies. The campaign's goal is to further make streets safer for all ages and modalities while utilizing its 2012 City's Complete Streets Policy as a guide to making the city safer and more accessible for all modes of travel.

Chicago's RTA

Chicago's Regional Transportation Authority (RTA) launched the Access to Transit program in 2012. The program supports small-scale projects that improve pedestrians' and bicyclists' access to public transit. for certain project types, federal funding from the Congestion Mitigation and Air Quality Improvement Program (CMAQ) is leveraged with RTA and local funding. Benefits for both local communities and the RTA system include increased transit ridership (reducing congestion and vehicle emissions), better first and last mile connections (making it safer and easier for riders to access transit service), lower parking demand, pedestrian-friendly neighborhoods, and support for walkable, transit-oriented development.

Level of Effort for Implementation: High

- Construction and streetscaping would be required
- Coordination with municipalities, PennDOT and private property owners

Resources

U.S Department of Transportation, Federal Highway Administration
Pennsylvania Department of Transportation
National Cooperative Highway Research Program
UNC Highway Safety Research Center
Mineta Transportation Institute
Broward County, FL
City of New Brunswick, NJ
Regional Transportation Authority (Chicago Area)

Transit Signal Priority and Preemption

Port Authority's Values:
Reliable, Growth-Oriented, Efficient

Overview

Traffic signal priority and/or preemption (TSP) allows for the modification of traffic signal timing to give priority to specific vehicle types, such as transit, or emergency vehicles. The term "transit signal priority" only refers to the prioritization of transit vehicles. For this paper, TSP will refer to a broader category of traffic signal priority. The primary purpose of TSP is to reduce travel times, increase reliability for transit users, and improve safety.

There are two types of TSP: signal priority and signal preemption. Signal priority gives longer green light times at traffic signals on roads where transit vehicles are known to operate. It reduces congestion and delays on those routes. Signal preemption is an active measure, which reads a transponder in the emergency or transit vehicle and changes the signal timing to reduce the wait-time of the priority vehicle. Transponders can be prioritized so that an emergency vehicle can have a higher priority than a transit vehicle.

A more specific type of signal preemption is conditional signal priority (CSP). CSP-equipped buses only send priority requests when the requests improve reliability. For example, if the bus is ahead of schedule, it would not send the priority request. However, if the bus is behind or on schedule it would send the priority request. Researchers have reported that CSP is more effective at improving transit system reliability than traditional TSP.

Analysis

Researchers have found significant but limited positive effects of TSP's ability to affect transit system reliability. Empirical data from multiple studies suggest that most TSP phase adjustments did not occur quick enough to reduce delay to transit vehicles. Systems that are most effective at reducing transit vehicle delays require higher degrees of sophistication and monitoring. However, manufactures of TSP systems report significant benefits. Depending on the length of the corridor, particular traffic conditions, bus operations, and TSP strategy implemented, transit travel times are typically reduced by 8% to 12%. Implementation of TSP has also proven to improve schedule adherence and transit travel time reliability. In Oregon, Portland's transit system, TriMet, was able to avoid adding another bus to a corridor by implementing TSP, which resulted in a 10% decrease in travel time and up to a 19% reduction in travel time variability; in California, Santa Clara's EMTRAC Systems reported that buses receiving signal priority traveled 18.4% faster than those without priority; and in Washington, D.C., WMATA bus travel times decreased by 20% on average.

Another effective way to mitigate the impacts of delays caused by traffic signals is bottleneck bypass lanes, also called queue jump lanes. The lanes are a simple street engineering tool to let buses bypass the queue of private vehicles at signalized intersections. They're quicker to install than full bus lanes and mitigate delays by giving buses a way around the worst traffic bottlenecks on a route. According to the National Association of City Transportation Officials, "queue jump lanes combine short, dedicated transit facilities with either a leading bus interval or active signal priority to allow buses to easily enter traffic flow in a priority position.

Applied thoughtfully, queue jump treatments can reduce delay considerably, resulting in run-time savings and increased reliability." In Denver, CO, transit queue jumps/bypass lanes reduced delays at intersections on two streets by 7 to 10 seconds. Queue jumps require specialized signal heads at intersections, which costs less than $1,000 to add.

Peer Examples

Los Angeles County's Metro

Metro's 400-mile network of rapid bus service has 2,600 buses in its entire fleet with 520 signalized intersections equipped with TSP. Since implementation, ridership has increased 40% and travel times have been reduced by 29%. The new technology gives priority to Metro rapid buses at traffic signals by having longer green lights and shorter red lights.

Pierce Transit, WA

Pierce Transit has 245 buses in its entire fleet. Using a combination of TSP and signal optimization Pierce Transit was able to reduce transit signal delay by about 40% in two out of seven bus corridors. Altogether, is operates seven bus corridors with 110 signalized intersections equipped with TSP.

Chicago's CTA & Pace

In 2016, the first phase of TSP installation, optimized signal timing, was implemented on certain corridors which both Chicago Transit Authority (CTA) and Pace buses service. Further installation of TSP will be an important component of the Bus Rapid Transit and Arterial Rapid Transit systems that are being developed for the Chicago region. Thirteen priority corridors that include 500 intersections have been chosen based on key factors such as bus ridership, geographic location, and network connectivity.

Level of Effort for Implementation: Moderate

- Requires coordination with other government agencies including SPC, City of Pittsburgh other municipalities, Allegheny County, and PennDOT. TSP would be best implemented at the county level.
- TSP costs could be spread over several agencies instead of just Port Authority, including each municipalities' law enforcement and emergency service agencies.
- SPC has a regional signal program and could also be a potential resource for sharing costs and effort needed for implementation.

Resources

Pennsylvania Department of Transportation
Oregon Department of Transportation
Washington Department of Transportation
US Department of Transportation
National Public Radio

Transit Centers

Port Authority's Values
Growth-Oriented, Safe, Accessible

Overview
Transit centers are locations where transit vehicles operating on several routes converge to allow riders the opportunity to transfer between routes to continue their trips. Many transit centers also provide connections to other modes such as bicycle and pedestrian paths, intercity bus and rail services, and, through park-and-ride lots, automobiles. Transit centers typically include bus layover facilities (considered in more detail in a separate whitepaper). Transit center design considers such features as passenger volume, number of transit vehicles on the site at any one time, local auto and pedestrian traffic levels, and existing development.

Analysis
Transfer facilities are an essential part of transit systems. Throughout public engagement efforts for the NEXTransit Long-Range Transportation plan, there was support for transit centers at several locations in Port Authority's service area. This support aligns with the earlier research indicating that many trips within the Porth Authority service area are from one community to another without the need to travel through downtown. Increasing the number of locations for transfers would facilitate those community trips.

Researchers have found personal safety while traveling to and from and while waiting for a transit vehicle is a major factor in a potential rider's decision to choose transit. Modern transit centers provide amenities to enhance rider safety such as lighting, various levels of protection from weather, areas for pick-up and drop-off, and areas to walk and stand safety away from traffic.

Modern transit centers often can be designed with the following features:

- Spaces for bike and scooter share stations
- Sustainability elements through incorporating of renewable energy collection (i.e. solar or wind) facilities, providing locations for recharging electric buses and mitigating stormwater runoff through incorporation of bioswales
- Facilities for training of riders with disabilities
- Spaces for nonprofit-organizations and for small businesses such as a café
- Connections to intercity bus and Amtrak services

Regardless of Port Authority's future system design, transit centers located in places with high passenger volumes are likely to support its operations. Obtaining the required land for the transit centers can be challenging, especially when factoring in equity and environmental justice considerations. Potential strategies to overcome this include locating transit centers in underutilized parking areas or incorporating transit centers into the fabric of a central business district.

Currently, Port Authority is preparing to begin a study of the Central Business District's bus network in collaboration with the Pittsburgh Downtown Partnership. This study will include at least one network option which incorporates a larger transit center into the Downtown core. While a location has not yet been selected, NEXTransit offers some basic criteria for discussion purposes that will help to advance public review and selection of alternatives (and

the requirements that will be used to create the alternatives).

Although NEXTransit presents several options for future connectivity that aim to create better neighborhood-to-neighborhood connections that don't require riders to pass through or connect Downtown Pittsburgh if it's not on their way, Downtown will continue to remain the center of Port Authority's transit network. The core rapid transit network routes currently terminate within or near Downtown, but in the future, through routing across the County from east to west or north to south with Downtown as a central hub may be feasible. While this is already possible based on where busways and light rail assets are located, a transit center that can provide flexible connections is necessary to make these connections comfortable, consistent and easier to understand.

Peer Examples

Sparks, NV

The Regional Transportation Commission (RTC) Centennial Plaza opened in 2008 and serves bus rapid transit (RTC Rapid Lincoln Line), local buses, paratransit, and Megabus. The transit center design was inspired by Sparks' 117-year history and the railroad's importance to the city, and also will all be able to support service expansion to 2030 and beyond. It includes a mobility center, where in-house eligibility and travel training for persons with disabilities is conducted. The training includes multiple floor surfaces and a bus mock-up. In addition, weather-permitting, trainees can utilize the outside area of the transit center.

Springfield, OR

The Lane Transit District's Springfield Station is a transit center that has an innovative and environmentally friendly design. Green features include a rainwater catchment device and a system of bioswales to assist in cleaning and reducing the amount of stormwater runoff from the facility. It also includes pedestrian amenities such as open shelters, ample parking, and natural gardens. The transit center houses several businesses and provides bus rapid transit and local bus service, as well as Greyhound bus service.

Champaign/Urbana, IL

The Illinois Terminal is Champaign-Urbana Mass Transit District's (MTD) multimodal facility located in downtown Champaign that is served by local buses, rural transit providers, intercity bus providers, passenger rail, and a ride share zone. The building has retail space within the building as well as meeting spaces and banquet halls. With assistance of grant money from the Federal Transit Administration, the transit terminal will be renovated and expanded to transform under-utilized land for more productive public use in the downtown area, while improving access and allowing for faster, easier transfers and reduce wait times.

Level of Effort for Implementation: Moderate to High

- Construction of new transit centers may require land acquisition, planning, engineering, and construction.
- At a minimum, platforms would be needed for rider waiting areas and bus pads would be required to maintain pavement integrity at the facilities.
- Larger more complex transit centers could be major construction projects.
- Transit centers could be constructed in conjunction with other corridor related improvement projects.

Resources

Champaign-Urbana Mass Transit District
PIVOT Architecture Firm
Regional Transportation Commission of Washoe County

Transit-Oriented Development (TOD)

Port Authority's Values:
Affordable, Efficient, Equitable

Overview

Port Authority is already investing in and supporting transit-oriented development (TOD) throughout Allegheny County. TOD refers to compact, walkable, pedestrian-oriented, mixed-use communities located within close distance of high-quality transit. TOD reduces car dependency and supports jobs and housing without requiring car ownership. Port Authority currently plays three primary roles in promoting this type of development centered around transit access: as a sponsor for joint development on sites owned by Port Authority, as a stakeholder for developments occurring within ½ mile of a current or future high-capacity station, and as an advocate for sustainable land use decisions along Pittsburgh's transit corridors. The term transit-oriented communities (TOC) is prioritized by Port Authority, which goes beyond a development focus and emphasizes the goal of supporting communities with integrated transit.

High-quality TOD on and near properties Port Authority owns can accomplish several goals, including the creation and promotion of equitable, mixed-income and mixed-use communities around transit, including access to affordable housing. Proximity to transit can increase property values and may cause lower-income residents to get priced out of transit-accessible communities. Because of this possibility, affordability is a major guiding principle of Port Authority's TOC program.

In 2016, Port Authority published its *Transit-Oriented Development Guidelines*, which includes a classification of TOD types and station types, overall goals and principles, and guidelines for transit-adjacent and transit-centric development in 6 different density contexts. Port Authority TOD staff promote partnerships throughout the county to implement these goals and represent Port Authority in working with local government and other stakeholders on joint development opportunities. These program guidelines establish goals and principles that Port Authority staff use to guide planning work around joint development. In addition to furthering the agency's equity-related goals, joint development ventures would ideally minimize parking for on-site uses and adequately price park and ride spaces, or refrain from including any new parking where appropriate.

Analysis

The benefits of transit-oriented development are wide and varied. The provision of jobs, services, and housing is a smart land use strategy that reduces infrastructure needs by collocating uses, minimizing the need for inter-activity travel, prioritizes non-automotive transit modes. The goals of TOD are walkable, mixed-use, thriving neighborhoods with a high quality of life. Increased reliance on public transit can reduce air pollution by having fewer cars on the road. From a market standpoint, transit-oriented developments are recognized as creating value and helping to support revitalization in underserved neighborhoods. According to a report released in 2004 from the Transportation Research Board, TOD has been shown to increase ridership and farebox revenues for transit agencies, increase land values for the private sector, spur economic development, increase affordable housing

opportunities, reduce road costs and traffic congestion, increase social cohesion and interactivity, and more.

Key principles include putting stations in locations with the highest ridership potential and development opportunities; designating a ½-mile radius around the station as higher density, mixed-use, walkable development; offering seamless pedestrian connections to and from transit stations, reducing parking requirements to further promote transit and allocate land for the highest and best use as opposed to car storage; and use the transit station as a catalyst for redevelopment and placemaking throughout parks, plazas, and public spaces included nearby.

The implications for Port Authority focus most prominently near fixed guideway stations. Stations along the East and West Busways and the Red, Blue, and Silver light rail lines have the potential for joint development that serves both the communities (by offering new economic opportunities and housing options near transit) as well as Port Authority (by bringing increased ridership and related fare collection to support the agency's budget needs. Residents and other stakeholders in communities have repeatedly requested affordable housing.

The *NEXTransit Long-Range Plan* further identifies corridors for rapid transit expansion with new or extended fixed guideways. Each of these projects envisioned carries with it opportunities to pursue joint development along the corridor and build in a transit-oriented market that supports the new route and addresses housing needs together.

Peer Examples

Pittsburgh's Port Authority

Eastside III is a TOD project located on the Purple Line (East Busway), designed around the newly renovated East Liberty Station. The development includes market-rate apartments, retail space, and structured parking.

Philadelphia's SEPTA

Paseo Verde is a mixed-use, mixed-income development containing housing and retail adjacent to the SEPTA's Temple University Train Station. SEPTA contributed funds to update the station as part of the construction. Paseo Verde is the first transit-oriented development in Philadelphia. The site, built on a previously vacant 1.9-acre lot, includes five stories, 120 affordable and market-rate apartments, and a community technology center.

Level of Effort for Implementation: High

- Development projects would require significant of coordination with stakeholders, local government, and public feedback.

Resources

Transit Cooperative Research Program
Transit Oriented Development Institute

Increasing Access for Unbanked Riders

Port Authority's Values:
Growth, Equitable, Accessible

Overview

The term "unbanked" describes groups of individuals who do not use banks or credit unions for their financial transactions. These individuals have no (or limited) access to credit cards or rely solely on pre-paid cards. Furthermore, "underbanked" individuals may have a basic savings account with a financial institution but do not use more advanced financial services, such as checking accounts, loans, or retirement savings accounts.

Unbanked individuals lack access to banks usually due to one or more of the following factors: a poor credit history, an outstanding issue from a prior banking relationship, a lack of understanding about the U.S. banking system, a language barrier, a lack of appropriate identification needed to open a bank account, or living paycheck to paycheck due to limited and unstable income. Individuals may also choose to be unbanked because they distrust banks, value privacy, find bank account fees too high, or they may perceive that they do not have enough money to meet banks' minimum balance requirements. Therefore, unbanked individuals need access to transit services that do not require these financial services.

In 2019, 5.1% of households in Allegheny County were unbanked, with 24.2% underbanked. In the City of Pittsburgh, 8.4% of households were unbanked and 19.1% were underbanked. Those percentages are even higher in minority and elderly segments of the population. While, cashless systems have inequitable impacts on passengers, all passengers benefit from the increased reliability associated with cashless systems. Cashless transactions have been studied and found to be reliably faster for on-board fare payments than cash-based transactions. This reduces vehicle dwell times thereby increasing the reliability of transit vehicles along their routes. Cashless transactions typically use either a fare card or smart phone connected to a bank account or credit card.

As transit agencies across the nation continue to progress towards cashless fare collection methods, programs to reach unbanked individuals are essential.

Analysis

Although the benefits of cashless fare collections systems are proven, there must also be effective strategies to reach unbanked and underbanked who are existing riders as well as those who are not yet transit users due to barriers posed by cashless fare systems.

In addition to reducing dwell times, cashless systems allow transit systems to collect data which can be used in transit service planning such as how boarding patterns differ by time of day and day of week, how often riders are using the transit system, and which routes they use. Cashless systems all create the potential for transit systems to create programs such as incentives for frequent riders or to create other dynamic pricing strategies such as discounts for off-peak travel. Using compatible technologies, cashless systems can allow integration of service among transit systems with connecting routes. This makes transfers between systems more seamless to customers. Using fare cards for other services like parking, ride-hailing, and bicycle-share program can help to facilitate and

encourage multimodal trips. Currently, Port Authority has an arrangement with Healthy Ride to facilitate bicycle usage for first/last mile access. ConnectCard users can rent a bike using the Nextbike app, kiosk, or by calling Customer Service. The program grants users unlimited 15-minute rides. If a ride exceeds 15 minutes, the user will be charged $2 per 30 minutes.

Port Authority is committed to providing a more affordable fare structure for its lowest-income riders, and is currently researching best practices at other agencies and using this to create a solution that works well for riders, the system, and the community overall. Strategies to address unbanked riders include the following:

1. Increase options to use cash to load onto fare cards or mobile accounts. Including but not limited to, ticket vending machines, customer service centers, and retail partners such as grocery stores.
2. Allowing the use of prepaid cards for cashless payments. The use of prepaid cards would allow unbanked individuals to use payment methods to which they have greater access. Allowing online payment systems to link to fare collection methods should also be considered.
3. Collaborate with other government services to see if there are potential government funding sources. For example, Virginia and Massachusetts allow electronic benefits from some social service programs to pay for transit fares.
4. Collaborate with Bank-On Allegheny County which works to connect unbanked and underbanked populations to safe, affordable, and appropriate financial products and services.

Peer Examples

Los Angeles's Metro

Los Angeles Metro's TAP (Transit Access Pass) is used for payment for their bus and rail systems, but also for their bike-share program, microtransit, electric vehicle sharing and charging, ride-hailing, and parking. They can be purchased pre-loaded on a bus or at a train station by utilizing cash or an electronic form of payment. The pass fee, in addition to the fare, is $1 at one of the 400 TAP vendor locations or at private vendors for convenience, such as the library, for $2. When a card is brought within range of a LA Transit System Reader, the balance is deducted.

New York City's MTA

Passengers can purchase or add money to a MetroCard at a MetroCard vending machine. The larger vending machines accept cash and credit/debit cards, while the smaller machines do not accept cash. A SingleRide ticket, used for a subway or bus ticket within two hours of purchase, is available for cash only at the large vending machines. These machines can only return up to $9 in change and includes dollar coins, not bills. Cards are also available at station booths with a cash-only purchase. Every month, MTA also sends it Mobile Sales Service Centers around the five boroughs, making scheduled stops at senior centers, shopping centers, and along major bus routes. Representatives answer questions and help with MetroCard issues.

Level of Effort for Implementation: Moderate

- Developing programs to reach the unbanked could require significant coordination with financial institutions, community-based organizations retailers, other local government agencies, as well as fare collection vendors.
- Procuring ticket vending machines with the necessary capabilities would require procurement activities.

Resources

Federal Deposit Insurance Corporation
SmartCard Alliance
Georgia Institute of Technology
University of Illinois at Chicago
The Urban Institute
Bank on Allegheny County
Healthy Ride
Metropolitan Transportation Authority

Vehicle Design & Amenities

Port Authority's Values:
Ridership, Accessible, Connective

Overview

Vehicle design and amenities can influence ridership by making transit more attractive to the public. According to Data USA, in 2018 about 9% of households in Allegheny County use public transportation to commute to work. Having bus and rail vehicle amenities can help to improve existing riders' quality of life and attract new riders by improving their comfort, convenience, and ability to better utilize their time, whether for a daily commute or for non-work trips such as shopping, day care, or accessing inter-city travel facilities.

Analysis

Vehicle design and amenities can enhance passengers' ride experiences and satisfaction, therefor influencing ridership. Vehicle design options include kneeling buses and plastic seats. Kneeling buses decrease the height of the passenger's step up onto the bus from the curb by about 8 inches. These can assist elderly, persons with disabilities, children, and passengers carrying objects in both hands get onto the bus safely. Some may kneel in the front right corner and some may kneel in the rear. Plastic seats have begun to replace cloth seats in some transit agencies. The change is being implemented inside some Blue Line light rail vehicles, to generate customer feedback. The swap is expected to save about 1,600 hours and $200,000 in maintenance a year.

Vehicle amenities such as free Wi-Fi, USB ports, and power outlets can increase rider satisfaction. Having Wi-Fi on public transit is attractive to potential passengers as it increases internet accessibility. Access to Wi-Fi can increase commuters' quality of life by allowing them to effectively their time on public transit. In 2017, MTA New York City Transit added a total of 83 new buses, as well as retrofitting their current fleet, with Wi-Fi and USB charging ports throughout the vehicles.

Some public transit requires a stroller to folder up prior to boarding and the passenger must keep the stroller with them, out of the aisle, once aboard. According to the 2011 report "Strollers, Carts, and Other Large Items on Buses and Trains," Scandinavian cities have begun to remove poles in their trains to create space for twin strollers, while Copenhagen's trains have designated areas for strollers and buses allow for unfolded strollers.

Storage space and luggage racks can be helpful to those travelling with kids, running errands, or travelling to and from the Pittsburgh International Airport. Luggage racks offer an out-of-the-aisle storage option for either luggage or large items. This helps to keep the aisles clear and from riders blocking the doors.

Peer Examples

Minneapolis-Saint Paul's Metro Transit
After testing plastic seats on a handful of cars in 2019, Metro Transit announced in 2020 that they would be replacing more than 13,000 cloth seats and bottoms with new, custom-designed plastic seats by spring 2021. According to Metro's Customer Relations Manager, customers would frequently suggest plastic seats. In total, 91 light rail vehicles are being retrofitted. The change was made in consideration of the cost and time of maintaining and cleaning the current cloth seats and customer feedback, in addition to the additional cleaning requirements brought on by the COVID-19 pandemic.

Los Angeles's Metro

Metro's fuzzy fabric seats are rare among U.S. transit systems and have caused years of complaints as well as large dry-cleaning bills. Red and Purple subway lines were upgraded in 2018 from wool and nylon to vinyl seating with a drainage hole. The change was one of the strategies Metro is pursued to improve increase ridership and improve riders' experiences. Past riders had experienced lice and bed bugs, or have sat in mustard blended into the upholstery, causing some to not even directly sit on the seats.

New York City's MTA

In 2017, in efforts to revitalize MTA's bus operations, New York City added 86 new buses to their Select Bus Service in Brooklyn and 79 arrived in Manhattan. These buses replaced nearly 40% of MTA's current fleet and represent a $1.3 billion investment of Capital Program resources. This was part of a 2016 initiative that planned to add more than 2,042 state-of-the-art new buses to the fleet over the course of five years. The buses are equipped with Wi-Fi service and USB charging ports throughout the vehicles. In 2020, announced they would be deploying 9,000 new digital screens across the system over the next year. These screens will be located in stations, on platforms, and subway cars. This allows for passengers to have up-to-the-minute travel and station information.

Level of Effort for Implementation: Low

- Would require new buses and/or retrofitting current fleet

Resources

U.S Department of Transportation, Federal Highway Administration
Parents Magazine
Busbud.com
Metro Transit of Minneapolis/St. Paul
Los Angeles Times
Metropolitan Transit Authority of New York City

Wayfinding and Signage

Port Authority's Values:
Accessible, Equitable

Overview

Wayfinding is a system of signs and tools that help people orient themselves. Effective wayfinding tools help people figure out where they are, where exactly they want to go, and how to get there.

It is especially important for a transit system to implement good wayfinding practices—signs, maps, visual symbols—since a complicated or confusing system will discourage people from using transit. An innovative and consistent system of transit signs can make bus and light rail stops easier to find and navigate, provide better route information, and help orient new riders and visitors.

Analysis

In addition to standard metal signposts, Port Authority has investigated installing digital kiosks at bus and light rail stops to help riders plan their trips. In 2016, Port Authority piloted a new $900,000 wayfinding project for innovative wayfinding tools at six light rail stations and nine bus stops, including interactive kiosks and interactive bus stop displays, as well as new non-digital signs at 85 bus stops showing maps and route frequency. These kiosks include interactive touch screens that show "you are here" markers, route maps, and service updates in the event of construction or emergency closures. The kiosks can also show the real-time location and estimated arrival time of the next vehicle.

Higher-traffic transit hubs, especially those with nearby connections to other modes of transportation, could be candidates for more this type of interactive wayfinding kiosks and signs. However, most of the 7,200 bus stops in the county will not likely warrant the expense of a digital kiosk. In these cases, the non-digital signs used in the pilot could still be expanded to all 7,200 bus stops to make bus stops in the system more consistent and navigable.

For underground light rail stations, overhead exit signage can advertise station exit numbers, nearby cross streets or points of interest, and connecting transit routes. Using station exit numbers in subway systems is becoming more popular in Asia and North America since they are easy to use regardless of transit users' spoken language, reading level, or familiarity with the light rail system.

Port Authority staff is currently overseeing the creation of wayfinding signage guidelines and a master plan for 69 fixed guideway stations. Beginning with a pilot at South Hills Junction, the goal of the plan is to create standards of wayfinding signage for different station typologies throughout the system. Deliverables of the project include wayfinding signage standards and guidelines for several station typologies and detailed specs for in-house fabrication by Port Authority's Sign Shop.

Peer Examples

Washington, DC's WMATA

Metrobus provides more than 400,000 trips each weekday in D.C., Maryland, and Virginia. In September 2018, over 700,000 transfers occurred from Metrobus to Metrorail and vice versa. These intermodal transfers play a critical role in connectivity. WMATA produced a guide that explains how clear, consistent wayfinding signage helps passengers complete their transfers. Wayfinding can be especially helpful for tourists. For wayfinding to be successful certain aspects must be considered: location of information, quality of information, maps, aesthetics, lighting and placement, and digital wayfinding.

Philadelphia's SEPTA

In 2015, SEPTA completed a wayfinding signage project at 30th Street Station to improve the passenger experience as well as vehicular and pedestrian flow. The project removed outdated signs and installed various interior and exterior signs including free-standing directional signs, dynamic gate deification kiosks, passenger information displays, map kiosks, overhead wayfinding signs, and wall plaques. Currently, SEPTA is redesigning the signage for its "Rail Transit" network to ensure riders of all languages, abilities, and familiarity with the system can effectively utilize the wayfinding signage. SEPTA is using a survey posted publicly in Fall 2020 to help guide its Master Plan.

Seattle Department of Transportation

In July 2019, Seattle produced the Pedestrian Wayfinding Strategy as part of the development of Seamless Seattle, a pedestrian wayfinding system for the city. The guide builds on the recommendations from the 2017 Seamless Seattle Scoping Study. It details why and how wayfinding signage is successful. Also included are ten principles that detail how to develop and provide wayfinding information.

Level of Effort for Implementation: Low to Moderate

- Updating all 7,200 bus stops with the same new (non-digital) wayfinding signage is a straightforward task; the greatest obstacle is deploying new signs at such a large scale.
- Installing interactive kiosks at additional bus stops would require more effort and coordination with municipalities about installing kiosks on sidewalks.

Resources

Port Authority
Washington Metropolitan Area Transit Authority
SEPTA
Seattle Department of Transportation
The Urbanist
Mass Transit Magazine
Pittsburgh City Paper
Metro Magazine

Workforce Expansion Program

Port Authority's Values
Growth-Oriented

Overview
In recent years, the Port Authority of Allegheny County has encountered challenges in acquiring the needed talent to fill open positions for Operators (drivers) and Maintenance staff. If the recommendations set forth in NEXTransit are going to be successfully carried out, it is essential that the Authority build upon its current human resources capacity in order to ensure that staff positions are filled as the system expands. Having new capacity to store and maintain transit vehicles will be useless without the talent to operate and maintain these vehicles over time.

From June 2016 to June 2021, the average active operator count was just under 1,200. Employment has been in a steady decline over the last six years, dropping to approximately 1,150 in June 2021. The average vacancy count has hovered around 50 over the most recent six-year period.

Over the same time period, the Maintenance employee numbers gradually increased from 813 to 850 in FY2020, then jumped to 916 in FY2021 due to increased sanitation requirements related to COVID-19. Maintenance vacancies increased from 27 at FY2016 year end to 52 at FY2021 year end.

Traditional benefits, such as healthcare and retirement programs, along with competitive pay rates help to attract new talent. However, filling open positions in recent years has become much more competitive due to increased competition from trucking and delivery services. Recent changes to Commercial Driver License (CDL) requirements have also negatively impacted Port Authority's hiring process, as well as the overall attractiveness of employment in the transportation sector.

Analysis
The Authority has several programs already in place to attract and retain staff, including working with PA CareerLink (the state run employment office), relationships with several local Military Veteran Groups (Veterans Leadership Program, Vetjobs.org, Pittsburgh Hires Veterans, and the Pittsburgh Veteran's Employment Consortium). Port Authority works with local technical schools and participate in community based Virtual Job Fairs. Port Authority hosted a combined in-person/virtual job fair that was convened at the PA CareerLink office in September 2021 to recruit drivers and maintenance staff.

In addition to the Port Authority Website, open positions are advertised on Indeed.com, Monster.com, TransitTalent, Vibrant Pittsburgh, SoulPitt, and with a large number of Community Organizations such as PA Women Work, African American Chamber of Congress, and the Hispanic Chamber of Congress.

As many transit systems deal with staffing challenges, it is important to note what successful programs have transpired elsewhere that the Authority could adopt or build upon. The foundation for the majority of these programs is developing strong relationships with local schools to create a natural pipeline of applicants. Port Authority has been moving in this direction, but these efforts require an investment of time and talent. The recent hiring of the Director of Equity and Inclusion is a step in the right direction to increase outreach into the communities that Port

Authority serves. Operations personnel have also begun participating in these efforts with technical schools. Employment needs have led Port Authority to significantly increase its participation in job fairs for various groups.

Port Authority should develop a focused plan with dedicated resources in order to strive for a consistent pool of qualified applicants as it works towards system expansion. This type of program would increase its visibility as an employer of choice, uppermost in the minds of potential employees.

Peer Examples

Washington, DC's WMATA

The Washington Metropolitan Area Transit Authority (WMATA) had a high rate of turnover for bus mechanics and was operating at a deficit of 50 members of its mechanics workforce. In response, WMATA developed the Transit Works Program to introduce veterans, high school students, and underrepresented populations to transit occupations and provide the skills needed to enter pre-apprenticeship programs, apprenticeship programs, or entry-level positions at WMATA. The agency partnered with a veteran's support services organization and two high schools in the area to recruit veterans and students to tailored, pared-down courses in WMATA's technical skills program. Of the trainees enrolled in the program, over 80% completed successfully, and WMATA found that veterans were more likely than students to apply for positions directly out of the program.

Level of Effort for Implementation: Low to Moderate

Resources

Transit Cooperative Research Program
US Government Accountability Office