



Valley OnBoard

Toward a 20-year
Vision for an
Accessible,
Equitable, Efficient
Network for PVTA

A HOPE
Project


Prepared by UMass Amherst
Regional Planning Studio
Fall 2022

PVTA

LA&RP
Landscape Architecture
& Regional Planning

VOB
Valley OnBoard





Public transportation can
offer a "ladder of
opportunity"

TRANSIT EQUITY DASHBOARD
(KLUMPENHOUWER, 2021)

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Glossary and Abbreviations

Express/Limited Stop Service - Fixed-route service designed to run nonstop over long segments between a small number of fixed stops, which are typically at major destinations along a route.

Farebox - Revenue from ticket sales.

Flex Service - Provides scheduled service to fixed bus stops that allows the bus to deviate closer to a passenger's starting or ending points when requested.

Flex Zone - Predefined geographic areas where curb-to-curb on-demand service can be accessed

Grid Network - Network designed as a grid so that most destinations can be reached from most origins with only one transfer.

Headway - The time between two transit vehicles going the same direction on the same route/line

Hub and Spoke Network - Network designed to connect the city center to neighborhoods and suburban areas without additional connections between the neighborhoods.

Local Service - Service designed to travel short segments making many stops along a fixed-route corridor.

BEB - Battery Electric Bus

CTTransit - Connecticut Transit

EJ(C) - Environmental Justice (Community)

FTA - Federal Transit Administration

HOPE - Helping Obtain Prosperity for Everyone

HUD - The Department of Housing and Urban Development

MBTA - Massachusetts Bay Transportation Authority

PVPC - Pioneer Valley Planning Commission

PVTA - Pioneer Valley Transit Authority

PV-TRIPS - Pioneer Valley Transit Review and Improvement Planning Study

RTA - Regional Transit Authority

SATCO - Springfield Area Transit Company

VATCO - Valley Area Transit Company



Executive Summary

The Pioneer Valley Transit Authority (PVTA), Massachusetts’ largest regional transit authority (RTA), has partnered with the University of Massachusetts at Amherst (UMass) on a two-year project. The goal of this project is to analyze and redesign the current transit network and service offerings to enhance equity and economic vitality throughout its service area in Hampshire and Hampden counties. The UMass planning project, Valley On Board (VOB), is part of a larger Pioneer Valley Transit Review and Improvement Planning Study (PV-TRIPS project).

Funded by the Federal Transit Administration (FTA) and the US Department of Transportation through a Helping Obtain Prosperity for Everyone (HOPE) grant, the Valley On Board project advances the goal of the Federal HOPE Program, which is to improve public transit in areas of persistent poverty in the U.S. The Fall 2022 UMass Regional Planning Studio proposes an adaptable 20 year vision that includes network, operational, and capital improvements that will increase efficiency, accessibility, and equity of public transit for riders throughout the Pioneer Valley, with a specific focus on those living in areas that meet the Commonwealth’s criteria for Environmental Justice Communities (EJCs).

This report summarizes Phase III of the two-year Valley On Board planning project. This process consists of five components:

1. An analysis of the drivers of change in the region and review of the scenario planning conducted in Fall 2021.
2. Development and implementation of an accessible, flexible, and interactive public engagement strategy
3. An analysis of data gathered from engagement events.
4. Route and recommendation development that is consistent with the analysis of the drivers of change and public feedback.
5. Evaluation of recommendations using the metrics of access, equity and efficiency to evaluate priorities of implementation.

The drivers of change, public feedback, and transit design and public engagement best practices were used to develop an adaptable 20 year vision for the PVTA.

Project Scope

Valley On Board is a project-based partnership between the PVTA and the UMass Amherst Department of Regional Planning and Landscape Architecture. This report is the culmination of work performed by graduate students enrolled in the Regional Planning Fall 2022 Studio course. The Fall 2022 Studio is part of a larger two-year partnership between PVTA and UMass Amherst, the goal of which is to redesign the regional transit network to better serve current and future riders into the next 20 years. The larger project comprises four phases:

Phase I: UMass Amherst’s Fall 2021 Planning Studio will conduct SWOT analysis of the current network, scenario planning to envision future contexts, and design of proposed route alternatives to enhance transit service.

Phase II: UMass Amherst’s Department of Civil and Environmental Engineering will conduct research on energy modeling,

Phase III: UMass Amherst’s Fall 2022 Planning Studio will engage in a public participation process to get public feedback on the initial route recommendations in Phase I and make revisions accordingly.

Phase IV: PVTA will complete the review process and develop a finance and implementation plan.

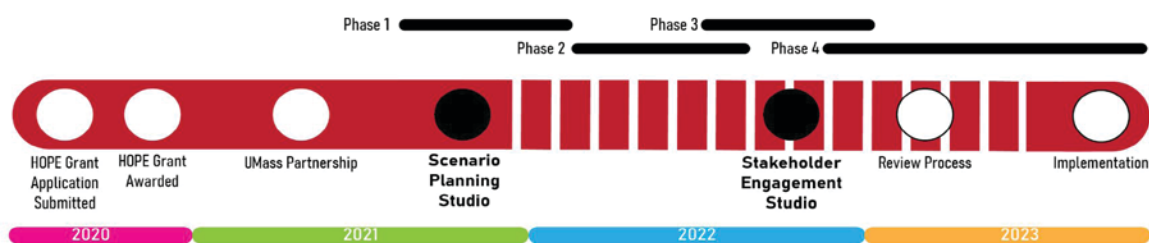


Figure 1: Valley On Board Project Timeline

Project Context

Prior to this project, the PVTA worked with the consulting firm, AECOM, to create a comprehensive plan in accordance with state planning requirements for all Regional Transit Authorities (RTA's). The comprehensive plan was completed in 2020 and, as a five year plan, was limited in scope. Valley On Board expands the planning timeline to 20 years, to provide an ample opportunity to implement changes that traditionally require longer timelines, such as new infrastructure and major fleet modifications.

An important contextual consideration for this study is the COVID-19 pandemic, which began in 2020 and triggered a dramatic decrease in ridership due to stay-at-home orders and a shift towards remote work and schooling. Though some stabilization has occurred, the long term impacts of the pandemic are still yet unknown, continually creating uncertainty around transit demand levels and determining priority service areas.

Likewise, the impacts of climate change contribute many unknowns to the future within which the PVTA network must deliver service. The scenario planning process undertaken as part of this project envisioned a variety of outcomes driven by climate change, ranging from population and economic shifts to weather-related hazards.

Regional Context

The PVTA, established in 1974, is located in western Massachusetts and serves 24 member communities across Hampden and Hampshire counties, making it the largest regional transit agency in the Commonwealth. The PVTA was created by the state to fund and oversee public transportation in the Pioneer Valley. Today, the PVTA serves urban, suburban, and rural communities. The PVTA's mission is to improve the livability of its member communities by providing transportation services. The PVTA provides transportation services by contracting with four local providers to maintain its fixed-route services. These providers include: the Springfield Area Transit Company (SATCo), the Valley Area Transit Company (VATCo), Hulmes Transportation, and UMass Transit (UMTS) which operate and maintain their large fleet. These providers have garages located in Springfield, Northampton, Palmer, and on the University of Massachusetts Amherst campus respectively.

The providers maintain separate fleets and staff. PVTA is funded primarily by state funding, followed by federal and local sources, as well as farebox revenues and grants. Member communities receive PVTA service through an assessment based on the number of fixed route miles and transit passengers served within that city or town.

An interactive version of the current route map can be found on the Valley On Board website.

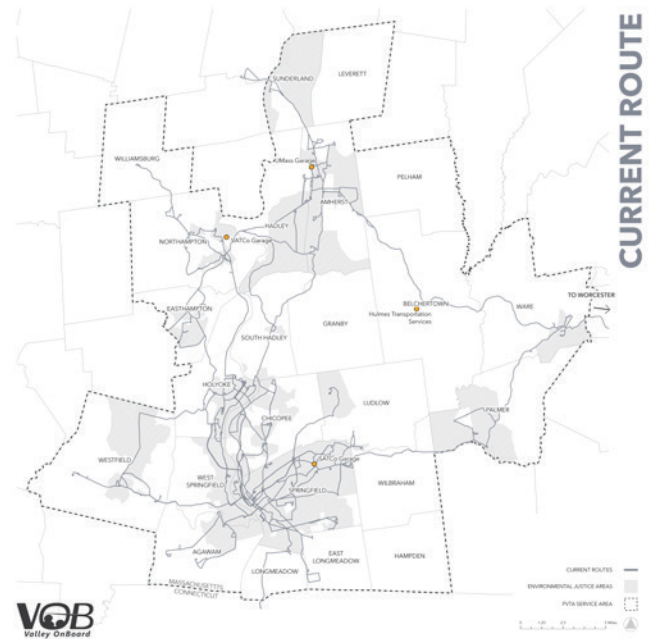


Figure 2: PVTA Service Area with existing routes and garages.

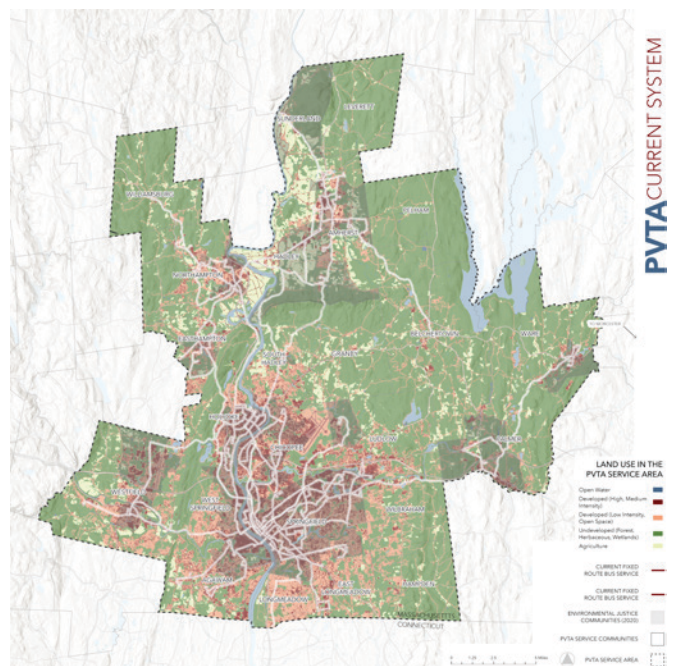


Figure 3: PVTA Land Use Map

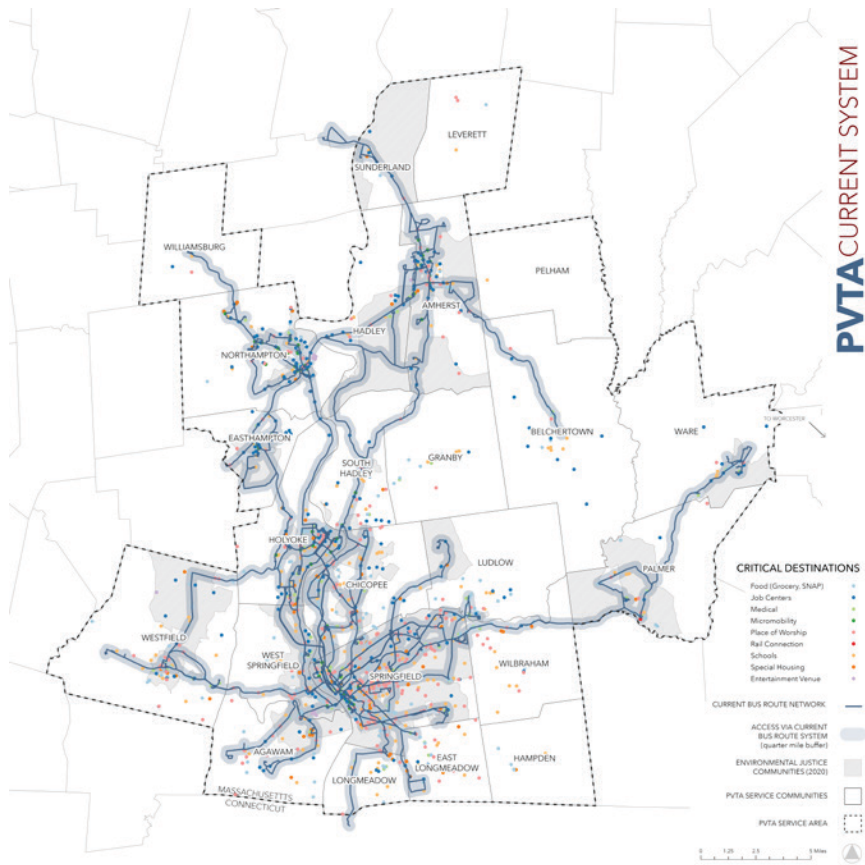


Figure 4: PVRTA Critical Destination Map

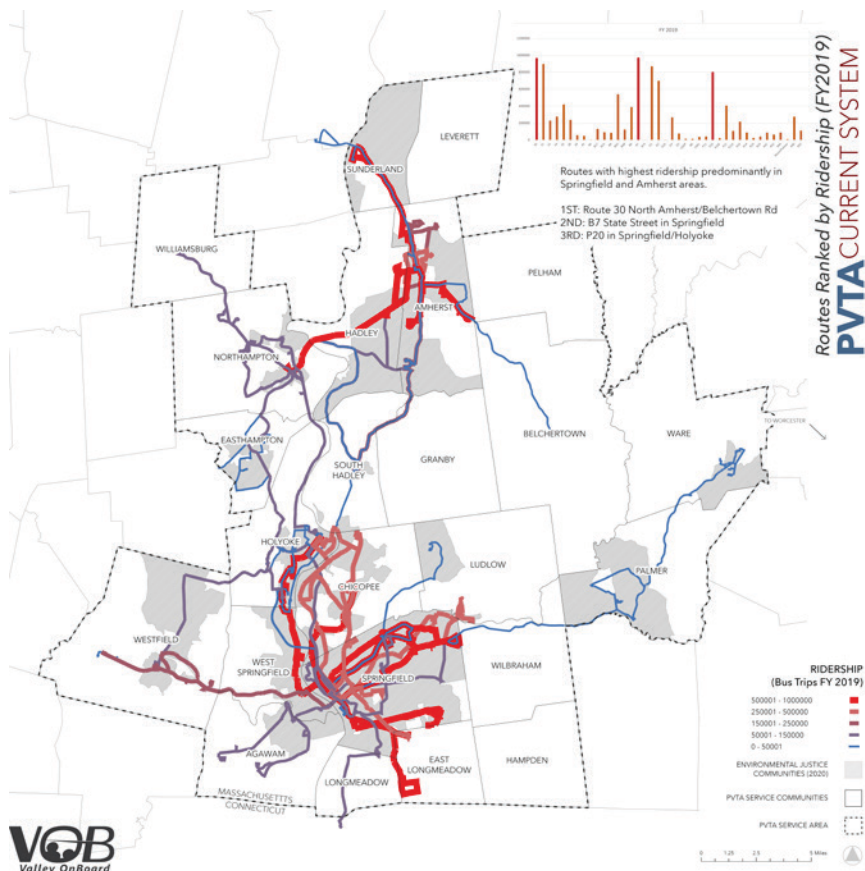


Figure 5: PVRTA Ridership by Route, FY 2019 (Pre-COVID)

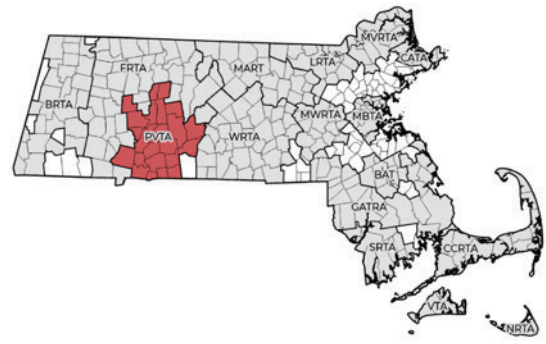


Figure 6: PVTa service area shown in relation to all Massachusetts RTAs.

Focus Community

The Valley On Board planning project is funded by a Helping Obtain Prosperity for Everyone (HOPE) grant, a federal program dedicated to improving public transit in areas of persistent poverty. To address the HOPE program goals, the VOB planning project used the state of Massachusetts' Environmental Justice Communities (EJCs) distinction to identify focus communities with high rates of transit-reliant residents. These communities are distributed throughout the service area with greater concentrations in Springfield and Holyoke (figure 8). Environmental Justice Communities are defined by the following criteria: 25% or more of households low English proficiency, and/or annual median household incomes 65% or less than the statewide average, and/or a population of 40% or more of minorities, and/or a population of 25% or more minorities where the median income is no more than 150% the statewide annual median household income. These barriers inhibit people's ability to influence decisions about things affecting their own lives and communities, making them more vulnerable than other residents and warranting special consideration from a planning standpoint. Due to this vulnerability and the high prevalence of transit-reliant residents living within Environmental Justice Communities, this study has deliberately elevated their place in decision-making considerations (What is an Environmental Justice Population?, n.d).

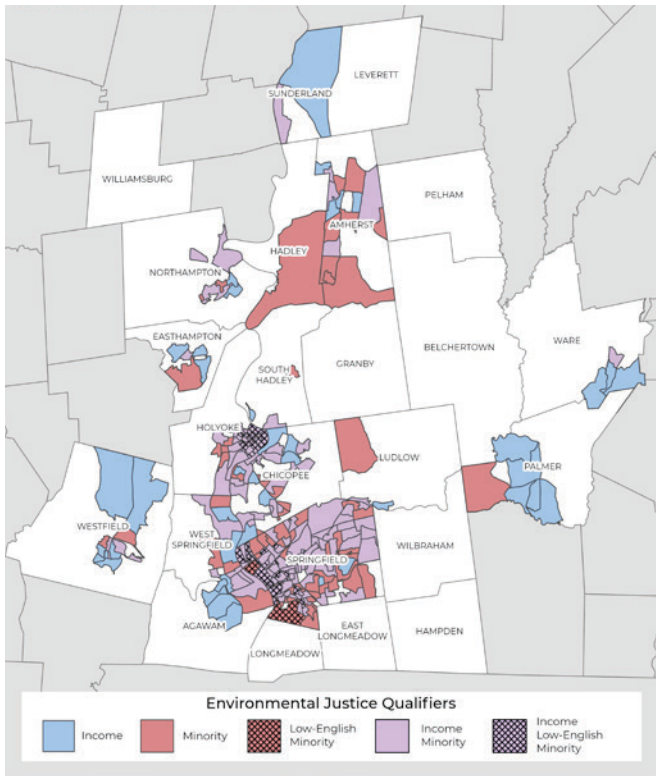


Figure 7: Environmental Justice Communities within the Pioneer Valley by qualifier.

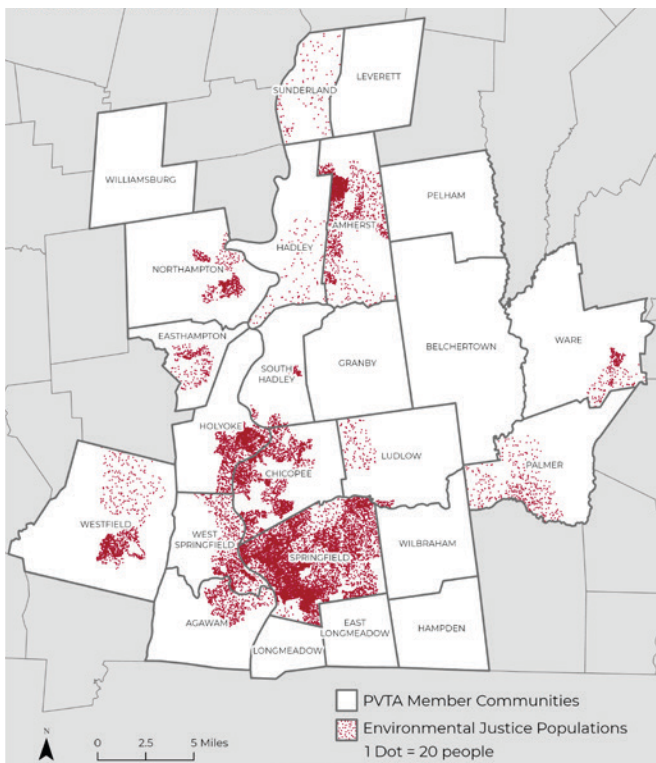


Figure 8: Population Dot Density of Environmental Justice Communities within the Pioneer Valley (1 dot = 20 people)

Objectives and Metrics

The objectives of the HOPE grant guided the development of metrics for the Valley On Board planning project. According to Klumpenhouwer et al. and the TransitCenter.org, a foundation working to improve public transit across the US, public transportation can offer a “*ladder of opportunity*” by providing affordable and convenient connections to jobs, goods and services, medical care, and other essentials of daily life (2021).

Valley On Board aims to strengthen the ladder of opportunity by examining the existing PVRTA network for strengths and opportunities for improvement, engaging with the public (specifically underrepresented populations), and creating a route redesign and recommendations that meet the needs of current and future riders. Therefore, Valley On Board’s objective is to develop a 20 year vision for the PVRTA that increases ridership and efficiency as well as enhances accessibility and equity of the PVRTA system.

Ridership and efficiency are the typical metrics applied when assessing transit outcomes. However, for this project, Valley On Board has also chosen to focus on accessibility and equity measures. Access can be generally understood as the number of critical destinations (jobs, schools, recreational areas, shopping, medical facilities, etc.) that people can reach within 45 minutes. This can also be understood as coverage of the service. Equity can be generally understood as how effectively transit services provide service to communities that are most reliant. In this report, equity is specifically measured by the number of Environmental Justice Communities served.

While these objectives are equally important, they do have competing interests. These competing interests can be seen in the graphic from Jarret Walker’s blog on transportation. Ridership and efficiency would create a route design that has higher frequency in the most densely populated areas while coverage which is related to accessibility and equity has routes that connect people from all across the region but have much lower frequency levels due to the lower ridership levels on lower density routes (Walker, 2018).



EFFICIENCY



ACCESS



EQUITY

Transit Design Concepts

The PVTA's large and varied service area presents inherent challenges to devising a route redesign that is efficient, accessible, and equitable. A primary example of this is the tension between maximizing ridership and coverage, as shown in the Figure 9 Jarret Walker's Competing Interest Graphic. This page provides a brief summary of contemporary transit design concepts that have helped shape this project's approach to balancing service needs and providing a well-rounded redesign for the PVTA service area.

Express Routes

Express Routes are faster transit routes that are designed to get people between major stops (usually the two end points of the route) with limited stops in between. These routes are most typically designed for commuting to major job centers and can make a system more efficient.

Flex Routes

Flex routes provide scheduled service to fixed bus stops and allows the bus to travel closer to the passenger's starting and ending points, if requested 24 hours in advance. Service occurs from stop to stop at the times listed in the schedule, but may be re-routed between stops as requested in order to pick-up/drop-off passengers at locations not directly on the route. This can make the transit options more accessible. (Ex: ¼ mile radius of route, Existing PVTA Ware-Palmer service)

Flex Zones

Flex zones differ from flex routes as they provide curb-to-curb on demand service for entire predefined areas in a region. Flex zones are typically good for extending coverage into suburban and rural areas that are not well covered by traditional fixed route coverage making it more accessible and equitable.

Micro-Transit

Micro-Transit is small scale on demand transit services that can offer BOTH flex service and flex routes with on demand scheduling. The key difference here is the scale of the transit vehicle. This transit concept may also be referred to as fleet diversification. Similar to the flex routes and zones, this transit design can increase equity and accessibility.

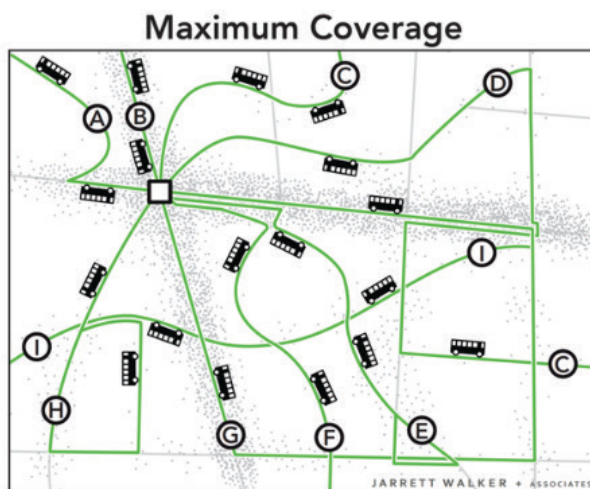
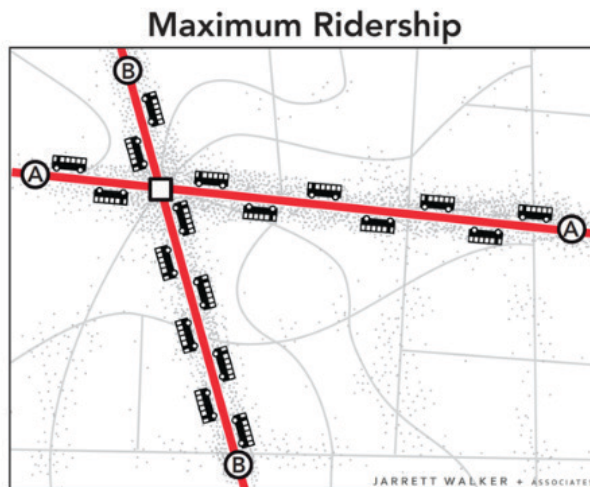


Figure 9: Jarret Walker's Competing Interest Graphic

Free Bus Fare

Free bus fare or free bus fare for vulnerable populations has been found to increase ridership. Free bus fare is found to be especially beneficial to youth, elderly, and low-income riders, and can help make public transit more equitable (Tomeš et al., 2022).

Electrification of Fleet

Electrification of the fleet involves the replacement of current buses with electric buses. Electric buses reduce pollutants, which is especially important for urban vulnerable populations and environmental justice communities. Therefore, electrification of the fleet can increase equity (Audrey Ku et al., 2021).

Marketing

Easily understood and accessible information on transit services is key to attracting new riders (Lewis et al., 2012). Re-branding and marketing PVTA services to the wider community can increase efficiency of the network by increasing ridership.

Drivers, Scenarios, and Alternatives

The first step in the development of a 20 year vision for the PVTA included an analysis of the existing conditions. The analysis of existing conditions involved visiting two garages/service hubs operated by PVTA partners, route rides, a review of current transit trends, and a review of current regional land use and economic development plans. Spatial analysis and strengths, weaknesses, opportunities, and threats (SWOT) analysis were completed to identify current opportunities and gaps in the system.

The above analyses indicated that the current PVTA system readily connects people and essential destinations within the urban cores of the network. However, the network could be improved by greater connection to rural areas in the region.

The analyses also revealed multiple opportunities in the PVTA network including opportunities to increase micro-mobility by expanding the PVTA and ValleyBike partnership, implementing more express routes and transit priority treatments, integrating more regional land-use and transit planning, expanding the electric and hybrid bus fleets, and furthering the existing efforts to implement bus shelters at stops with high ridership and longer wait times. Following this analysis of the current conditions, will encourage the focus of future conditions. To explore potential future characteristics of the valley, scenario planning was used.

Scenario planning is a long-term comprehensive planning strategy with roots in the military and business worlds. Over the last 30 years, this planning technique has been adapted to function in both regional and urban planning (Goodspeed 2019). A key component of using scenario planning is scenario development. Robust scenario development requires analyzing various trends and identifying potential uncertainties, or drivers, that may shape the future of the study region.

The first step in the scenario planning process was to understand the forces that will drive change in the future of the region. Through extensive research during Phase I, a series of drivers were identified that were considered most impactful in shaping the future of the Pioneer Valley. These drivers were Climate Change, Policy/Politics, Funding, Generational Values, Historical Legacy of the Pioneer Valley, and Global Impacts of Energy and Technology. Each of these drivers and their potential outcomes for the region are described below:

Drivers



The impact of global climate change will be felt in the next 20 years in the Pioneer Valley. While climate change is projected to contribute to an increase in flooding, heat waves, and other natural disasters, as a northern, inland region, the Pioneer Valley could potentially be the destination for climate migrants in the coming decades (“MA Climate Change Clearinghouse”). Residents of coastal cities and areas at higher risk of severe storms and heat waves might see the Pioneer Valley as a comparatively safe and stable area to relocate. Each of the scenarios consider the impact of climate change in the Valley to varying degrees. They also consider the potential of the threat of climate change to drive significant changes in land use, vehicle use, and energy consumption habits in the Valley and nationwide.

A united effort to reduce greenhouse gas emissions would likely require significant increases in density, a robust public transportation system, and an electrified bus fleet. The movement towards vehicle electrification is already underway. In October 2022, PVTA was awarded \$67.5 million from state and federal grants for the purchase of more electric buses. 12 of these new buses will arrive in late spring, and increase the fleet to include a total of 16 all electric buses. The scenarios consider the need to prepare for climate-related natural disasters, the transition to renewable energy, and a potential influx of climate migration as potential impacts on the future of the PVTA.



As a primarily state-funded agency, the PVTA relies on the support of politicians and other decision-makers to receive funding and policy support. Valley On Board identified the fractured state of regional policy and

planning in the region as a weakness of the current system. The scenarios consider the potential for increased political support from new state politicians and interest groups, as well as the potential for greater regional unity as drivers of change for the Pioneer Valley's future. The scenarios consider the potential for increased political support from new state politicians and interest groups, as well as the potential for greater regional unity as drivers of change for the Pioneer Valley's future.

In 2022, Massachusetts Governor-Elect Maura Healey listed a number of high-priority capital investments in her transportation platform. Among these are East-West rail, for which Healey has said she will appoint a Director at MassDOT to oversee, and support for the "Inland Route," a new Amtrak service linking Boston to New Haven via Springfield. Healey's platform highlights investment in rail and coordination with RTAs like the PVTA in order to coordinate their services with a future regional rail system ("Transportation," 2022). While most of Healey's published plans for transportation in Massachusetts pertain to the MBTA, the plans for investment in regional rail infrastructure make certain potential changes to the Valley, like East-West rail service to Springfield, more likely than in 2021.



The Massachusetts 2022 election included a ballot question, Question 1, to pass the Fair Share Amendment, which passed. This amendment to the state constitution will levy a 4% marginal income tax on Massachusetts residents making over \$1,000,000 per year. The money raised will be constitutionally earmarked for "public education and transportation."

Although it is too soon to understand exactly what types of projects or service changes this additional funding will go towards, there is potential for state funding from this amendment for the PVTA. In the past two years, federal funding for transportation projects has grown with the passage of the Infrastructure Investment and Jobs Act (IIJA) in 2021 and the Inflation Reduction Act (IRA) in 2022. The billions of dollars pledged to transportation are just beginning to be distributed through grant programs, but these funding opportunities are important for PVTA to keep in mind when planning capital projects in the future.

For more information on some of the grants of note for the PVTA see [Appendix A](#). While the PVTA might not be the organization in charge of planning all of these potential projects and applying for grants, any grants that are awarded in the region will have the potential to dramatically change the way that transit serves people.



The updated population projection for Hampshire and Hampden counties, based on 2010-2020 Census data, predicts that the population will decrease from approximately 628,000 in 2020 to approximately 558,000 by 2040. Currently, the region sees the highest levels of in-migration in the age 15-19 cohort, and the highest levels of out-migration in the age 20-24 and 25-29 cohorts, mapping on to the large numbers of college students moving into and out of the region for school. The population that does not leave the Valley after college are mostly Millennials and Baby Boomers.

Research from the Joint Center for Housing Studies at Harvard University finds that urban areas continue to become younger, while aging Millennials are choosing to move to suburbs (Lee 2021). This research supports a future in which young people continue to prefer to live in cities, but are not necessarily more likely to stay there as they reach adulthood compared to previous generations. However, the tendency of young people to prefer living in cities has only expanded in recent history, and is likely to continue to increase in the future (Lee, Lee, and Shubho 2019). For new generations with less earning potential and purchasing power in an inflationary economy, smaller, more affordable cities are becoming popular destinations (Olick 2019).

Meanwhile, the potential for a smaller college-age generation, who are also increasingly choosing options outside of traditional four-year higher education programs, could mean a smaller service population for the PVTA in the future, especially in the northern half of the Pioneer Valley. The scenarios imagine futures where all of these dynamics play out. In some, the Valley's relatively affordable small cities attract young folks who prefer sustainable, transit-rich lifestyles from around the country. In others, population decline in the northern Valley shrinks the PVTA service population.



The legacy of industry in the southern Pioneer Valley could be a significant driver of change in the future. Old industrial buildings like mills, which are common in the region, have become sites for successful adaptive reuse projects. Community colleges and trade schools have seen enrollment growth in recent years, even as traditional four-year college enrollment has declined (Nadworny 2022).

In the northern half of the Valley, the historical legacy is one of agriculture. In a future where the current dominant industry, higher education, sees decline (see Generational Shift), it's possible that the legacy of the agricultural industry, especially in farm towns like Hadley, will see a resurgence to fill the gap. Currently, the PVTA is not a viable option for most agricultural workers as it does not serve many agricultural employment centers or operate during the early hours when most agricultural workers commute. A future driven by the Valley's historical legacy would need a PVTA that serves these agricultural and industrial workers better, while college students would become a less central target group for service.



The Valley on Board project started in the midst of the COVID-19 pandemic, before its long-term implications for transit use were as clearly identifiable. At the end of 2022, transit ridership nationwide has still not returned to pre-COVID levels (Dickens and Kahana 2022). In New England, transit ridership is still at approximately 70% of pre-COVID levels. PVTA's ridership still sits around 65% of pre-COVID levels, and the rate of recovery has slowed significantly since 2021. PVTA has installed air filtration systems on all buses that help lower the risk of spreading COVID-19 on buses. While ridership might eventually recover to pre-COVID levels, the rate of recovery at the time of publication has significantly diminished. PVTA ridership is likely to remain at ~70% pre-COVID levels for the foreseeable future. Valley on Board's 20-year vision should account for a future where transit is a somewhat harder sell, especially for elderly and immuno-compromised individuals.

The advent of remote work and school is also reshaping the demand for transit around the world. Although traffic volumes in some cities have returned to pre-COVID levels on average, the "return to work" is not complete. Currently, around 80% of workers who are able are working remotely either part time or full-time (Molla 2022). While higher education students have largely returned to in-person learning (Ward 2022), many schools are leaving remote and hybrid options in place. For example, UMass Amherst in the Pioneer Valley continues to offer and expand its University Without Walls (UWW) program. Remote learning is an increasingly attractive option to many potential students, especially those outside of traditional college age. A significant migration to online learning at the Five Colleges and other schools in the Valley would change the demand for transit, especially in the northern portion of the Valley.

Scenarios

Taking into consideration these drivers, four scenarios were developed in the Phase I report to help explore the possibilities of what the Pioneer Valley may look like in 2040. From the scenarios, a route redesign was developed to meet the future being explored. These routes were designed to create a more efficient, accessible, and equitable system in each potential alternative was measured to examine how well it met the metrics of efficiency, accessibility, and equity. A brief summary of each scenario and resulting route redesign alternative is described below. For a more detailed description of the scenario process, see the [2021 Valley On Board Scenario Planning Phase I Report](#).

VALLEY STASIS

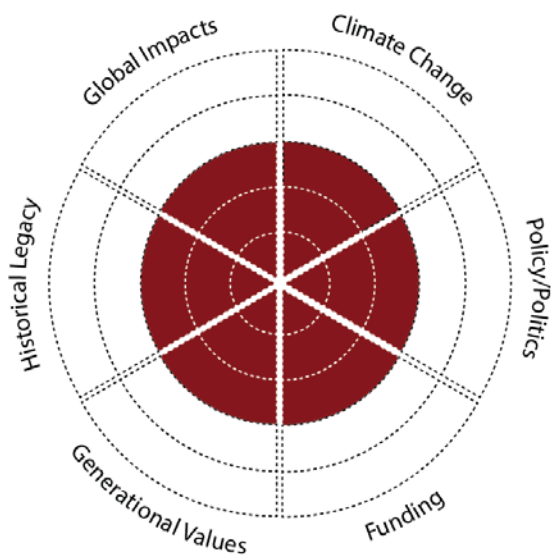


Figure 10: Valley Stasis Scenario Radial

NEW SMALL CITY

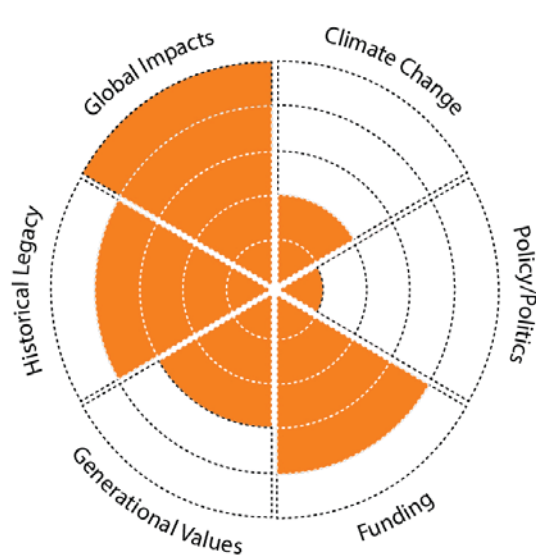


Figure 11: New Small City Scenario Radial

SKILLED VALLEY

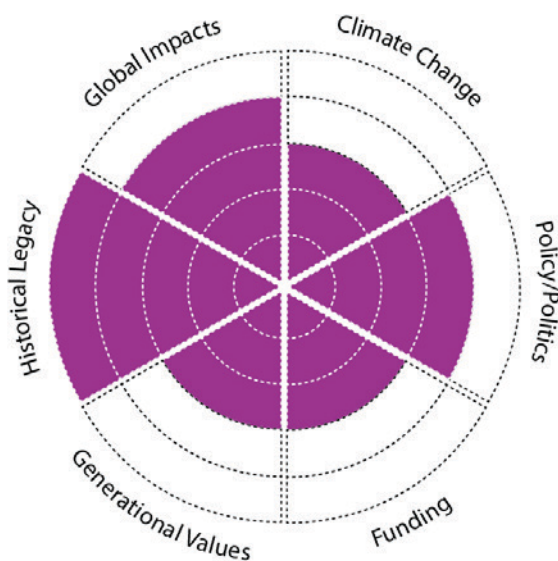


Figure 12: Skilled Valley Scenario Radial

HIGHER GROUND

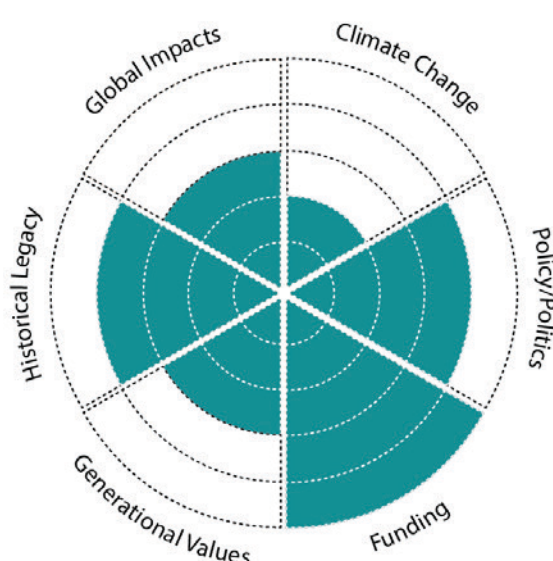


Figure 13: Skilled Valley Scenario Radial

Scenario-Driven Redesign Alternatives

Valley Stasis

The Valley Stasis, or Business as Usual, route redesign focuses on increasing coverage to the southeast region of the service area, rural connections, and transit access to EJCs. The transit dream of an East-West high-speed rail between Boston and Springfield does not come into fruition within the 20-year outlook. Longer distant express routes become an intermediary solution for mass transit connecting to Worcester and Boston. Most fixed routes of the PVRTA's current system remain and interregional express routes are expanded.

New Small City

The New Small City scenario envisions a revitalization of the major urban centers in Hampden and Hampshire Counties. New Small City's route redesign builds support for rapid growth in Springfield, Northampton and Amherst. The PVRTA remains focused on providing a comprehensive service network in these three nodes. A grid network is established within Springfield to facilitate frequent service and interurban express routes, which are critical for connecting the main service areas.

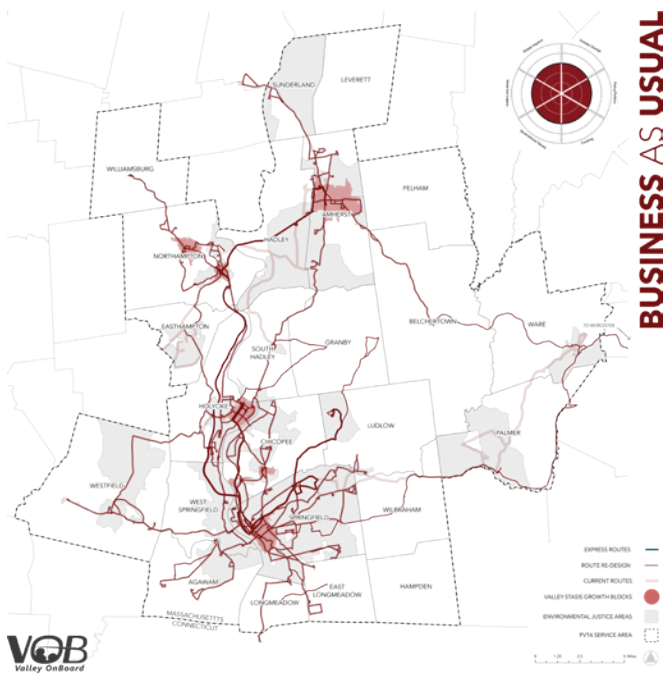


Figure 14: Valley Stasis (Business as Usual) Route Redesign Alternative

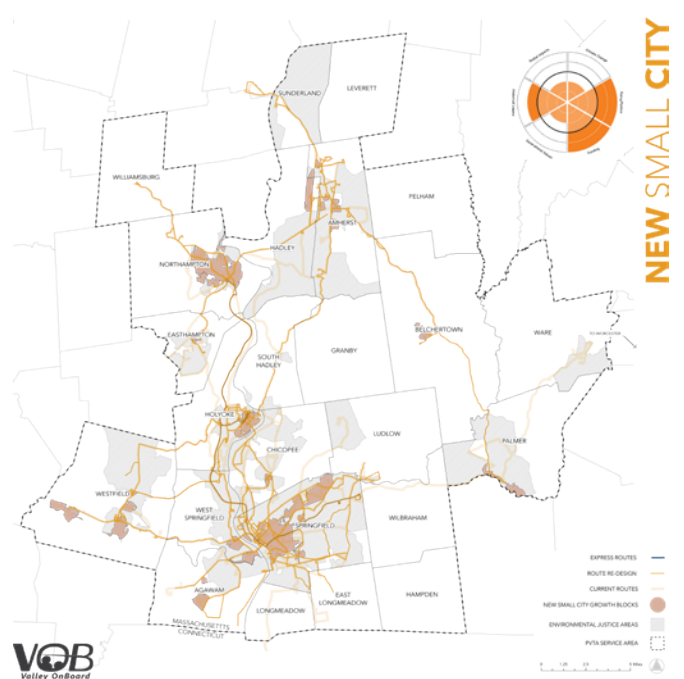


Figure 15: New Small City Route Redesign Alternative

Skilled Valley

The Skilled Valley scenario envisions a shift in higher education enrollment shifting the major employment centers throughout the Valley. Enrollment decreases at traditional four-year colleges throughout the Valley, while federal funding for free community college greatly increases enrollment at area trade and two-year colleges. UMass will matriculate many of these students initially, however in future years, students who may have attended those schools choose other universities outside the service area. Overlaid on all of the drivers are the distinct values of a new generation who care deeply about preserving the environment, supporting local food production, and avoiding student debt. The system is reconfigured into a dual-hub-and-spoke design revolving equally around Union Station in Springfield and the Holyoke Transportation Center. From the hubs, routes extend east and west to serve communities of anticipated growth from climate migrants. In the major urban centers frequency of routes is increased to better accommodate a variety of work schedules.

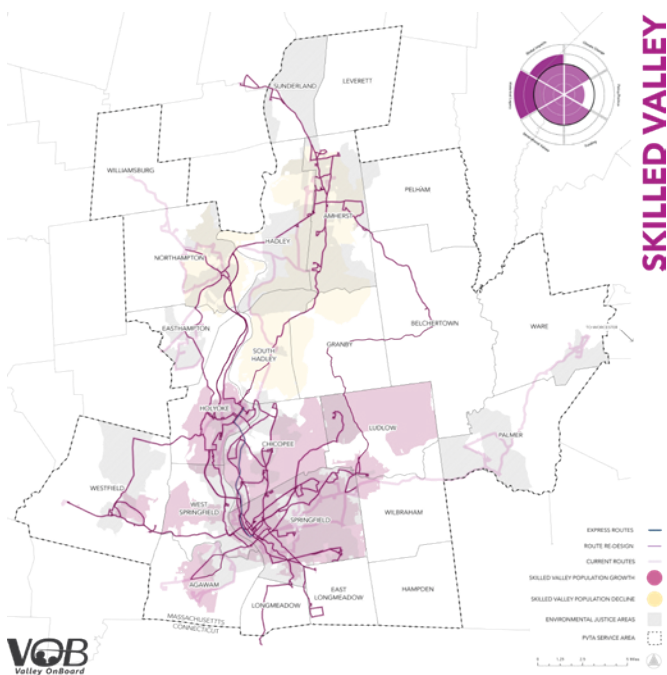


Figure 16: Skilled Valley Route Recommendation

Higher Ground

The Higher Ground scenario imagines the need for climate adaptation; increases in state funding leading UMass to greatly expand research investments in climate adaptation agriculture, clean energy transition, and stormwater management; and vast workforce retraining and development. These investments lead to job growth in the agriculture and energy sectors, attracting more young professionals to northern university hubs. Simultaneously, as remote options untether workers from commute-based decision making, university students increasingly stay in the Valley post-graduation, slowing the brain drain. A high-emission climate change scenario also drives population increase across the Pioneer Valley as southern and coastal populations move to northern cities in search of safe areas with available housing and jobs. The PVTa network converts to a multihub design in response to both the rapidly growing population throughout the Valley, need for improved access to expanding job opportunities in the north, and greater climate resilience.

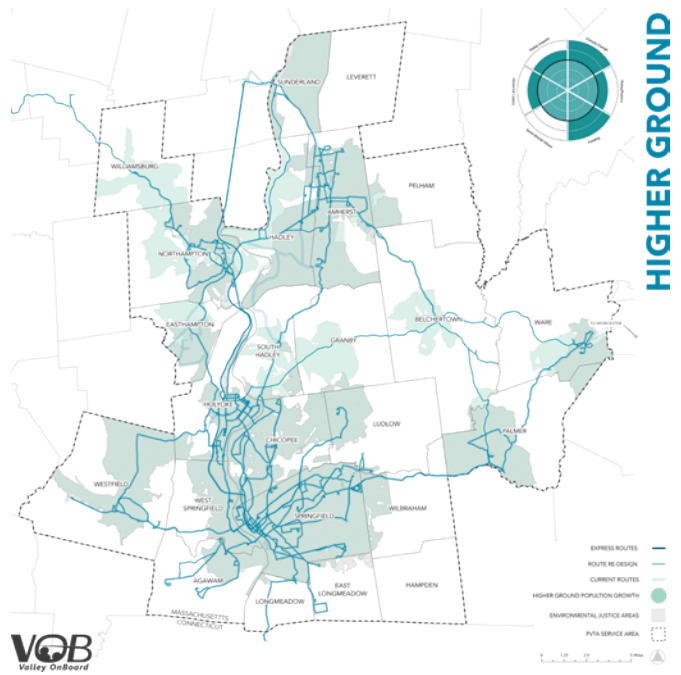


Figure 17: Higher Ground Route Recommendation

The transit recommendations from these four alternatives included increased express routes between hubs, implementing flex zones or routes in low-density service areas, adding transit priority treatments and park-and-ride locations, coordinating with ValleyBike, improving bus stop amenities and communications, incentivizing bus commutes by forming public-private partnerships with local companies, improving CDL staffing, and diversifying the bus fleet.

The purpose of scenario planning is not to predict the future, but to strategize how to achieve a set of given goals amid varying conditions. While it is unlikely that any one scenario outlined in this report will unfold exactly as envisioned, the future may hold a combination of elements from each. Accordingly, parts of each scenario’s redesign may be useful in the PVTA’s future. With this in mind, each route redesign was tested against each scenario based on the categories of access, equity, and efficiency. Each scenario represents a different pattern of future population, housing, and economic projections. Evaluating each route redesign against each scenario provides insight into which elements of the redesign may be universally successful and thus allow the PVTA to improve access, equity, and efficiency no matter how the future evolves.

Overall, the route redesign developed for the Higher Ground scenario provides service to the most destinations and environmental justice communities throughout all envisioned scenarios. This is likely because the route redesign increased coverage routes broadly throughout the service area in an effort to provide access to projected populations in both urban and town centers, recreational open space destinations, and northern agricultural areas. The route redesign developed for the Valley Stasis performed highest in efficiency across all scenarios. This means when comparing the cost of the system relative to the potential ridership capture of the designed network it performed as most cost efficient. To learn more about the grading process and the results, see the Scenario-Driven Route Redesigns section in the [2021 Valley On Board Scenario Planning Phase I Report](#).

This work revealed what aspects of the four route redesigns could potentially lead to a more accessible, equitable, and efficient future PVTA network no matter what the future holds. The next step in this work included bringing these alternatives to the public to better understand the region’s desires and needs, as well as the trade offs the public is willing to make for their public transit. This led to Phase III of the Valley On Board project, the public and stakeholder engagement process.

Public Engagement

Public engagement is a regular and required part of the transportation planning process and PVTA has traditionally done this engagement through onboard surveys in both the northern and southern regions of the service area annually. The surveys have focused on riders’ travel needs, satisfaction with service, and priorities for improvement. PVTA has also conducted public hearings and rider forums to connect with riders and hear their comments and concerns. While this engagement strategy solicits feedback from current PVTA riders willing to attend forums or take the survey,

Valley On Board’s goal was to focus on underrepresented voices in the process: Environmental Justice Communities, communities facing persistent poverty, and individuals who are not currently riders of the PVTA. Valley On Board focused on these groups to understand the gaps in the service, and what may be preventing people from riding the PVTA. Valley On Board’s approach consists of a variety of public engagement methods and welcomes feedback through interactive activities which educate and inspire interest in transportation planning. Inspiring greater interest from the community can create more detailed feedback, encourage more engagement, and empower individuals in the planning process. Additionally, connecting with a wider audience to understand their needs and hopes for the system is critical to informing an effective 20 year visioning and planning process that goes beyond conventional planning efforts.



Figure 18: PVTA Onboard Surveys

Statement of Intent

As the Federal Transit Administration intended through the HOPE Grant, *Valley On Board's public engagement goals are to go beyond the traditional public meeting to generate public discourse with populations traditionally excluded from the planning conversation*, such as Environmental Justice Communities and communities facing persistent poverty. Valley on Board additionally focused on youth engagement as a way to engage future riders of the PVRTA. The Federal Transit Administration and Federal Highway Administration's shared planning regulation directs planning efforts to evaluate the effectiveness of existing public outreach strategies, as well as move beyond the one-size-fits-all approach to public engagement.

"Many agencies rely on formal meetings as the foundation of their public engagement plans because these are often required by law; however, agencies should consider going beyond the traditional methods of public outreach to incorporate innovative approaches that leverage the ever-changing communications environment in which we live." (What Do We Mean by "Meaningful Public Engagement"? | FTA, n.d.)

The FTA recommends distributing flyers in the community at places people frequent outside of government settings as well as posting information directly at bus stops. Innovative approaches to public engagement include game-playing. Leading research indicates the effectiveness of game-playing in promoting social learning and increasing citizen engagement (Hassan and Hamari 2020). These strategies along with best practices in transportation public engagement were used by the Valley on Board team to develop an innovative public engagement strategy that meets the goal of engaging populations traditionally excluded from the planning conversation through the principles of interactivity, accessibility, and flexibility. These principles were critical to the development of the engagement strategy as well as the development of the participation toolbox which is introduced below and can also be found in [Appendix F](#).

Engagement Goals

The goals of the engagement process were clearly laid out prior to beginning to conduct events. These goals included receiving 1,000 responses on the survey, engaging with 15 people per in-person event, and reflecting the diversity of the Pioneer Valley community, as well as engaging with a geographically diverse population from across the service area. Beyond these goals, there was also the objective of engaging with the target populations, specifically environmental justice communities. Another goal of the engagement process was to go beyond traditional methods used in the past by PVRTA in order to make the process more interactive, accessible, and flexible.

In order to evaluate the progress on these goals, some metrics were also developed to measure the progress and success. In the survey, ZIP codes of individuals, as well as demographic information including age, race, and household income, were collected to evaluate the diversity of responses and individuals engaged with. The respondents' demographics could then be compared with the overall demographics of the valley. The survey was also conducted in both English and Spanish, and could be analyzed by the language of the respondent to measure language diversity. For in-person events, the main metric for measuring the progress towards the defined goals was geographic location and spread of events. Due to the sensitive nature of demographic questions without anonymity, this was difficult to collect in correspondence with the in-person events.

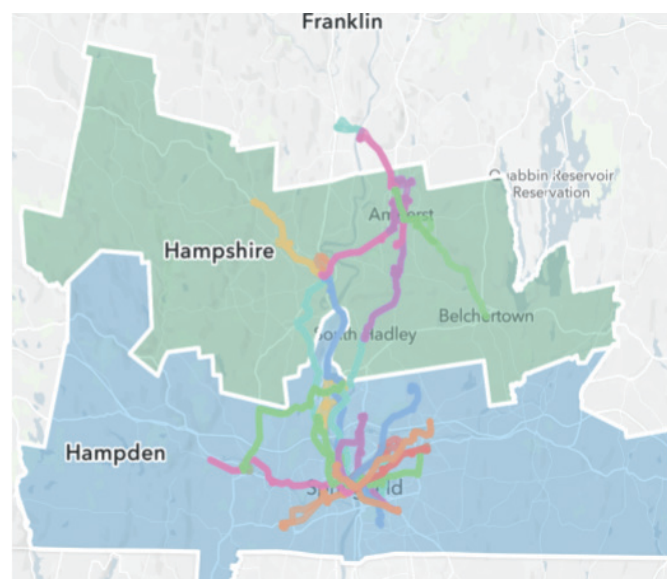


Figure 19: Map showing Hampshire and Hampden counties with current PVRTA routes overlaid.

Public Engagement Strategy

To best engage with the public during Phase III of PV-TRIPS, the Valley On Board team developed and implemented a public engagement strategy which integrates engagement practices from American Planning Association awarded projects (related best practices case studies can be found in [Appendix D](#)) into the broader goal of designing a more equitable, accessible, and efficient bus network for the next 20 years. This process included using innovative engagement approaches, outreach to target populations, and the creation of a public engagement “toolbox” to best engage with the public throughout the process and collect feedback capable of informing the route redesign and 20-year vision recommendations.

The focus populations for this project included Environmental Justice communities, rural communities, and communities facing persistent poverty. All of these communities have been traditionally excluded from the planning process. In order to reach the goal of being more equitable and accessible, these populations had to be the focus of outreach efforts.

To successfully engage with these individuals and communities, it was necessary to create engagement materials that were accessible to people with different levels of planning knowledge and English language proficiency. To meet this need, each of the engagement materials are available in English and Spanish. Additionally, activities include educational background information, visual components, color coding, and the use of symbols and pictures. The Pioneer Valley Planning Commission (PVPC) Sustainability and Equity Report emphasizes these practices, among many others, as a way to create inclusive engagement for individuals from underrepresented backgrounds (Krupczynski and PVPC 2014) For more information on best practices for engaging with vulnerable populations, see [Appendix E](#).

In order to conduct effective public engagement, organizations must move beyond traditional meeting formats and inaccessible locations. Engagement should occur in places with local significance, to improve accessibility to community members. This can include places like libraries, supermarkets, schools, and bus stops (What Do We Mean by “Meaningful Public Engagement”? | FTA, n.d.). Each of these locations are settings where engagement was conducted for this project, using the toolbox to not only collect feedback but also facilitate meaningful discussion about the future PVTA network.

Another important facet of public engagement is creating and utilizing partnerships with local community organizations. By working with trusted community partners, individuals and community members are more likely to engage. This is a way to help create a community presence and gain community members’ trust. Lastly, great community engagement is flexible and able to be conducted in a variety of settings while welcoming a range of different feedback forms and levels of engagement.

This project’s engagement and participatory activities were developed within an understanding of participation as thick or thin. Thick participation is defined by Nabatchi and Leighninger as a process that enables large numbers of participants in small groups to learn, decide, and act (2015). It is considered the most intense and information-rich form of engagement. This project employed thick participation methods to create meaningful dialogue around participants’ priorities and understand participant’s ideal bus routes to collect qualitative data for the Valley On Board project. While thick participation is highly meaningful and important to the process of public engagement, it is not realistic to use it as the only method of engagement as it takes increased time, preparation, and funding.

These limitations mean that thick participation is best supplemented by thin participation. Nabatchi and Leighninger define thin participation as participation that engages individuals rather than groups and requires less time and intellectual and emotional resources (2015). There were a variety of thin participation methods incorporated in this project to maximize participation and allow individuals with less time or energy to participate in the process and still provide meaningful feedback.

The combination of thin and thick methods of participation was key in the Valley On Board engagement strategy and inspired the creation of the Engagement Toolbox, which includes a variety of methods to be used in different settings to engage participants with a range of availability of time, energy, and planning knowledge. The toolbox created by Valley On Board is being shared with PVTA, including editable digital versions of all activities, instructions for editing the activities, and instructions for their implementation so that the participation does not end with the Valley On Board project. The toolbox will allow the PVTA to continue the wide variety of engagement events and activities throughout not just PV-TRIPS, but the next 20 years, as PVTA works towards the vision of an equitable, accessible, and efficient network.

Engagement Toolbox Development Process

The above strategy required a number of activities and tools for its implementation. With the principles of **accessibility**, **flexibility**, and **interactivity** guiding the Valley On Board strategy, the development of the Valley On Board toolbox ensued. The toolbox was designed specifically to solicit a variety of feedback for the development of the 20 year vision for the PVTA. The engagement methods employed and utilized in the toolbox aim to reach a variety of audiences and are adaptable to many different types of events. The toolbox can be used to engage youth and students in an educational setting, riders of all demographics in a workshop setting, or even non-riders in a public tabling setting.



Valley On Board had the objective of collecting community feedback from a variety of people for the 20 year vision. However, the transportation planning process is highly complex, and the public has varying knowledge on the process and its components, including the scenario planning process and route alternative designs. Simply displaying route maps from the various alternatives would likely not have allowed for very widespread, meaningful, easily accessible engagement.

In order to more effectively communicate these complex concepts and create interactive activities for engagement, Valley On Board had to create something more easily understandable by the public. To do this, the alternative route designs were examined for key priorities, such as the concept of more express routes. The identified priorities were then placed into categories and became the foundation for the engagement activities. In each activity, the priorities were presented to the public as options and components of the redesign process that could then be ordered by their importance to individuals, allowing Valley On Board to collect clearer feedback from the public.

Some priorities identified as commonalities and important components of the alternatives include things such as bus infrastructure, frequencies of routes, destination access, and fleet electrification. While the priorities are not exactly the same across all activities, this process can be found in each activity and there are several priorities that were seen in all activities.

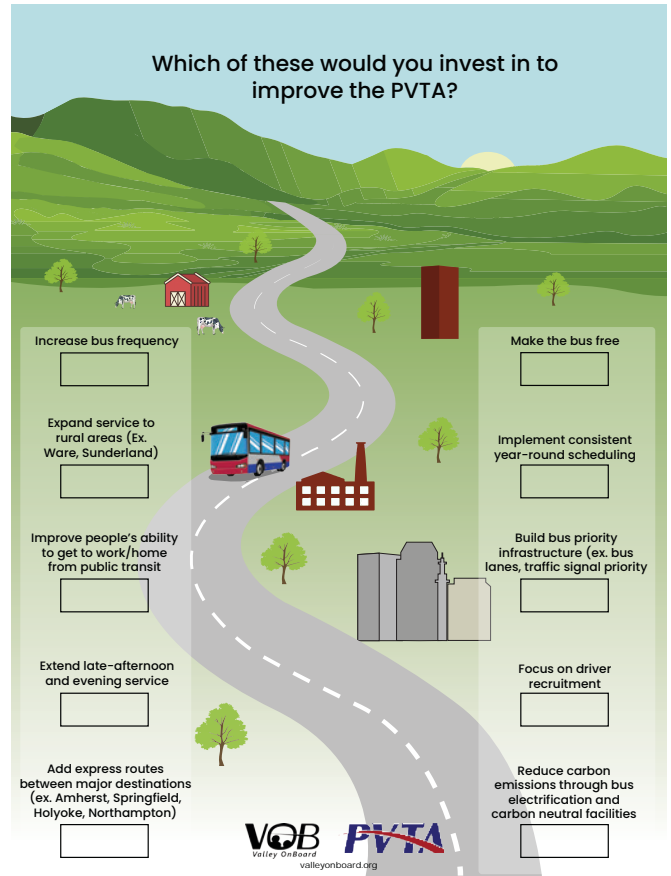


Figure 20: Outreach Events Polling Activity Poster



Figure 21: Chicopee Spooktacular's Kid-Friendly Polling Activity Poster

Public Engagement Toolbox

The development of the public engagement toolbox was crucial in the engagement process and is what makes the Valley On Board approach to engagement stand out. Each of the activities in the toolbox is branded for PVRTA use and can be edited to fit the event it is being used at and the priorities of interest. Additionally, the activities in the toolbox are meant to complement each other and have QR codes that link directly to the Valley On Board website with digital versions of each activity. The variety of activities in the toolbox can be used for combinations of thick and thin participation, across many settings including educational, professional, and less formal events. The activities are intended to be deployed by PVRTA, partner organizations, businesses, and schools. The activities used can vary depending on the time allotted, materials available, facilitator preferences, and the target audience of the event. For more information on the toolbox, the activities in it, and the instructions to activities, see [Appendix F](#).



Figure 24: Transportation Conversation Card Scorecard

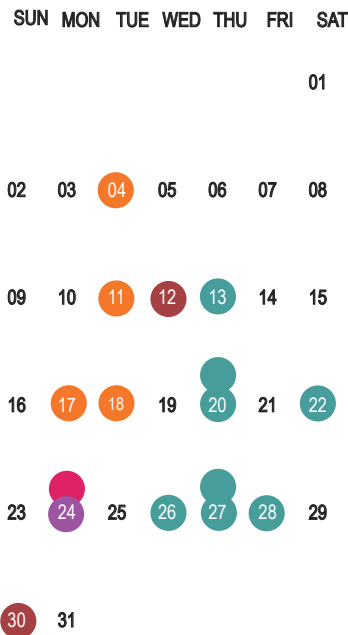
Engagement Tool	Time Commitment	Materials	Type of Participation	Target Audience
Survey	5 minutes	Customizable online survey. Participants must have a phone/computer with internet access. Existing Qualtrics link:	Thin	Varied audiences
Mapping	45 minutes	Large print physical maps, dot stickers or markers, wiki sticks	Thick	Youth, students, groups of people
Conversation Cards	15 minutes	Conversation card deck	Thick	Varied audiences, groups of people
Polling	2 minutes	Polling board, bus bucks (voting money)	Thin	Varied audiences

Table 1: Engagement Toolbox Table

Events Around the Valley

The public engagement toolbox was deployed in a variety of settings around the Valley to reach a diversity of demographics. Below is a brief overview of how and where the toolbox was utilized. For more information, including a list of all events attended by the Valley On Board team, please see [Appendix G](#).

October 2022



November 2022



- Youth Events
- Tabling Events
- Stakeholder Meetings
- PVTA Public Meetings
- Material Drop Off

Figure 26: Event Calendar



Figure 23: Students work on the mapping activity



Figure 25: Polling Activity at the Holyoke Mall

Rider Forums and Paratransit Forums

The PVTA holds public forums for all rider populations to provide a platform for collecting public feedback and commentary. The feedback and commentary collected during these events helps guide the PVTA to make necessary changes to better serve the community. These forums are held in two types of spaces: in-person near major transit centers within the PVTA service area and online using Zoom. The variety of locations allows PVTA to reach broader audiences within the vast service area.



Figure 27: Students conducting rider forums outside of the Academy of Music bus stop in Northampton, MA

Stakeholder Meetings

Stakeholder meetings are an essential element of planning for the future of public transportation, especially in a regional system that serves many different towns with individualized forms of government. These meetings are meant to engage with established community stakeholders in areas of interest and environmental justice communities. Community organizations with established relationships to community members were selected as partners and stakeholders in the process to allow for better engagement and a deeper understanding of the communities' needs. The stakeholders involved in the stakeholder meeting process of Valley On Board included educators, planners, and established community organizations.

These meetings focused on providing background information on the Valley On Board project and collecting feedback from stakeholders of interest. A barrier to many planning projects is ensuring all relevant stakeholders are involved and connected with the project. Valley On Board was unable to engage with all possible stakeholders in the short span of the project and stakeholder engagement should continue throughout the project as well as after PV-TRIPS is complete.

Youth Events

Youth engagement events allowed the most time for engagement. This allowed Valley On Board to utilize multiple activities from the toolbox in each event. The goals of the youth engagement events were: 1) to familiarize students with the project and its goals, 2) to introduce the students to basic transportation terminology, 3) to collect information on students' travel habits and destinations of interest not currently serviced by PVTA, 4) to educate students about the trade offs necessary in creating a well connected transit system, and 5) to spark interest in transit for young people. These events focused on connecting with the future potential riders of the PVTA.

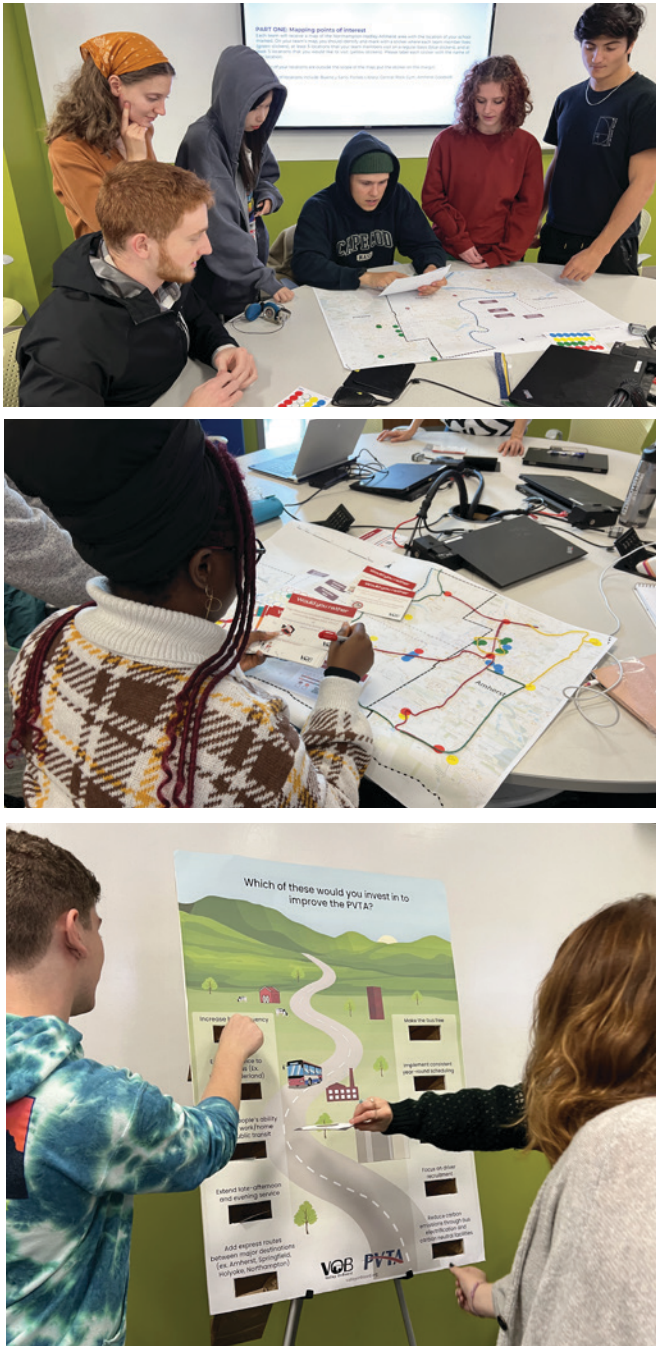


Figure 29: Youth Event at UMass Amherst

Tabling Events

The goal of tabling events was to hear from a wide range of community members throughout the PVTA service area with a special focus on outreach in EJ communities. These communities often rely more heavily on the PVTA than others in the Pioneer Valley. Tabling events made use of all of the low-time-commitment engagement materials to collect feedback from the public. The strategy used was to inform the community of the project's goals, spark interest in the local transportation system in both riders and non-riders, and gather any type of comments or suggestions that emerged from that process. To learn more about the variety of tabling events conducted, see [Appendix G](#).



Figure 30: Tabling Events

Material Drop Off

As discussed in the strategy, the materials were intentionally developed to be easily understood so that they could be facilitated by community members without Valley On Board present. The materials were dropped off at libraries, high schools, and bus shelters so people at each location could participate in Valley on Board in whatever way that was convenient. While the materials dropped off were sometimes included multiple engagement tools, other times the locations were given only educational and marketing materials to hand out to community members. This engagement strategy is focused on reaching non-riders and riders where they are, in a non-intrusive manner. To learn more about the material drop off, see [Appendix G](#).



Figure 31: Informational Materials

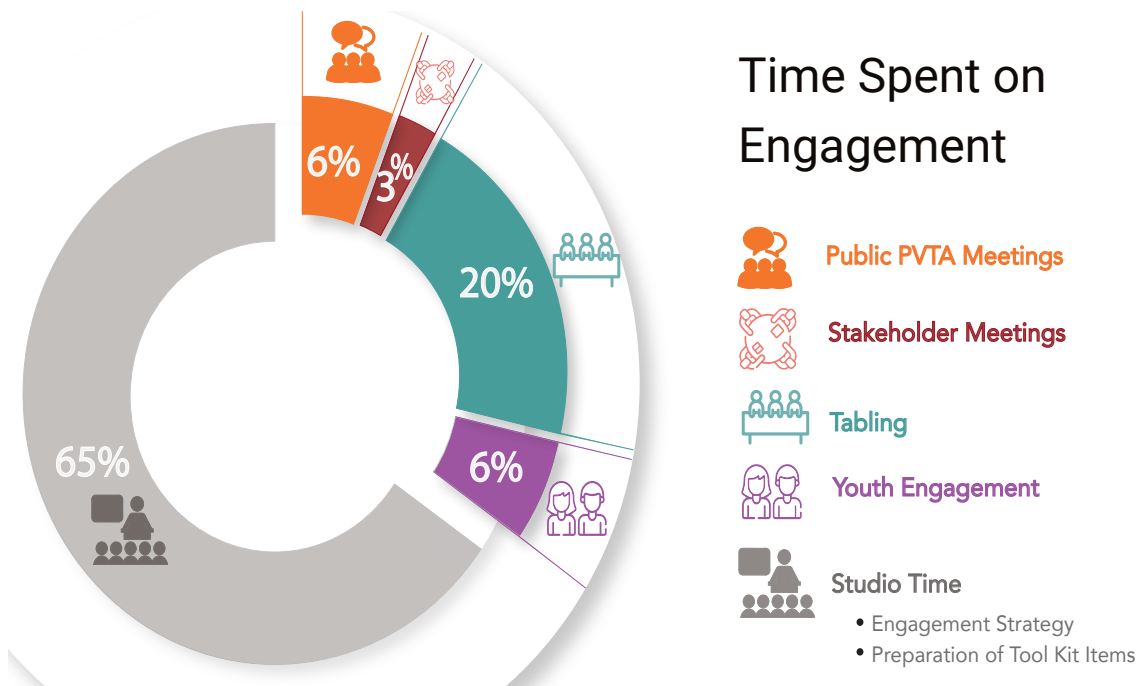


Figure 32: Time Spent on Engagement

Limitations to Public Engagement

The Valley On Board strategy was developed to promote the PVRTA's and FTA's goals using the best practices for public engagement. However, due to the scope of the work there are limitations to the engagement process that should be noted. The first limitation is the spatial spread of the engagement activities. Many of the public engagement events were located in Hampshire County, specifically in Amherst and Northampton.

The southern portion of the service area was proportionately less engaged when accounting for the population of the area compared to the number of people engaged in the area. Another limitation to the engagement is specifically related to one of the target populations, non-riders. Non PVRTA riders lacked knowledge around the current PVRTA network which made engaging them more time-intensive and difficult. While the public engagement strategy tried to address this limitation with educational materials and interactive engagement, more educational materials directly related to the PVRTA network would help address this limitation in future engagement.

Public Engagement Findings

The Valley On Board team hosted 29 total engagement events throughout the PVRTA's service areas from PVRTA rider forums at bus stations, to tabling at community events, to workshops. The Valley On Board website featured online versions of the survey and engagement activities so as to not limit engagement and reach a wider audience. In the engagement process, Valley On

Board collected people's preferences and received a combination of general comments as well as rankings of predefined categories from the activities.

Comments were collected from participants about their experiences on the PVRTA and how they would like to see it improved. Some of the public's comments were transcribed feedback from conversations Valley On Board had in person, and others were collected through the online survey's open response section. A total of 194 comment cards and 658 survey responses were collected. These comments range from broad recommendations about the service area, to more specific and personal comments about people's experiences with a specific bus route or bus stop. These written responses all formed the complex qualitative data Valley On Board processed.

In the structured engagement activities, such as polling, participants' rankings of predefined improvement categories, from better access to rural areas and adding express routes to increased frequency were collected (for a full list of priority categories, see [Appendix F](#)). \$8,640 were spent in the polling activity's voting, equivalent to about 87 participant responses. The information collected from the polling activity was then processed as quantitative data, allowing Valley On Board to put number values to the interest in each priority. The methods used to analyze and weight both qualitative and quantitative feedback are described below.

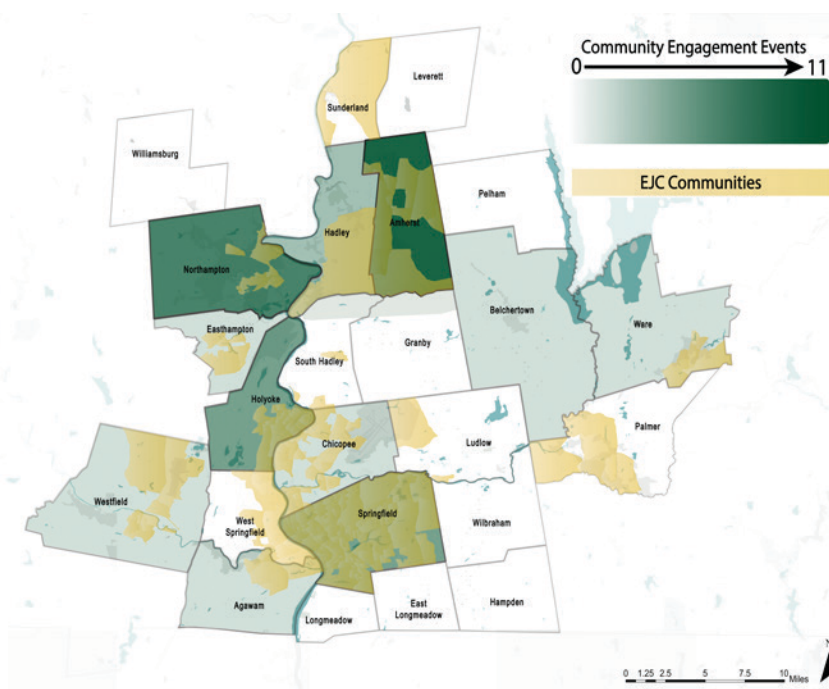


Figure 33: Map representing the number of engagement events per municipality within the PVRTA service area. Darker the shade of green, the more events conducted in that location.

Data and Results

There were four main methods of data collection and public engagement: a survey, polling, Transportation Conversation Cards, and participatory mapping. Each source resulted in its own unique format and scale of data, meaning that they could not be combined immediately. For example, while the survey yielded a combination of traditional multiple choice, likert scale values, and open responses, the conversation cards and polling yielded simple preferences among provided options, and mapping yielded spatial data about stop and route priorities. Comments given at events were also analyzed.

Quantitative Methods

A weighting method was utilized to combine the four data sources where each response was counted equally, but a different weight was assigned to each ranked choice within a priority category. Across all four activities, the spatial data was either completely absent or not adequate enough to use any method other than all responses ranked equally. The results were normalized by the number of people in each sample. In the survey, individuals ranked each of the four priority areas from very important to not important at all, with two intermediate rankings. Priorities ranked very important were given a weight of four, while not important at all were given a weight of one. This could not be done for the polling, conversation cards, and mapping as there was no ranking involved and individuals simply selected their top priority. Therefore, those selections were automatically given the weight of four, with data still being normalized by the number of individuals in the sample. For example, in the conversation card dataset, each time a priority was selected as the individual's preference, it was counted as one point. Each priority's total was then weighted by four and normalized by the sample size. Using the chosen quantitative method, the data ranked the following priorities respectively: Express, Rural Service, Increased Evening Service, and Increased Frequency.

A detailed description of quantitative methods, priority categorization, and results of the weighting process can be found in [Appendix H](#). A full list of survey questions can be found in [Appendix F](#).

Improve amenities			2	2
Aesthetics			2	5
Bike Racks			3	9
bus shelters			3	102
Charging Ports			3	6
Emergency Call Boxes			2	13
Informational Materials			3	16
Lamps~Lighting			3	61
Seating			2	34
Shade			0	0
Signage			3	20
Snow Removal			2	10
Trash cans			2	4
Wifi			2	7

Figure 34: Screenshot of NVivo showing amenity codes

Qualitative Data Analysis

To understand participants' desired improvements to the PVTA beyond their quantitative responses, qualitative data was collected and analyzed. This data came in the form of comments, which came from in-person conversations at bus stops and open response survey questions. They were unique, personal, and specific. To properly analyze this data, it needed to be transformed from a collection of disparate comments into a single dataset. A software called NVivo was used to facilitate this analysis. NVivo was used to add codes to the textual data in order to quantify it. First the data was reviewed for common themes, and then codes were assigned wherever applicable. The codes were hierarchical, allowing analysis of the data across various levels of specificity.

For example, comments about Improved Amenities could be coded as related to bike racks, emergency call boxes, better informational materials, seating, and more. The data could then be subset by Improved Amenities generally, and any of the sub-codes more specifically. Figure 36 shows the full list of amenity codes. The most popular amenity improvement was additional bus shelters (Figure 37).

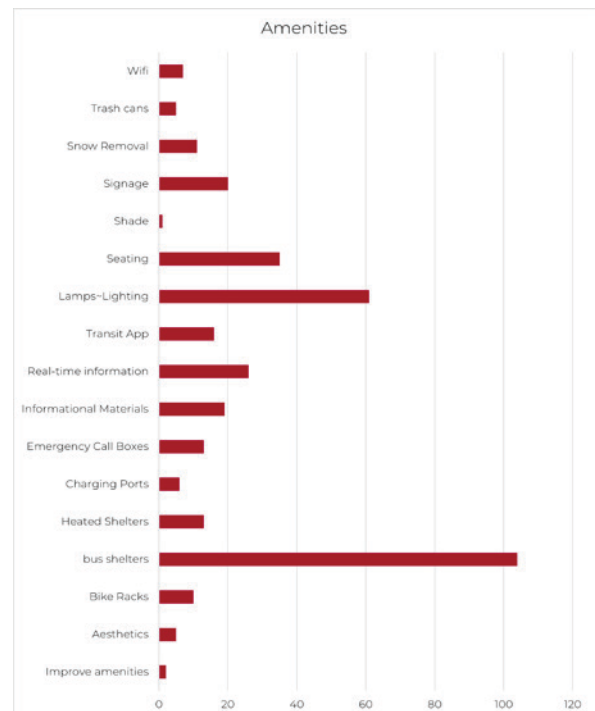


Figure 35: Most popular amenity improvements

A sample text response and corresponding assigned codes is shown in Figure 38. The participant’s request for “more visible bus shelters” was tagged with the “bus shelters” code. It was also tagged for “more frequent buses,” ‘Expand service hours’ for more service “around 8,” and for Florence as a location. By combining these various types of codes, comments could be quantified and compared.

After repeating this process for hundreds of responses, the participants’ desires were revealed, as well as where these improvements are most needed. For example, of those ~100 requests for bus shelters, 8 were in reference to locations in Amherst, and 7 were for stops on Route 9 in Hadley.

Overall, this process offered information that filled in the gaps of the quantitative analysis. The data told a story that went beyond what is visible on the PVTA’s system map. It showed the barriers that prevent people from taking full advantage of the PVTA as it is designed. For example, this qualitative analysis process revealed that, despite frequent B43 service in Hadley, the lack of bus stop amenities like shelters and real-time information means that fewer people are able to access and use this service than a quantitative analysis might assume. For more information on the coding methodology and the full results of the analysis, see [Appendix H](#).

	A : bus shelters	▼
1 : Agawam	2	
2 : Amherst	8	
3 : Belchertown	0	
4 : Easthampton	0	
5 : Hadley	0	
6 : Holyoke	1	
7 : Northampton	3	
8 : South Hadley	0	
9 : Springfield	1	
10 : Sunderland	1	
11 : Ware	0	
12 : West Springfield	2	
13 : Westfield	1	
14 : Williamsburg	0	
15 : Route 9	7	

Figure 37: An NVivo screenshot showing location co-occurrence with bus shelter requests

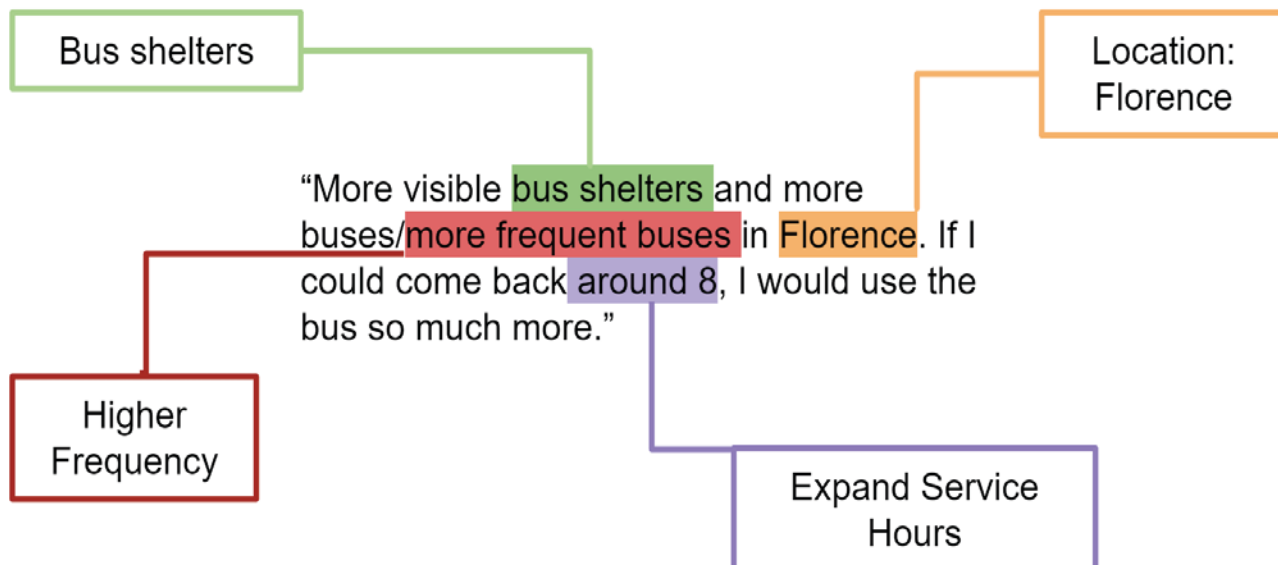


Figure 36: Example of code assignments on a public comment

Data Limitations & Lessons Learned

While the data is expansive, there are some limitations. The most influential drawback was the lack of comprehensive location-specific data. Though one of the goals of this engagement process was to solicit responses from all across the Valley's geography, a combination of the abbreviated timeline and the studio's geographic location meant that only 12 of the PVTA's 24 member communities were interfaced with directly. Within these 12 communities, some were engaged with more depth than others. For example, 11 out of 29 total events were conducted in Amherst. Other heavily engaged communities included Northampton, Holyoke, and Springfield. In addition to geographic accessibility, these locations were prioritized due to higher population density, number of Environmental Justice Communities, and stronger existing community connections with the PVTA.

As polling and the survey were the most widely implemented methods of data collection, they had the most participants and represented the most complete view of the Valley's preferences. The polling activity's results were tabulated on an event-by-event basis, allowing for geography to be roughly assigned to each set of responses. However, because the polling was often deployed at larger community gatherings, it is not known from where each participant hailed. The survey, on the other hand, directly asked for and collected the home ZIP code of each respondent, allowing us to easily view and segment the data spatially. Of course, this data is only as good as its input accuracy, and there were a number of incomplete or incorrect responses to this question. Figure 40, on the next page, visualizes the survey responses from each ZIP code in the service area. This data is significantly skewed towards the northern valley in general.

Though the survey and polling activity were deployed at the vast majority of engagement events, the conversation cards and mapping activity were more limited in their implementation due to the level of involvement required of participants. The conversation cards were included in materials at each of the tabling events, but seldom used. The mapping activity, due to its space and material needs, was only deployed at a handful of specific events: at UMass Amherst, Holyoke High School, and Hopkins Academy in Hadley. As such, their data does not represent the full breadth of the PVTA service area, or even the 12 member communities that were directly engaged.

Though this potential spatial bias was identified at the outset of the engagement process and attempts were made to mitigate its effects, there was another, more unexpected challenge that impacted the integrity of the dataset. In order to incentivize responses, Valley On Board offered survey-takers a chance to win one of four \$25 gift cards at the end of a completed survey. Soon after publicizing that fact, the survey was identified by an unknown number of bots, which submitted hundreds of fraudulent responses. Although most false entries were able to be identified and removed, there may have been other fraudulent responses. Ultimately, Valley On Board opted to weight each response equally, regardless of geographic location, to minimize the effect of the remaining false entries.

A full breakdown of data methods can be found in [Appendix H](#).

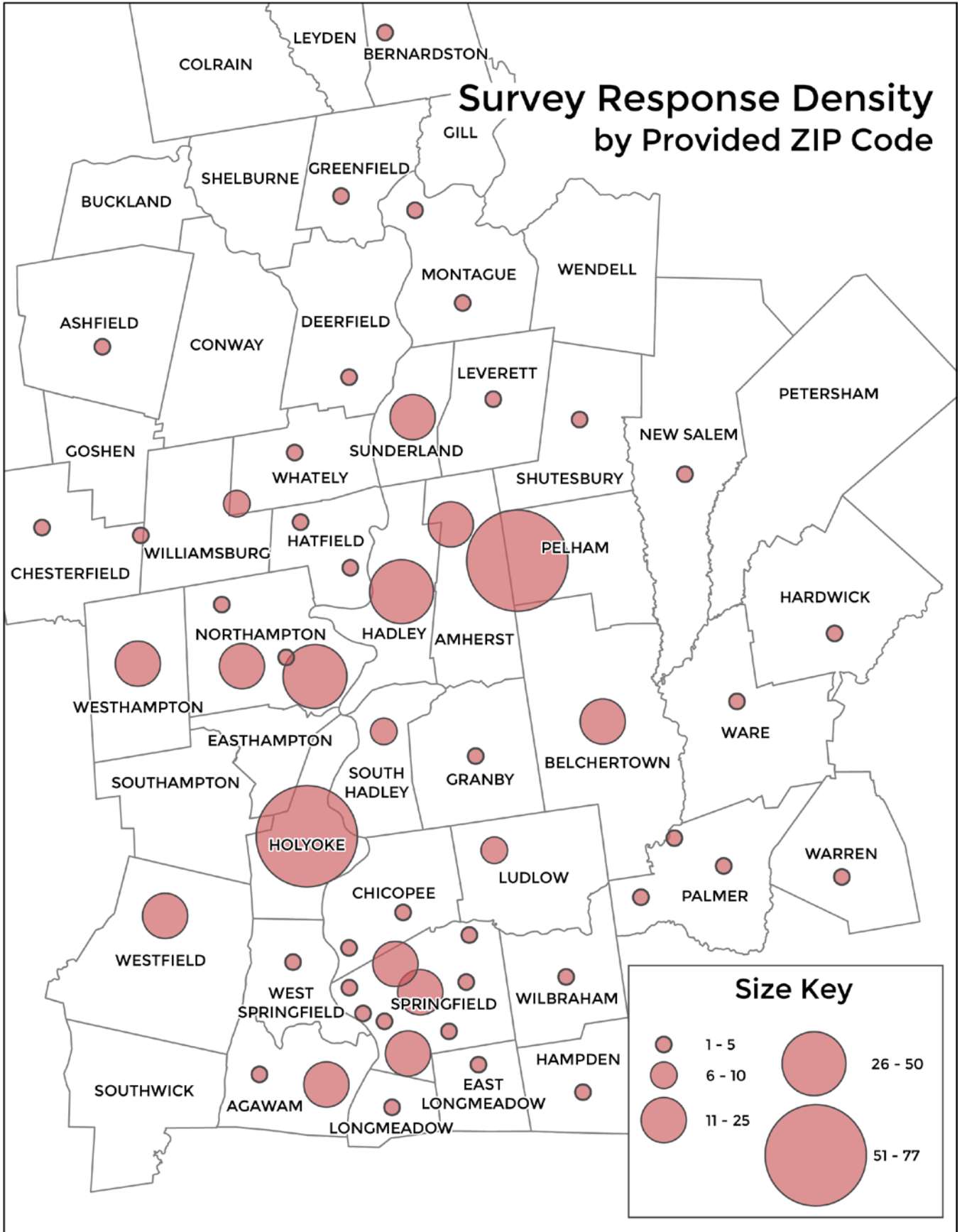
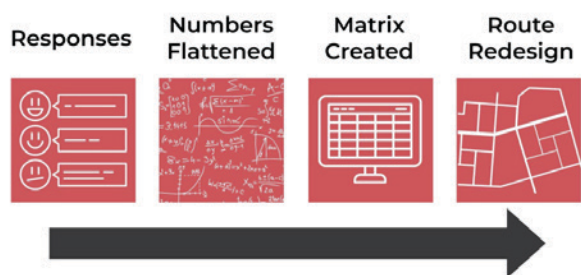


Figure 38: ZIP Codes provided in survey responses

Route Recommendation Design Process



Following the collection of data and public feedback, the route redesign and recommendation process began. The first step in the redesign process was to examine existing PVTA routes for potential operational improvements. Service patterns, regional connectivity, and schedules were examined and revisions were made. For more information on the revisions to PVTA service, see [Appendix I](#). It should be noted that in the initial revision process, the only considerations of the existing conditions of the PVTA bus routes were made, without incorporation of scenario drivers and alternatives yet.

Next, data from the public engagement activities was quantified and analyzed, using the techniques discussed in the next section. The result: regional express & rural service were found to be the top desired priority improvement areas. This insight informed network redesign and aided in identifying which design recommendations from the four scenario-driven alternatives were most relevant to incorporate in the redesign.

Beyond the results of public outreach and redundancies in existing routes, the design process also incorporated analysis of job access for community members within the existing PVTA service area. Potential access was determined by comparing current PVTA routes with possible redesigns, and considering how well each addressed the imagined future of the last studio's four scenarios. Additionally, the geography and amenities of each town in the service area as a whole were analyzed to determine what current routes could be updated to maximize ridership and what routes could be added to improve connectivity.

Attention was then turned to developing a cost-neutral route redesign. The ultimate goal of this redesign was to keep consistent with existing funding and resource levels of the PVTA. This process took into account three out of last year's four scenarios: Higher Ground, New Small City, and Skilled Valley. Valley Stasis, the fourth scenario, represents the existing PVTA routes, and is the basemap from which the routes were being redesigned. Presently, PVTA's operating expense is \$15.6 million per year. The cost-neutral redesign was projected to be \$17.1 million per year, or within 10% of the current operating expenses across the entire network.

Additional factors taken into consideration when redesigning the routes were an estimated 86 total vehicles; operating hours amounting to about 300,000 hours, which is roughly 1,000 hours per weekday; and total mileage not exceeding 4.3 million miles. Last year's route alternatives included useful statistics such as mileage, annual cost, headways, and demographics of people within a quarter mile radius. These existing metrics were used to ensure that the redesign met goals gleaned from extensive public engagement and statistical analysis.

To help visualize changes in service, the PVTA service area was broken down into six sections, as seen in the map below. A breakdown of the specific changes for each of the six sections can be found in [Appendix I](#).

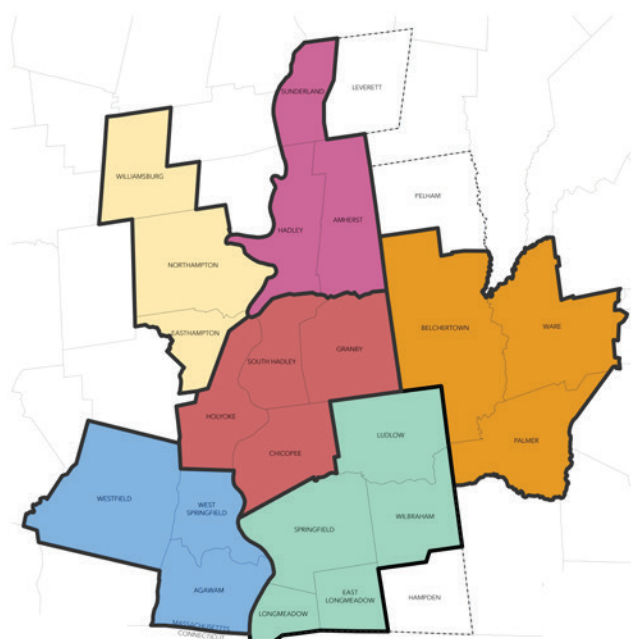


Figure 39: Divisions of the Valley used in the redesign process

Route Recommendation: Standard Route Redesign

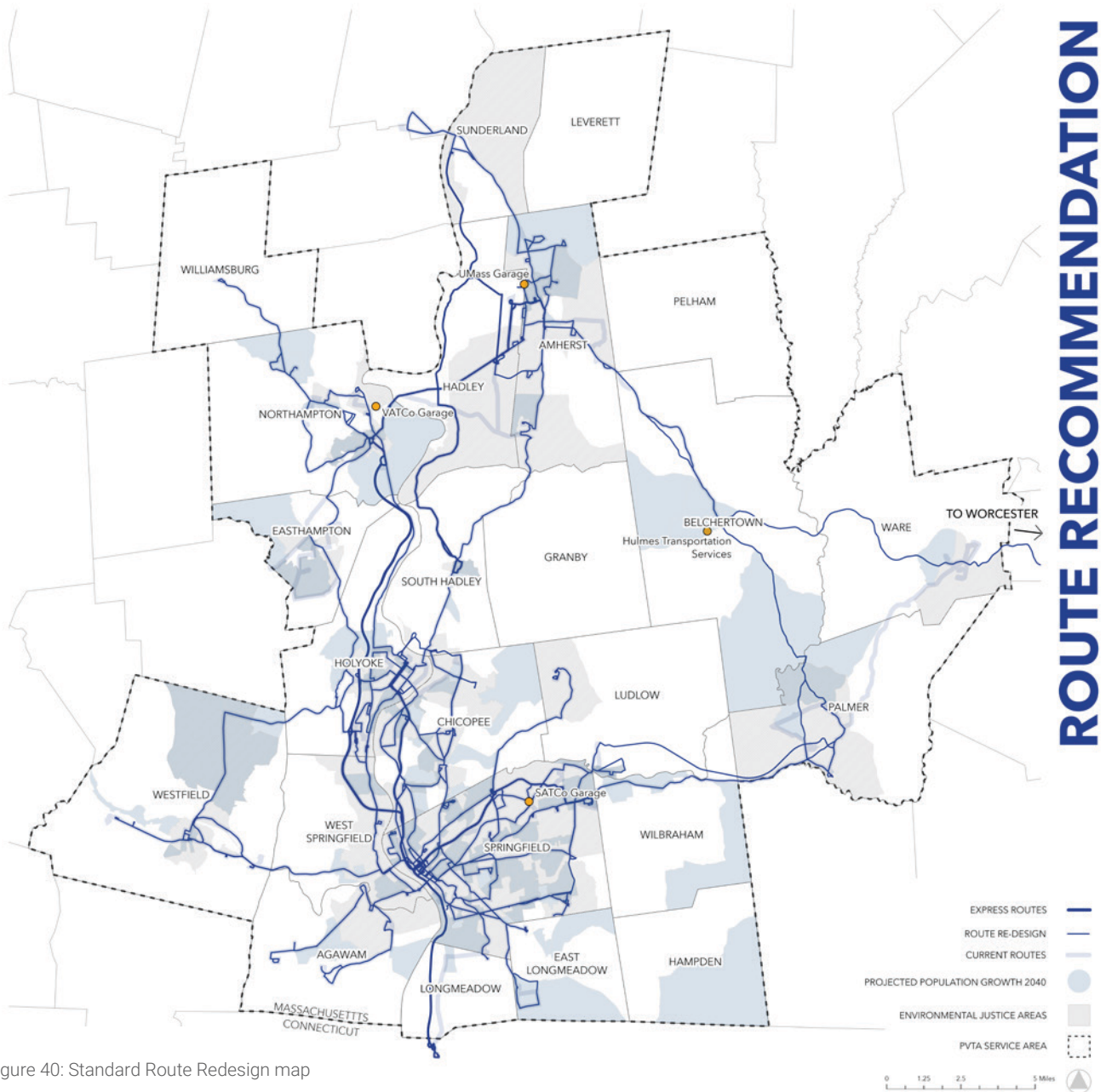
[View an interactive version of this map here.](#)

This map shows the route changes, improvements, and updates recommended by the standard (initial) redesign. Although the initial redesign does not address every stated priority because of budget constraints, it is able to increase frequency and expand rural service and express routes in the areas with highest current or potential ridership.

To test this redesign, the “Maria” isometric feature on Remix was used. The isochrome measures accessible area in terms of population, number of jobs within a quarter-mile walking distance—from a point or a combination of walking time and transit under 30 minutes.

Maria was placed in the same spot in both the alternative and current PVTA routes at 8:00 AM on a weekday to determine what jobs sites she could access within a 30 minute time frame. The 8:00 AM time point was chosen because it would allow an individual to get to a day shift at a job. The majority of the region saw an increase in job accessibility with notable increases in Springfield, Sunderland, and Westfield. The route optimization with increased bus frequency and service allows Maria’s job access to increase by ~7% from various locations in Springfield to jobs in surrounding areas. In the Amherst, Sunderland, Hadley area job access increases by ~26% for this cluster of towns.

A table showing the full job accessibility findings for the current system and both the standard and dream redesigns is included in [Appendix I](#).



ROUTE RECOMMENDATION

Figure 40: Standard Route Redesign map

Route Recommendation: Dream Route Redesign

[View an interactive version of this map here.](#)

The dream route redesign roughly quadruples the budget of the standard route redesign, allowing for more updates such as higher frequency, more express routes, more rural service, and expanded hours. The dream route redesign addresses more of the priorities outlined by the public engagements activities as a result of the larger budget. The increased budget allowed for all high ridership routes to have headways between 8-15 minutes during peak hours and no longer than 60 minutes for lower ridership routes.

To test the dream route redesign, Maria was used once again, though this time to compare the standard redesign with the dream. The majority of towns had an increase in job accessibility except for South Amherst and Sunderland. The most notable increases in job accessibility were in the Hadley, Belchertown, and Eastampton areas, with accessibility increasing by 700%, 540%, and 140% respectively.

A table showing the full job accessibility findings for the current system and both the standard and dream redesigns is included in [Appendix I](#).

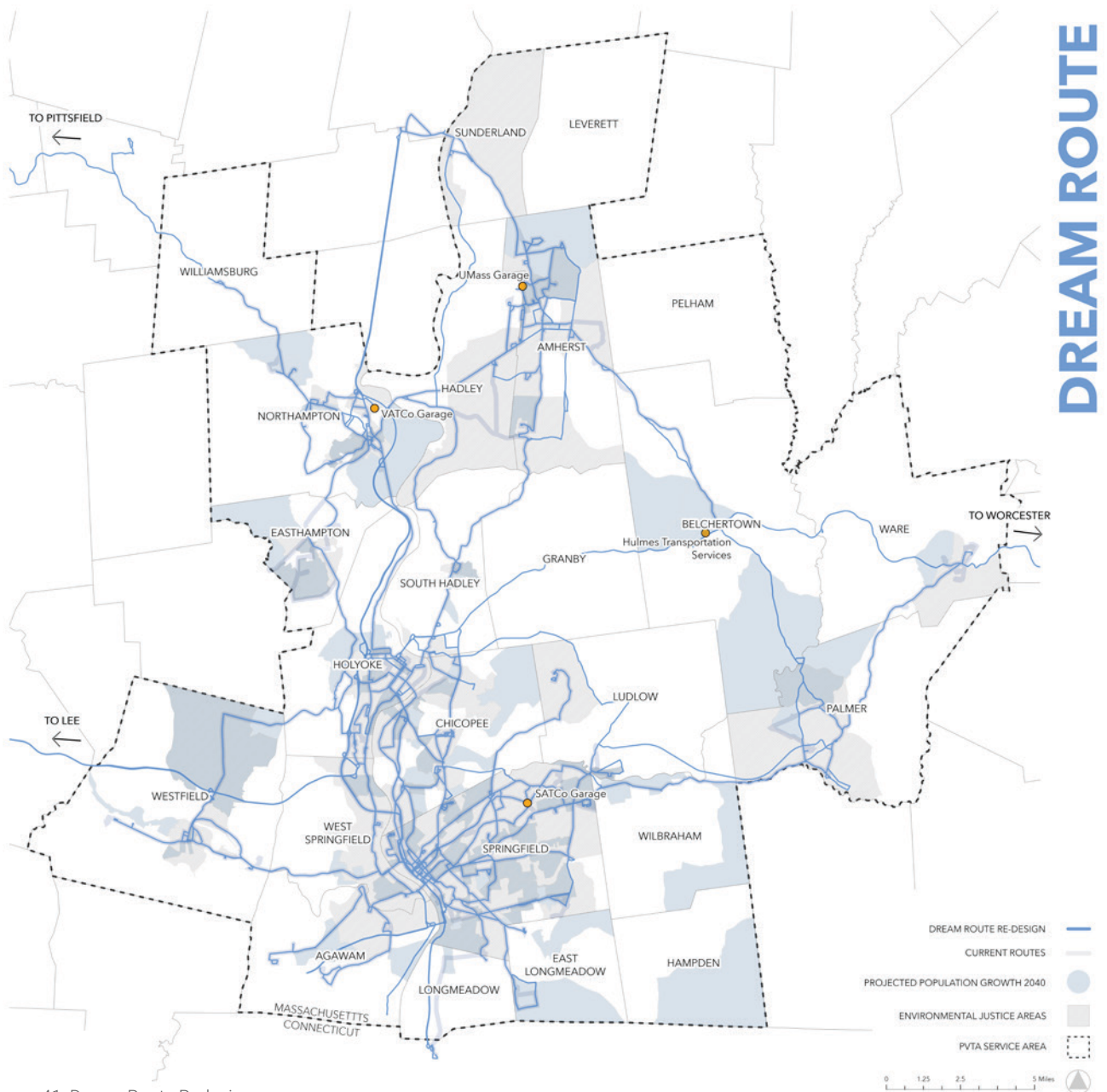


Figure 41: Dream Route Redesign map

Operational Recommendations

Reduced Fares for Low-Income Riders

From November 25th to December 31st 2022, every RTA in Massachusetts is offering fare free service through a \$2.5 million MassDOT discretionary grant. Year-round fare-free transit was one of the most popular priorities found in both polling and survey data. However, at this time fare-box revenue makes up a significant portion of the PVTA's operating budget, and eliminating fares is not feasible. In order to increase access and diminish financial burden on vulnerable communities, PVTA should consider implementing a reduced fare program for low-income riders.

Extended Service Hours & Increased Frequency

Expansion of existing services by way of extending service hours and increasing bus frequency ranked highly in both conversation card and polling data, and was often mentioned in open response and verbal comments. Regardless of how the population demographics of the Valley shift over the next 20 years, it is vital that the PVTA expand its service hours to meet the diverse work and appointment needs of the region. This includes not only extending bus operation into the evening hours, but also potentially beginning service earlier in the morning to account for workers in non-office jobs with earlier start times. This recommendation is especially impactful for EJ communities, which are more likely to work non-office jobs in the service and manufacturing industries. Similarly, PVTA should consider increasing bus frequency, which would minimize wait time at the bus stop and potentially incentivize new riders.

Recruitment

Driver shortage has been a serious limiting factor in day-to-day operations of the PVTA, and must be remedied to successfully implement the suggested route redesigns. In order to recruit drivers, the PVTA should leverage their existing relationships with public high schools to develop an educational and career mentoring program around transit systems. Additionally, working with driver unions to improve wages, PTO and vacation time, and health benefits could help with recruiting and retaining drivers. Finally, the PVTA should continue to train and sponsor potential drivers through the CDL certification process.

Demand-Response Paratransit

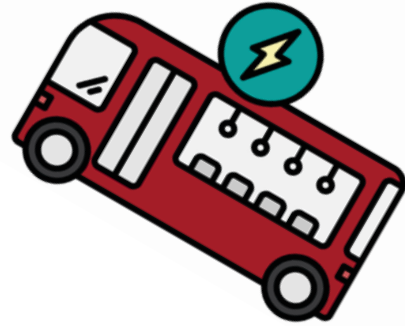
In October 2022, the PVTA ran a successful pilot program offering same day paratransit rides operating between 9am and 2pm. Considering the demonstrated demand for this service, the PVTA should explore funding options to continue and expand this program.



Capital Recommendations

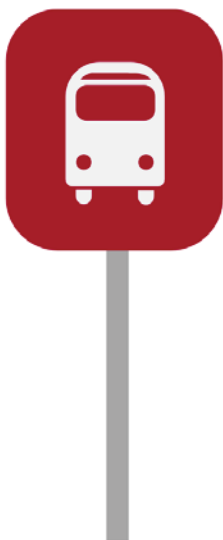
Bus Fleet Electrification

Based on polling data, bus electrification is a major priority for riders. Recently, the PVTA was able to purchase four more electric buses using grant money awarded by the Federal Transit Authority. PVTA should work towards the full electrification of its fleet by continuing to apply for state and federal funding.



Bus Stop Amenities

Many survey and rider comments suggested the need for improved bus stop amenities. Improvements mentioned include bus shelters, signage, seating, lighting, and improving real time bus information. We recommend that PVTA leverage their current partnerships with municipalities and develop a priority bus stop improvement plan.



Implementation Strategy

Though the dream scenario most comprehensively meets the needs of the Pioneer Valley, it is not fiscally achievable with existing resources. Currently, Fixed Route service throughout the Valley has a total operating cost of \$38.5 million while taking in a farebox revenue of \$ 4.5 million, making the total cost for the system \$34 million (“FY22 Annual Report,” n.d.). The standard redesign, while smaller in scope, is possible to achieve within 10 percent of the current level of funding. Therefore, PVTA should take immediate steps towards implementation of all route changes and additions included in the standard redesign to lay the groundwork for future service expansion should additional funding become available.

The first improvement PVTA can make towards the dream redesign is the implementation of the new fixed route frequency and routes. The proposed route redesign is expected to operate within 10 percent of the current operating budget, however given the volatility of the economy, it is difficult to have a certain estimate of costs. While the operational costs (including labor, fuel, and administrative costs) would increase with increased frequency and expanded service, such improvements could help bolster PVTA’s reputation, ridership, and increase farebox revenues. The proposed redesign can also be adapted over time to better serve changes within the valley. The PVTA should also consider implementing microtransit in rural areas such as Pelham and Leverett due to population increases.

Another improvement PVTA should make is continuing the pilot program of dial-a-ride and demand responsive paratransit. Meeting minutes from the October 11th Paratransit council indicated that there is operational power to run the program full-time. Full-time operation of paratransit services would minimize barriers for people with disabilities. In FY22, the current model of paratransit had an operating cost of \$7.2 million while only generating revenues of \$647,000 (“FY22 Annual Report,” n.d.). It is likely that these margins would stay the same with both an increase in expenses and revenues for the full time model.

A highly requested improvement by the public comment was the creation of more bus shelters and stop amenities. Based on figures from an MBTA, it is estimated that an initial creation of bus shelters and amenities would cost \$40,000 (Mohl 2019). Included in this price is the purchasing price, installation, and allocation of one year of maintenance. The PVTA was awarded the Shared Streets & Spaces grant with a stated \$449,500 that can be used to fund improvements such as bus shelters and amenities.

Another improvement that should be implemented as soon as possible is a program for recruitment and retention of bus drivers. While there is no exact dollar figure recruitment and retention of well trained drivers would limit service delays and operate functionally within the valley. Costs of drivers will gradually increase in the form of wages, benefits, and retirement plans. Despite this increasing cost, the benefit of having more drivers is immeasurable, allowing for full schedule, frequent, timely service and increased driver satisfaction.

As a major capital improvement, the public sentiment around fleet electrification is growing fast in the local and national discourse. Currently electric buses can cost around \$1.2 million per bus, however, there are a number of federal & state funding sources available to purchase these improvements, which would allow the PVTA to be more environmentally conscious, economical in the long-run, create more transportation equity in Environmental Justice Communities by reducing emissions, and appeal to the interests of individuals looking to mitigate climate change.

Lastly, the proposed East-West rail has been gaining traction and may one day become a reality. In order to plan for this major project operations can be modified for increased demand and stops along the area (Belchertown, Palmer, Ware). While there may be added costs to this plan, recent funding in infrastructure should help fund these ideas.

See [Appendix A](#) for a list of funding opportunities available that PVTA should consider for future funding of route, operational, and capital improvements.

Next Steps

The redesign and accompanying recommendations were created through consideration of the current system, drivers of change, public feedback, and transit planning best practices. However, the future is always changing, so it is imperative that the public engagement process does not end with this report. Valley On Board's work revealed a need for the PVTA to continue to build community relationships to gain more valuable input and trust from its constituents.

The first step in continuing this public engagement process is to continue to implement the public engagement toolbox throughout the Pioneer Valley. Specific focus should be placed on communities not adequately engaged during the course of this studio, as well as Environmental Justice Communities in Hampden County and rural communities in Hampshire County. Multiple organizations in Hampden County, including Springfield Public Libraries, Makelt Springfield and the New North Citizen Council, were interested in hosting engagement events. Due to the limited time scope of the 13-week studio, these events were unable to be scheduled. PVTA should host events with these partner organizations as a learning opportunity for the organization on hosting more in-depth engagement events, and an opportunity to collect more engagement results.

To facilitate further engagement opportunities, as well as increase channels of communication between the PVTA and member communities, especially those with large Environmental Justice populations, the PVTA should implement a bus ambassador program. These ambassadors may be volunteers or paid, and should represent the full demographic diversity of the service area. This suggestion is based on the success of GoRaleigh's public participation plan, which utilized ambassadors with "deep and trusted connections with specific communities," who have established relationships with both the communities they are representing and the transit agency.

PVTA should also leverage their current relationships with public schools to increase engagement with the region's youth. Youth events are not only an educational opportunity for students— they also solicit feedback from an often overlooked and unheard population. Youth engagement, like a youth mentorship program, would provide the PVTA a potential professional development opportunity to educate high school students about job opportunities in transportation with the PVTA and transit more generally. As well as engaging youth directly, the PVTA should continue to build relationships with the teachers and administrators at the public schools so these types of programs can be implemented.

Finally, many conversations during the engagement process indicated that education and awareness of PVTA services was lacking across the region. The PVTA should leverage connections with community organizations to disseminate educational and marketing materials related to PVTA service and operations.

The Valley On Board project, 20 year vision, and route redesign are not the last steps in the development of the PVTA. The route redesign is not final. Rather, it is meant to be adaptable to whatever the future holds. Supporting the 20 year vision and dream redesign, the public engagement strategy and toolbox are intended to serve the PVTA long-term. PVTA should continue to utilize the activities and tools designed by Valley On Board to engage with the public and further adapt the PVTA system for years to come. Through this lens of consistent and meaningful engagement, partnership with the community, and aiming for the dream alternative over time, PVTA can become a ladder of opportunity for communities in the Pioneer Valley and help community members thrive while reaching the major life opportunities and destinations that they desire.



Appendices

A. Funding

The table below lists a number of grants that are currently disbursing, or will in the future disburse, funding from the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA). The PVTA should monitor grant opportunities from these bills as they continue to roll out, and take advantage of opportunities to secure capital funding for this report’s capital recommendations, as well as other projects that arise. The PVTA has already secured significant funding for the purchase of electric buses and necessary supporting infrastructure, and more funding for electrification is on the way.

Grant Program	Details
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	Similar to the HOPE grant which funded this plan, this program offers money for capital infrastructure investment that centers sustainability and equity. Past projects have included multimodal transit hubs, bridge replacements, and snow removal systems.
Rural Surface Transportation Grant	This grant funds infrastructure projects in rural areas, including transportation demand management solutions and projects that improve rural economic opportunity and access.
Reconnecting Communities Pilot Program	This grant funds projects to address existing highway facilities that create barriers to access, opportunity, and mobility by dividing communities.
Neighborhood Equity and Access Grants	The Inflation Reduction Act (IRA) dedicates \$3 billion to “support neighborhood equity, safety, and affordable transportation access with 4 competitive grants to reconnect communities divided by existing infrastructure barriers, mitigate negative impacts of transportation facilities or construction projects on disadvantaged or underserved communities, and support equitable transportation planning and community engagement activities.”
\$1 billion for clean heavy-duty vehicles	Including electric buses
\$20 billion for climate-smart agricultural policies	Potential to reshape and revitalize the agricultural economy in the Pioneer Valley

Table 2: Possible funding sources for PVTA

B. Service Changes

Route	Type of Change	Area(s) affected	Date of Change	Details
X90	Route Split into Two Parts	Chicopee, Holyoke, East Longmeadow, Springfield	December 12th, 2021	Split into two parts: one serving Chicopee to HTC (Holyoke Transit Center), and the other serving Chicopee to East Longmeadow. Passengers traveling between the two parts must transfer at Chicopee Big Y. Both parts function on a 60 minute frequency.
G2E	Full Service Suspension	Springfield, East Longmeadow	December 12th, 2021	
B6	Frequency Reduction	Springfield, Ludlow	December 12th, 2021	Weekday frequency decreased from 20 to 30 minutes.
B7	Frequency Reduction	Springfield	December 12th, 2021	Weekday frequency reduced from 15 to 20 minutes.
X90	Service Change	Chicopee, Holyoke, East Longmeadow, Springfield	January 18th, 2022	Chicopee A-branch trips on weekdays and Saturdays now service Walmart. Chicopee–East Longmeadow trips on weekdays and Saturdays only service Walmart on north-bound trips.
B43	Service Change	Amherst, Hadley, Northampton	January 23rd, 2022	Weekday service between 7am and 1pm operates every half hour.
R44	Service Change	Northampton, Florence	January 23rd, 2022	Service operates from 7am to 7 PM on weekdays and Saturdays, and 11AM to 5PM on Sundays
B48	Service Change	Northampton, Holyoke	January 23rd, 2022	Service operates from 7am to 7pm, and does not pick up or drop off passengers between Stop and Shop and the Holyoke Transit Center
G2	Route Extension	East Longmeadow	June 26th, 2022	Service in East Longmeadow Industrial Park was extended to service Chestnut St, Shaker Rd, and Denslow Rd. The 5:50 pm weekday departure from Union Station now services East Longmeadow Industrial Park, and no longer services East Longmeadow Big Y.
G5	Service Cancellation	Longmeadow, Springfield	August 28th, 2022	Service is no longer provided inside Georgetown Apartments.
B17	Travel Time Reduction	Springfield	August 28th, 2022	Saturday travel time from Wilburham/Alden to Sixteen Acres center is reduced from 8 minutes to 5 minutes.
R24	Departure Times Adjusted	West Springfield, Holyoke	August 28th, 2022	
R24	Service to Certain Stops Eliminated	West Springfield, Holyoke	August 28th, 2022	Service to stops #370 (Lyman / Elm), #371 (Walnut / Hampden), #5800 (Mont Marie), #470 (Soldiers Home) has been canceled.

Table 3: Service changes since December, 2021

Route	Type of Change	Area(s) affected	Date of Change	Details
T90	New Service	Springfield, Holyoke, Chicopee	August 28th, 2022	Services Holyoke Transportation Center, Chicopee Big Y, and Westover Job Corps Center on weekdays when Westover Job Corps classes are in session.
X90	Adjusted Departure Times	Springfield, Holyoke, Chicopee	August 28th, 2022	
34	Partial service suspension	UMass Campus	September 19th, 2022	Service ends at 12:15 pm on weekdays.
33	Schedule Change	Amherst, UMass Campus, Hadley	September 24th, 2022	Saturday service follows the Sunday schedule (running every 80 minutes).

Table 3 Continued: Service changes since December, 2021

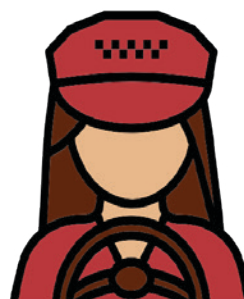
C. Connection to 2021 Report

As seen in the scenario planning done in Phase I, a great deal can change in 20 years. However, plenty can also change in just one year. The first part of phase III included analyzing changes in conditions in the Pioneer Valley from 2021-2022 and updating the scenarios based on current PVTA service changes, driver shortages, policy/funding changes, COVID-19's changing impacts, climate change, and updated data. These updates helped inform the final route redesign and recommendations along with providing the public with the most up to date information. Since the publication of the final report in December of 2021, there have been further changes to the PVTA bus routes. The changes to the routes have been implemented to address a staffing shortage of qualified drivers, while trying to minimize the impacts on PVTA passengers. Changes have been made to the Springfield, Northampton, and Amherst-UMass service areas, affecting every community serviced by the PVTA. For a complete list of service changes by route since 2021, see [Appendix B](#).

Driver Shortages

This year, the UMass 33 and 34 bus routes were drastically reduced. The 33 is now running every 80 minutes on Sunday, and the 34 now ends at 12:15 PM on weekdays. Although deemed to be the routes that would affect ridership the least, the pressure that students are now putting on other bus routes is very noticeable. A student said that now the route 35 bus is "almost always overcrowded". There's barely any space to sit, stand or even move, and the disability seats are being taken up as well. "Not only is there a driver shortage," PVTA's Sandra Sheehan stated, "a bus driver training facility they had been using to train their drivers has also recently closed down."

Losing 5 prospective drivers, 1 full time, and 1 part time driver has drastically reduced the bus route coverage in Northampton. They will now have to rent out a large lot to continue bus driver training. She comments "We gain some of them, we lose some, and then we get new challenges. We're working through those things as fast as we can. Obviously, we will have to pay to lease this property because we don't have any space within our facilities to do this. So that's an additional operating cost." RTA's have also exhausted their incentives. Promotions such as signing bonuses, accessible hiring advertisements, paid training, improving employee health and wellness facilities, better professional development supports, boosting operator safety, and scheduling flexibility have not been enough to bring in new drivers. Merrimack Valley Regional Transit Authority (MVRTA) has repainted their lounge, added two massage chairs, and a high end coffee machine to the driver rest area all in efforts to retain the few full time drivers they have left. On top of that, they are raising wages to be very competitive with other blue collar jobs. A combination of these factors has the MVRTA optimistic that their current class of drivers will complete training and drive for their system. This is a very forward thinking plan that other agencies may benefit from, especially the PVTA.



D. Best Practices Report

These seven case studies were selected from the American Planning Association's awards on public engagement from the years 2011 through 2020. The selected case studies were the People's Planning Academy (2020), the Highline Canal Conservancy (2016), Southern Nevada Strong (2016), Making Planning Public: Newark Zoning Workshop (2015), Bayview Community Based Transit Plan (2020), Hawaii Pedestrian Plan (2013), and the Fast Forward Mobile Outreach Program (2011). Each case study presented innovative and expansive strategies for engaging members of the public with the planning process. There were several commonalities of these case studies, beginning with educating the public on the planning process and the project of interest. Each case study then incorporated a broad range of engagement strategies into activities and events with large numbers of community members. The large-scale engagement was done through partnering with local businesses and community organizations. At the center of each project was the desire and goal of centering the engagement process around marginalized and underrepresented communities. This can be seen in the diversity of materials available with each project that responded to demographic and language diversity of the region and populations of interest.

Looking at each case study in more detail, there are many strategies that were employed beyond these commonalities. For example, the People's Planning Academy aimed to build agency and capacity for community members to truly engage with the planning process. This was done through six free workshops for individuals interested in being involved. The individuals were trained in land use planning and after the workshops, encouraged to join the stakeholder committee for the next phase of the planning process. This was an exceptional example of building community capacity and truly educating community members to be more deeply involved in the planning process.

The Highline Canal Conservancy project aimed to engage large numbers of community members in the process while educating them on issues of interest and building consensus. This was done through four open house series, with three meetings each at locations of interest. The open houses consisted of introductions; engagement of individuals in the opportunities and challenges identification, visioning, and drafting of the plan; evaluation of the plan with next steps for involvement and implementation. The large number of participants was also reached through attending existing events to increase awareness of the project and outreach.

The Southern Nevada Strong project focuses on adequately reaching target populations. This was done through first identifying populations of interest through urban ethnographic research, then creating outreach toolkits and educational videos. The engagement included a survey in English and Spanish, and priority-setting exercises. In order to reach target populations, they engaged with individuals directly in both English and Spanish. They also targeted and intentionally oversampled marginalized populations and enlisted the help of culturally competent experts to connect with hard-to-reach populations. Each of these strategies helped to engage marginalized communities of interest in the project.

Making Planning Public: Newark Zoning Workshop was focused on creating community understanding of the planning process and gaining community insight. This was done by first testing the workshop design with community-based organizations. The workshop built community capacity from basics to more nuanced discussions of competing interests and how they shape development decision making. The three activities included zoning use, zoning for design, and the planning process. The workshops also included conversations, discussion, and storytelling to build consensus and collect insight.

The Bayview Community Based Transit Plan aimed to involve the community in the entire planning process from start to finish. They began with creating a statement of intent, reviewing and ranking previous plans, defining an equity index, and doing participatory budgeting all with the community. They did this process by hosting and designing over 60 events. In each phase of the process, over 1000 residents were engaged with. The process was made efficient by having an abundance of thick participatory events in phase 1 for interviewing community members, doing research and prioritization. The following phases were more focused on collecting feedback and spreading awareness of the project, while creating a positive community presence. This was the most robust of the case studies.

The Hawaii Pedestrian Plan used more conventional methods of engagement throughout the process, however they were still in-depth and created strong feedback. These methods included stakeholder committees, workshops, and individual interviews. Each of the engagement methods were targeted towards communities of interest, specifically Environmental Justice Communities and Title VI individuals. Lastly, the Fast Forward Mobile Outreach Program was the most innovative of the case studies. It involved remodeling a bus to be a mobile outreach station about the project. Individuals could enter the bus and engage with all the materials in an interactive way. Each of the case studies inspired the engagement strategy employed in the Valley On Board project.

E. Vulnerable Populations Report

According to the National Library of Medicine National Center of Biotechnology Information, vulnerable populations are defined as patients who are racially or ethnically minorities, children, elderly, socially-economically disadvantaged, under-insured, or those with medical conditions. Those within these vulnerable populations also have health conditions exacerbated by inadequate health care (DBW, 20213). Another definition from the Encyclopedia Britannica defines vulnerability as easily hurt or harmed, physically, mentally, or emotionally (Britannica, 2022). The third definition of a vulnerable person is someone who belongs to a group within society that is either oppressed or more susceptible to harm. This includes children, senior citizens, low-income workers, and asylum-seekers. Within these classifications, populations are at greater risk for harm and lack the resources to protect and defend themselves (Eagly, p,1281 2010). These subgroups often receive poor treatment and are potentially susceptible to mistreatment by those who may otherwise hold power over them (Jolivet et al., 2012).

Gauging vulnerable populations throughout much of the globe is critical to inform policy reform and provide more inclusive accessibility to those most impacted by socio economics factors, disability, and mobility. These categories also have been classified with higher proportions of older adults, women, young adults, black workers, people with disabilities, and low-income people who depend on public transportation more than other populations (Heaps, Abransom, Skillen 2021). Improving public transit for vulnerable populations can enhance their physical and mental health while improving their health equity by increasing the accessibility to medical care, healthy food, vital services, employment opportunities, and maintaining social connections (Heaps, Abransom, Skillen 2021). Considerations like access, convenience, and cost for transportation or other issues relative to vulnerable populations are of great importance. Additionally, covid has significantly impacted ridership and the reduction of routes on public transportation as a direct result.

Vulnerable populations in the Pioneer Valley

According to The Community Health Needs Assessment report published in 2016, through the collaborative efforts of the partners of a Healthier Community Collaboration of Education Services, the Pioneer Valley Planning Commission and the Partners for a Healthier Community identified children, youth, and older adults with primary mental health conditions. Latinos, black, LGBTQ

individuals and veterans were identified as the Pioneer Valley vulnerable population (Partners for a Healthier Community, Collaborative for Educational Services,Pioneer Valley Planning Commission, 2016). They also identify members with low-income levels, those living in poverty, and those who are homeless. Within these different populations, all face barriers that make it challenging to obtain affordable quality care (Partners for a Healthier Community, Collaborative for Educational Services,Pioneer Valley Planning Commission, 2016).

The combination of environmental justice communities and those identifying as vulnerable populations, are at increased risk of poverty and exposure to other conditions. These often do not impact surrounding communities and towns where higher wealth and economic security are available. The double identification in these communities further exacerbates the complications of a person's life when they are also limited access to resources and educational opportunities.

To serve these populations and understand their needs, the definition of accessibility must be decided. Boisjoly and Yengoh accessibility potential for opportunities, interactions, and the ease of reaching the desired destination while looking at the meaning of the trip rather than the trip itself (Boisjoly,Yengoh 2017). The article considers Bannister's sustainable mobility framework, which identifies local concerns and favors active and public transportation. He places pedestrians first and places cars at the bottom to determine what he believes is a more equitable transportation model (Boisjoly,Yengoh 2017). His perspective provides greater insight and transportation options while reducing the negative impact of car transportation (Boisjoly,Yengoh 2017).

Paratransit Riders

Another consideration in the PVRTA services which particularly meet the needs of disabled and limited mobility people is the services of paratransit. Without this grant-funded service those vulnerable populations unable to walk to a traditional bus stop would further experience reduced accessibility to daily activities. Paratransit is a special public transportation service that supplements larger public transit systems by providing individualized rides without fixed routes or timetables (Merriam-Webster, 2022). In terms of the Pioneer Valleys Paratransit system qualifying riders are required to schedule pick ups twenty four hours before needed services.

People who use paratransit, particularly those who are disabled will best know what their needs are and how the system should be revised in order to

better serve them in the future. While this section of PVTA funding is grant based, it is also important to maintain and to continue to apply for grants in order to help financially fund this alternative system of transportation. Having the disabled population as a part of the planning and implementation will help to identify what their particular needs are in order to best accommodate them while seeking out more inclusive public transportation in the Pioneer Valley. The few responses collected, included both positive and negative comments. Some respondents said that the program was good while others said it needed a greater level of improvement because it did not meet all of the public's needs. Some had also recommended that paratransit come up with a weekly calendar in which riders could block out advanced trips instead of calling or scheduling within a 24 hour window.

For those who would qualify for paratransit also identify as the vulnerable populations it is again hard to be able to collect information from them when their lives are so overwhelmed by having to constantly be over scheduled. Some said that it was good while others said it needed a greater level of improvement because it did not meet all of the public's needs. Some who responded had also recommended that paratransit come up with a weekly calendar in which riders could block out advanced trips instead of calling or scheduling within a 24 hour window. Another issue that came up was the actual price of the paratransit system.

Need For Public Engagement of Vulnerable People

Within the 24 municipalities in which the PVTA operates, several communities have a larger demographic which identifies as vulnerable people. Having efficient public transportation to meet their needs is a critical component of maintaining independence, mobility and economic opportunities. Without reliable public transportation many barriers prevent these people from meeting their daily needs and as well as goals and accessibility to resources throughout the Pioneer valley where PVTA operates. The interactions and continued established bridge organizations within the community will better assist both the PVTA and people in vulnerable populations.

Working with vulnerable populations to increase public participation will better assess how their needs are currently being met with the application of PVTA infrastructure. By identifying these community members, it is necessary to be able to better understand their needs in comparison to those who do not identify according to the above section of vulnerable populations. Community members,

especially those of a vulnerable population, are willing to take an interest and engage when they are affirmed that the researcher is not using them only to conduct research (Goedhart et al., 2021). When an established form of trust is created, the public sees the researcher as trying to include them in a project that would benefit them (Goedhart et al., 2021).

Best Practices

The most inclusive way of working with vulnerable populations is to meet them where they are. Without bridge people it is difficult to successfully identify vulnerable populations due to the severe lack of trust they experienced by being discredited and seen as a burden to society. Additionally, when working with vulnerable populations who identify as refugees and migrants, it is crucial to reach out to the organizations they are already using to best meet their needs.

Accessing mixed modalities to collect information and data from vulnerable populations about their experiences and use of public transportation in the Pioneer Valley was beneficial in developing a wide variety of information. Organizing tabling events in particular locations like food pantries was a positive interaction. The semi-formal interviews or conversations with people became very important in collecting data. Sharing stories and finding common ground became an asset in gathering vital information after self-identifying as one of the groups, such discussions and conversations with members allowed for personal feedback in the sense of security to be exchanged. Making these populations feel safe allowed them to share personal experiences as disabled people.

Bridge People & Organizations

Building trust with the public is important to receive honest feedback. Without this trust, both the researcher and the public can have a negative experience (Goedhart et al., 2021, Wilkins, 2018). Those who might identify as migrant populations or refugees may be even more reluctant to give their input or join any official group due to their migration status (Goedhart et al., 2021).

Building trust allows local community members who feel at risk to open up a little more to share their experiences willingly. Bridge people or organizations associated with the less trusting population to help share similar identities. For example, those who might be food insecure, disabled, or experiencing homelessness throughout their lives. These people provide familiarity often unattainable by researchers, especially among underserved communities (Goedhart et al., 2021). Another recommended method is going

to a location and having an understanding and a familiar face people recognize (Goedhart et al., 2021). While this seems like a natural practice, creating a less threatening environment is core to reaching out to vulnerable populations to make them feel safe and give feedback (Goedhart et al., 2021). Making this connection will build a foundation between the public and the person collecting the data, who might be considered an outsider to people in vulnerable populations (Goedhart et al., 2021).

Many of the vulnerable populations identified within Hampden and Hampshire county may also not speak English as their first language. The language barrier can be another roadblock preventing more significant feedback from vulnerable people. Materials resources in several languages will help extend one’s reach in communities, especially in Environmental Justice Communities, to best serve the outreach efforts (Goedhart et al., 2021). While Goedhart et al. suggest having translators and interpreters available, the previous section still holds validity. When working in vulnerable populations, one must establish trust with the community members.

Building trust, creating safe environments, and providing opportunities for social learning to those with limited means and a potential lack of understanding of any given topic is critical to building long-term relationships. Establishing long-term relationships, especially in Environmental Justice Communities and VP communities, will strengthen the relationship of community members who better know an organization or agency that works with specific vulnerable populations than outside agencies or non-associative communities. When considering the aspect of trust building, it must be understood that many communities with vulnerable populations feel that their needs and limitations will not be valued (Wilkins, 2018). Trust building can be tough to establish if bridge people, or bridge organizations are separate from the established communication and participation. Level of safety refers to physically safe environments in terms of the physical location and accessibility, as well as the safety one feels to speak their mind and be validated. People can thereby engage in topics (Pfaff et al., 2021). They may have a general understanding to engage and be educated in a safe environment that allows them to feel that their voices and suggestions will have an equal say among other community members, including community planners and transportation professionals.

Tool Box

Methods used to collect data included a survey, polling activity, conversation cards, and a mapping exercise. The IRB approved the survey and allowed the public to provide information based on their interactions—or lack thereof—with the PVRTA. The polling exercise allowed the public to use “bus bucks” to identify how they might use money to identify what they found most critical for financial investments. The conversation cards generated opportunities to have non-formal conversations based on a series of 12 “would you rather” questions. These asked the public about changes they would like to see made to the current infrastructure of the bus route systems in all 24 member communities. The questions also considered what potential new routes might be needed when creating infrastructure opportunities, including a new bus route to Mount Warner. Finally, the mapping exercise was an interactive engagement activity primarily used within high school communities to identify the current mapping trajectory of the PVRTA. It might be of value to rate and evaluate the various interaction methods within the toolbox to assess how they increase the opportunity to engage with vulnerable populations. Below is an example of what a rating system might look like.

Interactives	Long-term Partnerships	Trust Building	Safety	Social Learning	Total
Transportation Conversation Cards					
Participatory Mapping					
Polling					
Survey					
Flyers					

Figure 42: Proposed toolbox evaluation grid

Stakeholders

In this body of research, three main stakeholder groups regarding public transportation have been identified. The groups are riders, non-riders, and local community stakeholders. Within the rider group are non-disabled populations that can use the regular PVRTA bus system. Other riders are those who are considered disabled or identified within the vulnerable populations who might benefit from paratransit door to door services such as Dial-A-Ride. The second identified group are the non-riders. These are people who have not used the bus at all but potentially could be riders later in life due to unpredictable circumstances that would make them best served by a more adequate public transportation services and systems. The third stakeholder group includes organizations, hospitals, nonprofits and other agencies and services which meet the needs of those in vulnerable populations. These stakeholders already have vulnerable populations who currently use their

services in Hampshire and Hampden counties. While some of these agencies work directly with vulnerable populations, others are at locations and offices that PVTA could develop for their long-term relationships and efforts to reach these community members more effectively.

Limitations

Some of the limitations that prevented Valley On Board’s materials from reaching the general public included those medical offices requiring materials to be laminated according to the CDC’s guidelines due to covid still. Another limiting factor was the delay in hospitals approving materials to be distributed and displayed in medical facilities like Cooley Dickinson Hospital Another limiting factor was needing more time to reach out to vulnerable populations and agencies that worked directly with them, which was difficult within the abbreviated, 13-week period of this studio. Another area for improvement is the turnaround time of other agencies trying to establish potential public engagement events.

Recommendations

One way to better serve and facilitate a more significant response from this vulnerable population would be to meet them where they are, or where they are seeking services. Organizations like the Center for New Americans, the Ascentia Care Alliance and the Community Upliftment Program are excellent sources for collecting feedback from at-risk, vulnerable populations particularly of refugees and migrant people. There is also a need for more information and responses from senior citizens of both Hampshire and Hampden County.

Identifying more targeted events where senior citizens are often found would be best. Such locations as inner-city in-town community senior centers were missed in this semester’s survey work and public participation. PVTA should continue to set up tabling events at locations like public libraries during hours with the higher senior population traffic flow. Additionally, the lack of medical facilities engaged is another gap in collecting feedback. The strict requirements of the CDC for protocols due to Covid reduced opportunities for students to engage with the public at medical facilities .

Increased public participation within the high schools and the grade schools would increase the amount of public response, particularly in that vulnerable population identified by the reports in 2015 (Ramasubramanian, 2015). Attending local farmer’s markets, particularly in Hampden County, is beneficial as many of the cities and towns fall

under the Environmental Justice Communities with greater populations of vulnerable people. It would be strongly advised that all farmer markets within Hampden County and the New End Neighborhood associations as identified by colleagues be included. Additionally, registering to speak at local political hearings and meetings would also benefit the PVTA in disseminating the information to the public, as many of these meetings are recorded.

Stakeholders	Who they Serve
Cooley Dickinson Hospital	General Population & Vulnerable
Holyoke Medical Center	General Population & Vulnerable
UMass Amherst	General Populations & Vulnerable
Holyoke Community College	General Populations & Vulnerable
The Center for New Americans	Vulnerable Refugee Populations
Ascentina Care Alliance	Vulnerable Refugee Populations
Community Upliftment Program	Vulnerable Refugee Populations
Amherst Survival Center	Vulnerable Populations
Northampton Survival Center	Vulnerable Populations
First Church of Amherst	General Population
Rodger PVT Academy	Vulnerable Teens Populations
Make it Springfield	General Public
Baystate Dental Offices	General & Vulnerable Populations
Springfield Arise for Social Justice	Vulnerable Populations
Springfield Housing Authority	Vulnerable Populations
Social Security Disabilities Office	Vulnerable Populations
Dept Transitional Assistance Office	Vulnerable Populations
Mercy Medical Center	General & Vulnerable Populations
Baystate Medical Center	General & Vulnerable Populations
Baystate Children's Hospital	Vulnerable Populations
Shriner's Children's Hospital	Vulnerable Populations

Table 4: Vulnerable population stakeholders

Some communities within the vulnerable population were not engaged at the same level as other vulnerable populations. One particular group within the vulnerable population that stood out was the refugees and migrants. Due to uncertain residency status within the country, refugees and migrants are reluctant to engage and provide feedback.

Establishing more substantial networking opportunities within these facilities will increase the public's response and help the PVTa obtain more responses from those who have been identified as vulnerable populations.

Another gap that occurred was in working with particular organizations such as the Transitional Assistance Office in Springfield, the Social Security Disability Office and the Springfield Housing Authority. People served by these organizations who struggle to find affordable housing, those who register for disability services and financial funding were not targeted in public participation. Including them would improve efforts to serve them better in the future. Furthermore, future efforts could include other offices like Protective Services of families and children who have been identified as vulnerable and needing additional services and protection.

F. Engagement Toolbox

Survey Questions

Q1. CONSENT TO TAKE PART IN CONFIDENTIAL RESEARCH: Long-term planning for the PVTA based on your travel behavior

Q2. Please verify that you are not a robot by clicking on the box below

Q3. This survey is administered by the UMass Amherst Fall 2022 Regional Planning Studio on behalf of the Pioneer Valley Transit Authority (PVTA). The purpose of this survey is to gather information about how people in the Pioneer Valley access transportation. The survey will ask you basic questions about yourself, as well as more specific questions about how you use the PVTA. The survey will not collect any information about your identity, and your participation and feedback will remain anonymous. The survey will allow you to skip questions that you prefer not to answer.

Q4. In what year were you born?

Q5. How do you identify?

Q6. Do you consider yourself Hispanic or Latinx?

Q7. Which of the following categories do you identify with? (check all that apply)

Q8. What was your approximate total household income before taxes in 2021?

Q9. Including yourself and any children, how many people are in your household?

Q10. What is the highest level of school you have completed or the highest degree you have received?

Q11. What is your ZIP code?

Q12. Do you have a driver's license?

Q13. Are you currently a student?

Q14. What is your current employment status?

Q15. How often do you ride PVTA buses?

Q16. Do you use PVTA's Paratransit (Dial-a-Ride) services?

If the survey-taker says that they use paratransit, they are taken to the following questions:

Q17. The questions on this page ask about your use of PVTA Paratransit/Dial-a-Ride services. Please base your answers on your use of Paratransit/Dial-a-Ride service.

Q18. How frequently do you use this service?

Q19. Where do you most frequently ride on the paratransit service? (Check all that apply)

Q20. What transportation services other than PVTA paratransit services have you used?

Q21. What are your thoughts on the initial rider approval/certification process?

Q22. Does the requirement to book trips in advance prevent you from making any trips?

Q23. If PVTA offered same day booking how likely would you be to use it?

Q24. Do you prefer to use paratransit or fixed-route services?

Q25. Does the cost of paratransit service affect you?

Q26. If yes, how does it impact you?

Q27. Are you familiar with the PVTA travel training program?

Q28. What is one thing that would improve the quality of your paratransit ride?

If the survey taker indicated on Question 15 that they use the PVTA, they are taken to the following questions:

- Q29. The questions on this page will ask you about your use of PVTA fixed-route (bus) service. Please base your answers on your use of fixed-route (bus) service.
- Q30. Where do you frequently travel on the PVTA? (check all that apply)
- Q31. What is the average length of your trip?
- Q32. How do you get to the bus stop? (Check all that apply)
- Q33. How do you reach your destination after using PVTA? (Check all that apply)
- Q34. Can you reach your critical destinations by PVTA? (e.g. supermarkets, school, work, medical appointments, recreation, etc.)
- Q35. How do you get to destinations not accessible by bus? (Check all that apply)
- Q36. Do bus delays impact your daily ride?
- Q37. What features would you like to see added or improved on the PVTA? (for example, emergency call boxes, LED lighting, bus shelters, street lights)
- Q38. Are there specific bus stops that you use that need improvements? Please describe below:
- Q39. Below are several long-term priorities for the PVTA. Please select how important you think each priority is.
- Providing access to more destinations within the Pioneer Valley and beyond
 - Expanding service hours (more buses late at night or at different times of the day)
 - Make existing routes faster, more frequent, and more reliable
 - Express routes between major urban centers like Northampton, Springfield and Holyoke
- Q40. What else would improve your experience on PVTA?
- Q41. Is there anything you would like to share with us that we didn't ask about?

If the survey taker indicated on Question 15 that they DO NOT use the PVTA, they are taken to the following questions:

- Q42. What is your primary mode of travel?
- Q43. If you work or attend school, how long is your typical commute?
- Q44. Which of the following reasons dissuade you from using the PVTA? (check all that apply)
- Q45. Has the COVID-19 pandemic affected your willingness to use public transit?
- Q46. Below are several long-term priorities for the PVTA. Please select how important you think each priority is.
- Providing access to more destinations within the Pioneer Valley and beyond (4)
 - Expanding service hours (more buses late at night or at different times of the day) (5)
 - Make existing routes faster, more frequent, and more reliable (6)
 - Express routes between major urban centers like Northampton, Springfield and Holyoke (7)
- Q47. Is there anything you would like to share with us that we didn't ask about?

All survey-takers are asked the following question:

- Q48. Where did you hear about this survey?

Polling

Three separate polling activities were deployed: 8-category, 10-category, and For Kids.

8-category priorities:

More Destinations

Expand Service to Rural Areas

Connect to Regional Destinations

Express Service Hours

Late Night Service

Maintain Route Timing During Off-Season

Improve Existing Routes

Increase Safety and Accessibility at Bus Stops

Increase Bus Frequency Along Popular Routes

Express Routes

Express Routes between Major Urban Centers

Bus Priority Infrastructure (bus lanes, traffic signal priority)

10-category priorities:

Increase bus frequency

Expand service to rural areas (Ex. Ware, Sunderland)

Improve people's ability to get to work/home from public transit

Extend late-afternoon and evening service

Add express routes between major destinations ex. Amherst, Springfield, Holyoke, Northampton)

Make the bus free

Implement consistent year-round scheduling

Build bus priority infrastructure (ex. bus lanes, traffic signal priority)

Focus on driver recruitment

Reduce Carbon Emissions through bus electrification & carbon neutral facilities



Figure 43: 8-category polling activity being deployed at the Cranberry Fair

For Kids destinations:

Store Library

Park Friend/Family

School

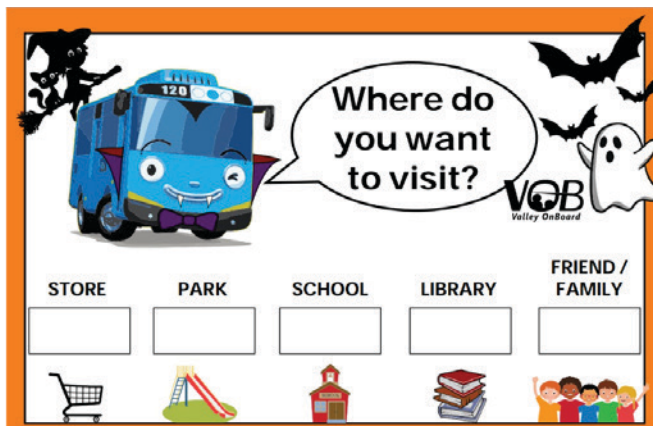


Figure 44: Board used for children at the Chicopee Spooktacular

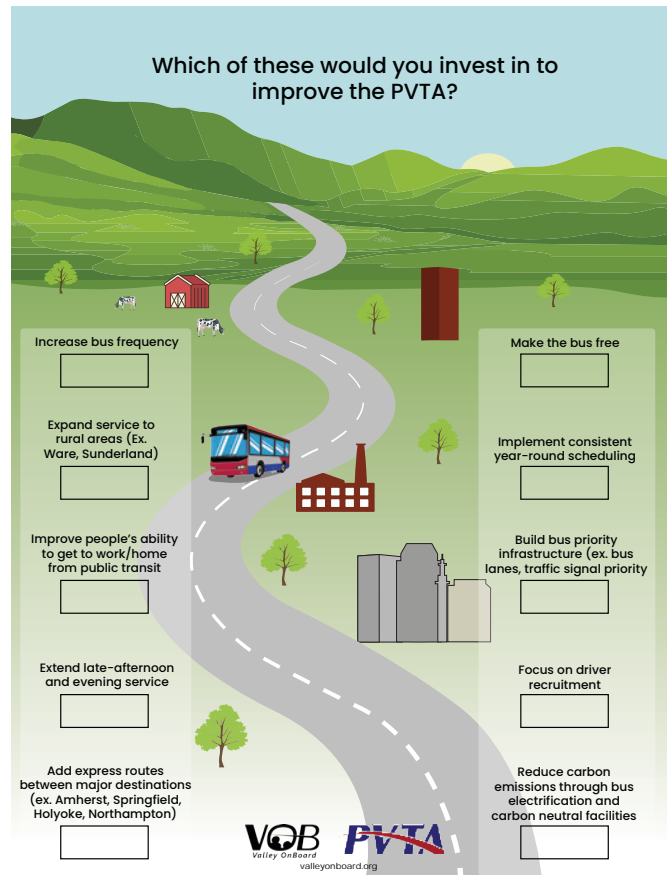


Figure 45: Board used for 10-category polling



Transit Mapping Activity

PART ONE: Mapping points of interest

Each team will receive a map of the Northampton-Hadley-Amherst area with the location of your school marked. On your team's map, you should identify and mark with a sticker where each team member lives (green stickers), at least 5 locations that your team members visit on a regular basis (blue stickers), and at least 5 locations that you would like to visit (yellow stickers). Please label each sticker with the name of the location.

If some of your locations are outside the scope of the map, put the sticker on the margin.

Examples of locations include: Bueno y Sano; Forbes Library; Central Rock Gym; Amherst Goodwill.

PART TWO: Transit design

You and your team members will take on the role of transit planners for the northern PVTA service area (Amherst, Hadley & Northampton). Through this activity, you will calculate a budget to build a new transit system for your region. Then you will work with your team to plan out a network of bus routes and stops to connect the people in your region. Your goal is to lay out infrastructure that balances the cost of the rider's experience (access distance to/from stations, travel distance on the system, number of transfers) against the agency cost (length of route, number of bus stops).

Task 1: Select Materials

One person from your group should come to the instructor's station to collect the following materials for this project:

- 1 area map (Chicopee, W Springfield, Springfield, Holyoke)
- 20 Wikki Stix (all same color), these will represent your routes
- a pair of scissors to share with your table

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Figure 46: Page 1 of participatory mapping instructions

Task 2: Calculate Available Budget

In the real world, the federal government provides a large source of funds to build transit infrastructure through grant programs. Suppose that your region is eligible for \$20,000 of federal funds. You can also supplement these funds with local tax revenues averaging \$1 per resident. The Northampton-Hadley-Amherst area has a combined population of about **70,000**. Your total budget is the sum of the federal and local sources:

Federal Share	\$20,000
Local Share	70,000 residents × \$1 =
Total	

Task 3: Design Transit Network

This is the creative part. Look at your map and identify parts of the area that you want to serve.

A scale is provided at the bottom right side of the map so that you can estimate the dimensions of your system.

Use the Wikki Stix to represent bus lines on existing roads. **One inch represents 1 mile, and each stick is 6 inches (6 miles)**. You can use scissors to cut the sticks to size.

As you layout your network, you will need to be mindful of your budget constraint (calculated above) and the cost of your system (table below).

Lines	(Miles of Route) × \$1,500 =
Local Share	(Number of Stations) × \$500 =
Total	

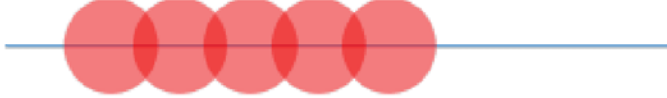
While you want to serve as many people as possible, you also need to make decisions about trade-offs between reaching outlying neighborhoods and providing short access distance to bus stops. You should consider with your group what kind of network you want to build, and then have some fun. This is your opportunity to be creative, so you should not feel constrained by what you know about the current PVTA system. There is no one right way to go about this: you may place bus stops first and connect them later, or you may lay out lines and then place stations. As a guide, you may notice that one Wikki stick costs \$4,500, and a bus route with 1 station per mile will cost \$2,000 per mile to build; then, you can use this to adjust the size and spacing of your network accordingly. If you want an express and local route along a corridor, you can double up Wikki Stix - one line local, the other express.

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Figure 47: Page 2 of participatory mapping instructions

The two examples below have the same cost associated with 5 stations and the same length of routes:

1. closely spaced stations



2. spread out stations



Task 4: Comment on Your Design

Write a brief statement (a paragraph) about your design. You should answer the following questions:

- How many routes and branches does your system have?
- How many express and local stations does your route have?
- If you had a larger budget, what would you do differently?

Task 5: Submit to your group leaders

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Figure 48: Page 3 of participatory mapping instructions

Transportation Conversation Cards

(also available in Spanish)

Would you rather

Increased frequency in residential areas across the valley?
or
Expanded service along existing express routes between Northampton and Holyoke/Springfield?



1



Figure 49: Question Card #1

Would you rather

Expanded service to recreational and entertainment destinations?
or
More frequent service generally in Amherst and Northampton?



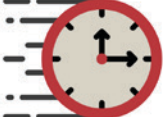
4



Figure 52: Question Card #4

Would you rather

An express route that doesn't make as many stops, meaning less time on the bus?
or
A standard route that runs more frequently, meaning less time at the bus stop?



2





Figure 50: Question Card #2

Would you rather

Frequent, interconnected service throughout Springfield?
or
More routes to destinations like Westfield, Agawam, and Ludlow?



5





Figure 53: Question Card #5

Would you rather

High-frequency circulator routes around local community colleges (HCC, STCC)?
or
Consistent scheduling during the school year and summer?



3





Figure 51: Question Card #3

Would you rather

Regular service to Franklin County (Greenfield)?
or
More frequent service generally in Springfield, Holyoke, and Chicopee?



6




Figure 54: Question Card #6

Would you rather

More frequent service along existing express (no- or low-stop) routes between Northampton, Holyoke, and Springfield?

or

Expanded late-night hours on existing routes?



7



Figure 55: Question Card #7

Would you rather

A new express route between Sunderland and Springfield via Holyoke?

or

Weekend service to Berkshires destinations like Pittsfield?



10



Figure 58: Question Card #10

Would you rather

Expanded early morning hours on existing routes?

or

More express routes between Springfield, Amherst, and Northampton?



8



Figure 56: Question Card #8

Would you rather

Increased service frequency for existing routes on weekends?

or

Increased connections from urban to rural areas?



11



Figure 59: Question Card #11

Would you rather

On-demand service to agricultural and rural destinations?

or

A new express route between Amherst and Holyoke/Springfield?



9



Figure 57: Question Card #9

Would you rather

Regular service to central Massachusetts (Worcester)?

or

On-demand service seasonally available to agricultural employment and outdoor recreation areas?



12



Figure 60: Question Card #12



VOB

Valley OnBoard

Toward a 20-year Vision for an Accessible, Equitable, Efficient Network for PVTA

A HOPE Project

This package contains 12 conversation cards, 1 instruction card, 1 score card, and four priority cards. This deck is intended to spark and inform conversations about the present and future of the Pioneer Valley Transit Authority (PVTA). You can share your conversations with the Valley OnBoard team using the included QR code.



Figure 61: Introduction Card



Have a

TRANSPORTATION CONVERSATION

would you rather...



Figure 64: Introduction Reverse

Help shape the future of public transportation in the Pioneer Valley:



Have a TRANSPORTATION CONVERSATION

Figure 62: Question, Glossary, How to Play Reverse

Glossary

Not too familiar with some of the terms included in the cards? No problem!

Express route: an express route is a low- or no-stop bus route between two popular destinations. Because the bus doesn't stop as often, you spend less time on the bus, and get to your destination quicker!

On-demand: on demand service for a particular area means that, within that area, you can request a ride using an app or phone call. Generally, the possible destinations are limited to a specific service area.

Regular service/standard route: otherwise known as a "fixed route," where the bus operates based on a set timetable, and services set stops.




Figure 65: Glossary Card

How to play

Discuss the included "would you rather" questions with your group!

Each question compares two examples of possible priorities for the future of the PVTA. Keep track of which answers you choose on the score card, and total up each color to discover your preferred priority. You can learn more about all four priorities on the included cards, and discover even more about Valley On Board online at valleyonboard.org.



Share your priorities and any feedback you have during the game using the QR code, or by going to valleyonboard.org/conversationshare.



Figure 63: How to Play Card

Score Card

Keep track of your preferences with this score card. Once you're gone through the whole deck, total up each color to discover which priorities mean the most to you! Please share your scores with Valley On Board using the QR code, and learn more about each priority on the included cards.

1	2	3	4	5	6	7	8	9	10	11	12




Figure 66: Score Card

Improved Existing Routes

Improving the existing routes will make routes more frequent, reliable, accessible, and safe.

What improved existing routes will mean for the valley:

- More frequent interconnected service in downtown Springfield
- Increasing bus frequency along popular existing routes
- Increased safety and accessibility at bus stops (shelters, information)



Figure 67: Priority Card #1

Expanded Service Hours

Expanding service hours will result in bus service starting earlier and stopping later.

What expanding service hours will look like for the valley:

- Expanding service hours (more buses late at night or at different times of the day) to accommodate shift workers and recreational trips
- Maintaining route schedules during off seasons (summer, school breaks)



Figure 70: Priority Card #3

New Express Routes

Express routes are routes that don't make many stops, meaning you spend less time on the bus.

What prioritizing express routes will mean for the valley:

- Increasing the availability of existing express routes (B43E, R29E, G73E)
- Creating new express routes between population centers like Northampton, Amherst, Springfield, and Holyoke
- Increasing bus priority infrastructure (bus lanes, signal priority)



Figure 68: Priority Card #2

Access to Other Places

Access to other places will result in new (or increased) service to areas that are not currently connected to the PVTA.

What access to other places will look like for the valley:

- Expanding service to rural areas, either through new routes or on-demand service
- Connecting to regional destinations like Worcester, Greenfield, and Pittsfield



Figure 71: Priority Card #4

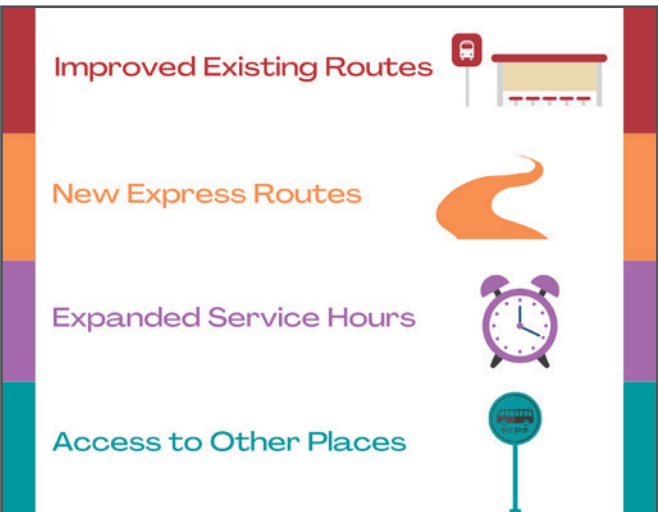






Figure 69: Priority and Score Card Reverse





The VOB network is focusing on a redesign that addresses the goals of increased access, equity, and efficiency, based on identifying service gaps from existing conditions and plausible future scenarios.


www.valleyonboard.org
We want your input!
Take our survey

El VOB se está centrando en un rediseño que aborda el objetivo de aumentar el acceso, la equidad y la eficiencia, basándose en la identificación de las deficiencias del servicio en función de las condiciones existentes y los posibles escenarios futuros.


www.valleyonboard.org
Queremos tu opinión!
Haga la encuesta

Valley On Board

Toward a 20-year Vision for an Accessible, Equitable, Efficient Network for PVTA

About Valley On Board


Valley On Board has partnered with the Pioneer Valley Transit Authority to develop a 20 year plan. So far, route designs have been developed to focus on increasing equity, accessibility, and efficiency of the PVTA network.

Goals	Recommendations
<ul style="list-style-type: none"> Increase the destinations that can be reached within the Pioneer Valley Increase number of environmental justice (EJ) communities serviced by the PVTA network Increase the efficiency of the PVTA network 	<ul style="list-style-type: none"> Increase express routes between hubs Implement flex zones and/or routes in low-density service areas Add bus lanes and more park-and-ride locations Improve bus stop amenities and communications

Your Voice

Our work can only take us so far. Your voice can help paint the future of the PVTA! For ways to get involved visit valleyonboard.org, join us at one of our events, or take the survey.

Learn More



- Read the Report
- Take the Survey
- Find an Event & More!



Valley On Board

Hacia una visión de 20 años para una red accesible, equitativa y eficiente para PVTA

Quiénes Valley On Board

Valley On Board se ha asociado con el autoridad de tránsito en el Valle Pioneer (PVTA). Están asociado para desarrollar un plan del red pública de 20 años. Los diseños de rutas se centran en aumentar la accesibilidad, equidad, y eficiencia del red PVTA.

Objetivos	Recomendaciones
<ul style="list-style-type: none"> Aumenta los destinos de los autobuses en el valle Aumenta el alcance para justicia ambiental con PVTA Aumenta la eficiencia del autobús 	<ul style="list-style-type: none"> Aumenta autobús expreso entre centros Agrega rutas flexibles en zonas de baja densidad Agrega carriles de autobús y park and ride Mejora características de paradas de autobús

Su Voz

Su voz puede ayudar al futuro de la PVTA. Involucrarse en valleyonboard.org, ven a nuestro evento o toma la encuesta.

Aprenda Más



- Lee el reporte
- Toma la encuesta
- Enuentra un evento & Más!




Help to imagine the future of the PVTA
Take the Survey • Explore the Website • Read the Report
www.valleyonboard.org
PVTA LA&RP Landscape Architecture & Regional Planning




Ayude para imaginar el futuro de la PVTA
Tome la encuesta • Explore el sitio web • Lea el informe
www.valleyonboard.org
PVTA LA&RP Landscape Architecture & Regional Planning

Figure 72: Informational materials including bookmarks, posters, and business cards, in English and Spanish



WHY DON'T YOU RIDE ME?



Take 10 minutes to share why you use the bus, or what would make you ride!

You can help make the future of transportation in the Pioneer Valley work for everyone.

valleyonboard.org



WE RIDE THE PVTA... DO YOU?



Take 10 minutes to share why you use the bus, or what would make you ride!

You can help make the future of transportation in the Pioneer Valley work for everyone.

valleyonboard.org



WHY DRIVE WHEN YOU CAN RIDE?



Take 10 minutes to share why you use the bus, or what would make you ride!

You can help make the future of transportation in the Pioneer Valley work for everyone.

valleyonboard.org



Figure 73: Three advertisements mounted on PVTA buses

G. Events

This appendix contains an inventory of all events coordinated or attended by Valley On Board, as well as details about the type of activities deployed, the types of attendees, and any notable takeaways.

Rider Forums and Paratransit Forums - PVRTA Coordinated (1-2 hours)

Valley On Board attended and collected public feedback at in-person rider forums at the Holyoke Transit Center, Union Station in Springfield, and Academy of Music in Northampton, as well as multiple virtual Paratransit forums. Valuable commentary was collected through conversations with many riders and non-riders at the in-person forums, but low attendance led to a lack of public commentary during the virtual meetings. Despite low attendance in this instance, the PVRTA should continue to hold virtual events to reach a wider audience, especially those with low mobility who are often excluded from this sort of event.

Stakeholder Meetings (30 minutes to an hour)

Planner Round Table | October 12th, 2022

The first stakeholder meeting engaged planners from Chicopee (1), Holyoke (4), and Hadley (1). Questions posed in the meeting included “how could the PVRTA improve services in your town”, “how has the PVRTA supported your community”, and “how easily are you able to communicate with the PVRTA”? This meeting provided a valuable opportunity to understand the intricacies of how town planners communicate with the PVRTA, as well as specific community priorities for public transportation.

Education Administration | October 31st, 2022

Valley on Board spoke with West Springfield High School principal Patrick Danby to assess how the PVRTA can best serve the Town of West Springfield as a whole, as well as young riders in the area. He expressed interest in extended service hours, free service for homeless families, adding a stop at the school, and routes to community colleges for continued educational opportunities.

Education Administration Panel | November 1st, 2022

This event was attended by representatives of Chicopee High School, Palmer High School, Hadley Public Schools, and Northampton Public Schools. Attendees expressed a desire for better public transportation options to internship opportunities, jobs, and community colleges in the area. This included improving transportation for students who are dual-enrolled at a high school and a local community college like Holyoke Community College (HCC) or Greenfield Community College (GCC). Most students currently enrolled in the program have access to a personal or family vehicle, but this may be due to the state of PVRTA service along these routes. Students spend up to two hours on the bus to get from school to school, and by decreasing these travel times, more students could participate in this program, furthering education attainment.

Community Organization Leadership Roundtable | November 9th, 2022

Though a number of local community organizations were invited to this roundtable discussion, only one representative attended: Kaillean Hubbard of All Out Adventures. All Out Adventures is an outdoor recreational organization for people with disabilities. The organization has several members who regularly use the PVRTA Paratransit. Kaillean suggested expanding paratransit access to more remote rural locations, improving the reliability and flexibility of the paratransit services, and improving standard route accessibility for all users of the PVRTA.

Amherst Transportation Advisory Committee Meeting | November 17th, 2022

The Transportation Advisory Committee (TAC) invited Valley On Board to speak at their November meeting in an effort to gain context for the PVRTA’s goals, receive an update about the work that has already been done, provide their feedback on the project, and create a more direct line of contact with the PVRTA. The committee has available grant funding to spend on bus shelter and stop improvements, and they will be looking to the PVRTA for guidance on where the money would be best allocated.

Youth Events (1 - 1.5 hours)

A standard youth workshop consisted of a brief presentation on Valley On Board; time to complete the participatory mapping activity in small groups, including sharing designs with the full class; and time to complete the survey at the end of the period. Several members of Valley On Board were present at every workshop to relay instructions, answer questions, and provide general help. When time allowed, polling and conversation cards were also implemented.

Full instructions for the participatory mapping activity can be found in [Appendix E](#).

Hadley Public School | October 24th, 2022

These workshops were run for three classes of Sophomores at Hopkins Academy during their civics course, and followed the standard format described above. The students were engaged and thoughtful throughout the entire process, and their responses offered valuable insight into the travel and destination preferences of Valley youths. A copy of the conversation card deck was shared with the teacher for use in a future class.

Springfield Honors Academy Visit | October 28th, 2022

Springfield Honors Academy students came to UMass to get a tour of campus and the Design Building. After the tour, Valley On Board representatives spoke to the students about the Regional Planning program, and the individual paths in higher education. The class was then split into groups and given a chance to explore components of the engagement toolbox. Finally, the representatives worked in small groups with students to find resources for their class's final research paper.

UMass Undergraduate Class | November 1st, 2022

This workshop took place in a 100-level Sustainable Community Development class at UMass Amherst, and followed the standard format described above. Due to the large class size and long meeting time, the Valley On Board team chose to run the polling activity and conversation cards alongside the mapping activity. Students had already completed the survey as homework for a prior class meeting. All in all, the students were very engaged and able to complete all of the tool box items provided.

UMass Envirothon | November 10th, 2022

This event was attended by Central Mass Technical High School students. The students toured the campus, before meeting with members of the Landscape Architecture and Regional Planning program, which included several members of Valley On Board. After a Q&A session, the students played the Transportation Conversation Card deck. However, because the students were not local, certain questions in the deck were confusing. The students were very engaged and hopefully a bit more interested in public transportation by the time they left.

Holyoke High School | November 14th, 2022

These workshops were run for four classes at Holyoke High School: two marketing classes and two US history classes. The US history students were more involved and engaged with the overall mapping process but both classes were able to create very creative route maps. Due to shorter class times, the opening presentation about Valley On Board was omitted from this set of workshops, but the rest of the workshop followed the standard format described above.

Tabling Events (1-6 hours)

Amherst Survival Center | October 13th, 20th, 27th 2022

Valley On Board tabled at the Amherst Survival Center three times over three weeks, each time for about two hours during the food pantry pick-up time. The Survival Center was targeted to solicit feedback from low-income community members—a priority group in the redesign process. There is a bus stop in front of the center which facilitated conversation with riders and non-riders alike. Survey links and informational materials were distributed, and verbal feedback was collected.

Northampton Cycling Club Meeting | October 20th, 2022

Several Valley On Board members attended a Northampton Cycling club weekly meeting to discuss the project and hand out informational materials. Bikers are an important community to engage, as biking is a major transportation mode connecting bus stops to a rider's final destination.

Cranberry Fair | October 22nd, 2022

The Cranberry Fair is an annual community event in Amherst Center, including a second-hand sale organized as a fundraiser for the First Congregational Church. During the event, a wide age range of people were engaged, from college students to senior citizens. Visitors to the table were encouraged to try the polling activity, and informational materials were available to be handed out.

Florence Farmers Market | October 26th, 2022

The Florence Farmers Market is a moderately-well attended weekly market. Visitors to the table were given informational materials and encouraged to play through the Transportation Conversation Card deck. As this was the only event in Florence, the feedback gathered at this event was very valuable.

Chicopee Spooktacular | October 27th, 2022

The Chicopee Spooktacular was a Halloween costume parade where local kids received candy from local organizations and businesses. Attendees ranged from infants to parents to grandparents. Kids were engaged with a simplified polling activity and given candy and an informational bookmark after voting. Adults were simply given an informational bookmark.

Agawam Senior Center | November 4th, 2022

Valley On Board visited Agawam Senior Center during their Early Voting program, handing out informational materials and deploying the polling activity. In addition to gaining valuable insight to the PVTA's role in Agawam and the senior center's own transit system, the director of the senior center expressed an interest in working with the PVTA on future initiatives in Agawam.

Springfield Farmers Market | November 5th, 2022

Hosted in Forest Park, the Springfield Farmers Market was a mild success. Although shopper attendance was good, few people engaged with the polling activity and informational materials at the table. Team members in attendance maximized their time at the event by handing out materials to and soliciting feedback from other vendors, who were much more engaged.

Forbes Library | November 7th, 2022

The plan for the Forbes Library event was to give a presentation on the project, distribute marketing materials, and converse with participants. Unfortunately, attendance was low and in response, Valley On Board passed out bookmarks at the front entrance. The visitors of the Forbes Library during this time tended to be mainly seniors.

Westfield Food Pantry | November 22nd, 2022

Valley On Board joined the Westfield Food Pantry at their annual distribution of Thanksgiving meals. Despite lower-than-expected attendance, a number of in-depth conversations were had. In addition to standard informational materials and the polling activity, Valley On Board served cookies with PVTA stickers as a dessert option for those receiving meals or walking by. At the end of the event, extra cookies were donated to the food pantry to be distributed alongside the informational bookmarks.

Holyoke Mall | December 3rd, 2022

Valley On Board tabled at the Holyoke Mall on a Saturday morning during the Christmas season. The table was set up at the entrance closest to the mall's bus stop, allowing for engagement of a large number of riders. Despite being disallowed from engaging shoppers directly, the selection of informational materials and large polling board drew in plenty of participants.

Material Drop Off (driving time varies depending on location)

Sometimes, due to conflicting schedules and the abbreviated timeline of this project, a full event could not be organized. In these cases, materials were delivered to interested parties for further distribution.

Ware and Belchertown Public Libraries | November 4th, 2022

Ware and Belchertown Public Libraries were given bookmarks and flyers for distribution in these more remote locations of the PVTA service area.

Easthampton High School | November 4th, 2022

Easthampton High School expressed interest in hosting a youth workshop, but were unable due to schedule conflicts. In lieu of a full workshop, Valley On Board delivered several decks of Transportation Conversation Cards, physical score cards, and bookmarks to the school. The cards were retrieved at a later date for reuse, and to analyze the completed score cards.

Springfield Public Library | November 14th, 2022

Valley On Board worked with Elizabeth Mckinstry at the Central Springfield Public Library to deliver bookmarks, which were then distributed to all nine branches of the library.

H. Engagement Data Analysis

Quantitative Data

The quantitative data is derived from the four exercises: Survey, Mapping Polling, and Transportation Conversation Cards. The activities listed above look to receive feedback on some or all of the priorities determined from the polling activity. The data show that Express, Rural Service, Extending Evening Hours, and Increased Frequency were consistent categories throughout engagement.

The priority hierarchy was determined by making all of the data available in the same format to be able to compare, contrast, and determine the top priorities of respondents.

The survey looked at 5/10 of the priorities: express, rural, evening, increased frequency, and amenities. The survey asked respondents to rank the four priority categories from very important, somewhat important, not very important, and not at all important. To make this activity comparable to the other 3, the data gathered from this activity multiplied the categories of importance by the priority rank. For example, $(105*4)+(76*3)+(18*2)+(4*1) = 688$ which was then divided by 13.64 to get 50.4 which is the calculated final number of respondents who said express service is very important. This calculation repeated for the other 3 categories of importance.

The mapping activity looked at 3/10 of the priorities: express, rural, and amenities. Although there were 10 priorities mapping only looked at express and rural so the responses were broken down into these two groups but the other responses count as 0. To calculate the total responses the number of respondents who said rural (48) was multiplied by the priority number 4 and this continued for the rest of the priorities. For example, express service $(48*4)+(0*3)+(0*2)+(0*1) = 192$; rural service $(66*4)+(0*3)+(0*2)+(0*1) = 264$. After calculating these numbers 192 and 264 would both be divided by 4 and 2 because there are four priorities and two of them are not reported. Example. $192/4/2=24$; $264/4/2=33$ and these are the final calculated numbers of respondents who said express and rural service respectively.

The conversation cards activity looked at 6/10 of the priorities: express, rural, evening, increased frequency, fare-free, and consistent scheduling. Each priority represented a different color: orange = express, teal = rural, purple = evening, and red = increased frequency. To calculate the total number of respondents who chose the purple card, which represents evening (207) was multiplied by the priority number 4 and this continued through the rest of the priorities. For example, rural service $(156*4) + (0*3) + (0*2) + (0*1) = 624$ which was then normalized. The normalization process took the total number of activity points (1988) and divided it by activity respondents (43) equalling 43.2326. The total points for each priority were then divided by this normalized rate. To normalize rural service, the total points (624) was divided by 43.2326, resulting in 13.5. This process then continued through the other 3 priorities.

The polling activity looked at 9/10 of the priorities: express, rural, first/last mile, evening, increased frequency, fare-free, consistent scheduling, priority infrastructure, driver recruitment, and electrification. This activity follows the same computation process as the conversation cards. The only difference is that the priorities are not represented by different colors, but with a clear label displaying the priority. To reiterate, the total number of respondents who chose express (720) was multiplied by priority number 4 and continues through the rest of the priorities. For example, express $(720*4) + (0*3) + (0*2) + (0*1) = 2880$ which was then normalized. Rural service total points (2880) was divided by the normalized rate (224), resulting in 12.9. This process was repeated through the other 3 priorities.

After looking at the normalized numbers for each activity the priorities ranked are rural service, express service, evening service, and increased frequency and seen in the table below.

	Mapping	Survey	Polling	Conv. Cards
Express	✓	✓	✓	✓
Rural Service	✓	✓	✓	✓
First/Last Mile			✓	
Evening		✓	✓	✓
Increased Frequency		✓	✓	✓
Fare-Free			✓	✓
Consistent Sched.			✓	✓
Priority Infrastructure			✓	
Driver Recruitment			✓	
Electrification			✓	
Amenities	✓	✓		

Figure 74: Bus Route Improvement Priority

Qualitative Data

Qualitative data primarily came from two sources: 1) General comment cards from PVRTA Rider Forums, and 2) Free-response questions on the survey. 194 comment cards and 658 total survey responses were analyzed.

A qualitative text analysis approach was adopted to process the responses and extract key takeaways. NVivo, a qualitative data analysis software designed for researchers, was the main tool used. After importing the text into NVivo, the Valley on Board team developed a series of codes to categorize and tag responses based on their content. Codes in NVivo are short summary words or phrases used to transform longer text responses to a shorter, more quantitative form. These codes sometimes also had sub-codes (which NVivo refers to as “descendant codes”) which further specify the type of request or complaint made in each comment. NVivo can report the total number of references to any given code, as well as the number of references to a code that occur with references to another code (co-occurrences). To take advantage of this co-occurrence analysis tool, codes were created for locations (usually towns) and routes mentioned, as well as more specific priorities like Consistent Scheduling and Higher Frequency.

Category	Total References
Accessibility Total	56
Bus pricing Total	29
Cleanliness Total	7
Comfort Total	5
Consistent Scheduling Total	45
Drivers Total	19
Expand service hours Total	91
Expand Service to rural areas Total	6
Express routes Total	24
Flex/Flag Stops Total	3
Higher frequency Total	94
Improve amenities Total	354
More Destinations Total	194
Multimodal Connectivity Total	15
Paratransit Total	29
Reduce Transfers Total	19
Routes Total	160
Sustainability Total	13
Grand Total	1294

Figure 75: Type of Bus Route Improvement and Total Referenced

Figure 45 shows the total number of responses (aggregating descendant code references) linked to each top-level code category. Improved Amenities and More Destinations were the most referenced categories overall, likely because the survey included questions specifically asking about what amenities should be improved in the PVRTA system, as well as destinations that participants currently could not access via the system.

Bus shelters were by far the most requested amenity improvement, with 104 total requests. Of those 104 requests for bus shelters, 8 co-occurred with references to Amherst, and 7 co-occurred with references to Route 9 in Hadley. 78 references had no location co-occurrence.

Expanded Service Hours (service outside current operating hours, at night, early mornings, etc) was referenced 91 times, including 5 co-occurrences each with Easthampton and Holyoke, and 7 co-occurrences with the 34 bus (which recently experienced service cuts). The most requested areas for additional service (More Destinations) were Amherst, Florence, Northampton, Springfield, and Greenfield (see More Destinations Table). The full codebook, with codes, number of references in the data, and code definitions, is displayed on the following page.

The PVRTA will be given full access to these NVivo files to continue exploration and analysis of this rich dataset beyond the Valley On Board project.

Name	Description	References
Accessibility	Feedback based on physical accessibility of buses or facilities	5
Accessible Buses	References to improving accessibility on buses, for those with mobility impairments, children, etc.	14
COVID	Comments relating to accessibility of buses to immunocompromised/elderly individuals because of COVID-19	6
Pedestrian Infrastructure	Requests for better pedestrian infrastructure near bus stops (like crosswalks or sidewalks)	18
Safety	Comments relating to safety concerns on the bus	13
Bus pricing	Comments about pricing of the bus	4
Fare payment system	Comments about the fare payment system(s) on the PVTA, requests for reloadable fare cards, passes, etc.	14
Fare-free service	Request for free bus or transit service	11
Cleanliness	Complaints about cleanliness of buses/stops	7
Comfort	Comments about riding the bus being uncomfortable (temperature, motion sickness)	5
Consistent Scheduling	Comments relating to delays, early departures, and other deviations from published schedules	45
Drivers	Comments relating to driver recruitment, attitude, compensation	19
Expand service hours	Late night service, weekend service, more service during off-seasons (school vacation), early morning service, restoration of service cuts	91
Expand Service to rural areas	Service to rural areas: Belchertown, Granby, Hampden, Leverett, Palmer, Pelham, Sunderland, Ware, Williamsburg,	6
Express routes		21
Bus Priority Infrastructure	Comments requesting bus lanes, signal priority or other bus priority infrastructure	3
Flex~Flag Stops	Requests for flexible-service routes or stops, or flag stops	3
Higher frequency	Buses come more frequently	60
Bus Crowding	Comments about buses being overcrowded	28
Fleet Diversification	Comments suggesting smaller/different vehicles for some routes	6
Improve amenities	safety and accesibility	2
Aesthetics	Comments about making buses more visually appealing, or adding art to buses/bus stops	5

Table 5: Full NVivo codebook showing parent and child codes, code descriptions, and number of references.

Name	Description	References
Bike Racks	Requests for bike racks near bus stops or on buses	10
bus shelters	Requests for more bus shelters, without a specific location given	104
<i>Heated Shelters</i>	<i>Request for heated or climate-controlled shelters</i>	13
Charging Ports	Comments about USB- or other charging ports for passengers on buses/at stops	6
Emergency Call Boxes	Request for installation of emergency call boxes at bus stops	13
Informational Materials	Schedules, Electronic signs with arrival times, maps, or other informational materials about the PVTA at stops	19
<i>Real-time information</i>	<i>Requests for real-time bus information, screens showing when buses will arrive/where buses are</i>	26
<i>Transit App</i>	<i>Comments about the Transit app</i>	16
Lamps~Lighting	Request for improved lighting/streetlamps at bus stops	61
Seating	Request for added seating/benches at bus stops	35
Shade	Requests for better shade in the summertime	1
Signage	Requests for more signage/visibility at bus stops	20
Snow Removal	Comments about removal of snow near bus stops	11
Trash cans	Requests for trash cans near bus stops	5
Wifi	Comments about Wifi on buses/at stops	7
Locations	Category Node for Location nodes	0
Agawam	Comments referencing Agawam	4
Amherst	Comments about PVTA in Amherst	34
Belchertown	Comments referencing Belchertown	4
Chicopee	Comments referencing Chicopee	2
Easthampton	Comments relating to PVTA service in Easthampton	7
Hadley	Comments about service in Hadley	2
<i>Route 9</i>	<i>Comments referencing Route 9 in Hadley</i>	17
Holyoke	Comments referencing Holyoke	8
Northampton	Comments relating to service in Northampton	18
South Hadley	Comments referencing South Hadley	1
Springfield	Comments relating to service in Springfield	17
Sunderland	Comments relating to service in Sunderland	4

Name	Description	References
Ware	Comments referencing Ware	3
West Springfield	Comments referencing West Springfield	5
Westfield	Comments referencing Westfield	1
Williamsburg	Comments referencing Williamsburg	4
More Destinations	Category node for requests for more PVTA destinations, and references to more service without a specific location named	20
Agawam	Requests for more/better service in Agawam	3
<i>Six Flags</i>	<i>Comments requesting service to Six Flags New England in Agawam</i>	5
Amherst	Comments requesting more destinations in Amherst	19
Belchertown	Requests for more/better service in Belchertown	3
Chicopee	Comments requesting more destinations in Chicopee	5
Community Colleges	Comments requesting more service to Community Colleges (Holyoke CC, Greenfield CC, etc)	2
East Longmeadow	Requests for more/better service to East Longmeadow	1
Easthampton	Comments requesting more destinations in Easthampton	5
Granby	Comments requesting more destinations in Granby	1
Grocery Stores	Requests for more/better service to grocery stores in the Pioneer Valley	9
Hadley	Comments requesting more service in Hadley	5
Holyoke	Comments requesting more destinations in Holyoke	3
Hospitals/Healthcare	Requests for more/better service to hospitals and other healthcare facilities in the Pioneer Valley	5
<i>Baystate Medical Center</i>	<i>Requests for service to Baystate Medical Center in Springfield</i>	3
Leverett	Comments requesting more destinations in Leverett	4
Longmeadow	Requests for more/better service to Longmeadow	3
Ludlow	Comments requesting more destinations in Ludlow	2
Montague	Comments requesting more destinations in Montague	1
Northampton	Comments requesting more service in Northampton	14
<i>Florence</i>	<i>Comments requesting more stops/better service in Florence, Northampton</i>	17
Outside PV	Destination tags for requests to destinations outside of PVTA service area	2
<i>Boston</i>	<i>Comments requesting service to Boston</i>	2

Name	Description	References
<i>Greenfield</i>	<i>Comments requesting service to Greenfield</i>	11
<i>Hatfield</i>	<i>Comments requesting service in Hatfield</i>	2
<i>Millers Falls</i>	<i>Comments requesting service to Millers Falls</i>	1
<i>Pittsfield</i>	<i>Requests for service to Pittsfield</i>	2
<i>Williamsburg</i>	<i>Request for service to/from Williamsburg in the Berkshires</i>	2
Palmer	Comments requesting service in Palmer	2
Pelham	Comments requesting more service in Pelham	2
Recreation	Requests for service to recreation destinations, state parks, etc.	10
School	Comments requesting service to schools in the Pioneer Valley	1
Shutesbury	Comments requesting service in Shutesbury	4
South Hadley	Comments requesting service in South Hadley	4
Southampton	Requests for service to Southampton	1
Springfield	Comments requesting service in Springfield	13
Sunderland	Comments requesting service in Sunderland	1
West Springfield	Comments requesting more service in West Springfield	1
Westfield	Comments requesting service in Westfield	3
Multimodal Connectivity	Comments requesting better coordination with other travel modes like bikes/Valleybike or trains	11
Bradley Airport	References to better connectivity to Bradley International Airport in Connecticut	4
Paratransit	Route code for comments relating to paratransit service	4
Approval	Comments expressing dissatisfaction with the paratransit approval process	5
Availability	Comments relating to availability of paratransit (number of seats, vehicles, etc)	4
Drivers	Comments related to paratransit drivers	4
Pricing	Comments related to paratransit pricing	4
Scheduling	Comments related to scheduling paratransit pickup/dropoff	8
Reduce Transfers	Comments requesting more direct service or fewer transfers between routes	19
Routes	Category Node for references to PVTA routes	0
30	Comments relating to Route 30 service	3

Name	Description	References
31	Comments relating to Route 31 service	6
33	Comments relating to Route 33 service	5
34	Comments relating to Route 34 service	8
35	Comments about Route 35 service	3
38	Comments referencing route 38	1
39	Comments about the former 39 route between Hampshire and Smith colleges	4
45	Comments relating to Route 45 service	1
B1	Comments relating to Route B1 service	1
B17	Comments relating to Route B17 service	2
B23	Comments about the B23	3
B4	Comments relating to Route B4 service	1
B43	Comments about the B43	16
<i>B43E</i>	<i>Comments relating to Route B43E express service</i>	5
B48	Comments relating to Route B48 service	7
B6	Comments relating to Route B6 service	3
B7	Comments relating to Route B7 service	4
B79	Comments about the B79 bus from Amherst to Worcester	6
FR25	References to Franklin RTA FR25 service	1
G1	Comments relating to Route G1 service	5
G2	Comments relating to Route G2 service	3
<i>G2E</i>	<i>Comments about the G2E express service</i>	2
G3	Comments relating to Route G3 service	1
G5	Comments relating to Route G5 service	1
G73	Comments relating to Route G73 service	8
M40	Comments about the discontinued M40 route	2
NE	Comments related to the Nashawannuck Express in Northampton	2
P20	Comments relating to Route P20 service	3
R10	Comments relating to Route R10 service	6

Name	Description	References
R14	Comments relating to R14 service	3
R21	Comments relating to Route R21 service	4
R23	Comments relating to Route R23 service	1
R29	Comments relating to Route R29 service	6
R41	Comments relating to Route R41 service	8
R42	Comments relating to Route R42 service	6
R44	Comments relating to Route R44 service	7
T3	Comments relating to Route T3 service	1
X90	Comments relating to X90 service	7
X92	Comments relating to Route X92 service	4
Sustainability	Comments about improving PVTA's environmental sustainability	0
Electric Buses	Comments about electrification/electric buses	3
Replace Cars	Comments expressing that bus service should replace car usage/reduce car dependency	10

I. Final Route Breakdown Tables

Standard Redesign

The following table shows new (light green) or significantly updated (no fill) routes in each region of the map. Routes with no change (no fill) have a blank "Updates from Standard" column.

Route	Description	Updates from Current System	Frequency
61	Outer Campus Loop	Allows for faster service to outer campus without traveling down N Pleasant; moves layover to Haigis Mall.	Mon-Fri 6am-12:30am (15min/30min after 7pm); Sat-Sun 8am-7pm (30min)
62	West Campus Loop	Serves west half of campus in opposite direction of 61 to provide bidirectional service with improved headways.	Mon-Fri 6am-7pm (18min); Sat-Sun 8am-7pm (35min)
63	East Campus Loop	Serves east half of campus in opposite direction of 61 to provide bidirectional service with improved headways. Weekends interlined with 62.	Mon-Fri 6am-7pm (18min); Sat-Sun 8am-7pm (35min)
71E	S Hadley to Sunderland via Rt 47	Provides requested service along Route 47 corridor; new connection to Franklin County/Greenfield from Hadley, S Hadley.	Mon-Fri 7am-5pm (90min)
X52	Amherst Crosstown	Improve retail/food access for east Amherst	Mon-Fri 9am-6pm (60min)
B79	Amherst-Worcester Intercity Service	Service added Tue & Wed; weekday mid trip added Belchertown-Spencertown connection w/ 45 & WRTA	Mon-Fri 6:55am-4:10pm (185min); Sat 7am-11am (240min), 11am-5:00pm (360 min); Sun 11am-5:00pm (360min)

Table 6: Amherst, Sunderland, Hadley

Route	Description	Updates from Current System	Frequency
45 T1	Amherst / Belchertown / Palmer	Improved, consistent weekday headway Amherst / Belchertown; new weekend service; new connection to Palmer (rplc WP-P)	Mon-Fri 7:03am-8:03pm (120min); Sat/Sun 10am-7pm (240min)

Table 7: Ware, Palmer, Belchertown

Route	Description	Updates from Current System	Frequency
R41	Northampton / Easthampton / HCC / Holyoke Mall	Decrease weekday headway from 60min to 45min	Mon-Fri 7am-8:00pm (45min); Sat 8:45am-7:00pm (62min)
B43	Northampton / Hadley / Amherst	More resources shifted to B43E, weekday local headway decreased from 20min to 45min; alternate local trips replaced by 31, 33, G73E	Mon-Fri 6:30am-11:30pm (45min); Sat 6am-1:45am (60min); Sun 8am-11pm (60min)
B43E	Northampton / Hadley / Amherst Express	Increase weekday headway from 3x/day to 30min at peak, 60min off-peak	Mon-Fri 7:30am-5:45pm (30-60min variable); Sat 10am-6pm (60min)
G73E	Springfield-Northampton-Hampshire Mall Express	Revise service pattern to uniform 45min frequency; extend to Hampshire Mall for connection to 31, 33	Mon-Sat 7:15am-8:30pm (45min)
R44	Northampton Circulator	Realigned to single service pattern; one-way loop service maintained with headway decreased from 60min to 30min	Mon-Fri 5:45am-9pm (30min); Sat-Sun 8am-10pm (60min)

Table 8: Northampton, Williamsburg, Easthampton

Route	Description	Updates from Current System	Frequency
98	Holyoke/ Fairview/ Aldenville	More service for Fairview, Aldenville, and South Hadley Falls	Mon-Fri 8am-7:30pm (60 min); Sat-Sun 9am-4pm (60min)
B23	Holyoke / Westfield via Holyoke Mall, HCC	Decrease headway from 60min to 30min; expand to service Holyoke Mall to facilitate connection to G73E	Mon-Fri 6:30am-6:30pm (30min), 6:30pm-8:30pm (60min); Sat-Sun 9am-6pm (60min)
R24	HTC / Holyoke Hospital / Ingleside Loop	Realign to focus on Ingleside, Downtown, Holyoke Hospital as circulator; decrease headway 60min -> 30min; on-demand service to Providence Behavioral Hospital	Mon-Fri 8:45am-7:30pm (30min); Sat 9am-4pm (30min)
R57A	Holyoke / Amherst via S Hadley	Replace R29, 38; maintain 38 headway & decrease R29 headway 120min -> 30min; reduce redundancy	Mon-Fri 7am-7pm (30min), 7pm-10pm (90min); Sat 7:30am-8:30pm (90min); Sun 7:30am-7:30pm (90min)
P11	Holyoke Community College Express		Mon-Fri 7:30am-4:30pm (30min)

Table 9: Holyoke, South Hadley, Chicopee

Route	Description	Updates from Current System	Frequency
P21E	Holyoke / Springfield Express via I-391	Decrease weekday headway from 60min to 22min; weekend headway from 60min to 45min	Mon-Fri 6:00am - 8pm (22min), 8pm-10pm (45min); Sat 8:00am-9:00pm (45min); Sun 9:00am-9:00pm (45min)
G5	Dickinson-Jewish Home / Longmeadow	Elimination of Enfield service pattern, replaced by B61E; Saturday headway decrease from 90min to 60min	Mon-Fri 6:00am-11:15am (47min), 11:15am-5:30pm (59 min), 5:30pm-9:00pm (38 min); Sat 8:00am-7:30pm (60 min); Sun 9am-4pm (60min)
X90	Inner Crosstown	Minor Changes; Reduction of deviations now serviced by #98	Mon-Fri 6:15am-7:30pm (20min), 7:30pm-9:15pm (40 min); Sat 7:00am-6:15pm (20 min), 6:15pm-8:45pm (52 min); Sun 9:00am-8:00pm (59 min)

Table 10: Springfield (West of Union Station), West Springfield, East Longmeadow, Agawam, Westfield

Route	Description	Updates from Current System	Frequency
B6 T1	Ludlow via Bay St	Realign bidirectional service along Berkshire Ave; turn at State St i/o Center	Mon-Fri 5:15am - 9:30pm (30min); Sat 7am-8pm (30min); Sun 8:30am-7pm (35min)
B7E	Eastfield Mall / Springfield Union Station	Cut travel time to Eastfield Mall in half (peak hours express)	Mon-Fri 7am - 9am; 3pm - 5pm (45min)
X92	Mid City Crosstown	Decrease headways from 45min to 40min; coordinate with revised B6	Mon-Fri 6am-8pm (40min); Sat 5:45am-10pm (45min)
B61E	Enfield Express	Replace G5 pattern to Enfield; improve travel time & coordinate with CTTransit	Mon-Fri 6am - 9am; 3pm - 6pm (30min)
B7	Eastfield Mall via State St / Boston Rd	Add new service pattern to Palmer (2-4x/day); minor realignments; decrease headway from 20min to 15min	Mon-Fri 5am - 10:30pm (20min); Sat 5am - 8:45pm (20min); Sun 9am - 6:30pm (30min). Ware service: Mon-Fri 7am - 7pm (240min)
B17	Eastfield Mall via Worthington St / Wilbraham Rd	Decrease headways from 45min to 40min; coordinate with new G13	Mon-Fri 6am-8pm (40min); Sat 7am-5:30pm (40min)
G13	Sixteen Acres via "The X" & Sumner Ave	New service along Sumner Ave, improve connectivity for WNE & S/E Springfield	Mon-Fri 6am - 9pm (50min); Sat 8am - 7pm (50min)
G2	Carew-East Springfield / Belmont-Dwight Rd	Minor service pattern changes	Mon-Fri 5am-9:45pm (15min); Sat 6am-9pm (15min); Sun 9am-6:30pm (25min)
G3	Spfld Plaza via Liberty / King-Westford	Minor weekday headway improvements	Mon-Fri 5:45am-7pm (15min); Sat 7am-6:30pm (15min); Sun 9am-5:15pm (25min)

Table 11: Springfield (East of Union Station), Ludlow, Indian Orchard, Enfield, East Springfield, Eastfield

Dream Redesign

The following table shows new from standard redesign (dark green), updated from standard redesign (light green) or significantly updated currently existing (no fill) routes in each region of the map. Routes with no change (no fill) have a blank "Updates from Standard" column.

Route	Description	Updates from Standard	Frequency
30	North Amherst / Old Belchertown Rd	Increase to 24hrs/day	Mon-Fri 7:15am-7:15pm (8 min), 7:15pm-7:15am (10 min); Sat/Sun 8am-12am (15min); 12am-8am (20 min)
31	S Deerfield / Sunderland / South Amherst via Hampshire Mall	Increase to 24hrs/day	Mon-Fri 7:06-6:30 (15 min), 6:30-8:30 (20 min); Sat/Sun 10:45-7:30 (20 min)
33	Puffers Pond / Hampshire Mall	Increase frequency	Mon-Fri 7:06-10:30 (15 min); Sat/Sun 10am-10pm (20 min)
61	Outer Campus Loop	Increase to 24/hrs day	Mon- Fri 6am-10pm (10min), 10pm-6am (15min); Sat/Sun 8am-10pm (15min), 10pm-8am (20 min)
62	W Campus Loop	Increase frequency	Mon-Fri 6am-9am (10min), 9am-7pm (15min); Sat/Sun 8am-10pm (15min)
63	E Campus Loop	Increase frequency	Mon-Fri 6am-9am (10min), 9am-7pm (15min); Sat/Sun 8am-10pm (15min)
71E	S Hadley to Sunderland via Rt 47	Increase frequency	Mon-Fri 6am-8pm (15min); Sat/ Sun 8am-10pm (30min)
X52	Amherst Crosstown	Increase connectivity	Mon-Fri 6:15am-7:30pm (8min), 7:30pm-9:15pm (20 min); Sat/ Sun 7am-8:45pm (20 min)
B79	Amherst-Worcester Intercity Service	Increase frequency	Mon-Sun 7am- 10pm (60 min)

Table 12: Amherst, Sunderland, Hadley

Route	Description	Updates from Standard	Frequency
45 T1	Amherst / Belchertown / Palmer		Mon-Fri 7am-7pm (15 min); Sat/ Sun 10am-7pm (15min)

Table 13: Ware, Palmer, Belchertown

Route	Description	Updates from Standard	Frequency
R41	Northampton / Easthampton / HCC / Holyoke Mall	Increase frequency	Mon-Fri 7:00am-9:00pm (15 min); Sat 8:45am-9:00pm (15 min); Sun 8:00am-9:00pm (15 min)
B43	Northampton / Hadley / Amherst	Increase frequency	Mon-Fri 6:30am-10:00pm (8 min); Sat 6:00am-1:45am (8 min); Sun 8:00am-9:30pm (8 min)
B43E	Northampton / Hadley / Amherst Express	Increase frequency	Mon-Fri 7:00am-10:00pm (20 min); Sat 9:00am-1:00am (30 min); Sun 9:00am-7:00pm (30 min)
G73E	Springfield-Northampton-Hampshire Mall Express	Increase frequency	Mon-Fri 7:15am-11:30pm (15 min); Sat 7:15am-6:00pm (15 min) 6:30pm-1:30am (30 min); Sun 8:00am-8:00pm (30 min)
R44	Northampton Circulator	Increase frequency	Mon-Fri 5:45am-7:15pm (15 min); Sat 8am-1:30am (30 min); Sun 8am-7:00pm
B48	Northampton / Holyoke via Route 5	Increase frequency	Mon-Fri 7:30am-9:00pm (15 min); Sat 9:30am-1:30am (20 min); Sun 9:30am-6:30pm (20 min)
R42	Northampton/ Williamsburg	Increase frequency	Mon-Fri 5:45am-8:00pm (15 min); Sat 7:00am-1:30am (20 min); Sun 9:00am-6:30pm (30 min)
Pittsfield Connector	Northampton/ Pittsfield	New Route from Northampton to Pittsfield	Mon-Fri 10:00am-7:00pm (2 hr); Sat 9:00am-6pm (2 hr); Sun 9:00am-4:00pm (2 hr)
R97E	Springfield / Lee via I-90	New Route from Springfield to Lee	Mon-Fri 6:30am-4:30pm (60 min); Sat 8:30am-3:30pm (60 min); Sun 8:30am-3:30pm (60 min)

Table 14: Northampton, Williamsburg, Easthampton

Route	Description	Updates from Standard	Frequency
G1	Chicopee / Sumner-Allen-Canon Circle		
98	Holyoke/Fairview/Aldenville	More service for Fairview, Aldenville, and South Hadley Falls	Mon-Fri 6am-7pm (15min); Sat/Sun 8am-7pm (15min)
B23	Holyoke / Westfield via Holyoke Mall, HCC	Decrease headway 60min -> 15min; expand service to Holyoke Mall to facilitate connection to G73E	Mon-Fri, Sat 6:30am-6:30pm (15min); Sun 7am-7pm (15min)
R10	Westfield / WSU / West Springfield via Route 20	Decrease headways across time schedule	Mon-Fri 5:30am-7:15am, 7:15am-10:15pm (15min); Sat 8am-9pm (15min); Sun 10am-6:45pm (15min)
R24	HTC / Holyoke Hospital / Ingleside Loop	Decrease headways across time schedule	Mon-Fri 8:45am-4:45pm (15min)
R57A	Holyoke / Amherst via S Hadley	Decrease headways across time schedule	Mon-Fri 7am-7pm (10min); Sat/Sun 7:30am-5:30pm (10min)
P21	Holyoke / Springfield via Chicopee	Decrease headways across time schedule	Mon-Fri 5am-7:30pm (8min), 7:30pm-8:30pm (15min); Sat 8am-7:30pm (15min), 7:30-8:30pm (15min); Sun 8am-5:45pm (15min)
68	Holyoke/Ludlow	Connect Holyoke to Ludlow	Mon-Fri 6am-7pm (15min), 8am-7pm (15min)
97	Fairview/Ludlow Center	Connect Ludlow to Fairview neighborhood	Mon-Fri 6am-7pm (15 min); 8am-7pm (15min)
96	Holyoke/Sunderland	Connect Holyoke to Sunderland	Mon-Fri 6am-7pm (15min), Sat/Sun 8am-7pm (30min)
G5 T1	Chicopee Crosstown	More destinations/ service in Chicopee	Mon-Fri 6am-7pm (15min); Sat/Sun 8am-7pm (15 min)
P22 T1	Holyoke to Springfield	Express Holyoke to Springfield	Mon-Fri 6am-7pm (15min); Sat/Sun 8am-7pm (15min)
G1ns T1	Chicopee to Springfield	Express Chicopee to Springfield	Mon-Fri 6am-7pm (15min); Sat/Sun 8am-7pm (15min)
RE1	Holyoke/Granby/Belchertown	Connect Belchertown to surrounding towns (Holyoke, Granby)	Mon-Fri 9am-6pm (15min); Sat 8am-7pm (15min)
P11	Holyoke Community College Express	No Change	Mon-Fri 7:30am-8:30am (15 min), 9:15am-4:30pm (15 min)

Table 15: Holyoke, South Hadley, Chicopee

Route	Description	Updates from Standard	Frequency
P21E	Holyoke / Springfield Express via I-391	Increased Frequency	Mon-Fri 6:00am-7:00pm (10 min); Sat 8:00am-6:00pm (40 min), Sun 9:00am-5:00pm (40 min)
G5	Dickinson-Jewish Home / Longmeadow	Increased frequency, Sunday service	Mon-Fri 6:00am-9:30pm (15 min); Sat 8:00am-8:30pm (15 min); Sun 9:00am-7:00pm (30 min)
X90	Inner Crosstown	Increased frequency	Mon-Fri 6:15am-7:30pm (8 min), 7:30pm-9:15pm (20 min); Sat 7:00 am-6:15pm (20 min), 6:15pm-8:45pm (52 min); Sun 9:00am-5pm (59 min)
B12	Stonybrook Express	Increased frequency, Consistent schedule	Mon-Sat 10:00am-6:00pm (60 min)
R14	Feeding Hills / Springfield		Mon-Fri 6:45am-9pm (10min); Sat/Sun 7:45am-5:45pm (10min)
P20	Holyoke / Springfield via Holyoke Mall / Riverdale St		Mon-Fri 5:30am-8:30pm (12 min), 9:00pm-11:00pm (29 min); Sat 6:00am-8:45 pm (10 min), 8:45pm-9:15pm (35 min); Sun 9:00am-7:00pm (16 min)
WSU	WSU Campus Shuttle		Mon-Fri 6:45pm-5:15pm (10min)

Table 16: Springfield (West of Union Station), West Springfield, East Longmeadow, Agawam, Westfield

Route	Description	Updates from Standard	Frequency
B6 T1	Ludlow via Bay St	Increase frequency; consistent scheduling	Mon-Fri 5:15am-7:30pm (8min); 8pm-11:30pm (15min); Sat-Sun 7am-10pm (15min)
B7E	Eastfield Mall / Springfield Union Station	Increase frequency	Mon-Fri 5am-10pm (15min); Sat-Sun 7am-7pm (15min)
B12	Stonybrook Express	Increase frequency	Mon-Sat 10am-6pm (60min)
X92	Mid City Crosstown	Increase frequency	Mon-Sun 5am-10pm (15am)
B61E	Enfield Express	Increase frequency	Mon-Sun 6am-10pm (30min)
B7	Eastfield Mall via State St / Boston Rd	Increase frequency	Mon-Sun 5am-10:30pm (15min)
B17	Eastfield Mall via Worthington St / Wilbraham Rd	Increase frequency	Mon-Sun 6am-8pm (15min)
G13	Sixteen Acres via "The X" & Sumner Ave	Increase frequency	Mon-Sun 6am-7pm (15min)
G2	Carew-East Springfield / Belmont-Dwight Rd	Increase frequency	Mon-Sun 5am-10pm (8min)
G3	Spfld Plaza via Liberty / King-Westford	Increase frequency	Mon-Sun 5am-10pm (15min)
X17 T1	E Springfield/Ludlow Crosstown	Provide greater connectivity to Ludlow/Eastfield Mall	Mon-Sun 6am-9pm (15min)

Table 17: Springfield (East of Union Station), Ludlow, Indian Orchard, Enfield, East Springfield, Eastfield

Maria Job Accessibility

Corridor	Population along corridor	% non-white residents	Median income	Job access, Base	Job access, Standard Redesign	% Change, Base to Standard	Job access, Dream Redesign	% Change, Standard to Dream
Amherst	4,300	40%	\$56,906	18,149	18,728	3%	20,507	9%
Belchertown	1,000	21%	\$94,812	2,058	2,075	1%	13,448	548%
Easthampton	3,400	16%	\$63,657	3,208	3,211	0%	7,714	140%
Hadley		24%	\$86,690	2,336	2,290	-2%	18,614	713%
Holyoke	5,000	89%	\$42,537	7,815	7,945	2%	11,636	46%
Palmer	1,400	17%	\$68,694	2,580	2,589	0%	2,806	8%
Springfield - Sumner Ave	11,500	66%	\$41,571	16,249	17,499	7%	22,624	29%
Springfield - Main St	10,500	87%	\$41,571	51,026	53,935	5%	54,118	0%
Springfield - State St	13,500	87%	\$41,571	26,660	30,099	11%	34,734	15%
South Amherst	800	51%	\$56,906	20,117	20,719	3%	18,438	-11%
Sunderland	600	27%	\$54,524	690	936	26%	719	-23%
Westfield	6,900	21%	\$74,456	794	1,023	22%	1,042	2%

Table 18: Demographics and job accessibility numbers and changes for base route, standard redesign, and dream redesign



J. General Improvements

During the time spent gathering feedback, participants also provided comments not directly related to the specific questions asked. Some popular general improvement suggestions received were: train the drivers to be kinder and more tolerant, add amenities to the bus and bus stops, have the bus run on time so connections would not be missed, create a reminder system so drivers do not forget and skip bus stops, clean the busses more frequently in the winters, and make the bus free.

Another general improvement strategy for the PVTA would be to retain current drivers by boosting job satisfaction. The PVTA could benefit from this as their current operators leaving would have the largest impact on bus service. In addition to slowing down the loss by resignations of their current drivers, this approach could also attract new ones. A 2014 survey from a consultant group in Boston accumulated over 200,000 responses from people all over the world and determined the top three factors of employee happiness. The most important aspect of job satisfaction was “appreciation of work”, followed by “good relationships with colleagues”, and “work-life balance” (Morgan, 2014).

The PVTA could improve these areas of employee experience in a number of ways. First, by offering a driver of the month award that comes with a parking spot at the front of the building, or implementing salary pay tiers which one can rise on by working more hours. A very popular method to improve and foster better work relationships is to host company sponsored outings where people can bring their family and friends. Their outside-of-work friendship can carry over to the professional side, and foster a sense of community at work. To improve work-life balance, PVTA can consider giving drivers more paid time off, longer parental leave, shorter shifts, or more schedule flexibility. Evidence suggests giving employees more of a choice in their work-life balance will keep them happier and on the job longer (Morgan 2014). While other improvements may be of benefit, increasing driver satisfaction to improve retention and recruitment should be a priority and would improve the overall quality and breadth of service.

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L. Bibliography

- Audrey Ku, Daniel Kammen, and Sergio Castellanos. 2021. "A Quantitative, Equitable Framework for Urban Transportation Electrification: Oakland, California as a Mobility Model of Climate Justice." *Sustainable Cities and Society* 74 (November): 103179. <https://doi.org/10.1016/j.scs.2021.103179>.
- "Bayview Community-Based Transportation Plan." 2020. San Francisco County Transportation Authority. https://drive.google.com/file/d/10YTAAjpQRZGeCZE4mttF-nBWTt02i0eq/view?usp=sharing&usp=embed_facebook.
- Boisjoly, G., & Yengoh, G. T. (2017, August 2). Opening the door to social equity: Local and participatory approaches to transportation planning in Montreal - european transport research review. SpringerOpen. Retrieved November 16, 2022, from <https://etr.springeropen.com/articles/10.1007/s12544-017-0258-4>
- DB, W. (2013, April 26). Vulnerable populations in healthcare. *Current opinion in anaesthesiology*. Retrieved November 13, 2022, <https://pubmed.ncbi.nlm.nih.gov/23385323/#:~:text=Vulnerable%20populations%20include%20patients%20who,exacerbated%20by%20unnecessarily%20inadequate%20healthcare.rom>
- Dickens, Matthew, and David Kahana. 2022. "Transit Ridership Update." APTA. <https://www.apta.com/wp-content/uploads/APTA-POLICY-BRIEF-Transit-Ridership-09.28.2022.pdf>.
- Eagly, I. V. (2010). UCLA - escholarship. escholarship.org. Retrieved November 13, 2022, from <https://escholarship.org/content/qt1nj1g83c/qt1nj1g83c.pdf>
- Encyclopædia Britannica, inc. (2022). Vulnerable Definition. Encyclopædia Britannica. Retrieved November 13, 2022, from <https://www.britannica.com/dictionary/vulnerable>
- Goodspeed, Robert. 2019. "Scenario Planning: Embracing Uncertainty to Make Better Decisions." Lincoln Institute of Land Policy. <https://www.lincolnst.edu/publications/policy-briefs/scenario-planning>.
- Goedhart, N. S., Pittens, C. A. C. M., Tončinić, S., Zuiderent-Jerak, T., Dedding, C., & Broerse, J. E. W. (2021, September 3). Engaging citizens living in vulnerable circumstances in research: A narrative review using a systematic search - research involvement and engagement. *BioMed Central*. Retrieved November 16, 2022, from <https://researchinvolvement.biomedcentral.com/articles/10.1186/s40900-021-00306-w>
- Hassan, Lobna, and Juho Hamari. 2020. "Gameful Civic Engagement: A Review of the Literature on Gamification of e-Participation." *Government Information Quarterly* 37 (3): 101461. <https://doi.org/10.1016/j.giq.2020.101461>.
- Healthier Community, P. for a, Commission, P. V. P., & Educational Services, C. for. (2016). *Community Health Needs Assessment - Cooley Dickinson Hospital*. [Cooley-Dickinson-2016-communith-health-needs-assessment.pdf](https://www.cooleydickinson.org/wp-content/uploads/2016/09/Cooley-Dickinson-2016-communith-health-needs-assessment.pdf). Retrieved November 19, 2022, from <https://www.cooleydickinson.org/wp-content/uploads/2016/09/Cooley-Dickinson-2016-communith-health-needs-assessment.pdf>
- Healthier Community, P. for a, Commission, P. V. P., & Educational Services, C. for. (2016, November 8). *Community Health Needs Assessment . Community Health Needs Assessment 2016*. Retrieved November 19, 2022, from https://www.publichealthwm.org/application/files/8415/1568/7144/BMC_CHNA.pdf
- Heerings, M., Bovenkamp, H. van de, Cardol, M., & Bal, R. (2022, February 18). Ask us! adjusting experience-based codesign to be responsive to people with intellectual disabilities, serious mental illness or older persons receiving support with Independent Living. *Health expectations : an international journal of public participation in health care and health policy*. Retrieved December 12, 2022, from <https://pubmed.ncbi.nlm.nih.gov/35178839/>
- Jolivet, A., Cadot, E., Florence, S., Lesieur, S., Lebas, J., & Chauvin, P. (2012, January 19). Migrant health in French Guiana: Are undocumented immigrants more vulnerable? Retrieved November 13, 2022, from <https://research-portal.najah.edu/migrant/24001/>

- "Information about the High Line Canal & Water Management." n.d. Accessed November 20, 2022. <https://highlinecanal.org/community/>.
- kfrostincog, dir. 2011. Fast Forward Mobile Outreach Highlights. <https://www.youtube.com/watch?v=g7Qr88ocybl>.
- Klumpenhouwer, Willem, Jeff Allen, Rick Liu, Mitchell Robinson, Diego Da Silva, Steven Farber, Alex Karner, et al. 2021. "A Comprehensive Transit Accessibility and Equity Dashboard." Findings, July. <https://doi.org/10.32866/001c.25224>.
- Krupczynski, Joseph, and Pioneer Valley Planning Commission. 2014. "Sustainability + Equity: Engaging Underrepresented Communities on Issues of Sustainability in the Pioneer Valley."
- Lee, Hyojung. 2021. "Are Millennials Leaving Cities? Yes, But Young Adults Are Not | Joint Center for Housing Studies." May 12, 2021. <https://www.jchs.harvard.edu/blog/are-millennials-leaving-cities-yes-young-adults-are-not>.
- Lee, Yongsung, Bumsoo Lee, and Md Tanvir Hossain Shubho. 2019. "Urban Revival by Millennials? Intraurban Net Migration Patterns of Young Adults, 1980–2010." *Journal of Regional Science* 59 (3): 538–66. <https://doi.org/10.1111/jors.12445>.
- Lewis, Carol Abel, Grace Arthur, and Sandra Onyejekwe. 2012. "Reviewing, Analyzing and Updating Marketing Strategies to Increase Public Transit Ridership." SWUTC/12/476660-00050-1. Center for Transportation Training and Research Texas Southern University. <https://static.tti.tamu.edu/swutc.tamu.edu/publications/technicalreports/476660-00050-1.pdf>.
- "MA Climate Change Clearinghouse." n.d. Accessed December 15, 2022. <https://resilientma.mass.gov/data/maps>.
- "Making Planning Public: Newark Zoning Workshop." n.d. American Planning Association. Accessed November 20, 2022. <https://www.planning.org/awards/2015/newarkzoning.htm>.
- Mohl, Bruce. 2019. "T Notes: Bus Shelter Maintenance Pricey." *CommonWealth Magazine* (blog). April 9, 2019. <https://commonwealthmagazine.org/transportation/t-notes-bus-shelter-maintenance-pricey/>.
- Molla, Rani. 2022. "The Year Work Didn't Return to Normal." *Vox*. December 15, 2022. <https://www.vox.com/recode/2022/12/15/23505303/workers-2022-quits-remote-work-unions>.
- Morgan, Jacob. 2014. "The Top 10 Factors For On-The-Job Employee Happiness." *Forbes*. December 15, 2014. <https://www.forbes.com/sites/jacobmorgan/2014/12/15/the-top-10-factors-for-on-the-job-employee-happiness/?sh=3d63802a5afa>.
- Nabatchi, Tina, and Matt Leighninger. 2015. *Public Participation for 21st Century Democracy*. Hoboken, UNITED STATES: John Wiley & Sons, Incorporated. <http://ebookcentral.proquest.com/lib/uma/detail.action?docID=1895541>.
- Nadworny, Elissa. 2022. "Skilled Trade Programs Are Booming after College Enrollment Dropped in the Pandemic." *NPR*, March 20, 2022, sec. Education. <https://www.npr.org/2022/03/20/1087766188/skilled-trade-programs-are-booming-after-college-enrollment-dropped-in-the-pande>.
- Olick, Diana. n.d. "Millennials Are Pouring into These Smaller Cities and Buying Homes." *CNBC*. Accessed December 16, 2022. <https://www.cNBC.com/2019/05/02/millennials-are-pouring-into-these-smaller-cities-and-buying-homes.html>.
- "People's Planning Academy – Plan 2020." n.d. Accessed November 20, 2022. <https://plan2020.com/plans/lu/peoples-planning-academy/>.
- "FY22 Annual Report." n.d. Pioneer Valley Transit Authority. <https://www.pvta.com/documents/annualReports/FY%202022%20Annual%20Report.pdf>.

- Raasubramanian, L. (2015). Engaging vulnerable populations using ... - CUNY academic works. <https://academicworks.cuny.edu>. Retrieved November 11, 2022, from https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1035&context=hc_pubs
- "Statewide Pedestrian Master Plan Hawaii." 2013. Department of Transportation State of Hawaii. https://drive.google.com/file/d/10sONi2LQpqqqGoCVbYxATAUf2drOzMkD/view?usp=sharing&usp=embed_facebook.
- Strong, Southern Nevada. n.d. "Southern Nevada Strong | Comprehensive Regional Plan." Southern Nevada Strong. Accessed November 20, 2022. <https://www.southernnevadastrong.org/>.
- Tomeš, Zdeněk, Hana Fitzová, Vilém Paří, Václav Rederer, Zuzana Kordová, and Marek Kasac. 2022. "Fare Discounts and Free Fares in Long-Distance Public Transport in Central Europe." *Case Studies on Transport Policy* 10 (1): 505–17. <https://doi.org/10.1016/j.cstp.2022.01.011>.
- "Transportation." 2022. Maura Healey for Governor. 2022. <https://maurahealey.com/issues/transportation/>.
- Truong, M. (2022, February 14). Community PARTNERS IR Tory - Massachusetts. COMMUNITY PARTNERS DIRECTORY | Mass.gov <https://www.mass.gov>. Retrieved November 29, 2022, from <https://www.mass.gov/doc/ori-community-providers-directory/download>
- Walker, Jarrett. 2018. "Basics: The Ridership – Coverage Tradeoff." Professional blog of public transit consultant Jarrett Walker. Human Transit (blog). February 26, 2018. <https://humantransit.org/2018/02/basics-the-ridership-coverage-tradeoff.html>.
- Ward, Micah. 2022. "Looking Ahead to 2023: Here's What's in Store for Higher Education." University Business (blog). December 13, 2022. <https://universitybusiness.com/looking-ahead-to-2023-heres-whats-in-store-for-higher-education/>.
- Wilkins, C. H. (2018, October). Home - PMC - NCBI. National Center for Biotechnology Information. Retrieved December 12, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/>

The background consists of two large, overlapping geometric shapes. The top-left portion is a dark red color, while the bottom-right portion is a gold or light brown color. The shapes are angular and create a dynamic, modern composition.

Thank You!