West Station Area Transit Study

June 9th, 2022

MAPC

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Enhanced Multimodal Accessibility Model (EMMA) development: Renaissance Planning Group and the Central Transportation Planning Staff (CTPS)

Acknowledgements

This study was made possible by a generous grant from the Barr Foundation.

MAPC would like to thank the City of Boston; the City of Cambridge; the Town of Brookline; Central Transportation Planning Staff; Massachusetts Department of Transportation; Massachusetts Bay Transportation Authority (MBTA); State Senator William Brownsberger; Boston City Councilor Elizabeth Breadon; the Barr Foundation; 495/MetroWest Partnership; Harvard University; Massachusetts Bicycle Coalition (MassBike); WalkBoston; Livable Streets Alliance; Transit Matters; Allston/Brighton Health Collaborative; Boston University; A Better City; members of the Allston I-90 Multimodal Project Task Force; residents of Allston/Brighton; and others who participated in various project meetings for their input.

About MAPC and this Study

The Metropolitan Area Planning Council (MAPC) is the regional planning agency of the 101 cities and towns of Greater Boston. Our mission is to promote smart growth and regional collaboration.

The Massachusetts Department of Transportation (MassDOT) is planning to replace the Allston Viaduct, part of the Massachusetts Turnpike (I-90), because it is nearing the end of its useful lifespan. This project presents opportunities to rethink traffic patterns in Boston's Allston neighborhood and expand safe, sustainable, enjoyable transportation options for multiple modes. The Allston Multimodal Project will reconstruct I-90, relocate Soldier's Field Road and other streets and pathways, construct a new West Station stop and intermodal facility on the MBTA Worcester Line, and construct a new street network creating a new neighborhood in Allston.

MAPC undertook this study to determine possible future growth and travel demand around West Station, to compare the effectiveness of different transportation policies; and to recommend strategies, services, and infrastructure needed to support sustainable transportation to and through the West Station area. The intent of the study is to both inform the design of the Allston Multimodal Project and West Station, as well as the development that will be enabled by the project. For modeling purposes, MAPC has made assumptions about project elements based on information available at the time. However, unless expressly stated, it should not be assumed that this report expresses MAPC's official position on any of the project elements or issues.

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West Station Area Transit Study Contents

Executive Summary

Introduction

Over the coming decades, a section of Allston will be utterly transformed by massive infrastructure changes and subsequent land development. MassDOT's Allston Multimodal Project includes straightening the Mass Pike (I-90) and bringing it to ground level; redesigning the tangled Allston Interchange; and constructing a new commuter rail station on the MBTA Worcester/Framingham Line. What happens afterwards makes this much more than just a transportation project. Realignment of the highway will unlock 50-plus acres of land and air rights for development. MAPC estimates this area, dubbed "Allston Landing," has potential for over 11 million square feet of new construction. Meanwhile, north of Cambridge Street, nearly 2 million square feet of development is planned for Harvard's Enterprise Research Campus (ERC); and the surrounding neighborhood is already a hotbed of development activity.

Infrastructure and development changes at this scale are uncommon in the Boston region, and the outcomes will affect both the surrounding neighborhood and the broader region. The situation presents a unique and critical opportunity to coordinate regionally significant plans for station design, the roadway network, transit service, and land use policies. This analysis by the Metropolitan Area Planning Council (MAPC) is intended to complement the many other planning and advocacy efforts underway by focusing on those issues and setting forth recommendations for the next steps in planning, policy development, and land management.

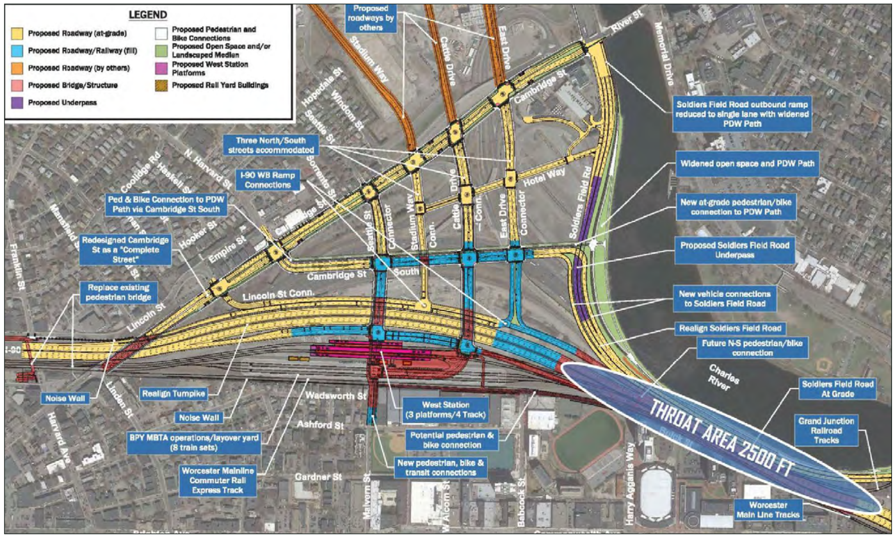
Over the last two years, MAPC talked to many stakeholders about their vision for Allston Landing, and how the area could be designed and developed in way that reduces car dependency and greenhouse gas (GHG) emissions, improves access to jobs, fosters housing affordability, and creates other benefits for local residents and the region as a whole. There was clear consensus that planning should be focused on creating a sustainable and diverse neighborhood connected to the rest of the Inner Core through great transit and easy biking; and a neighborhood that provides economic benefits for the City of Boston, the broader region, and those in need of opportunity.

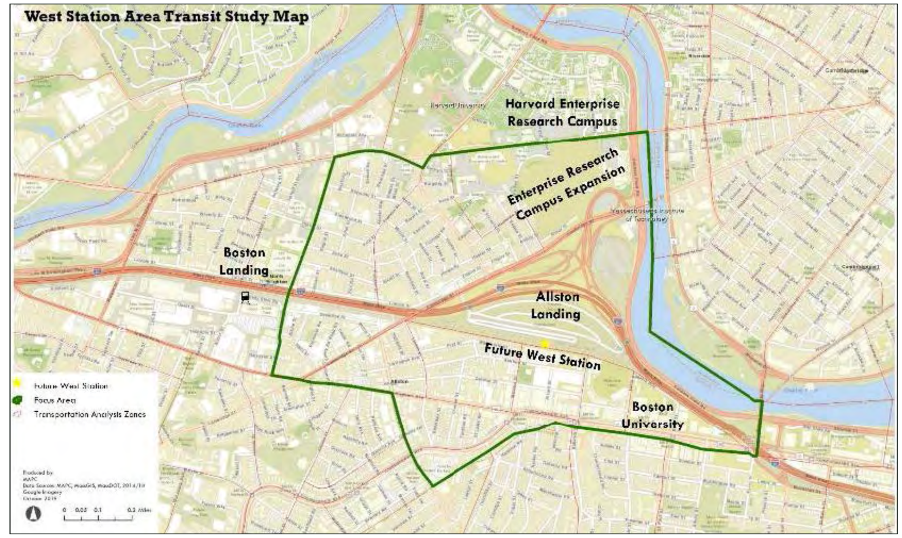
Time and time again, stakeholders recited a common refrain about what they didn't want: "Not another Seaport." The comparison is instructive: like Allston Landing, the Seaport started as a largely blank slate of parking lots and warehouses. A new highway interchange, street grid, and transit line set the stage for redevelopment. While the state and city steered growth with good intentions, nearly two-thirds of workers arrive by car, the median household income is more than double the median income for Boston, and where fewer than 20% of the residents are people of color.

This report seeks to lay out a roadmap for infrastructure, transit, and development that will lead to more sustainable and equitable outcomes. It was prepared with input from planning staff in Boston, Cambridge, and the Central Transportation Planning Staff, and used newly created modeling tools to forecast future land use and travel patterns. We tested dozens of different transit and land use alternatives and evaluated the outcomes on mode change, transit ridership, (GHG) emissions, and equitable job access. By comparing the results of these alternatives, we can identify what interventions may have the biggest benefits for the current and future residents of Allston, as well as the region overall.

The future of the West Station Area will unfold over the course of multiple decades. Construction of the interchange could take eight years, according to MassDOT. Land at Allston Landing likely won't be ready for development until 2035 or later; it will take 15 years or more after 2035 to approach buildout. In the meantime, the ERC and surrounding neighborhood could see over five million square feet of development. By 2050, the West Station Area (identified as the Focus Area for our model analysis, see map) could see over 6,000 new homes and tens of thousands of new jobs.

Inevitably, new growth will increase travel demand. By 2040 (well before full buildout), MAPC estimates 22,000 trips to the West Station Area every morning, a big increase from the 13,700 in pre-COVID years. Without concerted effort, most of these trips will be made by car. If abundant parking and limited transit options are available, we estimate that 58% of people coming to the area in 2040 would drive or be driven. In other words, an additional 3,600 cars could be coming to the neighborhood every morning, contributing to congestion, crashes, GHG and polluting emissions, and heat islands. (That future looks much like the Seaport,





which received 24,000 inbound trips each morning prior to COVID, with a 63% auto mode share.) With limited rail frequencies and buses connecting at West Station stuck in traffic, job access for workers in Allston (and for new employers in Allston Landing) would be limited as well.

These results demonstrate that the limited transit services currently proposed in project plans are insufficient to achieve the vision for a sustainable and equitable neighborhood. More efforts are needed to improve transit access to the area, discourage auto use, and provide safer options for active travel. The question is, which strategies are more effective, and whom do they benefit?

Drawing from community input, recent plans, current initiatives, and permitting documents, MAPC and CTPS developed a range of alternatives for future transportation conditions. The "Baseline" for all scenarios includes the transportation assumptions used for MassDOT's 2017 Draft Environmental Impact Report (DEIR). The model we used overlays additional services, connections, or policies onto that Baseline and compares their relative impact on mode share, transit ridership, and other metrics.

One major set of assumptions has to do with *commuter rail frequency*, an issue of critical importance to many stakeholders. The DEIR assumes that "peak period" commuter rail service would be limited to approximately four inbound trips and two outbound trips each morning (6-9 AM). We also tested a sample of the regional rail alternatives conceptualized in the MBTA's Rail Vision study; namely Rail Vision Alternatives 3, 4, 5, and 6. All of these provide 15-minute frequency to West Station, though the available destinations vary: Rail Vision 3 includes 15-minute rail frequency at a subset of key stations; Rail Visions 4 and 5 provide similar high-frequency service to almost all stations within 15 miles of Downtown Boston; and Rail Vision 6 assumes 15-minute frequency of service across most of the commuter rail system, and includes a north-south rail link.

The analysis also assessed the benefits of various *Bus Rapid Transit (BRT) connections*. The Baseline level of bus service includes three shuttle bus lines between West Station and Harvard Square, Kendall Square, and the Longwood Medical Area (LMA), operating at 5 to15 minute intervals and in mixed traffic (i.e., without dedicated bus lanes). MAPC created and tested two more-robust BRT alternatives. These alternatives assume buses are traveling in dedicated lanes at free-flow speeds (i.e., not stuck in traffic) running every 9 minutes during the morning peak period. One alternative ("BRT-A") connects to Harvard Square, Kendall Square, Longwood Medical Center, Watertown, and Nubian Square. Another ("BRT-B") extends this network as far as Mattapan, JFK/UMass, Sullivan, and Porter Squares, providing multiple commuter rail and rapid transit connections.

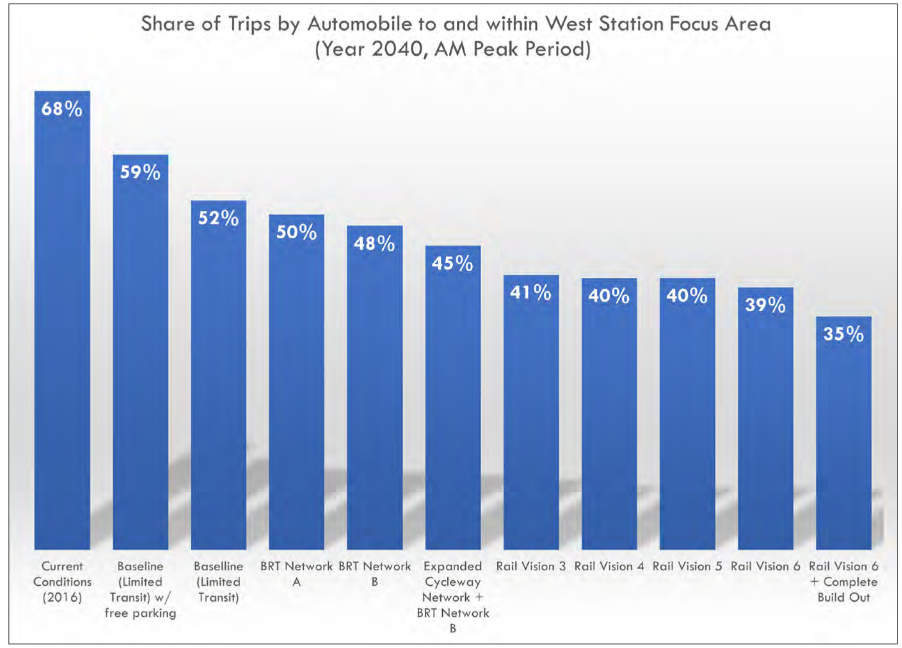
Current plans for the Allston Multimodal Project include only limited improvements for pedestrians and bicyclists, such as a connection across the Worcester Line rail at Malvern Street. MAPC analyzed a much more robust network that significantly expands the infrastructure for *protected, low-stress bicycling and pedestrian facilities through and around West Station*. These include a link representing the “People’s Pike” connection from Cambridge Street east to a new bicycle and pedestrian bridge over I-90 and Soldiers Field Road at Agganis Way. The network also includes separated facilities on most major streets in Allston as well as the Grand Junction bicycle/pedestrian connection all the way to Kendall Square.

Finally, MAPC tested two different alternatives for the *cost of parking*: one alternative in which parking is free; and another in which parking costs $18 per day.

Working with CTPS, MAPC estimated the time and cost savings associated with each of the alternatives described above, and used this information to estimate changes in travel patterns and mode choice. We were able to combine some of the alternatives, but not all of them. For example, there is no scenario with Rail Vision improvements and BRT improvements, due to limitations on the use of Rail Vision data. It should be noted that the data presented above are for planning purposes to compare the scenarios within this study. They should not be used to project the precise number of trips that will occur within Allston Landing and the project Focus Area. Rather, the results can help to prioritize future analysis and investigation.

Key Takeaways

MAPC analyzed dozens of scenarios and combinations to assess the benefits of different transportation options. The technical results are summarized in the full report and documented in the appendix. Our analysis finds that a combination of land development and densities, parking policies, transit services, transit infrastructure, and bicycle infrastructure around West Station can reduce the share of trips made by automobile to less than 50%, and even as low as 35% (see bar chart). With the right decisions, West Station can become less like the Seaport (where drivers make over 60% of morning trips) but a neighborhood where most of the trips are made by transit, cycling, rolling, and walking.



Our analysis of the study results identifies other clear, key findings that can help the West Station Area to achieve a more sustainable and equitable transportation future:

To be a successful neighborhood, West Station needs rapid bus service connecting it to surrounding communities. Planning for this service should start now. Good BRT corridors will link West Station to many other neighborhoods, allowing more people to get there without a car and opening up economic opportunity for disadvantaged communities. A complete rapid bus network will provide benefits not offered by commuter rail. Whereas rail service will connect West Station to a broad region (mostly east-west), bus service will make it accessible to other neighborhoods throughout Boston, Cambridge, Watertown, and nearby. West Station can serve as an intermodal hub of this network, allowing easy transfers from rail to bus. It should be designed to serve that purpose from the outset, even if the BRT and rail improvements may take many years to implement. Separated bus lanes through West Station and the surrounding neighborhood are essential to achieving truly rapid service. Though the capital cost of BRT is lower than rail, it is a complicated endeavor to retrofit city streets, especially those recently constructed. Planning for the Allston

Multimodal Project should ensure that the design supports physically separated, dedicated bus lanes with sheltered stations and other elements of gold standard BRT service through the site.

High frequency rail service to key stations both east and west provides the biggest GHG benefits for West Station. Compared to the limited transit services in the Baseline scenario, scenarios with frequent rail service to and from key stations has the largest incremental benefit on vehicle miles traveled (VMT) and GHG emissions for people going to West Station, since it carries large numbers of suburban commuters who would otherwise make long car trips to West Station. Frequent rail will also serve people coming from Fenway, Back Bay, and Downtown Boston, thereby helping to reduce congestion in the Inner Core. The design of West Station should support frequent bidirectional service; and the MBTA should begin planning now for high frequency service to key stations by 2040.

Even the best public transit struggles to compete with driving when parking is abundant and cheap. Parking policy must be at the center of transportation demand management efforts at Allston Landing. There are many reasons people choose to drive (or be driven) rather than taking transit or an active mode. Often faster than transit, driving generally has low out-of-pocket costs, (even at current high fuel prices) except where there are tolls and parking fees. Even when transit is frequent and convenient, some travelers will choose to drive if they can do so at low cost. Our analysis found that even in Rail Vision 6, with subway-like frequencies on the rail network, more than one in six transit riders would switch to driving if parking cost $0 instead of $18 per day. As the planning for Allston Landing proceeds, keeping the number of parking spaces down and ensuring a premium for those parking spaces is critical for managing congestion, achieving transit objectives, and mitigating climate impacts. Other pricing policies may be needed to discourage auto travel if ridesharing or autonomous vehicles allow people to be driven to West Station at low cost.

Walking and biking could be the preferred option for a substantial share of travelers to the West Station Area. It needs fully-protected and well-designed pedestrian and bike infrastructure to make this vision a reality. Almost 550,000 residents live within a roughly 30-minute bike ride of West Station, creating tremendous potential for active transportation. In combination with robust BRT service, a connected network of protected routes could enable nearly two in five trips to or within the West Station Focus Area to be made by walking, biking, or scooters. Notably, active transportation infrastructure doesn't just attract folks who would otherwise drive (or be driven) to the area; it also provides another option for transit riders, helping to reduce crowding on the system and enabling more flexible travel. This won't happen with unseparated bike lanes or sharrows. Protected/barrier separated, low-stress, and attractive routes leading to and through the West Station area (including high-quality routes along and across the commuter rail tracks) are essential to attracting and serving riders safely and comfortably. Planning for these connections must start now as streets, intersections, and other infrastructure of the Allston Multimodal Project move into more detailed design.

A true live-work-play neighborhood around West Station will help to advance sustainable transportation and equity in the region. Land use plans should establish a strong framework for a dynamic, diverse neighborhood while remaining flexible to changing market conditions. When a high density and diversity of housing options, jobs, services, food retailers, and entertainment exist in a single neighborhood, fewer people need to travel elsewhere during their day. Our analysis showed that at full build-out, nearly one in six trips will be made within the focus area, making it more likely they can be accomplished by walking, biking, or a short transit trip. However, this outcome can only be achieved if residents and workers of all kinds can find a place to live, work, and shop. A range of high-, moderate-, and low-income housing options are needed to enable access for residents of all backgrounds, and intentional policies to support small businesses and entrepreneurs are needed to enable equitable economic development and self-sufficiency. Land use plans should also be flexible enough to accommodate changing market and financial conditions over the coming decades so that development can take advantage of new opportunities while also advancing essential transportation and equity priorities.

Recommendations

Boston and Harvard University should develop policies that limit new parking spaces and make sure they are appropriately priced to encourage transit, cycling, and walking. The goal of limited and appropriately priced parking is to minimize social costs such as congestion, air pollution, GHG emissions, and reduced public health outcomes, all of which should be factored into the price. **Boston and MassDOT should also consider other policies to reduce automobile traffic,** including variable tolling and surcharges that discourage "dead head" driving by TNCs and in the future, autonomous vehicles.

MassDOT and Boston should ensure the design of the street network fully supports sustainable transportation options such as walking, cycling, and transit. The Allston I-90 project is being designed by MassDOT to accommodate peak-period automobile traffic at a specific level of service. Streets designed to accommodate peak-period auto traffic will conflict with the need to create streets that are safe for cycling, walking/rolling, and bus only travel lanes – all of which are needed to reduce traffic. To be truly multimodal, the Allston project should look for ways to reduce the cross-section of local streets and the overall footprint of the space devoted to automobile traffic, and dedicate that space for transit, walking, cycling, and rolling. In particular, streets and pathways over the Mass Pike and connecting Allston Landing and Boston University to West Station must be safe for transit, pedestrians, and other non-motorized travel, and designed to reduce conflict points with vehicular traffic.

MassDOT and the MBTA should ensure that the design of the new West Station has the track and platform space to accommodate 15-minute bidirectional rail service. A particular focus should be on the ability to provide frequent service between West Station and South Station. Moreover, **MassDOT and MBTA should advance regional rail across multiple corridors with a focus on 15-minute frequency of service at key stations within the Inner Core.** While developing a regional rail network with frequent all-day service will take many years to realize, the benefits are great for both the West Station and Allston as well as the metropolitan region as a whole.

MBTA and MassDOT should carefully design West Station to facilitate transfers from rail to bus and from the Worcester Line service to a potential future Grand Junction rail connection to Kendall Square and North Station. The ease and time it takes for people to transfer from one vehicle to another has a significant impact on their decision to use public transit or another mode. Therefore, thoughtful design considerations such cross-platform connections for rail-to-rail transfers, proper vertical connections between bus and rail, and appropriate space for a bus concourse to support local and regional bus service are needed.

MassDOT should provide a shared-use path from Cambridge Street to Agganis Way, the so called "People's Pike," even if it is narrow. Some have expressed concern about whether there is enough right-of-way on the southern end of West Station to accommodate both an east-west path connection and space for an express track. While this study could not detail the design of the track layout or pathway network, the study determined that both frequent rail service and extensive, separated greenway connections are necessary for a successful West Station. MassDOT should complete a full evaluation of the benefits and challenges of both the proposed express track and the east-west path connections.

Conclusion

The development opportunity created by the Allston Multimodal Project is a rare opportunity to create a new neighborhood in the City of Boston and should be informed by past mistakes, such as an abundance of free parking, lack of multiple high frequency transit options, little safe cycling infrastructure, easy automobile access, and lack of housing diversity.

Good planning must pay attention to the interactions between transportation and development policy. A creative planning process driven by the residents, workers, and employers in the Allston neighborhood, can create a new neighborhood that doesn't produce a lot of automobile traffic; where people get around mostly by walking, biking, and public transit; where current and future residents can better access the Charles River; and where low-income households can benefit from new job growth in the area and beyond. No one measure alone will produce the results that stakeholders want for this new neighborhood in Allston, but multiple efforts taken in concert can create one of the best neighborhoods in the metro region. Without such planning — and policies and funding to implement those plans — we could see another neighborhood where housing benefits mainly the well off, job opportunities are limited to a select few, and climate challenges worsen. **The choice is ours.**

Introduction

Over the coming decades, a 50+ acre corner of Boston will be utterly transformed by the straightening of the Massachusetts Turnpike (also known as the Mass Pike or I-90). What comes after: the tangled Allston Interchange off I-90 will be completely rebuilt; a new commuter rail station will be built; and an entire new neighborhood —provisionally named Allston Landing—will be created on the land and air rights made available by this highway project. The scale of this transformation demands attention and thoughtful planning to ensure maximum benefits for the surrounding neighborhood and the entire region. This analysis by MAPC is intended to complement the many other planning and advocacy efforts underway by focusing on the role of land use policies and transit service on ensuring equity and sustainability in the new neighborhood.

In the last few years, much of the public conversation about MassDOT's Allston Multimodal Project has focused on the design of the "throat"—a narrow section of land between Boston University (BU) and the Charles River that must accommodate both the reconstructed highway, Soldiers Field Road, the rail tracks, and a multi-use path. Now that MassDOT has settled on a proposed alignment for that section, there is an opportunity to examine other aspects of the project including station design, roadway network, transit service, and land use policies that will determine its impact on equity and sustainable transportation.

Over the last two years, MAPC actively solicited input from many stakeholders about their vision for Allston Landing (Figure 1), and what it could do to reduce car dependency and greenhouse gas (GHG) emissions, improve access to jobs, foster housing affordability, and create other benefits for the region. There was clear consensus that planning should be focused on creating a diverse neighborhood connected to the rest of the Greater Boston's Inner Core,[1] with economic benefits for the City of Boston, the broader region, and those in need of economic opportunity.

Time and time again, stakeholders recited a common refrain about what they didn't want: "Not another Seaport." The comparison is useful: like Allston Landing, the Seaport was an underutilized industrial area with parking lots and warehouses. A new highway interchange, street grid, and transit line set the stage for redevelopment. While the state and city steered growth with good intentions, the Seaport fell short of a truly sustainable, resilient, and equitable vision. Limited transit options, subpar bike infrastructure, and a lack of affordable housing have resulted in a neighborhood where most workers commute by car, the median household income is more than double the median for Boston, and where fewer than 20% of the residents are people of color.

This report—based on analysis of several different transit and land use alternatives and input from stakeholders—seeks to lay out a roadmap for development and transit that will support a more sustainable and equitable outcome for West Station and Allston Landing. MAPC's technical analysis shows that rapid bus service and low-stress bike connections can substantially reduce auto trips and improve transit accessibility to employment for those who need it most. In addition, our analysis shows that even the best transit struggles to compete with auto travel when parking is cheap or free, and that high frequency regional rail service to West Station will be key in capturing long-distance auto trips to reduce GHG emissions.

While conducting our technical analysis, MAPC also met with staff from Boston and Cambridge, Harvard University, MassDOT and the MBTA, and many community stakeholders. These conversations highlighted the many different perspectives and interests that intersect in this project, as well as the barriers to more effective coordination and partnership. We identified some critical tensions that need to be addressed, and questions that could be investigated jointly by project stakeholders.

1 Defined by MAPC as Arlington, Belmont, Boston, Brookline, Cambridge, Chelsea, Everett, Lynn, Malden, Medford, Melrose, Milton, Needham, Newton, Quincy, Revere, Saugus, Somerville, Waltham, Watertown, and Winthrop.

Based on these findings, we identify actionable recommendations that should be adopted to improve outcomes for the West Station area. First, to achieve the benefits of bus rapid transit and active transportation networks that can be implemented in the near term, MassDOT, Boston, and Harvard University must set aside street space and other rights-of-way to create the transit and active links in and around West Station, and throughout the Inner Core. Boston and Harvard University also should develop policies that promote parking pricing as a means to encourage transit, cycling, and walking. MassDOT and the MBTA should ensure that the design of the new West Station has the track and platform space to accommodate fifteen-minute bidirectional rail service. Finally, MassDOT and MBTA should advance regional rail across multiple corridors with a focus on fifteen-minute frequency of service at key stations within the Inner Core.

Although this study was able to evaluate several scenarios, not every potential alternative was evaluated nor every question resolved. Tensions and unknowns that still require additional analysis include the design details of the station layout, rail service along the Grand Junction connecting West Station and Cambridge, integrating a multiuse pathway along the rail corridor, potential conflicts between automobiles using the I-90 interchange with transit and pedestrians accessing West Station, and the impacts on commuting and travel with more people working remotely.

Project Background

Allston Multimodal Project

In 2014 the Massachusetts Department of Transportation (MassDOT) announced the planning process for the Allston Multimodal Project, which included plans for several elements:

- Relocation and reconstruction of the I-90 interstate and construction of a new Allston Interchange connecting to Cambridge Street.
- Relocation and reconstruction of the MBTA Commuter Rail Worcester/Framingham Line and construction of a new West Station stop and intermodal facility on the Worcester Line.
- Reconstruction of the Paul Dudley White path and Soldiers Field Road along the Charles River, in addition to reconstructing I-90 and shifting the rail tracks in an area known as “the throat”.
- Creation of a new street network bordered by I-90, Cambridge Street, and Soldiers Field Road.

As of 2022, the Multimodal Project continues to proceed through the state and federal environmental permitting process. A Notice of Project Change, focused principally on a new configuration for the narrow “throat” section between Boston University (BU) and the Charles River, is expected to be released in 2022, with a Final Environmental Impact Report following in 2023. As of Spring 2022,

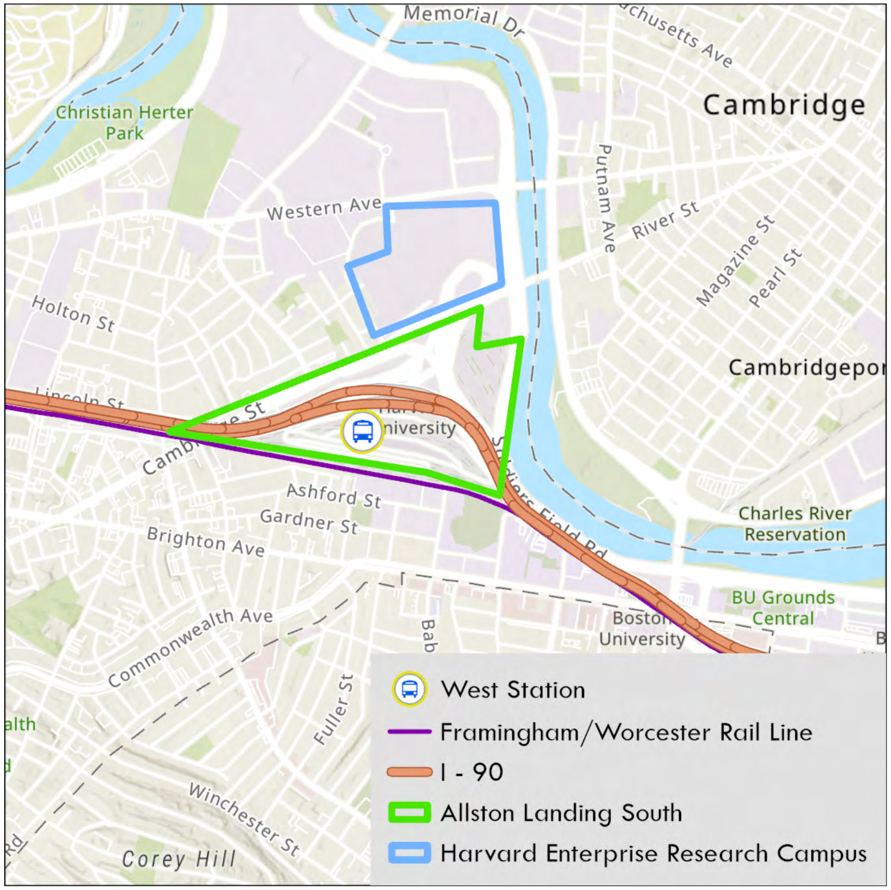


Figure 1. Location of Future West Station

MassDOT anticipates starting construction late 2023 or early 2024 with project completion by 2032. MassDOT plans to construct West Station concurrently with the highway realignment, so that it will open around the same time (prior plans had pushed station construction to a subsequent phase). Figure 1 shows the location of the proposed West Station.

Harvard University Enterprise Research Campus and Allston Landing

The Allston Multimodal Project is more than just a transportation project. The highway will be shifted onto vacant Beacon Park rail yards currently owned by Harvard University, and the new West Station will be built south of that, also on the existing rail yards. Through a land swap still under negotiation, Harvard will exchange the rail yard for land north of the new interchange, unlocking a major development opportunity for Harvard. (This will also return ownership of Beacon Park yards to the state, since the Turnpike Authority sold the land to Harvard in 2003 for $75 million.)

In combination with adjacent parcels, Harvard will then own 50+ acres of land at "Allston Landing South," the area bounded by the new turnpike and interchange, Cambridge Street, and Soldiers Field Road. This area has potential for 7 million square feet of development with an additional 4 million square feet of potential air rights development over the highway and rail station. Meanwhile, north of Cambridge Street, Harvard's Enterprise Research Campus (ERC) is already planned for nearly 2 million square feet of development. In combination with the substantial infill growth going on in the immediately adjacent BU campus and in surrounding portions of Allston, this makes the broader West Station area a regionally significant development site.

It's important to note that neither Harvard's ERC nor Allston Landing will be a campus extension or designated for new dorms—they are envisioned as an entirely new neighborhood with a mix of uses including office, lab, residential, and civic uses. Harvard has established a separate entity, the Allston Land Company, to oversee the planning and development of the ERC and Allston Landing. The exact mix of uses and pace of development depends on market conditions over the coming decades as the area is built out, as well as Harvard's financial ability to provide community benefits and amenities with each phase. Harvard has already committed to $50 million to support construction of West Station concurrently with the highway project. These sites, along with adjacent infill growth, are projected to add 11.2 million square feet of development over the next thirty years. Other areas of Allston and nearby Brighton are also experiencing significant redevelopment, adding to the total development in the area.

MassDOT Project Design

Under MassDOT's Allston Multimodal Project, some parameters for this new neighborhood are already being decided. The Multimodal Project includes the construction of the interchange ramps as well as the new street grid for Allston Landing. The layout of this grid, right of way widths, lane counts, and so forth are all integral elements of the project design and engineering. All streets are currently planned to include sidewalks. Cambridge Street and some of the other new streets will include separated bicycle lanes and sidewalks connecting to the larger trail network along the Charles River as well as to the new West Station. While MassDOT has indicated that ensuring sufficient throughput for vehicles exiting I-90 is a critical design priority for the street grid, project staff have expressed concern that an interchange design prone to back-ups onto the highway may not receive approval from the Federal Highway Administration.

The Allston Multimodal project also takes place in the context of many other local, regional, and state plans and programs described below, including Harvard University's Master Plan for the ERC/ Allston Landing and the City of Boston's role in approving individual developments in the project area.

Perhaps more importantly, a project of this magnitude affects a broad array of stakeholders, who have been involved over recent years: the City of Boston, Allston residents & neighborhood organizations, advocacy organizations, advisory committees, Cambridge and Brookline. Public conversation around the multimodal project and development has identified a wide variety of concerns and goals for the project, including traffic congestion, air quality, GHG emissions, and bicycle and pedestrian safety. Almost everyone MAPC talked to expressed hope for a new neighborhood where most of the trips are made by walking, biking, and public transit, where there's less auto traffic, and where more people pass through the area on public transportation. They also want Allston to have a balance of commercial and residential land uses with more affordable housing. These earlier plans and public conversations on the project thus helped shape the scope of MAPC's study, described in the following below.

Origins and Purpose of this Study

MassDOT filed a Draft Environmental Impact Report (DEIR) for the Allston Multimodal Project in 2017. Many stakeholders who commented on that DEIR expressed concern about the timing of West Station, the level of transit service proposed, and other aspects of the project relevant to transportation demand and mode choice. As a result, when granting the Massachusetts Environmental Policy Act (MEPA) Certificate for the DEIR in February 2018, the Secretary of Energy and Environmental Affairs noted the need for additional analysis for the design, timing and sequencing of West Station as part of the I-90 Allston project. MAPC offered to manage this independent study to determine the types of transit, transportation demand management strategies, and land use policies that should be implemented at West Station in order to reduce the environmental impact of the multimodal project and subsequent development. The City of Boston also expressed their strong interest in having MAPC conduct such a study and identified specific areas to focus on.

In 2019 MAPC began this study, which focused on forecasting future growth and travel demand; comparing the effectiveness of different transportation and policy strategies; and recommending strategies, services, and infrastructure needed to support sustainable transportation to and through the West Station area. As will be seen, we paid particular attention to the ways that strategies could improve transit accessibility to employment, particularly for low-income workers in Allston and beyond. The intent of the study is to both inform both the design of the Allston Multimodal Project, as well as the development that will be enabled by the project.

The three objectives of the study were the following:

- Provide municipal and state governments, stakeholders, and the development community with an **objective evaluation of the strategies that could best improve access** to jobs, labor, housing, and major destinations around West Station;
- Help municipal and state governments to **proactively plan for and implement regional mobility improvements as well as sustainable housing and economic development** as the new Allston I-90 interchange and West Station area is developed; and
- Prioritize **transit and other non-auto services that** MassDOT can use to **inform the design of the new West Station.**

In other words, this study is focused on aspects of the transformation of the West Station area that fall outside the scope of MassDOT's project design, or which have not been examined in detail up to this point. There are still many other elements of the Allston Multimodal Project itself that merit scrutiny and review: details of the "throat" design and its impacts on the Charles River; lane count and configurations on I-90 and Soldiers Field Road; phasing of the project and construction impacts; and so forth. These issues should continue to be rigorously explored. There are findings in our research that may contribute to those deliberations; but they are not the focus of this study. For modeling purposes, MAPC has made some assumptions about these elements based on current plans. However, unless expressly stated, it should not be assumed that this report expresses MAPC's official position on any of these issues.

Goals: What are the hopes for West Station?

There is a complex landscape of stakeholders and decision makers concerned with the West Station area. In order to understand the variety of interests and concerns, MAPC held two public meetings attended by over 90 people, and met repeatedly with organizational and institutional representatives during this process. We gathered input from MassDOT staff and officials; planning staff in the cities of Boston and Cambridge and the Town of Brookline; Allston residents; Harvard University; 495/MetroWest Partnership; Transit Matters, MassBike; WalkBoston, and others.

Input from these stakeholders helped shape the goals for West Station, as well as the scenarios and evaluation metrics used. Fortunately, we heard many common themes and found broad agreement on an overarching vision for the West Station area. We distilled the feedback into the following goals, which then informed the interventions we tested and the metrics used for evaluating the scenarios.

A successful West Station and associated transportation improvements will…

- Create more **convenient and efficient transit** locally and regionally
- **Improve** the **reliability** and capacity of the MBTA system
- **Reduce car trips**, and vehicle miles travelled (VMT) of residents and workers in West Station area
- **Shift more auto trips regionwide** to transit, walking, rolling, and cycling
- Encourage **compact, walkable development** in Allston with a strong sense of place
- **Improve job access and transit equity** for lower-income households
- **Expand housing opportunities** including affordable housing
- Create **financial and economic benefits** for the City of Boston and the region
- Improve **access to workers to retain businesses** in the Boston area
- **Reduce greenhouse gas emissions** to help meet regional climate goals

Over the course of our conversations with many residents and advocates, we heard a common refrain about what people didn't want: "Not another Seaport." They hoped that planning for the West Station area would learn from the mistakes of the Seaport, a well-intentioned neighborhood that is successful in some regards, and falls short in others. It is almost uniformly high income, lacks housing diversity as well as racial and ethnic diversity, generates huge amounts of auto travel and congestion, provides little in the way of climate resiliency measures, and fails to capitalize on its proximity to downtown and the availability of rapid transit service. While we chose to exclude "Not another Seaport" from our list of goals, it serves as a useful cautionary tale and example that can help focus attention on the hard choices that must be made to create a truly equitable and sustainable neighborhood.

Policy and Planning Context

Planning for the Allston Multimodal Project and the West Station area isn't happening in a vacuum. There are many other planning and policy initiatives underway that will inform, influence, or constrain planning and development in the area. To ensure that our analysis and recommendations are aligned with these plans, and to identify potential conflict, MAPC studied various land use and transportation plans for the area. Information from these plans assisted MAPC in developing the scenarios and evaluation metrics used in the West Station Area Transit Study and helped ensure that the study recommendations support local, regional, and Commonwealth goals.

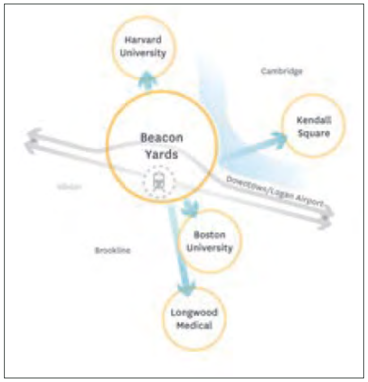


Figure 2. West Station Area, Imagine Boston 2030 Plan

- Imagine Boston 2030 is the citywide master plan adopted in 2017. It identifies West Station as an "edge area" poised to become an "expanded neighborhood." The plan calls the West Station area one of the most important new developments for Boston, stating that "significant investment in infrastructure, including an open-space network that provides connectivity to the Charles River, the development of West Station, coordinated and sustainable stormwater management, and stronger transit connections to surrounding neighborhoods will be critical to supporting residential growth and creating a mixed-use research and innovation hub" (Figure 2).

- [GoBoston 2030] is the city's transportation plan adopted in 2017. The plan sets aspirational goals of increasing the share of people who commute by transit, walking/rolling, cycling, and working from home, so that the city can reduce the percentage of people driving alone by half (from 50% to 25%.) GoBoston 2030 identifies West Station as a key regional hub for rapid bus and rail. The recommendations from these two plans were used to create bus and cycling service scenarios and to evaluate the model results.

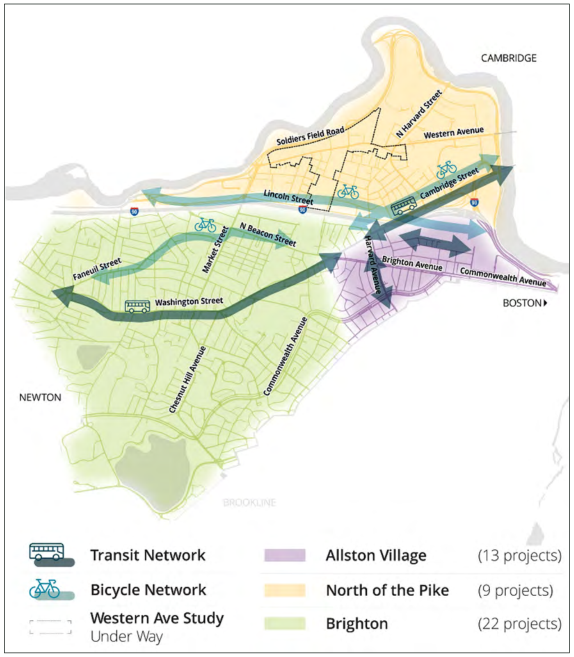


Figure 3.
Allston/Brighton Mobility Plan Recommendations

- [Allston/Brighton Mobility Plan] was adopted in 2021 and includes future bus priority lanes along Washington Street, Cambridge Street, and Brighton Avenue and separated cycling corridors along several streets in the project area (Figure 3), and were used to develop bus transit and cycling scenarios for West Station.

- [Rail Vision] —MBTA's Rail Vision study evaluated six alternatives for a new regional rail network, with varied frequencies of service and connections. MAPC evaluated Rail Vision alternatives 3, 4, 5, & 6, all of which included 15-minute rail frequencies for West Station.

- **MBTA and municipal bus priority improvements** —Boston and Cambridge are constructing bus lanes and other bus priority improvements for key routes connecting through and near West Station, coordinating these services with MBTA's Better Bus Project and Bus Network Redesign. These bourgeoning rapid bus plans were used in part to develop the bus scenarios in this study.

- [LandLine Greenway Network] is MAPC's vision to connect greater Boston's greenways and trails into a seamless network. The envisioned greenway network in LandLine was used to create the separated bicycle network scenarios for West Station.

- [Massachusetts' Global Warming Solutions Act] (GWSA) sets out a series of requirements for how the Commonwealth is to achieve emissions reductions by at least 85% by 2050. Currently the transportation sector produces 42% of statewide greenhouse gas (GHG) emissions in the Commonwealth. Reducing vehicular traffic and associated GHG emissions were one of the metrics used to evaluate the transportation scenarios in this study.

- **Parking Policies** —MassDOT's 2017 draft environmental study for the Allston I-90 project assumed no parking costs for the new development around West Station. MAPC's **Perfect Fit Parking** research show that the availability of "free" and/or abundant parking promote driving, thus creating more traffic and associated air quality problems. MAPC, in conjunction with staff from Harvard University and Boston, developed market-rate parking pricing for the scenarios evaluated in this study. **Boston's newly adopted parking policies** at transit stations were in development during this study, and the parking price scenarios used here are consistent with the goals of those new policies.

- **Equity** —Academic research shows that households of color are disproportionately burdened by higher transportation costs, longer commute times, and less access to private vehicles. Development at West Station will create new housing and jobs opportunities, and new transportation options traveling through West Station should also increase access to these opportunities. The study included metrics for how well the transit scenarios improve job and worker access, particularly for lower-income households and households of color.

- **Development Plans** —MAPC reviewed Harvard's development plans for the **Enterprise Research Campus** as well as the 2040 development assumptions for Allston Landing and Greater Boston used by MassDOT in the 2017 Allston Multimodal Project DEIR. MAPC also reviewed proposed growth as shown in **MassBuilds**. These data were used by MAPC to then develop two land use/development scenarios, described below.

Study Model Methodology and Approach

MAPC considered various travel demand models when determining the best approach for this study. The Central Transportation Planning Staff (CTPS)'s travel demand model was initially considered but was determined to be prohibitively expensive and laborious for this effort; and the level of detail provided by that model was not necessary for the exploratory analysis at the heart of the study. Instead, MAPC, in coordination with CTPS staff, decided to use a new model that would use data from the CTPS travel demand model to more quickly and easily evaluate varied development and transportation scenarios.

Therefore, MAPC, with the assistance from the Renaissance Planning Group (RPG), developed a "sketch modeling" tool that can be used to quickly test out many different assumptions. The model uses the detailed outputs from the CTPS travel demand model, and then pivots off those results using statistical relationships developed from other data sources. This Enhanced Multimodal Accessibility Model (EMMA) responds to the need for reliable planning-level insight into urban travel behaviors that are sensitive to land use, urban design, and travel costs with minimal reliance on complex regional travel models. It utilizes multimodal accessibility as the overarching analysis framework, linking travel behavior to the effectiveness with which different travel modes (walking, driving, public transit, e.g.) connect households, jobs, schools, and shopping.

The EMMA tool includes travel within all eastern Massachusetts. For this West Station Area Transit Study, the model includes a Buffer Area, which in general is any area that can be reached within a 30-minute bicycle ride from the future location of West Station. The tool also has a model Focus Area that includes land that is likely to see substantive new development around West Station. The model operates at the Census Block scale inside the Buffer Area and at the Transportation Analysis Zone (TAZ)[2]scale across the rest of the region (see Figure 4).

For the West Station area analysis, MAPC used the following EMMA outputs for each scenario:

- total trips in the morning peak period (6 to 9 am);
- travel mode share, which is the percentage of trips by automobile, transit, and active transportation (i.e., walking, cycling, rolling);
- vehicle miles travelled (VMT) that was then used to calculate greenhouse gas (GHG) emissions; and
- the number of jobs accessible by households as well as the number of workers accessible to employers.

For more information on the EMMA tool and study methods, please see the Appendix.

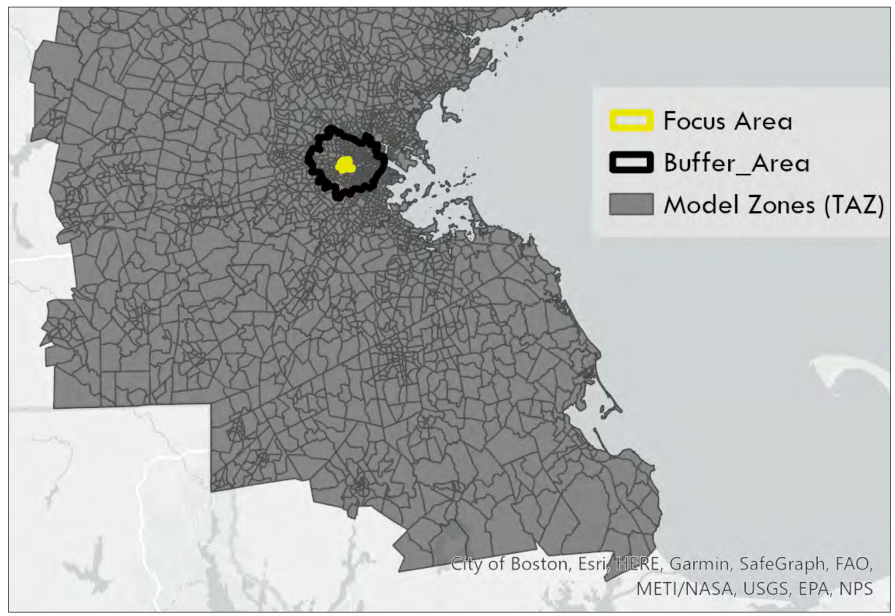


Figure 4a. Buffer Area and Focus Area for West Station Area Model Analysis

2 A traffic analysis zone (TAZ) is an area delineated by transportation officials for tabulating traffic-related data, especially journey-to-work and place-of-work statistics.

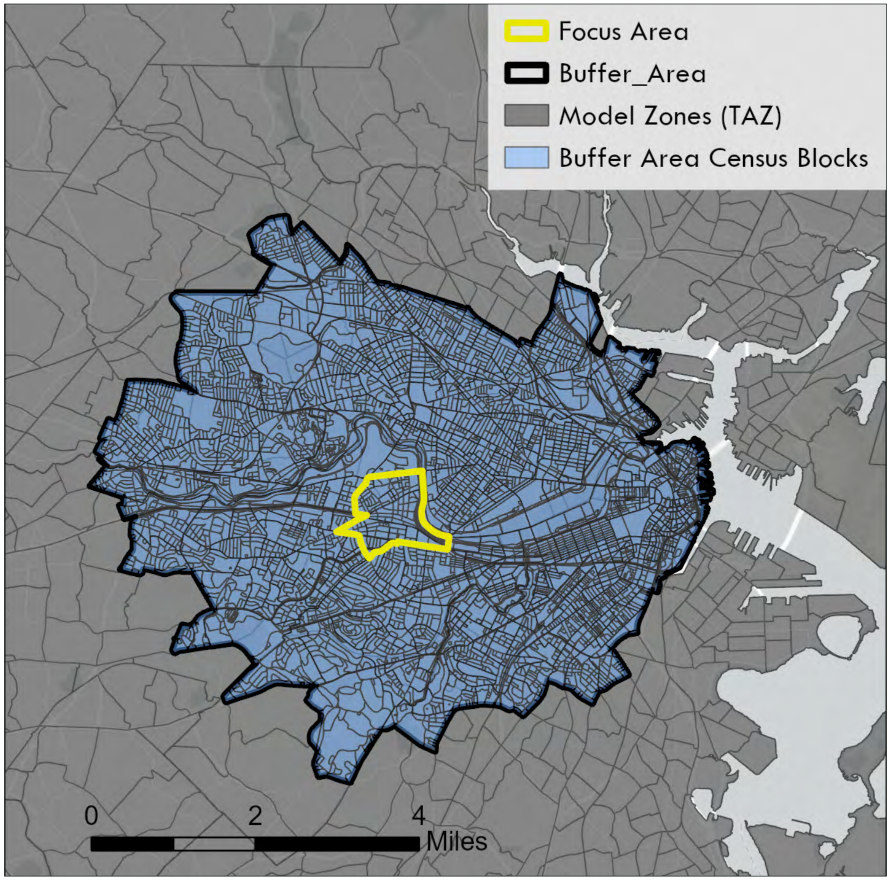


Figure 4b. Buffer Area and Focus Area for West Station Area Model Analysis

Current Travel Conditions

The current conditions of Allston Landing are well known to all who have passed through the area: it is a tangle of ramps, roadways, rail lines, and empty land. From a transportation perspective, nearly every trip here is traveling through the area, and very few trips are to and from the immediate station area. As of 2016, MAPC estimates there were fewer than 1,100 jobs and only 54 households in the two Transportation Analysis Zones (TAZs) that cover Allston Landing and the ERC. In the Focus Area, there were an estimated 8,900 jobs and 4,300 households as of 2016.

The entire Focus Area is situated within Allston, a Boston neighborhood with around 19,000 residents today (Figure 5). The neighborhood is young, diverse, and mobile. Over 56% of residents are enrolled in college and over 90% of residents are renters. The majority of Allston residents rely on non-automobile travel modes (walking, rolling, cycling, transit) to get around Greater Boston. Fewer than half of Allston households have access to an automobile, and the number of vehicles per household has decreased from 0.84 in 2000 to 0.27 in 2017.[3] Prior to the COVID-19 pandemic, most Allston residents walked, biked, or rode transit to work, with fewer than a quarter driving or carpooling.[4]

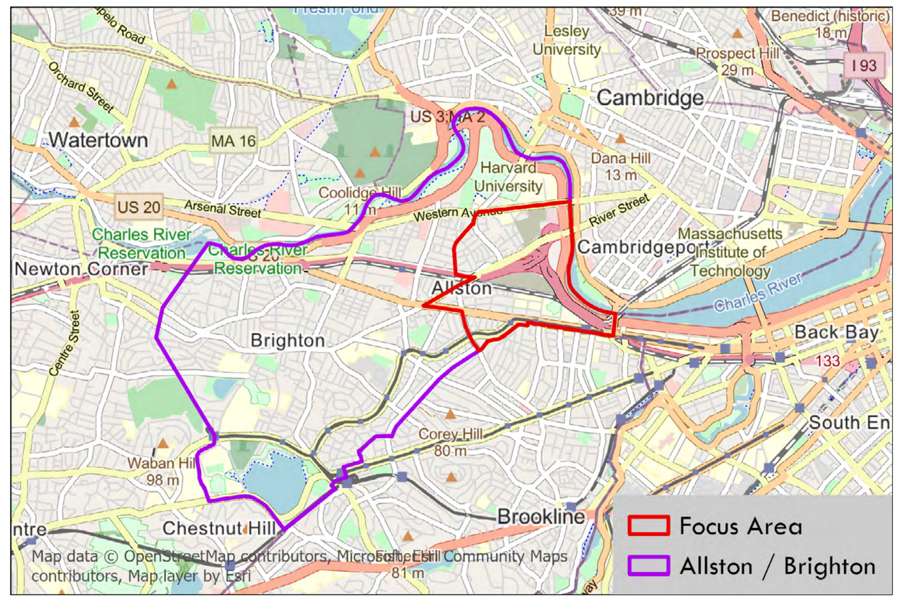


Figure 5.
Allston/Brighton Neighborhood and West Station Study Focus Area Boundaries

3 Allston neighborhood profile, compiled by Boston Planning and Development Agency, April 2019. See linked citation source.

4 Based upon analysis by the City of Boston of American Community Survey and Census data, 2010-2017. See linked citation source.

CTPS Regional Model	AM Peak Trips That End in Areas Shown			
Base Year 2016	*Total*	*Auto*	*Transit*	*Active*
Focus Area	13,694	9,304	2,119	2,272
Buffer Area	723,827	394,213	191,308	138,306
Allston + Brighton	54,991	41,737	5,987	7,266
Seaport	23,913	15,033	5,327	3,554
Downtown Boston	182,204	56,370	86,134	39,700

Mode Share				
		Auto	*Transit*	*Active*
Focus Area		67.9%	15.5%	16.6%
Buffer Area		54.5%	26.4%	19.1%
Allston + Brighton		75.9%	10.9%	13.2%
Seaport		62.9%	22.3%	14.9%
Downtown Boston		30.9%	47.3%	21.8%

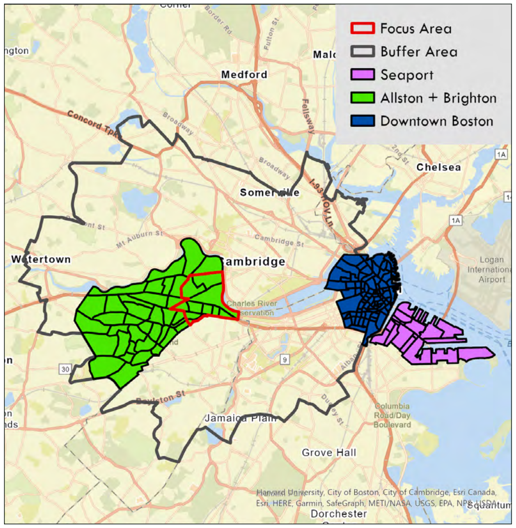


Figure 6. 2016 Morning Peak Period Travel Mode Share and Trips, Allston/Brighton, Downtown Boston, and Seaport

The number and share of trips by mode is shown for trips that end in the Focus Area, Buffer Area, Allston/Brighton, the Seaport, and Downtown Boston. These figures are for all trips in the morning peak, not just work-based commutes, and include trips both ending in and within selected travel areas.

The largest geography, the Buffer Area, encompasses 31 square miles and is the destination for over 720,000 trips every morning, with 353,000 of those trips both starting and ending in the Buffer Area. 55% of those trips are made by car, and just over one quarter on transit.

The Focus Area attracted approximately 13,700 trips every morning, a quarter of all trips heading to Allston/Brighton. Two thirds of those trips are made by car, with the rest split between transit and active transportation, which includes walking and biking.

The Seaport provides a useful comparison. Like Allston Landing, the Seaport was a largely ‘blank slate’ for development that followed a major multimodal project: the I-90 extension and the Silver Line through the Seaport. Millions of square feet of development have been built and occupied over the past 20 years, but the transportation outcomes have been less than ideal. An estimated 63% of morning trips to the Seaport are by car, versus only 30% of trips in nearby Downtown Boston. Despite the proximity to South Station and the presence of the Silver Line, the Seaport has a number of factors that discourage non-auto travel: it is easily accessible by auto from large parts of the region; other than the Silver Line, most transit is stuck in congestion; it has abundant parking, often subsidized or bundled; it is a high-stress bike environment; it lacks housing diversity; and it has a high concentration of commercial land uses.

Allston is also a commuter destination: the neighborhood has over 21,000 payroll jobs, 58% of which were in Educational Services, not surprisingly given the presence of Boston University and Harvard University in the area. Unfortunately, most of these employees drive to their workplace: as of 2016, 59% of the people working in Allston and Brighton commute by car, and only 15% take transit. Proximity to I-90 and Soldiers Field Road, along with a large supply of free parking, make the neighborhood easily accessible by auto to large parts of the region; however, easy transit to jobs in Allston and Brighton is limited to Green Line neighborhoods or those along bus lines such as the 66.

While it is hard to determine what commute patterns will be in 2022, travel models can provide a good sense of general conditions in pre-COVID times. Figure 6 compares estimated 2016 travel mode share for five different geographies, based on outputs from the CTPS travel demand model.

Downtown Boston's mode split could be something to aspire to: nearly half of morning trips are made by transit, and another 22% by walking or biking. In contrast to the Seaport, Downtown Boston has extensive and varied transit options that include all subway lines, many buses, as well as commuter rail stops. The Downtown area has dense development with a mix of commercial and residential areas, as well as substantial walking and biking infrastructure. Although there are parking options Downtown, most of the parking is in parking garages with high prices for daily use. The zoning, policies and infrastructure for Downtown clearly influence the travel modes that can be mirrored for Allston Landing.

Current Development Plans and Forecasts around West Station

The West Station area is poised for substantial new development over the coming decades as a result of the Allston Multimodal project and nearby development plans. As described previously, the Multimodal Project will free up over 50 acres of land for new development in Allston Landing, nearly all of it owned by Harvard University. On the other side of Cambridge Street, Harvard's Enterprise Research Campus Master Plan has been approved for 1 million square feet of development. Meanwhile, there is considerable change underway in the surrounding portions of Allston, and this combined growth will generate substantial increases in travel demand in the area. Without careful planning and bold action on transportation strategies, the result will be increased congestion, growing emissions, decreased pedestrian and bicyclist safety, and worsening transportation inequities. Understanding the nature and timing of proposed or potential growth is key to planning for sustainable and equitable transportation strategies. This section describes anticipated development in and around the West Station, as currently understood.

While Harvard University has not publicly announced any specific plans for Allston Landing, MAPC developed land use projections for the site in 2019 to support the environmental permitting and design for the proposed development. These projections were informed by multiple conversations with Harvard University Staff and study of comparable redevelopment areas in Greater Boston. Details of the assumptions and inputs used are available in a memo prepared by MAPC for MassDOT. Prior land use projections prepared for the Draft Environmental Impact Report in 2017 are now considered obsolete and not described here.

Within Allston Landing, there are two distinct development sub-areas. The so-called "terra firma" section, north of the relocated turnpike, is where new development will take place on the land surface; there are approximately 39 acres of potentially developable land (excluding road rights of way.) Meanwhile, the "air rights" section is approximately 34 acres where new development can be built on decking above the turnpike, West Station, and the Worcester Main Line.

MAPC's 2019 analysis of development capacity on the terra firma parcels incorporated the assumption that approximately 20% of the potentially developable area would be set aside for open space uses; and the remainder would be built out at an average floor-area-ratio (FAR) of 5.0 (slightly less than recent Kendall Square or Seaport development.) At that density, the terra firma section could support up to 7 million square feet of development. While the mix of uses will be determined by market conditions, the assumptions used for the DEIR include about 4,500 housing units, nonresidential space sufficient to accommodate approximately 12,400 employees, and 2,900 parking spaces to be used by residents, workers, and visitors. Development won't commence until after the Multimodal Project is complete in 2032 (or afterwards), and full buildout of the area is anticipated to take 20 years or more. Therefore, only 3.7 million square feet of terra firma development is expected to be in place by 2040, the horizon used for most project modeling.

Development on the air rights parcels is considerably more complicated, given the engineering challenges and costs associated with decking over the transportation facilities. Extra work during the Multimodal Project construction—pillars, decking, etc.—could facilitate the air rights development, but at additional cost and time for the project itself. Furthermore, the entire area over the transportation facilities won't all be available—MAPC assumed only half the 34 acres would be decked and built on. To justify the cost of air rights construction, it is necessary to build at a higher density than if financially feasible on terra firma parcels. MAPC assumed an FAR of 7.0, slightly lower than the handful of air rights projects currently underway in the city and assumed that development wouldn't commence until after 2040.

North of Cambridge Street, Harvard's Enterprise Research Campus (ERC, alternatively referred to in some publications as Allston Landing North) has an approved Master Plan for seven acres at 'Site 115' abutting Western Ave, and a BPDA-approved "Framework Plan" for the full 36-acre campus. The Site 115 Master Plan allows an effective FAR of 3.0, resulting in approximately 900,000 square feet of development, split almost evenly among office, R&D, residential, and hotel uses. Harvard has designated a developer for this site and development is anticipated to be completed prior to 2030. The Framework Plan for the rest of the campus provides a layout for the area and general design principles, but not specific uses or densities. In 2018, Boston changed the allowable density on the underlying zone to an FAR of 4.0. However, a more conservative figure of 3.0 was used for the "build" scenario and the scenarios used for this report. At that density, the ERC—exclusive of the seven acre portion of Site 115 now being developed—could accommodate 1.62 million square feet of development. MAPC assumed a mix of housing (34%), nonresidential (39%), and parking (19%).

The imminent transformation of North Allston is the result of decades of land assembly and planning on Harvard's part. Harvard purchased Beacon Park Yards and an adjacent parcel from the Turnpike Authority in 2000 and 2003, in two transactions totaling $227 million. Harvard also acquired land from private owners and from the City of Cambridge; the University's total land holdings in Allston were valued at $969 million in 2018. In both Allston Landing and the ERC, development will be overseen by the Harvard Allston Land Company (HALC), a wholly-owned subsidiary of Harvard University created in 2018 to advance the vision of a "center for innovation, collaboration, and entrepreneurship, [with]…a range of research-oriented companies, social ventures, businesses, and startups." HALC is not solely a charitable enterprise, however—a principal objective is to provide a return on investment for the Harvard endowment. As a result, development must—on the whole and over time—return a profit for HALC. Harvard representatives have also indicated that to protect the endowment's investment, borrowing will be kept to a minimum and most development will be "self-financed," with proceeds from each phase paying for investments in the next.

Significant Harvard institutional development (versus enterprise) in the pipeline includes a 110,000 square foot faculty and administrative office building on the Harvard Business School Campus north of Western Ave; and a new basketball/sports facility near the existing athletic fields. Harvard has indicated it has plans for only 180 dorm beds in this entire area.

The scale and timing of Harvard-related development in the West Station area is summarized in the chart in Figure 7.

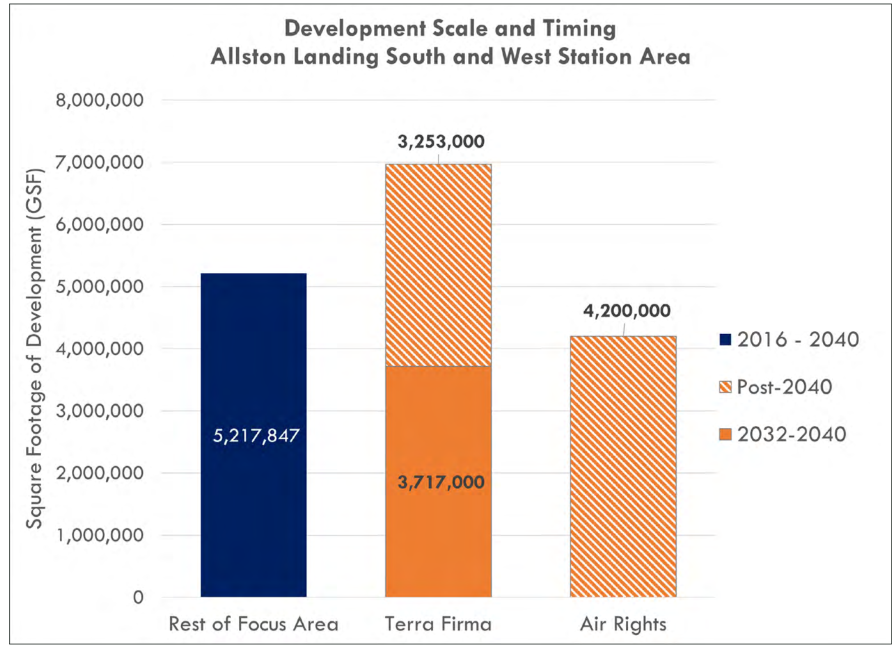


Figure 7. Forecasted Development Scale and Timing, West Station Area

As noted above, there is also substantial development activity happening in nearby portions of Allston and on the Boston University campus south of the Worcester Main Line. Working with the BPDA, MAPC inventoried development projects underway (documented in our regional development tracking database Massbuilds), with particular attention to projects within ½ to ¾ mile of West Station (in the Focus Area.) Some of the most significant developments proposed or underway include Allston Square, a 390,000 square foot mixed use development, Phase 3 of the Boston University

Armory West project (220 units of student housing), and 89 Brighton Ave. (124,000 square feet, 138 condo units, 7000 square feet of retail). Overall, MAPC identified approximately 1.75 million square feet of non-Harvard development planned or underway in the Focus Area.

In total, the Focus Area is projected to grow by 4,677 housing units and 10,420 jobs between 2010 and 2040, with an additional 1,300 housing units and 3,575, jobs anticipated in post-2040 development at Allston Landing. For context, the total projected household and job growth for the 101 municipalities in the MAPC region is 366,000 households and 261,000 jobs over the same period. Other development areas in the region with comparable growth potential over a similar period include the Seaport Planned Development Area (PDA), which comprises 33 acres and 7.7 million square feet of development approvals, built out over a 10-15 year time period; a 40-acre area in the Seaport surrounding the PDA is likely to see a similar amount of development, bringing the total to 15 million square feet, exclusive of any new development taking place east of B Street. The Longwood Medical Area since 2000 is also comparable, with 7.9 million square feet of new development across 40 acres.

The massive amount of development likely to take place around West Station highlights the need for coordinated planning to ensure sustainable transportation and equitable development.

Transportation Plans at West Station

The Allston Multimodal Project will completely reshape the transportation network in the area through redesign and reconstruction of the highway, the creation of West Station, and the construction of a new street grid. Understanding current plans is key to identifying what else needs to be done to promote sustainable transportation in the area.

As noted previously, the Multimodal Project will partially straighten I-90, reducing the dramatic curve that exists as the highway loops around the now defunct rail yard. The tangled interchange that currently exists will be demolished and replaced with a more compact "urban" on- and off-ramps that terminate at signalized intersections connecting to the new street grid and Cambridge Street. Current plans for West Station (Figure 8) include four tracks and three platforms located immediately south of I-90. The north and south platforms would be served by a single track and could be used for a future Grand Junction Service connecting to Kendall Square and North Station. The middle platform would be served by tracks on both sides and would probably be the main platform for Worcester Line service. South of the platforms, there is an operations/layover yard with capacity for eight trainsets, and a single express track south of the layover yard. MassDOT has indicated the express track is needed to accommodate full-speed express service that does not stop at West Station, as well as to provide an alternative route in case of a disabled train at the platforms.

Commuter rail service levels for West Station have not been finalized. MassDOT's 2017 DEIR travel modeling assumed Worcester Line rail service of three trips in the peak direction (eastbound toward South Station) during the morning peak period, four trips in the peak direction (westbound) during the afternoon peak period, and at least one trip in each direction every three hours during all other periods. Since that time, the MBTA has adopted a long-term vision for 15-20 minute frequencies all day on the most dense corridors, including West Station.[5]

West Station will also be built to accommodate bus and shuttle through-traffic from north to south, as well as buses that will have West Station as their final stop. The number of bus bays and routing for buses is still at the conceptual level and will be refined by MassDOT in later phases. A new bridge over the tracks will be constructed at the end of Malvern Street (south of the tracks) and will be open to bus, bike, and pedestrian travel only. Buses traveling to or from points north will likely travel along new north-south streets proposed for the new street grid. Current plans do not include dedicated or protected bus lanes on any of the new streets or on Malvern Street and adjacent parts of Comm Avenue. Figure 8 includes MassDOT's concept for the future street network and West Station.

5 See Fiscal Management and Control Board resolution adopted November 4, 2019.

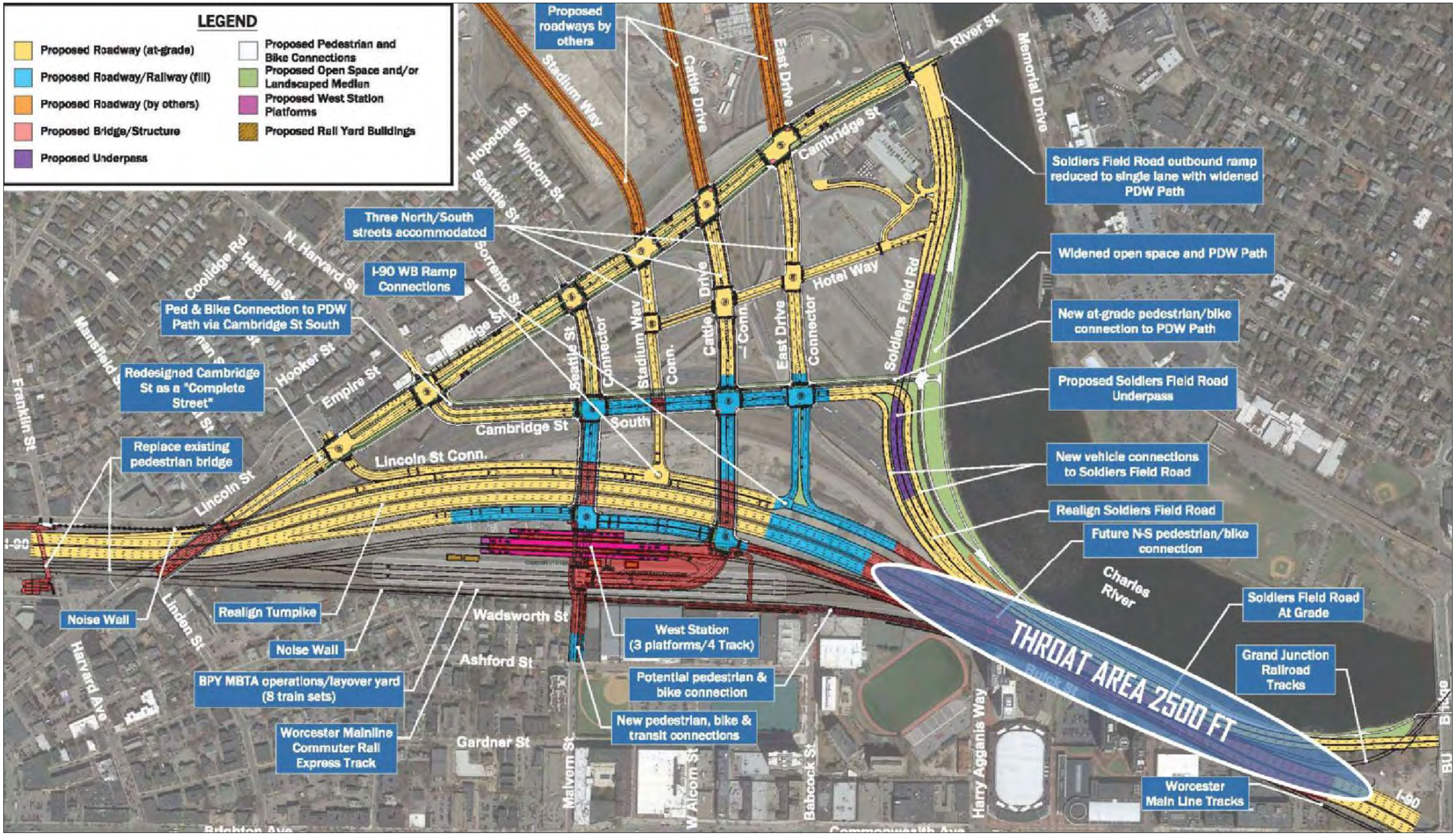


Figure 8. Proposed Street Network and Future West Station
Source: MassDOT Allston Multimodal Task Force Meeting presentation, February 23, 2021.

The DEIR assumed three new "shuttle" routes connecting West Station to Harvard Square, Kendall Square, and Longwood Medical Area, operating at 5 to 15 minute intervals (Figure 9). MassDOT's most recent plans include a direct bus connection from West Station to Commonwealth Avenue via Malvern Street. All other MBTA and private bus operations would be the same as existing.

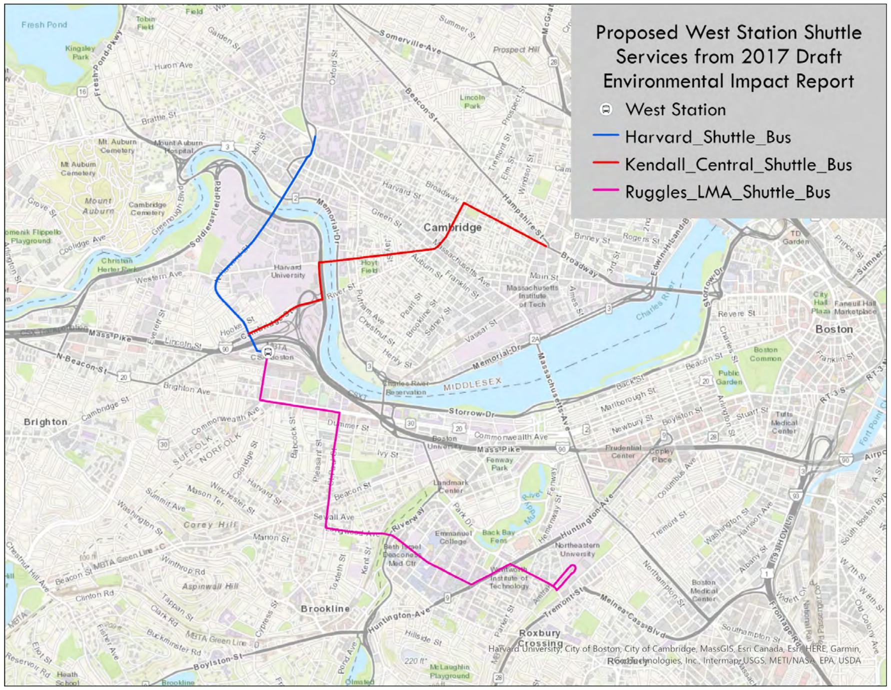


Figure 9. Proposed West Station Shuttles in Project DEIR

Current project plans include a variety of bike and pedestrian improvements: The Paul Dudley White bike path along the Charles River would be widened and improved, and new connections across Soldiers Field Road would be created. The Malvern Street connector would also permit nonmotorized travel from Commonwealth Ave/BU directly to West Station and beyond. The current MassDOT plans also accommodate a “future” pedestrian and bike connection passing over the “throat” section from Agganis Way to the Paul Dudley White bike path, as well as a “potential” narrow shared-use path running south of the rail tracks, providing a more direct connection from West Station, and potentially to Agganis Way and the Paul Dudley White path (see Figure 8).

Some stakeholders have called on MassDOT to create a “People’s Pike” in the form of a wider linear park extending along the south edge of the project area, with the elimination of express track south of the Station. The benefits of a People’s Pike include a more pleasant, lower-stress experience for walkers and bikers, and a buffer between the rail lines and the neighborhoods immediately to the south. Elimination of the express track on the Worcester Main Line would enable a wider cross section for a linear park, but would require all trains to pass through the station, even if not stopping, and reduce the flexibility of rail operations in the area.

MAPC used the above design and service plans as a starting point for the West Station Area Transit Study, coordinating with MassDOT, the Boston MPO, Harvard University, the City of Boston, and others. MAPC also reviewed other land development and transportation plans for the area to create and evaluate additional scenarios to help determine the services needed for a successful West Station.

Things We Tested

Land Uses/Development

In terms of future growth, this analysis largely adopted the land use projections developed by MAPC in 2019 and described above, with 3.7 million square feet of development in the Focus Area by 2040 (called 2040 Build) and a Compete Build Out scenario with 11.2 million square feet of development in the Focus Area. MAPC also tested other development-related assumptions such as the level of affordable housing, but the results were inconclusive and not presented here.

Commuter Rail Service Levels

MAPC tested various levels of commuter rail service. The baseline for our analysis was the schedule included in the DEIR of approximately four trips in the peak direction (inbound/eastbound toward South Station) during the morning peak period, and two outbound trips during the morning peak. For the purposes of this analysis, it is referred to as the Build 2040 **Baseline alternative**.

We also tested a sample of the regional rail alternatives conceptualized in the MBTA’s Rail Vision study; namely Rail Vision Alternatives 3, 4, 5, and 6. All of these provide fifteen-minute frequency to West Station, though the available destinations vary. Rail Vision 3 includes fifteen-minute rail frequency at a subset of key stations throughout the commuter rail system. In the case of the Worcester Line, this includes West Station and the stops in Natick, Framingham and Worcester. Meanwhile, Rail Visions 4 and 5 provide similar high-frequency service to almost all stations within 15 miles of Downtown Boston, as far as Riverside on the Worcester Line. Rail Vision 6 assumes fifteen-minute frequency of service across most of the commuter rail system, and includes a north-south rail link. With the exception of Alternative 4, all Rail Vision scenarios incorporate a rail shuttle service on the Grand Junction line between West Station and North Station, via Kendall Square.

Bus Rapid Transit (BRT)

The Baseline level of bus service improvement was based on the shuttle services proposed in the DEIR. This Baseline service consists of three shuttle bus lines between West Station and Harvard Square, Kendall Square, and the Longwood Medical Area (LMA), operating at 5 to15 minute intervals and in mixed traffic (i.e., without dedicated bus lanes). The DEIR did not assume any other changes in bus service elsewhere in the region (including changes that have happened due to COVID-19 pandemic or the MBTA's Better Bus Project or Bus Network Redesign).

MAPC also developed two BRT alternatives with input from City of Boston, CTPS, and public engagement feedback. These alternatives assume buses are travelling in dedicated lanes at free-flow speeds (i.e., not stuck in traffic) with 9-minute headways during the morning peak period. These alternatives represent aspirational levels of bus service through key corridors, and we did not assess the feasibility of this on any particular roadway segment to determine conflicts with travel lanes or parking.

The first BRT alternative (BRT-A) involves high-frequency dedicated bus service on the corridors shown in purple in Figure 10. It provides BRT-level service on the shuttle connections from West Station north to Harvard Square, east to Kendall Square, and south to the Longwood Medical Area; and includes additional links west to Watertown Square and further southeast to Nubian Square. The second BRT alternative (BRT-B) expands the service to include the additional corridors shown in red. BRT-B provides connections as distant as Mattapan, JFK/UMass, Sullivan, and Porter Squares,

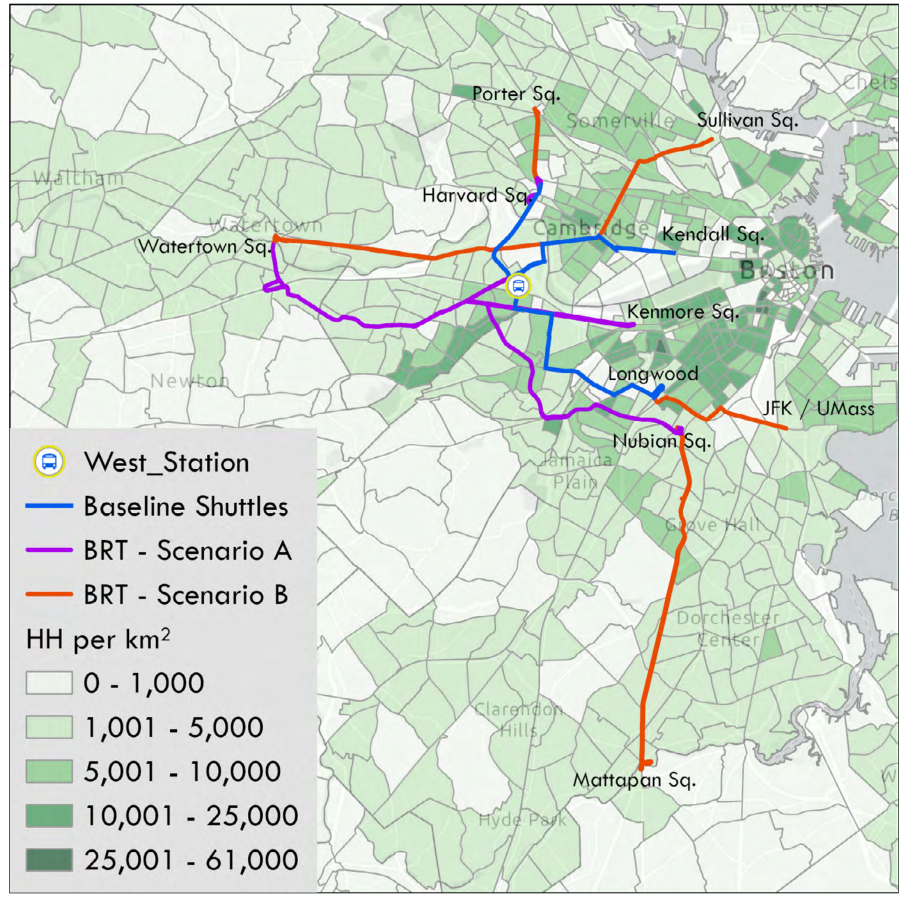


Figure 10. Conceptual Bus Rapid Transit (BRT) Scenarios for West Station Area

providing multiple commuter rail and rapid transit connections. All other bus service levels are held at current conditions across the region for all alternatives.

Dedicated Bicycle and Pedestrian Infrastructure

The baseline for the bicycle and pedestrian network is based on the OpenStreetMap (www.openstreetmap.org) layer for pedestrian and cycling infrastructure as of December 2019. This layer includes a range of cycling-related classifications for network segments, including on-street paint-only bicycle lanes, dedicated protected cycleways, off-street cyclepaths, and multi-use, and pedestrian paths.

MAPC also created an alternative network that significantly expands the infrastructure for protected, low-stress bicycling and pedestrian facilities through and around West Station. The network incorporates MAPC's LandLine vision and was refined through discussions with community stakeholders and municipal staff. The resulting conceptual cycletrack network is shown in Figure 11 below. Blue lines show existing facilities, while purple lines show the location of expanded traffic-separated facilities. These include a link representing the "People's Pike" connection from Cambridge Street east to a new bicycle and pedestrian bridge over I-90 and Soldiers Field Road at Agganis Way. The network also includes separated facilitieson most major streets in Allston as well as the Grand Junction bicycle/pedestrian connection all the way to Kendall Square.

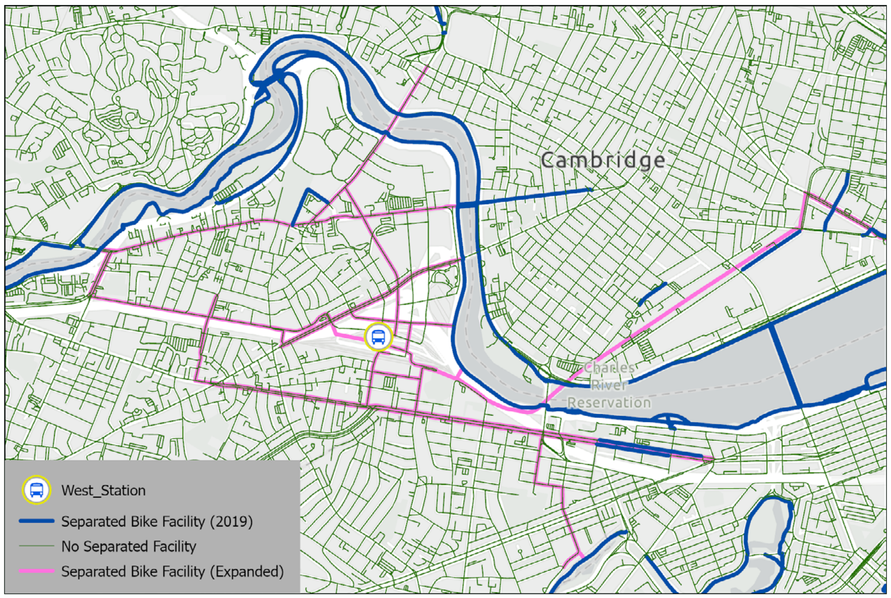


Figure 11. Current Conditions and Expanded Separated Bike Facility Scenario for the West Station area

Parking Cost and Auto Availability

Parking availability and cost are important factors that influence people's travel and commute choices, and are the product of multiple decisions made by developers, employers, city officials, and property owners. Consistent with the land use inputs developed by MAPC in 2019 for the MassDOT's environmental analysis, the baseline assumption for the cost of parking is $18 per auto trip to the Focus Area. In order to estimate the impact of this cost, we also modeled scenarios without any parking costs at all.

Type	Scenarios
Development within West Station Focus Area	• Build 2040* (3.7M SF in Focus Area) • Complete Build out (post-2040, 11.2 M SF in Focus Area)
Bus Rapid Transit (BRT) Network	• Shuttles (as envisioned in DEIR)* • BRT-A Network (Allston/Brighton, Longwood, Cambridge • BRT-B Network (BRT-A plus Somerville, Watertown, Roxbury, Dorchester)
Regional Rail (Rail Vision) Network	• Limited West Station service (as envisioned in DEIR)* • Rail Vision Scenarios 3, 4 (no Grand Junction), 5, 6
Cycletrack (separated bicycle lanes) Network	• Existing facilities* • Expanded network (within Allston/Brighton and Cambridge)
Parking Pricing	• $18/day within Focus Area* • "Free" parking within Focus Area

Table 1. Scenarios Tested

Included in Baseline Alternative

MAPC's land use forecasts also included certain assumptions about parking availability, which are retained here. Specifically, those forecasts assume auto ownership rates of only 0.3 vehicles per household, on average, consistent with the availability of parking in the development square footage. Costs for residential parking are not considered in the model.

The land development and transportation options described above were then entered into the EMMA model to test how they might impact mode choice (i.e., trips by transit, auto, and walking/cycling), job access, and vehicle miles travelled/greenhouse gas emissions. Table 1 shows the scenarios tested.

Modeling Results

This section presents selected results of the EMMA modeling analysis. Full results are available in the appendix.

Trip Production and Travel Model Share

Under the future Build 2040 land use assumptions, the Focus Area is projected to attract 22,200 trips during the AM peak period. This represents an increase of 63% over the 2016 conditions (13,600 trips to/within Focus Area) and is comparable to the number of trips to the Seaport each morning in 2016. The increase in trip-making is driven primarily by the projected increases in employment, retail space, and services in the area, which will attract commuters, shoppers, and others on daily business.

Under the Baseline transportation conditions described above, MAPC estimates that 52% of trips to or within the Focus Area would be made by auto in 2040. This represents a substantial decrease in auto travel mode share, down from 68% of trips in 2016; however, it still indicates that the number of auto trips to the Focus Area could increase by about 2,300 (25%) each morning, resulting in more congestion and greater risk of crashes. Almost all of the reduction in auto travel mode share is the result of trips shifting to active transportation, which increases from 17% to 31% of all morning trips to or within the Focus Area as higher
densities allow more residents to accomplish trips by walking or biking to nearby destinations. Meanwhile, the transit travel mode share is projected to remain relatively steady at 16-17%, since the Baseline assumptions include relatively minor improvements in transit service.

Travel demand will continue to increase after 2040; when Allston Landing achieves full buildout. MAPC estimates the Focus Area is projected to attract as many as 30,000 trips each morning. These results demonstrate the significant increase in travel demand that will result from development made possible by the Allston Multimodal Project. They indicate that currently proposed transportation improvements and policies are insufficient to prevent unsustainable increases in auto travel and its associated impacts. Other transit and active transportation improvements will be needed to create a more sustainable condition for the workers and residents in Allston.

Transit Improvements

Model results indicate that both bus rapid transit and regional rail improvements show promise at reducing automobile traffic in the Focus Area. Compared to the 2040 Build Baseline conditions, the more extensive of the two bus rapid transit networks we tested (BRT-B) could boosts transit ridership 3.2 percentage points (from 17.2% to 20.4%) and reduces automobile trips by 3.8 percentage points (from 51.8% to 48%), even with limited rail service to West Station.

Regional rail improvements that create high-frequency east-west rail service at West Station could have even more substantial impacts on travel mode share. Depending on the scenario, frequent rail service for West Station would reduce the share of automobile trips anywhere from 11 to 13 percentage points (Figure 12). All the Rail Vision services are likely to increase both transit and active travel (walking/cycling/rolling) at West Station, likely because travelers are more likely to use both modes of travel (and less likely to drive) when frequent 15-minute regional rail service is available. Rail Vision 6 has

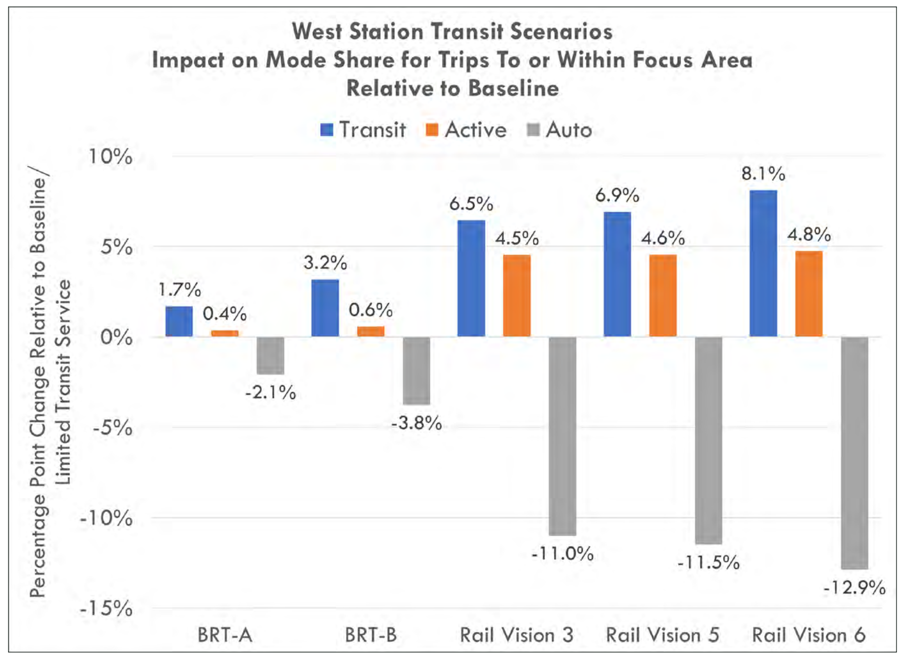


Figure 12.
BRT and Rail Vision Travel Mode Impacts for Trips to or Within West Station Focus Area

the highest transit ridership for Focus Area, and the lowest share of auto trips, due to the 15-minute rail frequencies across nearly the entire MBTA commuter rail system. With that level of commuter rail service, MAPC estimates the Focus Area would attract only 8,600 auto trips each morning, a 5% decrease from the 2016 conditions. Due to the limitations of our sketch modeling tool and information available from CTPS, MAPC was not able to test scenarios that included both the BRT networks and the Rail Vision improvements.

Active Transportation (Walking/Rolling/Cycling)

MAPC found that, on its own, an expanded cycling network will have only a modest impact on travel mode share for trips to and within the Focus Area. However, if implemented in conjunction with Bus Rapid Transit improvements, a more connected, stress-free bicycle and walking network may have a notable impact on travel travel mode share. A combination of the active transportation network with BRT-B results in auto travel mode share 6.7 percentage points lower than the Build 2040 Baseline (from 51.8% to 45.1%), almost double the impact of BRT-B alone (Figure 13). Under this combination, almost two out of every five trips would be made by walking or biking. While transit travel mode share is slightly lower than under the scenario with BRT-B alone, suggesting that a better active transportation network provides additional options for transit riders, increasing travel flexibility and potentially reducing crowding on buses and trains.

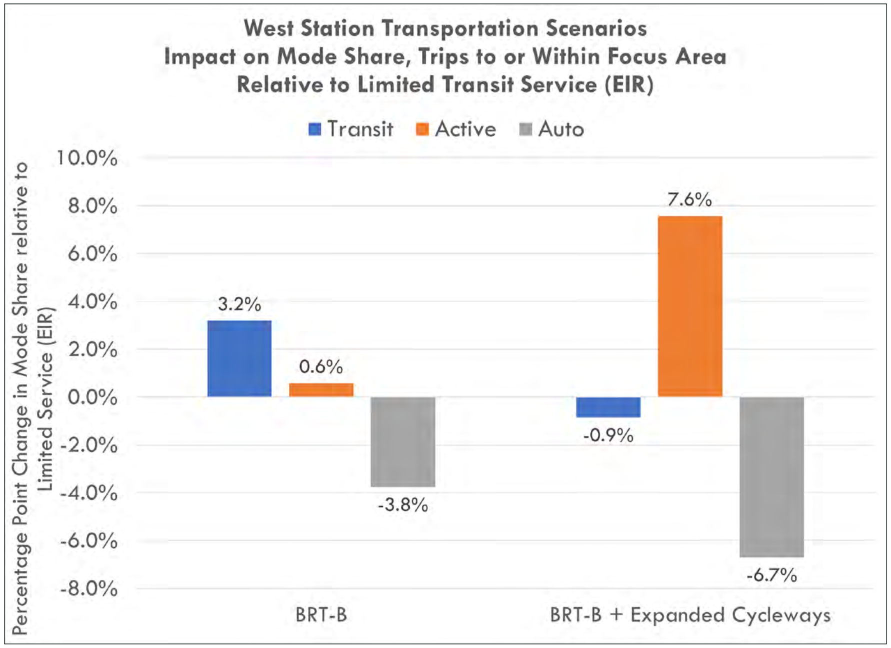


Figure 13. Cycle Network Impacts on Travel Mode Share, Trips to and Within West Station Focus Area

Parking Costs

There is growing research showing that parking constraints—the price and the availability of parking—are critical factors in reducing vehicular traffic. The Build 2040 Baseline incorporates the same parking assumptions as were developed by MAPC in 2019 for MassDOT's environmental analysis; specifically, a daily parking cost of $18 for auto trips to the Focus Area and residential parking supply of 0.3 spaces per unit. As noted previously, those assumptions result in an estimated 11,500 auto trips to or within the Focus Area each morning under the Baseline scenario with the limited transit service assumed in the DEIR. If parking were free, auto trips would be even higher—an estimated 12,800 each morning, equivalent to 58% of all trips to the Focus area and an increase of almost 40% over the 2016 conditions.

Parking costs also amplify the benefits of rail improvements. As noted above, the Rail Vision 6 scenario with $18 parking costs could decrease the number of auto trips relative to 2016 conditions. However, if rail improvements are put in place without assuming a daily cost for parking, thousands more travelers will opt to drive instead of taking the train. The estimated number of auto trips is approximately 10,500, nearly eliminating the improvements in transit and active transportation use from more frequent rail services (Figure 14).

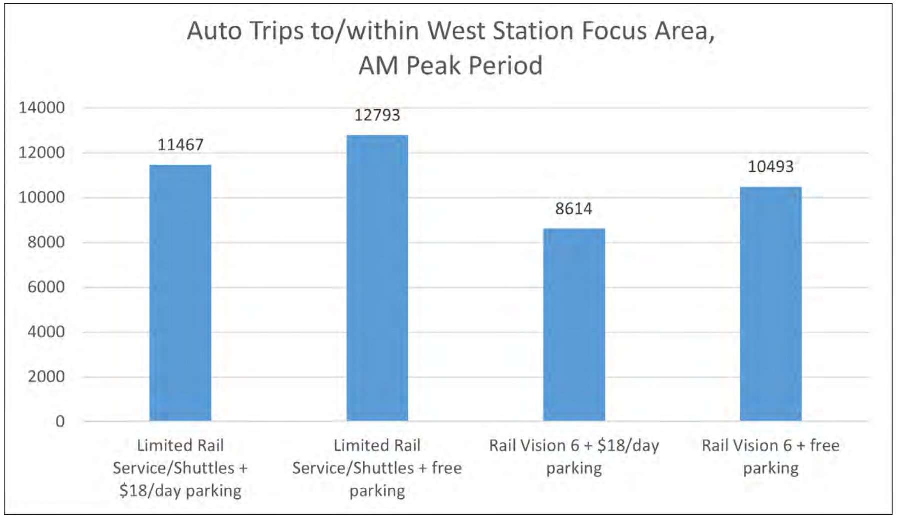


Figure 14. Parking Cost Impacts for Trips to and Within West Station Focus Area

Job Accessibility

In addition to reducing congestion and emissions, it is also important for transportation investments to reduce existing transportation inequity, not perpetuate transportation inequities, and provide improved access to opportunity. Workers who can get to large numbers of jobs in a reasonable amount of time via transit will have more opportunities to find jobs they can get to without spending unreasonable amounts of time and money commuting. They'll also have more opportunities to change jobs without having to move or change commute mode. This is particularly important for low-income workers who often have fewer job prospects and are often transportation cost burdened. If the West Station area is going to become a major job center for the region, it should be easily accessible to those who need economic opportunities the most.

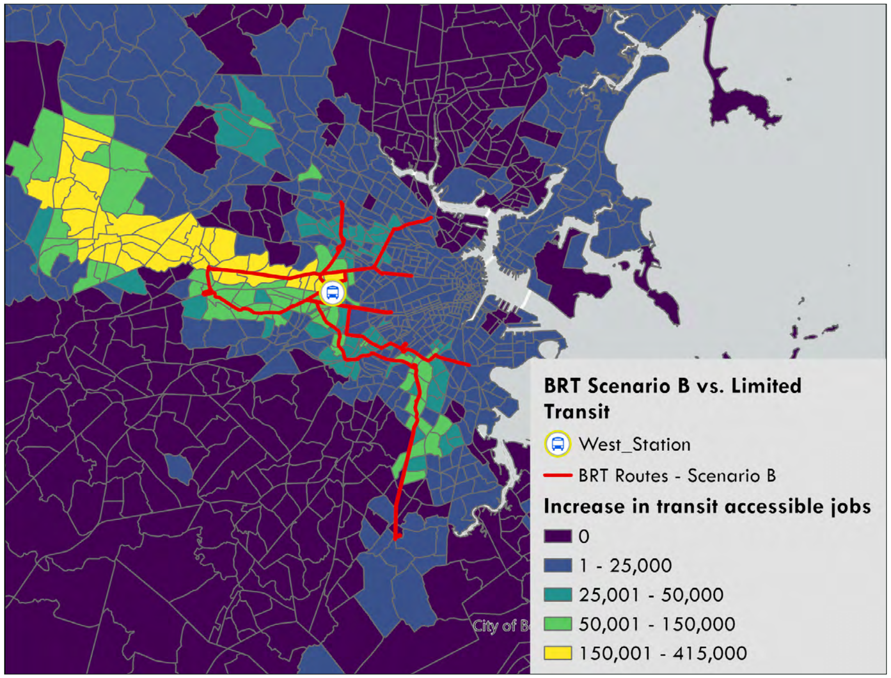
To evaluate how the various transit options could improve transit access to jobs, MAPC estimated the number of projected jobs accessible within a 45 minute commute from each analysis zone. We also analyzed how many workers would be within a 45-minute transit commute of West Station to see how transit improvements could increase employers' access to labor.

We studied the change in the larger Buffer Area instead of the Focus Area because almost all the alternatives provide connections outside of the Focus Area and have an impact on job and workforce accessibility in this larger geography.

Under the Baseline scenario with limited transit services, Buffer Area households have transit access to ~750,000 jobs. The scenarios with the greatest increase to job accessibility over the Baseline were the extended Bus Rapid Transit network BRT-B alternative and the Rail Vision 6 alternative (Figure 15). The BRT-B transit service boosts Buffer Area access to jobs by 2.5%, and increases access to jobs from Environmental Justice (EJ) neighborhoods[6] by more than 4%. Rail Vision 6 impacts are even greater: increases of 3.6% in the Buffer Area and 7% in Environmental Justice TAZs. With either of these improvements, workers in EJ communities would have access to considerably more jobs than are accessible in the baseline scenario. In contrast, Rail Vision 3 provides access to fewer jobs than does the baseline scenario. While Rail Vision 3 does include commuter rail improvements, it lacks the Baseline shuttle services connecting West Station to Harvard, Longwood, and Kendall. As a result, it provides substantially less access for EJ TAZs, as compared to the Baseline scenario. As demonstrated by the maps in Figure 15, commuter rail improvements generally provide accessibility benefits to suburbs and outlying communities along the lines, whereas rapid bus connections provide far more benefit in the Inner Core and especially in EJ communities.

The results are similar when looking at employer access to workers. In the Baseline Scenario, Buffer Area employers have access to about 135,000 households. BRT-B boosts access to labor by 3.5 percentage points for all Buffer Area employers and by more than eight percentage points for employers in EJ TAZs. Rail Vision 6 significantly increases employer access to households and workers across the Inner Core, the suburbs and beyond. As with access to jobs, Rail Vision 3 provides less benefit than the Baseline scenario for Environmental Justice communities.

6 In Massachusetts, Environmental Justice (EJ) populations are defined by one or more criteria: lower household income, minority (non-white) population, and households lacking English proficiency. For a complete definition and links to maps, see https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts



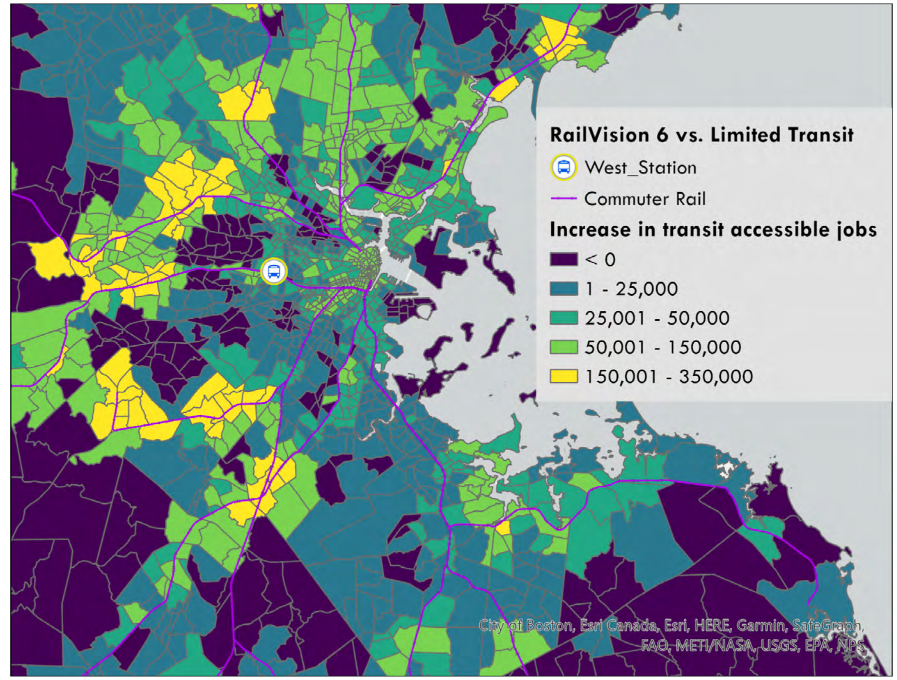


Figure 15. Jobs Accessible by Transit, BRT-B and Rail Vision 6 Scenarios

Greenhouse Gas Emissions and Vehicle Miles Travelled

Reducing vehicle emissions is key to meeting the Commonwealth's climate goals. Even with an increasing number of electric vehicles in Massachusetts, reducing vehicle miles traveled is both helpful to that effort and essential to solving the region's congestion crisis. Vehicle Miles Traveled (VMT) is a key metric that is the function of both travel mode and trip length. Transportation improvements such as increased commuter rail frequency allow many travelers to shift long trips from auto to transit, thereby reducing VMT. In contrast, most users of proposed extended bicycle and pedestrian infrastructure are making relatively short trips and some of them may be switching over from transit. As a result, the per-trip GHG benefits of pedestrian and bike improvements are less than for commuter rail improvements. When large numbers of people use those connections, they can have a large collective impact.

As shown in Figure 16, Rail Vision service scenarios are most effective at reducing GHG emissions (approximately 30% decrease compared to the 2040 Baseline Limited Transit Service). Adding system-wide frequent rail service allows travelers to replace longer automobile trips from across the region.

In comparison, the expanded bus rapid transit (BRT-B) network plus an expanded active bike/ped network provides about half as much benefit in VMT and GHG emissions, since these services would replace shorter driving trips compared to regional rail.

The above estimates assume parking costs at $18/day around West Station. With free parking, people are more likely to drive, the number of automobile trips increase, and VMT and emissions are 15% to 20% higher across all scenarios.

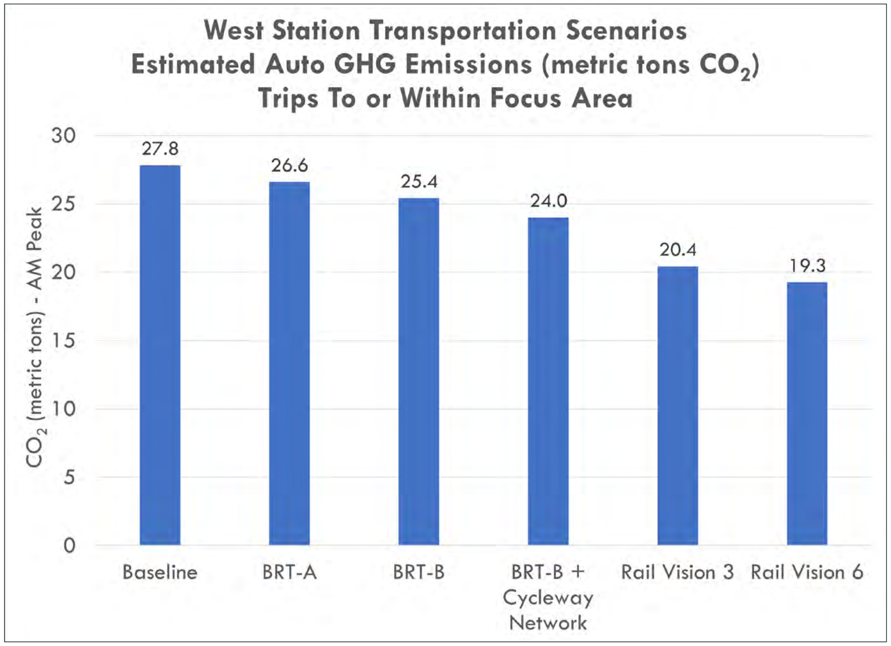


Figure 16. Greenhouse Gas Emissions, West Station Transportation Scenarios

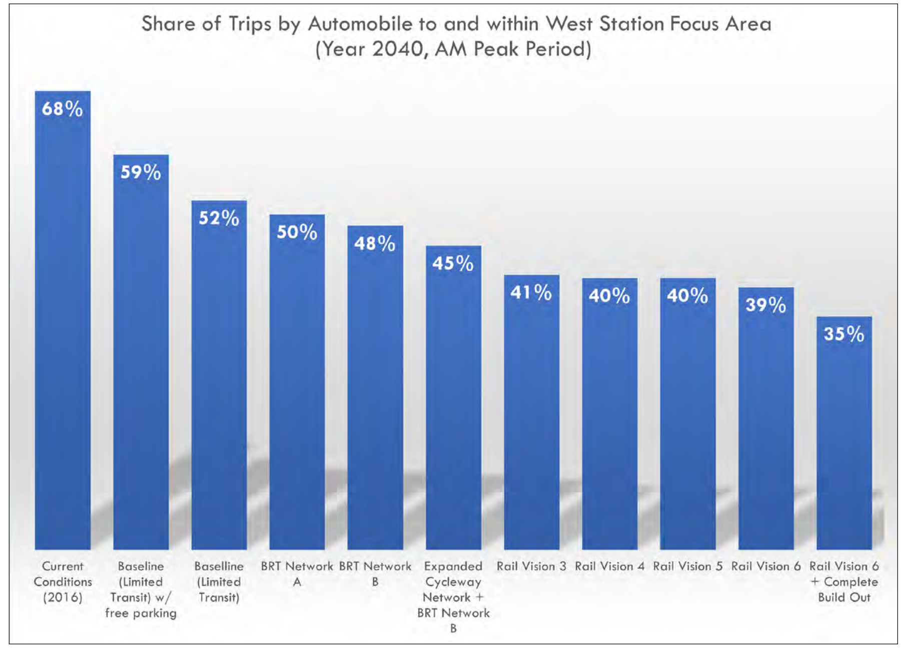


Figure 17. Share of Trips by Automobile to and within West Station Focus Area

Key Takeaways

MAPC analyzed dozens of scenarios and combinations to assess the benefits of different transportation options. The technical results are summarized in the full report and documented in the appendix. Our analysis finds that a combination of land development and densities, parking policies, transit services, transit infrastructure, and bicycle infrastructure around West Station can reduce the share of trips made by automobile to less than 50%, and even as low as 35% (see Figure 17). With the right decisions, West Station can become less like the Seaport (where drivers make over 60% of morning trips) but a neighborhood where most of the trips are made by transit, cycling, rolling, and walking.

Our analysis of the study results identifies other clear, key findings that can help the West Station Area to achieve a more sustainable and equitable transportation future:

To be a successful neighborhood, West Station needs rapid bus service connecting it to surrounding communities. Planning for this service should start now. Good BRT corridors will link West Station to many other neighborhoods, allowing more people to get there without a car and opening up economic opportunity for disadvantaged communities. A complete rapid bus network will provide benefits not offered by commuter rail. Whereas rail service will connect West Station to a broad region (mostly east-west), bus service will make it accessible to other neighborhoods throughout Boston, Cambridge, Watertown, and nearby. West Station can serve as an intermodal hub of this network, allowing easy transfers from rail to bus. It should be designed to serve that purpose from the outset, even if the BRT and rail improvements may take many years to implement. Separated bus lanes through West Station and the surrounding neighborhood are essential to achieving truly rapid service. Though the capital cost of BRT is lower than rail, it is a complicated endeavor to retrofit city streets, especially those recently constructed. Planning for the Allston

Multimodal Project should ensure that the design supports physically separated, dedicated bus lanes with sheltered stations and other elements of gold standard BRT service through the site.

High frequency rail service to key stations both east and west provides the biggest GHG benefits for West Station. Compared to the limited transit services in the Baseline scenario, scenarios with frequent rail service to and from key stations has the largest incremental benefit on vehicle miles traveled (VMT) and GHG emissions for people going to West Station, since it carries large numbers of suburban commuters who would otherwise make long car trips to West Station. Frequent rail will also serve people coming from Fenway, Back Bay, and Downtown Boston, thereby helping to reduce congestion in the Inner Core. The design of West Station should support frequent bidirectional service; and the MBTA should begin planning now for high frequency service to key stations by 2040.

Even the best public transit struggles to compete with driving when parking is abundant and cheap. Parking policy must be at the center of transportation demand management efforts at Allston Landing. There are many reasons people choose to drive (or be driven) rather than taking transit or an active mode. Often faster than transit, driving generally has low out-of-pocket costs, (even at current high fuel prices) except where there are tolls and parking fees. Even when transit is frequent and convenient, some travelers will choose to drive if they can do so at low cost. Our analysis found that even in Rail Vision 6, with subway-like frequencies on the rail network, more than one in six transit riders would switch to driving if parking cost $0 instead of $18 per day. As the planning for Allston Landing proceeds, keeping the number of parking spaces down and ensuring a premium for those parking spaces is critical for managing congestion, achieving transit objectives, and mitigating climate impacts. Other pricing policies may be needed to discourage auto travel if ridesharing or autonomous vehicles allow people to be driven to West Station at low cost.

Walking and biking could be the preferred option for a substantial share of travelers to the West Station Area. It needs fully-protected and well-designed pedestrian and bike infrastructure to make this vision a reality. Almost 550,000 residents live within a roughly 30-minute bike ride of West Station, creating tremendous potential for active transportation. In combination with robust BRT service, a connected network of protected routes could enable nearly two in five trips to or within the West Station Focus Area to be made by walking, biking, or scooters. Notably, active transportation infrastructure doesn't just attract folks who would otherwise drive (or be driven) to the area; it also provides another option for transit riders, helping to reduce crowding on the system and enabling more flexible travel. This won't happen with unseparated bike lanes or sharrows. Protected/barrier separated, low-stress, and attractive routes leading to and through the West Station area (including high-quality routes along and across the commuter rail tracks) are essential to attracting and serving riders safely and comfortably. Planning for these connections must start now as streets, intersections, and other infrastructure of the Allston Multimodal Project move into more detailed design.

A true live-work-play neighborhood around West Station will help to advance sustainable transportation and equity in the region. Land use plans should establish a strong framework for a dynamic, diverse neighborhood while remaining flexible to changing market conditions. When a high density and diversity of housing options, jobs, services, food retailers, and entertainment exist in a single neighborhood, fewer people need to travel elsewhere during their day. Our analysis showed that at full build-out, nearly one in six trips will be made within the focus area, making it more likely they can be accomplished by walking, biking, or a short transit trip. However, this outcome can only be achieved if residents and workers of all kinds can find a place to live, work, and shop. A range of high-, moderate-, and low-income housing options are needed to enable access for residents of all backgrounds, and intentional policies to support small businesses and entrepreneurs are needed to enable equitable economic development and self-sufficiency. Land use plans should also be flexible enough to accommodate changing market and financial conditions over the coming decades so that development can take advantage of new opportunities while also advancing essential transportation and equity priorities.

Areas for Further Analysis

Although this study was able to evaluate several scenarios, there are potential conflicts and alternatives that are beyond the scope of this study and need to be resolved, including:

- *Grand Junction service and cross platform transfer* —This study found that 15-minute frequent rail service on the Grand Junction connecting West Station to Kendall Square and North Station had a small but net positive impact. This study model had limitations in evaluating additional Grand Junction service alternatives. More detailed analysis of services is needed to determine which service options and cross-platform operations might be most useful.

- *Post-pandemic travel patterns* —Most travel modeling for Greater Boston is based upon travel data collected prior to the COVID-19 pandemic. Current traffic patterns suggest that many office workers are returning to a hybrid schedule, alternating between working at-home and in-office. However, two-thirds of Massachusetts workforce is in occupations where remote work is less feasible, such as restaurant, medical, and manufacturing.[7] Commutes also account for less than 20% of daily trips. Nonetheless, a hybrid work schedule should result in lower traffic during morning and afternoon peak-periods, which is important for right-sizing streets and for designing transit services. Travel behaviors will continue to evolve over the next 20 years, and more research is needed to determine peak-period and off-peak period travel volumes and patterns that might take place in 2040 and beyond.

- *Further scenarios* —Other scenarios beyond the scope of this study that should be evaluated by MassDOT, Harvard University, and the City of Boston include:

    - Combining a frequent regional rail network and an expanded Bus Rapid Transit network

    - New bus services to be proposed under the MBTA Bus Network Redesign

    - Additional parking and auto pricing scenarios

    - Other separated bicycle network scenarios

    - Affordable housing scenarios

    - Further rail service scenarios that might impact platform/track configurations

Recommendations

Boston and Harvard University should develop policies that limit new parking spaces and make sure they are appropriately priced to encourage transit, cycling, and walking. The goal of limited and appropriately priced parking is to minimize social costs such as congestion, air pollution, GHG emissions, and reduced public health outcomes, all of which should be factored into the price. **Boston and MassDOT should also consider other policies to reduce automobile traffic,** including variable tolling and surcharges that discourage "dead head" driving by TNCs and in the future, autonomous vehicles.

MassDOT and Boston should ensure the design of the street network fully supports sustainable transportation options such as walking, cycling, and transit. The Allston I-90 project is being designed by MassDOT to accommodate peak-period automobile traffic at a specific level of service. Streets designed to accommodate peak-period auto traffic will conflict with the need to create streets that are safe for cycling, walking/rolling, and bus only travel lanes – all of which are needed to reduce traffic. To be truly multimodal, the Allston project should look for ways to reduce the cross-section of local streets and the overall footprint of the space devoted to automobile traffic, and dedicate that space for transit, walking, cycling, and rolling. In particular, streets and pathways over the Mass Pike and connecting Allston Landing and Boston University to West Station must be safe for transit, pedestrians, and other non-motorized travel, and designed to reduce conflict points with vehicular traffic.

7 "Preparing for the Future of Work in the Commonwealth of Massachusetts", July 2021, pp. 19-20.

MassDOT and the MBTA should ensure that the design of the new West Station has the track and platform space to accommodate 15-minute bidirectional rail service. A particular focus should be on the ability to provide frequent service between West Station and South Station. Moreover, **MassDOT and MBTA should advance regional rail across multiple corridors with a focus on 15-minute frequency of service at key stations within the Inner Core.** While developing a regional rail network with frequent all-day service will take many years to realize, the benefits are great for both the West Station and Allston as well as the metropolitan region as a whole.

MBTA and MassDOT should carefully design West Station to facilitate transfers from rail to bus and from the Worcester Line service to a potential future Grand Junction rail connection to Kendall Square and North Station. The ease and time it takes for people to transfer from one vehicle to another has a significant impact on their decision to use public transit or another mode. Therefore, thoughtful design considerations such cross-platform connections for rail-to-rail transfers, proper vertical connections between bus and rail, and appropriate space for a bus concourse to support local and regional bus service are needed.

MassDOT should provide a shared-use path from Cambridge Street to Agganis Way, the so called "People's Pike," even if it is narrow. Some have expressed concern about whether there is enough right-of-way on the southern end of West Station to accommodate both an east-west path connection and space for an express track. While this study could not detail the design of the track layout or pathway network, the study determined that both frequent rail service and extensive, separated greenway connections are necessary for a successful West Station. MassDOT should complete a full evaluation of the benefits and challenges of both the proposed express track and the east-west path connections.

Conclusion

The development opportunity created by the Allston Multimodal Project is a rare opportunity to create a new neighborhood in the City of Boston and should be informed by past mistakes, such as an abundance of free parking, lack of multiple high frequency transit options, little safe cycling infrastructure, easy automobile access, and lack of housing diversity.

Good planning must pay attention to the interactions between transportation and development policy. A creative planning process driven by the residents, workers, and employers in the Allston neighborhood, can create a new neighborhood that doesn't produce a lot of automobile traffic; where people get around mostly by walking, biking, and public transit; where current and future residents can better access the Charles River; and where low-income households can benefit from new job growth in the area and beyond. No one measure alone will produce the results that stakeholders want for this new neighborhood in Allston, but multiple efforts taken in concert can create one of the best neighborhoods in the metro region. Without such planning — and policies and funding to implement those plans — we could see another neighborhood where housing benefits mainly the well off, job opportunities are limited to a select few, and climate challenges worsen. **The choice is ours.**

Appendix: Sketch Model Tool and Study Methodology

Model Development

Use of the CTPS travel demand model to evaluate many different transportation scenarios and policy alternatives would have been prohibitively expensive and laborious for this effort; and the level of detail provided by that model was not necessary for the exploratory analysis at the heart of the study. Therefore, MAPC researched, adopted, and customized a "sketch modeling" tool that can be used to quickly test out many different assumptions. Such models use detailed outputs from a detailed behavioral model (such as the CTPS travel demand model) as their basis, and then pivot off those results using statistical relationships developed from other data sources. There is an emerging landscape of such tools, and MAPC used this study as an opportunity to test out the approach in the Boston Region.

Given the novelty and complexity of such tools, it was necessary to procure expert assistance for the development of a model. In consultation with MassDOT and CTPS, MAPC issued a Request for Information (RFI) describing MAPC's use cases for a sketch modeling tool and soliciting information about available products and services. Six firms responded to the RFI. Their responses informed the publication of a Request for Proposals (RFP) with detailed specifications about features, technology, and data inputs. Through this RFP, MAPC selected Renaissance Planning Group (RPG), a transportation planning firm with a particular expertise in "accessibility-based" modeling.

RPG proposed a sketch modeling tool that would enable rapid analysis of travel behaviors, including mode choice, non-motorized travel, average trip length, trip distribution, and ride-hailing service utilization throughout the Boston region. This Enhanced Multimodal Accessibility Model (EMMA) responds to the need for reliable planning-level insight into urban travel behaviors that are sensitive to land use, urban design, and travel costs with minimal reliance on complex regional travel models. It utilizes multimodal accessibility as the overarching analysis framework, linking travel behavior to the effectiveness with which different travel modes (walking, driving, public transit, e.g.) connect households, jobs, schools, and shopping. https://renaissanceplanning.github.io/WestStation/index.html

EMMA is designed to use travel time and cost information from the CTPS travel demand model, but contains its own formulas for trip generation (how many trips are produced in a given area), distribution (where those trips are going), and mode choice (how people choose to get there.) Just like the travel demand model, these formulas are based on travel survey data, and they were calibrated to match the CTPS travel model outputs as much as possible. Unlike the travel demand model, EMMA does not attempt to assign each traveler to a specific path on the road network or a specific transit route; instead, it estimates the likelihood that someone will use a given mode based on travel time, cost, and other neighborhood characteristics. EMMA is also able to use more detailed information on demographics and pedestrian and bike facilities than is currently accounted for in the regional model.

The model extent includes 164 municipalities in Eastern Massachusetts, the same extent as the CTPS travel demand model. To better model and summarize forecasts for the West Station area, MAPC and RPG also defined two subsets of the model area: the Focus Area and a Buffer Area (see map.) The Focus Area encompasses 500 acres of land within about a half mile of West station. It includes the entirety of Allston Landing and the Enterprise Research Campus, as well as a large area south of the turnpike along Commonwealth Avenue where substantial redevelopment is likely. The Buffer area is a larger geography that covers all of Allston and Brighton, as well as the Longwood Medical Area, downtown Boston, most of Brookline and Cambridge, and part of Somerville. The extent of the Buffer Area was defined based on an approximately a thirty-minute bicycle ride from the Focus Area and contains the neighborhoods that have the highest attraction to the Focus Area given their proximity. Measuring the impact that the alternatives have on trips to the Focus Area is a good indicator of how the new neighborhood around West Station will function from a transportation perspective. Measuring the impact that the alternatives have on the Buffer Area identifies their greater regional impact.

For most of the region, EMMA uses the same travel analysis zones as are used in the CTPS model. In the Focus Area and Buffer Area, the model uses more geographically detailed census blocks as the unit of analysis. Within each geographic area, MAPC specifies the number and characteristics of resident households, the number and type of jobs, the cost of parking, and other important factors. These inputs can be changed to create alternative scenarios. The other big variables are travel time and cost between different zones. MAPC and CTPS worked together to define different transportation alternatives; and CTPS ran these through a portion of their travel demand model to provide detailed travel time and cost estimates under different alternatives. These were then input into EMMA to create new scenarios.

The key outputs of the model for each scenario are mode split, job accessibility, and greenhouse gas (GHG) metrics. The mode split is a breakdown of the percentage of trips taken to and from a given area by the different travel modes. EMMA also quantifies the number of workers that can access jobs in a thirty-minute commute time by the different modes, and the degree to which employers can access workers. These are termed accessibility metrics. Finally, the model quantifies the vehicle miles traveled (VMT) to and from each area, which serve as the basis for estimates of GHG emissions. For simplicity, the analysis is confined to the morning AM peak period (6am–9am).

Multimodal accessibility is an established transportation analysis metric that is recently generating new insights into travel behavior. It is a relatively simple metric, comprised of a few key components:

- **Zones** are geographic aggregations, such as census blocks or travel analysis zones (TAZ's), that generalize locations where trips come from or go to.
- **Purposes** are the reasons we travel: jobs, schools, stores, etc.
- **Population groups** are defined by demographic characteristics that impact how, why, when, and where people travel.
- **Costs or Impedances** refer to the time and money required to travel from each zone to each other zone. Cost components include things like transit fares, transfer times, highway tolls, and parking costs.
- **Decay** refers to the concept that travel is less likely to occur between two zones if the cost to travel between them is high. Specific rates of decay vary by mode and travel purpose.

The EMMA tool includes travel within all eastern Massachusetts. For this West Station Area Transit Study, the model includes a Buffer Area, which in general is areas that can be reached within a 30-miunte bicycle ride from the future West Station, as well as a model Focus Area that includes land that is likely to see substantive new development around West Station. The model operates at the Census Block scale inside the Buffer Area and at the Transportation Analysis Zone (TAZ) scale across the rest of the region (see maps on the next page).

For the West Station area analysis, MAPC used the following EMMA outputs for each scenario: total trips in the morning peak period (6 to 9 am); travel mode share, which is the percentage of trips by automobile, transit, and active transportation (i.e., walking, cycling, rolling)"; vehicle miles travelled (VMT) that was then used to calculate greenhouse gas (GHG) emissions; and the number of jobs accessible by households as well as the number of workers accessible to employers.

Transportation Assumptions

Commuter Rail: The Baseline for our analysis was the schedule included in MassDOT's project DEIR of three trips in the peak direction (inbound/eastbound toward South Station) during the morning peak period, and two outbound trips during the morning peak. MAPC also tested a sample of the regional rail alternatives conceptualized in the MBTA's Rail Vision study; namely Rail Vision Alternatives 3, 4, 5, and 6. All of these provide fifteen-minute frequency to West Station, though the available destinations vary. Rail Vision 6 assumes fifteen-minute frequency of service across most of the commuter rail system, and includes a northsouth rail link. With the exception of Alternative 4, all Rail Vision scenarios incorporate a rail shuttle service on the Grand Junction line between West Station and North Station, via Kendall Square.

Shuttles and Bus Rapid Transit: The Baseline level of bus service improvement was based on the shuttle services proposed in MassDOT's 2017 project DEIR. This Baseline service consists of three shuttle bus lines between West Station and Harvard Square, Kendall Square, and the Longwood Medical Area (LMA), operating at 5 to15 minute intervals and in mixed traffic (i.e., without dedicated bus lanes). The DEIR did not assume any other changes in bus service elsewhere in the region (including changes that have happened due to COVID-19 pandemic or the MBTA's Better Bus Project or Bus Network Redesign).

MAPC also developed two BRT alternatives with input from City of Boston, CTPS, and public engagement feedback. These alternatives assume buses are travelling in dedicated lanes at free-flow speeds (i.e., not stuck in traffic) with 9-minute headways during the morning peak period. These alternatives represent aspirational levels of bus service through key corridors, and we did not assess the feasibility of this on any particular roadway segment to determine conflicts with travel lanes or parking.

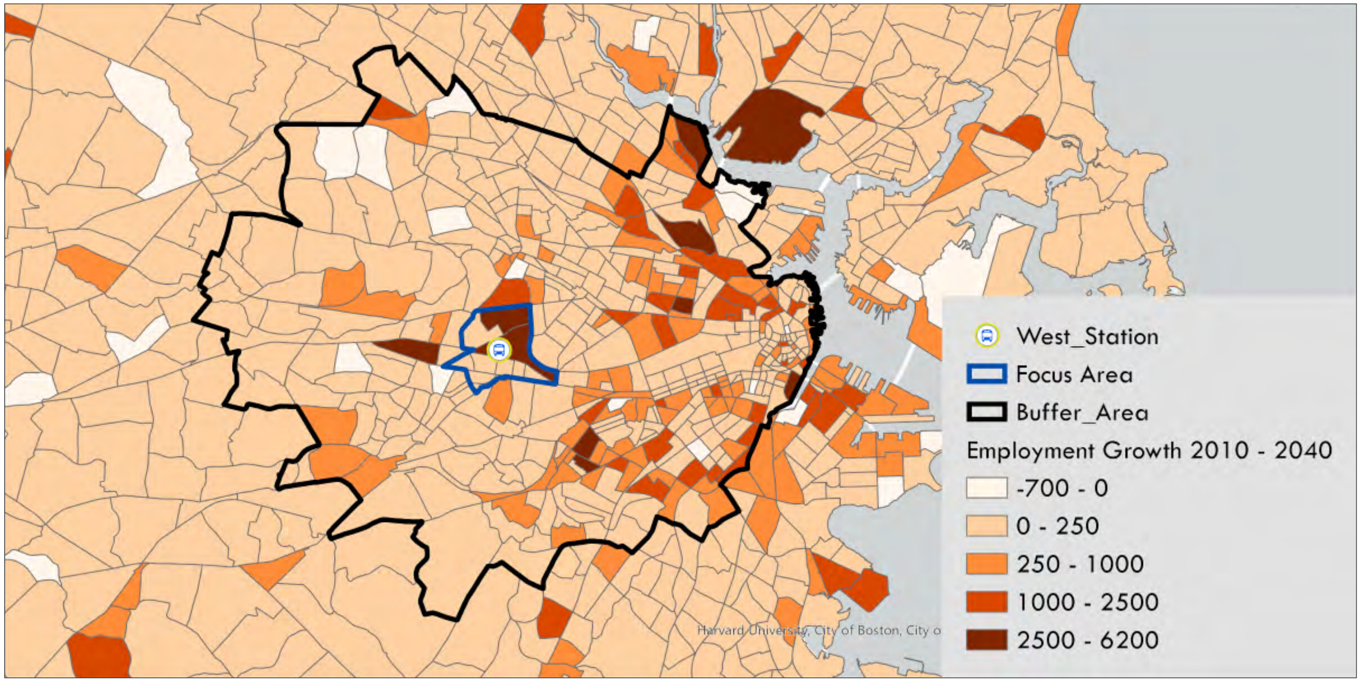
Separated Cycleways: The Baseline for the bicycle and pedestrian network is based on the OpenStreetMap (www.openstreetmap.org) layer for pedestrian and cycling infrastructure as of December 2019. This layer includes a range of cycling-related classifications for network segments, including onstreet paint-only bicycle lanes, dedicated protected cycleways, off-street cyclepaths, and multi-use, and pedestrian paths. MAPC also created an alternative network that significantly expands the infrastructure for protected, low-stress bicycling and pedestrian facilities through and around West Station. More detail of this separate cycleways network in described in the main body of the report.

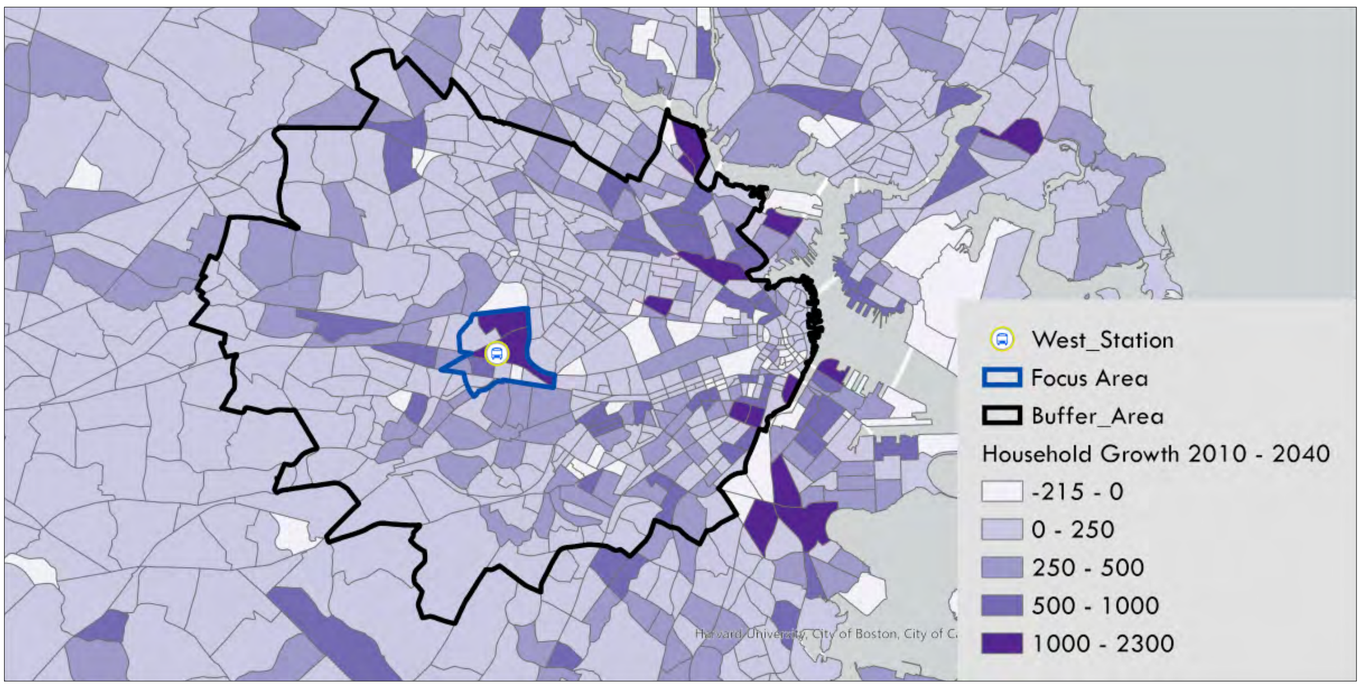
Parking: Consistent with the land use inputs developed by MAPC in 2019 for the MassDOT's environmental analysis, the baseline assumption for the cost of parking is $18 per auto trip to the Focus Area. In order to estimate the impact of this cost, we also modeled scenarios without any parking costs at all. MAPC's land use forecasts also included certain assumptions about parking availability; specifically, those forecasts assume auto ownership rates of only 0.3 vehicles per household, on average, consistent with the availability of parking in the development square footage. Costs for residential parking are not considered in the model.

Housing and Employment Assumptions

MAPC developed land use projections for Allston Landing in 2019 to support MassDOT's environmental permitting and design. These projections were informed by multiple conversations with Harvard University Staff and study of comparable redevelopment areas in Greater Boston. Details of the assumptions and inputs used are available in a memo prepared by MAPC for MassDOT and described in the main body of this report.

The model also assumed additional growth in employment and households that were distributed across the project Focus Area, Buffer Area, as well as eastern Massachusetts. In total, the Focus Area is projected to grow by 4,677 housing units and 10,420 jobs between 2010 and 2040, with an additional 1,300 housing units and 3,575, jobs anticipated in post-2040 development at Allston Landing. For context, the total projected household and job growth for the 101 municipalities in the MAPC region is 366,000 households and 261,000 jobs over the same period. The maps below illustrate the distribution of this proposed employment and population growth in the Focus Area, Buffer Area and surrounding neighborhoods.


West_Station
Focus Area
Buffer_Area
Employment Growth 2010 - 2040
-700 - 0
0 - 250
250 - 1000
1000 - 2500
2500 - 6200


West_Station
Focus Area
Buffer_Area
Household Growth 2010 - 2040
-215 - 0
0 - 250
250 - 500
500 - 1000
1000 - 2300

Model Results — Trips to Focus Area

The table below shows the model results for trips to and within the project Focus Area for the various scenarios.

Scenarios		Total Trips			Travel Mode Share*			VMT
Land Use	Transportation	Transit	Active	Auto	Transit Share	Active Travel Share	Auto Share	Vehicle Miles Travelled
Arrow indicates whether higher or lower values are more desirable		↑	↑	↓	↑	↑	↓	↓
Build 2040	Baseline: Limited Rail Service/ Shuttles	3,000	6,200	13,000	17%	31%	52%	76,700
Build 2040	Free Parking + Baseline	3,000	6,200	13,000	14%	28%	59%	89,900
Build 2040	BRT Network A	4,200	6,900	11,000	19%	31%	50%	73,300
Build 2040	BRT Network B	4,500	7,000	10,600	20%	32%	48%	70,000
Build 2040	Cycleway Network + BRT Network B	3,600	8,500	10,000	16%	39%	45%	66,200
Build 2040	Rail Vision 3	5,200	7,900	9,000	24%	36%	41%	56,300
Build 2040	Rail Vision 4	5,300	7,900	8,900	24%	36%	40%	55,700
Build 2040	Rail Vision 5	5,400	7,900	8,900	24%	36%	40%	56,000
Build 2040	Rail Vision 6	5,600	7,900	8,600	25%	36%	39%	53,100
Build 2040	Free parking + Rail Vision 6	4,600	7,000	10,500	21%	32%	47%	66,300
Complete Build-out	Rail Vision 6	8,800	10,200	10,100	30%	35%	35%	61,467

Model Results — Job Access and Access to Workers in the Focus Area

The table below shows the model results for trips to and within the project Focus Area for the various scenarios.

Land Use Scenario	Transportation Scenario	Jobs Accessible by Transit for Focus Area Households	Workers Accessible by Transit for Focus Area Employers
Build 2040	Limited Rail Service/ Shuttles (EIR) -- Baseline	2,126,000	334,000
Build 2040	BRT Network A	2,434,000	358,000
Build 2040	BRT Network B	2,515,000	371,000
Build 2040	Expanded Cycleway Network with BRT Network B	2,515,000	371,000
Build 2040	Rail Vision 3	2,057,000	330,000
Build 2040	Rail Vision 4	2,101,000	340,000
Build 2040	Rail Vision 5	2,101,000	340,000
Build 2040	Rail Vision 6	2,215,000	353,000
Build 2040	Free parking + Rail Vision 6	2,215,000	353,000
Complete Build-out	Rail Vision 6	2,215,000	353,000