METRO CONNECTOR

Existing Conditions Report

October 2024

RIPTA

RHODE ISLAND PUBLIC TRANSIT AUTHORITY

Contents

Table of Figures

Table of Tables

1 Introduction

The purpose of the Metro Connector Study is to consider options for providing fast, reliable, and frequent transit that connects major transportation hubs, regional activity centers, and residential neighborhoods in metropolitan Providence while achieving other State goals related to climate, sustainable housing growth, and economic development in an equitable manner. **This Existing Conditions Report is a key piece of the Metro Connector Study; it provides an overview of opportunities and constraints within the study area, identifies the most relevant information and sets the stage for development and evaluation of rapid transit alternatives**. This introduction lays out the rest of this report, providing:

- **Report Purpose**, which describes the role of the Existing Conditions Report in the overall Metro Connector Study
- **Report Outline**, which describes how this report is organized.
- **Study Area**, which provides an overview of the study area examined in this document

Report Purpose

This Existing Conditions Report provides an overview of opportunities and constraints within the study area, identifies the most relevant information and sets the stage for development and evaluation of rapid transit alternatives.

A key piece of the Metro Connector Study, the Existing Conditions Report collects, synthesizes, and assesses a variety of qualitative and quantitative information that provides context for the rapid transit study.

Transit Forward RI 2040, Rhode Island's statewide Transit Master Plan, was adopted into the State Guide Plan in 2020. The Plan identified that much of metropolitan Providence has very high underlying demand for transit which rivals that found along existing light rail and bus rapid transit corridors in much larger cities across the US. Two corridors were identified that connect such areas of high demand and that run north-south across the Providence metropolitan region, the first extending from the Central Falls/Cumberland border through Pawtucket, downtown Providence, Cranston, and Warwick to the CCRI-Warwick Campus, and the second connecting downtown Providence to T.F. Green International Airport.

The purpose of the Metro Connector Study is to consider options for providing fast, reliable, and frequent transit that connects major transportation hubs, regional activity centers, and residential neighborhoods in metropolitan Providence while achieving other State goals related to climate, sustainable housing growth, and economic development in an equitable manner.

Report Outline

This report is organized into seven chapters, with each chapter examining a different type of existing conditions information:

1. **Chapter 1 – Introduction**, which is this chapter.
2. **Chapter 2 – Plan and Policy Review** summarizes existing transportation and land use plans, transportation policies, and other studies which inform potential future rapid transit in the study area.
3. **Chapter 3 – Land-Use and Zoning Assessment** assesses current and future land uses in the study area, with a special focus on the relationship between land use and rapid transit.
4. **Chapter 4 – Transit Network Analysis** highlights relevant aspects of the transit network and transit performance in the study area.
5. **Chapter 5 – Existing Right-of-Way Conditions** describes existing relevant right-of-way characteristics, such as roadway widths and railroad right-of-way.
6. **Chapter 6 – Market Analysis** describes the market for transit in the study area.
7. **Chapter 7 – Environmental** identifies the major environmental features in the study area that should be considered as part of the study, with an emphasis on sensitive environmental features that will serve as constraints to our analysis.

Study Area

The Metro Connector study area (Figure 1-1) can generally be defined as the area from the Valley Falls neighborhood of Cumberland, RI in the north to the Community College of Rhode Island's Warwick Campus in Warwick, RI, including much of Central Falls, Pawtucket, Providence, and Cranston. The study area includes several potential north-south road alignments connecting these areas.

The study area for the project is the area within 1 mile of the two corridors identified for light rail and/or bus rapid transit in RIPTA's Transit Forward RI 2040 Transit Master Plan (TMP). The study area allows us to consider a wide variety of potential alignments.

The major transit corridors identified in the TMP are:

- A longer corridor from Valley Falls to CCRI-Warwick or TF Green Airport Station via Broad Street or Dexter Street in Central Falls, Downtown Providence, and Route 2 (named Reservoir Boulevard, New London Avenue, and Bald Hill Road).
- A shorter corridor from Downtown Providence to TF Green Airport Station or CCRI Warwick via Eddy Street, Warwick Avenue, and Post Road.

Although the study area includes the municipalities of Cumberland, Central Falls, Providence, Cranston, and Warwick only, residents from other communities in Rhode Island and Massachusetts are expected to benefit from an investment in high-capacity transit as well.

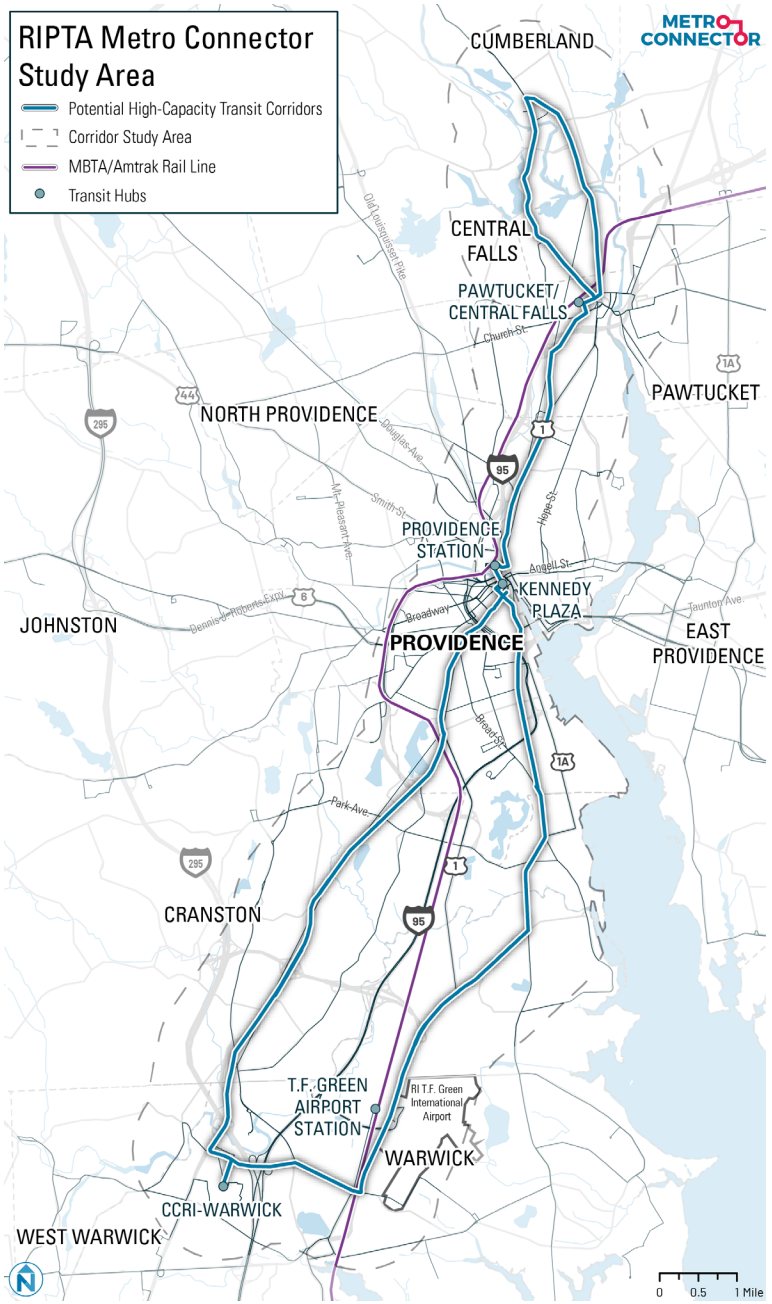


Figure 1-1 Metro Connector Study Area

2 Existing Plans and Policy Review

This chapter establishes the Metro Connector planning effort within the context of other plans and policies completed or ongoing in Rhode Island. Through this work, RIPTA can better understand the state and local policies in place today, and adopted plans that establish broader goals with which the Metro Connector should align or, if inconsistencies are present, that RIPTA should be aware of at the outset of this effort.

The work focused on plans where transportation, sustainability, and/or land use were addressed. The most relevant findings from each plan regarding the Metro Connector Study are summarized over the following pages.

The list of plans reviewed is in Table 2-1 below.

Table 2-1 Reviewed Plans and Reports

Plan	Agency/City	Publication Date	Link (if available)
Statewide Transportation Plans			
Transit Forward RI 2040 (Statewide Transit Master Plan)	RIPTA, Rhode Island Department of Transportation (RIDOT), and Rhode Island Department of Administration (RIDOA) / Division of Statewide Planning (DSP)	2020	Link
Moving Forward RI 2040 (Statewide Long Range Transportation Plan and Metropolitan Transportation Plan)	RIDOA / DSP	2020	Link
State Transportation Improvement Program (STIP)	Rhode Island State Planning Council	2024	Link
Statewide Bicycle Mobility Plan	RIDOA / DSP	2020	Link
Congestion Management Plan	RIDOA / DSP	2020	Link
Climate and Sustainability Plans			
2021 Act on Climate and 2022 Climate Update	Rhode Island Office of the Governor and the Executive Climate Change Coordinating Council (EC4)	2021/2022	2021 Act on Climate: Link 2022 Climate Update: Link
Clean Transportation and Mobility Innovation Report	Rhode Island Mobility Innovation Working Group	2021	Link
Climate Justice Plan	City of Providence / Office of Sustainability	2019	Link
2021-2024 Rhode Island Asthma Strategic Plan	Rhode Island Department of Health (RIDOH)	2021	Link
Safety and Complete Streets Policies/Plans			
Statewide Complete Streets Policy	Rhode Island General Assembly	2012	Link
RI Complete Streets Plan	RIDOT (2025 update under development by RI DSP)	2015	Link
Walk Bike PCF	RIDOT, RI DOA/DSP, City of Pawtucket, City of Central Falls	2020	Link
Providence Great Streets Plan	City of Providence/Department of Planning & Development	2020 & 2024	Link
North Main Street Corridor Study	City of Providence/Department of Planning & Development	2022	Link
North Main Street Roadway Safety Audit	RIDOT	2024	Not available
Safe Streets for All (SS4A) Plans (Under development)	RIPTA and local municipalities (under development)	Expected 2024 and later	Not available

Plan	Agency/City	Publication Date	Link (if available)
Land Use & Housing Plans and Policies			
Statewide Transit-Oriented Development Pilot Program Legislation (2023 H6084B)	RI General Assembly	2023	Link
Housing Facts RI	HousingWorks RI	2023	Link
Pawtucket & Central Falls Station District Vision Plan	City of Pawtucket / City of Central Falls	2016	Link
Providence Comprehensive Plan (2024 Update)	City of Providence / Department of Planning & Development / Providence	Expected 2024 (under development)	Not available
Warwick Master Plan	City of Warwick / Planning Board	2013	Link
Warwick Station Development District Master Plan	City of Warwick / Planning Department	2012	Link
City of Pawtucket Comprehensive Plan	City of Pawtucket / Planning Commission	2017	Link
Central Falls 2050	City of Central Falls / Planning and Economic Development	Expected 2024 (under development)	Not available
City of Cranston Comprehensive Plan	City of Cranston	2010	Link
Town of Cumberland Comprehensive Plan Valley Falls and Lonsdale Economic Revitalization & Social Equity Plan	Town of Cumberland	Comprehensive Plan: 2017 Valley Falls and Lonsdale Plan: 2023	Comprehensive Plan: Link VFL Plan: Link
Ocean State Accelerates (Comprehensive Economic Development Strategy)	Rhode Island Commerce	2023	Link
RI 2030: Charting a Course for the Future of the Ocean State	Office of Governor Daniel J. McKee	2022	Link

Statewide Transportation Plans

Transit Forward RI 2040 / Statewide Transit Master Plan (2020)

The Statewide Transit Master Plan (TMP) lays out a long-range vision for RIPTA services for 2040. The plan is guided by the following goals:

- Enhance: Make transit more attractive and compelling
- Connect: Connect people to activities
- Thrive: Grow the economy and improve quality of life
- Sustain: Ensure financial and environmental sustainability

The plan was based on detailed modeling of ridership demand across the State and informed by extensive public outreach through community meetings, workshops, and surveys. Its recommendations are organized into 5 initiatives, three of which are particularly relevant to the Study. **One of the five TMP initiatives specifically calls for the introduction of HCT between Central Falls and CCRI Warwick, and between Providence and RI TF Green International Airport (the Airport).**

Table 2-2 Transit Forward RI Initiatives

Initiative	Relevance to Metro Connector Study
Improve the frequency, span, and speed of existing services.	Existing RIPTA services with high ridership and serving areas with high transit propensity were identified for further investment. This included a recommendation to make service in the two high-capacity transit (HCT) corridors faster, more frequent and more reliable.
Develop HCT such as light rail, bus rapid transit, or rapid bus	The TMP's most relevant recommendation was the identification of two major corridors for HCT, either Bus Rapid Transit (BRT) or Light Rail Transit (LRT), based on high levels of ridership demand, shown in Figure 2-2. One corridor would potentially operate between CCRI Warwick and Central Falls; the second would potentially operate between CCRI Warwick and Providence via TF Green Airport. Both routes would operate every 10 minutes or better for at least 18 hours per day. The plan identified these projects as near-term priorities.
Make it easier to get to and from transit stops	This initiative would improve access to transit services through new pedestrian and bicycle investments along several major corridors in Metro Providence, including the two corridors identified for HCT.

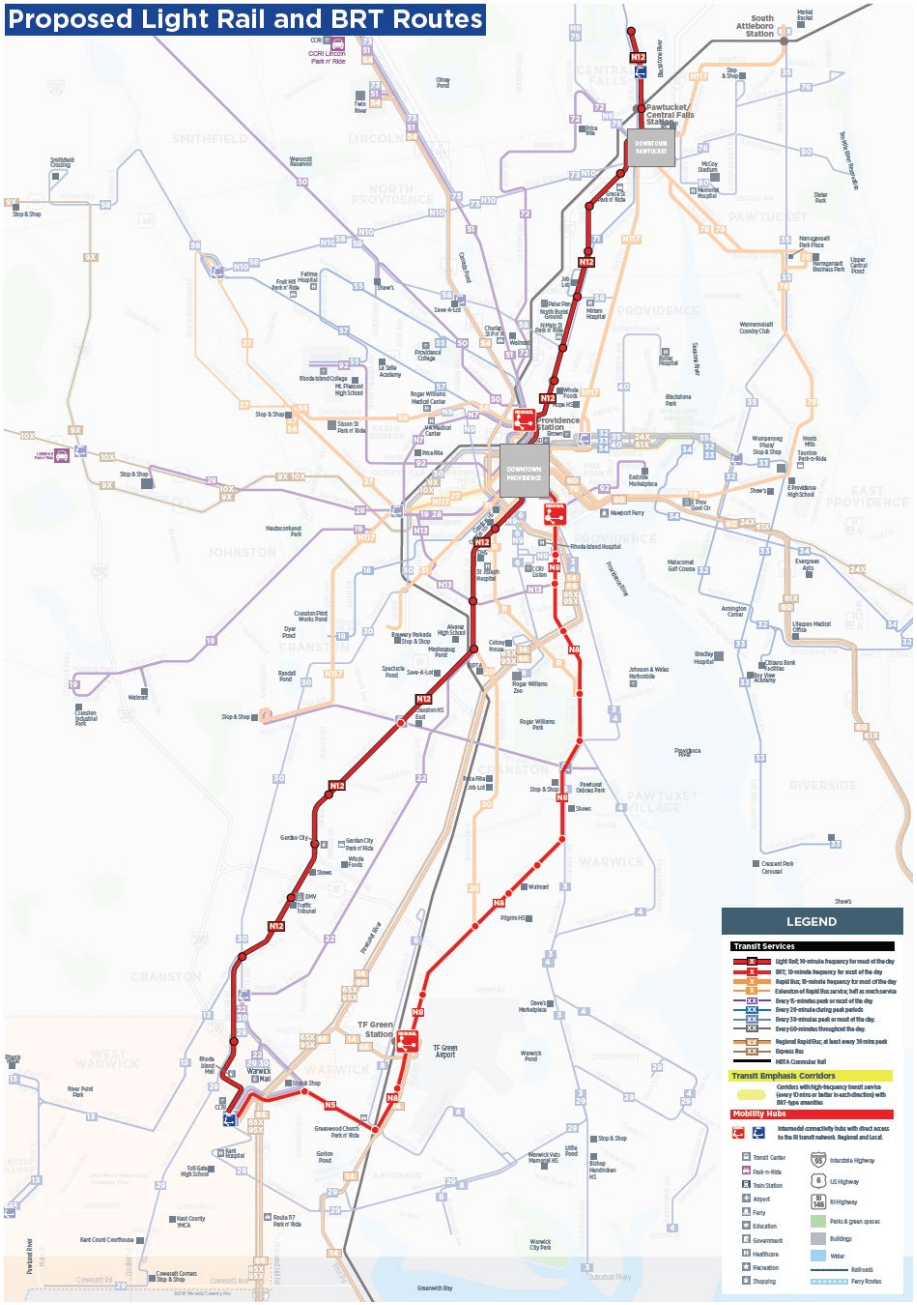


Figure 2-1 High-Capacity Transit

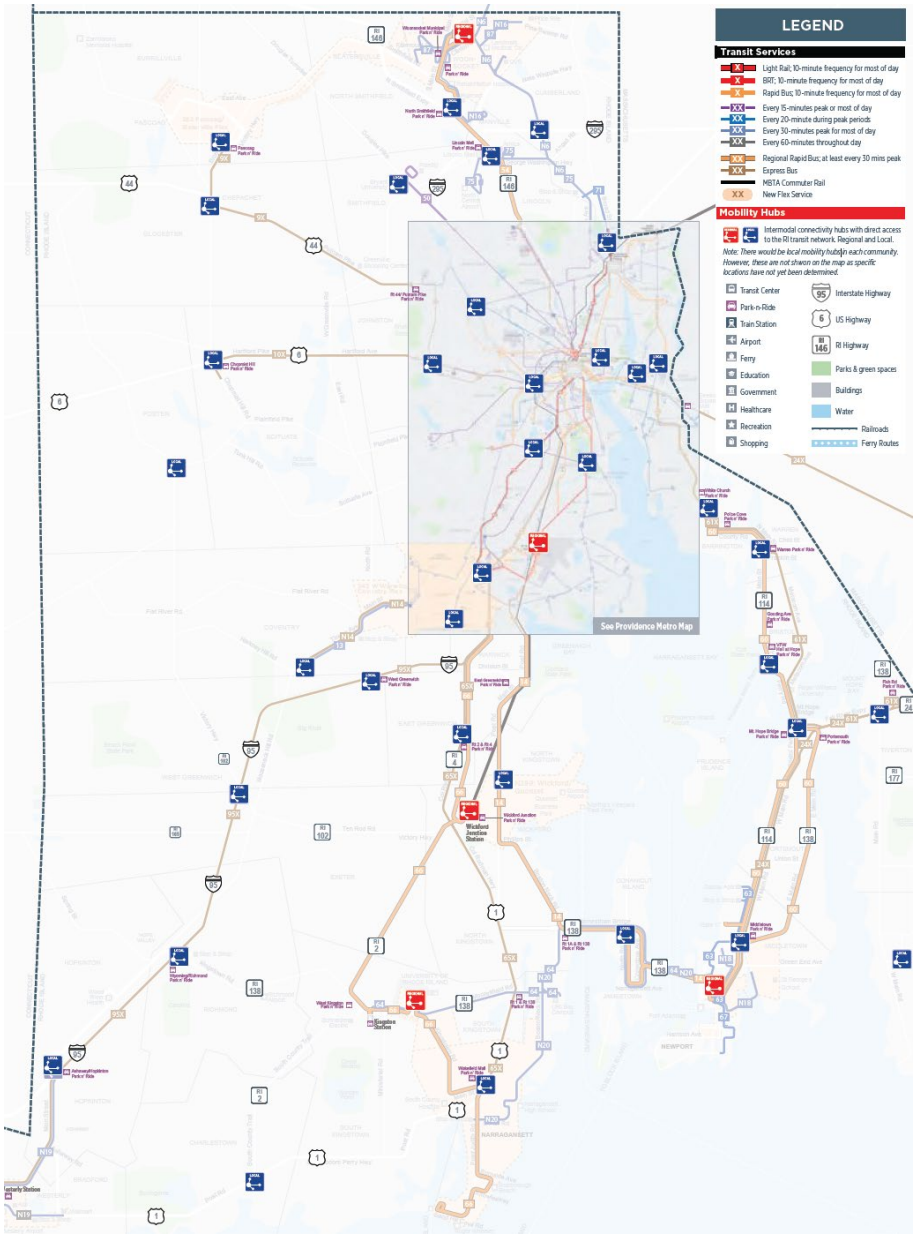


Figure 2-2 Mobility Hubs

Moving Forward RI 2040 / Rhode Island Long Range Transportation Plan and Metropolitan Transportation Plan (2020)

Moving Forward RI 2040 is the State's most recent Long Range Transportation Plan update. It represents a fiscally constrained approach to bringing together detailed modal plans, including the TMP, Bike Mobility Plan, and Congestion Management Plan. The plan describes Rhode Island's most critical transportation needs and challenges over a twenty-year horizon through 2040 and establishes performance measures and targets.

The plan projects trends through 2040. Higher densities and increasing congestion are expected, with the greatest increases around Providence and in Warwick near RI TF Green International Airport. Population is expected to grow by almost 2% in Providence County through 2040, and by 0.5% in Kent County (although employment is expected to shrink in both counties, by -0.4% and -1.2%, respectively). Overall, a 7% increase in trip-making is expected statewide, with some of the largest increases along the study corridors. These trends underscore the need for HCT in the study corridors.

The plan identified five statewide goals, all of which would be directly advanced by the development of HCT. To advance these goals, **the plan identified key projects including BRT/LRT improvements between Central Falls and CCRI Warwick and Providence and the Airport. It further established performance measures including those to increase transit ridership; build more dedicated bus lanes to improve transit reliability; encourage mode shift and reduce VMT; and increase the number of people living and working along frequent transit corridors.**

Table 2-3 State Transportation Goals and Metro Connector Study

State Transportation Goals	Relevance to Metro Connector Study
Connect People and Places across all modes for efficient and effective travel ▪ Performance Measures: Increase transit ridership, on-time performance, and reliability of person-miles traveled	Identify priority networks for all modes; focus on intermodal connections; and provide incentives for use of public transportation
Maintain Infrastructure to create a reliable network and adequate travel choices ▪ Performance Measures: Increase the number of dedicated bus lane miles and reduce safety incident rate	Prioritize multi-modal solutions that have a high return on investment; improve safety and mobility for all travelers; and bundle ADA, safety and multi-modal facility improvements.
Strengthen Communities to enhance the quality of life ▪ Performance Measure: transportation equity benefits	Prioritize improvements that encourage mode shift; support Complete Streets ordinances; support TOD ordinances; promote regional TOD funds that leverage public resources; ensure transportation investments benefit disadvantaged communities and minimize displacement; ensure public transit is faster, more frequent, affordable and gets people where they want to go; and better connect land use.
Promote Environmental Sustainability by prioritizing non-single occupancy vehicles (SOVs)) ▪ Performance Measure: Reduce VMT	Promote alternatives to SOV trips, particularly transit; implement smart growth policies; develop measures to counter transportation GHG emission sources; and support active transportation and transit.
Support Economic Growth through transportation connectivity and choices ▪ Performance Measures: Increase total population and employment within ½ mile of frequent transit	Provide opportunities for TOD; maximize efficient multimodal connections at TF Green Airport; invest in regional mobility enhancements; promote non-SOV transportation; and improve safety.

State Transportation Improvement Program (STIP) 2022-2031 (most recently amended in 2024)

The State Transportation Improvement Program (STIP) is a federally required document outlining the State's plans to use US Department of Transportation Funds. The most recent update for FFY 2022-2031 lists funded surface transportation projects. Programmed funding relevant to the proposed HCT corridors include support for:

- TMP implementation (e.g. mobility hubs, frequent transit networks, crosstown service, rapid bus, regional rapid bus, and other transit improvements)
- Study and development for a new Providence Intermodal Center
- Construction of a bus hub at the CCRI Warwick Campus

Funded roadway projects were identified through a review of the most recent RhodeWorks Plan (2022). RIDOT manages the RhodeWorks program to provide State match to federal projects, particularly repairing, rehabilitating, and preserving bridges and other major infrastructure. Programmed roadway improvements through 2032 include additional projects within the Metro Connector Study area that provide opportunities to support transit.

Active Transportation Program

- Traffic Safety Program (Statewide)
- US-1, North Main St (Doyle Ave to Pawtucket T/L)
- Woonasquatucket Greenway Enhancements (Providence)
- North Main St. at Doyle Ave. and Randall St. (Providence)
- Elmwood Avenue between Route 2 and I-95 (Providence)
- Bald Hill Road (RI-2) Warwick

Major Capital Projects

- East Ave Corridor (Warwick)
- Post Road/US -1 (Warwick)

Corridor Improvements Program

- RI-2 Bald Hill and Quaker Lane (Warwick)

Congestion Management Plan (2020)

The State Transportation Improvement Program (STIP) is a federally required document outlining the State's plans to use US Department of Transportation Funds. The most recent update for FFY 2022-2031 lists funded surface transportation projects. Programmed funding relevant to the proposed HCT corridors include support for:

- TMP implementation (e.g. mobility hubs, frequent transit networks, crosstown service, rapid bus, regional rapid bus, and other transit improvements)
- Study and development for a new Providence Intermodal Center
- Construction of a bus hub at the CCRI Warwick Campus

Funded roadway projects were identified through a review of the most recent RhodeWorks Plan (2022). RIDOT manages the RhodeWorks program to provide State match to federal projects, particularly repairing, rehabilitating, and preserving bridges and other major infrastructure. Programmed roadway improvements through 2032, include additional projects within the Metro Connector Study area that provide opportunities to support transit.

Active Transportation Program

- Traffic Safety Program (Statewide)
- US-1, North Main St (Doyle Ave to Pawtucket T/L)
- Woonasquatucket Greenway Enhancements (Providence)
- North Main St. at Doyle Ave. and Randall St. (Providence)
- Elmwood Avenue between Route 2 and I-95 (Providence)
- Bald Hill Road (RI-2) Warwick

Major Capital Projects

- East Ave Corridor (Warwick)
- Post Road/US -1 (Warwick)

Corridor Improvements Program

- RI-2 Bald Hill and Quaker Lane (Warwick)

Statewide Bicycle Mobility Plan (2020)

Along with the TMP, the Statewide Bicycle Mobility Plan (BMP) has been incorporated into Moving Forward RI 2040, the LRTP. Several BMP goals directly relate to public transit including: integrating the bicycle and transit networks, improving bicycle connectivity to transit facilities, considering shared bus-bike lanes, making improvements to the bicycle network around transit facilities, improving bus access for bicyclists, and improving bike parking near transit facilities. These enhancements will be considered part of Metro Connector Study concepts and align with Complete Streets policies below. The map in Figure 2-3 identifies corridors as candidates for the proposed recommendations, connecting with existing and fully funded facilities to create a statewide network, and indicating treatments that have not yet been funded.

Additionally, there are currently several planned and proposed bike and pedestrian enhancements within the Metro Connector Study area. These include:

- Extension and enhancement of the Woonasquatucket Greenway bike trail into downtown Providence.
- A proposed infill connection on the Blackstone Valley Bike Trail between Central Falls and Providence
- A proposed Mineral Springs Greenway that would intersect with the northern HCT corridor

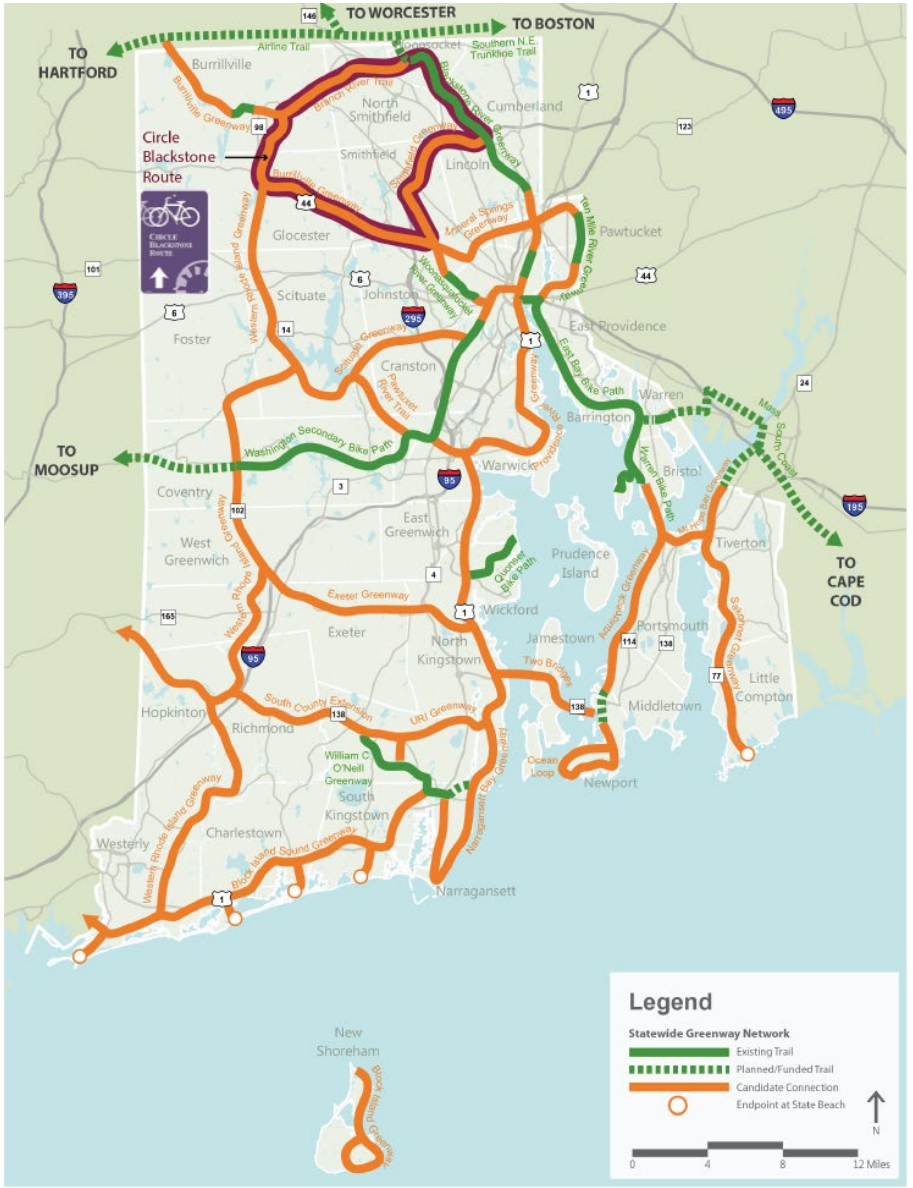


Figure 2-3 Proposed Statewide Greenway Network

Climate and Sustainability Plans

RI Act on Climate (2021) and 2022 Climate Update

The 2021 Act on Climate (RIGL §42-6.2) set mandatory targets for statewide greenhouse gas (GHG) emission reductions to achieve net zero emissions by 2050. These mandates are legally enforceable.

Table 2-4 RI Act on Climate Goals and Metro Connector Study

RI Act on Climate Goals	Relevance to Metro Connector Study
Reduction of greenhouse gas emissions by the following amounts below 1990 levels: ▪ 45% reduction by 2030 ▪ 80% reduction by 2040 ▪ Net-zero emissions by 2050	HCT is projected to increase transit ridership and encourage mode shift, thereby reducing overall VMT and GHG emissions and helping the State to achieve net zero by 2050.

The Act also established the Environmental Climate Change Coordinating Council (EC4) which is tasked with identifying priority actions to achieve net zero and preparing annual updates on the State's overall progress. **EC4's most recent 2022 Climate Update identified transportation as the state's largest GHG source responsible for 39.7% of statewide GHG emissions with two priority actions that the Metro Connector Study will directly help support.**

Table 2-5 Climate Update Priority Actions and Metro Connector Study

2022 Climate Update Priority Actions	Relevance to Metro Connector Study
Implement Transit Forward RI 2040 (TMP)	This action is estimated to grow transit ridership by 87,000 daily passenger trips and significantly reduce GHG emissions. The EC4 specifically points to the implementation of priority corridors recommended in the TMP, including the HCT corridors under study. The EC4 includes these emission reductions in their modeling for annual updates to achieve net zero.
Develop Complete Streets State Plan	Complete Streets enable safe use and support mobility for all users, including drivers, pedestrians, bicyclists and transit riders. Designing roadways with all users in mind will make the transportation network safer and more efficient. The Metro Connector Study will advance complete street strategies as part of corridor concepts.

Clean Transportation and Mobility Innovation Report (2021)

This plan offered a mobility vision for Rhode Island and assessed strategies and new technologies that would lead to a more equitable and environmentally responsible transportation system. The plan calls for improvements and programs that aim to create a more efficient transportation network for Rhode Islanders, goals that specifically align with the Metro Connector Study.

On-board rider surveys from RIPTA indicate that low-income households rely heavily on public transportation, indicating that transit investments to attract new riders would decrease emissions as well as enhance mobility for low-income Rhode Island residents. Additionally, the growing concentration of the low-income population, projected to be 60% in greater Providence, reinforces the need for improved public transportation as traffic congestion and parking constraints increase.

The plan recommends expanding and investing in transportation assets to improve accessibility, including implementation of Transit Forward RI and creating a forward-looking transit structure for HCT and other transportation technologies.

Providence Climate Justice Plan (2019)

The City of Providence also has set a goal to become carbon neutral by 2050, and its Climate Justice Plan focuses on transitioning away from fossil fuel usage, particularly for "front line communities" or the low-income communities of color that are situated close to transportation facilities and industrial areas. These communities are shown on the Environmental Justice Screening Map (Figure 2-4).

The plan prioritizes modification of traffic patterns, transit improvements, and mode shift away from single-occupancy vehicles. **The Metro Connector Study aims to introduce improved transit serving several of the front-line communities mapped by the City, particularly in South Providence.** These improvements will help meet City goals to encourage mode shift and reduce emissions. The City has previously made progress towards these goals through a new zoning ordinance in 2014 that removed parking minimums in Downtown and in three TOD overlay zones, all served by the Metro Connector study corridors.

Figure 5

Environmental Justice Screening Map: Frontline Communities

Demographic Data (National Percentiles)

- Data not available
- Less than 50 percentile
- 50–60 percentile
- 60–70 percentile
- 70–80 percentile
- 80–90 percentile
- 90–95 percentile
- 95–100 percentile

Figure 5: Source: EPA's Environmental Justice Screening and Mapping Tool (EJSCREEN). Version 2018.

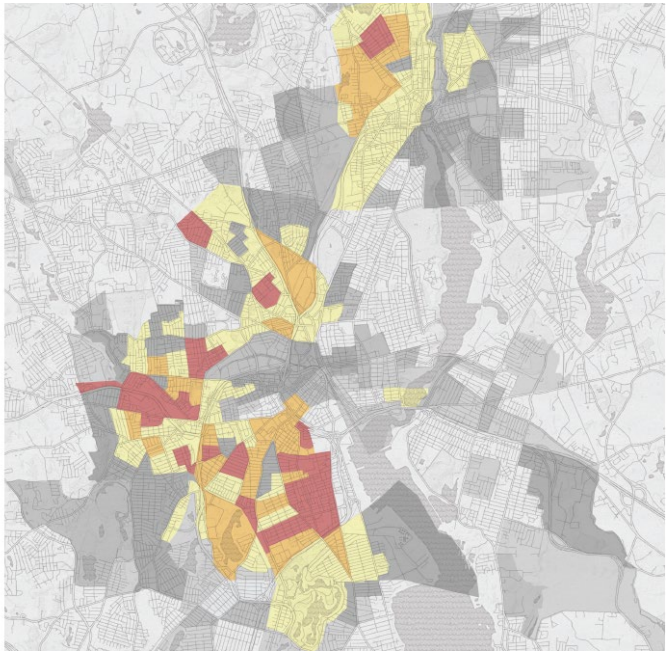


Figure 2-4 Environmental Justice Screening Map

2021-2024 Rhode Island Asthma Strategic Plan (2021)

This plan aims to prepare Rhode Island for the health effects of climate change and specifically focus on high asthma burden areas to mitigate these effects, in part through transportation. The plan is particularly focused on the air quality effects of transportation, and one of the objectives of the plan is to improve transportation infrastructure and reduce traffic congestion in and around low-income and communities of color. Public transit and particularly high-capacity transit is an effective strategy for reducing automobile usage, making this plan relevant to this effort.

One strategy proposed in the plan includes working with towns to pass, fund, and implement complete streets, which aligns with this effort because complete streets highlight modes other than driving, including public transit. The plan also proposed to improve public transportation, both the service and infrastructure, which directly aligns with the high-capacity transit effort.

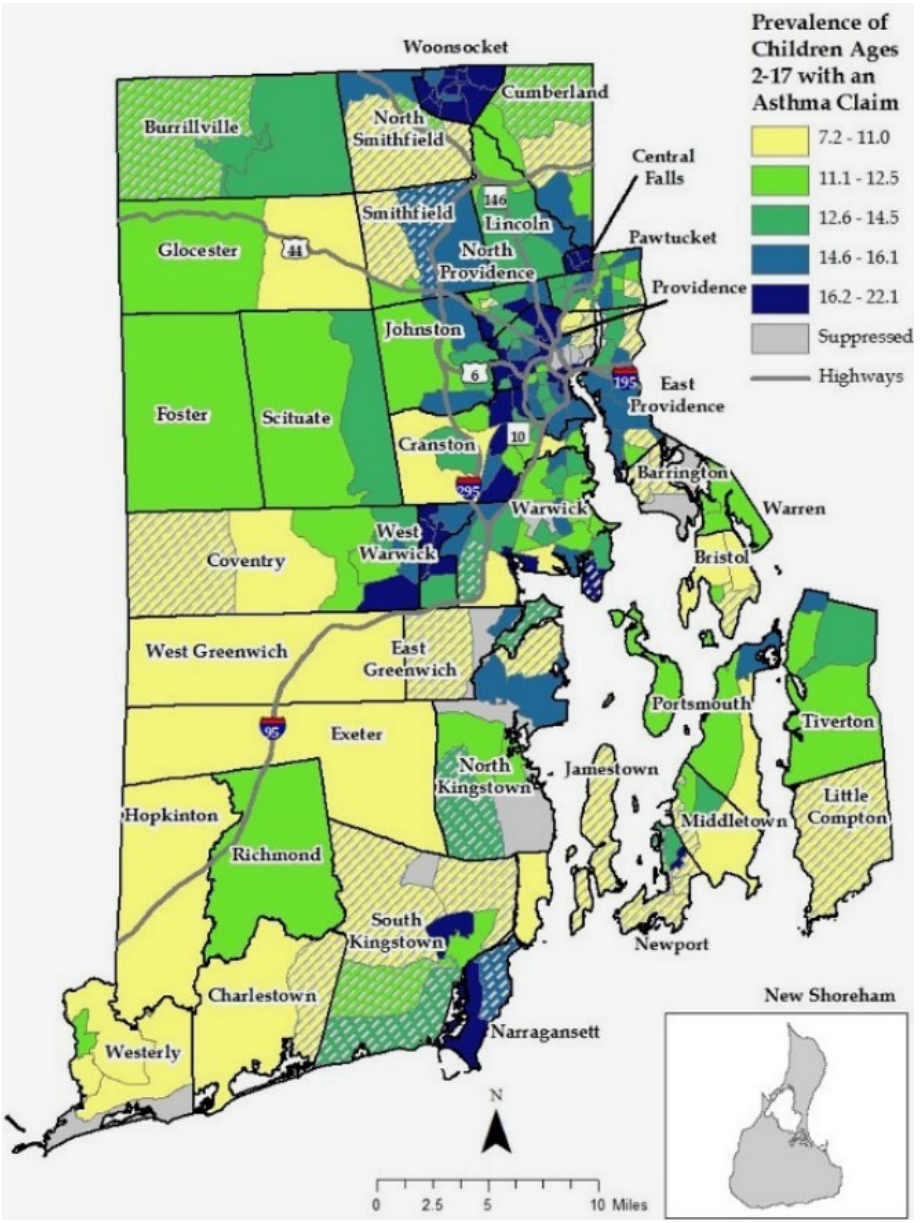


Figure 2-5 Asthma Hotspot Prevalence in Rhode Island

Safety and Complete Streets Plans

RI Complete Streets Policy and Master Plan (2015)

The RI General Assembly introduced a statewide Complete Streets design policy in 2012 (RIGL § 24-16-2).

> This policy requires that when the State constructs or modifies roadways, the relevant department must "consider complete street design features that facilitate safe travel by all users that expands upon currently accepted state and federal design requirements to accommodate all users, including current and projected users, particularly pedestrians, bicyclists and individuals of all ages and mobility capabilities."

In response to this policy, RIDOT completed a RI Complete Streets Master Plan in 2015. The RI Division of Statewide Planning is now working on a new Complete Streets Plan expected to be complete in 2025. The DSP indicates that this new plan will provide complete streets design and implementation guidelines for both the State and local municipalities. Policy guidance will be adopted into future planning for HCT corridors.

Walk Bike PCF (2020)

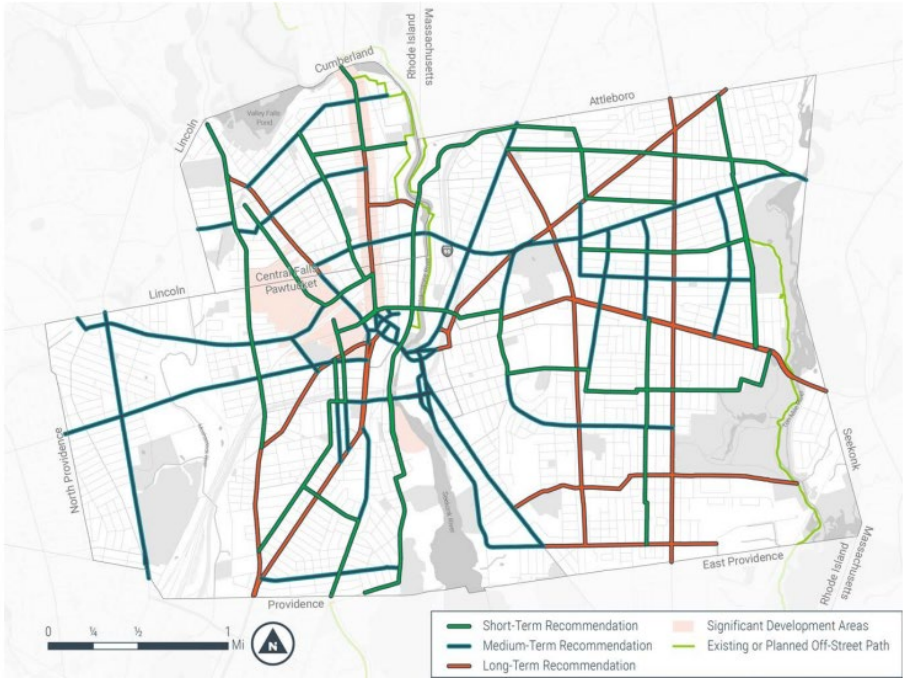


Figure 2-6 Walk Bike PCF Recommendations

This plan aims to create a multimodal network for Pawtucket and Central Falls, making it safer to walk and bike and improving access to public transportation, which would directly benefit the HCT effort. The plan noted that most bus routes operating in Pawtucket and Central Falls are low-frequency, and ridership is concentrated along the two high-frequency routes. There are also quality-of-life impacts for commuters who don't drive, including higher commute times and earning an average of $10,000 less per year for riders of public transit.

The plan recommends multiple improvements to the walking and biking network, shown in Figure 2-6. These improvements would make it more comfortable and safer to walk in Pawtucket and Central Falls and will make it easier for residents to access high-capacity transit. **The plan recommends specific improvements for walking and biking to Broad Street, Exchange Street, and Main Street, including measures like restricting on-street parking to create bus/bike lanes, tightening intersection geometry, and eliminating slip lanes.** Some of the short-term recommendations have been implemented, including infrastructure to strengthen the Blackstone River Bikeway in Pawtucket.

Providence Great Streets Master Plan (2020)

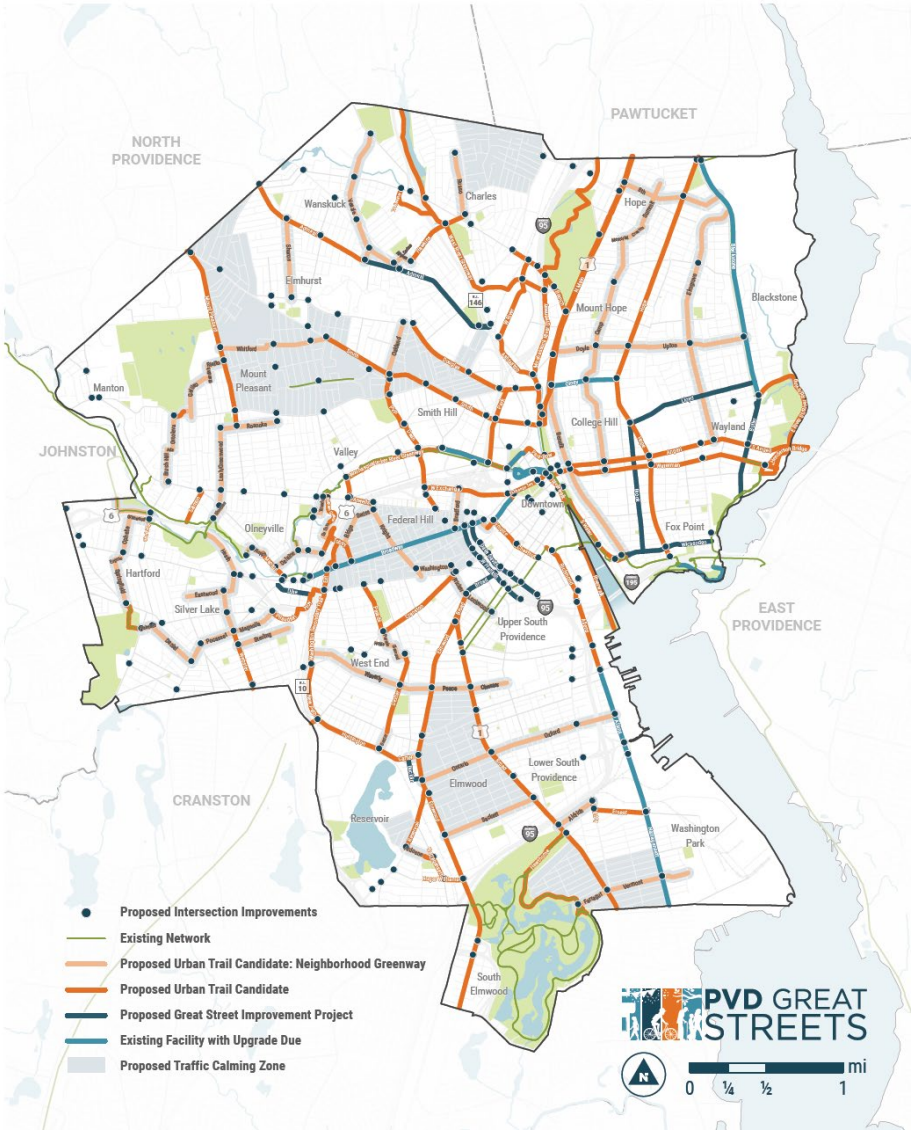


Figure 2-7 Proposed Citywide Urban Trail Network

The Great Streets Initiative aims to improve safety and livability on Providence's streets, including through improvements to make transit safer and more efficient, and is outlined in Figure 2-7. The plan includes the following priority strategies:

- A new network of urban trails connecting with RIPTA-identified transit priority corridors on Broad, Dorrance, Dyer, Eddy, Elmwood, Exchange, Washington, and Weybosset Streets, as well as the North Main Street corridor.
- Traffic calming measures for North Main Street (see North Main Street Study below).

The suggested facilities in the Great Streets Plan shown in Figure 2-7 indicate candidates to improve connectivity in the multimodal network and are primarily recommendations, rather than improvements that have been fully funded. The City is planning to update this plan within the next year.

Providence subsequently adopted a Vision Zero Policy in 2024 aspiring to eliminate traffic fatalities and severe injuries among all road users. **Increased public transit ridership and enhanced mobility infrastructure were identified as key strategies for achieving this vision.** Providence has also received a $27.2 million grant through Safe Streets for All to begin implementing Vision Zero strategies.

North Main Street Corridor Revitalization Study (2022)

This study resulted in a RIDOT Roadway Safety Audit (RSA), and safety improvements have been identified. RIDOT conducted the RSA in response to discussion from the North Main Street Task Force in Spring 2024. VHB is currently reviewing the RSA and it likely will not be finished before the end of Summer 2024.

Providence's North Main Street Corridor Revitalization Study, produced at the behest of former Councilwoman LaFortune, offers recommendations to improve the safety and character of this major arterial that connects Downtown Providence with Pawtucket. Although the R-Line currently runs along North Main Street, the study called for improved transit use to help mitigate climate change effects and meet other goals. The study also found that local growth along the corridor has outpaced housing supply and called for increased density and new housing.

The North Main Street study proposes improved transit service along North Main Street, increasing frequency and redesigning transit stations along the corridor to be more inviting and using complete streets strategies that prioritize people walking, biking, and taking transit. Several concepts developed by the City,

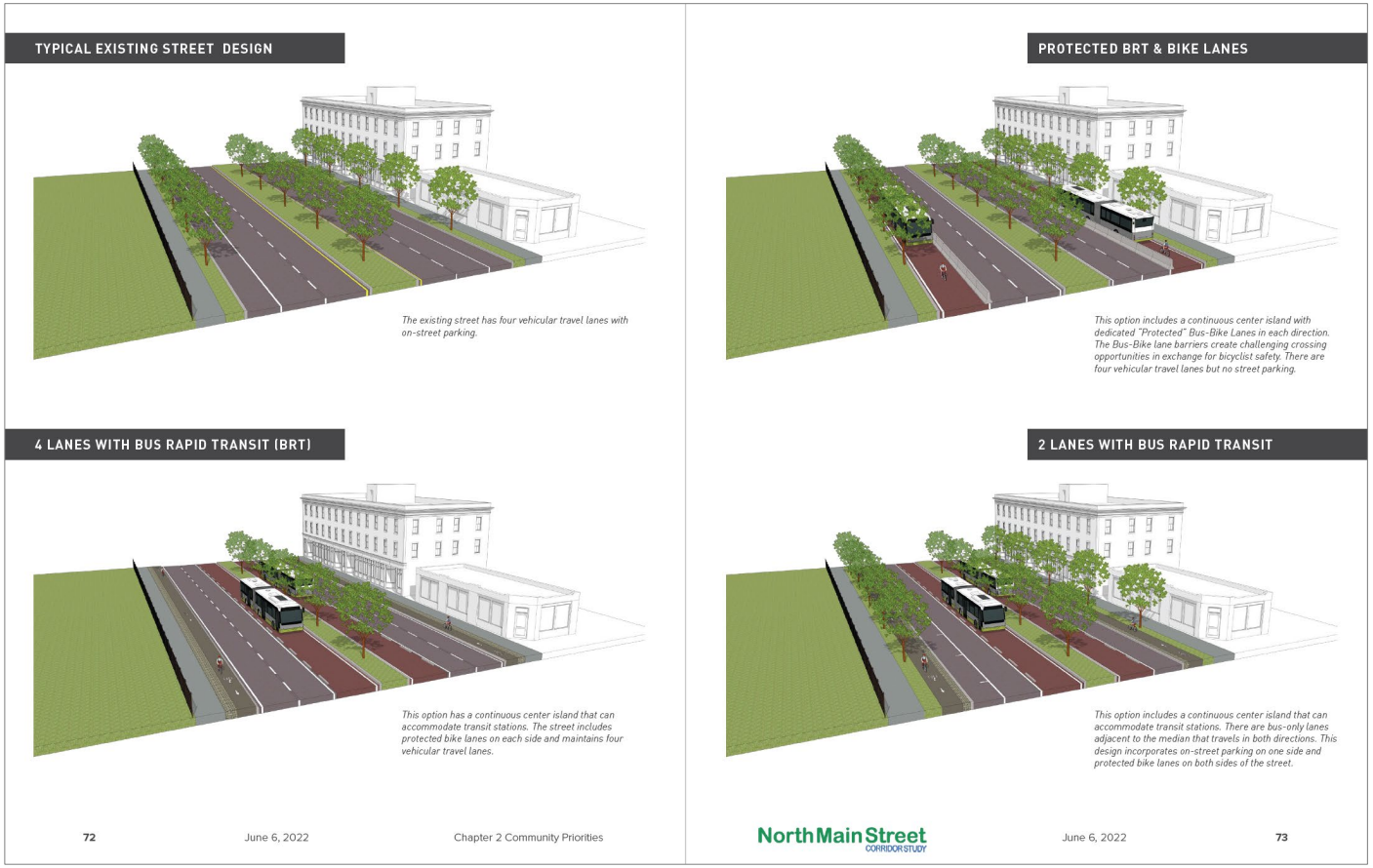


Figure 2-8 Proposed Street Designs

demonstrated in Figure 2-8, show HCT running in dedicated transit lanes. To align with City goals, the Metro Connector Study will develop similar concepts for municipal and public review.

Safe Streets for All (SS4A) Action Plans (Under Development)

As part of Transit Forward RI implementation, RIPTA is currently spearheading an effort to improve roadway safety through a grant awarded under USDOT's Safe Streets and Roads for All (SS4A) program. The program aims to make regional and local roads safer for all users, including drivers, pedestrians, cyclists and transit riders. Transit riders are active street users - relying on accessible sidewalks, visible crosswalks, and clearly marked boarding areas.

RIPTA is working with 31 municipalities (including Central Falls, Pawtucket and Cranston) to develop individual SS4A action plans. Once complete, these municipalities will be able to apply for funding through the SS4A program and advance strategies to support public transit, including transit stop access and safety along the Metro Connector corridors. Providence's Great Streets Master Plan serves as their SS4A plan and they have received over $27.2 million in implementation funding.

Land Use & Housing Policies and Plans

Transit-Oriented Development Pilot Program (2023)

The RI General Assembly created a Transit-Oriented Development (TOD) Pilot Program (RIGL § 45-24-77) to increase the availability of housing near transit, alleviate traffic congestion, and further State climate goals. Through the program, **municipalities will be empowered to establish zoning overlay districts or other land use tools within ¼ mile from mobility hubs and 1/8 mile from frequent transit service (defined by Transit Forward RI as 15 minutes or less). HCT concepts to be developed through the Metro Connector Study will meet the frequent service criteria and provide significant new opportunities to increase housing density and supply in a sustainable manner, which in turn will help to grow long-term ridership along the study corridors.**

To date, the General Assembly has committed $4M to incentivize municipal rezoning and the creation of affordable housing units in TOD districts. The RI Department of Housing is tasked with developing selection criteria for the program, including density and percentage of affordable units in the project.

Housing Facts RI (2023)

The Housing Fact Book is an annual publication presented by HousingWorks RI, a research and policy organization focused on housing affordability indicators and social well-being. The annual report outlines housing affordability data for Rhode Island's 39 municipalities.

More than one-third RI households and one-half of renters are cost burdened by their housing. A chronic lack of supply of both owner and rental homes continues to hamper Rhode Islanders' housing options. Only two study area communities (Providence and Central Falls) meet the state's goal for 10 percent affordable housing stock in every community.

The report notes that transit offers valuable perspectives on regionalism because corridors are not defined by municipal boundaries, but by routes along which Rhode Islanders live and work. HousingWorks RI conducted additional analysis[1] to further evaluate opportunities for new housing presented by the state's TOD Pilot Program along the Metro Connector transit corridors. Takeaways included:

- About 47% of the parcels currently zoned for single-family residential along the corridor are in Warwick and Cranston. Most parcels zoned for multi-family use are found in Providence, followed by Pawtucket and Central Falls.
- Much of the zoning along the corridors doesn't allow for densities to support sustainable ridership, and more multi-family zoning is needed to create vibrant, walkable and economically thriving neighborhoods that support transit.
- Today, zoning and the uses allowed change dramatically when the corridor crosses municipal boundaries. From a regional perspective, more collaboration between communities is needed to create more cohesive corridors with transit supportive zoning.

Pawtucket & Central Falls Station District Vision Plan (2016)

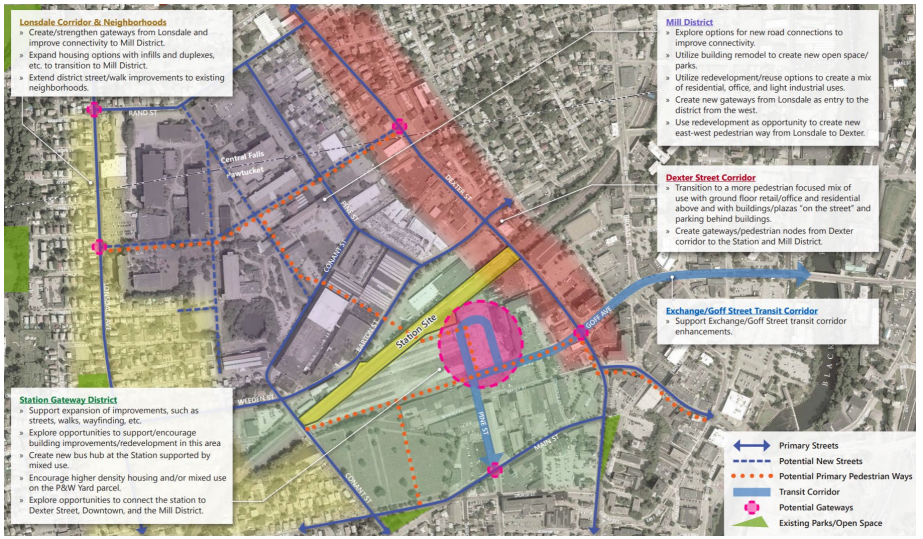


Figure 2-9 Station Vision Plan

[1] https://www.youtube.com/watch?v=N_CrOwZ3pBM&t=853s

This plan established a vision for a new TOD overlay zone encompassing parts of both Pawtucket and Central Falls around a new MBTA commuter rail station and relocated Pawtucket bus hub. The two cities subsequently established a Joint Pawtucket/Central Falls zoning overlay district in 2019 called the Conant Thread District. The new intermodal center opened in 2023.

Both cities increased development densities and eliminated parking minimums in the District to encourage high-density, mixed-use development. The vision plan also outlines changes to create new streets and reinforce connections between the train station, local destinations, and surrounding neighborhoods.

The HCT corridors under study are envisioned to serve this key transportation hub, and the increased density and allowed mix of uses in the TOD district will strengthen ridership potential. Likewise, the frequent, fast and reliable transit service envisioned for the corridors will enhance opportunities for further sustainable development and strengthen the local community. The Pawtucket bus hub is the second busiest in the State and provides connecting RIPTA service to riders traveling throughout Pawtucket, Central Falls, and the greater Blackstone Valley area.

Providence Comprehensive Plan Update (Expected 2024)

The City of Providence is currently working to update their Comprehensive Plan, with a final document expected by the end of 2024. As shown in Figure 2-11, drafts of the document released in spring and summer 2024 **prioritize both Downtown and the North Main Street corridor as Priority Mixed Use Growth Areas, designated for the highest levels of transit service and mobility options. The City has also designated Elmwood Avenue, Reservoir Avenue, and Eddy Street as Growth Corridors**, or transit corridors with mixed-use and higher-density residential infill development. The plan also includes multiple strategies for encouraging transit use and improving mobility, including adding bike parking at transit stations and improving walking and biking routes to transit.

A draft plan was approved by the City Planning Commission in June 2024, but changes are still possible before City Council adoption, expected in late 2024.

Following final plan adoption, the City's Department of Planning and Development has indicated an intent to amend local zoning to focus higher-density, mixed-use development in these areas. Additional strategies that will be highly supportive of HCT along the corridors under study include:

- Continue investments in multi-modal transportation safety, efficiency, and electrification in line with the Great Streets Plan, RI TMP, and RI LRTP, to encourage mode shifts toward public transportation, and other modes.
- Promote TOD and place new residential developments at locations that increase potential ridership on the transit system and support Providence as the region's employment and cultural center.
- Advocate for sufficient funding to maintain existing transit service levels, increase frequency, and extend service spans in line with the recommendations of TMP.
- Improve infrastructure to prioritize buses and bus passengers especially on the highest frequency corridors, including the creation of dedicated right-of-way for buses.
- Prioritize curb uses, including the preference for bus stops, where needed, over on-street parking. Also, ensure sufficient sidewalk and ADA infrastructure exists at bus stops.
- Support RIPTA in its process to establish a new, world-class Providence transit center that meets the needs of RIPTA operations, transit users and Providence's planning and economic development goals.

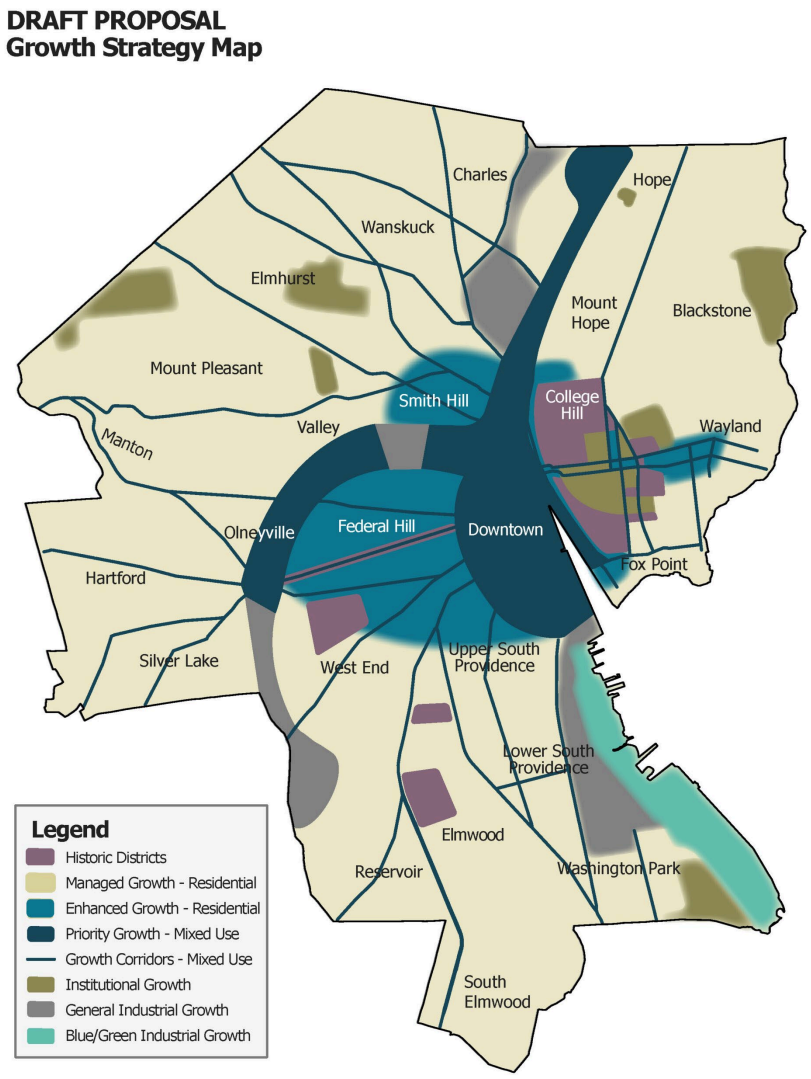


Figure 2-10 Draft Proposal: Growth Strategy Map

Warwick Master Plan (2013)

Figure 2-11 Warwick Comprehensive Plan Strategic Priorities

One of the goals of Warwick's master plan is to work with RIPTA to enhance service in Warwick to improve connectivity and reduce car trips, as well as supporting roadway projects along east/west routes and major commercial corridors to reduce traffic congestion.

There is significant congestion on Warwick's roadways, primarily due to high population densities, poor access management, and a lack of sufficient east-west routes. Main Avenue and a section of Post Road were operating at an LOS E or F during the morning or evening peak hours when the plan was completed. In addition, the plan noted that 13 of the 50 most dangerous intersections in Rhode Island are within Warwick, including Main Avenue and Post Road, according to a 2011 report. Public transit in Warwick is also mainly oriented towards Providence rather than offering intra-city connectivity.

The plan recommended prioritizing complete streets projects for corridors such as Route 2, Route 5, and Jefferson Boulevard to emphasize key linkages between the bicycle and transit networks. Some of these corridors are likely well-suited for HCT. The plan also proposes to evaluate the feasibility of enhanced or new linkages across Warwick's rail corridor and support initiatives to increase transit ridership.

Warwick Station Development District ("City Centre") Master Plan (2012)

This master plan outlined a vision for public infrastructure improvements and higher density development in the area surrounding TF Green Airport and the then-proposed commuter rail station. It led to the establishment of a defined TOD district, now known as City Centre Warwick. Goals include capitalizing on intermodal transportation resources to foster mixed-use growth and creating a sustainable, livable community by improving access to transportation, housing, and new jobs.

The City Centre district is envisioned to capture economic benefits for Warwick with mixed-use development, retail and restaurants, and other development capitalizing on its location as a regional transit hub. Figure 2-10 shows the rezoned district encompassing both the Airport and MBTA rail station.

The HCT corridors under study are envisioned to serve this district, offering improved connections to both the Airport and MBTA station. The increased density and allowed mix of uses in the TOD district will strengthen ridership potential. Likewise, the frequent, fast and reliable transit service envisioned for the corridors will enhance opportunities for further sustainable development and strengthen the local community.

City of Pawtucket Comprehensive Plan (2017)

Pawtucket's Comprehensive Plan recognizes the need for more efficient public transit in the city and addresses the potential for the new commuter rail station for the city and opportunities for transit-oriented development in surrounding areas. The plan proposed a Transit-Oriented District around the now-opened Pawtucket-Central Falls Transit Center, which would also increase potential ridership for the HCT effort. Another action item in the plan is to focus on advancing the new Pawtucket-Central Falls commuter rail station that is now open. The plan also noted the need to develop a transit-emphasis corridor on Exchange Street related to the relocation of the RIPTA bus hub, which moved to the new transit center.

Central Falls 2050 (Under Development)

The City of Central Falls is currently developing an update to its Comprehensive Plan to present a framework for the city's future. The city's planning board is undertaking the update, and the final recommendations are expected in 2024 or 2025.

City of Cranston Comprehensive Plan (2010)

The Comprehensive Plan for the City of Cranston focuses on strategies to reduce traffic by promoting alternate modes other than driving and implementing measures to increase safety, including traffic calming in residential neighborhoods. The plan addressed multiple public transit issues, including whether parking should be adjusted to increase the potential for transit use in high-density areas and alternatives for commuter rail in Cranston.

The plan does not provide specific recommendations for locations but offers overarching strategies for RIDOT, Public Works, and the Planning Department. One of the strategies in the plan is promoting alternate modes of transportation, including public transit, specifically fixed-route bus services, to reduce dependency on vehicles. The plan noted that alternative modes are underutilized even though Cranston has a significant transit-dependent population, and the plan recommends making information on public transportation available. Another strategy advises a feasibility study for transit-oriented development around a potential Cranston rail station and preserving railroad rights-of-way for future transportation corridors.

Town of Cumberland Comprehensive Plan and Valley Falls and Lonsdale Economic Revitalization & Social Equity Plan (2017)

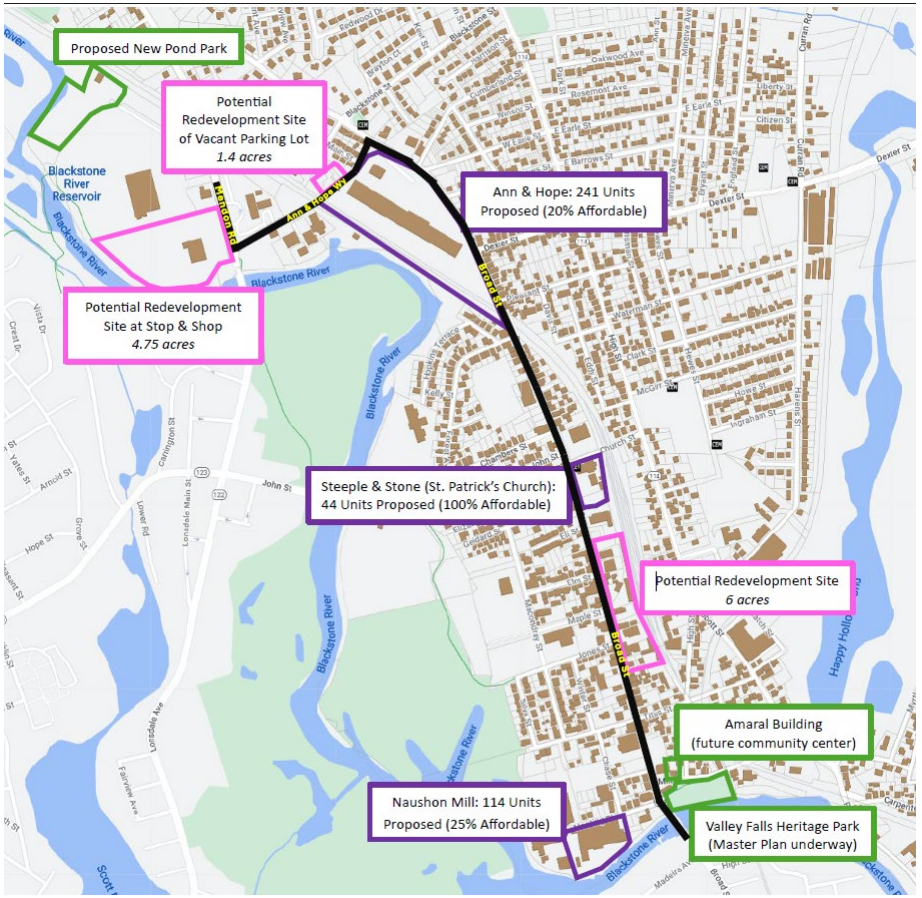


Figure 2-12 Proposed Development in Valley Falls/Lonsdale along Major Corridor

The Valley Falls area in the Town of Cumberland forms the northern border of the study area, and this plan addresses multiple land use and transportation-related issues in the surrounding area.

The plan makes several findings related to transportation in the Valley Falls area. It notes that Broad Street needs traffic calming and safety enhancements and is supportive of RIPTA bus service and the potential for future commuter rail service passing through Cumberland, north of Valley Falls. The area's proximity to the Blackstone River Bike Path was also noted as enhancing the area's potential for revitalization.

A separate plan, the Valley Falls and Lonsdale Economic Revitalization & Social Equity Plan (2023), specifically addresses revitalization along the Broad Street and Mendon Avenue corridors. These neighborhoods border Central Falls to the north and would be impacted by high-capacity transit. The plan outlines concepts for introducing higher density residential development along the Broad Street corridor in areas likely to be served by high-capacity transit. The plan recommends amending the Development Regulations to provide better access to existing and future developments, which could help provide connections to high-capacity transit. The plan also recommends enhancing pedestrian safety, including the installation of crosswalks and sidewalks, throughout the Town, including on Broad Street, Mendon Road, and Highland Avenue. This improvement would create a safer environment for transit users to access high-capacity transit services.

Ocean State Accelerates (Comprehensive Economic Development Strategy) (2023)

This plan is the State's Comprehensive Economic Development Strategy (CEDS) which sets a statewide economic strategy to provide access to US Economic Development Agency (US EDA) funding programs. It identifies state priorities for economic development, supports related state investments in affordable housing and transportation, and prioritizes embedding sustainability into transportation initiatives. **The plan recommends expanding public transit networks, focusing on access to employment opportunities and training, and prioritizing access to transit hubs, rapid bus corridors, and frequent transit routes. The plan also recommends implementing the Transit Forward RI 2040 plan for first-mile/last-mile connections to improve access to services throughout the state.**

The plan also notes that a significant portion of the state south of Providence, including Warwick, has limited transit accessibility and low walk scores. Cumberland has the highest walk score in the state, which is compatible with high-capacity transit.

RI 2030: Charting a Course for the Future of the Ocean State (2022)

This policy statement sets forth the Governor's priorities through 2030. Among other priorities, this plan calls for the State to "**implement the vision outlined in the state Long Range Transportation Plan, including the Rhode Island Transit Master Plan 2040, to better connect Rhode Islanders with each other**." The plan also prioritizes actions to progress towards the emission mandates listed in the 2021 Act on Climate. Both plans prioritize increasing and strengthening public transit to attract more riders and reduce emissions. The Governor's priorities also include increasing housing production, which would be supportive of HCT.

Summary and Opportunities

The Metro Connector Study is tasked with considering the introduction of high-capacity transit into two corridors spanning from the Central Falls/Cumberland border to CCRI-Warwick, and from downtown Providence to RI TF Green International Airport. This review of state and local plans and policies has found that the introduction of faster, more frequent and reliable transit in these corridors will align with numerous State and local plans and policies.

- The existing market for HCT in Rhode Island is well-documented in the Transit Forward RI 2040 plan. This plan used a data-driven approach to understand existing and future population, job densities, travel flows, and the market for transit. Based on this data, the two HCT corridors being studied were identified as being able to support all day frequent high-capacity services.
- Moving Forward RI 2040, the Statewide LRTP, establishes performance measures to increase transit ridership, introduce more dedicated bus lanes, improve RIPTA's reliability, and increase the number of residents and jobs served by frequent transit in order to encourage mode shift and reduce VMT. These strategies will be considered for implementation as part of the Metro Connector Study.
- The State's Congestion Management Plan found the Providence Metro region to be the most congested in the state, with up to 17% of highways congested during the weekday peak. It supports a network of prioritized multimodal corridors to mitigate bottlenecks, increase mode choice, and improve intermodal connectivity.
- The 2021 RI Act on Climate established a mandate to achieve net zero GHG emissions by 2050. The EC4 tasked with identifying strategies to achieve this mandate identifies the transportation sector as the largest source of GHG emissions in the State and recommends implementation of the TMP as funding allows.
- The Clean Transportation and Mobility Innovation Report recognizes that transit investments decrease emissions while enhancing mobility for low-income residents. The plan recommends implementation of Transit Forward RI as part of a set of strategies to create a more equitable and environmentally responsible transportation system. Providence's Climate Justice Plan also looks to encourage mode shift and reduce emissions, particularly in disadvantaged frontline neighborhoods. The Metro Connector study corridors pass directly through several of these communities.
- Other statewide and municipal documents point to the Transit Forward RI 2040 plan as a strategy to achieve complementary goals, including improved transportation network connectivity, stronger communities, increased economic development, reduced GHG emissions, and safer streets that accommodate all users. Implementation of fast, frequent, more reliable transportation along the two high priority corridors will support all of these goals.
- The State adopted a Complete Streets policy in 2012, with an updated Complete Streets Plan now underway. The City of Providence has a Great Streets Master Plan and RIPTA is now working with other municipalities in the Metro Connector Study area to prepare Safe Streets for All Action Plans. The presence of widely adopted and consistent multimodal transportation network policies will support a complete streets design approach for concepts in both HCT corridors, with opportunities to offer affordable mobility options, safer streets and improved quality of life.
- North Main Street has been identified for significant capital investment by several safety plans and the state TIP. North Main Street's density, community support, and width make it well suited for HCT.
- Advancement of HCT in the Metro Connector study corridors presents a significant opportunity to meet local and State land use goals and to catalyze new housing to help solve the state's housing supply gap. Parcels along the full length of both corridors will likely be eligible for increased density and funding incentives under the State's TOD Pilot Program. The higher densities and mixed-uses allowed in the following areas will also bolster ridership along the corridors:
  - Five established municipal TOD zones (Conant Thread in Pawtucket/Central Falls, City Centre in Warwick and three TOD overlay zones in Providence).
  - Priority growth areas/corridors identified in Providence's draft comprehensive plan update: downtown, North Main Street, Elmwood Avenue, Reservoir Avenue and Eddy Street.
  - A proposed high-density district in the Valley Falls area of Cumberland.
  - However, as noted by an evaluation of municipal zoning and housing development potential in the Metro Connector corridors, much of the zoning along the corridors doesn't allow for densities to support

sustainable ridership, and more multi-family and mixed-use zoning is needed to create the vibrant, walkable and economically thriving neighborhoods that support transit. Furthermore, from a regional perspective, more collaboration between communities is needed to create more cohesive corridors with transit-supportive zoning.

3 Land Use Assessment

This chapter assesses current and future land uses in the study area, with a special focus on the relationship between land use and rapid transit.

- **Existing Land Use Break Down** summarizes the proportion and acreage of different land uses within the study area.
- **Glossary of Land Use Categories** defines the more than 30 different land use types.
- **Zoning Analysis** describes the existing zoning in each study area by municipality, with a special emphasis on high-capacity transit-supportive zoning types.
- **Land Assessment** summarizes the acreage within the study area of different land uses most relevant to high-capacity transit: multifamily housing, affordable housing, commercial uses, mixed use, vacant land, and underdeveloped properties.
- **Summary and Opportunities** lays out the most relevant findings for the potential of HCT in this corridor from this study of existing land use.

Existing Land Use Breakdown

The study area spans 46,150 acres and features a diverse mix of land uses. The corridor area is dominated by high-density residential (25%), medium-high density residential (17%), and commercial (8%) uses, collectively occupying 22,750 acres within the study area (see Table 3-1 and Figure 3-1).

Residential land uses account for 44% of the corridor area, with 42% of these residential areas classified as medium-high density or denser (1/4 acre lots or smaller) (see Figure 3-3). Multifamily housing primarily falls under high-density residential, with standalone houses that are duplexes, triplexes, or quadplexes falling under medium-density residential. High-density residential areas are primarily found in Providence, Pawtucket, and Central Falls, while medium-density areas are mainly located in Cranston, Warwick, and Cumberland.

Commercial uses are clustered along the two high-capacity transit corridors, extending along major thoroughfares. Industrial uses are spread across the corridor but are more prevalent in Providence, Warwick, and Cranston, while institutional uses are mainly concentrated in Providence.

Transportation, communication, and utilities account for 13% of the study area, or 6,150 acres. Despite this significant development, 7,400 acres of the study area are covered by forested areas. With less than 1% vacant developable land, future development would rely on infill and reuse of previously developed land.

Rhode Island's Department of Statewide Planning maintains a dataset containing the land use and land cover across the state. This dataset uses a standardized classification code list and for the purposes of this study, similar categories have been grouped together. The naming conventions used in this study are the same as Rhode Island Department of Planning uses in documentation. A glossary of all land use types follows the summary information on the following two pages.

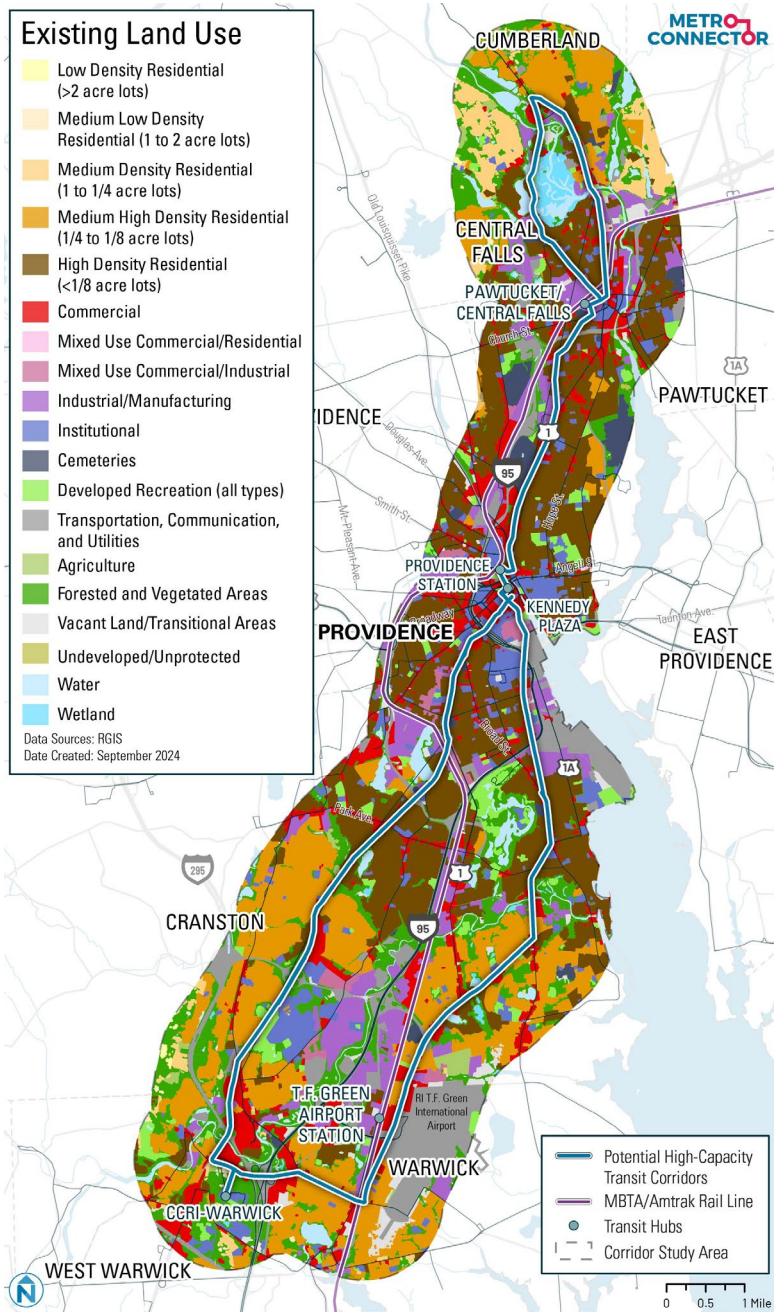


Figure 3-1 Existing Land Use

Land Use	LULC Code	RIGIS LULC Description	Area (Acres)	% Study Area
Residential	111	High Density Residential (< ⅛ acre lots)	11,491	25%
	112	Medium High Density (¼ to ⅛ acre lots)	7,761	17%
	113	Medium Density Residential (1 to ¼ acre lots)	955	2%
	114	Medium Low Density Residential (1 to 2 acre lots)	38	<1%
	115	Low Density Residential (>2 acre lots)	27	<1%
		Total Residential	**20,271**	**44%**
Commercial	120	Commercial (Sale of products and services)	3,506	8%
		Total Commercial	**3,506**	**8%**
Industrial	130	Industrial (Manufacturing, design, assembly, etc.)	2,441	5%
		Total Industrial	**2,441**	**5%**
Mixed Use	151	Mixed Use Commercial/Residential	23	<1%
	152	Mixed Use Commercial/Industrial	388	1%
		Total Mixed Use	**411**	**1%**
Institutional	170	Institutional	1,978	4%
		Total Institutional	**1,978**	**4%**
Transportation, Communication, and Utilities	141	Roads (divided highways >100' plus related facilities)	3,953	9%
	142	Airports (and associated facilities)	902	2%
	143	Railroads (and associated facilities)	244	1%
	144	Water and Sewage Treatments	95	<1%
	145	Waste Disposal (landfills, junkyards, etc.)	145	<1%
	146	Powerlines (100' or more width)	200	<1%
	147	Other Transportation (terminals, docks, etc.)	584	1%
	148	Ground-mounted Solar Energy Systems	28	<1%
		Total Transportation, Communication, and Utilities	**6,152**	**13%**
Cemeteries	163	Cemeteries	596	1.3%
		Total Cemeteries	**596**	**1.3%**
Developed Recreation	161	Developed Recreation (all recreation)	1,052	2%
		Total Developed Recreation	**1,052**	**2%**
Agriculture	210	Pasture (agricultural not suitable for tillage)	139	<1%
	220	Cropland (tillable)	80	<1%
	230	Orchards, Groves, Nurseries	21	<1%
		Total Agriculture	**240**	**<1%**
Forested Areas	300	Brushlands (shrub and brush areas, reforestation)	165	<1%
	410	Deciduous Forest (>80% hardwood)	6,745	15%
	420	Softwood Forest (>80% softwood)	43	<1%
	430	Mixed Forest	449	1%
		Total Forested Areas	**7,401**	**16%**
Vacant Land and Transitional Areas	162	Vacant Land	340	<1%
	750	Transitional Areas (Urban Open)	154	<1%
		Total Vacant Land and Transitional Areas	**494**	**1%**
Undeveloped Open Land	720	Sandy Areas (Not beaches)	1	<1%
	740	Mines, Quarries, and Gravel Pits	125	<1%
		Total Undeveloped Open Land	**126**	**<1%**
Water	500	Water	1,217	3%
Wetlands	600	Wetlands	264	1%
		TOTAL	**46,150**	**100%**

Table 3-1 Existing Land Use

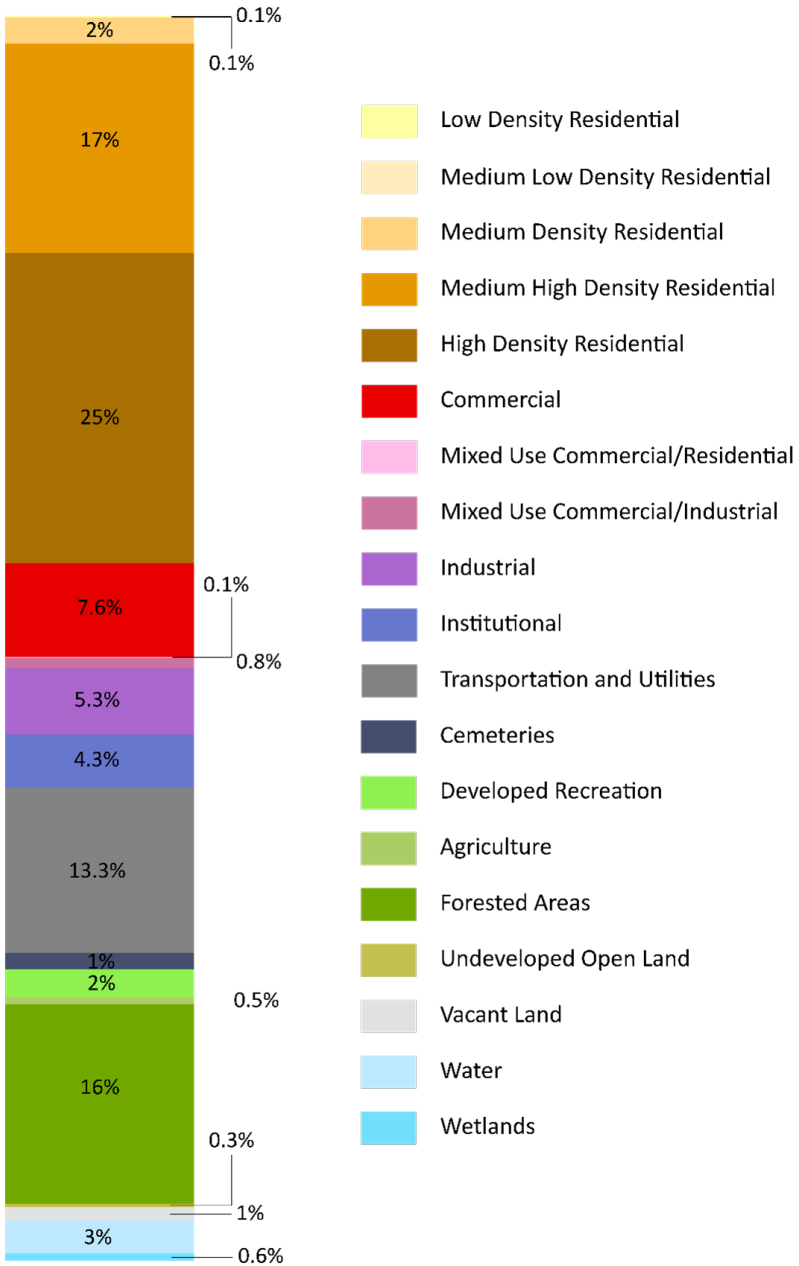


Figure 3-2 Existing Land Use Breakdown

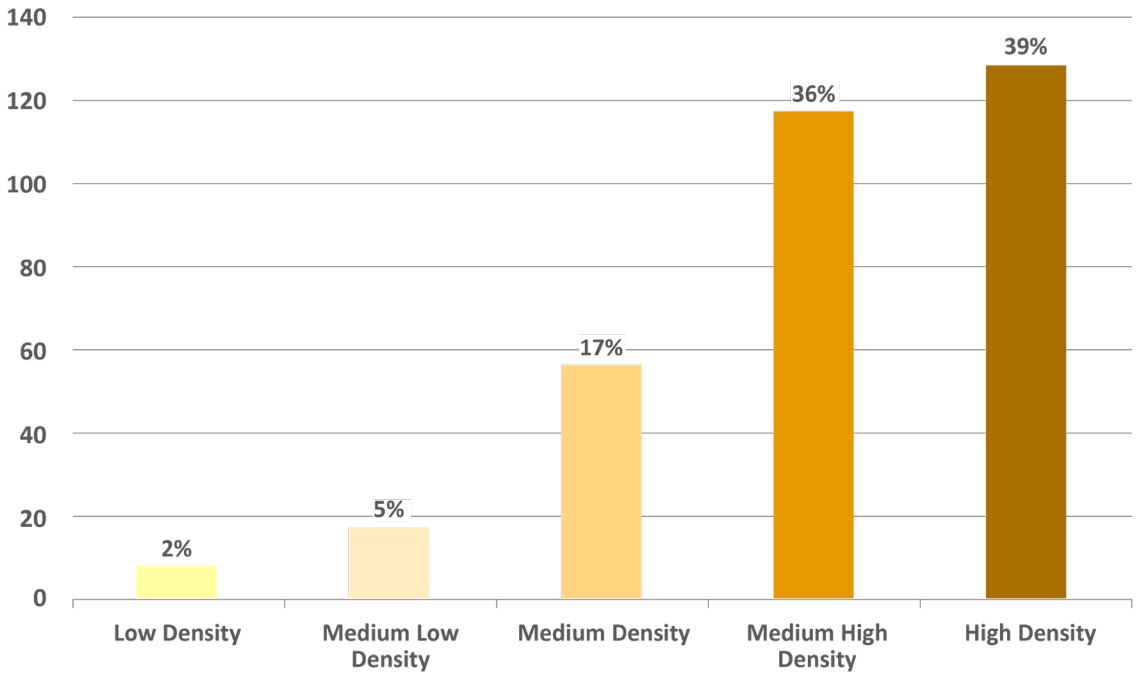


Figure 3-3 Residential Land Use Breakdown

Glossary of Land Use Categories

Residential

High Density Residential: Areas where the residential lot size is less than 1/8 of an acre, typically associated with dense housing developments like apartment buildings, townhomes, or tightly packed single-family homes.

Medium High Density Residential: Residential areas with moderate to high housing density, where lot sizes range from 1/8 to ¼ of an acre, often including suburban homes, duplexes, or townhomes.

Medium Density Residential: Areas where residential lot sizes range from ¼ to 1 acre, often including single-family homes on modestly sized lots with some open space.

Medium Low Density Residential: Residential zones with larger lots, between 1 and 2 acres per lot. These areas often feature larger homes with significant open space, usually in suburban or rural settings.

Low Density Residential: Residential areas with very large lot sizes, over 2 acres per lot. These areas often include rural estates, farms, or homes with significant amounts of open land.

Commercial, Industrial, and Mixed Use

Commercial: Areas primarily used for commerce, including retail shops, hotels, restaurants, and service businesses. This category encompasses business districts, shopping centers, and commercial strips.

Industrial: Land with manufacturing, processing, warehousing, and distribution. This category includes both light and heavy industrial.

Mixed Use Commercial/Residential: Areas where commercial and residential uses coexist, often in the form of buildings with ground-floor commercial space and upper-level residential units, or neighborhoods where residential and business activities are closely integrated.

Mixed Use Commercial/Industrial: Areas that blend commercial and industrial activities, such as business parks or areas where light industrial operations coexist with offices, retail, or service businesses.

Institutional

Institutional: Land used for public or private institutions, including schools, hospitals, government buildings, churches, and similar facilities.

Transportation, Communication, and Utilities

Roads: Divided highways with 100’ or more of right-of-way width.

Airports: Land used for aviation, including runways, terminals, and associated infrastructure for both commercial and private air traffic.

Railroads: Areas dedicated to railroad tracks, stations, and related infrastructure for freight or passenger rail systems.

Water and Sewage Treatments: Land used for facilities that treat water or sewage, including treatment plants, pumping stations, and associated infrastructure.

Waste Disposal: Land dedicated to waste management facilities, including landfills, junkyards, incinerators, and recycling centers

Powerlines: Powerlines that are greater than 100’ in width.

Other Transportation: Land used for transportation infrastructure not covered under roads, railroads, or airports, such as bus depots, ferries, or transit stations.

Ground-Mounted Solar Energy Systems: Land used for solar energy production via ground-mounted photovoltaic (PM) systems, including solar farms and smaller solar installations on open land.

Cemeteries

Cemeteries: Land dedicated to burial grounds and cemeteries, including associated infrastructure.

Developed Recreation

Developed Recreation: Land used for recreational purposes, including parks, golf courses, playgrounds, sports fields, and other recreational facilities.

Agriculture

Pasture: Non-tillable land used for grazing livestock that is not suitable for cultivation due to soil conditions, topography, or other factors.

Cropland: Tillable agricultural land that is suitable for tilling and planting crops, including row crops, grain fields, and similar productive uses.

Orchards, Groves, Nurseries: Land used for cultivating fruit trees, groves, or nursery plants, often including orchards or other perennial agricultural operations.

Forested Areas

Brushlands: Areas dominated by shrubs, small trees, or brush, often found in areas recovering from disturbance or where reforestation is taking place.

Deciduous Forest: Forest areas where more than 80% of the trees are deciduous (hardwood), typically comprising species like oaks, maples, and birches.

Softwood Forest: Forest areas where more than 80% of the trees are coniferous (softwood), such as pines, spruces, or firs.

Mixed Forest: Forested areas where neither deciduous nor softwood species dominate, with a roughly equal mix of hardwood and softwood trees.

Vacant Land and Transitional Areas

Vacant Land: Land that is not currently being used for any active purpose, such as unused urban lots, abandoned agricultural land, or undeveloped parcels.

Transitional Areas: Land that is undergoing significant change in use, such as areas under construction, redevelopment, or undergoing environmental restoration.

Undeveloped Open Land

Sandy Areas: Non-beach sandy areas, such as inland sand dunes or other sandy landscapes that are not associated with coastal environments.

Mines, Quarries, and Gravel Pits: Areas used for the extraction of minerals, rocks, or other materials, including active and inactive mines, quarries, and gravel pits.

Water

Water: Bodies of water, including lakes, ponds, rivers, streams, and reservoirs.

Wetlands

Wetlands: Land that is saturated with water, either permanently or seasonally, and supports aquatic vegetation. This includes swamps, marshes, and bogs.

Zoning Analysis

Cumberland

In Cumberland, the parcels around the HCT corridor include commercial, residential, and industrial uses. The residential uses are designated under the R-2 and R-3 districts. The R-2 district allows medium-density development, including single-family and two-family units. While the R-3 district allows for high-density development, including single-family, two-family, and multi-family units. The R-2 districts are more prevalent around the HCT corridor than the R-3 districts.

Most of the commercial uses are designated within the Limited Commercial District (C-1), which accommodates retail, services, and office establishments catering to neighborhood needs. Additionally, some parcels fall under the General Commercial District (C-2), which permits larger-scale commercial activities. The area also has a significant presence of light industrial zones, supporting non-hazardous manufacturing, assembly, and storage operations.

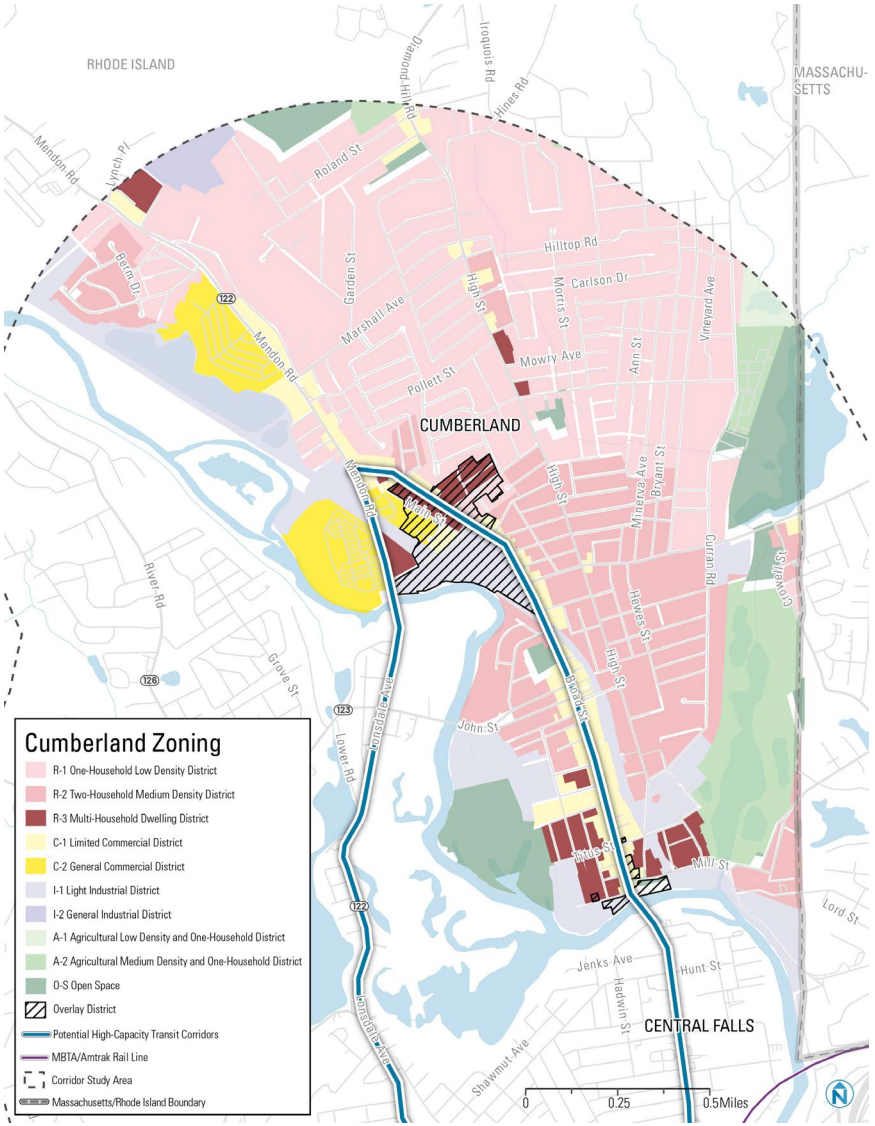


Figure 3-4 Cumberland Zoning

Central Falls

In Central Falls, the HCT corridors are surrounded by commercial, industrial, residential, and mixed-use zones. The commercial uses are designated under the Limited Commercial District (C-1), allowing retail, services, and offices, and the General Commercial District (C-2), allows larger commercial businesses. The Commercial Downtown (C-D) District aims to revitalize the downtown area, promote a mix of business, financial, institutional, public, quasi-public, cultural, and residential (upper floors only) uses.

The residential uses are mainly zoned under the Multi-Household Dwelling (R-3) District to support medium-density residential development, allowing single-family, two-family, and multi-family units.

There is a large presence of industrial uses categorized under the Industrial (M-1) District, which supports general manufacturing and assembly without hazardous impacts, and the Heavy Industrial (M-2) District, designated for heavy industrial uses that may be hazardous or incompatible with residential uses.

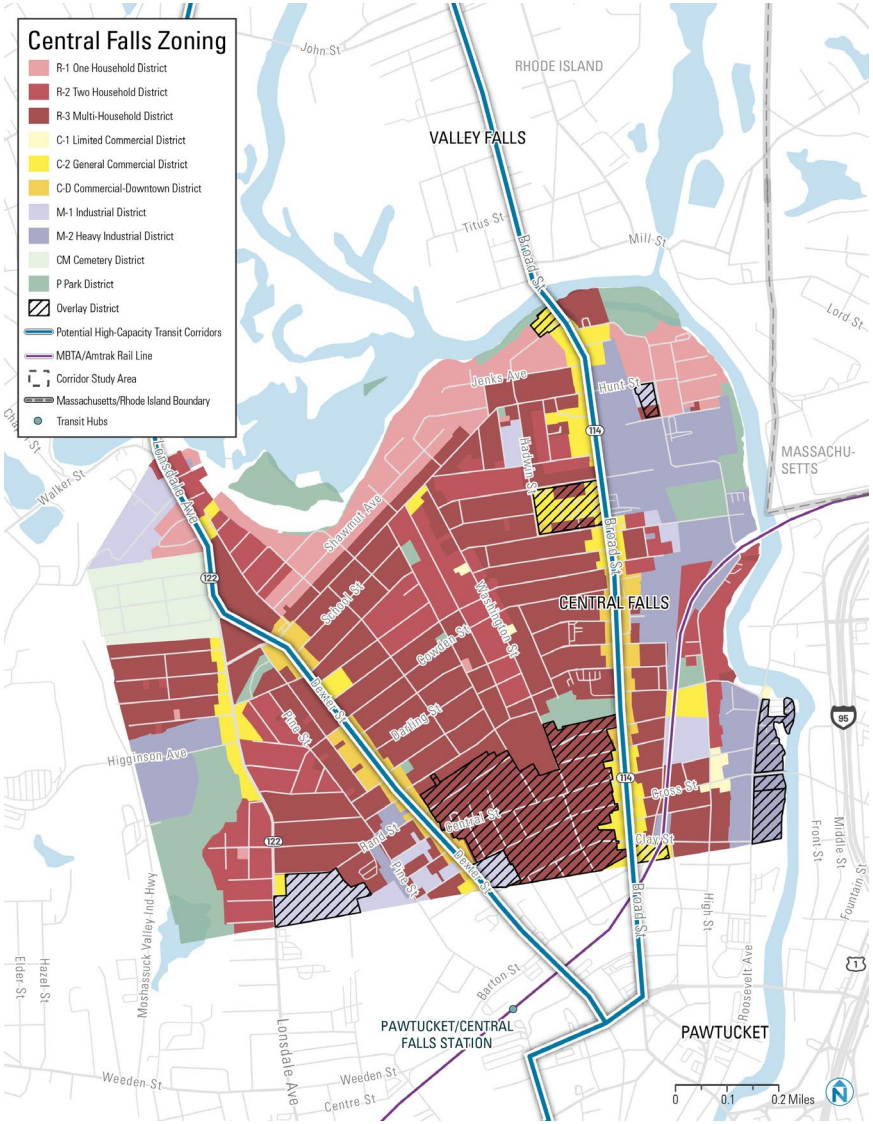


Figure 3-5 Central Falls Zoning

Pawtucket

The parcels around the HCT corridor in Pawtucket mostly include commercial, residential, and industrial uses. Commercial uses are designated under the Commercial General (CG) District, which allows retail, services, and offices. Moreover, the Commercial Downtown (CD) District includes a mix of uses (commercial, residential, institutional, etc.) and aims to revitalize the downtown area. The Conant Thread (CT) District adjacent to the CD District promotes the active reuse of historic mill structures around the Pawtucket-Central Falls Commuter Rail Station. This district aims to create diverse housing and job opportunities by leveraging its proximity to public transportation, aligning with the principles of transit-oriented development (TOD). The CT District also promotes light industrial uses that align with the district's mixed-use vision.

Most of the residential uses around the HCT corridor are designated under the Residential Multi-family (RM) District, which allows single-family and multi-family dwellings. Around the downtown area, residential uses are zoned under the Residential Elevator (RE) District, allowing high-density residential development.

The Industrial Open (MO) District is designated for light industrial activities such assembly, manufacturing, and storage.

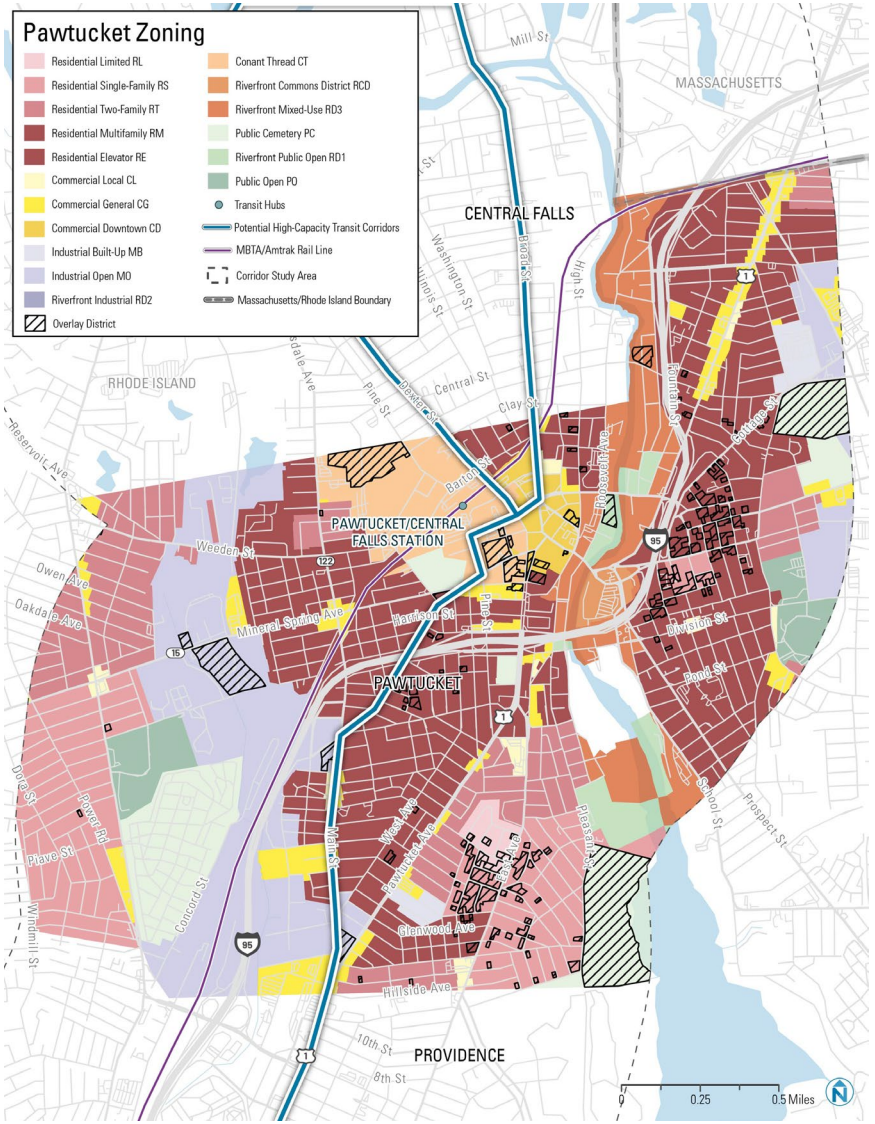


Figure 3-6 Pawtucket Zoning

Providence

The parcels close to the High-Capacity Transit corridors in Providence are mainly zoned for commercial, light industrial, and high-density residential uses. The majority of the commercial uses along the transit corridors are designed to create key commercial nodes and support large-scale businesses that manage high commercial activity. These commercial uses are located close to residential areas, promoting mixed-use zones and local economic growth. Heavy commercial uses (including motor-related businesses, outdoor storage, logistics hubs, etc.) are located near industrial zones to promote economic synergy and land use optimization to reduce traffic congestion in residential or pedestrian-focused areas.

Residential zones near the transit corridors predominantly include high-density multifamily dwellings with easy access to retail, services, offices, and other compatible uses. These zones are typically set back from the transit corridors to reduce the impact of traffic and noise. Low-to-medium density residential zones, including single-family and two-family homes, are mostly located away from the transit lines.

Downtown Providence is a mixed-use area including a variety of commercial, institutional, public/quasi-public, residential, light industrial, and other compatible uses. This area, designated as the downtown district, has six sub-districts allowing for buildings heights ranging from 45 feet to 300 feet. Most of the taller buildings are located in the heart of the downtown area, with heights gradually decreasing in the outer sub-districts. This approach promotes contextual development, ensuring that the buildings in the downtown district align with the surrounding neighborhoods.

Light industrial zones are strategically placed closer to commercial and residential areas, where they act as a transitional buffer between the heavy industrial areas and residential neighborhoods. In contrast, the heavy industrial zones are located farther from residential areas, deliberately positioned to minimize their impact on residents' quality of life.

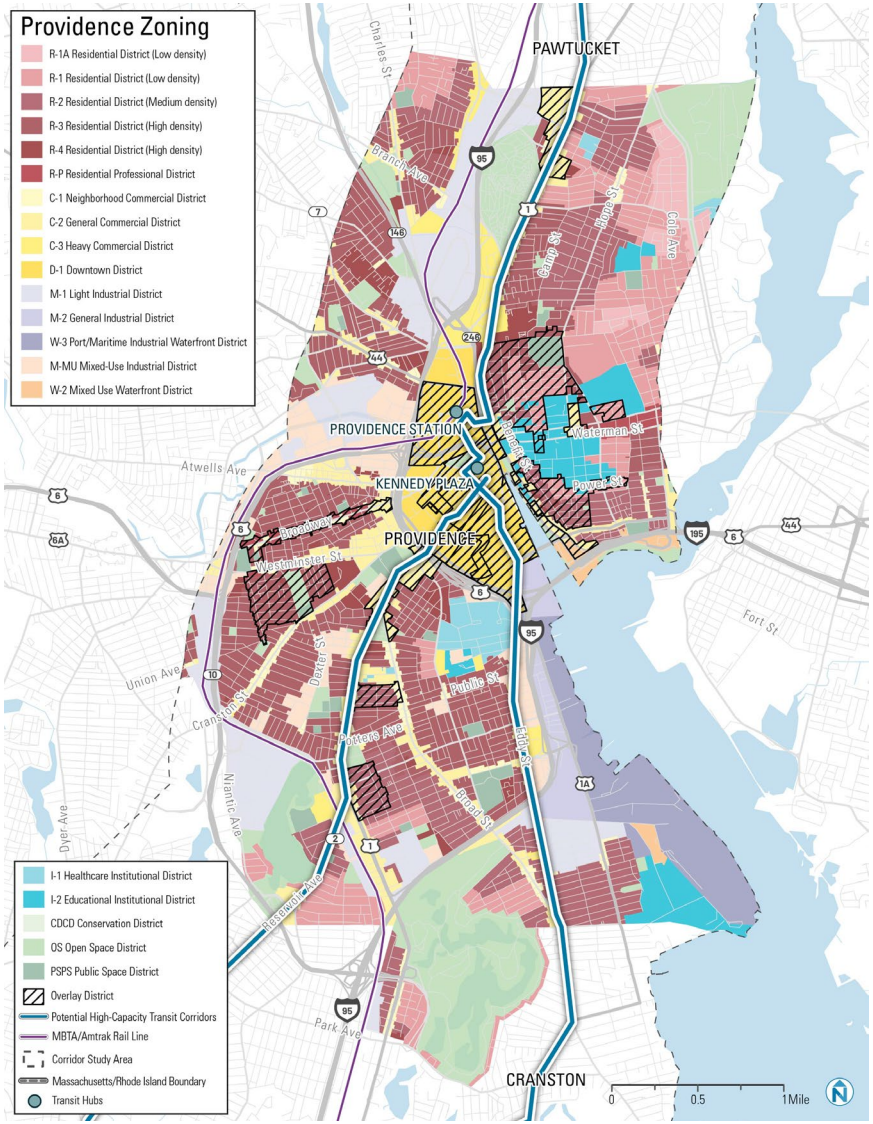


Figure 3-7 Providence Zoning

Cranston

In Cranston, the land use around the transit corridor is primarily a mix of commercial and residential zones, promoting both local economic activity and accessible living conditions. The commercial zones designated as C-1 and C-4 districts accommodate offices and highway businesses, such as retail stores, restaurants, service stations, hotels/motels, and storage facilities. Meanwhile, the C-2 and C-3 districts focus on neighborhood and general businesses, ensuring residents have easy access to essential services. Moreover, the C-1, C-2, and C-3 districts allow for mixed-use development, featuring residential units above ground-floor commercial spaces.

Residential zones around the transit corridor mostly include districts allowing single-family (A-6 and A-8) and multi-family (B-1 and B-2) units. These districts encourage higher density and provide more housing options with proximity to commercial and transit services.

Industrial uses are located away from the transit corridors, particularly near the borders with Providence, Warwick, and West Warwick to reduce the impact on residential areas.

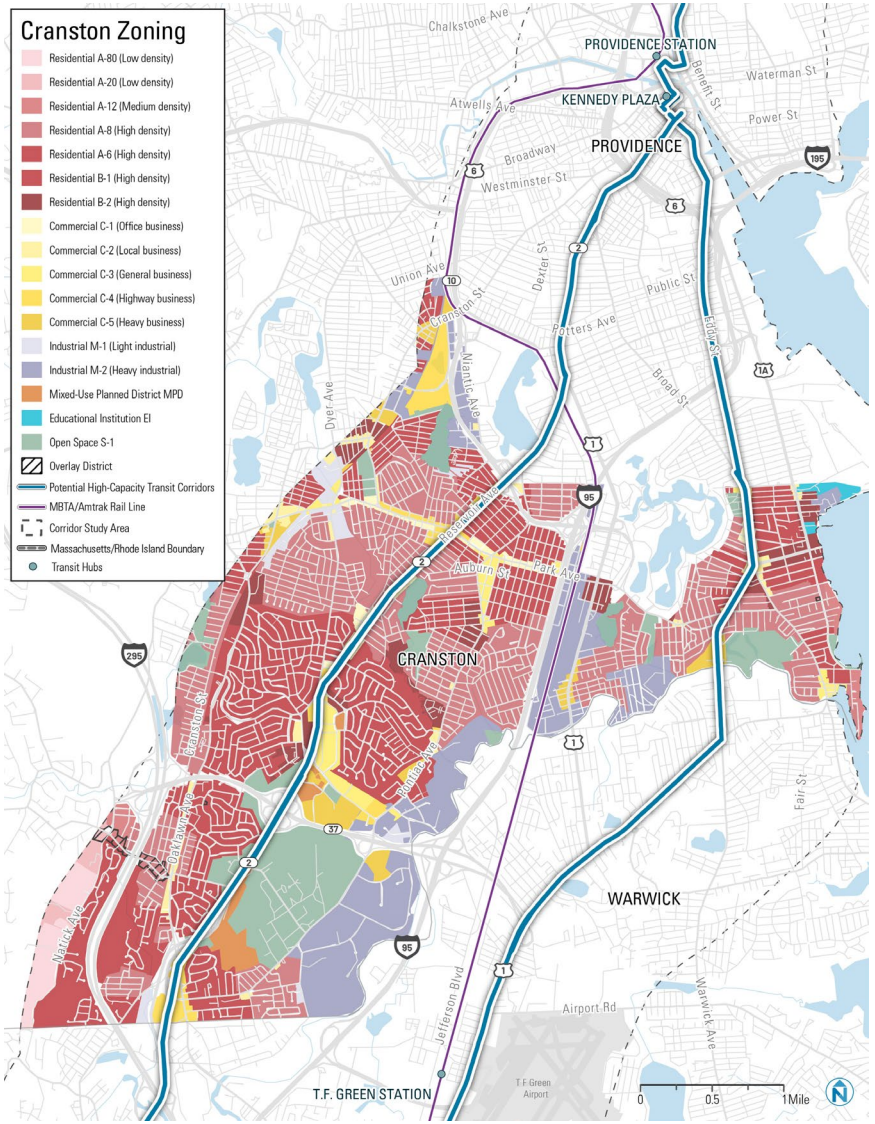


Figure 3-8 Cranston Zoning

Warwick

The parcels around the HCT corridor in Warwick are mainly zoned for single-family homes, commercial, and light industrial uses. Commercial uses are designated under the general business district zoning, which allows retail, services, office, and automotive-related uses. The single-family homes that are zoned under the A-10 residential district are restricted to one dwelling per lot—each lot required to have a minimum area of 7,000 square feet—promoting lower density and inefficient land use.

The City Center features two key areas: the Gateway District and the Intermodal District. The Gateway District accommodates both transportation-related and general commercial uses, prioritizing high-quality development and efficient vehicular circulation. Meanwhile, the Intermodal District, located near the Intermodal facility and Airport terminal, is designed to be a dynamic regional hub. It blends retail, commercial, office, and residential uses, emphasizing strong pedestrian and vehicle connectivity, streamlined traffic flow, and well-planned infrastructure to support high-density development.

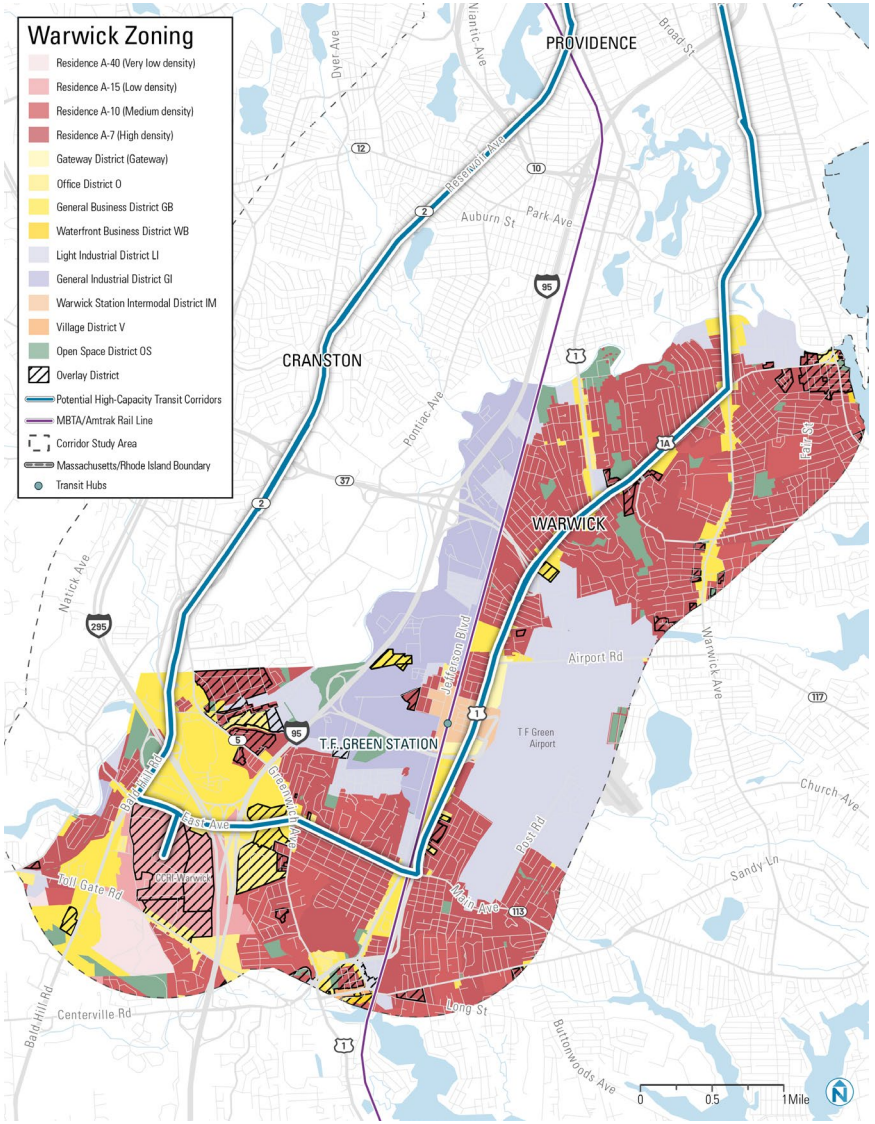


Figure 3-9 Warwick Zoning

Land Assessment

Multifamily Housing

Only 1,600 acres (3%) of the study area contain multifamily housing -- residential properties with more than two units. Providence has the highest number of multifamily properties, followed by Pawtucket and Cranston.

Table 3-2 Multifamily Housing by Municipality [2]

Town	Land Area (Acres)	% of Corridor Area
Providence	622	1%
Cranston	315	1%
Warwick	35	<1%
Cumberland	55	<1%
Pawtucket	380	1%
Central Falls	179	<1%
Total	**1,586**	**3%**

[2] Source: RIGIS (2020)

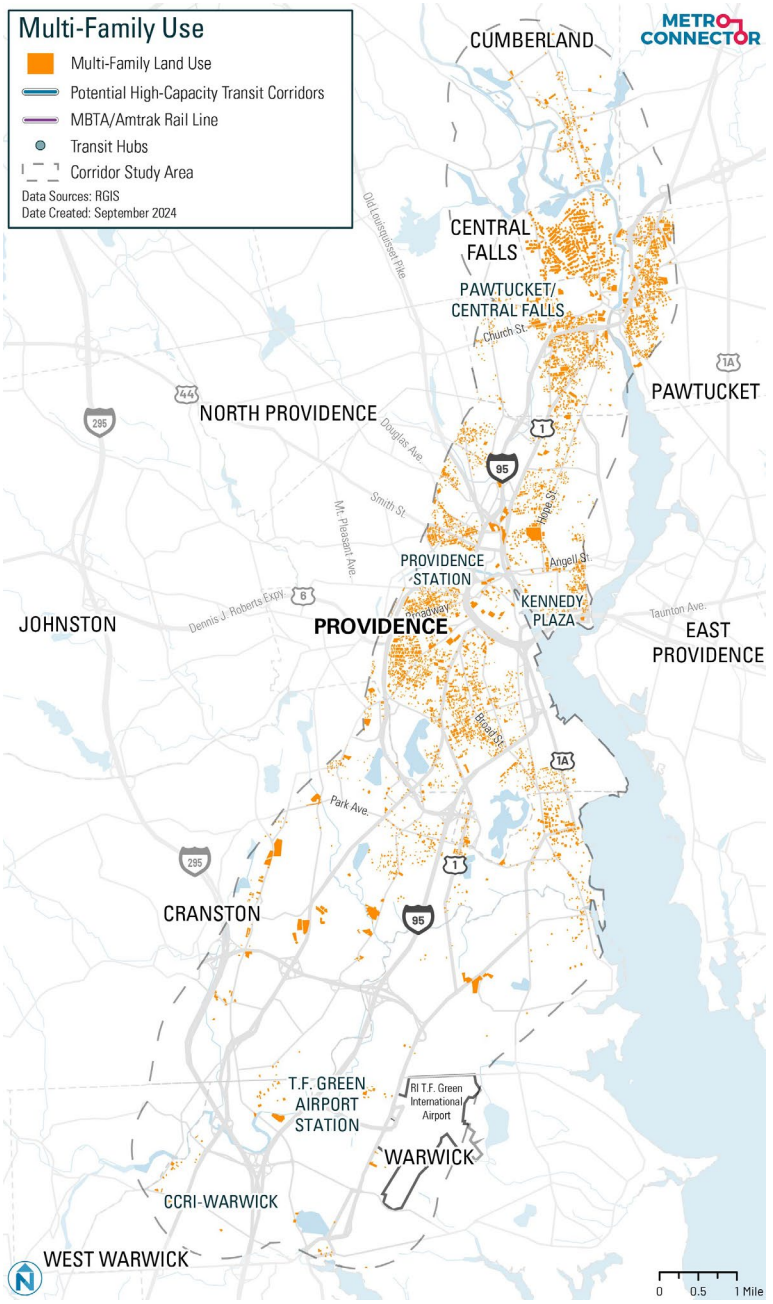


Figure 3-10 Multifamily Use

Affordable Housing

Affordable housing refers to housing on which occupants spend no more than 30% of their income on expenses like rent or mortgage payments, utilities, and maintenance. According to RIHousing, a unit qualifies as affordable if it receives subsidies from federal, state, or local sources and maintains an affordability restriction for at least 30 years. Access to affordable housing is crucial for low- and moderate-income families, as it ensures stable living conditions and allows households to dedicate sufficient resources to other essential needs.

The distribution of affordable units within the study area reveals a significant concentration in Providence with 156 properties including 10,648 units, indicating a high demand and the city's efforts to address housing needs. In unit count, Providence is followed by Pawtucket with 2,525 units across 43 properties. In contrast, Warwick and Cranston, despite their larger populations compared to Pawtucket, offer fewer affordable units. Cumberland and Central Falls have the lowest number of affordable units overall. Additionally, Providence and Pawtucket have a higher number of affordable units designated for families, whereas the other cities/towns mainly offer affordable housing for elderly and disabled populations.

Table 3-3 Affordable Housing Units by Municipality [3]

Town	No. of Properties	Total No. of Units
Providence	156	10,648
Cranston	16	1,587
Warwick	22	1,755
Cumberland	11	774
Pawtucket	43	2,525
Central Falls	14	681
Total	**262**	**17,940**

[3] Source: National Housing Preservation Database

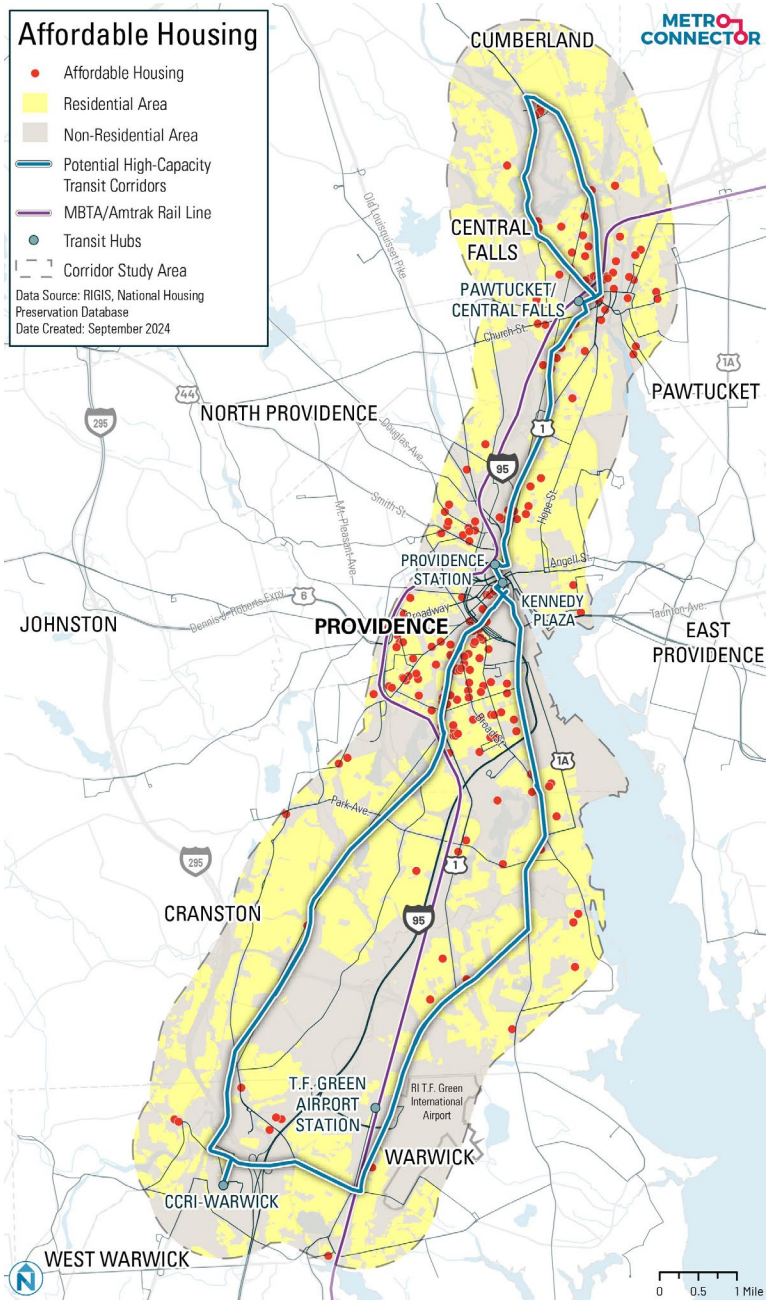


Figure 3-11 Affordable Housing

Commercial Uses

Commercial use land, or places where goods and services are bought and sold, can be an indicator of destinations and jobs. Warwick has the highest commercial acreage within the study area, followed by Providence which serves as a central hub for business activities.

Table 3-4 Commercial Land Use by Municipality[4]

Town	Land Area (Acres)	% of Corridor Area
Providence	968	2%
Cranston	574	1%
Warwick	1,346	3%
Cumberland	102	<1%
Pawtucket	368	<1%
Central Falls	122	<1%
Total	**3,480**	**7.5%[5]**

[4] Source: RIGIS (2020)

[5] The remaining 0.5% of the commercial uses are in Lincoln and West Warwick

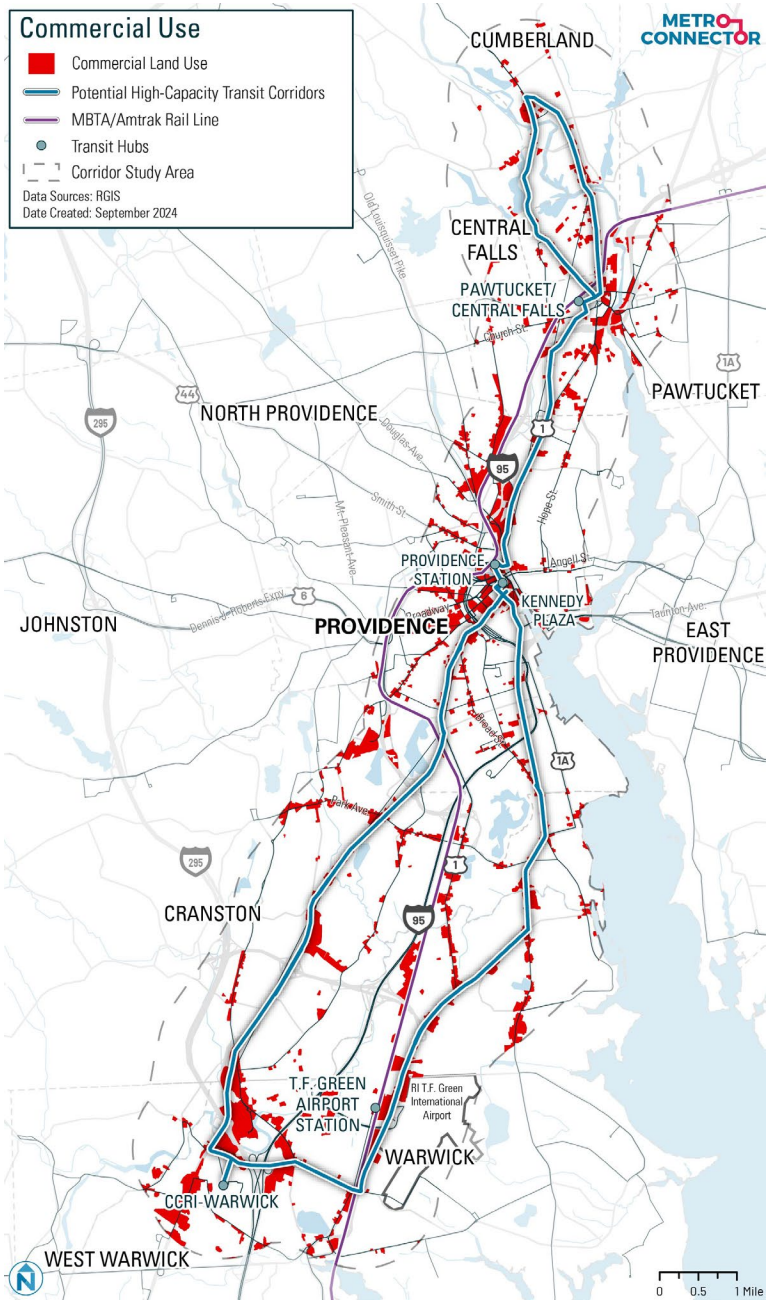


Figure 3-12 Commercial Land Use

Industrial Uses

Industrial land is used for manufacturing, warehousing, distribution, and processing. Warwick has the most industrial use land in the study area, followed by Cranston and Providence. Industrial uses often require on-site labor, which means that industrial sites can be major job hubs, depending on occupant and development size.

Table 3-5 Industrial Land Use by Municipality[6]

Town	Land Area (Acres)	% of Corridor Area
Providence	429	1%
Cranston	459	1%
Warwick	579	2%
Cumberland	63	<1%
Pawtucket	335	1%
Central Falls	194	<1%
Total	**2,059**	**6.4%**

[6] Source: RIGIS (2020)

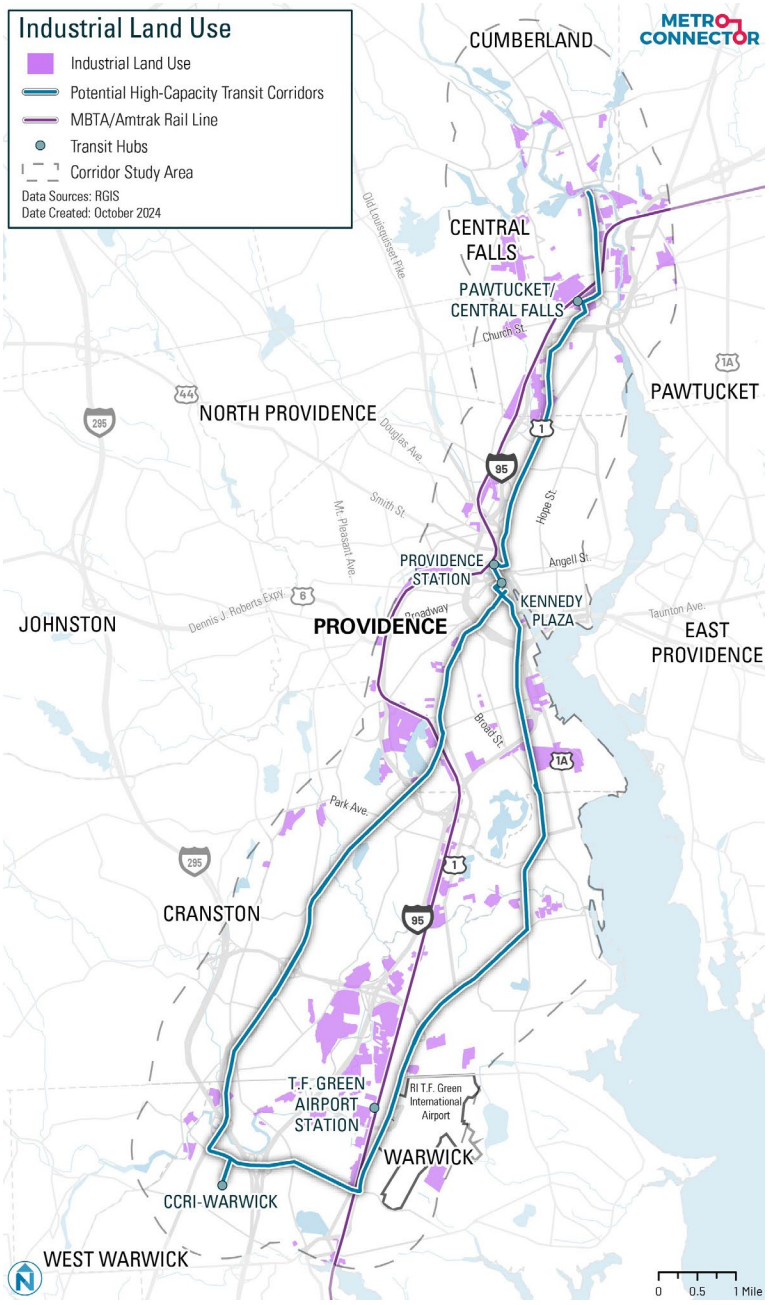


Figure 3-13 Industrial Land Use

Mixed Use Commercial and Residential/Industrial

Mixed use development is ideal for transit-oriented development, as this pairs commercial with either residential or industrial uses. This type of development can take the form of retail stores at the street level with apartments built on the floors above. The study area does not have a significant amount of mixed-use land. Providence, for example, has many downtown locations that are zoned for mixed-use commercial and residential, but do not utilize this and are single use only.

Table 3-6 Mixed Use Land by Municipality[7]

Town	Land Area (Acres)	% of Corridor Area
Providence	204	<1%
Cranston	89	<1%
Warwick	33	<1%
Cumberland	0	<1%
Pawtucket	7	<1%
Central Falls	8	<1%
Total	**339**	**1%**

[7] Source: RIGIS (2020), Tax Assessment Data

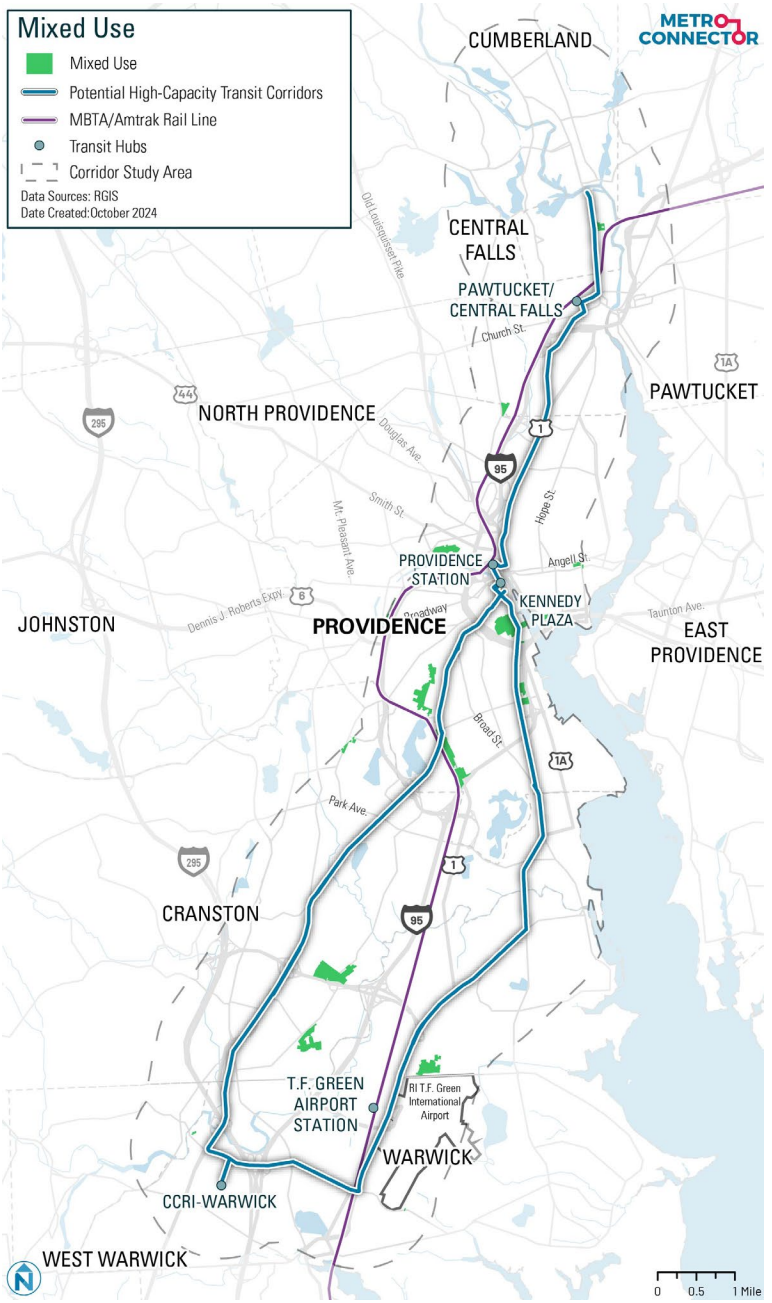


Figure 3-14 Mixed Use Residential/Commercial Land

Vacant Land

Per the State's Property Type Classification, vacant land can be categorized as developable, potentially developable, or undevelopable. While the overall availability (3%) of vacant land is limited within the study area, Providence and Warwick have relatively more prospects for new development. Both cities have more commercial vacant land than residential. On the other hand, Cranston, Cumberland, and Pawtucket, each with less than 1% vacant land, call for more strategic planning and careful prioritization of land use to fully realize their development potential. Across the study area, commercial vacant land slightly exceeds residential vacant land.

Table 3-7 Vacant Land by Municipality[8]

Town	Residential Vacant Land Area (acres)	Commercial Vacant Land Area (acres)	Total Vacant Land Area (acres)	% of Corridor Area
Providence	119	314	433	1%
Cranston	280	110	390	<1%
Warwick	117	140	257	1%
Cumberland	104	17	121	<1%
Pawtucket	14	75	89	<1%
Central Falls	9	8	17	<1%
Total	**643**	**664**	**1,307**	**3%**

[8] Source: RIGIS (2020), Tax Assessment Data

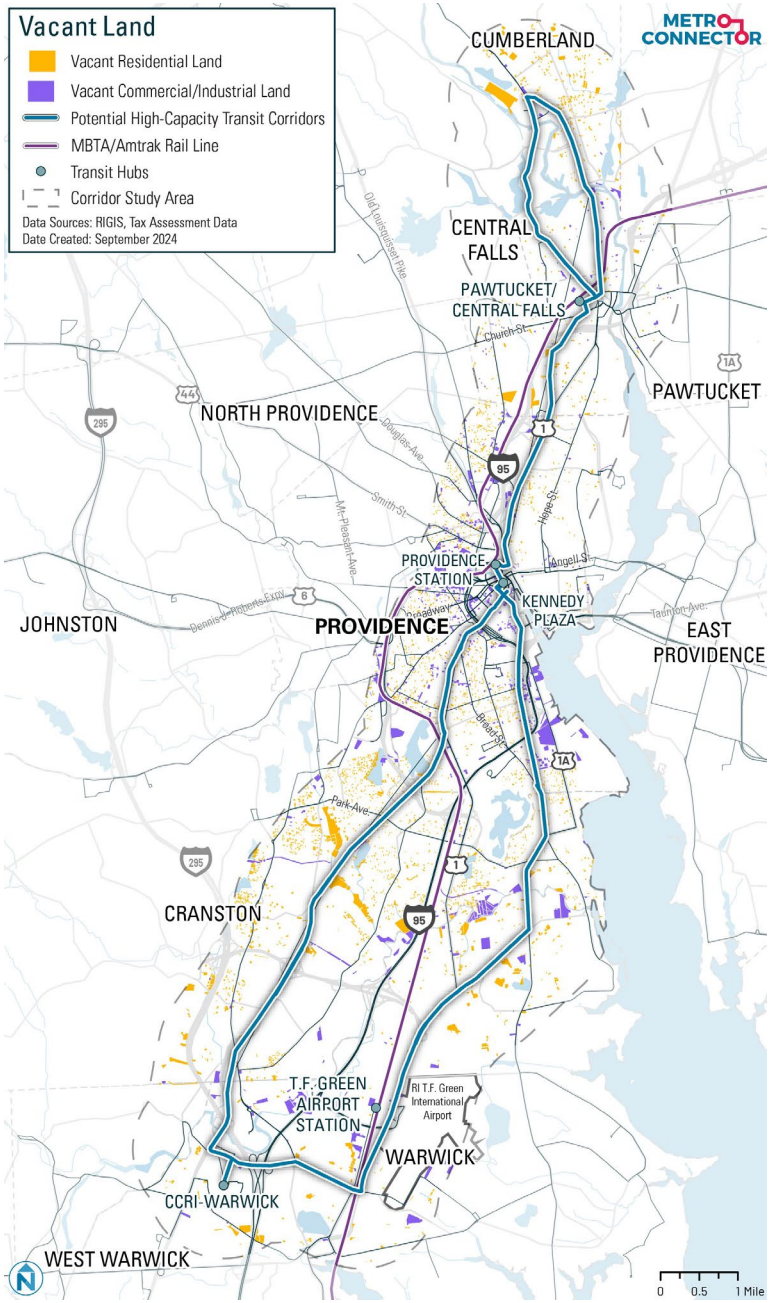


Figure 3-15 Vacant Land

Land Availability – Underdeveloped Properties

The assessed value of a property, assigned by local authorities, determines property taxes and calculates the owner's annual tax liability. This value is a percentage of the property's market value and is set through an appraisal process conducted by local assessors, who evaluate various factors such as recent sales, property conditions, and improvements.

The total assessed value is the sum of the assessed land value and the assessed building value. If the building value is 50% or less than the land value, it indicates that the property may be underdeveloped and has potential for redevelopment or expansion. According to data from the Tax Assessor's office for cities along the HCT corridor, Providence has more than 2,600 underdeveloped properties, while Warwick follows with 2,235. There are about 7,500 underdeveloped properties in the study area.

Table 3-8 Number of Underdeveloped Properties by Municipality[9]

Town	Number of Underdeveloped Properties
Cranston	203
Providence	3,312
Warwick	2,074
Cumberland	762
Pawtucket	962
Central Falls	238
Total	**7,551**

[9] Source: Tax Assessor's Data

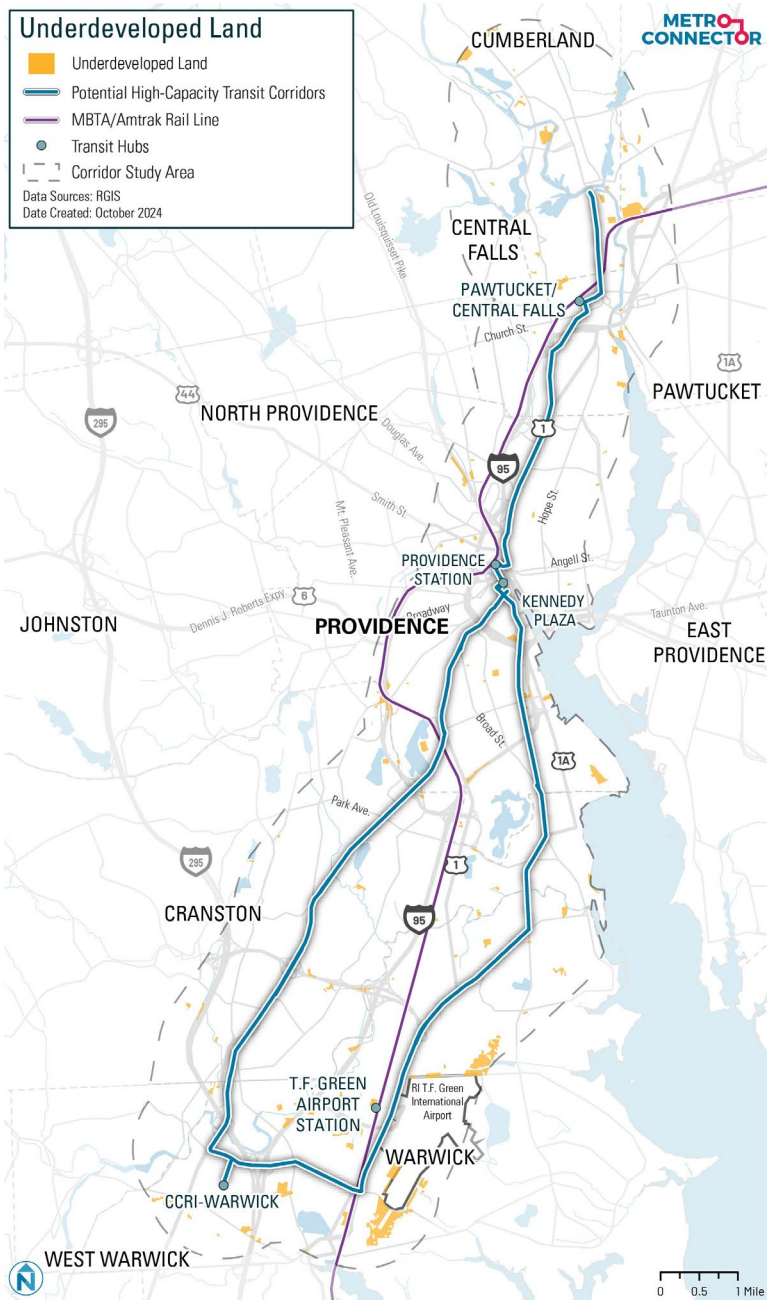


Figure 3-16 Underdeveloped Properties

Summary and Opportunities

The Land Use and Zoning Analysis chapter considers the relationship between land use and rapid transit. The analysis found significant swaths of transit-supportive land uses—dense commercial and residential areas—along the study corridors in each municipality. Opportunities for infill development along the study corridors were also identified. Major existing land use-related opportunities related to the potential for high-capacity transit in the study area include:

- Nearly half (44%) of the existing land use within the study area is dedicated to residential uses, and of these residential land uses, medium and high-density zoning account for 75% of the total area.
- Existing land use within the study area is diverse, with the highest proportion of existing land dedicated to residential; transportation, communication, and utilities; commercial; and industrial. About 16% of existing land is forested.
- Commercial uses are concentrated heavily along study corridors across all municipalities.
- There are over 7,500 underdeveloped properties in the study area, approximately 70% of which are in Providence and Warwick.
- There may exist an opportunity to increase the supply of affordable housing the study area through the development of additional multifamily housing. Today, only 3% of the study area is occupied by multifamily housing.
- With less than 1% vacant developable land across the entire study area, future development will primarily rely on infill and reuse of previously developed land.

Major zoning-related opportunities related to the potential for high-capacity transit in the study area include:

- Cumberland is primarily zoned for higher density residential uses along with a relatively large amount of parks and open space acreage. Zoning along the study corridors is primarily for commercial and medium-high density residential with smaller sections of light industrial uses.
- Central Falls is primarily zoned for residential, industrial, and commercial use. The immediate areas surrounding the study corridors are mainly commercial.
- Pawtucket is zoned for a wide variety of uses, with significant portions allocated for medium-high-density residential, mixed use, commercial, and industrial uses. The area along the study corridors is primarily high-density residential, with smaller patches allowing for mixed use development, commercial, and industrial uses.
- Providence's zoning features the largest and most dense commercial downtown in the study area surrounded by residential, industrial, and institutional zones.
- Cranston is predominantly zoned for medium-high density residences along with pockets in the study area allowing for mixed use development, open space, and commercial use.
- Warwick is zoned for a mix of industrial, residential, and commercial uses, with a relatively large share of the town's footprint within the study area consumed by the T.F. Green Airport. A similar mix of uses exists along the path of the study corridors before they terminate in the City Center, which features two mixed-use districts designed to allow for convenient access to commerce and residence alike.
- Higher residential density is needed within the study area in Warwick and Cranston to support sustainable ridership.
- High-capacity transit corridors provide municipalities with an opportunity to rezone the areas surrounding the corridors to allow higher density residential and mixed-use development.

4 Transit Network Analysis

The Transit Network Analysis is an overview of the state of public transit in the study area. It details transit routes operating in the area, highlights transit infrastructure and key transfer locations, and analyzes ridership. It assesses the role that high-capacity transit could play in the state's existing and planned transit network.

RIPTA Bus Service

The Metro Connector Study Area contains three of RIPTA's four major transit centers, including Kennedy Plaza, which is served by most of RIPTA's routes. As a result, the Study Area contains the highest density of RIPTA service in the entire state. To understand the role that HCT could play in the study area, this section provides a summary of the primary RIPTA bus routes that serve similar markets to those of the two HCT corridors identified in RIPTA's Transit Forward Rhode Island 2040 plan. Route profiles describe the 14 primary routes in the study area and a summary table (Table 4-1) provides an understanding of the major operating statistics of the other routes in the corridor. The following Primary and Other Routes are described in this section.

Table 4-1 Existing Bus Service

Route	Monthly Ridership (Oct. 2023)*	Monthly Ridership within Study Area*	Weekday Peak/Off-Peak Existing Headway	Planned TMP Peak/Off-Peak Weekday Headway
Primary Routes				
R-Line	203,210	203,210	10/15	Rapid Bus
QX	680	590	Express (hourly peak periods only)	Discontinued and replaced with microtransit or flex service
1	72,350	69,620	25/35	Rapid Bus
3	12,410	5,900	40/60	30 All Day
4	9,190	3,800	40/55	30 All Day
17	27,130	9,570	35/60	Rapid Bus
18	11,000	3,710	30/60	20 Peak
19	34,770	9,800	35/60	15 All Day
20	60,250	32,830	18/30	Rapid Bus
21	24,050	11,730	35/35	Light Rail/BRT
22	31,810	12,480	35/45	15 All Day
31	50,700	17,770	17/25	Rapid Bus
54	35,500	3,330	45/45	Regional Rapid 15
72	48,510	8,700	25/35	20 Peak
Other Routes				
12X	620	350	Express	Express
13	7,840	3,900	60/60	30 All Day
14	17,290	11,200	60/60	Regional Rapid
16	4,360	1,840	60/60	30 Peak
23	3,540	1,040	60/60	30 Peak
24X	2,230	690	Express	Express
27	33,850	15,280	30/60	Rapid Bus
28	29,240	14,320	30/45	15 All Day
29	3,520	1,420	60/60	30 Peak
30	12,880	11,360	45/50	30 All Day
32	5,820	3,590	60/60	20 Peak
33	25,820	11,370	30/60	20 Peak
34	14,160	6,760	60/60	20 Peak
35	9,510	3,910	45/60	30 All Day
40	4,490	3,230	45/60	30 All Day
50	32,080	18,700	30/45	15 All Day
51	22,000	16,060	45/60	15 All Day
55	21,070	11,500	35/60	20 Peak
56	48,570	29,860	20/25	Rapid Bus
57	17,900	10,660	35/45	20 Peak
58	12,030	6,210	60/60	30 All Day
59X	710	250	Express	Express
6	6,410	3,040	30/50	30 Peak
60	50,270	15,430	60/60	Regional Rapid 15

Route	Monthly Ridership (Oct. 2023)*	Monthly Ridership within Study Area*	Weekday Peak/Off-Peak Existing Headway	Planned TMP Peak/Off-Peak Weekday Headway
9X	1,450	490	Express	Express
61X	1,200	680	Express	Express
65X	1,680	980	Express	Express
66	25,760	13,880	Express	Regional Rapid
71	7,990	7,990	45/45	20 Peak
73	2,920	1,460	60/60	15 All Day
75	4,070	2,750	60/60	30 All Day
76	1,770	1,250	60/60	30 All Day
78	16,170	8,230	45/60	Rapid Bus
80	1,400	760	60/60	30 Peak
92	42,920	24,360	30/30	15 All Day
95X	1,200	580	Express	Express

**Data note: To determine the percentage of ridership within the study area, a combination of two separate RIPTA ridership datasets was used. To find the actual percentage of ridership in the study area, the report 'Stop Summary – Trip Average' was used. This percentage was then applied to RIPTA's 'Route Ridership (NTD Statistics)' ridership numbers for each route during the time period.*

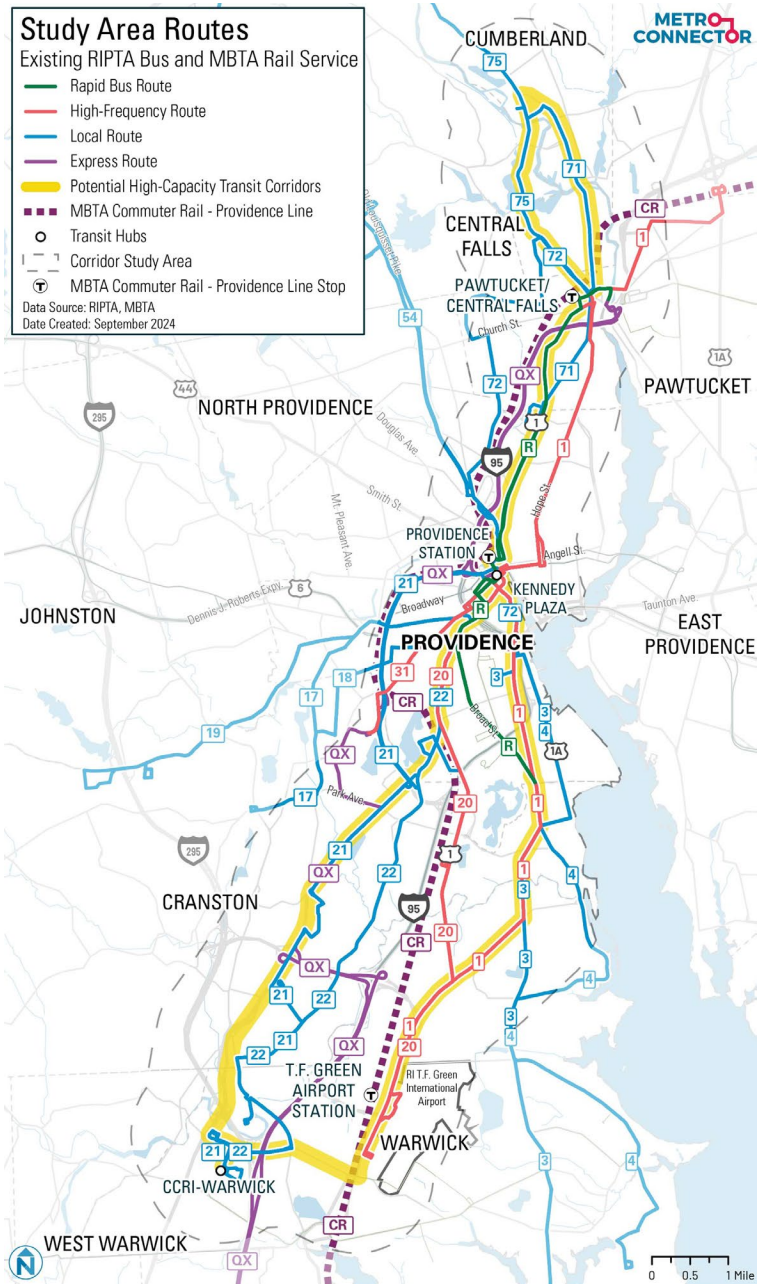


Figure 4-1 RIPTA Routes within Study Area

Primary Route Descriptions

R Line

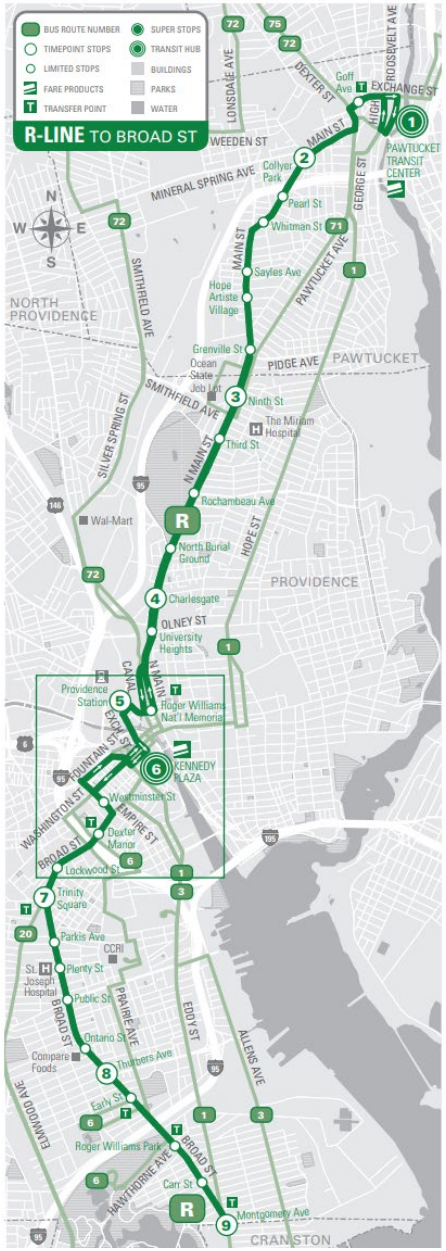
The R-Line is RIPTA's sole existing rapid bus service and the highest ridership route in the system. The R-Line operates between Broad St. in southern Providence to Roosevelt St & Main St. in Pawtucket, notably serving stops at Kennedy Plaza, Providence Station, and Pawtucket/Central Falls Station.

The R-Line operates service on weekdays and weekends, with service from 5:00 AM – 12:30 AM on weekdays, 5:00 AM – 12:15 AM on Saturdays, and 6:30 AM – 11:30 PM on Sundays. It also has the highest frequencies in the system, with 10-minute frequency all day on weekdays (5:00 AM to 7:30 PM) and 15-minute frequency all day on weekends (7:00 AM to 7:00 PM).

In October 2023, the R-Line had an average of 7,780 passenger trips each weekday, 3,140 each Saturday, and 3,230 each Sunday, for a total of 203,210 passenger trips during a calendar month. Of the average weekday passenger trips, all 7,780 took place within the study area. The R-Line is on-time (between 1 minute early and 5 minutes late) 76% of the time, just below RIPTA's on-time performance target of 80%.

The R-Line runs completely within the study area buffers and has extremely high ridership demand. With the addition of high-capacity transit, the R-Line would potentially offer duplicative coverage north of Kennedy Plaza.

Figure 4-2 R Line Route Map



Route 1

Route 1 Eddy/Hope/Benefit is a high-frequency route that provides service from T.F. Green International Airport to Bristol Place in South Attleboro via Kennedy Plaza and Pawtucket/Central Falls Transit Center.

Route 1 operates service on weekdays and weekends, with service from 5:45 AM – 10:35 PM on weekdays, 6:40 AM – 9:20 PM on Saturdays, and 6:45 AM – 8:15 PM on Sundays.[10] Although it is categorized as a high-frequency route, Route 1 has peak frequencies of 20 minutes on weekdays, and 40 minutes on weekends.

Route 1 has the second highest ridership in RIPTA's system, with 72,350 passenger trips in October 2023. On average, Route 1 served 3,020 passenger trips on weekdays, 890 on Saturdays, and 850 on Sundays. Of the average weekday passenger trips, 2,900 took place in the study area. Route 1 runs on-time 76% of the time, which is 4% below RIPTA's on-time performance standard of 80%.

Route 3

Route 3 Oakland Beach is a local route that provides service from Oakland Beach in Warwick to Providence Station, making stops in the Hospital District on Eddy St. and Kennedy Plaza.

Route 3 operates service on weekdays and weekends, with service from 6:00 AM – 9:00 PM on weekdays, 6:30 AM – 7:00 PM on Saturdays, and 8:00 AM – 7:00 PM on Sundays. Route 3 has peak frequencies of 40 minutes on weekdays, 75 minutes on Saturdays, and 100 minutes on Sundays.

Route 3 has the twenty-eighth highest ridership in RIPTA's system, with 12,410 passenger trips in October 2023. On average, Route 3 served 490 passenger trips on weekdays, 240 on Saturdays, and 175 on Sundays. Of the total passenger trips, 5,900 took place in the study area. Route 3 runs on-time 82% of the time.

Route 4

Route 4 Warwick Neck is a local route that provides service from Bayside Field in Warwick to Providence Station, making stops in the Hospital District on Eddy St. and Kennedy Plaza.

Route 4 operates service on weekdays and weekends, with service from 5:45 AM – 9:45 PM on weekdays, 7:00 AM – 7:40 PM on Saturdays, and 7:00 AM – 6:00 PM on Sundays. Route 4 has peak frequencies of 40 minutes on weekdays and 75 minutes on Saturdays, and 100 minutes on Sundays.

Route 4 has the thirty-third highest ridership in RIPTA's system, with 9,190 passenger trips in October 2023. On average, Route 4 served 365 passenger trips on weekdays, 165 on Saturdays, and 110 on Sundays. Of the total passenger trips, 3,800 took place in the study area. Route 4 runs on-time 83% of the time.

Route 17

Route 17 Dyer/Pocasset is a local route that provides service from the Stop & Shop on Atwood Ave. in Cranston to Kennedy Plaza in Downtown Providence, operating primarily along Dyer Ave, Westminster St, and Washington St.

Route 17 operates service on weekdays and weekends, with service from 6:15 AM – 10:00 PM on weekdays, 6:30 AM – 10:00 PM on Saturdays, and 7:45 AM – 7:30 PM on Sundays. Route 17 has peak frequencies of 32 minutes on weekdays, 44 minutes on Saturdays, and 42 minutes on Sundays.

Route 17 has the fifteenth highest ridership in RIPTA's system, with 27,130 passenger trips in October 2023. On average, Route 17 served 1,090 passenger trips on weekdays, 430 on Saturdays, and 415 on Sundays. Of the total passenger trips, 960 took place in the study area. Route 17 runs on-time 73% of the time.

Route 18

Route 18 Union Avenue is a local route that provides service from Dyer Ave & Chestnut Hill in Cranston to Kennedy Plaza in Downtown Providence, operating primarily along Union Ave, Cranston St, and Washington St.

Route 18 operates service on weekdays and Saturdays, with service from 6:00 AM – 7:15 PM on weekdays, and 7:30 AM – 7:00 PM on Saturdays. Route 18 has peak frequencies of 30 minutes on weekdays and 60 minutes on Saturdays.

Route 18 has the thirtieth highest ridership in RIPTA's system, with 10,995 passenger trips in October 2023. On average, Route 18 served 500 passenger trips

[10] Span of service is defined by RIPTA's Service Standards. The beginning of service refers to the departure of the first inbound trip, and the ending span of service refers to the departure time of the last peak direction trip.

on weekdays and 130 on Saturdays. Of the total passenger trips, 3,710 took place in the study area. Route 18 runs on-time 78% of the time.

Route 19

Route 19 Plainfield/Westminster is a local route that provides service from the Cranston Industrial Park to Kennedy Plaza in Downtown Providence, additionally serving the Cranston Walmart and operating primarily along Plainfield St, Westminster St, and Washington St.

Route 19 operates service on weekdays and weekends, with service from 6:00 AM – 11:15 PM on weekdays, 6:45 AM – 11:15 PM on Saturdays, and 7:30 AM – 8:00 PM on Sundays. Route 19 has peak frequencies of 32 minutes on weekdays, 40 minutes on Saturdays, and 43 minutes on Sundays.

Route 19 has the tenth highest ridership in RIPTA's system, with 27,130 passenger trips in October 2023. On average, Route 19 served 1,350 passenger trips on weekdays, 630 on Saturdays, and 630 on Sundays. Of the total passenger trips, 9,800 took place in the study area. Route 19 runs on-time 72% of the time.

Route 20

Route 20, Elmwood/T.F. Green International Airport is a high-frequency route that provides service from T.F. Green International Airport in Warwick to Kennedy Plaza in Downtown Providence, primarily running along Elmwood Ave.

Route 20 operates service on weekdays and weekends, with service from 5:15 AM – 11:00 PM on weekdays, 5:45 AM – 10:00 PM on Saturdays, and 5:30 AM – 9:00 PM on Sundays. Route 20 has peak frequencies of 15 minutes on weekdays and 30 minutes on weekends.

Route 20 has the third highest ridership in RIPTA's system, with 60,250 passenger trips in October 2023. On average, Route 20 served 2,470 passenger trips on weekdays, 775 on Saturdays, and 700 on Sundays. Of the average weekday passenger trips, 2,030 took place in the study area. Route 20 runs on-time 76% of the time, which is only 4% below RIPTA's on-time performance standard of 80%.

Route 21

Route 21 Reservoir/Garden-City/CCRI-Warwick is a local route that provides service from CCRI in Warwick to Kennedy Plaza, making stops in Cranston and Garden City Center.

Route 21 operates service on weekdays and weekends, with service from 6:00 AM – 10:10 PM on weekdays, 7:00 AM – 10:40 PM on Saturdays, and 7:00 AM – 8:30 PM on Sundays. Route 21 has peak frequencies of 32 minutes on weekdays, 35 minutes on Saturdays and 45 minutes on Sundays.

Route 21 has the nineteenth highest ridership in RIPTA's system, with 24,050 passenger trips in October 2023. On average, Route 21 served 930 passenger trips on weekdays, 580 on Saturdays, and 380 on Sundays. Of the total passenger trips, 11,730 took place in the study area. Route 21 runs on-time 76% of the time.

Route 22

Route 22 Pontiac Avenue is a local route that provides service from The Community College of Rhode Island (CCRI) – Warwick Campus to Kennedy Plaza in Downtown Providence, with stops at Warwick Mall and along Pontiac and Elmwood Avenues.

Route 22 operates service on weekdays and weekends, with service from 5:50 AM – 10:20 PM on weekdays, 6:30 AM – 10:00 PM on Saturdays, and 7:00 AM – 9:15 PM on Sundays. Route 22 has peak frequencies of 30 minutes on weekdays and 45 minutes on weekends.

Route 22 has the thirteenth highest ridership in RIPTA's system, with 31,810 passenger trips in October 2023. On average, Route 22 served 1,250 passenger trips on weekdays, 530 on Saturdays, and 550 on Sundays. Of the total passenger trips, 12,480 took place in the study area.

Route 22 runs on-time 68% of the time.

Route 31

Route 31 Cranston Street is a high-frequency route offering transportation from Brewery Parkade in Cranston to Kennedy Plaza via Cranston and Washington Streets.

Route 31 operates daily, with weekday service running from 6:00 AM to 11:15 PM, Saturday service from 6:30 AM to 10:00 PM, and Sunday service from 7:00 AM to

8:00 PM. During peak times, the route has frequencies of 16 minutes on weekdays, 18 minutes on Saturdays, and 20 minutes on Sundays.

In October 2023, Route 31 recorded the fourth highest ridership within RIPTA's system, with a total of 50,700 passenger trips. On average, the route accommodated 1,890 passenger trips on weekdays, 1,320 on Saturdays, and 940 on Sundays. Of the average weekday passenger trips, 660 occurred within the study area.

Route 31 achieves on-time performance 79% of the time.

Route 54

Route 54 Lincoln/Woonsocket is a regional route that provides service from Kennedy Plaza in Downtown Providence to Woonsocket, primarily operating along RI 146.

Route 54 operates service on weekdays and weekends, with service from 5:15 AM – 12:00 AM on weekdays, 6:45 AM – 11:00 PM on Saturdays, and 6:30 AM – 11:00 PM on Sundays. Route 54 has peak frequencies of 40 minutes on weekdays, 40 minutes on Saturdays, and 43 minutes on Sundays.

Route 54 has the ninth highest ridership in RIPTA's system, with 35,500 passenger trips in October 2023. On average, Route 54 served 1,320 passenger trips on weekdays, 730 on Saturdays, and 750 on Sundays. Of the total passenger trips, 3,330 took place in the study area. Route 54 runs on-time 76% of the time.

Route 72

Route 72 Weeden/Central Falls is a local route that provides service from Pawtucket/Central Falls Transit Center to Kennedy Plaza in Downtown Providence, providing service to Fairlawn and North Providence including Providence Station.

Route 72 operates service on weekdays and weekends, with service from 5:30 AM – 10:30 PM on weekdays, 7:00 AM – 9:15 PM on Saturdays, and 7:15 AM – 7:30 PM on Sundays. Route 72 has peak frequencies of 23 minutes on weekdays and 32 minutes on weekends.

Route 72 has the seventh highest ridership in RIPTA's system, with 48,513 passenger trips in October 2023. On average, Route 72 served 1,810 passenger trips on weekdays, 870 on Saturdays, and 980 on Sundays. Of the total passenger trips, 8,700 took place in the study area. Route 72 runs on-time 76% of the time.

Quonset Express

The Quonset Express is an express route that provides service from Quonset in southern Rhode Island to Pawtucket/Central Falls Transit Center. The Quonset Express operates along Interstate 95 from Quonset to Warwick and along State Highway 6 until it reaches Kennedy Plaza. The Quonset Express also serves Providence Station.

The Quonset Express operates service on weekdays only, with morning trips heading south from Pawtucket/Central Falls transit Center to Quonset at 4:40 AM and 5:33 AM, and afternoon trips heading north from Quonset to Pawtucket/Central Falls at 3:00 PM and 3:34 PM.

The Quonset Express has the fifth lowest ridership in RIPTA's system, with 680 passenger trips in October 2023. On average, the Quonset Express served 24 passenger trips on weekdays, with an average of 6 passengers per trip. Of the total passenger trips, 590 took place in the study area. The Quonset Express runs on-time 82% of the time.

Providence/Stoughton MBTA Commuter Rail Line

The Providence/Stoughton Line is an MBTA Commuter Rail Line that provides service from South Station in Boston to Wickford Junction, via Providence. It is branched service, so some trips go only between South Station and Stoughton and do not go to Providence, so the Providence variants are the only ones relevant to the high-capacity transit study. 21 round trips are offered on the Providence branch during weekdays, and 10 trips are offered on both Saturday and Sunday.

Ridership on the Providence line is highest in the study area at Providence Station, which accommodates 1,400 boardings and 1,200 alightings on an average weekday. Providence Station has double the ridership of Pawtucket-Central Falls Station, and seven-times the ridership of both T.F. Green International Airport Station and Wickford Junction.

The fare for traveling on the Commuter Rail is based on the Zone the station is located in. Pawtucket-Central Falls Station and Providence Station are in Zone 8, and T.F. Green International Airport Station is in Zone 9. Traveling from Zone 8 to Zone 9 is $3.25 and traveling within Zone 8 is $2.75. The fare for traveling to Boston from Zone 8 is $12.75.

Speed and Reliability

Often, taking transit is slower than driving, primarily because transit vehicles need to stop to pick up and drop off passengers. Slower service discourages many people from using transit. Beside stopping for passengers at bus stops, transit speeds in Rhode Island are impacted by general roadway conditions and infrastructure including stop signs, traffic signals, mid-block crossings, traffic congestion, double parking, and circuitous streets.

Speed and reliability improvements are critical to improving bus service.

Along with the frequency and span of service, speed and reliability are important attributes of transit service. Bus riders want to know how long it will take for them to get to their destination, and know they can count on this information, so they can plan their trip and be assured they will arrive on time.

Transit Speed

Speed is important because bus riders want to reach their destination quickly. Outside of Downtown Providence, Downtown Pawtucket, near highway on- and off-ramps for Route 10 in Providence, and near major destinations in Warwick and Cranston, bus speeds in the study area generally operate at acceptable speeds of at least 20 miles per hour (Figure 4-3). The MBTA's Providence Line averages speeds of approximately 35 miles per hour between Providence Station and T.F. Green International Airport Station. Along the corridors shown in red to the right, however, many factors can make buses slow and unpredictable:

- Providence and Pawtucket's narrow streets are difficult to navigate. Roads are also often blocked by delivery trucks and double-parked cars.
- Traffic congestion slows down buses and is unpredictable, especially in Providence and Pawtucket. Traffic can be better or worse depending on the day and hour.
- Bus stops that are blocked by illegal parking or double-parked cars.
- Some routes are long, increasing more opportunities for delays.
- Some routes have circuitous alignments. Bus routes that travel on smaller streets and make numerous turns result in trips that are longer and harder to keep on time.

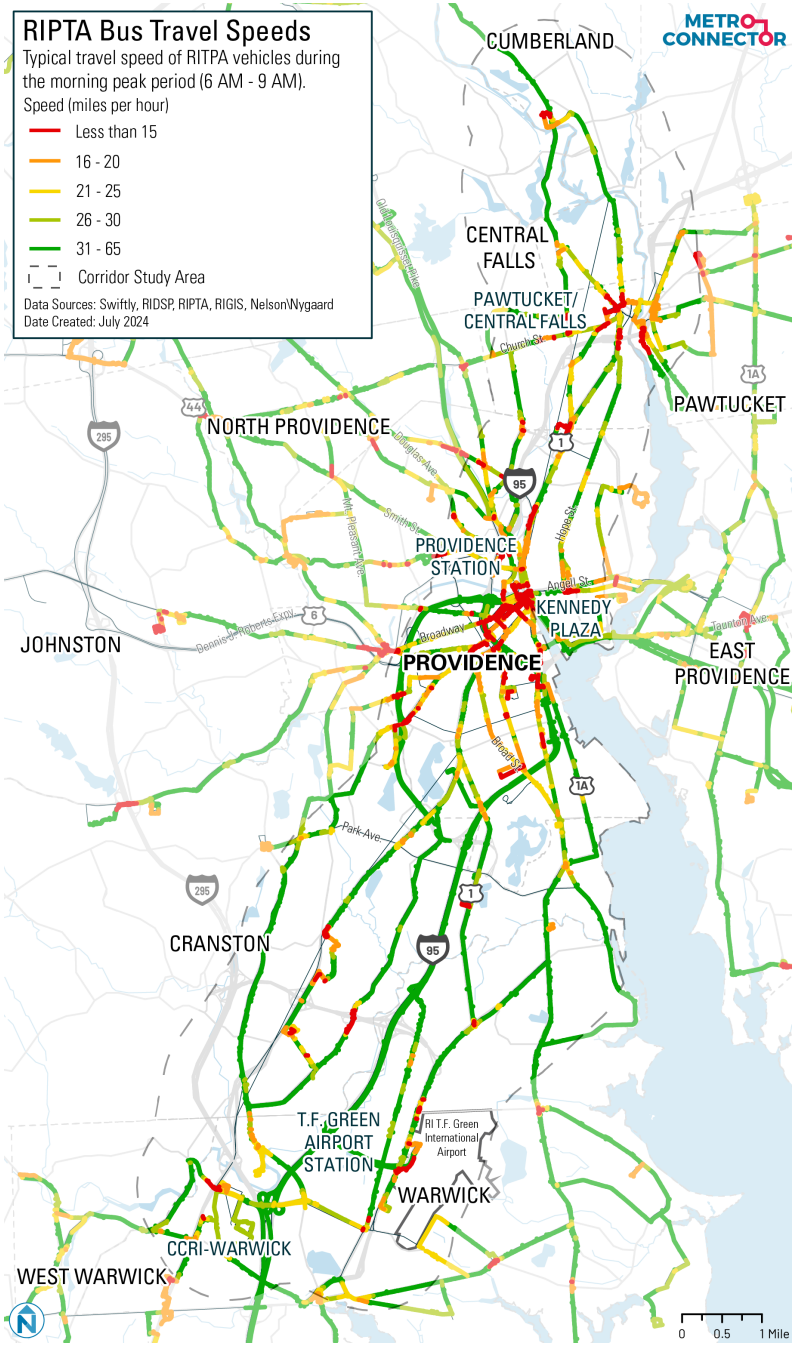


Figure 4-3 RIPTA Bus Travel Speeds

Reliability

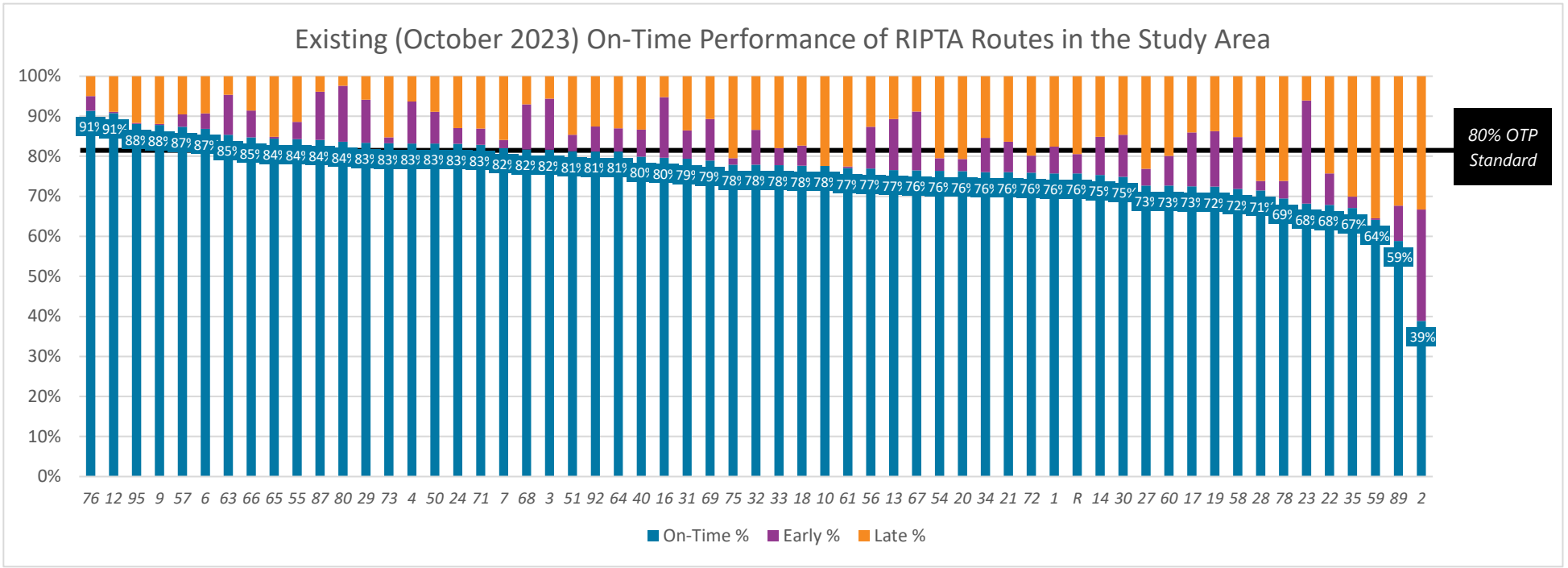
Riders need to be able to rely on RIPTA to get them where they are going when they need to be there. RIPTA works to ensure that nearly all buses leave on time, but once they leave, unavoidable and sometimes unforeseen events on the street mean that they can get delayed. For these reasons, RIPTA cannot ensure that all service is always on time. However, there are many things that RIPTA does to keep on-time performance as high as possible. For fixed-route services, these include:

- Including enough time in schedules to ensure that late arrivals on one trip do not cause late departures on the next trip.
- Including enough time in schedules to accommodate minor delays.
- Setting timepoints at key points along the route where early buses hold until their scheduled departure time. This practice reflects that early service often impacts passengers more than late departures as the wait for the next bus is almost always longer than the short hold time.

Twenty-two of the 49 Primary and Other Routes in the study area meet or exceed RIPTA's OTP standard of 80%.

For fixed-route services, RIPTA measures on-time performance at each mid-route timepoint, with on time defined as no more than one minute early and no more than five minutes late. RIPTA's goal is that 80% of all service departs from each timepoint within this window. As shown in Figure 4-4, reliability of RIPTA routes in the study area range from very high (over 90% for Route 76 and Route 12) to low (Route 89). As discussed in the following section, there is a major opportunity to expand transit priority infrastructure in the study area to reliably convey future high-capacity transit services at higher speeds. This transit priority infrastructure is likely to confer systemwide reliability benefits, since many RIPTA routes must necessarily provide service on the same corridors in dense areas like Downtown Providence and Pawtucket.

Figure 4-4 RIPTA Existing Bus On-Time Performance



Transit Priority Infrastructure

Transit priority infrastructure refers to measures and design elements that prioritize and expedite public transit vehicles over general traffic, such as dedicated bus lanes, signal priority systems, and streamlined boarding processes. This infrastructure is crucial for improving the reliability, efficiency, and attractiveness of transit services by reducing delays and making transit more competitive with private vehicle travel. For high-capacity transit services, transit priority infrastructure ensures that these systems can operate at their full potential, maintaining high speeds and minimizing congestion impacts. It supports such systems by providing the necessary physical and operational conditions to keep them moving smoothly and on schedule. This section and Figure 4-5 provide an overview of current and planned transit priority infrastructure, including:

- Transit Emphasis Corridors
- Transit Signal Priority and Queue Jumps
- Dedicated Busways
- Bus-On-Shoulder Lanes

High-Capacity Transit in the study area could build on and potentially utilize existing transit emphasis corridors in Providence and Pawtucket.

Transit Emphasis Corridors

Transit Emphasis Corridors feature several transit priority elements that are utilized by multiple bus and rapid bus routes. RIPTA has two Transit Emphasis Corridors: The Downtown Transit Connector (DTC), and the Pawtucket Transit Emphasis Corridor. RIPTA's Transit Master Plan identified a third for east-west service in College Hill on Waterman Street and Angell Street. The transit-priority elements on these corridors include:

- High-quality and larger shelters with seating, real-time information, and lighting
- Transit signal priority through extension of green lights and special signal phases
- Dedicated bus lanes on portions of the route
- Bicycle infrastructure through the inclusion of bikeshare stations and bike lanes and parking
- Branding and unique design for stations so that the corridor is identifiable through a consistent color theme and design

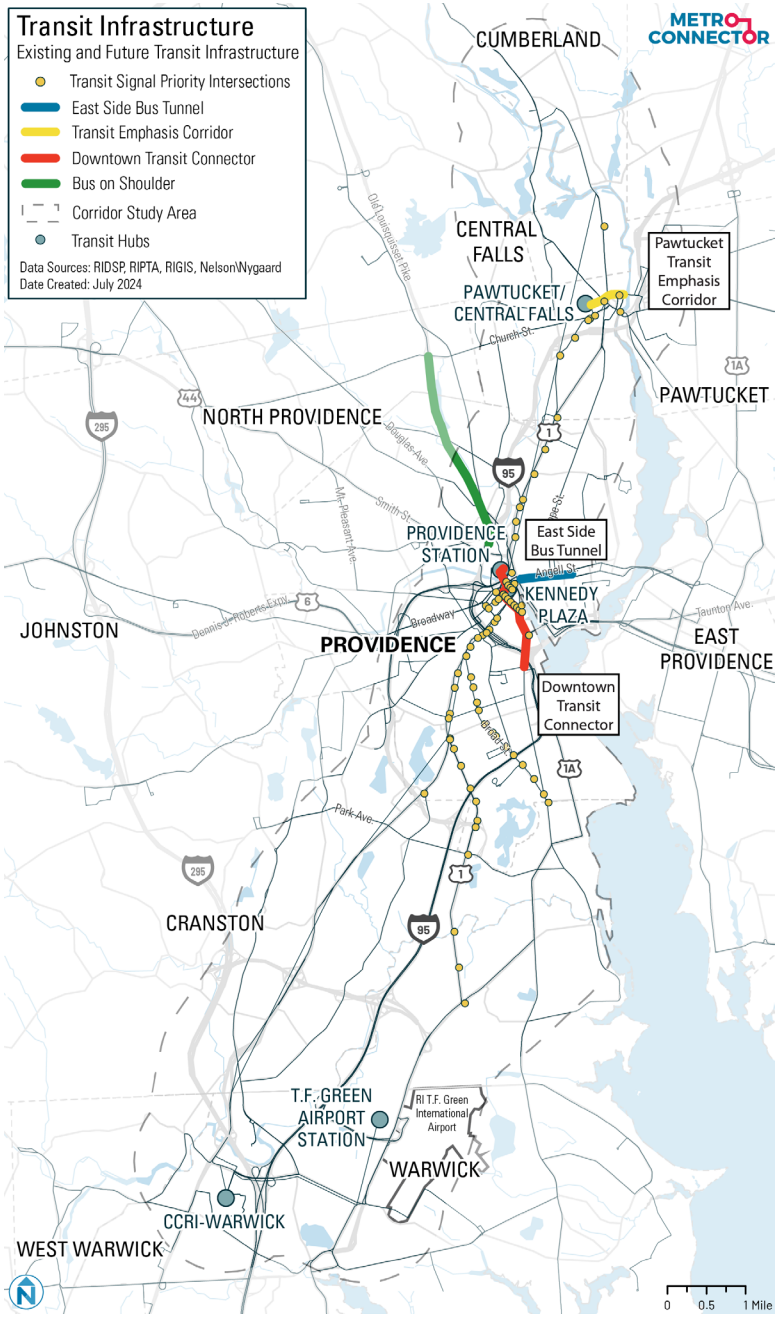


Figure 4-5 Existing and Under-Construction Transit Infrastructure

Transit Signal Priority

Transit signal priority helps buses run more efficiently by either extending green lights, allowing for buses to get through the intersection, or shortening red lights where buses are waiting. There are 112 intersections in the Providence region that are expected to become integrated with transit signal priority or already have transit signal priority capabilities. These intersections are primarily focused on the R-Line corridor, with 51 located along Broad St., Main St., North Main St., and other streets along the corridor. The Downtown Transit Connector has 13 TSP-enabled intersections, primarily along Dorrance St. and Exchange St. Other areas of focus are along Elmwood Ave., West Main Rd. (Aquidneck Island), and East Main Rd. (Aquidneck Island).

Bus Lanes and Queue Jumps

Bus lanes are the most effective way to improve transit speed and schedule reliability as they make the timing of the bus more predictable by allowing them to avoid traffic congestion. Currently, the City of Providence has some bus lanes along the Downtown Transit Connector and Pawtucket features bus lanes along Exchange Street concurrent with the Transit Emphasis Corridor.

Bus queue jump signals provide a leading bus interval to a bus located in a short bus-only lane located at a traffic signal. A leading bus interval is an advanced indication provided by dedicated bus signal that turns green before general traffic signals. Currently, there are no queue jumps in Rhode Island.

Dedicated Transitways

RIPTA has one dedicated busway in the East Side of Providence, which is the East Side Transit Tunnel. The tunnel was originally built in 1914 so that trolleys could more efficiently navigate College Hill. The tunnel was closed for renovation throughout much of 2024 but has reopened for service. The updates include bus shelter improvements, addition of amenities—lighting, shelters, signage—and overall structural and drainage repairs to the tunnel.

The MBTA's Providence/Stoughton Line operates in a dedicated railway right-of-way that allows the Commuter Rail to operate safely at high speeds. The right-of-way spans the entire length of the study area from north to south and its southern terminal is at Warwick Junction.

Bus On Shoulder (Route 146 Reconstruction Project)

Bus delays are often caused by car traffic. With services that operate on highways, buses can be given a travel time advantage when they can use highway shoulders during times of heavy traffic congestion. RIDOT is currently working on the Route 146 Reconstruction Project, which will accommodate bus-on-shoulder travel on RIPTA's Route 54 along the southern end of the highway in North Providence and Providence.

Figure 4-6 Bus Lanes and High-Quality Stations on Providence's Downtown Transit Connector

Bus Stop Infrastructure

RIPTA's buses provide service to approximately 3,360 bus stops statewide. RIPTA has six bus stop typologies that can be found within the study area including Transit Center/Mobility Hubs, Downtown Transit Connector (DTC) stops, Transit Emphasis Corridor (TEC) stops, High Activity stops, Standard stops, and Park & Ride lots. These bus stops vary in terms of their capacity to serve future high-capacity transit service, and they range from standard stops with few amenities to high-end transit centers:

- **Transit Center/Mobility Hubs** - provide connections to other routes and other transit services or modes of travel (e.g., MBTA Commuter Rail). Mobility hubs provide a comfortable waiting environment for riders and additional amenities for RIPTA staff during layovers and breaks. Kennedy Plaza is an example of a Transit Center in the study area.
- **Downtown Transit Connector (DTC)** - provide high-frequency transit service (5 minutes or better) between the Providence Train Station and the Hospital District and on Exchange Street in Pawtucket. This stop type is located along a high-frequency corridor with transit priority elements including dedicated bus lanes and transit signal priority.
- **Transit Emphasis Corridor Stops (TEC)** - most likely to be served by 3 or more routes with truncated service. These stops are in dense neighborhoods that are very walkable and provide connections between major activity centers.
- **High Activity Stops** – provide service to areas with high ridership volumes and are located adjacent to major destinations such as hospitals and universities.
- **Standard Stops** – most common type of RIPTA bus stop and are typical throughout Rhode Island at stops with lower ridership.
- **Park & Ride Lots** - mostly located in suburban and rural environments that allow riders to park their vehicle and transfer to RIPTA local and/or express bus routes for the remainder of their trip.

Figure 4-7 RIPTA High Activity Bus Stop

Service characteristics, frequency, land uses, and passenger volumes influence the type of bus stops located on a route. Available RIPTA amenities include benches, shelters, trash cans, real-time information, digital advertising, bike racks, leaning rails, and lighting. Additional investments for larger transit facilities may include boarding platforms, distinct branding (similar to R-Line), and landscaping.

Future high-capacity transit service would likely serve higher-end stops like DTC stops, TEC stops, and high activity stops. Should light rail be built in the study area, RIPTA may consider adding a 7th stop type to its typology for light rail service, which would include many of the same elements as DTC stops but with level boarding, additional real-time information, and longer platforms. Guidance regarding RIPTA's bus stop amenities and placement criteria can be found in RIPTA's Bus Stop Design Guidelines document.

Figure 4-8 Kennedy Plaza is one of three existing Transit Centers located in the study area.

Key Transit Hubs and Transfer Locations

There are several key locations in the study area facilitating connections between routes in the RIPTA system, as well as connection points to other transit providers serving Southern New England. The primary transfer locations are Kennedy Plaza, Providence Station, Pawtucket-Central Falls Transit Center, T.F. Green International Airport, and CCRI-Warwick (Figure 4-9).

These transit centers and high-volume transfer locations are key areas of focus to determine the placement of future high-capacity transit services.

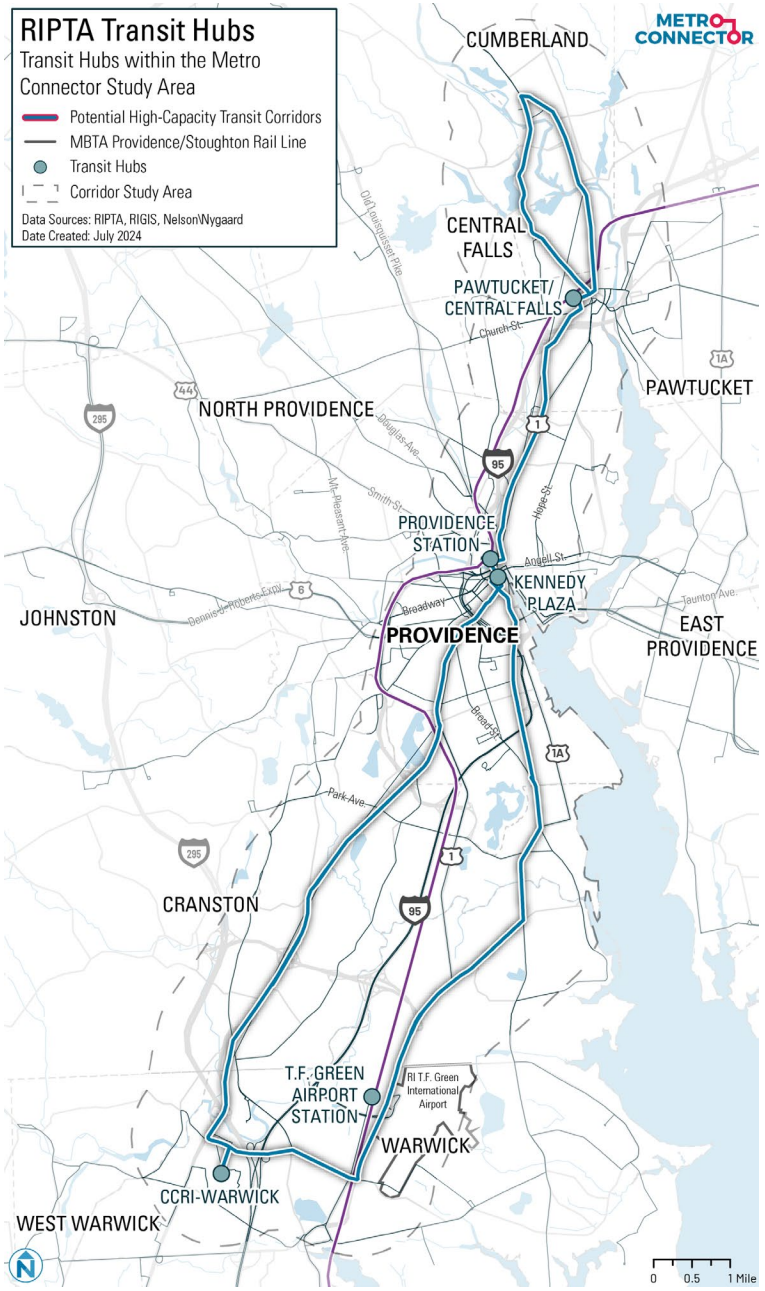


Figure 4-9 RIPTA Transit Hubs

Kennedy Plaza (under study for relocation)

Kennedy Plaza is located in Downtown Providence and is RIPTA's highest rider activity stop, averaging 11,500 daily boardings and 10,980 daily alightings among the 11 stops. Kennedy Plaza is a key transfer location, serving 45 of RIPTA's 56 routes (not including special service). Kennedy Plaza has 12 bus shelters, benches, lighting, real-time arrival information, and a passenger terminal building.

Kennedy Plaza is currently under study for relocation, as RIPTA and the City of Providence are researching locations for an alternative, higher-capacity transit center.

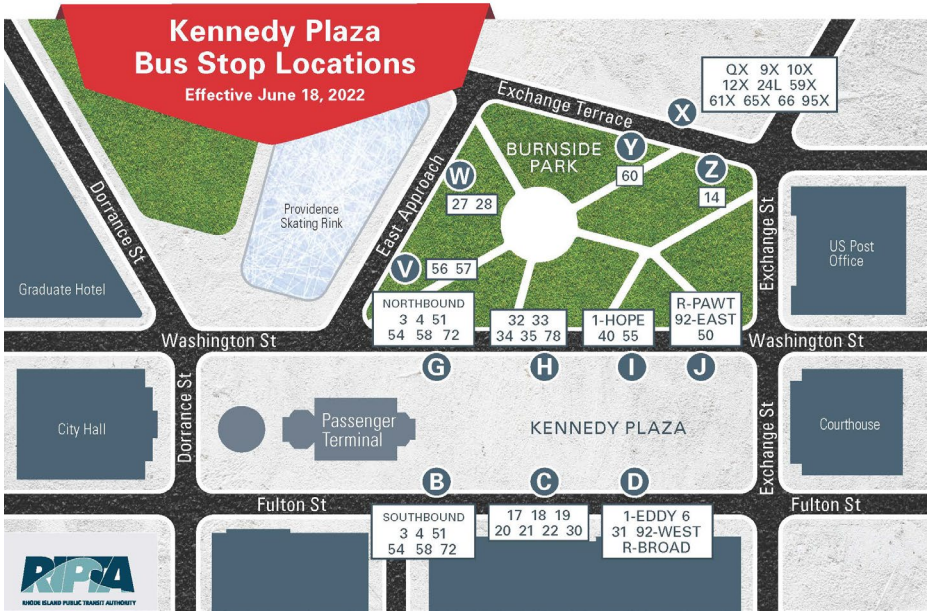


Figure 4-10 Kennedy Plaza Map

Source: KP-Map-Card-6_22-v2-Front8.pdf (ripta.com)

Providence Station

Providence Station is the connecting point for Amtrak and MBTA Commuter Rail in Providence. Nine routes serve three stops at Providence Station. The station itself offers seating, restrooms, a café, and real-time arrival information on incoming trains. There is one bus shelter at Providence Station which is at a stop that is served by eight routes, intended for riders departing the station, and additionally there are stops on Gaspee street, which is on the northwestern side of the Station, that serve an additional four routes. Providence Station averages 400 daily boardings and 340 daily alightings. During weekdays, there is RIPTA bus service at least every 10 minutes between Providence Station and Kennedy Plaza. Future HCT could facilitate travel between Providence Station and Downtown Providence.

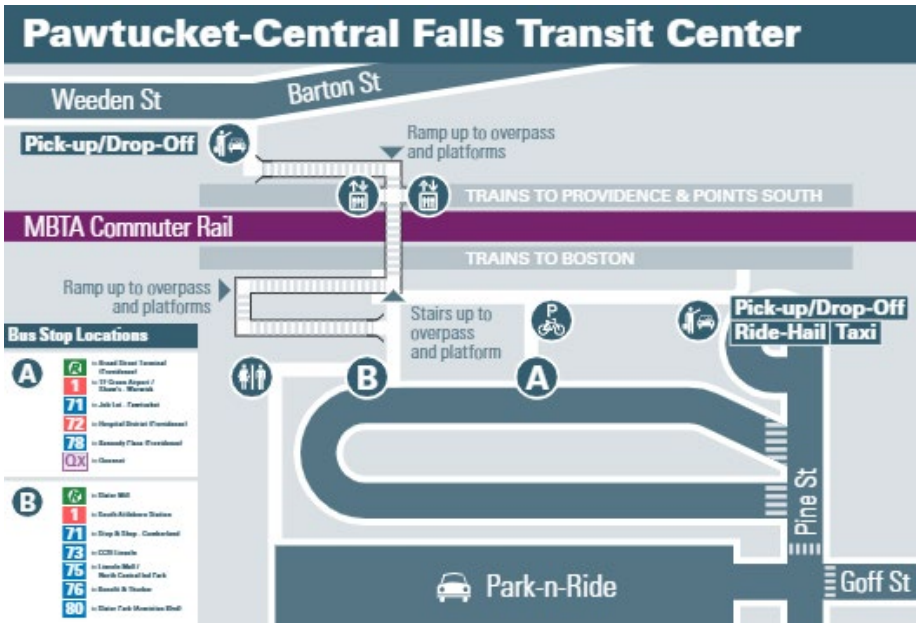
Figure 4-11 Providence Station Entrance

Source: https://www.railfanguides.us/ri/providence/index.htm

Pawtucket-Central Falls Transit Center

Pawtucket-Central Falls Transit Center serves 10 routes and the MBTA Commuter Rail. The station offers parking, bike storage, and enclosed waiting spaces. Pawtucket-Central Falls Transit Center is near the northern terminus of the R-Line, so Pawtucket-Central Falls is also a transfer location to routes that cover areas further north, northeast, or northwest of Providence. The Transit Center averages 560 daily boardings and 600 daily alightings.

Figure 4-12 Map of Pawtucket-Central Falls Transit Center



T.F. Green Airport Station

T.F. Green Airport Station is located at T.F. Green International Airport and provides riders access to four bus routes—Route 1, Route 14, Route 20, and Route 66—and the MBTA Commuter Rail. MBTA Commuter Rail currently provides 8 round trips serving the station each weekday and no weekend service. T.F. Green Airport Station averages 70 daily bus boardings and 40 daily bus alightings, and 186 commuter rail boardings and 167 commuter rail alightings each day.

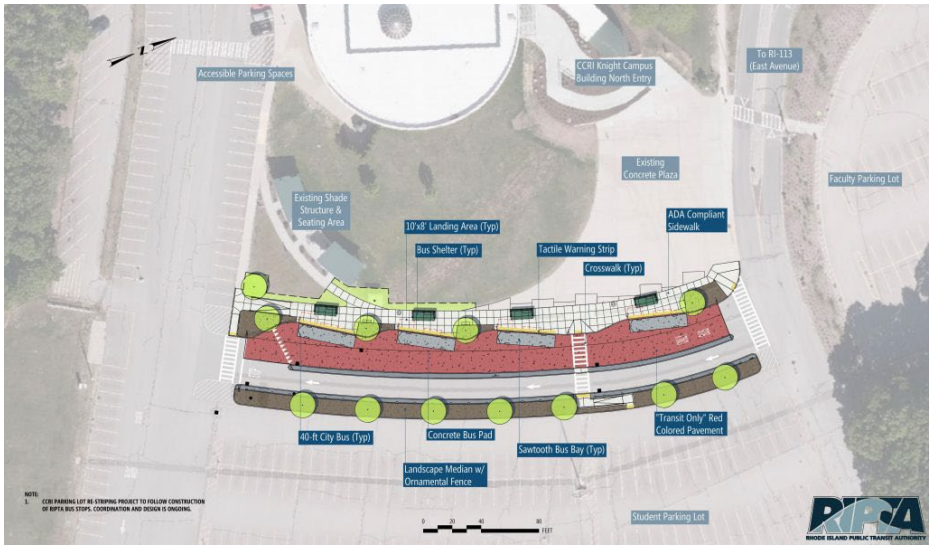
T.F. Green Airport Station is part of the InterLink transportation hub, which offers connections among multiple forms of travel. The airport is connected to MBTA Commuter Rails, RIPTA Bus Service, a parking garage, and rental car services. T.F. Green Station has a few options for a high-capacity transit stop based on what is already in use:

- Curbside at the airport, the eastern side of InterLink would be the most convenient option for riders, as this would provide service directly to the airport terminal.
- Jefferson Boulevard is on the western side of Interlink, connected via an approximately 1/3 mile walk through the skyway and parking garage. A high-capacity transit stop located on Jefferson would be most convenient for connections to the MBTA Providence/Stoughton Commuter Rail Line.
- Route 1, or Post Road, is another option, but this would require new InterLink infrastructure. This would be the middle-ground between curbside and Jefferson Boulevard. Route 1 was projected as a high-capacity transit corridor in RIPTA's Transit-Forward RI Plan.

CCRI Transit Center

CCRI-Warwick is a key southern transportation hub in RIPTA's system that provides service for nine routes—Route 13, Route 14, Route 16, Route 21, Route 22, Route 23, Route 29, Route 30, and Route 66. RIPTA and the Community College of Rhode Island have worked together to enhance the bus stops at the Warwick campus. The new bus hub has multiple loading bays that each include a shelter, real-time information, seating, lighting, and improved security. These improvements were proposed as part of Transit-Forward RI and have already been completed. The transit center averages 570 daily boardings and 580 daily alightings.

Figure 4-13 Diagram of improvements at CCRI Transit Center



Source: [CCRI Warwick Bus Stop Enhancement Project - RIPTA]

Ridership

Existing ridership volumes and patterns in the study area are important context for planning future rapid transit. This section documents ridership by stop in the study area and ridership distribution along key study area routes throughout the day. It is intended to describe the existing strength of the transit market in the study area.

Ridership by Stop

Understanding ridership levels at different stops can indicate where ridership responds most to current service levels (Figure 4-14).

In the study area, the highest levels of transit ridership occur in Providence, Pawtucket, and at major destinations in Cranston and Warwick like TF Green International Airport and CCRI-Warwick.

Other takeaways regarding high-ridership locations in the study area include:

- Stops along the R-Line, and Broad Street specifically, are also among the system's highest ridership stops.
- Kennedy Plaza is the highest ridership stop in the system by far, with an average of 11,500 boardings each weekday.
- The highest ridership stop outside the study area is at the University of Rhode Island's Memorial Union Center, which has 370 average daily boardings.
- Transit Centers and Hubs, such as Providence Station, Pawtucket-Central Falls, Newport Transit Center, and CCRI-Warwick, are among the highest ridership stops. Providence Station is the highest ridership Commuter Rail Station of the three within the study area, doubling the ridership at Pawtucket-Central Falls Station.

Future High-Capacity Transit service would likely capture much of the existing high ridership north of Park Avenue. It could also serve to facilitate connections between existing destinations in Warwick and Cranston, where bus service today must operate in a circuitous manner due to the many high-speed intersections in the area.

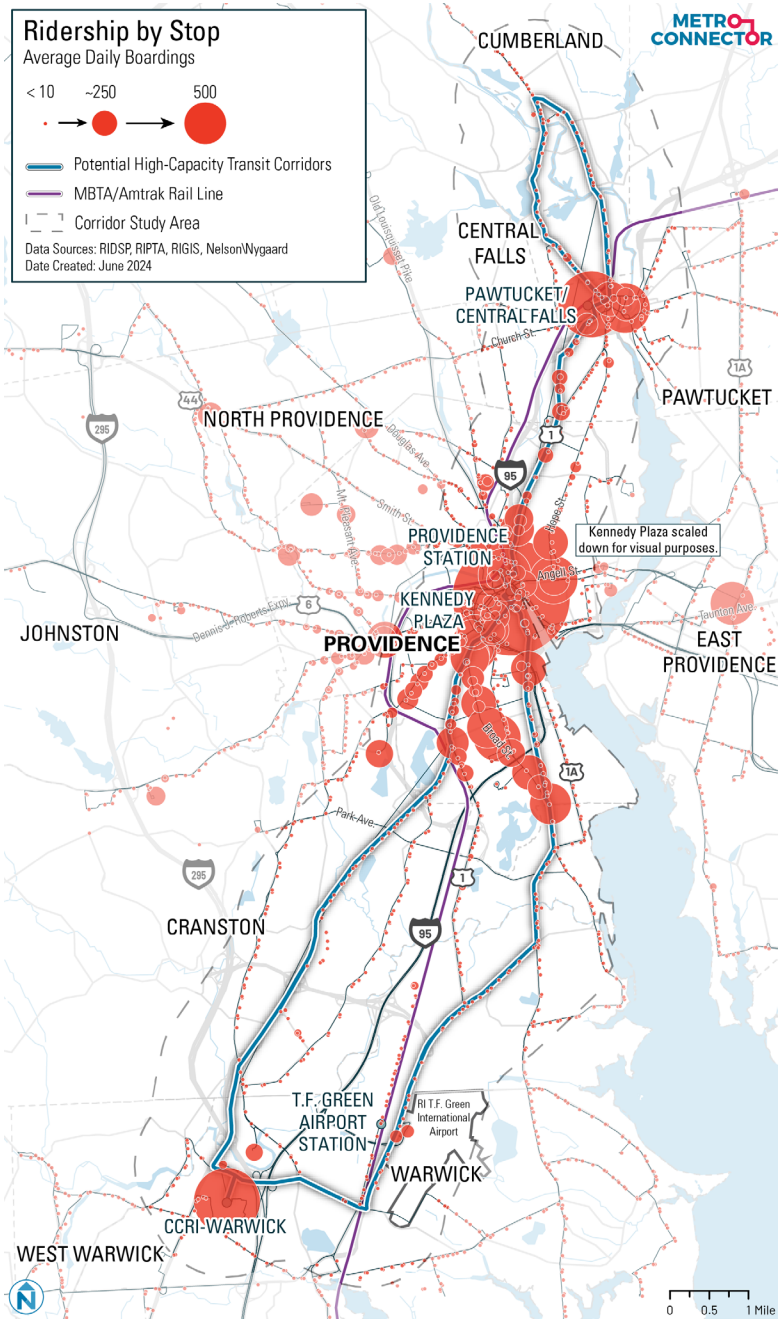


Figure 4-14 Ridership by Stop

Ridership by Time of Day

Transit agencies generally see their highest ridership during morning and afternoon peak periods, but some routes or regions see high ridership throughout the day, especially where fewer transit riders are office workers with 9:00 a.m. to 5:00 p.m. work schedules. Understanding the distribution of transit ridership throughout the day in the study area is an important context for assessing the potential demand for high-capacity transit over the course of a day.

Existing strong all-day ridership activity supports high-capacity transit, which typically provides very frequent service during most daytime hours and seven days a week.

RIPTA currently sees high demand for transit throughout the day in the study (Figure 4-15). From 6:00 AM – 7:00 PM, there are over 3,000 systemwide boardings and alightings each hour, with boardings exceeding 5,000 each hour from 7:00 AM – 5:00 PM. Boardings and alightings within the study area account for 60-70% of all boardings and alightings consistently throughout the day, even when ridership is lower in the early morning and late evening.

The MBTA Commuter Rail stations have boardings and alightings that are heavily based on peak-period travel; i.e, boardings peak on northbound trains between 6:30 AM and 7:30 AM and alightings peak in the evening between 4:30 PM and 7:00 PM. The afternoon peak is more spread out than the morning, with volume starting at 4:00 PM and lasting through 11:00 PM.

Figure 4-15 Systemwide Average Alightings by Hour (Oct. 2023)

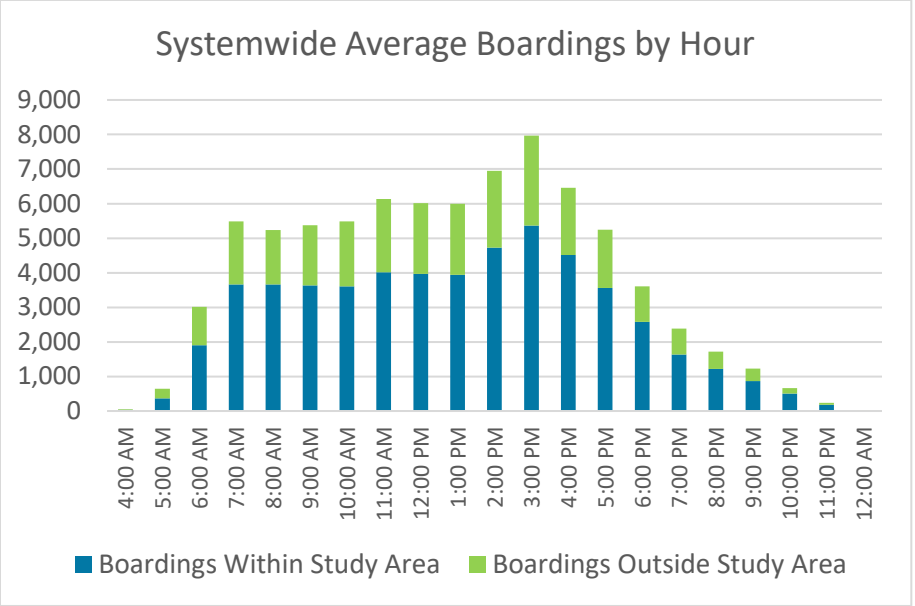
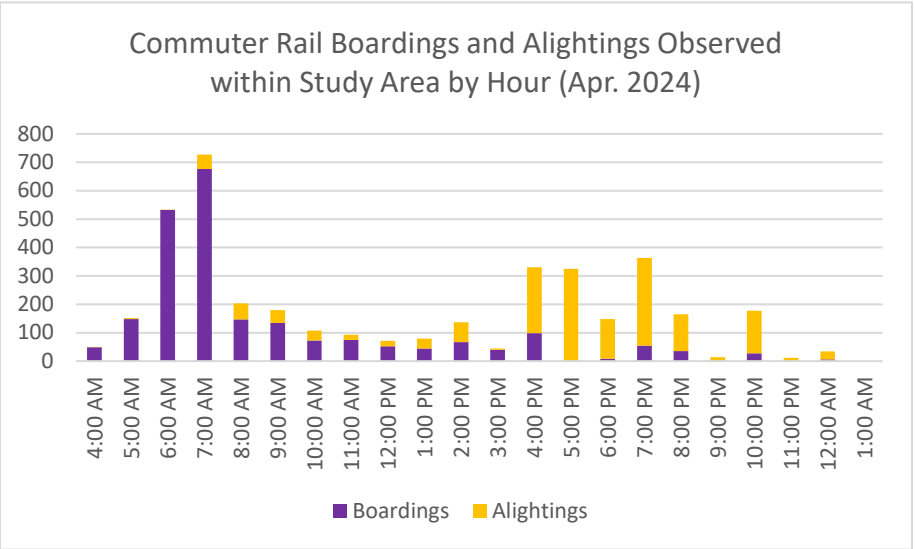


Figure 4-16 Commuter Rail Boardings and Alightings Observed within Study Area by Hour (Apr 2024)



Peak and Off-Peak Ridership

Figure 4-17 symbolizes RIPTA's bus stops based on the proportion of average weekday ridership that occurs during peak periods (from 6 AM – 9 AM and 3 PM – 6 PM) versus off-peak periods (all other times). A stop that is redder has a higher proportion of boardings occurring during peak periods, and a stop that is bluer has a higher proportion of boardings occurring during other times. On a stop level, most stops along key corridors are close to evenly split between peak and off-peak boardings, with slightly more off-peak than peak boardings. There are more off-peak hours than peak hours, so boardings that are split evenly between peak and off-peak see the same number of peak riders during the somewhat fewer peak hours as they do off-peak.

In general, boardings in the study area north of Park Avenue as well as at TF Green International Airport and CCRI Warwick are high no matter the time of day. There is high existing ridership during both peak and off-peak periods, which would be well served by future high-capacity transit.

The northern part of the study area in Central Falls and Cumberland as well as the portion of the study area south of Park Avenue in Cranston and Warwick is more off-peak driven than peak-driven, showing strong demand for transit all-day, but especially outside of traditional rush hour periods.

The central part of the study area in downtown Providence is mostly split between off-peak and peak boardings, showing the importance of having both high-quality peak and off-peak service in the study area.

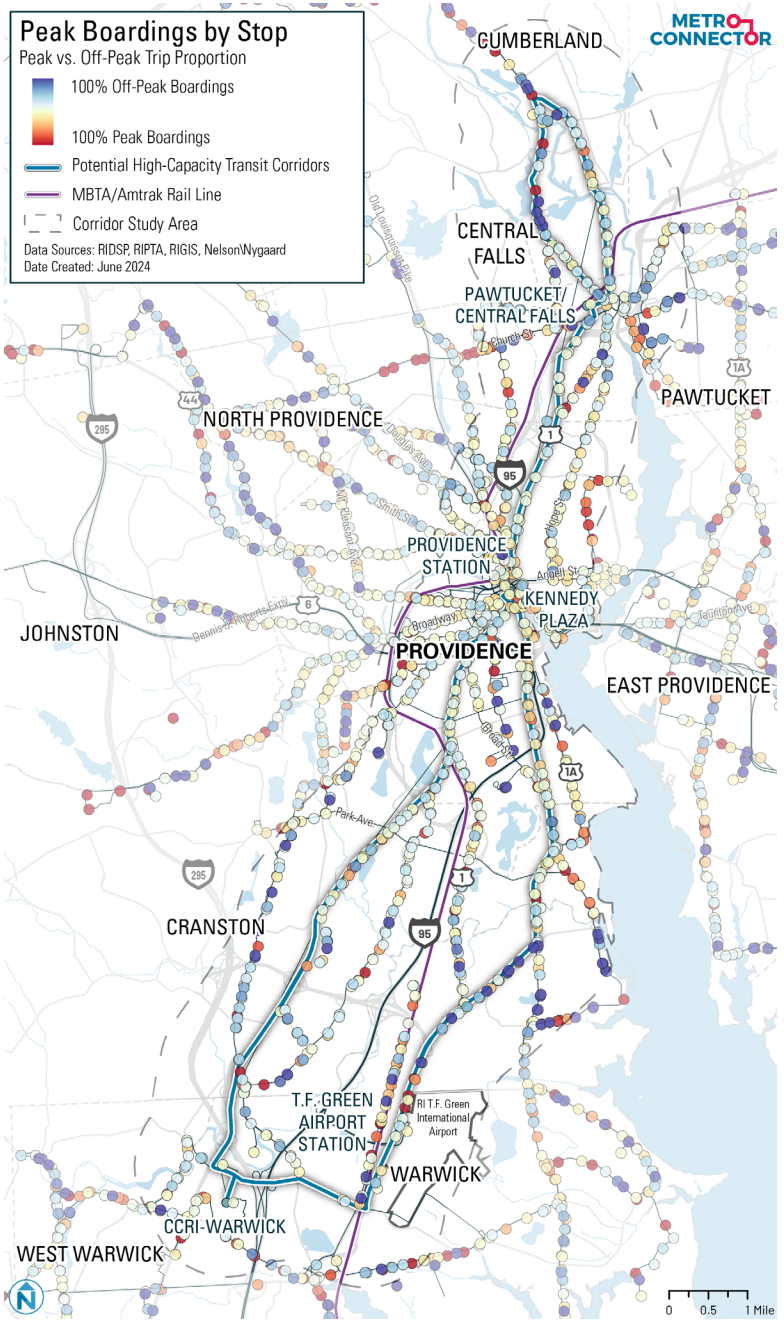


Figure 4-17 Percentage of Peak vs. Off Peak Boardings by Stop

Rail, Ferry, and Other Services

The Metro Connector Study Area is currently served by RIPTA, Amtrak, MBTA Commuter Rail, ferry, intercity bus, and several part-time and specialized services.

Amtrak

Rail lines between Rhode Island and Boston already offer a high-volume of service between the two cities. Within the study area, Amtrak only serves Providence Station. Amtrak operates 38 one-way trips on weekdays through Providence Station between its Northeast Regional and Acela services. The Northeast Regional's runtime between Providence and South Station in Boston is approximately 40 minutes and Acela's runtime is approximately 35 minutes. South of the study area, Amtrak services continue towards New York City, Philadelphia, and Washington, DC via Kingston, RI and Westerly, RI.

MBTA Commuter Rail

The MBTA operates the Providence/Stoughton Line between Boston and Wickford Junction, serving Providence Station, Pawtucket/Central Falls Transit Center, and T.F. Green International Airport in Warwick. Twenty weekday round trips serve the Providence branch on the Providence/Stoughton Line. The Providence/Stoughton Line's running time is approximately 75 minutes between Providence Station and South Station in Boston. The Providence/Stoughton Line's frequency during the peak is 25-30 minutes and 45-70 minutes off-peak.

The MBTA conducted the Rail Vision study in 2019, which identified cost-effective strategies to transform the existing commuter rail system. The study recommended that the entirety of the Providence/Stoughton line be electrified. It also created service alternatives for rail service and the four potential future service patterns for the Providence/Stoughton Line are listed below:

1. Higher Frequency: Increase all-day service to 30 minutes.
2. Regional Rail to Key Stations: 30-minute frequency at express service stops, which would include only Providence Station in the study area
3. Urban Rail: 15-minute frequency from South Station to Route 128, and 30-minute frequency from Canton Junction to Providence.
4. Full Transformation: High-frequency service systemwide, including 15-minute frequency from South Station to Route 128 and 30-minute frequency from Sharon to Providence.

Ferry, Intercity Bus, and Other Services

Outside of RIPTA, MBTA, and Amtrak services, transit in Rhode Island is also provided by Seastreak ferries, Greyhound, Peter Pan, vanpool, and various social service organizations.

Seastreak operates seasonal ferry services out of the Providence Ferry Terminal, running ferries three to four times a day from Providence to Bristol and Newport. Seasonal service begins June 21st and runs until October 14th. Run time is approximately 40 minutes from Providence to Bristol. Running time from Providence to Newport is 70 minutes direct, or 90 minutes via Bristol. A ferry dock shuttle runs from Providence Station to the Ferry Terminal three times a day. Other ferry services in the area operate out of Quonset, Newport, Jamestown, and Narragansett. Greyhound and Peter Pan operate intercity bus services, each with two stops in Providence. Greyhound buses depart from the Regency Plaza Apartments and the Convention Center, and Peter Pan buses depart from the Peter Pan bus terminal and the Convention Center. Both operators offer direct service to Boston at least twice a day, and direct service to New York City at least four times a day, among other direct and connecting routes.

In addition to these services oriented to the broader public, Providence Senior Services offers group transportation for senior high-rise residents and senior centers on weekdays between 9am and 3:30pm. Trips must be pre-arranged by Resident Services Coordinators or Senior Center Directors. The Non-Emergency Medical Transportation (NEMT) and Elderly Transportation Program (ETP) offer weekday transportation to non-emergency medical appointments to any Medicaid members and Rhode Island residents above the age of 60. Trips must be arranged at least two days in advance. Through its RIde program, RIPTA operates paratransit service for individuals unable to use fixed route systems due to disability. The door-to-door service requires pre-arranged reservations and operates within a ¾-mile corridor of RIPTA's fixed route services. Vanpool is another option for commuters, offering leased vans or SUVs to groups of commuters living or working in similar areas. RIPTA partners with Commute with Enterprise for this program and offers a vanpool subsidy of $100 per person each month.

Summary and Opportunities

The HCT study area has high transit demand and existing ridership, underscoring the potential of high-capacity transit to capture and better facilitate travel in the region. The analysis of RIPTA's existing transit network shows strong all-day transit activity throughout the study area. Considering the potential of high-capacity transit within the study area, the existing transit network offers the following findings and opportunities:

- **RIPTA has high ridership along the potential high-capacity transit corridors, and specifically along the R-Line alignment**. The R-Line accounts for 17% of RIPTA's systemwide ridership, showing extremely high existing transit demand for travel from Pawtucket/Central Falls area through downtown Providence—Kennedy Plaza and Providence Station—and along Broad St south of downtown Providence.
  - The R-Line is RIPTA's flagship service, offering the highest frequencies and spans of any route in their system. The success of the R-Line proves that there is existing transit demand for high-capacity transit in the study area. High-capacity transit could offer a service that exceeds the R-Line in terms of speed and capacity.
- **Downtown Providence is the central transit hub in the State of Rhode Island.** High-capacity transit service should maximize access to both downtown Providence as well as other key regional transfer points, such as Pawtucket-Central Falls Transit Center, CCRI-Warwick Campus, and T.F. Green International Airport. Other downtown destinations should be served as well, as places such as the Hospital District, the Jewelry District, Rhode Island School of Design, and Providence College are all high-volume travel destinations.
- **Existing ridership activity indicates high levels of travel during both peak and off-peak periods. High-capacity transit has the potential to offer high-frequency service along the corridors, while also improving all-day frequencies on connecting routes.**
- **RIPTA's existing transit network could become more efficient with high-capacity transit**, enabling existing bus routes to operate shorter alignments that connect to high-capacity transit stations. Bus routes in the study area could operate at a higher frequency and with a longer span of service:
- **Future BRT service could be designed to take advantage of existing and planned TSP.** RIPTA and RIDOT are working together to install transit signal priority (TSP) at many intersections throughout Rhode Island, and specifically in Providence along key corridors. Implementing TSP can help buses run more efficiently along corridors through shortening red lights for waiting buses and extending green lights for incoming buses.
- **T.F. Green Airport Station has the potential to be a more important transit hub within RIPTA's network with the addition of HCT service**. Currently, only a few bus routes and the MBTA Commuter Rail connect to the airport, with the Commuter Rail being the most direct path into Downtown Providence. High-Capacity Transit would establish a higher frequency means of transportation into downtown Providence, as opposed to the commuter rail, which only has trips eight times throughout the day. This study will consider which alignment a HCT route would take to serve airport passengers: curbside at the airport terminal, on Post Road (Route 1), or on Jefferson Boulevard at the MBTA station entrance/parking lot.

5 Road Characteristics

A potential future high-capacity transit line must be designed in the context of existing transportation infrastructure, including roadways and railway rights-of-way. This chapter examines how existing right-of-way characteristics may interact with the proposed high-capacity transit corridors in terms of width; signalized intersections; speed and congestion; and safety considerations. The right-of-way characteristics studied in this chapter include:

- Roadway width and number of travel lanes
- Signalized intersections
- Speed and congestion
- Safety
- Railway rights-of-way uses and existing ownership

Roadway Characteristics

The characteristics of the existing roadways in the study area are essential to understand, because they will be key determinants of an eventual design for high-capacity transit. This section of the report documents the number of travel lanes and the location of signalized intersections on roadways in the project study area, organized by municipality. These findings provide an understanding of the feasible roadways for high-capacity transit and potential modifications to lane configurations and intersections that may be needed to support high-capacity transit.

Number of Travel Lanes

Transit priority infrastructure like physically separated protected busways, bus-only lanes, transit stations, and other passenger amenities can be installed on many types of roadways, but wider roadways offer the most space for high-capacity transit infrastructure. This doesn't mean wider roads are the best for high-capacity transit – other factors like land use densities and connectivity to activities are considered – but roadway width is an important consideration. In the absence of available data for the exact width of rights of way in the study area, the project team studied the number of travel lanes of existing roadways.

Signalized Intersections

Intersections have a major impact on both transit speeds and pedestrian safety. Specifically, transit delay at intersections depends mainly on two factors: (1) how many intersections exist and (2) the intersection characteristics (such as intersection configuration and whether there is a traffic signal or stop sign). For this reason, this chapter examines the existing locations of signalized intersections. Future high-capacity transit could potentially alter existing signals to reduce delay, for example by installing transit signal priority (TSP) and/or queue jumps. For an analysis of where existing and planned TSP is located within the study area, see the Transit Analysis Chapter (Chapter 4) of this report.

Analysis Considerations and Data Sources

Because the focus of this report is on north-south oriented high-capacity transit corridors, this analysis focuses on north-south corridors that could be suitable for high-capacity transit. In addition, although limited access highways tend to have few intersections and a higher number of travel lanes, they are not typically strong candidates for high-capacity transit because there is limited access for people walking, biking, or rolling in wheelchairs, and because there tend to be few safe opportunities for transit vehicles to make stops. In addition, highways are usually physically separated from the origins and destinations that create demand for high-capacity transit. For this reason, limited access highways are not considered candidates for high-capacity transit corridors.

The project team used publicly available RIGIS data with manual spot checks and adjustments based on the latest available street-level and satellite imagery to document the number of lanes and the locations of signalized intersections. Because this is purely a desktop exercise reliant on available imagery, the results of this analysis will be validated further as needed in future stages of this project.

Cumberland

Cumberland has four main north-south corridors in the study area with at least two traffic lanes:

- River Road
- Mendon Road/Lonsdale Avenue (includes a section with three lanes and also has an at-grade rail crossing)
- Broad Street
- High Street

Because the northern terminus of the potential high-capacity transit corridors could be in Cumberland, it is also important to identify east-west streets that might suitably connect with the proposed High-Capacity Transit corridor. Candidate streets with at least two lanes include:

- Marshall Avenue
- Ann and Hope Way (noting there is an at-grade railroad crossing)
- John Street
- The two-lane north-south corridors of Mendon Road and Broad Street also intersect in Cumberland

The following areas are places where the roadway narrows and represent potential obstacles for future high-capacity transit:

- Mendon Road at Broad Street
- Lonsdale Avenue at John Street

Cumberland has only eight signalized intersections within the study area, the fewest of any municipality included in the study. These intersections occur along Lonsdale Avenue, High Street, and Broad Street.

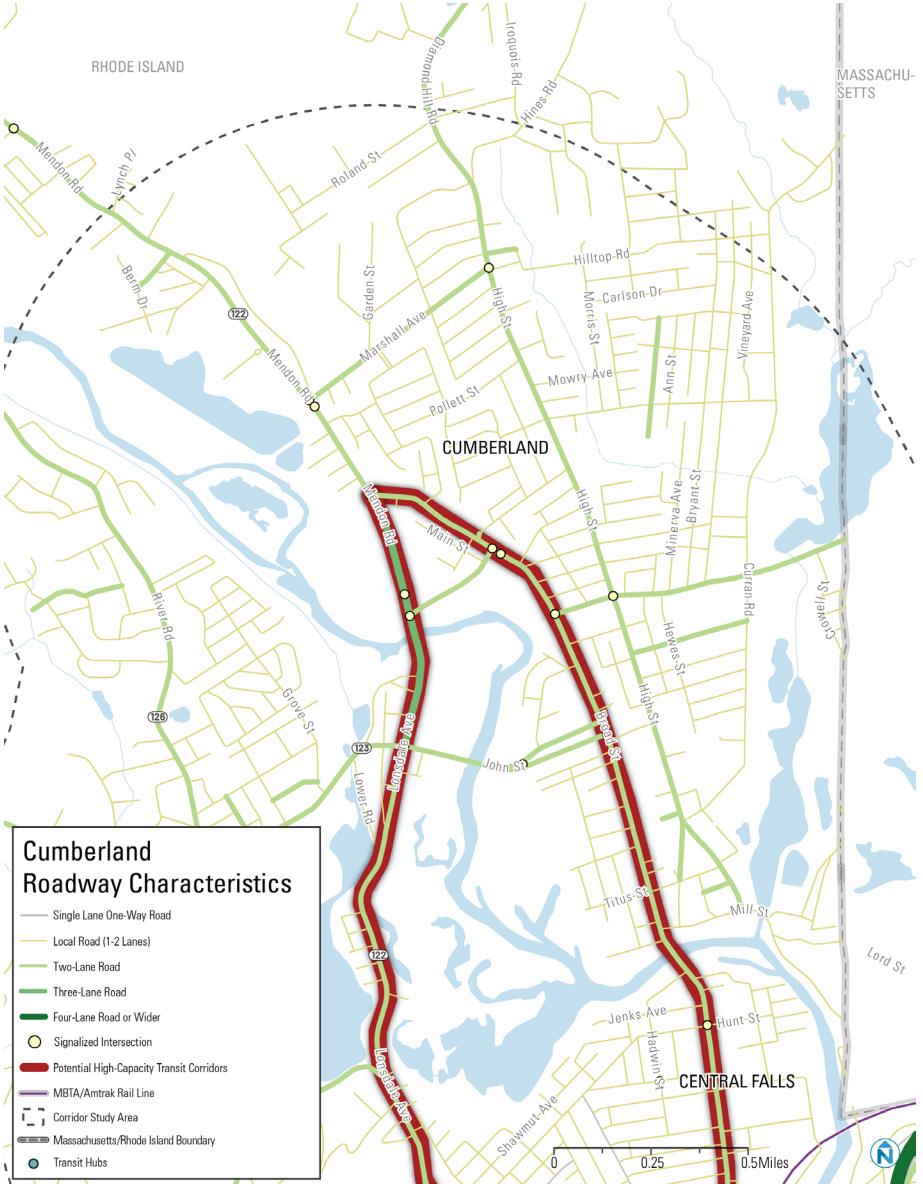


Figure 5-1 Number of Travel Lanes and Signalized Intersections in Cumberland

Central Falls

Central Falls has four main north-south corridors in the study area with at least two traffic lanes:

- Lonsdale Avenue
- Dexter Street
- Broad Street
- Pine Street

There are no notable roadway narrowings in this section of the study area.

Signalized intersections occur most frequently along these north-south arterials, with increasing frequency of signalized intersections approaching the southern border with Pawtucket. While both Lonsdale Avenue and Dexter Street have several signalized intersections, Pine Street is a nearby two-lane road that runs parallel and has no signalized intersections. Traffic volumes are lower on Pine Street than on the other parallel roadways.

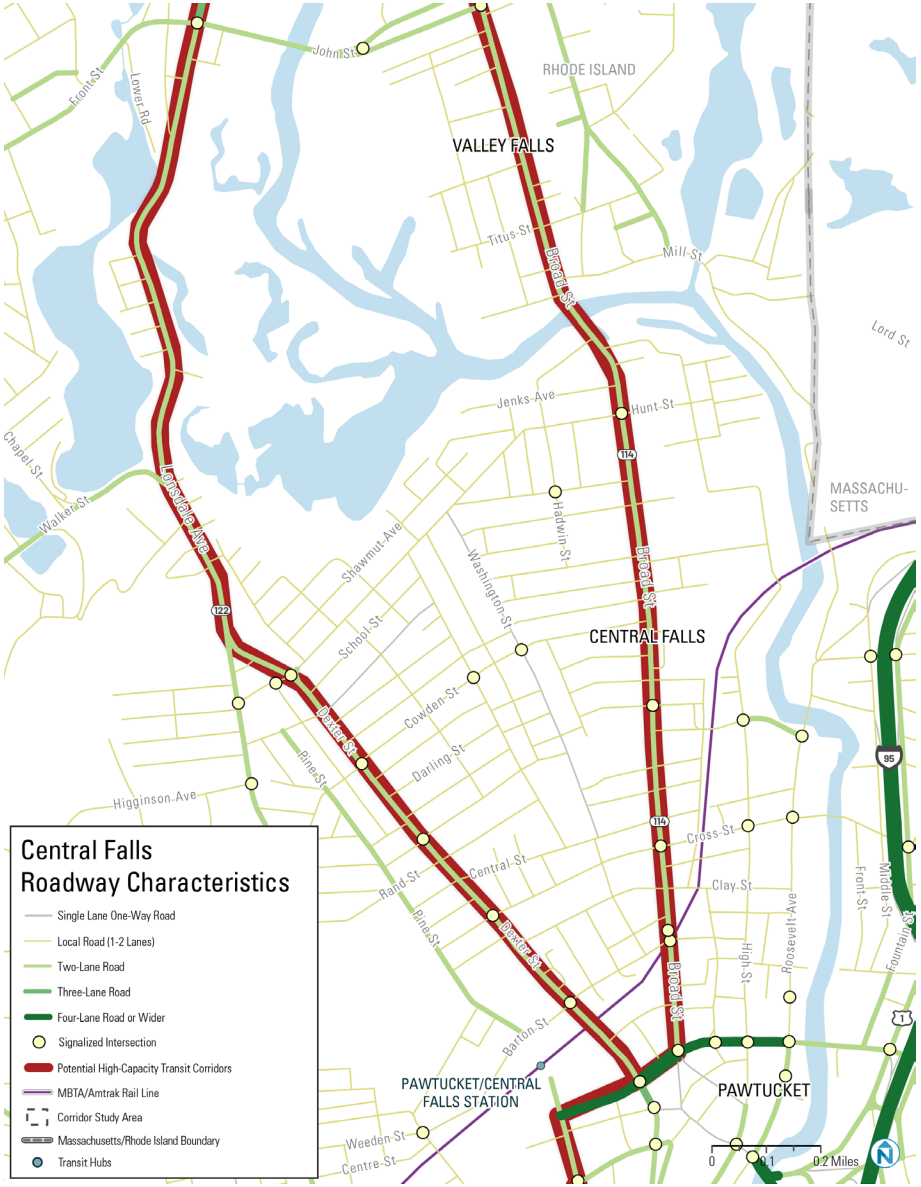


Figure 5-2 Number of Travel Lanes and Signalized Intersections in Central Falls

Pawtucket

Pawtucket has five main north-south corridors with at least two traffic lanes. I-95 also passes through Pawtucket; as a limited access highway, it would not be suitable for high-capacity transit. The following streets in Pawtucket are potential candidates for high-capacity transit:

- Smithfield Avenue
- Lonsdale Avenue/Main Street (includes short sections of three and four lanes)
- Dexter Street/Pawtucket Avenue/George Street
- Broad Street (includes a short four-plus-lane section)

All of these arterials are well suited for high-capacity transit because they continue through Pawtucket into neighboring municipalities in the study area.

Several of the corridors above come together around the Pawtucket/Central Falls Station and are connected by multiple east-west corridors with two or more lanes. Of these potential east-west connecting corridors, Goff Avenue/Exchange Street is particularly notable because it has four lanes and existing transit priority infrastructure. This makes it an especially strong candidate for supporting high-capacity transit.

The following narrowings of the roadway represent potential chokepoints for future high-capacity transit service:

- Lonsdale Avenue at Quincy Avenue
- Pawtucket Avenue at Randall Street

There is a dense network of signalized intersections on two-lane roads in Downtown Pawtucket, especially along the access ramps to I-95, on Main Street, George Street, and Goff Road/Exchange Street

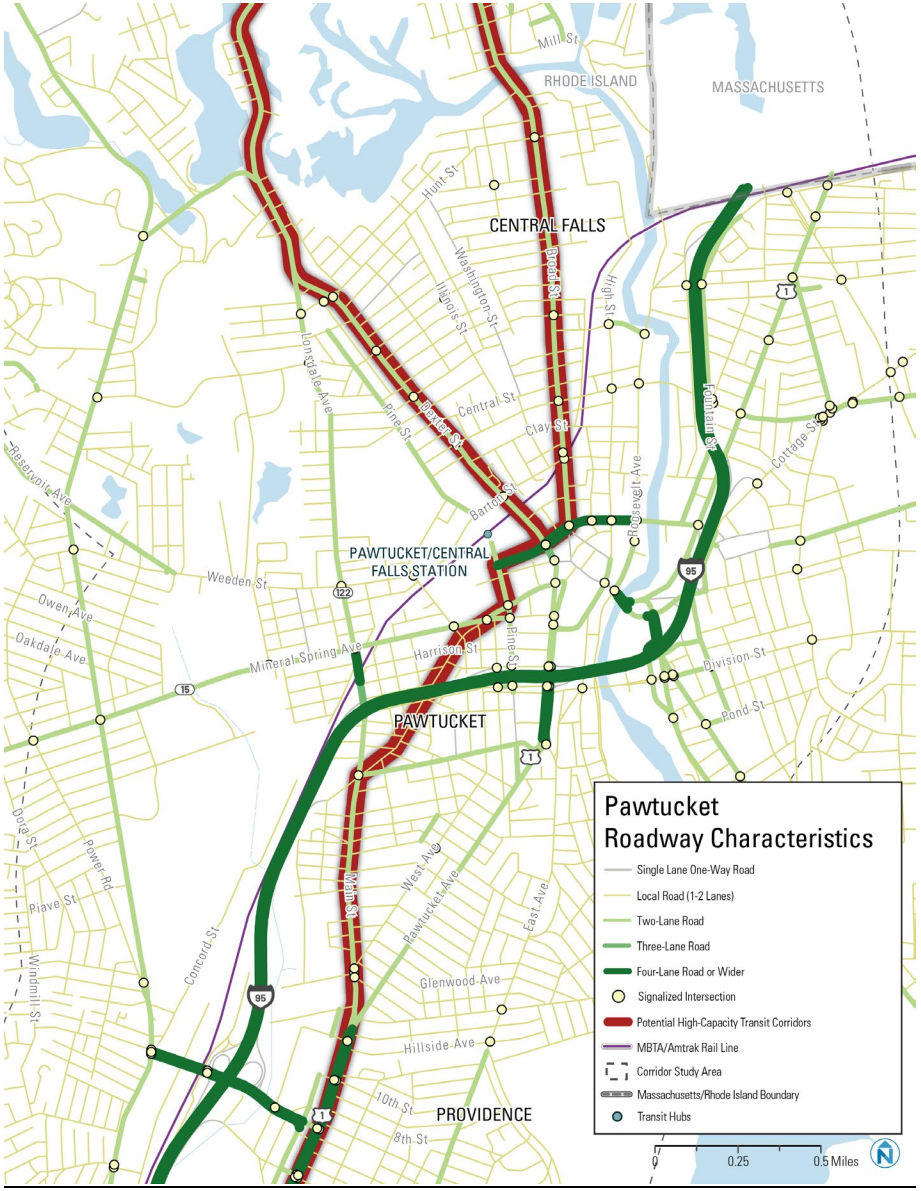


Figure 5-3 Number of Travel Lanes and Signalized Intersections in Pawtucket

Providence

Providence has several north-south corridors with at least two traffic lanes and several limited access highways. The following roadways have at least two traffic lanes and could be candidates for high-capacity transit to access Downtown Providence from the north:

- Douglas Avenue/Route 7
- Charles Street*
- Smithfield Avenue*
- North Main Street/Route 1* (includes a lengthy four-plus-lane segment)
- Hope Street

Charles Street, Smithfield Avenue, and North Main Street/Route 1 are especially well suited for high-capacity transit because they continue through Providence into neighboring Pawtucket to the north.

There are also several north-south corridors with at least two traffic lanes that could be candidates for high-capacity transit to access Downtown Providence from the south:

- Cranston Street (includes a three-lane segment)
- Reservoir Avenue/Route 2 (includes three- and four-plus-lane segments)
- Broad Street
- Eddy Street
- Allens Avenue/Route 1A (includes a four-plus-lane segment)

Each of these roadways to the south of Downtown Providence connect to those to the north via a dense network of streets with two or more lanes in Downtown. Downtown also has the highest density of signalized intersections in the entire study area. Because of these conditions, there may be several candidate alignments through Downtown Providence, and one-way service may be considered. There also exists the opportunity for a new transit-only guideway that connects Gaspee Street to Exchange Street located just to the west of Providence Station.

Outside of Downtown, signalized intersections occur most frequently on wider roadways in Providence, with the notable exceptions of I-95 and I-195. There are also several roadway narrowings, most notably along Branch Avenue, North Main Street/Route 1, Cranston Street, Reservoir Avenue, and Allens Avenue/Route 1A.

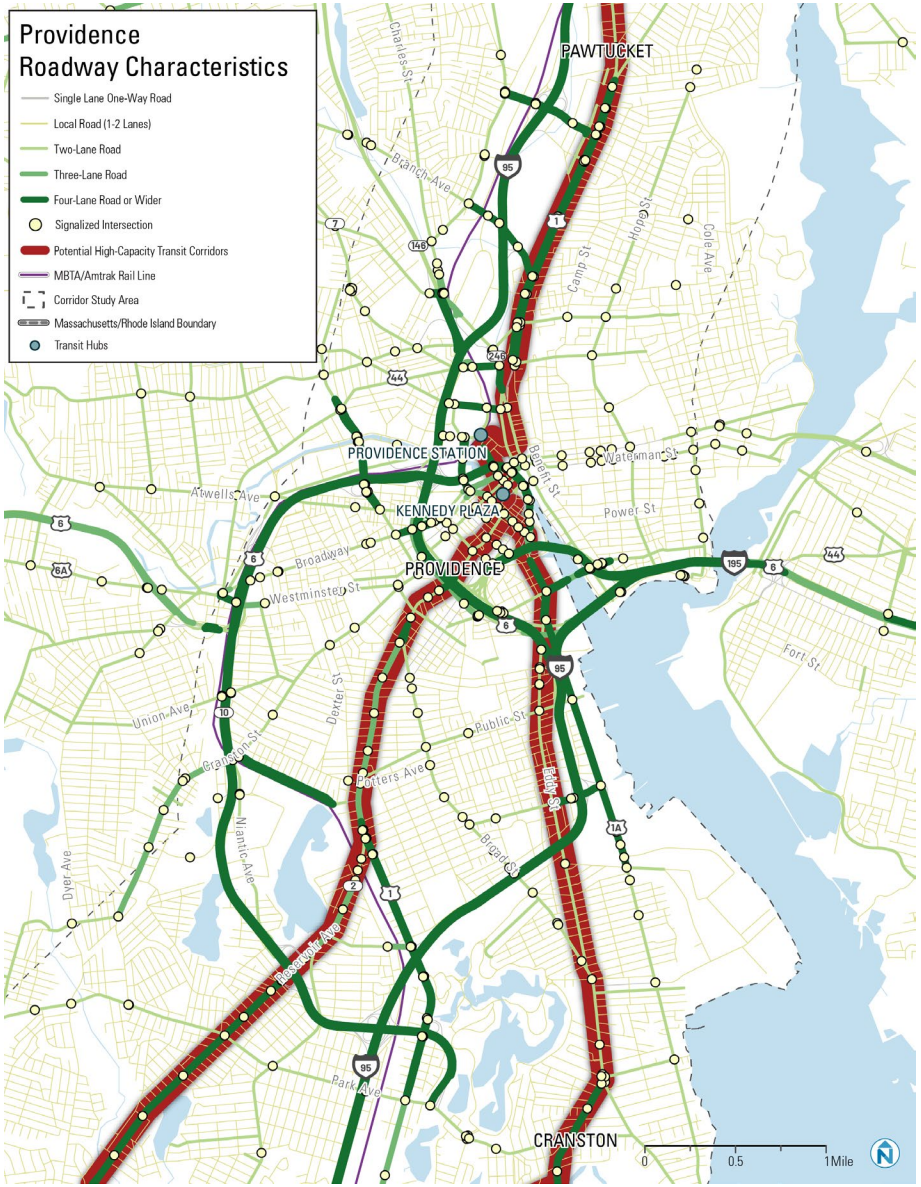


Figure 5-4 Number of Travel Lanes and Signalized Intersections in Providence

Cranston

Cranston has six main north-south corridors with at least two traffic lanes and several limited access highways. The following local streets are especially well suited for high-capacity transit because they continue through Cranston into neighboring municipalities to the north and south.

- Cranston Street (includes a three-lane segment)
- Oaklawn Avenue
- Reservoir Avenue/Route 2 (includes three- and four-plus-lane segments)
- Elmwood Avenue/Route 1 (includes three- and four-plus-lane segments)
- Eddy Street/Warwick Avenue (includes a four-plus-lane segment)
- Narragansett Boulevard/Route 1A (includes a four-plus-lane segment)

The following narrowings of the roadway represent potential chokepoints for future high-capacity transit:

- Cranston Street at Howard Street
- Cranston Street at Niantic Avenue
- Reservoir Avenue at Rounds Avenue
- Reservoir Avenue at Elmwood Avenue
- Broad Street at Montgomery Avenue
- Allens Avenue at Ernest Street
- Pontiac Avenue at Sockanosset Cross Road
- Pontiac Avenue at Howard Avenue

Signalized intersections are most heavily concentrated along Reservoir Avenue, US Route 1, Warwick Avenue, and Eddy Street.

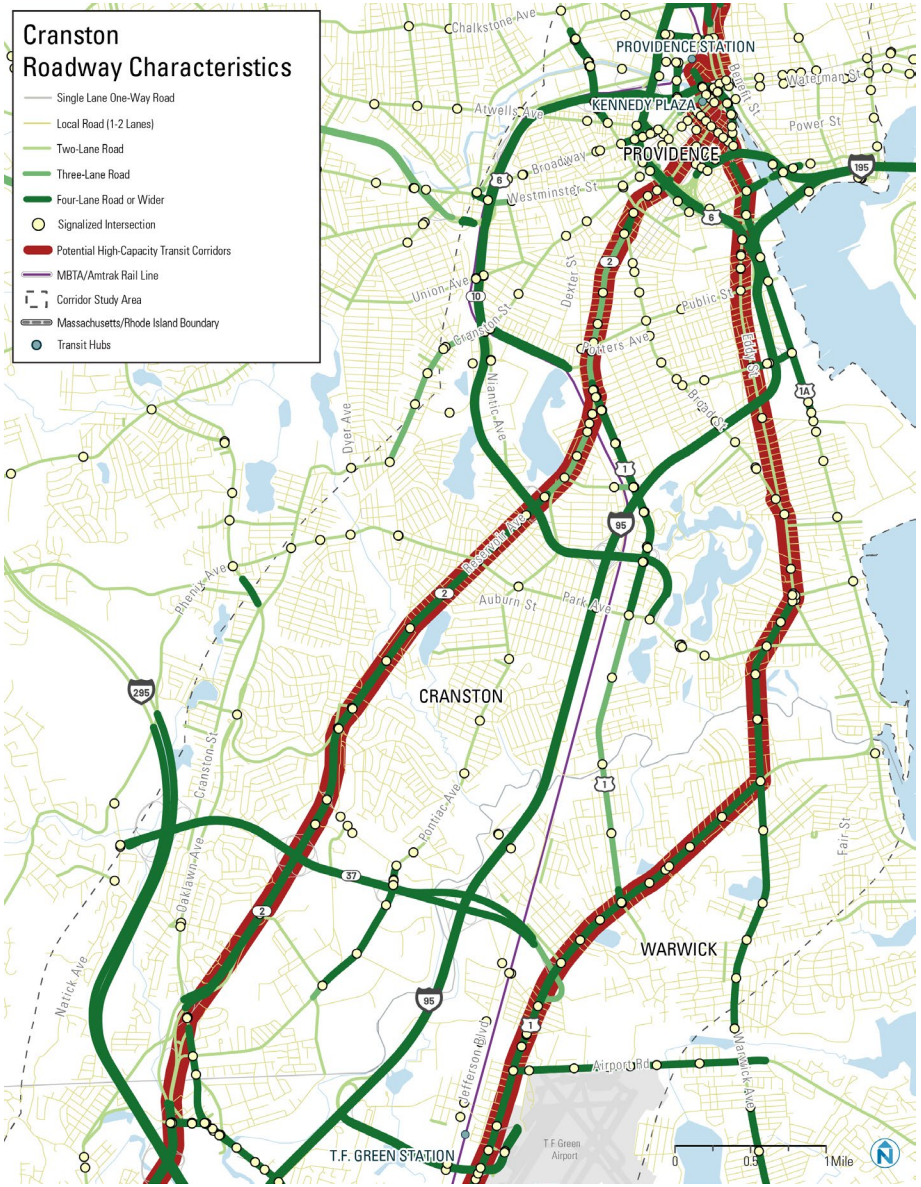


Figure 5-5 Number of Travel Lanes and Signalized Intersections in Cranston

Warwick

Warwick has five main north-south corridors with at least two traffic lanes and two limited access highways. The following local streets are especially well suited for high-capacity transit because they continue through Warwick into neighboring municipalities to the north and south.

- Reservoir Avenue/Bald Hill Road/Route 2 (four-plus lanes)
- Pontiac Avenue (includes a four-plus-lane segment)
- Elmwood Avenue/Route 1
- Post Road/Route 1/Route 1A (four-plus lanes)
- Warwick Avenue/Route 1A (includes a four-plus-lane segment)

Because the southern terminus of the potential high-capacity transit corridors could potentially be in Warwick, it is also important to identify east-west streets that might be suitable connect the two potential high-capacity transit corridors. Candidate streets with at least two lanes include:

- Airport Road (four-plus lanes)
- Greenwich Avenue (includes three- and four-plus-lane segments)
- East Avenue/Main Avenue (four-plus lanes)
- Toll Gate Road
- Centerville Road

The following narrowings of the roadway represent potential chokepoints for a future high-capacity transit corridor:

- Warwick Avenue at Norwood Avenue
- Warwick Avenue at Sandy Lane
- Main Avenue at Greenwich Avenue
- Main Avenue at Trinity Street
- Greenwich Avenue at Greenwood Avenue

Signalized intersections are distributed relatively evenly across each of the corridors of two or more lanes in width. Notably, Greenwich Avenue has a particularly high density of signalized intersections.

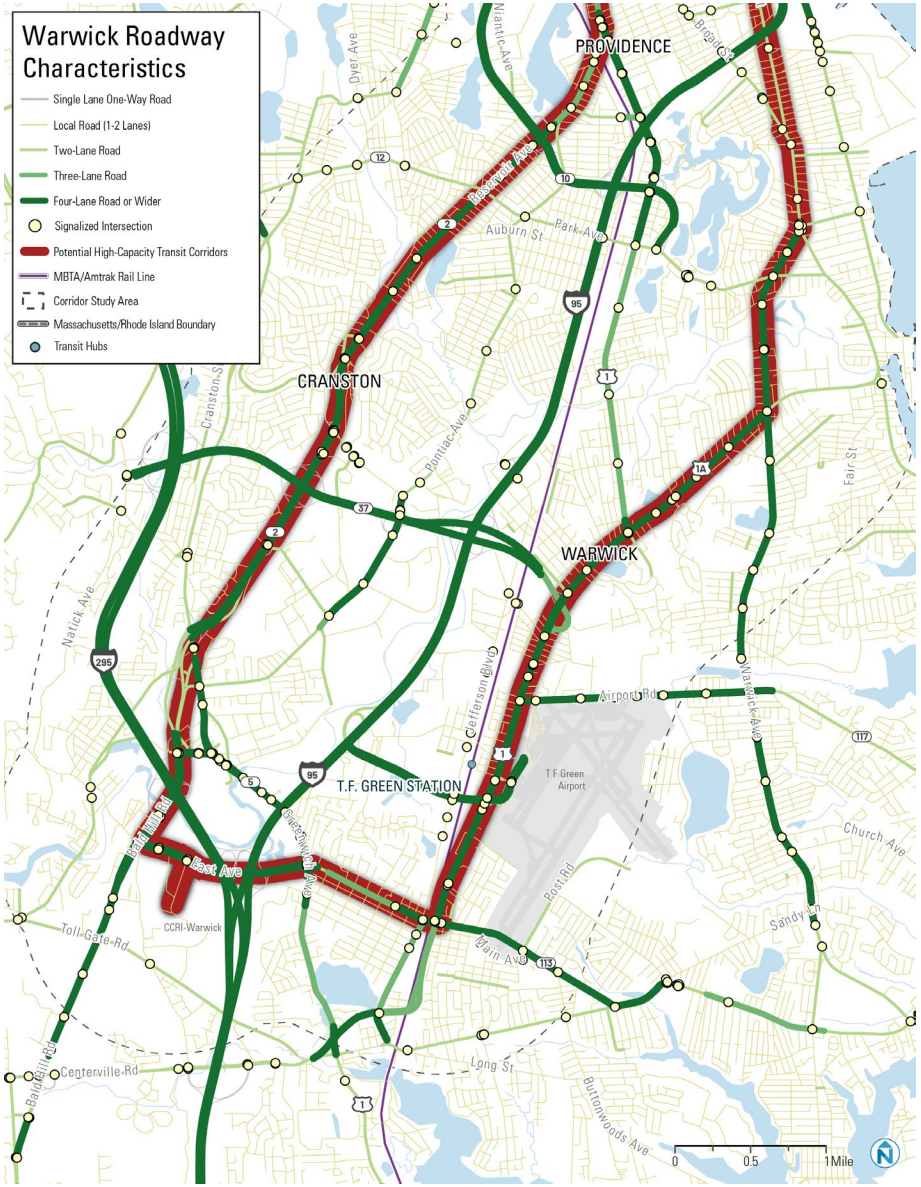


Figure 5-6 Number of Travel Lanes and Signalized Intersections in Warwick

Speed and Congestion

Transit speeds are important because riders want to reach their destination quickly. General roadway characteristics such as stop signs, traffic signals, mid-block crossings, traffic congestion, double parking, and circuitous streets are key determinants to transit speeds.

To evaluate transit speeds, the project team mapped morning peak RIPTA bus speeds throughout the study area (see Figure 5-7). This analysis relies on RIPTA's AVL data processed by Swiftly to identify the areas where, due to lower existing bus speeds, new and additional transit priority infrastructure could be needed to support potential high-capacity transit service.

Existing Transit Speed

Transit speeds are slowest (less than 15 miles per hour) in Downtown Providence, Downtown Pawtucket, near highway on/off ramps, and around major destinations in Warwick and Cranston. Outside of these areas, buses commonly operate above 20 miles per hour. However, many factors can make buses slow and unpredictable:

- Providence and Pawtucket's narrow streets are difficult to navigate and are often blocked by delivery trucks and double-parked cars.
- Traffic congestion slows down buses and is unpredictable, especially in Providence and Pawtucket. Traffic can be better or worse depending on the day and hour.
- Bus stops that are blocked by illegal parking or double-parked cars.
- Some routes are long, increasing opportunities for delays.
- Some routes have circuitous alignments. Bus routes that travel on smaller streets and make numerous turns result in trips that are longer and harder to keep on time.

To the extent that corridors in these areas are considered for rapid transit alignments in this study, they are likely candidates for more intensive speed and reliability improvement measures, such as bus lanes or transit signal priority.

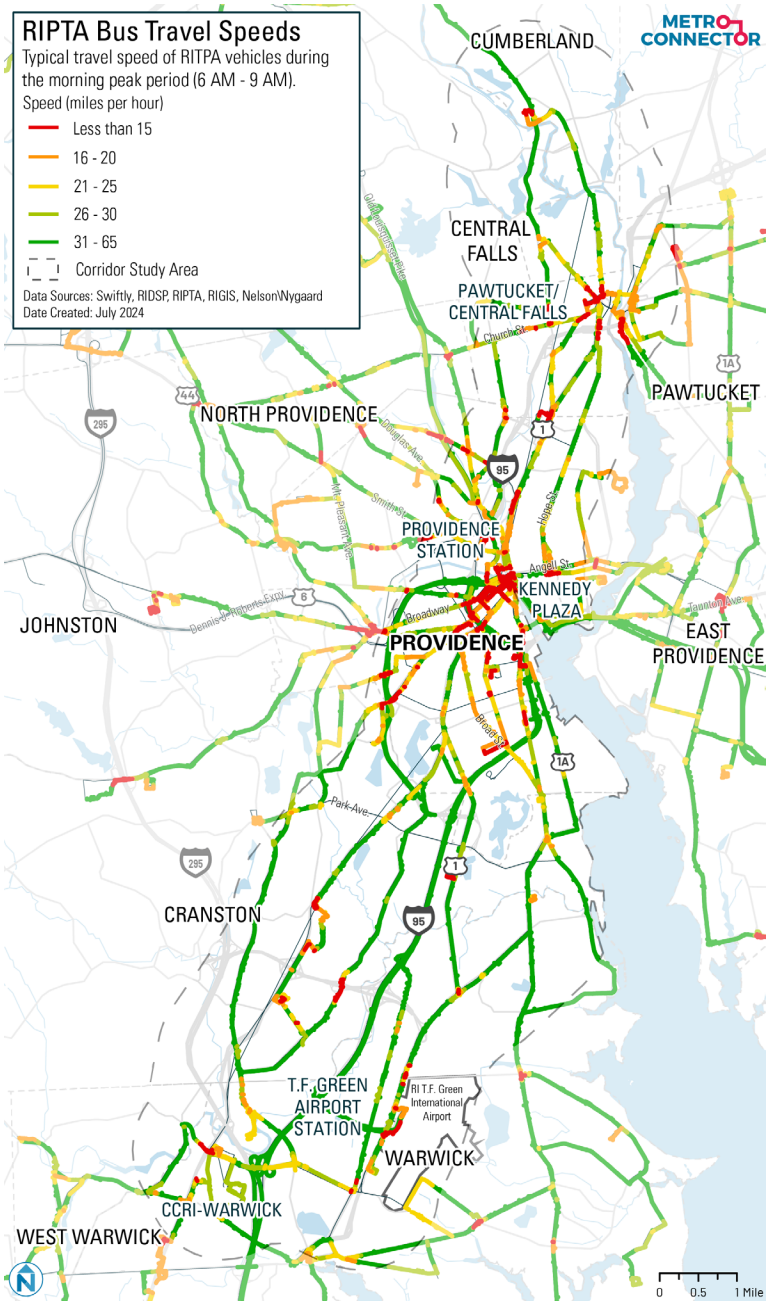


Figure 5-7 Map of Bus Speeds

Safety

Future high-capacity transit corridors will likely include the construction of new roadway and pedestrian infrastructure such as dedicated transit guideways, wider sidewalks, new street crossings, and new and reconfigured signals. This infrastructure facilitates the movement of transit vehicles and can also improve the safety of existing roadways by slowing automobile speeds and providing additional infrastructure for pedestrians and transit users. Furthermore, a safe roadway environment can ensure better access to potential high-capacity transit service, particularly for people walking, biking, and rolling in wheelchairs.

To evaluate roadway safety conditions, the project team used the last five years of available RIDOT data to identify hotspots of crashes causing injury throughout the study area (see Figure 5-8). The weighting scale in Table 5-1 was used to highlight the higher severity of more serious crashes. The "Crash Severity" type is pulled directly from the Federal Highway Administration's (FHWA's) KABCO[11] value in the dataset, with weights assigned by testing various alternatives. Crashes with no apparent injury were assigned a weight of zero so that only crashes involving injuries and fatalities appear on the map.

Table 5-1 Weights Used in Crash Density Analysis

Crash Severity	Analysis Weight
Fatal	15
Incapacitating (Suspected Serious Injury)	5
Non-Incapacitating (Suspected Minor Injury)	2
Complains of Pain (Possible Injury)	1
No Apparent Injury	0

Most crash hotspots within the study area occur on high-speed roads like interstates and state highways, with a higher crash density occurring on all types of roads in Providence and Central Falls. The following areas have the highest density of injurious crashes within the study area:

- Bald Hill Road at Toll Gate Road, at East Avenue, and at West Natick Road, Warwick
- Centerville Road at Greenwich Avenue, Warwick
- Reservoir Avenue at Park Avenue and at Legion Way, Cranston
- Broad Street at Norwood Avenue, Cranston
- Elmwood Avenue at Roger Williams Avenue, Providence
- Elmwood Avenue at Reservoir Avenue and Potters Avenue, Providence
- Broad Street at Elmwood Avenue, Providence
- North Main Street at Branch Avenue, Providence
- Smithfield Avenue at Silver Spring Street, Providence
- Dexter Street at Goff Avenue, Pawtucket
- Mineral Spring Avenue at Smithfield Avenue, Pawtucket
- Lonsdale Avenue at Weeden Street, Pawtucket
- Broad Street at Cross Street, Central Falls
- Broad Street at John Street, Cumberland

[11] KABCO Injury Classification Scale and Definitions, https://highways.dot.gov/media/20141

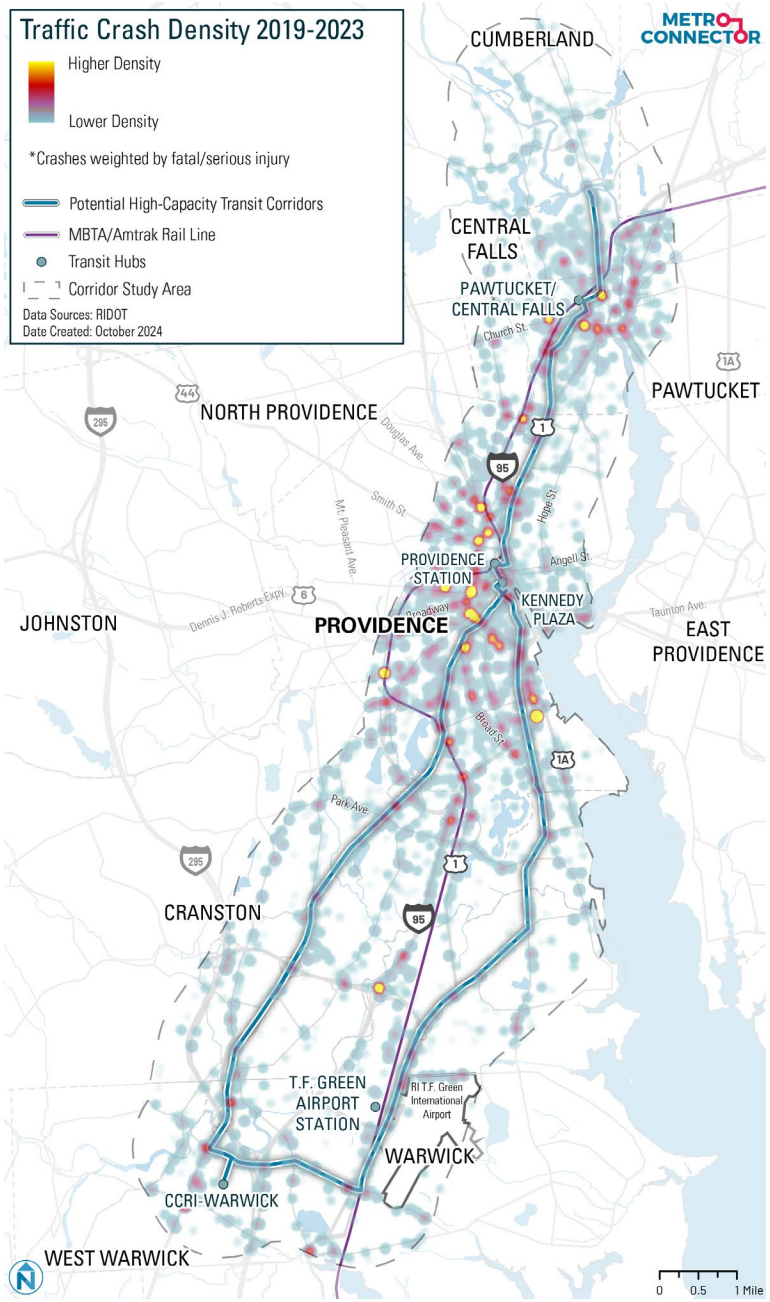


Figure 5-8 Crash Density Within The Study Area Weighted by Injury Severity

Railway Characteristics

Current Use of Existing Railroad Rights-of-Way

Existing railroad rights of way in the study area vary by use, including a mix of passenger, freight, commercial, converted bike path, inactive, and undeveloped rights of way (see Figure 5-9). High-capacity transit can potentially use existing railroad rights-of-way, although the ownership, existing use, width, and existing crossings and access to the rights-of-way can affect the feasibility of these corridors. The existing railroad rights-of-way in the study area have the following uses:

Freight/Passenger:

A key active freight and passenger rail line that runs north-south through the study area is the Amtrak Northeast Corridor (NEC) served by Amtrak and MBTA Commuter Rail, as well as Freight Rail Improvement Project (FRIP) Freight/Passenger Track. This corridor roughly parallels I-95 in the study area, except directly south of downtown Providence, where the line runs on the western border of Federal Hill and the West End and I-95 runs on the eastern border of Lower South Providence.

Commercial:

Commercial rail corridors are present in several places near the edges of the study area:

- Running through Cumberland is the Providence and Worcester Main Line running roughly parallel to Broad Street in the study area.
- Moshassuck Valley Industrial Track runs just over a mile spur off the NEC into Central Falls.
- The Harbor Junction Industrial Track runs parallel to the NEC and runs north and east into the Providence Port.
- The Warwick Industrial Track runs parallel to the NEC and travels east into Warwick.

Bike Path

The Washington Secondary Track has been converted to a bike path running primarily north-south through Cranston and into Warwick.

Undeveloped

Undeveloped rights-of-way include:

- The Pontiac Secondary Branch in Cranston.
- The Wrentham Industrial Track in the northeast section of the study area in Cumberland.
- The East Providence Secondary Track runs east from Providence into East Providence and is inactive and underground in the study area.

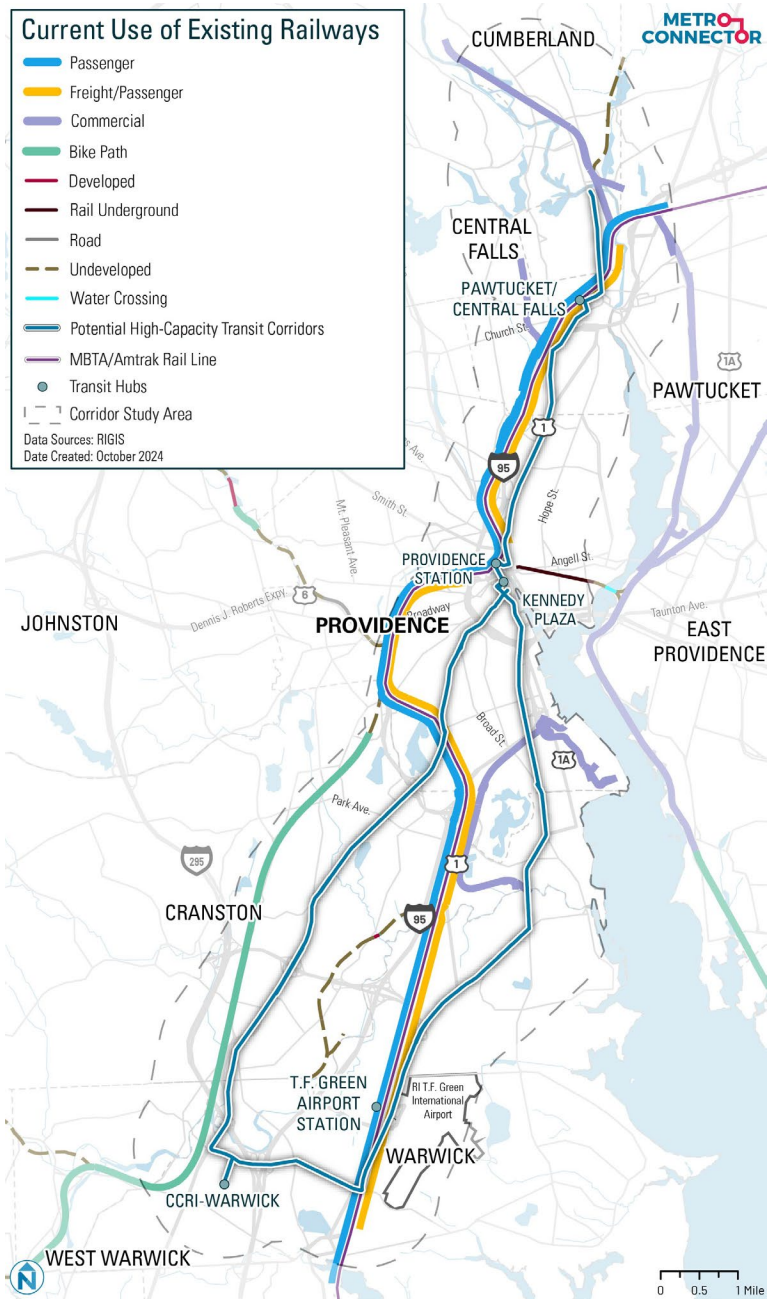


Figure 5-9 Current Uses of Existing Railroad Rights of Way

Ownership of Existing Railroad Rights-of-Way

The existing railroad rights-of-way in the study area are owned by a mix of private, state, and municipal owners (see Figure 5-10). Ownership of existing right-of-way and operating rights maintained by the railroads can greatly influence the legal and logistical feasibility of using the right-of-way for high-capacity transit.

Privately owned railroad rights of way include:

- The NEC owned by Amtrak
- The Wrentham Industrial Track in the northeast section of the study area in Cumberland.
- Moshassuck Valley Industrial Track in Central Falls.
- The Warwick Industrial Track in Warwick.

State owned railroad rights of way include:

- The NEC FRIP Track
- The Washington Secondary Bike Path running through Cranston and Warwick
- The East Providence Secondary Track connecting Providence and East Providence.
- The Pontiac Secondary Branch in Cranston.

Municipally owned railroad rights of way include the Harbor Junction Industrial Track connecting into the Providence Port.

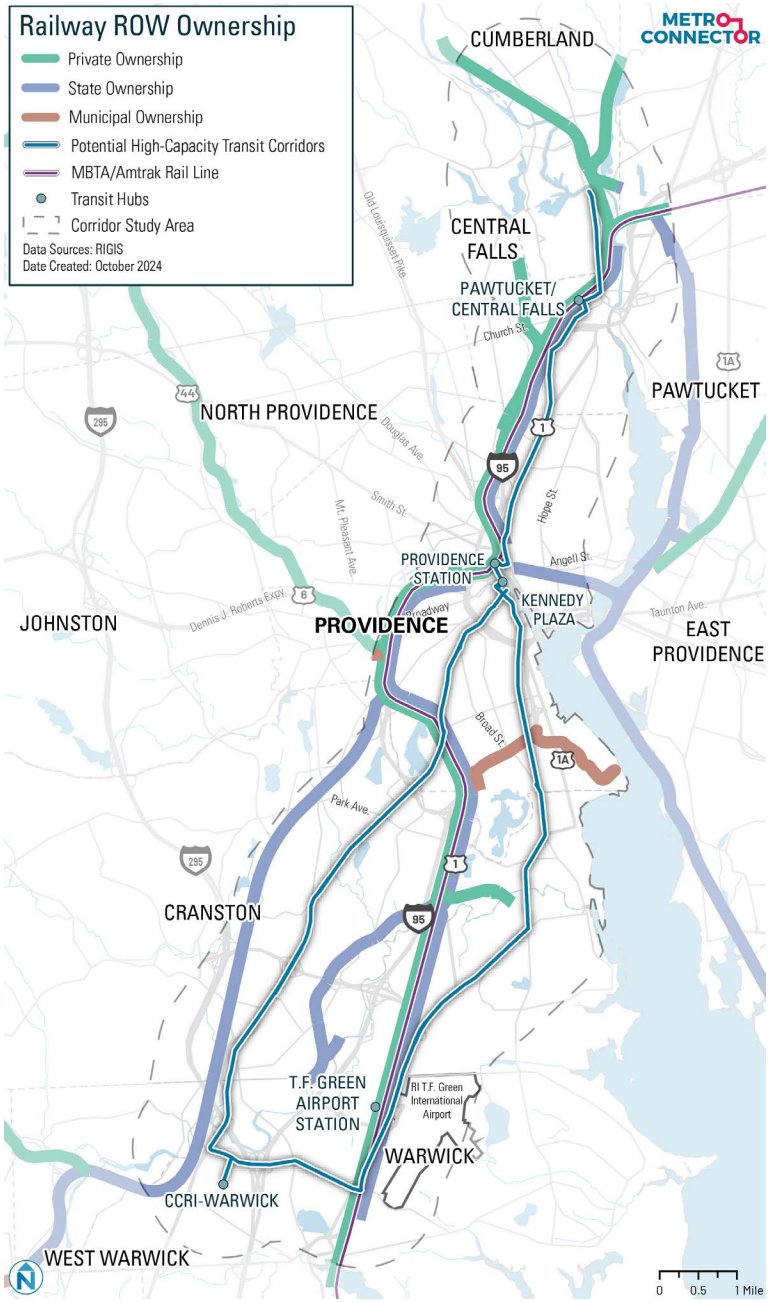


Figure 5-10 Ownership of Existing Railroad Rights of Way

Summary and Opportunities

Characteristics related to the width, intersections, and safety of existing roadways will impact the implementation and operation of any future high-capacity transit. Additionally, the current use and ownership of rail rights-of-way could impact the possibility to use these corridors for high-capacity transit. The analysis found the following opportunities in which existing roadway characteristics are already aligned with future rapid transit corridors:

- There are several north-south corridors within the study area that have continuous stretches of two or more lanes. These corridors would likely be wide enough to accommodate transit priority infrastructure.
- There are several east-west corridors both at the northern and southern ends of the study area that could potentially connect the two future high-capacity transit corridors at the end of their routes.
- The vast majority of the potential high-capacity transit corridors lie along roadways that are at least two lanes in width and could potentially accommodate transit priority infrastructure.
- While most rail rights-of-way in the study area have an active use, there are sections which are inactive or undeveloped. Like with roadway rights-of-way, additional study is required to evaluate the feasibility of using railroad rights-of-way as future high-capacity transit corridors. The operating rights maintained by railroads and the current use of these spaces is an important consideration.
- Several high crash areas are located on roadways that may also be well-suited for high-capacity transit. The redesign of roadways to accommodate future high-capacity transit service may also address existing safety issues.

Analysis also identified the following challenges to high-capacity transit posed by existing roadway conditions:

- Careful planning will be required to identify feasible corridors through Downtown Providence and Pawtucket, as these areas have the lowest bus speeds in the entire study area and a dense network of narrow streets and signalized intersections.
- Signalized intersections occur frequently throughout the entire study area, but almost exclusively on corridors with two or more lanes. Intersection treatments like transit signal priority will likely be important to the success of future high-capacity transit service.

6 Market Profile

The foundation of understanding how to best serve an area with transit is to understand the underlying market and demand for different kinds and levels of service.

This market profile examines:

- The underlying demand for transit services throughout the study area
- Where people are traveling from and where they're going
- Whether those factors would support high-capacity transit in the study area

Introduction

Underlying transit demand is strongly related to the following factors, discussed in detail in this chapter:

Population and Population Density: Since transit relies on having people in close proximity to service, higher population density makes it feasible to provide higher levels of service.

Socioeconomic Characteristics: Different people have a different likelihood to use transit, with differences related to socioeconomic characteristics. For example, households with many cars are much less likely to use transit than those with one or none.

Job Types and Employment Density: The density of jobs is also a strong indicator of transit demand, as traveling to and from work often accounts for the most frequent type of transit trip. The type of job influences who travels there and whether it is just employees or also customers, clients, patients, and students.

Travel Flows: People use transit to get from one place to another. High-capacity transit lines are designed to serve corridors with high volume travel flows.

More than any other factor, **population and employment density** will determine the underlying demand for transit. This is because:

- The reach of transit is generally limited to between one-quarter and one-half mile of the bus stop or station. As a result, the size of the travel market is directly related to the density of development in that area.
- Transit service frequencies, in turn, are closely related to market size. Bigger markets support more frequent service, while smaller markets can support only less frequent service.
- To attract travelers who have other options, such as private automobiles, transit service must be relatively frequent and get riders to their destination in a time and at a cost competitive with a private vehicle.

Population and job densities also provide an indication of the underlying population-based demand for transit in terms of the type and frequency of service that would be most appropriate. However, these densities broadly indicate demand across contiguous and nearby areas. Clusters of density throughout an area or along a corridor are strong indicators of demand, while a dense but small block group in an isolated area would not produce sufficient demand by itself. Demand can also accumulate along corridors to produce demand for more frequent service than the densities alone would indicate. For example, long corridors where most block groups have the density to support 15- to 30-minute service will often produce accumulated demand for 15-minute or better service.

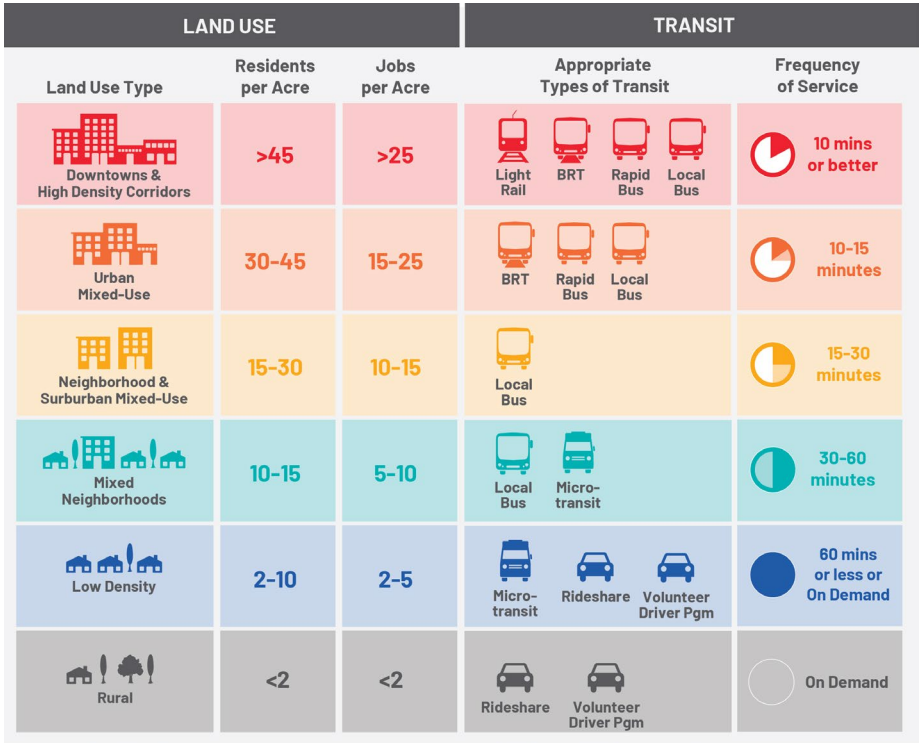


Figure 6-1 Relationship between Land Use and Transit Types and Frequencies

Areas that do not have at least 10 residents or 5 jobs per acre or a combination thereof, generally more sprawling communities made up of single-family homes, do not provide an environment where fixed-route transit can succeed easily, and are not appropriate for high-capacity transit.

Why is transit important?

Transit has the promise of being a safe, affordable, and convenient travel option for people of all ages and abilities. Transit is the most affordable mode for travel in the

study area. A monthly pass for unlimited RIPTA rides costs $70 for adults. An MBTA Monthly Commuter Rail pass costs $110, which would cover all MBTA-based Commuter Rail travel, including between Providence and Wickford. The Reduced Fare Bus Pass Program allows qualifying low-income seniors (age 65 and over) and low-income persons with disabilities to travel for free for two years. Students at many of the colleges throughout the region, including CCRI, can ride for free or purchase reduced fare passes, depending on the school. RIPTA costs riders less than $1,000 a year.

By contrast, **automobile ownership and gas cost residents of the municipalities that surround Providence between $10,493 and $14,476 per year.**[12] Given that residents in the region spend an average of 20 percent of their income on transportation, well-functioning public transit can remove a significant cost burden for many people.

$840

A year of unlimited transit passes costs a regular rider on RIPTA less than $1,000 a year.

$10,493 - $14,476

For the typical resident in Providence, Warwick, Central Falls, Pawtucket, Cranston, or Cumberland, the annual cost of automobile ownership (including fueling, insurance, and maintenance) is more than $10,000 per year and can be over $14,000 depending on the area.[13]

When a region invests in quality transit, it can allow for greater upward economic mobility for its residents, as lessening the burden of transportation costs can allow for a resident's resources to be spent on other needs, such as education, health care, savings, and the purchases of goods and investments. Additionally, transit is the most efficient method of transporting people in environments where street space is limited. Cars use more space than buses to move people, and the combined effect of thousands of cars on the road with only one or two people inside can result in significant congestion during peak travel periods. Transit vehicles such as buses can carry many more people down a street while using a fraction of the space that would be required to move those same people in cars.

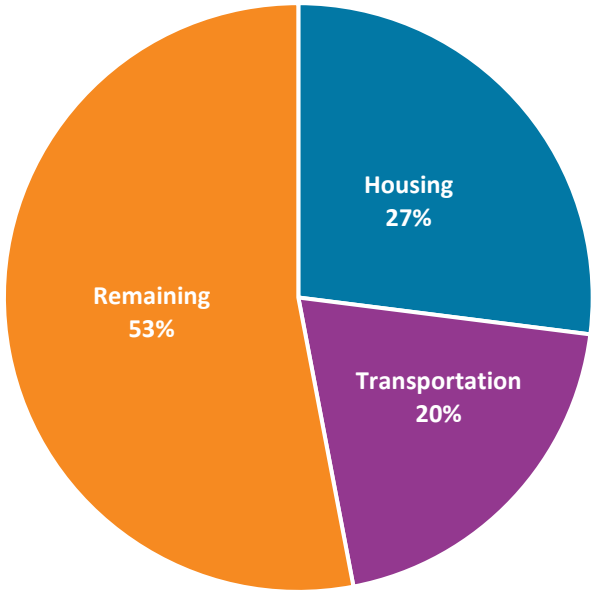


Figure 6-2 Average Housing and Transportation Costs – Providence Metro Area

The benefits of transit extend beyond alleviating congestion – **transit is both safer and more environmentally-friendly compared to traveling in a private car.** According to the CDC, communities with higher transit use experience fewer traffic related deaths per capita, and transit use reduces per-capita greenhouse gas emissions and pollution[14].

[12] Center for Neighborhood Technology Housing & Transportation Index, https://htaindex.cnt.org/

[13] Center for Neighborhood Technology Housing & Transportation Index, https://htaindex.cnt.org/

[14] "Transportation Recommendations," CDC. https://www.cdc.gov/transportation/expand-public-transportation.html

Population and Population Density

Population density is an important factor in where transit will be successful. High population density indicates land use types that are more suitable for frequent transit service and where transit is likely to have higher ridership. Densely populated areas tend to be more walkable and less auto-oriented, with more limited access to parking and less incentive to own a vehicle. There is a total of 279,729 people in the study area. Areas within the study area with high to very high population density (at least 30 residents per acre) include the southern portion of Central Falls, Downtown Providence, Federal Hill and South Providence. These areas with the most population density would be most supportive of high-capacity transit. Some of the densest parts of the region are in the study area, which is why the potential corridors were identified for high-capacity transit.

Table 6-1 Population by Municipality

Area	Population in Study Area	Total Population
Cumberland	9,898	36,276
Central Falls	22,382	22,382
Pawtucket	41,816	75,176
Providence	111,356	189,715
Cranston	54,852	82,691
Warwick	30,719	82,783
Total	**279,729**[15]	**489,023**

- **Cumberland:** Population density throughout Cumberland is low, with the highest density of 10-15 residents per acre in Valley Falls.
- **Central Falls:** Central Falls has significant population density; it is also in the top 25 densest communities nationally according to the 2020 Census.
- **Pawtucket:** Pawtucket has moderate population density overall, with the highest population density surrounding Route 1 and just east of the Seekonk River, as well as surrounding the Pawtucket/Central Falls commuter rail station.
- **Providence:** There is high population density in multiple areas of Providence, including West End, Elmwood, and Lower South Providence.
- **Cranston:** The only area of Cranston with somewhat high population density is its northern border near Park Avenue. Most of the city is low density.
- **Warwick:** Warwick has low population density compared to the rest of the study area.

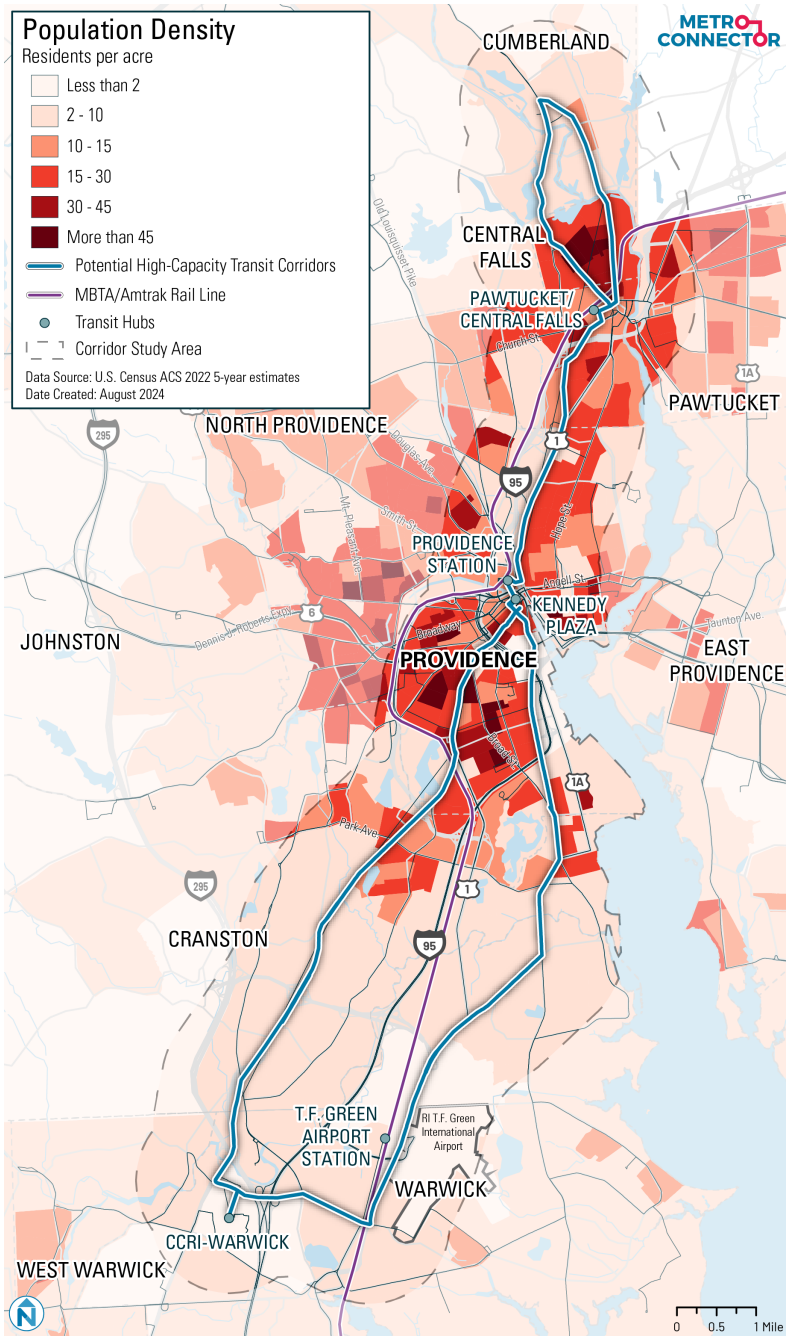


Figure 6-3 Population Density

[15] The population in the study area does not equal the municipal totals in the study area because study area does include very small parts of Lincoln, West Warwick, and North Providence

Socioeconomic Characteristics

In addition to population density, socioeconomic characteristics influence people's propensity to use transit. While not all these factors are used to calculate transit propensity later in this chapter, it is still important to consider several characteristics when prioritizing transportation equity, including race and ethnicity, income, foreign-born households, vehicle ownership, English proficiency, housing tenure, and transportation costs. Most of the analysis in this section is conducted using Census Block Groups, which are collections of Census Blocks, which are similar to city blocks. Block groups typically have around 250-550 housing units, which is why there are larger Block Groups in lower density areas.

Race and Ethnicity

In the United States, race is highly correlated with income, generational wealth, and other social characteristics. As a result, people of color tend to ride transit at higher rates than white, non-Hispanic residents. Providing equal access to public transit is required by the Federal Transit Administration (FTA) under Title VI of the Civil Rights Act of 1964.

- **Cumberland:** Residents in Valley Falls are primarily white, although there are small concentrations of Asian residents near Cumberland's border with Central Falls, as well as concentrations of Hispanic residents in the middle of Valley Falls.
- **Central Falls:** There are high concentrations of Hispanic residents throughout the study area, but particularly in Central Falls. There are also high concentrations of Black residents near the town's border with Pawtucket, as well as a mix of Hispanic and Black residents along one of the potential corridors for high-capacity transit.
- **Pawtucket:** There are high concentrations of white residents along Route 1 in Pawtucket, just east of one of the study corridors. Pawtucket also has a high concentration of black and Hispanic residents, especially east of the Seekonk River.
- **Providence:** Downtown Providence has a mix of white, black, Asian, and Hispanic residents. West End, Elmwood, Upper South Providence, and Lower South Providence all have high concentrations of Black, Hispanic, and Asian residents, while Federal Hill has a high concentration of white residents with some Black and Hispanic residents.
- **Cranston:** Cranston has high concentrations of white residents, as well as a mix of Asian and Hispanic residents, especially in West Cranston.
- **Warwick:** Warwick is primarily white, but there are concentrations of Asian residents north of CCRI.

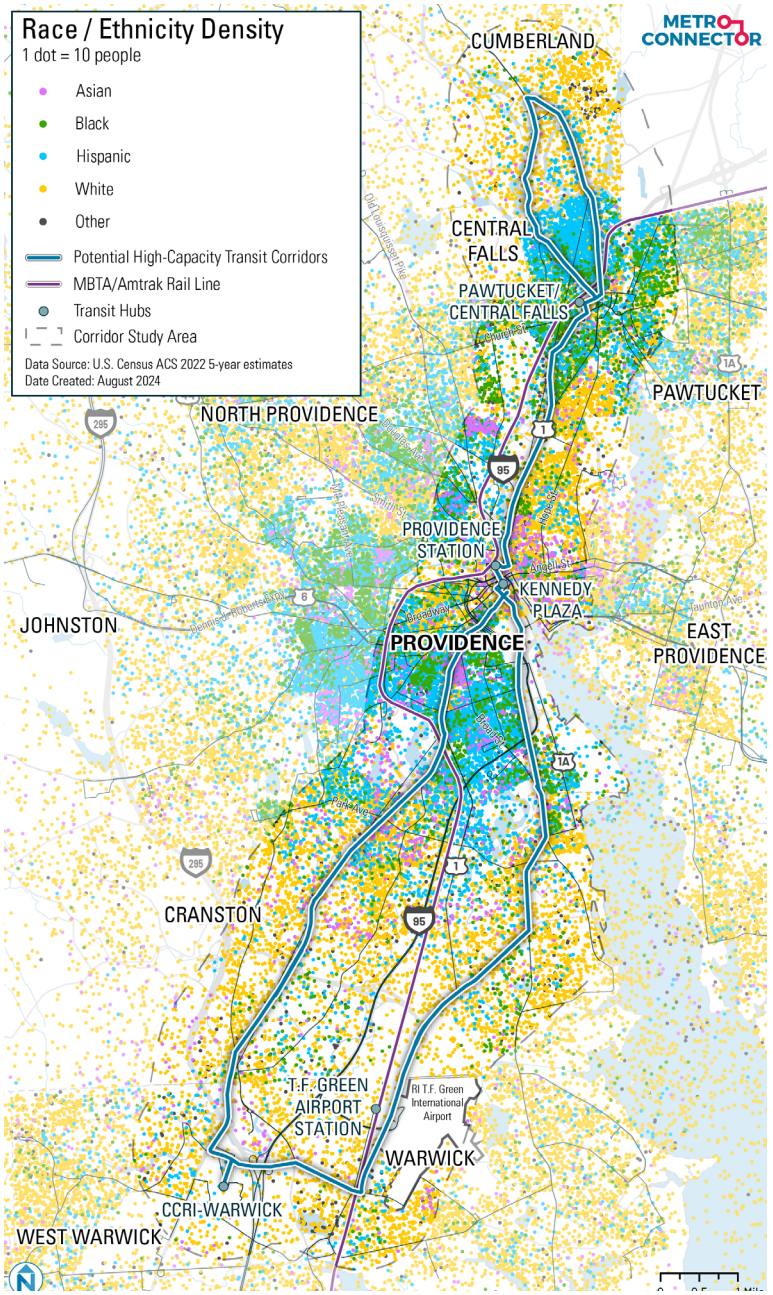


Figure 6-4 Race and Ethnicity

Low-Income Households

Residents with low incomes tend to ride transit more than other demographic groups because it is less expensive than owning a car, and many of these residents may rely on public transit as their primary mode. Understanding where low-income households are can help us understand travel behaviors and inform service recommendations.

- **Cumberland:** There is a concentration of low-income households in the northern tip of the study area in Valley Falls, directly adjacent to one of the potential corridors for high-capacity transit.
- **Central Falls:** Low-income households in Central Falls are concentrated in the southern portion of the city, between two of the potential corridors for high-capacity transit. Larger portions of Central Falls have a higher percentage of low-income households than Cumberland.
- **Pawtucket:** Pawtucket's low-income households are concentrated in the western area of the town, close to the Seekonk River and adjacent to the Pawtucket/Central Falls commuter rail station.
- **Providence:** Low-income households in Providence are concentrated in Upper and Lower South Providence, Elmwood, and Smith Hill.
- **Cranston:** Cranston has a low percentage of low-income households overall.
- **Warwick:** The only area in Warwick with a high concentration of low-income households is just north of the airport.

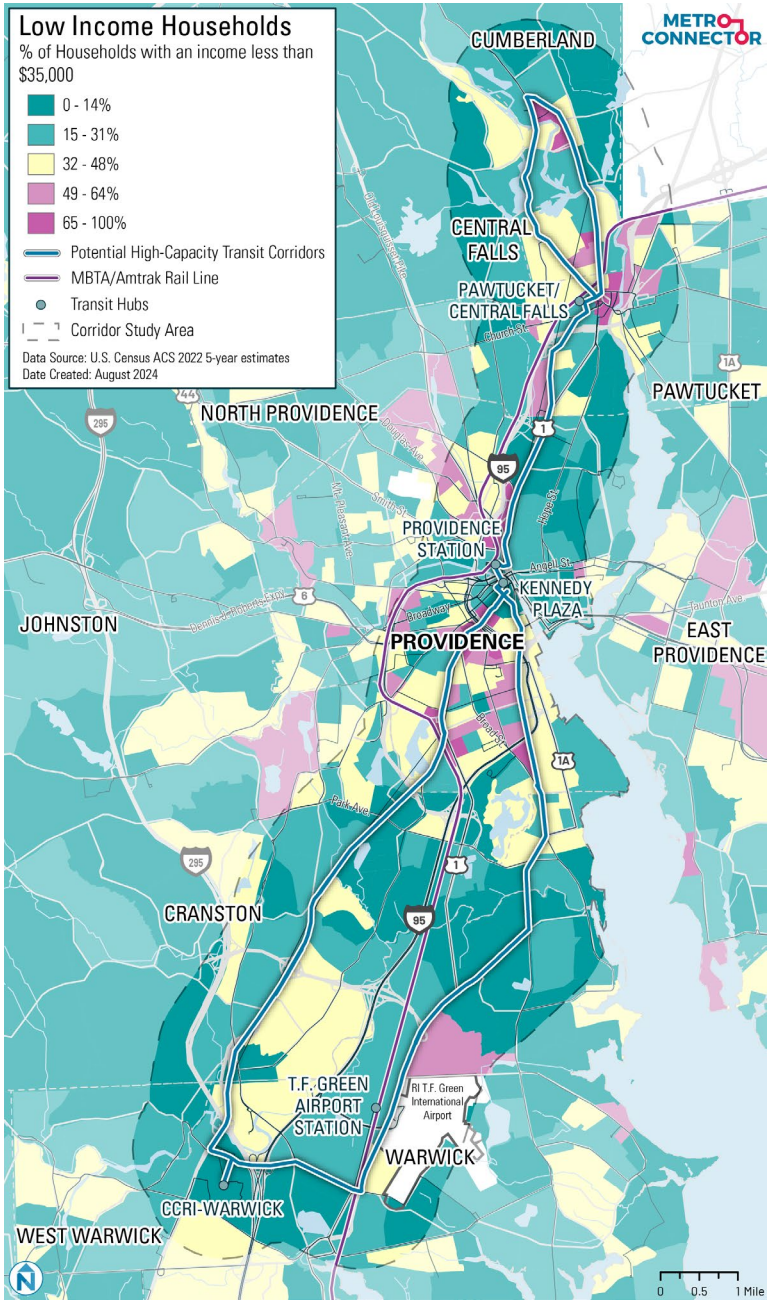


Figure 6-5 Low-Income Households

Foreign-Born Households

Generally, households with foreign-born members are more likely to use transit than native-born residents. In many countries outside the US, public transit use is much more common, so foreign-born residents may be more inclined to use transit when moving here. Immigrant communities may also be more likely to use transit because of the financial burden of arriving in a new country and getting a license, or unfamiliarity navigating different traffic laws. Neighborhoods around the Pawtucket/Central Falls commuter rail station and south of Downtown Providence have the highest percentages of households in the study area with foreign-born occupants.

- **Cumberland:** The highest percentage of households with foreign-born occupants in Cumberland is in Valley Falls near the border with Central Falls. Compared with Central Falls and Providence, however, the percentage of households with foreign-born residents is lower in the part of Cumberland within the boundaries of the study area.
- **Central Falls:** There is a relatively high percentage of households with foreign-born residents in Central Falls, especially on the municipality's border with Cumberland and in the western portion of the city adjacent with one of the potential corridors for high-capacity transit.
- **Pawtucket:** Pawtucket has a low percentage of households with foreign-born residents overall, with the highest percentages directly adjacent to the Pawtucket/Central Falls commuter rail station.
- **Providence:** The highest percentage of households with foreign-born residents in Providence within the study area are in Upper and Lower South Providence, West End, Elmwood, and Washington Park. Portions of Smith Hill, Reservoir, and Silver Lake have a high percentage of foreign-born residents in the study area.
- **Cranston:** Overall, the percentage of households with foreign-born residents is low throughout Cranston.
- **Warwick:** The area north of CCRI has the highest percentage of households with foreign-born residents in Warwick, especially compared with the rest of the municipality, where the percentage is low.

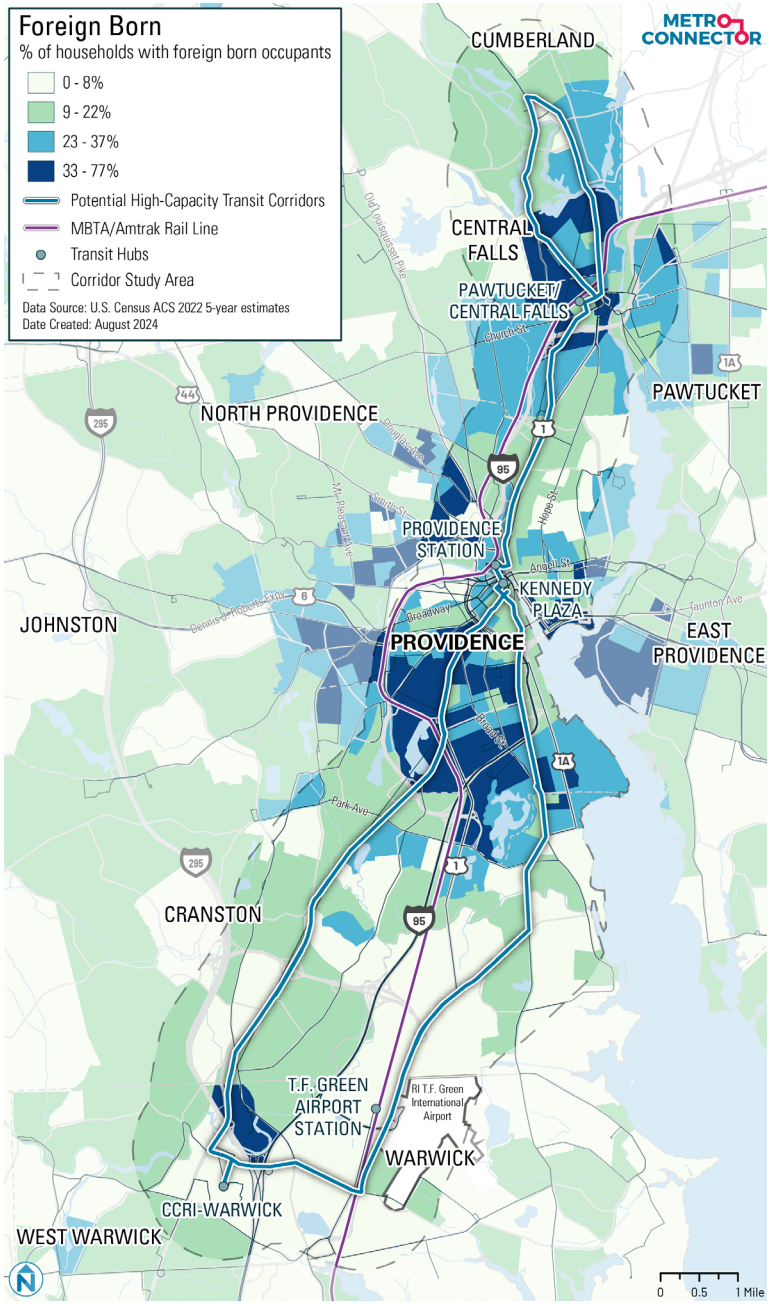


Figure 6-6 Foreign-Born Households

Zero Vehicle Households

People who live in households without access to a personal vehicle are more likely to use transit, either by choice or necessity. Residents living in the urban core, including municipalities like Providence, may choose to live car-free because they have access to jobs and other amenities via public transit or walking. Other residents may use transit because of cost or inability to drive. Neighborhoods around major transit stations, including Providence Station and the Pawtucket/Central Falls commuter rail station, have the highest percentages of households in the study area who do not own a vehicle.

- **Cumberland:** Most of Cumberland has a low percentage of households with zero vehicles, but there is a high concentration of these households in the northern portion of Valley Falls, adjacent to the potential corridors for high-capacity transit.
- **Central Falls:** Neighborhoods in the middle region of Central Falls have a high percentage of households with zero vehicles. The percentage of households with zero vehicles is lower in Central Falls near the town's border with Cumberland.
- **Pawtucket:** West of the Seekonk River and around the Pawtucket/Central Falls commuter rail station are the neighborhoods in Pawtucket with the highest percentage of households that do not own a vehicle.
- **Providence:** Downtown Providence and Federal Hill have the highest concentrations of households that do not own a vehicle in Providence. Parts of Upper and Lower South Providence, Smith Hill, Wanskuck, and Mount Hope also have high percentages of zero-car households, including an area adjacent to North Main Street, one of the corridors with potential for high-capacity transit.
- **Cranston and Warwick:** Except for a small area in Warwick north of CCRI, most households in these two towns have access to at least one vehicle.

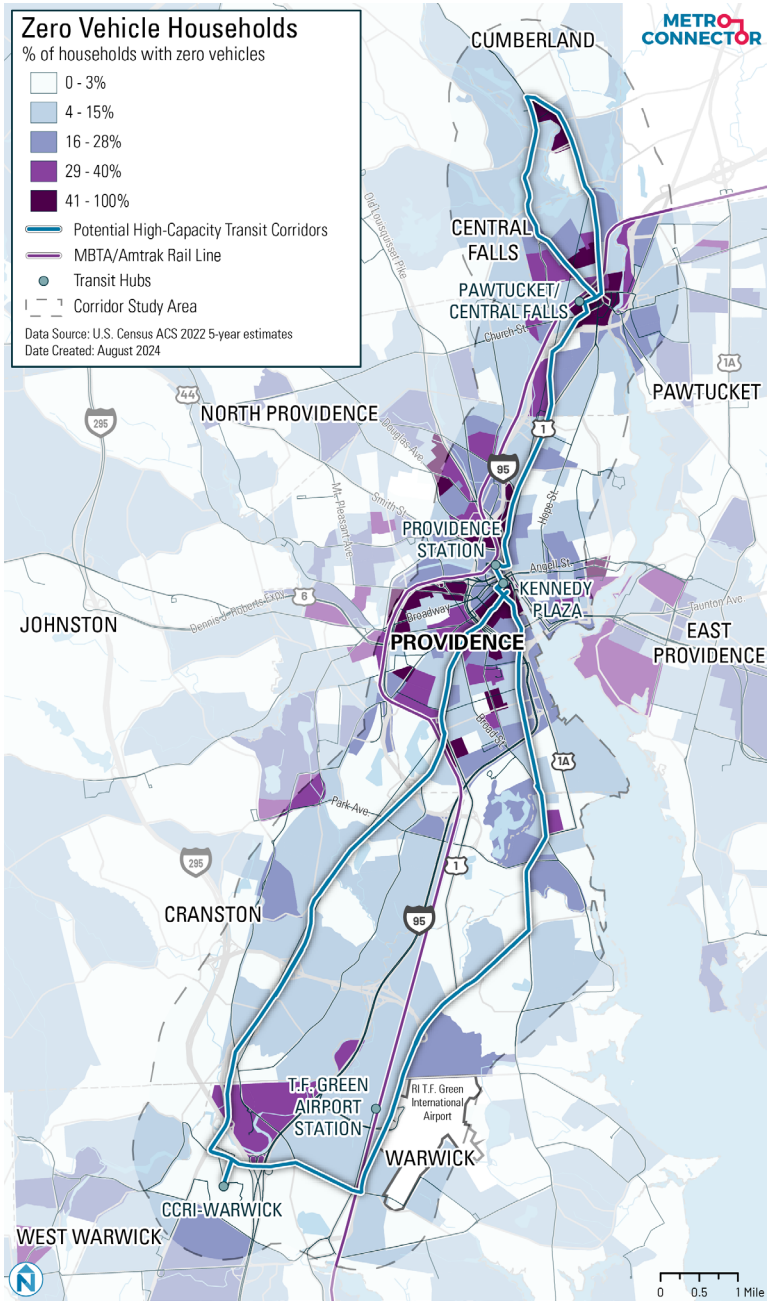


Figure 6-7 Zero Vehicle Households

Limited English Proficiency

Those with limited English proficiency (LEP) are considered a protected class under Title VI. Residents with limited English proficiency should have special consideration for communications and outreach. Residents with LEP are less likely than the general population to ride transit to work but are more likely than the general population to carpool, walk, or bike to work.[16] This indicates that the need for alternatives to driving alone among LEP populations is high, but that accessing transit service can be difficult, either because it does not work for their travel needs or a lack of legibility of the system. These challenges suppress potential ridership.

- **Cumberland:** The percentage of LEP residents is high in Valley Falls, but relatively low in the rest of Cumberland.
- **Central Falls:** There are high concentrations of LEP residents in the northern area of Central Falls, especially on the municipality's border with Cumberland.
- **Pawtucket:** There are relatively low concentrations of LEP residents in Pawtucket, but the area with the highest percentages is around the Seekonk River and adjacent to the Pawtucket/Central Falls commuter rail station.
- **Providence:** LEP residents are most concentrated in Lower South Providence, as well as in West End, Reservoir, and Elmwood.
- **Cranston and Warwick:** Cranston and Warwick have low percentages of LEP residents. The area of the two municipalities with the highest concentrations of LEP residents is Cranston's border with Providence.

Table 6-2 Languages of LEP Residents by Municipality

Municipality	Spanish	Indo-European	Asian & Pacific Island	Other
Cumberland	32%	59%	9%	0%
Central Falls	84%	15%	0%	1%
Pawtucket	44%	49%	3%	4%
Providence	80%	7%	9%	4%
Cranston	59%	18%	20%	3%
Warwick	38%	45%	16%	2%
Study Area	68%	20%	9%	3%

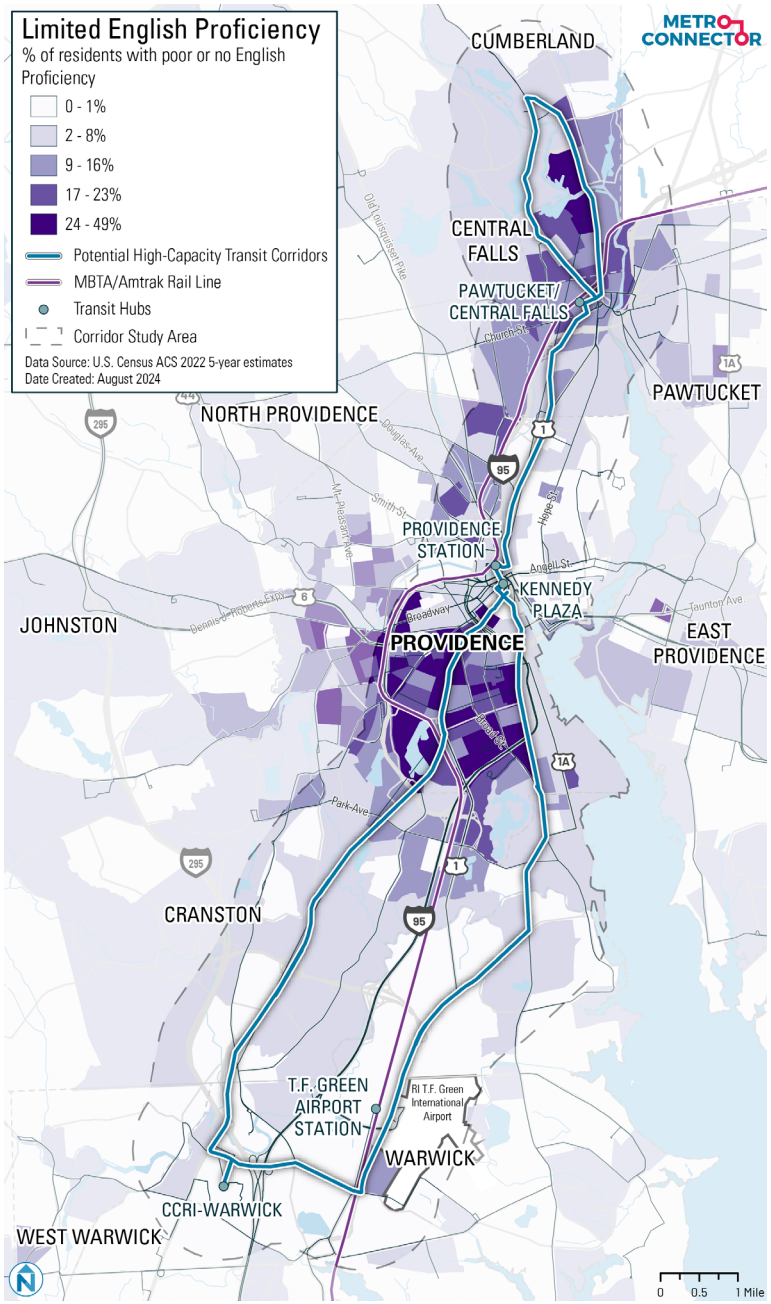


Figure 6-8 Limited English

[16] US Census 2022

Renters

Renters are much more likely to experience housing insecurity than homeowners due to fluctuating economic conditions while simultaneously being more transit-dependent and likely to live in car-free households, so it is important to consider them when assessing the need for high-capacity transit. Locations within the study area with the highest percentage of households occupied by renters include Federal Hill, Downtown Providence, western Pawtucket, significant portions of Central Falls, and north of CCRI in Warwick.

- **Cumberland:** The percentage of households occupied by renters is highest in the northern portion of Valley Falls but is also relatively high in areas of Cumberland near the town's border with Central Falls.
- **Central Falls:** Most of Central Falls has a relatively high percentage of households occupied by renters, but these households are especially concentrated in the southern area of Central Falls.
- **Pawtucket:** The percentage of renters in Pawtucket is highest around to the Pawtucket/Central Falls commuter rail station, as well as at the municipality's southern border with Providence, adjacent to one of the study corridors.
- **Providence:** Multiple neighborhoods in Providence have a very high percentage of households occupied by renters, including Federal Hill, Downtown, Smith Hill, and Elmwood. Other neighborhoods, including West End, Fox Point, Mount Hope, and Lower South Providence, have a relatively high percentage of renters as well.
- **Cranston:** Most of Cranston has a low percentage of renters, with the highest percentages in central Cranston.
- **Warwick:** There is a very high percentage of renters in Warwick north of CCRI and a relatively high percentage northeast of the airport, but the rest of the municipality has a relatively low percentage of renters.

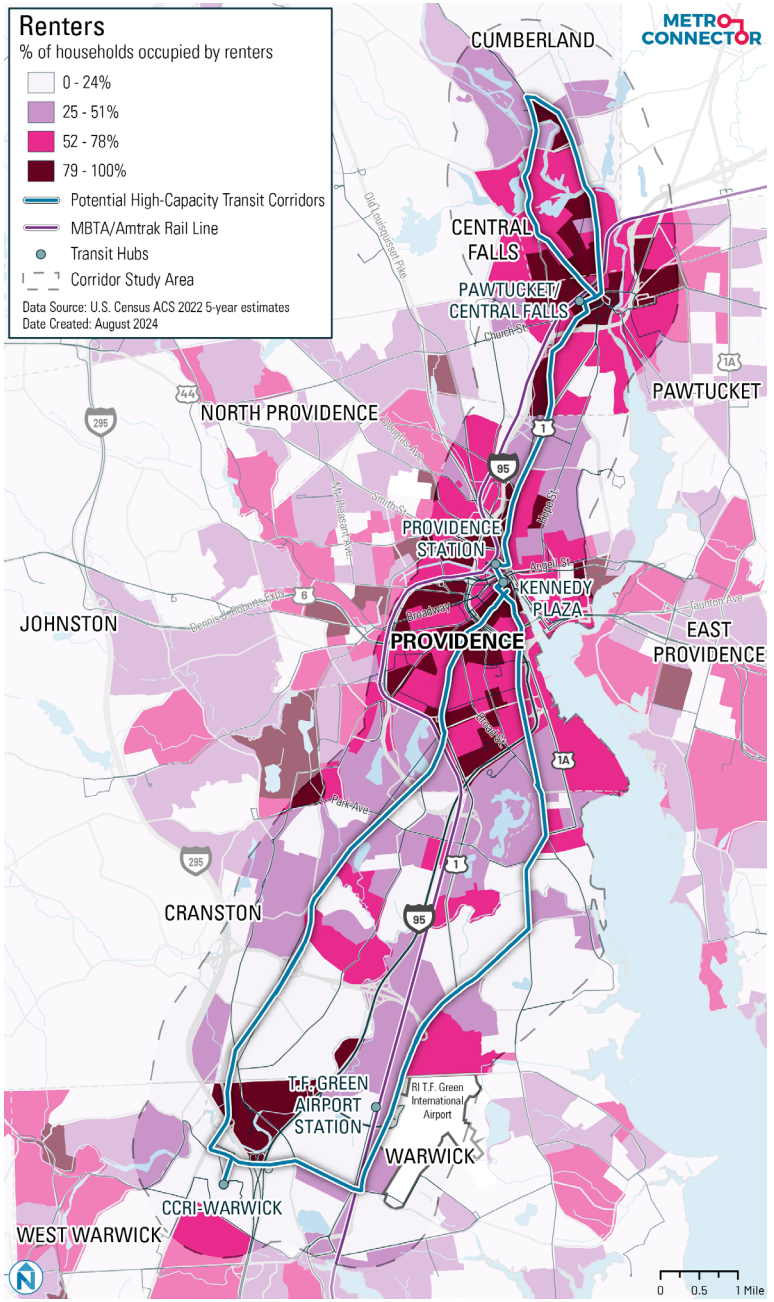


Figure 6-9 Renters

Transportation Costs

Figure 6-10 shows transportation costs throughout the study area, displaying data from the Housing and Transportation Affordability Index. Transportation costs are typically a household's second-largest expenditure and traditional measures of housing affordability tend to ignore transportation costs. Denser areas are characterized by shorter trip lengths and usually better walking, biking, and transit infrastructure which leads to lower transportation costs. Increasing access to transit and building more mixed-used, walkable developments can lower transportation costs.

- **Cumberland:** Transportation costs are moderate or high throughout Cumberland, with some neighborhoods experiencing very low transportation costs near the eastern border of Valley Falls, adjacent to one of the potential corridors for high-capacity transit.
- **Central Falls:** Transportation costs are relatively low in parts of Central Falls, especially in the eastern and southern parts of the municipality.
- **Pawtucket:** Pawtucket has low transportation costs in households directly around the Pawtucket/Central Falls commuter rail station, in addition to neighborhoods on the western side of the Seekonk River and near the town's border with Central Falls. Transportation costs are moderate in the rest of the municipality within the study area.
- **Providence:** Transportation costs are low in many neighborhoods throughout Providence, especially in Downtown, Upper and Lower South Providence, Federal Hill, West End, Fox Point and Smith Hill.
- **Cranston:** Transportation costs are moderate throughout Cranston but are lower in West Cranston compared with the eastern region of the municipality.
- **Warwick:** Transportation costs are moderate throughout Warwick and overall, slightly lower than in Cranston. Costs are lowest in Warwick just north of CCRI Warwick.

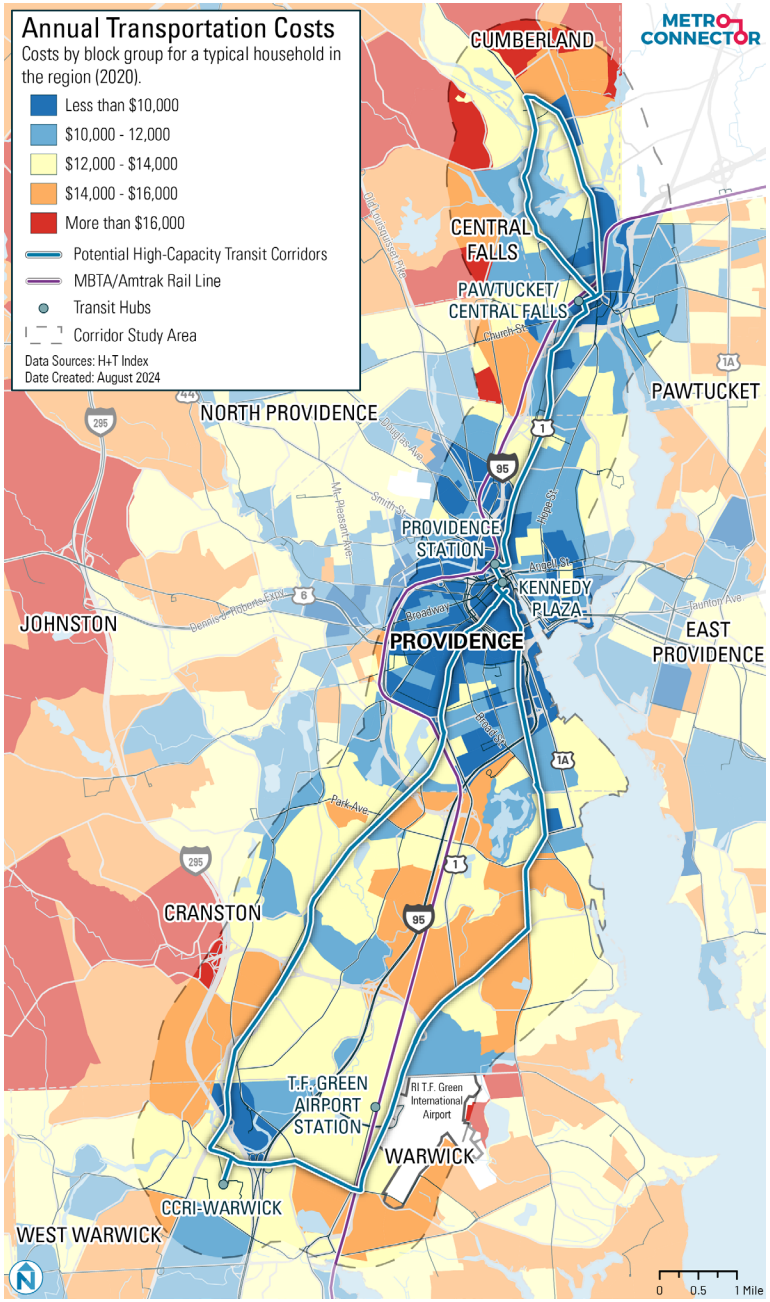


Figure 6-10 Transportation Costs

Socioeconomic Characteristics and Transit Propensity

When many residents who are likely to ride transit cluster together, they influence the underlying demand for transit to an extent that is not captured when only considering population density. In a given location, groups of people from transit-supportive demographics may be too small individually to reveal significant demand for transit service. However, the clustering of people with multiple transit propensity characteristics increases transit demand. Similarly, in places where transit-supportive demographics are underrepresented, transit demand may be lower than population density alone suggests. To take this into account, this analysis uses a transit propensity factor to measure relative demand for transit. Transit propensity factors are created by comparing journey-to-work data for select demographics in Rhode Island. A value of one means a group is as likely to take transit as an average study area resident. Anything below one means a group is less likely to take transit than an average resident, and above one means a group is more likely to take transit.

Residents more likely to take transit to work

Residents in the study area with the highest propensity for transit are those without a vehicle, who are almost eight times more likely to ride transit than the average person. Households that have one vehicle also have a higher-than-average propensity for transit, likely because there is usually more than one worker per household. Black residents are twice as likely to take transit and residents whose income is less than $25,000 are also more likely than average to take transit. Households with one car and foreign-born residents are also more likely to take transit than average, as are households with Asian and Hispanic residents, and those of other races.

Residents less likely to take transit to work

Residents with three or more cars are the least likely to take transit, while residents with two or more cars or incomes over $35,000 are also less likely than average to take transit. White residents in the study area are less likely than average to take transit, especially compared with other races and ethnicities. Households with native-born residents are also slightly less likely to take transit than the average household.

Table 6-3 Transit Propensity by Demographic Group

Demographic Group	Relative Transit Propensity
Race and Ethnicity	
White (not Hispanic)	0.73
Black (not Hispanic)	2.05
Asian (not Hispanic)	1.22
Other Race (not Hispanic)	1.63
Hispanic	1.43
Vehicle Ownership	
No Car	7.70
One Car	1.24
Two Cars	0.70
Three or More Cars	0.46
Country of Origin	
Native	0.95
Foreign	1.21
Household Income	
Less than $10,000	1.54
$10,000 - $15,000	1.44
$15,000 - $25,000	1.40
$25,000 - $35,000	1.09
$35,000 - $65,000	0.83
More than $65,000	0.80

Transit Propensity

Transit propensity displays the proportional weighted factor for all the relative transit propensity values on the previous page to display in general where residents are more or less likely to take transit compared to the average study area resident.

- **Cumberland:** The southern region of Valley Falls has a transit index factor just above or below one, but in the neighborhoods at the northern tip of the study area, adjacent to the potential corridors for high-capacity transit, the transit index factor is 1.5 or greater, meaning that residents are more likely than average to take transit. Residents living west of the Blackstone River and just north of the town's border with Central Falls are also more likely than average to take transit.
- **Central Falls:** All of Central Falls has a transit index factor of at least one, meaning that most residents are as likely to take transit as the average study area resident. Residents in the southern areas of the city, where the transit index factor is 1.5 or greater, are more likely to take transit in Central Falls than the rest of the municipality.
- **Pawtucket:** Residents around the Pawtucket/Central Falls commuter rail station have the highest transit propensity in Pawtucket, and transit propensity is relatively high in Pawtucket overall, especially adjacent to the corridor with potential for high-capacity transit. Transit propensity is lower east of the Seekonk River.
- **Providence:** Residents south of Downtown Providence have the highest transit propensity in the city, and residents in many of those neighborhoods are more likely than average to take transit.
- **Cranston:** Residents' propensity for transit is average throughout Cranston, with some areas east of I-95 having a lower-than-average propensity for transit.
- **Warwick:** Residents have a high transit propensity west of T.F. Green Airport adjacent to the corridor with potential for high-capacity transit, but other areas of Warwick, particularly immediately surrounding the airport and CCRI, have a below average propensity for transit.

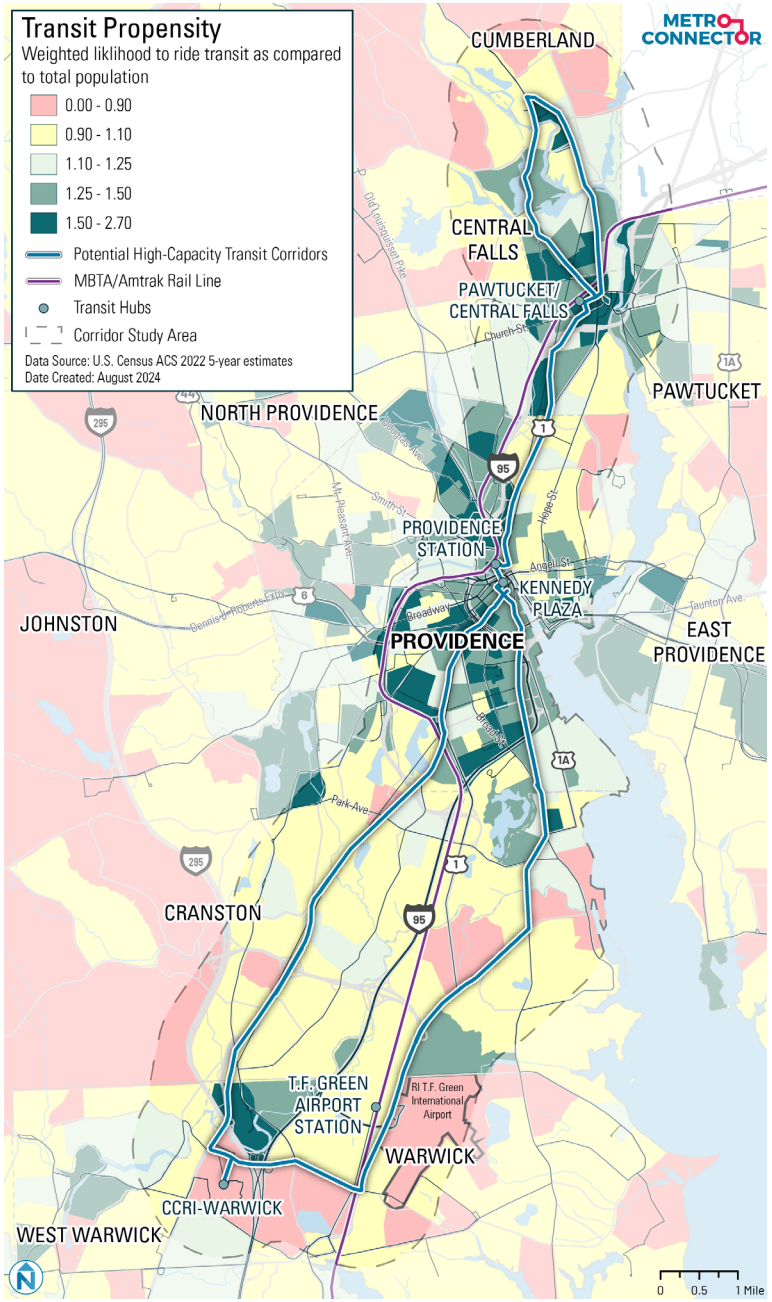


Figure 6-11 Transit Propensity

Adjusted Population-Based Demand

When demographic factors are considered in the context of population density-based transit demand, underlying demand is effectively higher in some areas and lower in others. This underlying demand can be called the "adjusted population density" and is calculated by multiplying the population density by the transit index factor. Transit demand intensifies in urban areas when considering socioeconomic characteristics and demand diminishes in sprawling areas.

Adjusted population density is highest in Providence and Central Falls, particularly around the Central Falls/Pawtucket commuter rail station. Although the population density around the Providence metro area shows that there is significant demand for transit, it is important to recognize that demand drops off steeply outside the metro area in most of the state. Outside of the urban core, including Cranston and Warwick in the study area, much of the state does not have an environment in which traditional, fixed-route transit will run successfully based on residential density.

- **Cumberland:** Most of Cumberland has a low adjusted population density, especially compared with neighboring Central Falls and Pawtucket. The only area of Cumberland with moderate adjusted population density is neighborhoods in Valley Falls east of the Blackstone River and north of John and Chambers Streets.
- **Central Falls:** Central Falls has high adjusted population density throughout the municipality, especially in the southern portion of the municipality and between the two potential corridors for high-capacity transit.
- **Pawtucket:** Adjusted population density is highest in Pawtucket on the east and west sides of the Seekonk River and west of the Pawtucket/Central Falls commuter rail station.
- **Providence:** Adjusted population density is highest in Providence in the West End and Elmwood neighborhoods, as well as in Lower and Upper South Providence and portions of Washington Park.
- **Cranston:** Cranston's adjusted population density is relatively low throughout the municipality, similar to its unadjusted density. The only areas with moderately high adjusted population density are in the northern portion of the city where it borders Providence.
- **Warwick:** The adjusted population density in Warwick is very low throughout.

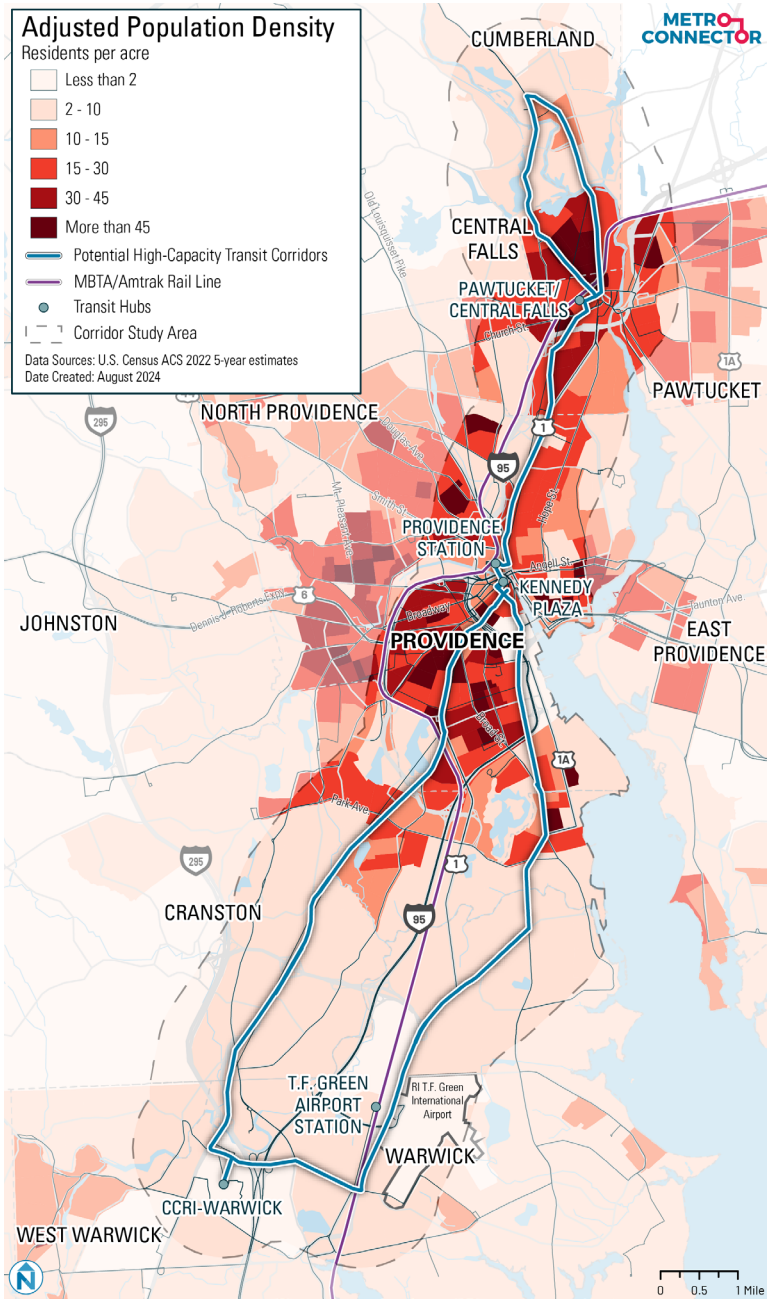


Figure 6-12 Adjusted Population Density

Jobs and Economic Activity-Based Demand

This section of the chapter describes demand for transit based on jobs and other forms of economic activity. In other words, it analyzes destinations people are trying to reach each day, as opposed to the places where people typically begin their trips each day.

Commuting is the most frequent and regular trip that most people, including transit riders, make. As a result, employment density is a major indicator of transit demand. Employment density is also an important indicator of demand because it represents other types of "ancillary" travel activity; customers, clients, patients, students, and visitors are also drawn to employment centers, just like employees. Some employment centers, like office buildings, warehouse districts, and manufacturing plants have less of this type of ancillary demand, while other employment centers, like hospitals and universities, generally have more of this type of ancillary demand. As job density increases, the demand for transit grows, particularly for more frequent service.

Providence has the highest job density in the study area with more than 25 jobs per acre west of Kennedy Plaza and in Downtown Providence, especially surrounding Providence Station. The only other location in the study area with more than 25 jobs per acre is adjacent to the Pawtucket/Central Falls commuter rail station.

- **Cumberland:** Job density is very low in Cumberland, including in Valley Falls.
- **Central Falls:** Employment density is low in Central Falls, with the highest density of 10 – 15 jobs per acre in the central portion of the municipality.
- **Pawtucket:** Job density in Pawtucket is relatively low except east of the Pawtucket/Central Falls commuter rail station.
- **Providence:** Employment density in Providence is very high Downtown, as well as in College Hill, Washington Park, and South Providence. Job density drops off sharply south of Downtown Providence and is much lower in Federal Hill and West End in comparison to the northern portion of the city.
- **Cranston and Warwick:** Employment density is low in Cranston especially compared to Providence, except for the shopping districts along Park Avenue, and is relatively low in Warwick as well except around the airport and CCRI.

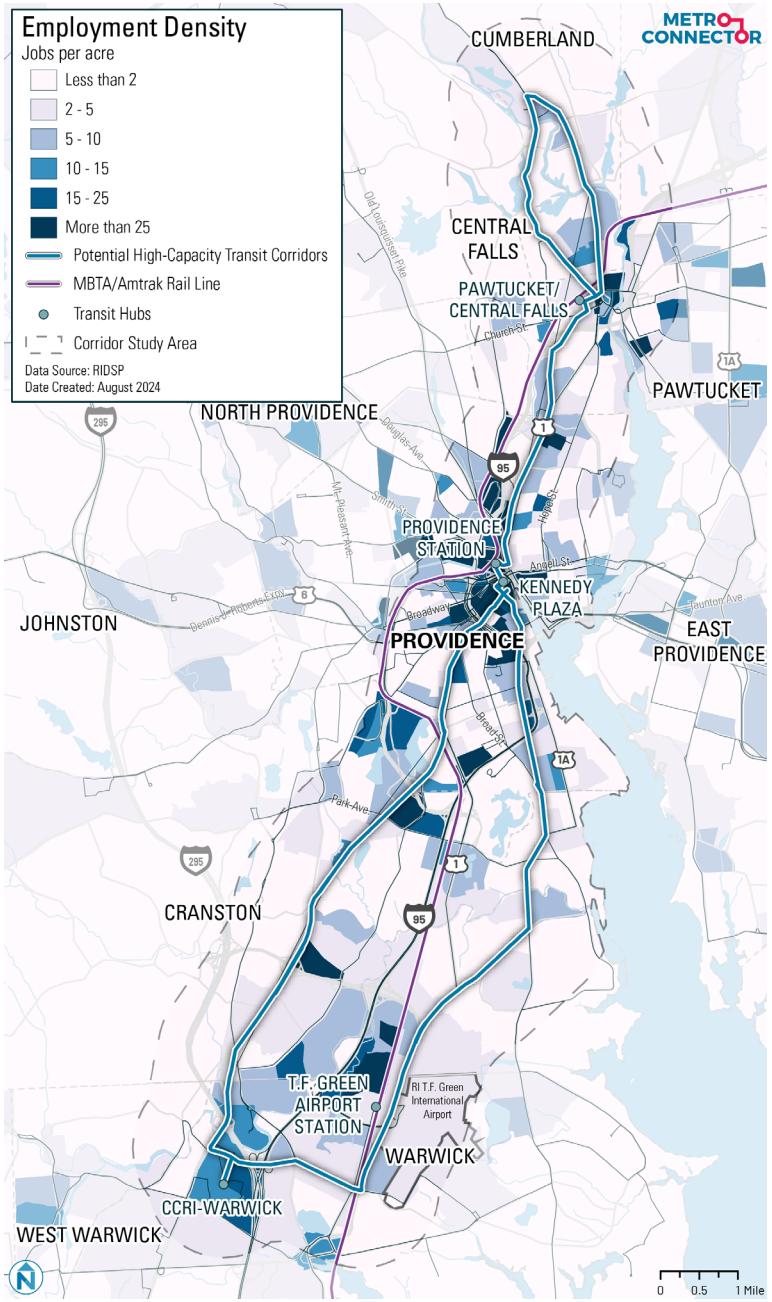


Figure 6-13 Employment Density

Customers, Clients, Patients, and Students

Many job sites attract travelers who are not employed at the site and can be broadly characterized as customers, clients, patients, and students. Many non-commute transit trips have destinations at these places, which include restaurants, grocery stores, schools, universities, and hospitals. Consequently, industries that attract customers, clients, patients, and students are associated with higher levels of transit ridership than other industries. On weekdays in 2023, almost half of trips (46%) in the study area were school, shopping, errands, and other trips most likely associated with being a customer, client, patient or student, while only 12% of trips were work trips.

- **Cumberland:** There is a moderate percentage of jobs with customers, clients, patients, and students within Valley Falls, especially in the northern tip of the study area between two of the potential corridors for high-capacity transit, east of the Blackstone River.
- **Central Falls:** Portions of the study corridors in Central Falls have a moderately high percentage of this type of jobs, with some in the southern area of the municipality and some pockets farther north.
- **Pawtucket:** The area to the southeast of the Pawtucket/Central Falls commuter rail station in Pawtucket has a high percentage of this type of job, although the area directly around the station has fewer in comparison. Neighborhoods on the town's border with Providence and on each side of the Seekonk River also have high concentrations of this type of job.
- **Providence:** The area east of Providence Station and surrounding Kennedy Plaza in Providence, which is just east of the corridors with potential for high-capacity transit, has a high percentage of this type of job as well.
- **Cranston:** Most of the study area south of Providence has a relatively low percentage of these jobs, but there are some areas of Cranston in the western portion of the study area and small pockets of the municipality that have a high percentage of this type of job.
- **Warwick:** Most of Warwick has a low percentage of this type of job but the area around CCRI Warwick has a relatively high percentage, especially compared to the rest of the municipality.

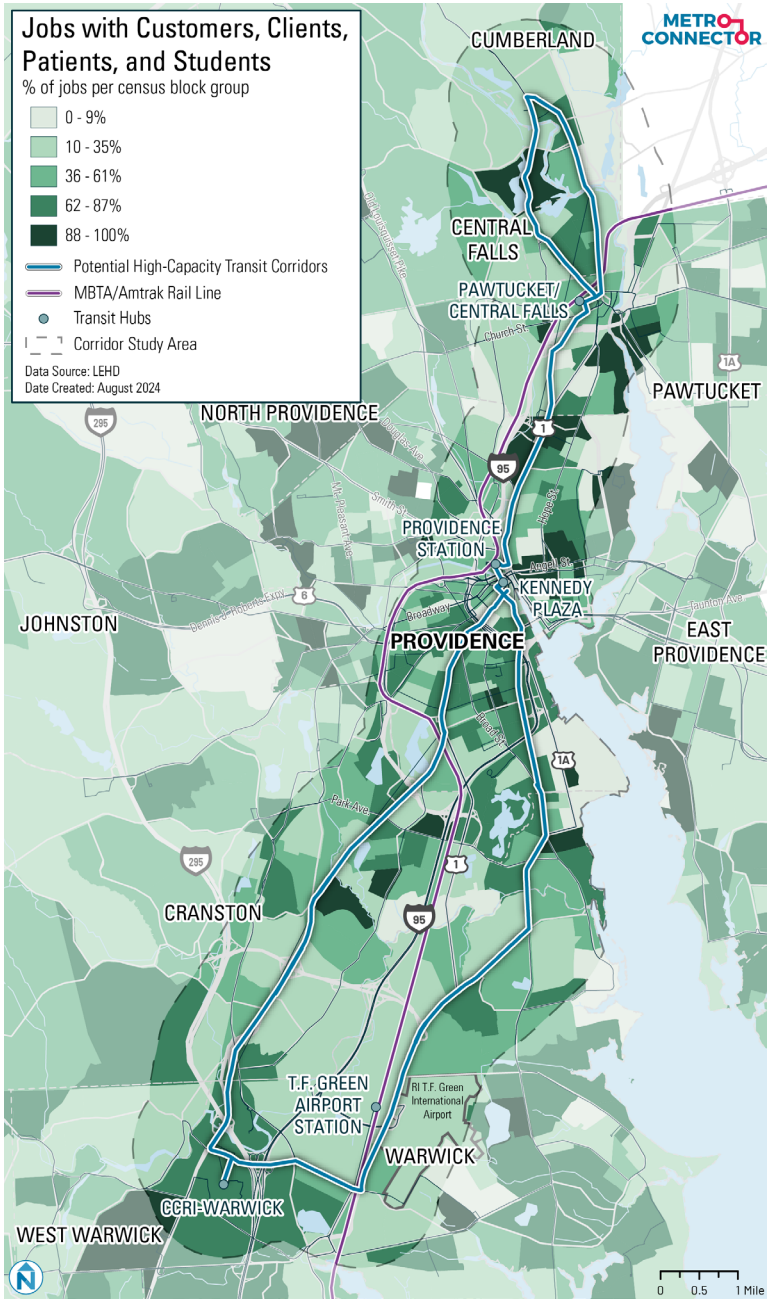


Figure 6-14 Customers, Clients, Students, and Patients

Jobs Held by Women

Women benefit most from all day frequent service and are more likely to take transit in general. Women have different travel patterns than men, and are more likely to work multiple jobs, work part time, and trip chain—all of which create stronger markets for all-day frequent service. Many places in the study area have uneven gender distributions of their employees. Areas where more jobs are held by men are more likely to be dominated by heavy industry and warehouses, among others.

There are significant portions of Providence, Central Falls, and Pawtucket where employees are 60% or more women, which indicates places where all-day frequent service is particularly important. Cranston and Warwick are less dense overall but portions of Warwick, particularly around CCRI, have neighborhoods where employees are 60% or more women.

- **Cumberland:** The manufacturing district in Cumberland is dominated by male workers, although there is a neighborhood in Valley Falls directly adjacent to one of the potential corridors for high-capacity transit where a high percentage of the jobs are held by women.
- **Central Falls:** The area of Central Falls between study corridors has a high percentage of jobs held by women, but the eastern region of Central Falls near the city's border with Cumberland has jobs with a higher percentage of male workers.
- **Pawtucket:** Pawtucket has a moderate percentage of jobs held by women, especially near the town's border with Providence and adjacent to the Seekonk River. A small area near the Pawtucket/Central Falls commuter rail station has a very high percentage of jobs held by women.
- **Providence:** Providence is the only municipality in the study area with multiple neighborhoods that have a very high percentage of jobs that are held by women, including Upper and Lower South Providence. However, the Port in Washington Park is dominated by male workers, and there is a high percentage of male workers in South Elmwood.
- **Cranston:** Most of the study area south of Providence has lower percentage of jobs held by women, but there are some areas of Cranston, close to where the city borders Providence, that have a moderate percentage of jobs that are held by women. Central Cranston has a lower percentage of jobs held by women compared to the rest of the municipality.
- **Warwick:** Much of Warwick has an even split between jobs held by both genders but the area around CCRI Warwick has a relatively high percentage of women workers, especially compared to the rest of the municipality.

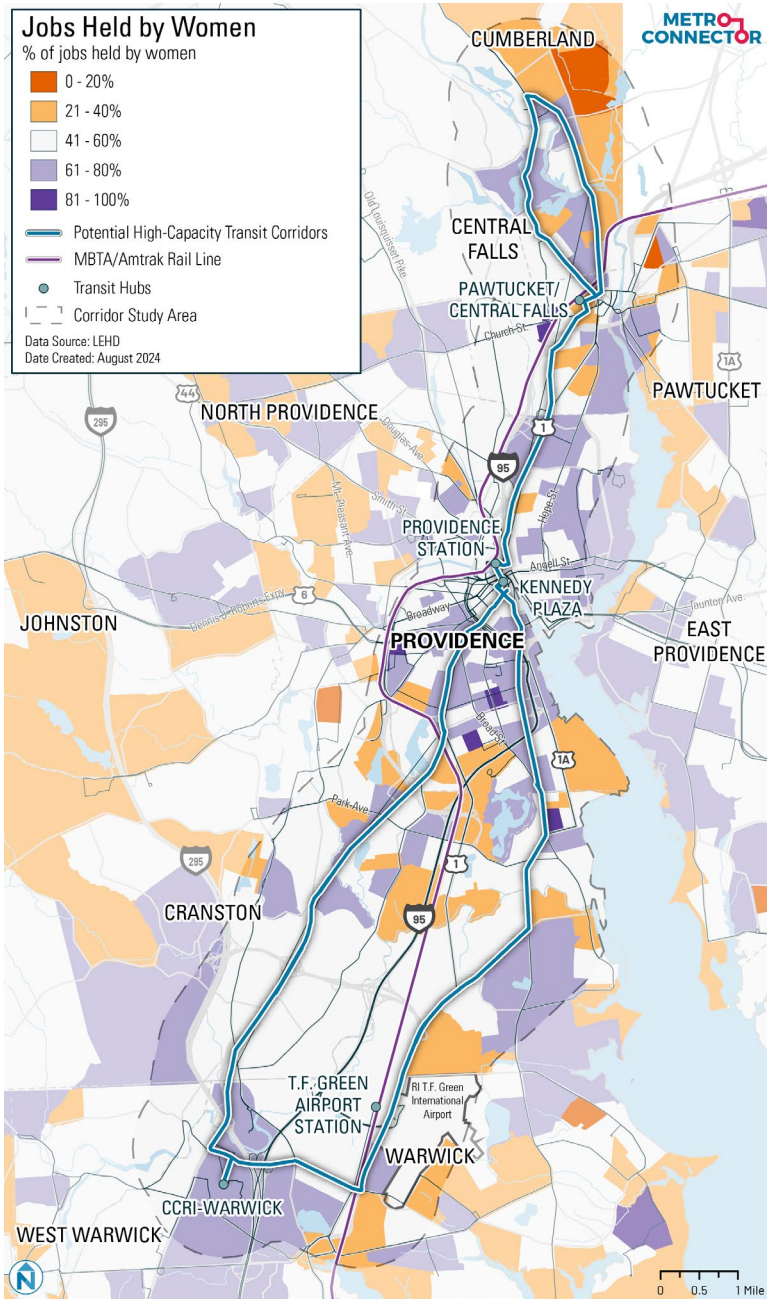


Figure 6-15 Jobs Held By Women

Adjusted Employment Density

Much like the resident socioeconomics described earlier in this chapter, different job types are associated with different levels of transit demand. Because industries with customers, clients, patients, and students create more demand, this market profile adjusts employment-based transit demand by the following factors, which are based on national transit-ridership research.

Adjusted employment density is highest around major transit stations, including the Pawtucket/Central Falls commuter rail station and Providence Station, as well as the Airport Station in Warwick.

Table 6-4 Demand Adjustment Factor by Job Type

Job Type	Demand Adjustment Factor
Jobs with Customers, Clients, Patients, and Students	1.3
Other Jobs	0.9

- **Cumberland:** Cumberland has very low adjusted employment density overall.
- **Central Falls:** Adjusted employment density is low in Central Falls overall, with the highest adjusted employment density in the central region of the municipality, between the two potential corridors for high-capacity transit.
- **Pawtucket:** Adjusted employment density is low in Pawtucket overall as well, but it is relatively high directly around the commuter rail station.
- **Providence:** Adjusted employment density is high in some areas of Providence, including Downtown and Federal Hill, as well as parts of Elmwood.
- **Cranston:** Cranston has low adjusted employment density overall.
- **Warwick:** Warwick has higher adjusted employment density than Cranston, especially around the airport as well as near CCRI.

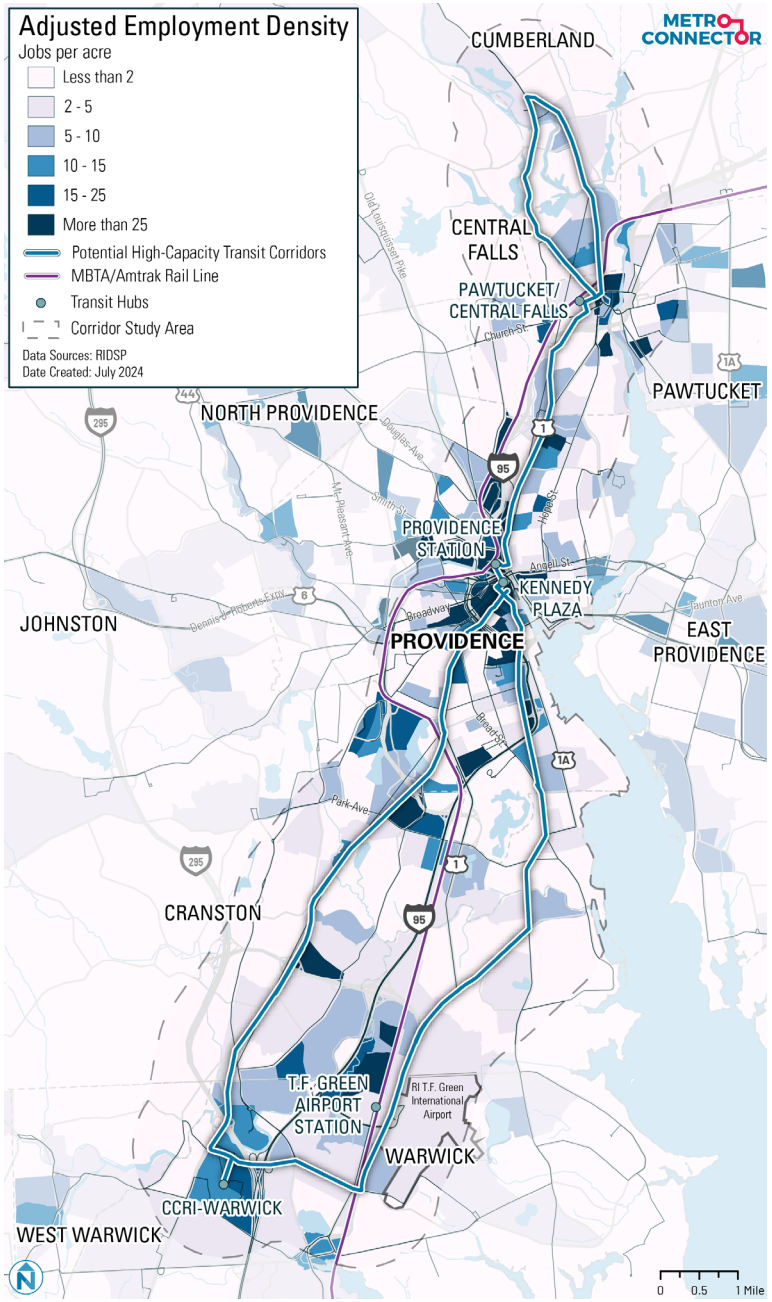


Figure 6-16 Adjusted Employment Density

Non-Traditional Commuters

Workers who make one or more work trips outside peak periods are more likely to have a low income than peak-period commuters. They are also more likely to have shifts that change on a weekly—or even daily—basis. Workers with varied schedules often have variable transit travel times depending on the times and days they work. Figure 6-17 shows where non-traditional commuters live. The best way to improve service for off-peak commuters is to provide more frequent off-peak service, which is typically a feature of rapid transit.

Areas where workers would benefit the most from more frequent off-peak and weekend service include South Providence, Downtown Providence, and north of CCRI in Warwick.

- **Cumberland:** Valley Falls in Cumberland has a moderate percentage of non-traditional commuters, particularly between two of the potential corridors for high-capacity transit. The percentage is lower in the eastern region of Valley Falls.
- **Central Falls:** Central Falls has a moderate percentage of non-traditional commuters on the municipality's border with Cumberland, but the percentage of this type of worker is generally lower than Cumberland. However, there is an area in the northeastern region of the municipality where the percentage of non-traditional commuters is high.
- **Pawtucket:** Pawtucket has a low percentage of off-peak commuters overall, with a higher percentage on the town's border with Providence, just west of the Seekonk River.
- **Providence:** Providence has the highest percentage of non-traditional workers compared with all the other municipalities in the study area. Neighborhoods within Providence where there is a high percentage of this population include South Providence, Downtown, and Washington Park.
- **Cranston:** The percentage of off-peak commuters in Cranston is low overall.
- **Warwick:** The percentage of non-traditional workers in Warwick is especially low around CCRI, although just north of the campus, the percentage of these workers is particularly high.

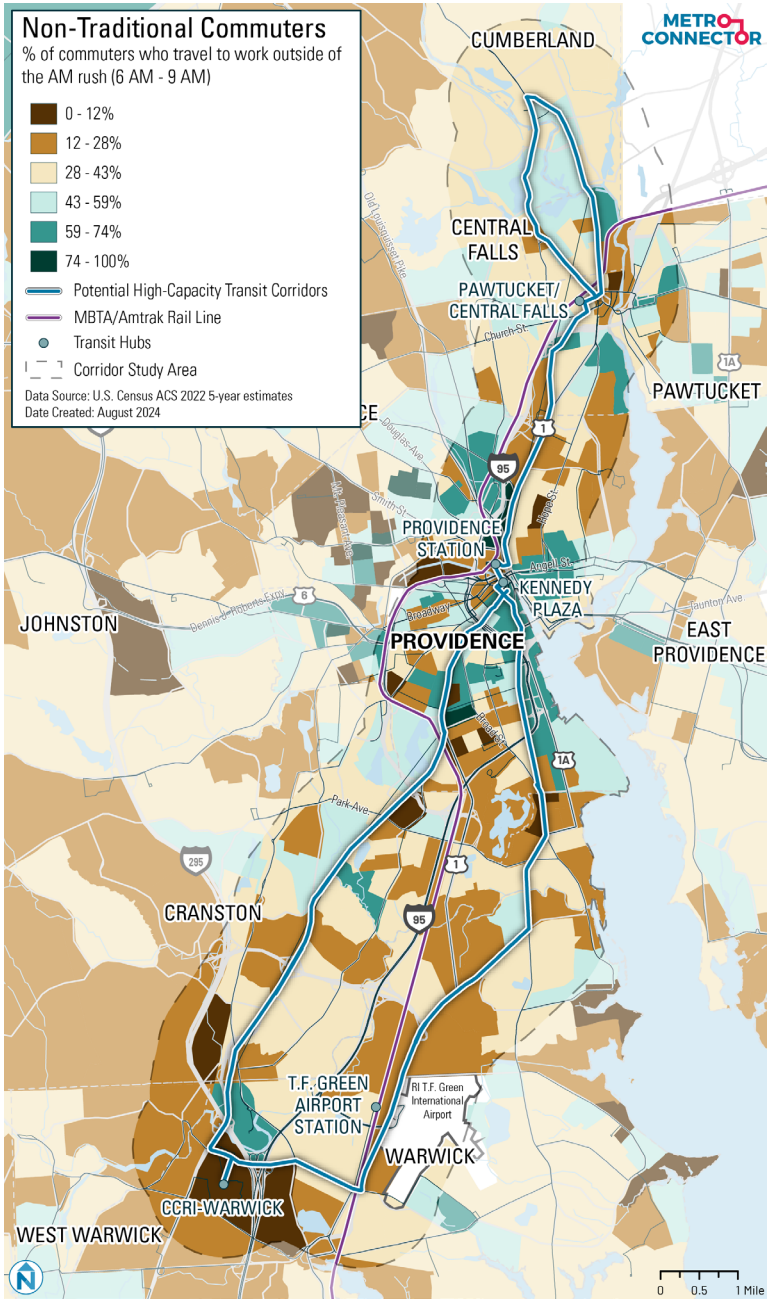


Figure 6-17 Non-Traditional Commuters

Land-Use Mix

Although population and employment density are excellent indicators of transit demand, land-use mix is also a critical indicator. A mix of land use in one place can produce even more demand than any one type of land use alone. Places where people are working, living, shopping, going to appointments, or recreating typically see steady activity levels throughout the day, evening, and on weekends, whereas places with solely employment or residential density have shorter, more defined windows of high travel demand.

Land use is the most mixed in Downtown Providence, and relatively less mixed throughout the rest of the study area, although some municipalities have regions where uses are mixed.

- **Cumberland:** Both population and employment density are very low in Cumberland, making land use mix in the municipality low overall and the town itself less supportive of transit than other parts of the study area.
- **Central Falls:** Residential density is high throughout Central Falls so land use mix is low throughout much of the municipality, but there is an area of mixed use in the middle of the city.
- **Pawtucket:** There are areas of Pawtucket with both high employment density and high residential density, but land use mix is low throughout Pawtucket.
- **Providence:** Land uses are very mixed and highly supportive of transit primarily in Downtown Providence, as well as parts of Elmwood. Areas such as Washington Park and around Providence Station have more employment density, while Federal Hill and South Providence have high residential density, making these areas less supportive of transit.
- **Cranston and Warwick:** Employment density is moderately high in both Cranston and Warwick, but residential density is less so, making the land use mix in both municipalities low overall.

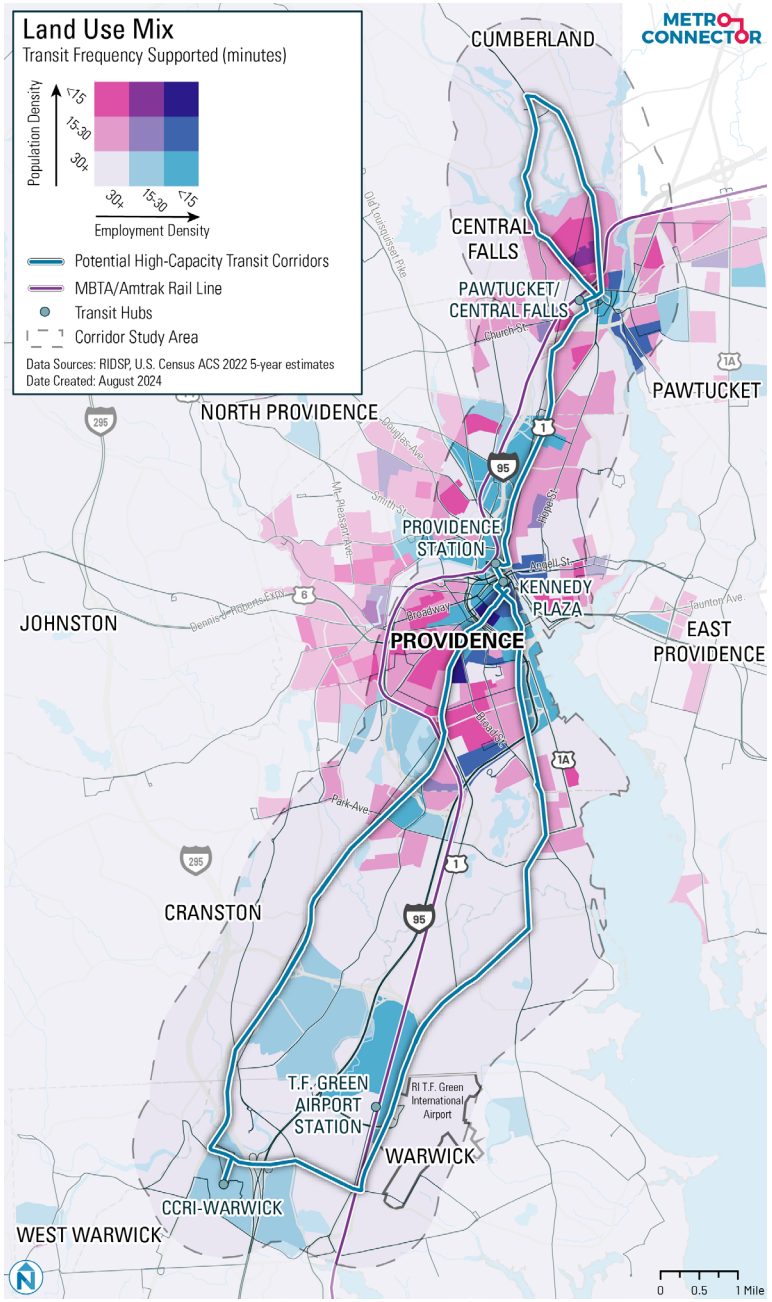


Figure 6-18 Land-Use Mix

Intersection Density

The pedestrian environment is a major consideration for transit usage since most transit riders walk between their origin or destination and their transit stop. A safe, comfortable, walkable environment is more conducive to transit ridership. Intersection density, shown in Figure 6-19, is a good proxy for walkability because a high density of intersections within a grid typically indicates a well-connected pedestrian environment. Factors that affect walkability and transit ridership include, but are not limited to:

- Sidewalks, crosswalks, and lighting
- Proximity to diverse sets of housing, services, offices, and other employment sites
- Transit availability and parking price

Intersection density is highest in Providence, particularly in Downtown Providence and Federal Hill. The Mount Hope and Elmwood neighborhoods in Providence are also moderately walkable, as is Pawtucket south of the Pawtucket/Central Falls commuter rail station. Northwestern Cranston and Central Falls have some walkability but other areas that have poor pedestrian environments and where walkability is limited include much of Warwick and Cumberland.

- **Cumberland:** Valley Falls has the highest walkability in Cumberland, but intersection density throughout the municipality is low overall.
- **Central Falls:** The middle region of Central Falls, between two of the potential corridors for high-capacity transit, has the highest walkability in the municipality.
- **Pawtucket:** Walkability is highest in Pawtucket immediately south of the Pawtucket/Central Falls commuter rail station almost to the town's border with Providence. This is adjacent to the corridors with potential for high-capacity transit.
- **Providence:** Providence has very high walkability in Downtown Providence and Federal Hill, and moderately high walkability in West End and Lower South Providence. College Hill and Mount Hope also have moderate walkability.
- **Cranston:** Parts of West Cranston have moderate walkability, but most of Cranston has low walkability.
- **Warwick:** Most of Warwick has low walkability.

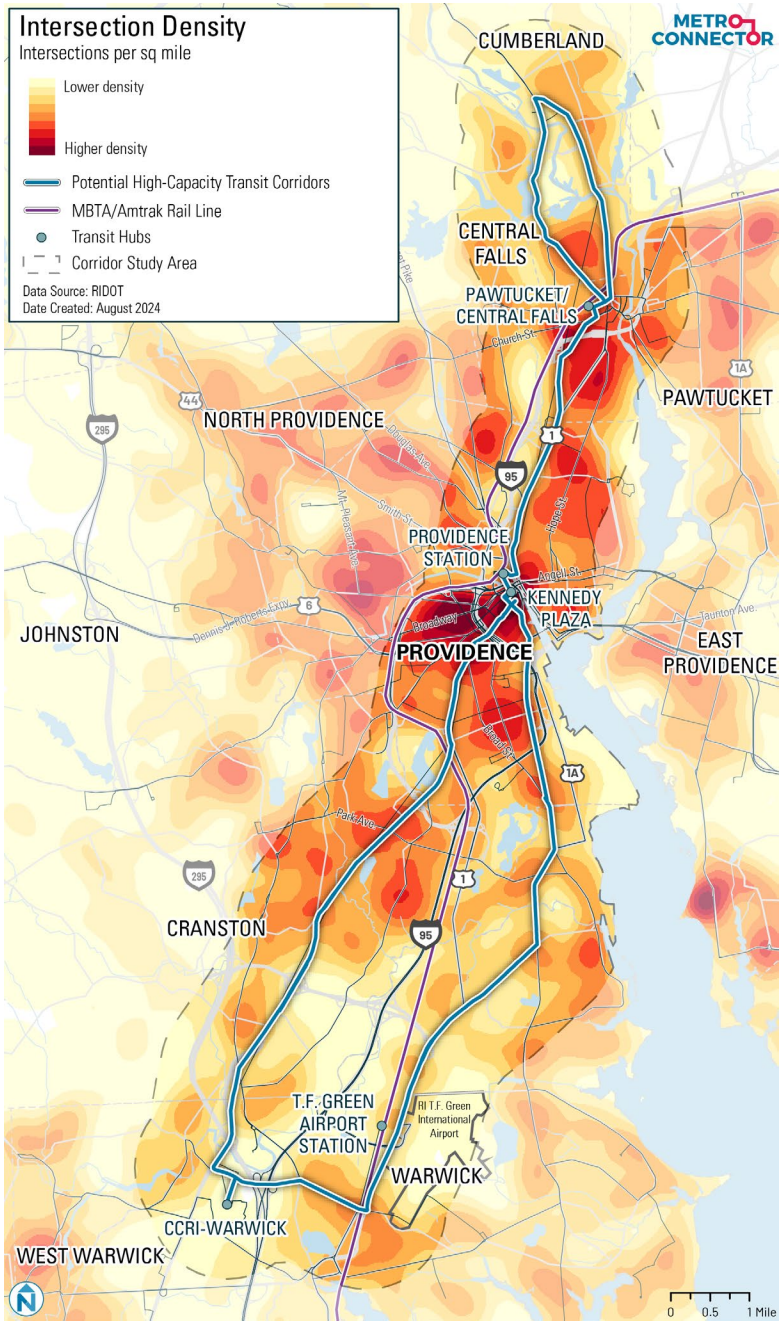
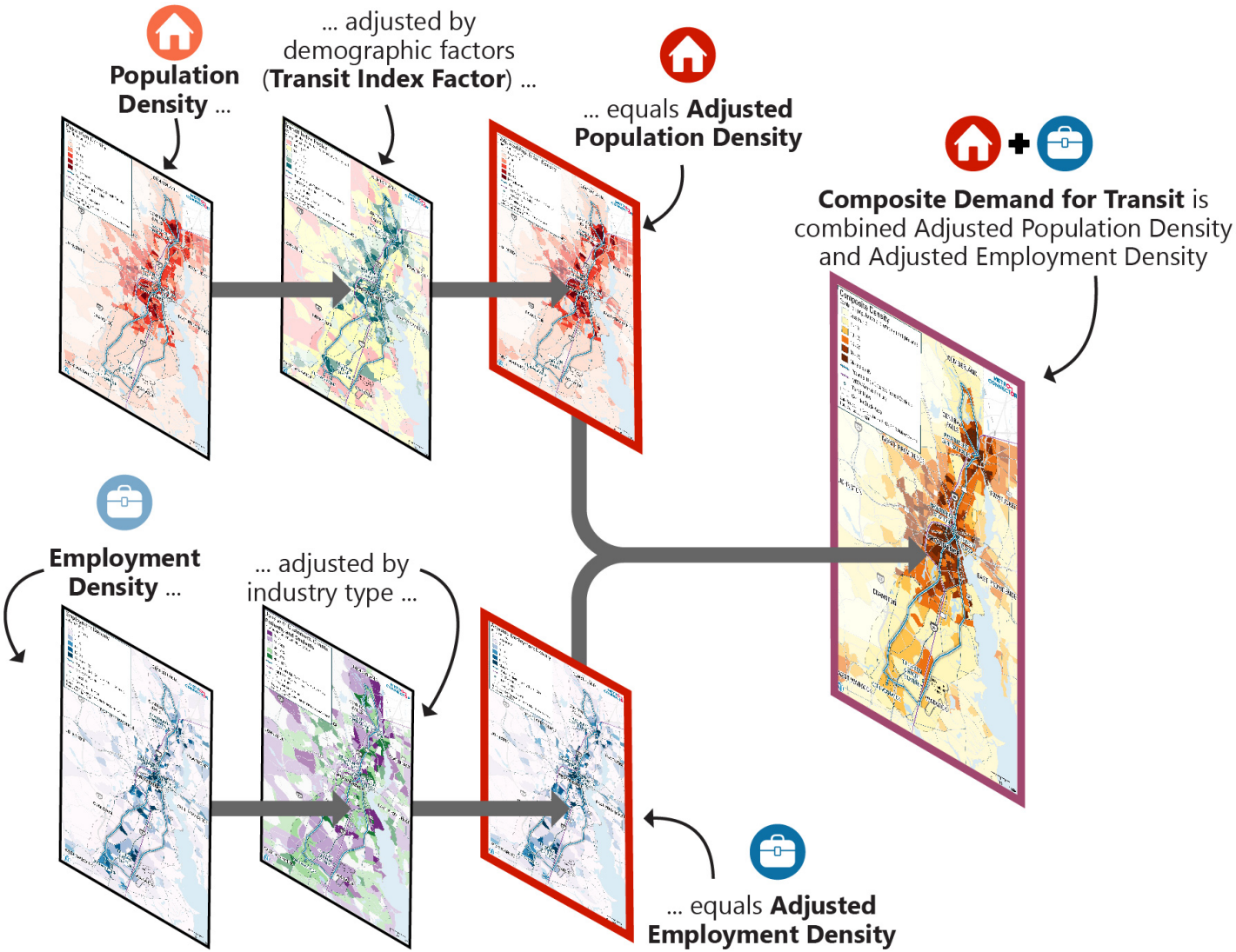


Figure 6-19 Intersection Density

Composite Transit Demand

Composite density is calculated by combining population density adjusted by demographic factors and employment density adjusted by industry type (see customers, clients, patients and students earlier in this document for more information). These four elements account for the vast majority of demand associated with high-capacity transit, and when combined, show how strong that demand is.



Areas shown in orange and darker brown can support higher levels of transit service, while lighter areas can support transit service with lower frequencies. Composite density can broadly indicate demand across contiguous and nearby areas, and demand can accumulate along corridors to produce demand for more frequent service than the densities alone would indicate. Long corridors where most block groups have the density to support 15- to 30-minute service can produce accumulated demand for 15-minute or better service, but areas that do not have at least 10 residents or 5 jobs per acre, or a combination of the two, do not provide an environment where fixed-route transit can succeed easily, and are not appropriate for high-capacity transit.

Places in the study area that can support high levels of transit service include most of Providence, especially Downtown and south, as well as Central Falls and Pawtucket, particularly around the Pawtucket/Central Falls commuter rail station. Demand cumulates along the length of the corridor from Central Falls to the Providence-Cranston border.

- **Cumberland:** The northern region of Valley Falls within the study area has moderate demand and slightly lower demand near the town's border with Central Falls, but demand throughout the rest of Cumberland is low.
- **Central Falls:** Transit demand is high throughout Central Falls, especially between the two corridors with potential for high-capacity transit.
- **Pawtucket:** Transit demand is highest in Pawtucket around the Pawtucket/Central Falls commuter rail station, with some areas of high demand just east of the Seekonk River.
- **Providence:** Transit demand is high throughout Providence, especially in Downtown Providence, Upper and Lower South Providence, and Federal Hill.
- **Cranston:** Transit demand is highest in Cranston at the municipality's border with Providence, and demand drops off to the south.
- **Warwick:** Transit demand is also relatively low in Warwick overall and is highest around the airport.

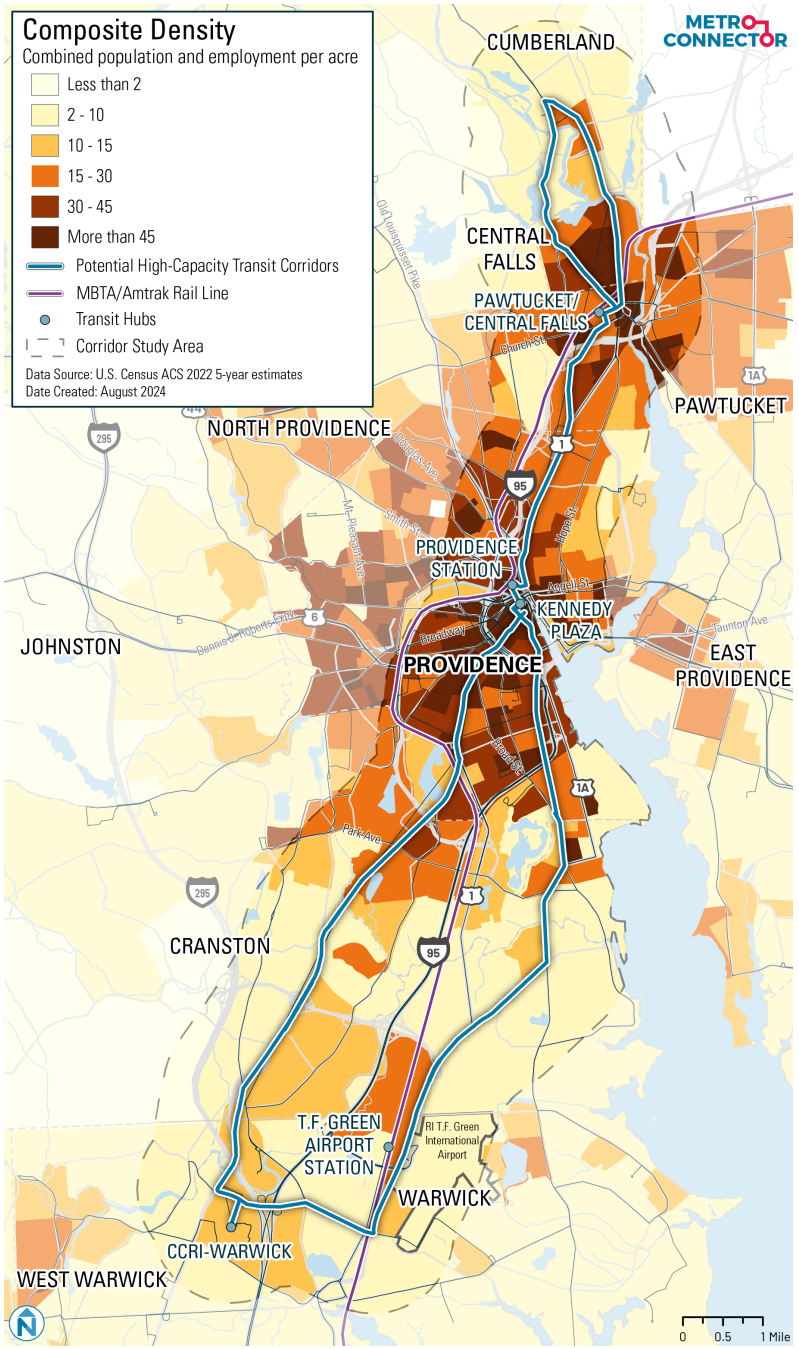


Figure 6-20 Composite Density

Travel Times and Travel Flows

For transit to be effective, it must take people from where they are to where they want to go at the time they want to go. Examining existing travel flows is one way to estimate where the highest demand for travel is, and where direct or relatively easy connections should be made. Travel flows are typically defined as the number of trips between two areas. The more trips made between two areas, the higher travel demand is.

Travel flows within the study area were mapped based on all trips taken between travel flow analysis zones, which are defined by municipal and neighborhood boundaries. The flows with the largest number of average daily trips are highlighted and include all types of trips made by all modes, as well as only those trips made on transit.

Travel Time Markets

Figure 6-21 shows the start time of trips originating in the study area in the years 2019 and 2023. While trip making did decrease significantly during the beginning of the pandemic, by 2023, overall trip making exceeded that of 2019 during many hours of the day, all after 3:00pm. While the traditional morning and afternoon peak periods still occurred in 2023, the percentage of trips happening during the peak periods was lower, and a greater number extending into the evening. This shows the strong demand for frequent, all-day service, well into the evening throughout the study area.

Figure 6-22 compares the start time of trips originating in the study area between a Thursday and a Saturday in 2023. There are many hours of the day where Saturday has a higher number of trips than Thursday. Saturday also has very consistent trip making throughout the day between 10:00am and 7:00pm. This indicates that travel demand on Saturday rivals that of weekday travel, and that rapid transit service should have frequent all-day service on weekends as well as weekdays.

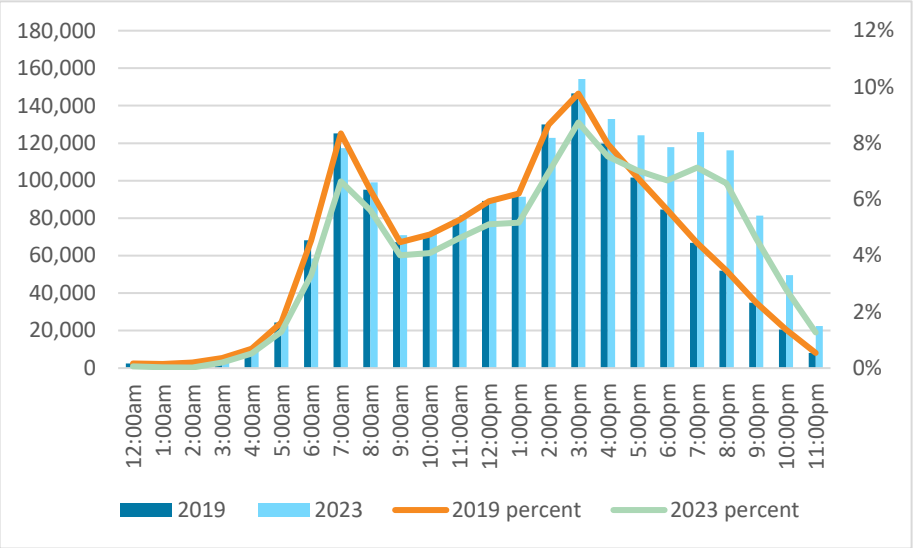


Figure 6-21 Trips Originating in Study Area (Thursdays)

Source: Replica

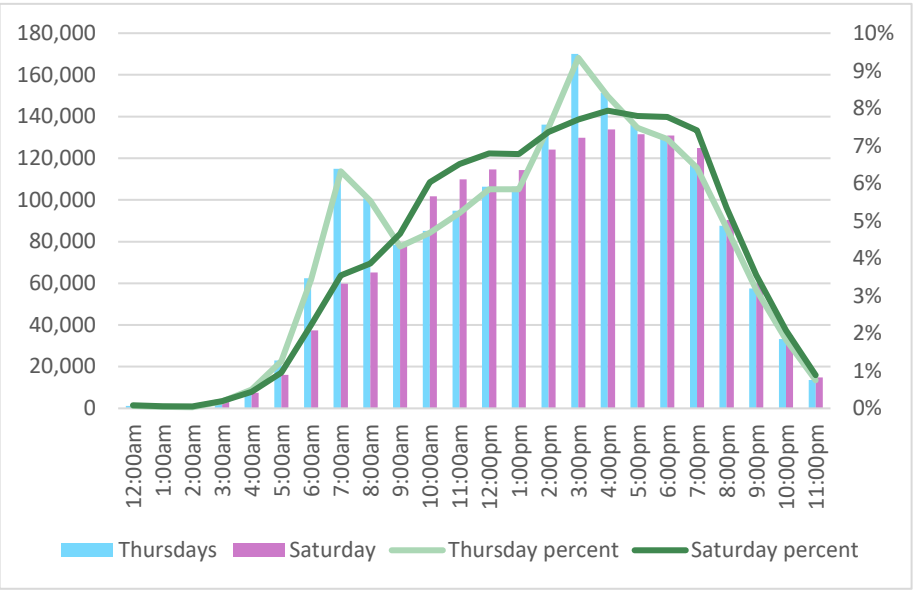


Figure 6-22 Trips Originating in Study Area (2023)

Source: Replica

Weekday All Travel Flows

Figure 6-23 displays travel flows within the study area and shows all types of trips made by all modes, including transit and automobile trips. The biggest flows originate in Pawtucket, Providence, and Cranston. In general, more trips start and end in areas with higher composite demand because there are more origins and destinations in these areas that attract trip making.

- The strongest travel flows in the study area are north-south from Cranston up to Pawtucket. The strongest travel flows that have more than 15,000 trips between the two geographies include:
  - Cranston-Southeast and Cranston-Northeast
  - Cranston-Northeast and Elmwood/West End
  - Elmwood/West End and Charles/Mount Hope/College Hill
  - Downtown Providence and Charles/Mount Hope/College Hill
  - Charles/Mount Hope/College Hill and Pawtucket-West
- Other strong flows that have between 10,000 and 15,000 trips between them include:
  - Warwick-West and Warwick-TF Green
  - Cranston-Northeast and South Elmwood/Washington Park/Edgewood
  - South Elmwood/Washington Park/Edgewood and Elmwood/West End
  - Elmwood/West End and Downtown Providence
  - Pawtucket-West and Central Falls

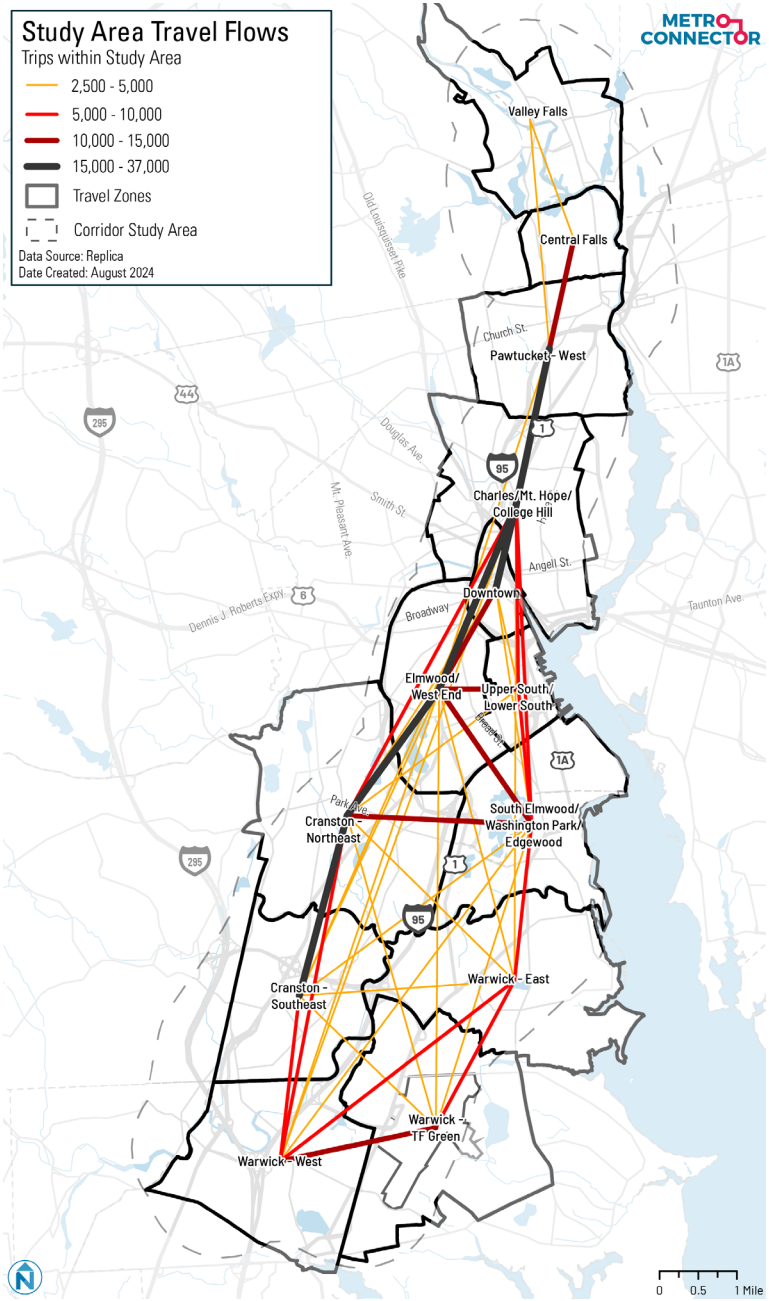


Figure 6-23 All Travel Flows

Weekday Transit Travel Flows

Figure 6-24 shows travel flows within the study area, displaying trips made by transit, including both RIPTA, Amtrak, and MBTA Commuter Rail trips. The RIPTA network is oriented radially around Downtown Providence and as a result, many transit trips within the study area are made to and from this neighborhood. However, there is also a high number of weekday transit trips between Providence and Pawtucket, as well as Pawtucket and Central Falls.

- The strongest transit travel flows in the study area are north-south primarily from neighborhoods in Providence to municipalities in the north, with some east-west flows within Pawtucket. The strongest transit travel flows that have more than 200 trips between the two places include:
  - South Elmwood/Washington Park/Edgewood and Elmwood/West End
  - Elmwood/West End and Downtown Providence
  - Elmwood/West End and Charles/Mount Hope/College Hill
  - Elmwood/West End and Pawtucket-West
  - Charles/Mount Hope/College Hill and Pawtucket-West
  - Pawtucket-West and Central Falls
- Other strong flows that have between 100 and 200 trips between them include:
  - Warwick-TF Green and Elmwood/West End
  - Cranston-Northeast and Elmwood/West End
  - Cranston-Northeast and Downtown Providence
  - South Elmwood/Washington Park/Edgewood and Downtown Providence

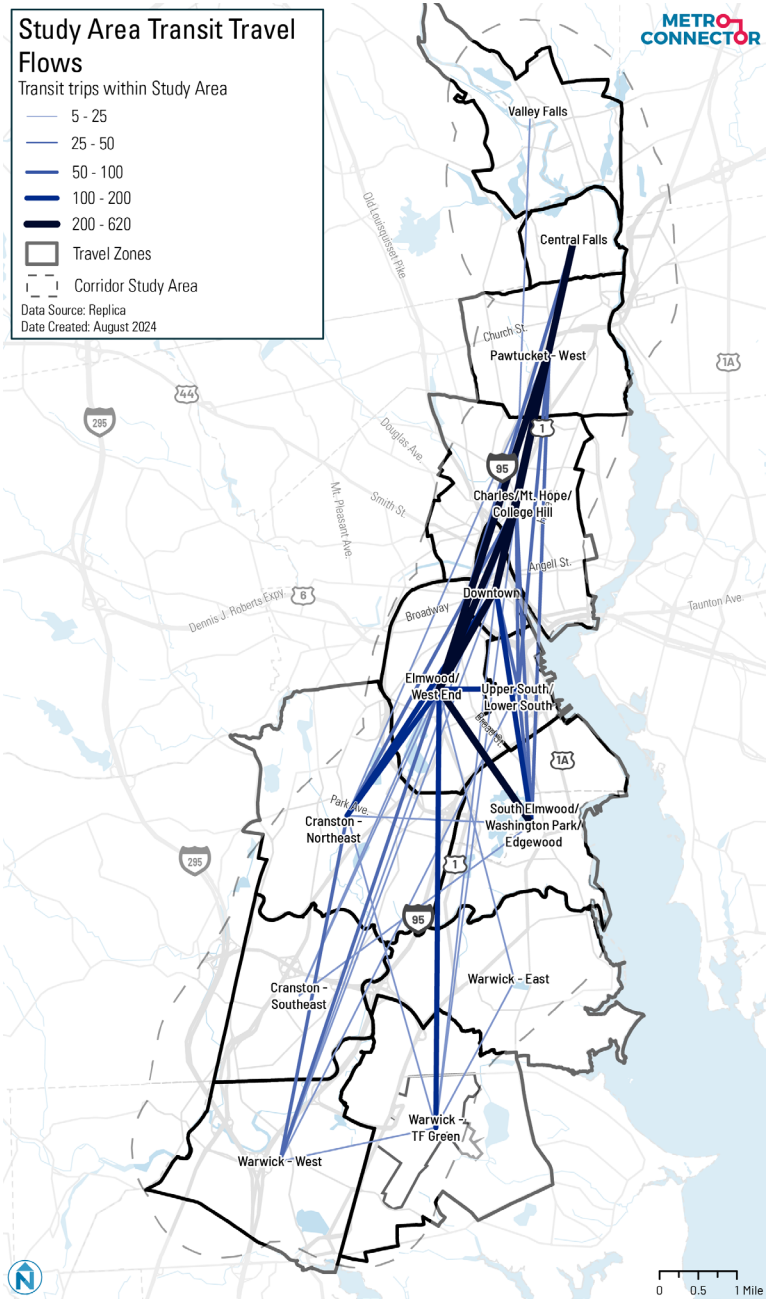


Figure 6-24 Weekday Transit Travel Flows

Equity Travel Flows

Large travel flows between places with high percentages of transit-dependent residents are particularly important to serve with transit. Figure 6-25 shows large travel flows with high percentages of trips made by those in zero-vehicle and low-income households, as well as people of color. The flows have high concentrations of one, two or all of these transit dependent groups.

Most equity travel flows are trips that begin and end in Providence, Pawtucket, and Central Falls, which all have higher proportions of equity populations. These flows are generally between neighboring zones, demonstrating that most travel made by equity groups are local trips within their community to access jobs, services, and social activities.

- The travel flows with higher proportions of equity groups (3 equity groups) are taken between the following areas:
  - Warwick-West and Elmwood/West End
  - Upper South/Lower South Providence and Charles/Mount Hope/College Hill

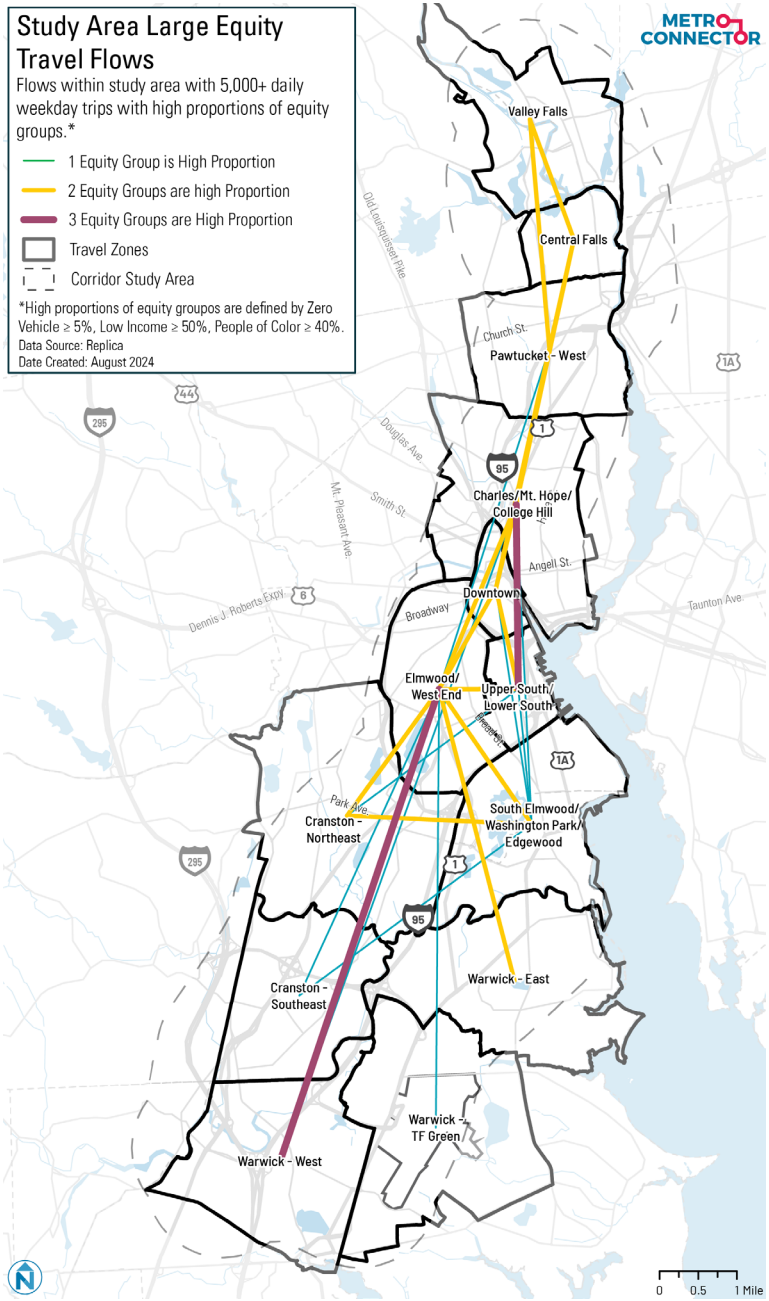


Figure 6-25 Equity Travel Flows

Summary and Opportunities

Rhode Island has transit demand that justifies higher levels of transit service. High-capacity transit would meet the demand for transit in Providence, Central Falls, and throughout the corridor.

- **The population demand is high along the central portions of the study area's key corridors.** Areas that border the study area corridors with lower population density compensate for this with higher employment density or travel activity, such as CCRI-Warwick and T.F. Green International Airport Station.
- **Most of the low-income households in the region are within the study area boundaries.** Some low-income households fall outside the study area boundaries, but other RIPTA services could provide those residents with transit options that could connect them to the high-capacity transit locations.
- **Areas with the highest concentration of non-white residents are located in Downtown Providence and Central Falls.** The potential high-capacity transit corridors would greatly benefit these residents, as the corridors go directly through the high-concentration areas.
- **Zero-vehicle households are most concentrated in downtown Providence, Central Falls and along the northern part of the corridor between the two areas.** Households without access to vehicles are more likely to ride transit, so high-capacity transit corridors are likely to be utilized by these residents.
- **Transit propensity, which is the likelihood to ride transit as compared to the total population, is highest in Downtown Providence, Central Falls, and the area north of Providence Station between Central Falls.** Running high-capacity corridors throughout these areas will provide the residents that are most likely to ride transit with a high-capacity transit option.
- **Travel Flows are strong along the potential high-capacity transit corridors.** Some of the strongest travel flows are between key nodes on the high-capacity transit corridors, many of which have one end in Downtown Providence. From Downtown Providence, trips are made between all areas.
- **High-Capacity Transit could provide many residents that rely on transit a frequent, reliable, and fast way to travel between key destinations**, and would create an opportunity to incorporate more crosstown routes that can connect them to/from their final destinations.
- **Travel demand is high all-day and all-week long in Rhode Island.** Although there are some higher travel times during the peak periods in the morning and evening, travel does not significantly dip during the middle of the day or on the weekend, and it remains steady throughout the day. High-capacity transit can run at high frequencies throughout the day, giving travelers a frequent and reliable way to travel throughout the day and week.
- **High-capacity transit can reduce transportation costs for residents**, which is especially important in areas that have higher transportation costs.
- **High-capacity transit can cause non-transit users to shift modes and take transit.** People that do not currently ride transit may be incentivized to ride high-capacity transit due to it being time-competitive, or even faster, than driving, and being a more economical and safer alternative to auto-commuting. High-capacity transit would also have effects on other RIPTA routes, which could improve the frequency and reliability of connecting routes.

7 Environmental Review

This section surveys and summarizes the existing environmental resources within the study area and identifies any related future constraints. The findings of this screening will provide an environmental context to the alternatives for each corridor and will be integrated into the Alternatives Assessment process.

The screening consists of GIS-based analysis of key environmental resources in the study area and uses publicly available data and other mapping resources.

The resources studied include:

- Hazardous materials and brownfields
- Natural and ecological resources, such as threatened and endangered species and critical habitat; wetlands and waterways, water resources, and floodplains
- Historic and cultural properties listed on the National and RI State Registers
- Areas particularly sensitive to noise and vibration, such as schools and hospitals
- Public parks and recreation sites
- Air quality
- Environmental Justice

Hazardous Materials and Brownfields

An analysis of data from the EPA's Cleanups in My Community mapping tool, the RIGIS "known underground storage tank locations" GIS layer, and the Rhode Island Geographic Information System (RIGIS) "leaking underground storage tank" layer indicates that the Study Area contains a variety of known contaminated and hazardous waste sites, including brownfields, superfund sites, and leaking underground storage tanks (see Figure 7-1).[17, 18, 19] These sites are most concentrated in the denser and more developed portions of the study area and are largely correlated to current or former industrial and manufacturing land uses. Many of the contaminated sites within the study area are proximate to sections of the proposed high-capacity transit (HCT) corridors in and around Providence, Central Falls, and Pawtucket.

A future high-capacity transit project may not directly impact any contaminated sites if construction largely occurs within the existing road right-of-way (ROW). Nevertheless, appropriate screenings and other precautionary measures should be pursued according to state and local requirements prior to and during construction, especially if there are known contaminated sites near specific corridor segments.

[17] EPA - Cleanups in My Community

[18] Underground Storage Tank Locations (2018) | Underground Storage Tank Locations (2018) | RIGIS

[19] Leaking Underground Storage Tanks | Leaking Underground Storage Tanks | RIGIS

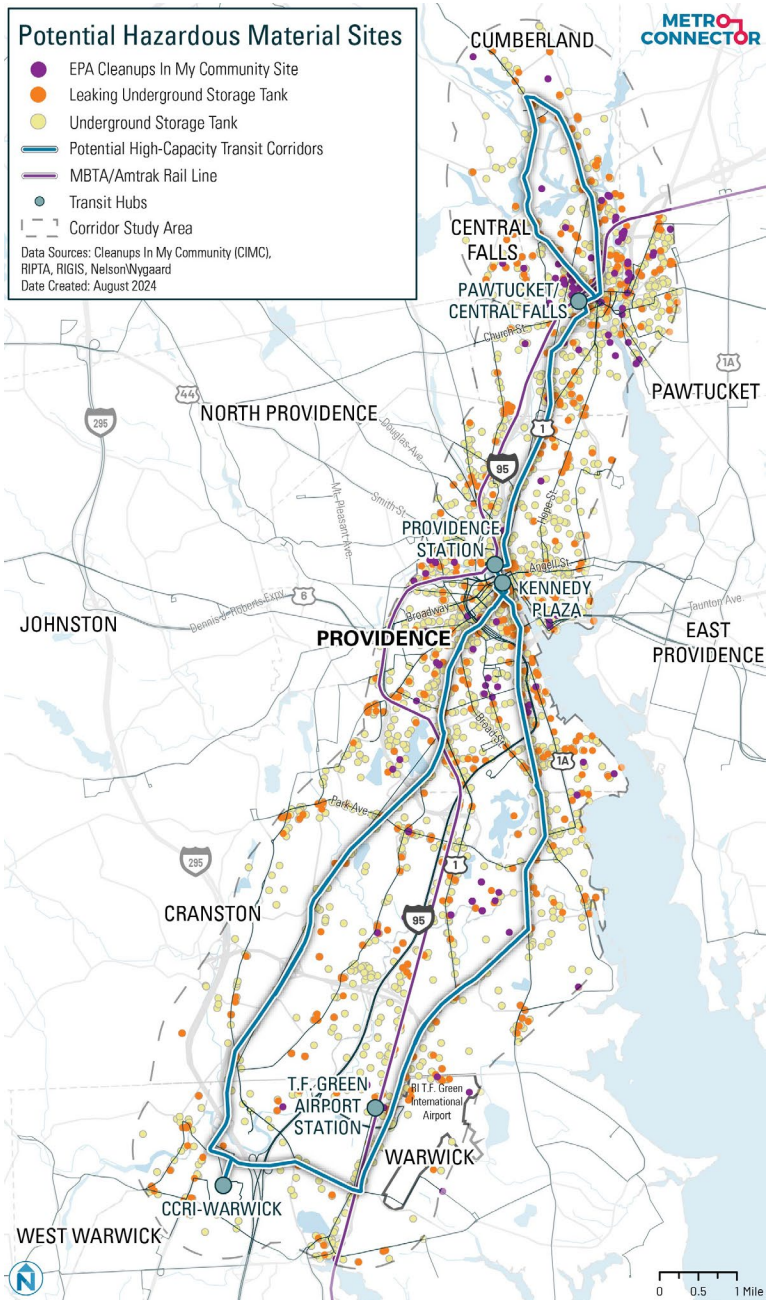


Figure 7-1 Potential Hazardous Materials Sites

Natural and Ecological Resources

Threatened and Endangered Species

Section 7 of the Endangered Species Act protects wildlife and plant species listed as endangered or threatened by the U.S. Fish and Wildlife Service (USFWS). This section provides preliminary information on protected species with the potential to occur within the study area. Prior to construction, additional investigation and/or consultation with the USFWS would be required to confirm their likely absence within the limits of disturbance along any potential HCT corridor.

The USFWS Information, Planning, and Conservation (IPaC) online system was used to conduct a records search for the presence of threatened or endangered species and designated critical habitat within the study area.[20] The RIGIS "Natural Heritage Area **(**Figure 7-7**)**" GIS layer was also consulted to determine the presence of state listed species. The USFWS identified four threatened, endangered, proposed endangered, or candidate fish and wildlife species with the potential to occur within the planning area as shown in Table 7-1. No designated critical habitat was identified.

Mammals

The study area has been identified by the USFWS to potentially contain habitat for the endangered Northern Long-eared Bat and the proposed endangered Tricolored Bat.[21] However, the study area is large and contains many different land use typologies. The areas immediately adjacent to the current proposed HCT corridors do not feature much suitable habitat for these species, as there is minimal tree coverage within the existing road ROW. However, further screening and analysis may be necessary to determine habitat potential prior to construction.

Birds

The study area has been identified by the USFWS to potentially contain habitat for the endangered Roseate Tern. The Roseate Tern is a shore bird, with habitats primarily featuring islands, sandy beaches, open bare ground, and grassy areas. Most of the study area is not likely to serve as a habitat for this species due to its distance from the coastline and lack of preferred habitat features.

Table 7-1 Federally Listed fish and Wildlife Species with Potential to Occur in the Study Area

Species	Listing Status	Habitat	Potential to Occur in Study Area
Tricolored Bat (Perimyotis subflavis)	Proposed Endangered	Found in forested habitats where they roost in trees, primarily among leaves of live or recently dead deciduous hardwood trees, but may also be found in Spanish moss, pine trees, and occasionally human structures.	Potential to occur within study area but would likely only be found in trees or similar habitat and not within existing developed areas or the road ROW.
Northern Long-eared Bat (Myotis Septentrionalis)	Endangered	Found in caves, mines, and in cavities or under bark within dead or live trees. May also be found in structures such as barns or sheds.	Potential to occur within study area but would likely not be found within existing developed areas or the road ROW.
Roseate Tern (Sterna dougallii dougallii)	Endangered	Found along seacoasts, on bay and estuaries. Nests on islands on sandy beaches, open bare ground, and grassy areas.	Unlikely to occur within the majority of the study area except for coastal portions.
Monarch Butterfly	Candidate	During migration monarchs may be found anywhere there are flowering plants, but they lay eggs on a variety of Milkweed (Asclepias spp.) in both upland and lowlands. Can often be found along woodland edges where milkweeds are prevalent.	Potential to occur within study area but would likely only be found near milkweed.

[20] IPaC: Home (fws.gov)

[21] Note: The Tri Color Bat is slated to be listed as endangered

Insects

The USFWS has identified potential habitat for the Monarch Butterfly within the study area. There may be Monarch butterflies found along the proposed HCT corridors, specifically in conjunction with the presence of milkweed plants. Further screening and analysis may be necessary to determine habitat potential prior to construction.

Wetlands and Waterbodies

An analysis of mapped state designated wetlands, USFWS National Wetland Inventory (NWI) wetlands, and various RIGIS hydrological layers, indicates that the study area contains a variety of wetlands, streams, rivers, ponds, lakes, and other waterbodies (see Figure 7-2 and Figure 7-3). Many of these wetlands and waterbodies are proximate to the proposed HCT corridors, while some are located underneath existing roadways that make up segments of the corridors.[22, 23, 24, 25]

This section provides preliminary information on wetlands and waterbodies with the potential to occur within the study area. Prior to construction, additional investigation and/official surveys likely would be required to confirm their presence along any potential HCT corridor.

All currently proposed HCT corridors are composed of existing and paved roadways that would limit the potential for wetland impacts unless major widening or other large-scale construction occurs. However, wetland protection measures that comply with state and federal guidelines should be followed during any construction activities. Additionally, permitting may be needed for any work done within the regulatory buffer areas surrounding wetlands or waterbodies within the study area.[26]

---

[22] Wetlands (1993) | Wetlands (1993) | RIGIS

[23] National Wetlands Inventory (usgs.gov)

[24] Freshwater Rivers and Streams (1:5,000) | Freshwater Rivers and Streams (1:5,000) | RIGIS

[25] Lakes and Ponds (24K) | Lakes and Ponds (24K) | RIGIS

[26] 250-RICR-150-15-3 (Rhode Island Code of Regulations)

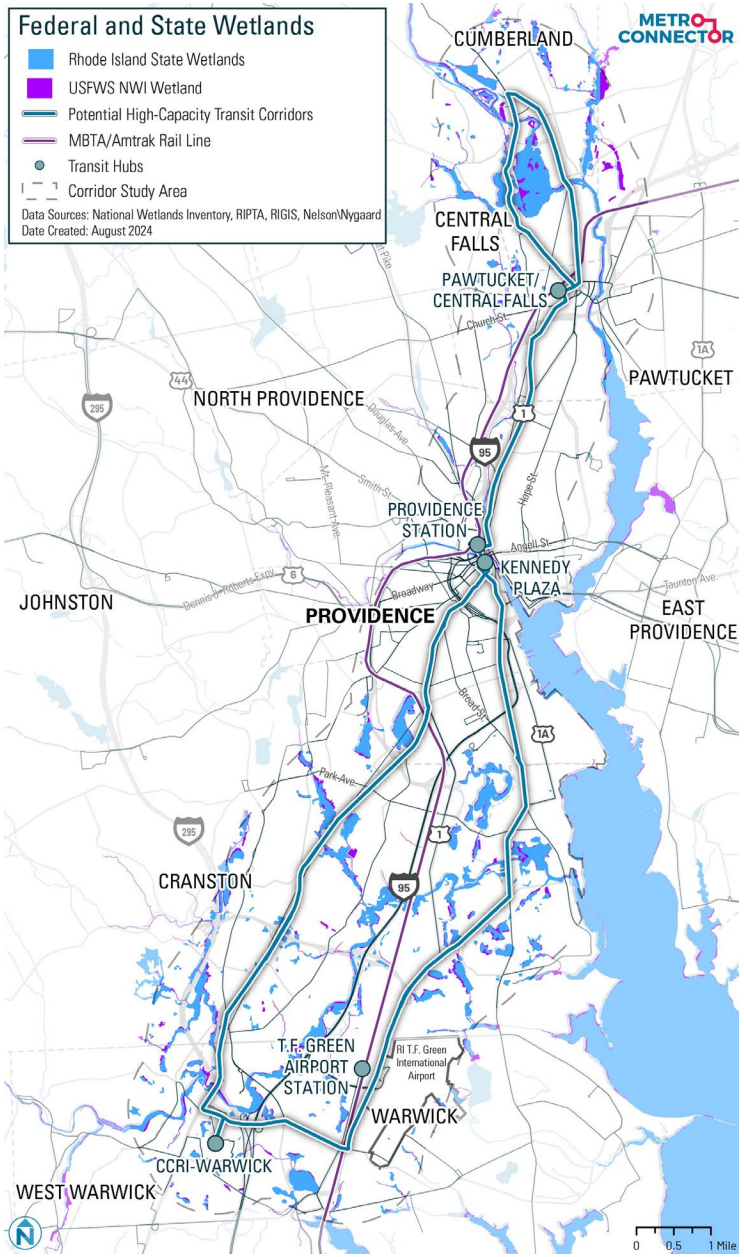


Figure 7-2 Federal and State Wetlands

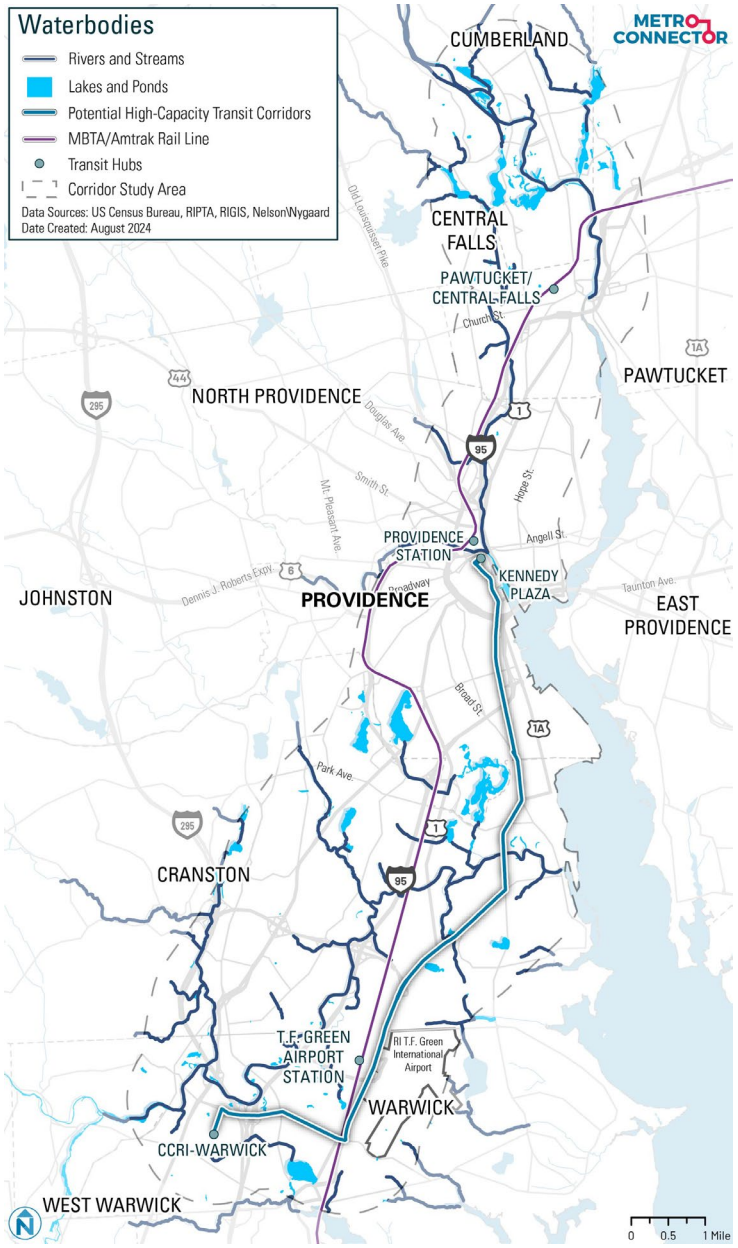


Figure 7-3 Waterbodies

Floodplains

An analysis of mapped FEMA floodplains from the National Flood Hazard Layer (NFHL) indicates that study area contains FEMA 100-year floodplains (see Figure 7-4), which require certain state and federal regulatory protections during a project's construction and other related activities.[27] The presence of floodplains correlates to the locations of streams, rivers and other waterbodies throughout the study area. The portions of the proposed HCT corridors within these floodplains are largely located in Warwick to the south and in Cumberland to the north.

All proposed HCT corridors comprise existing and paved roadways that would require minimal impervious coverage increases unless additional widening or major construction occurs. Unless widening occurs, the potential for increased stormwater runoff and related floodplain impacts may be fairly limited. However, floodplain protection measures that comply with state and federal guidelines should be followed during any construction-related activities. Additionally, permitting may be needed for any work done within the regulatory buffer areas surrounding floodplains within the study area.[28]

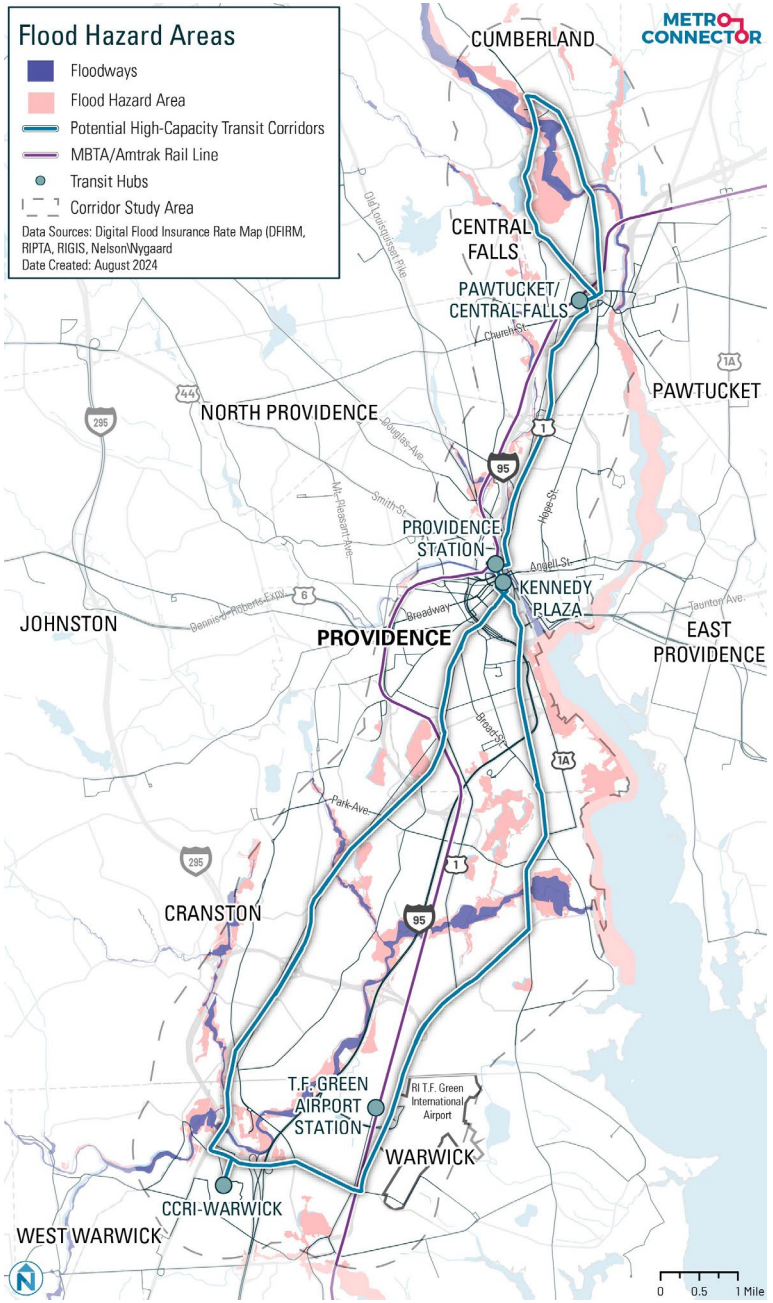


Figure 7-4 Flood Hazard Areas

[27] Flood Data Viewers and Geospatial Data | FEMA.gov

[28] 250-RICR-150-15-3 (Rhode Island Code of Regulations)

Historic and Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) and the Rhode Island Historic Preservation Act (RIHPA) require consideration of impacts to historic and archaeological resources. Additionally, the United States Department of Transportation (U.S. DOT) Act of 1966 requires further consideration of historic sites during the development of transportation related projects under Section 4(f).

An analysis of state historic resource GIS layers and federal National Register of Historic Places (NRHP) GIS layers indicates that there are a wide variety of historic resources present throughout the study area.[29, 30, 31, 32] Additionally, buildings within the study area that are older than 50 years of age (at the time of construction) may be eligible for listing on the NRHP, and would need to be assessed for their potential eligibility prior to a project's implementation.[33]

The highest concentration of these resources occurs within the denser and central portions of Providence and Pawtucket, which feature multiple state and federally listed historic buildings and districts. There are also state listed historic cemeteries dotted throughout the study area, with some located on properties adjacent to sections of the proposed HCT corridors.

Although unlikely, potential temporary impacts to these resources include vibration and visual disturbances. The development of HCT in place of auto-oriented traffic may even reduce the overall level of vibration generated along the corridors. Implementation of a HCT project would likely require additional work such as a cultural resources survey and consultation with the Rhode Island Historical Preservation and Heritage Commission (RIHPHC).

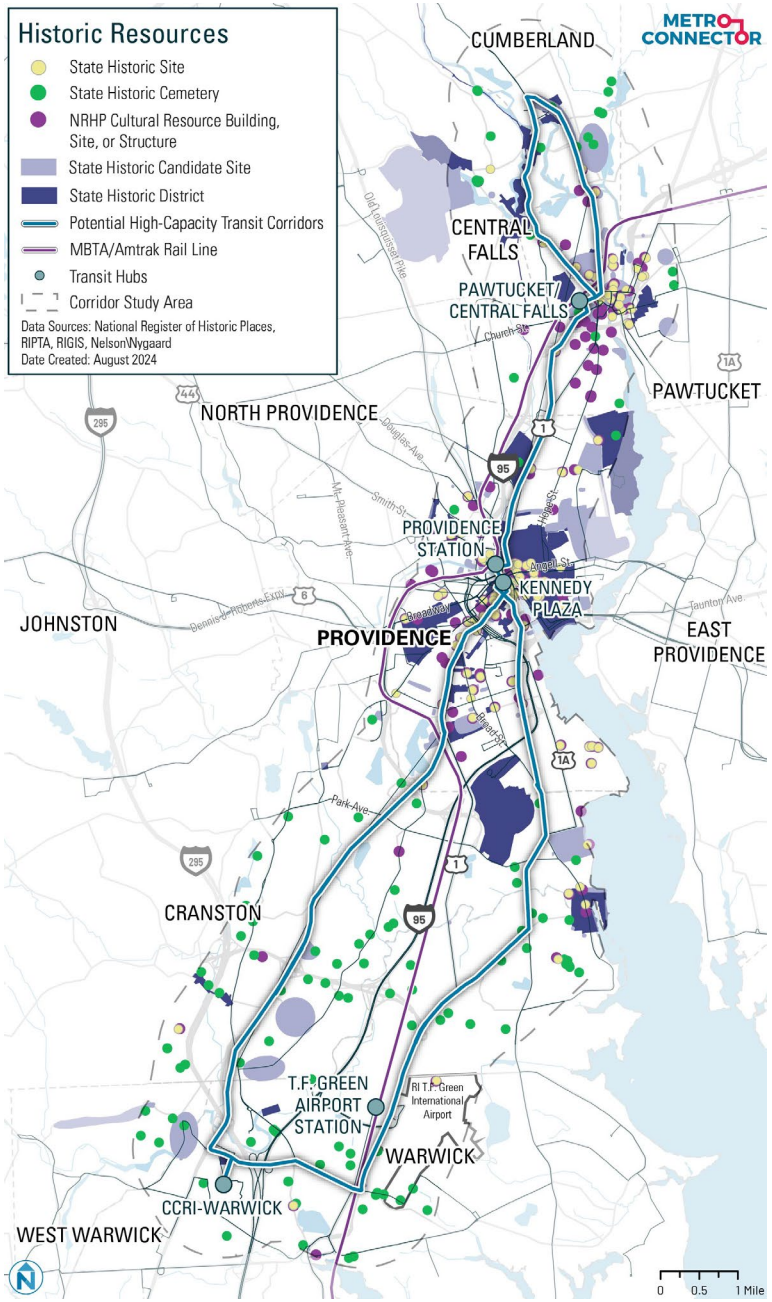


Figure 7-5 Historic Resources

[29] Historic Candidate Sites | Historic Candidate Sites | RIGIS (arcgis.com)

[30] Historic Sites | Historic Sites | RIGIS (arcgis.com)

[31] Historic Districts | Historic Districts | RIGIS (arcgis.com)

[32] DataStore - National Register of Historic Places (nps.gov)

[33] FAQs - National Register of Historic Places (U.S. National Park Service) (nps.gov)

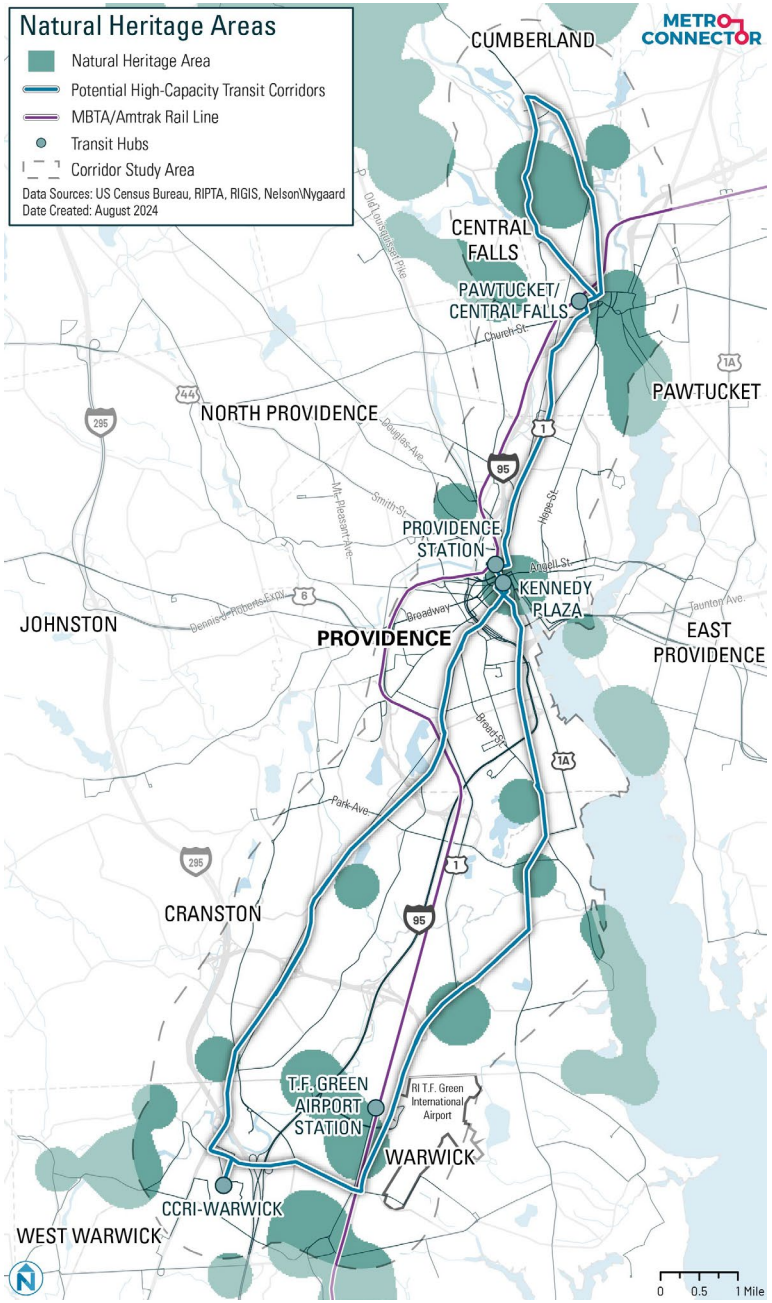


Figure 7-6 Natural Heritage Areas

Parks, Recreation Sites, and Conserved Lands

Section 4(f) of the U.S. DOT Act of 1966 protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. An analysis of various RIGIS GIS layers including bike paths, major parks and open space, hiking trails, and local and state conservation lands indicates that there are multiple bicycle paths that are intersected by some of the proposed HCT corridors, most notably, the Blackstone River Bikeway located at the northern end of the study area. There are also various parks and other state and locally designated conservation lands that are located immediately adjacent to segments of the proposed HCT corridors (see Figure 7-7).

High-capacity transit may result in the disruption of bicycle traffic along designated separated bike paths by HCT service along the proposed corridor. Measures should be taken to ensure uninterrupted bicyclist traffic flow during and after project implementation. A HCT project may also require minimal use of existing park property and conservation lands along the proposed HCT corridors. Although major impacts are unlikely, permitting, mitigation efforts, and other regulatory actions may be required in some areas.

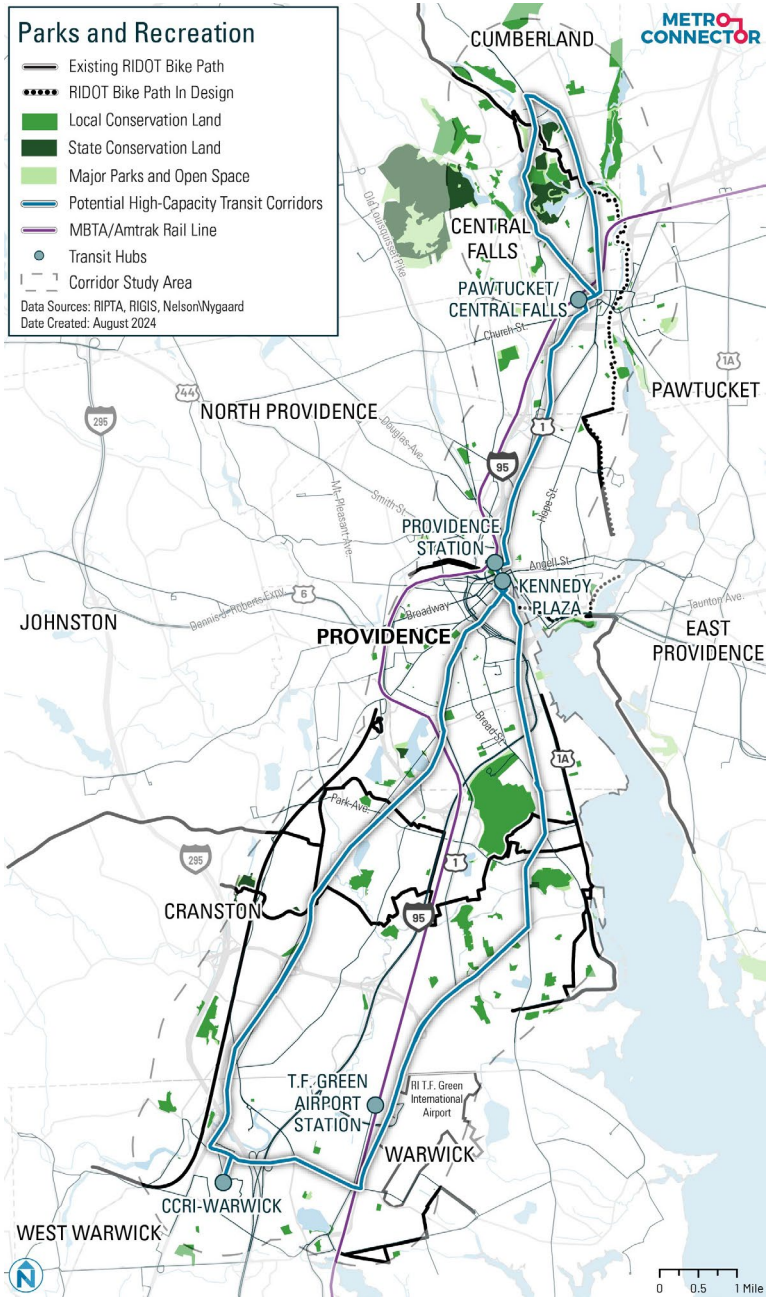


Figure 7-7 Parks and Recreation

Air Quality

The Federal Clean Air Act (CAA) requires the United States Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standards (NAAQS) for six commonly found pollutants, otherwise known as criteria air pollutants. These criteria pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO2), ozone (O3), sulfur dioxide (SOx), and particulate matter pollution with a diameter of 10 microns or less (PM10), and 2.5 microns or less (PM2.5).

In accordance with the CAA and based on air quality monitoring, all areas within the study area are currently designated as in attainment for all criteria pollutants. A future high-capacity transit project likely would lower air emissions and improve local air quality by decreasing the number of vehicle miles travelled (VMT) from single occupancy vehicles within the study area. It should be noted that electric vehicles still pose an asthma risk due to particulate emissions from tires and brakes. Short-term construction emissions would likely be negligible and would not exceed the NAAQS. An emissions analysis would be required to confirm that the construction emissions are minimal.

Asthma

According to the 2021-2024 Rhode Island Asthma Strategic Plan, there are significant racial/ethnic and socioeconomic disparities in pediatric asthma outcomes throughout the state.[34] The Plan identifies Providence, Pawtucket, Central Falls, and Woonsocket as the four "core cities" that, when combined, contain the majority of children living in poverty in the state. The study area includes three of the four aforementioned cities, with Woonsocket as the only city outside of the buffer. Currently, childhood asthma rates are higher in these cities than the state average. Emergency department (ED) visits for asthma related health concerns are also higher in the core cities, with rates at 11.1 per 1,000 children as opposed to 6.2 per 1,000 children statewide.[35] The majority of childhood asthma related ED visits were minority with 67% minority and 26% white, respectively.[36]

While unlikely to meet its 2025 deadline, a HCT project would be in line with Objective 4.2 listed in the Rhode Island Asthma Strategic Plan to "Improve transportation infrastructure and reduce traffic congestion in and around low income and communities of color by 2025."[37] The transportation infrastructure improvements resulting from a HCT project likely would reduce the overall VMT in the communities within and surrounding the study area by increasing transit ridership. This reduction in VMT likely would lead to air quality improvements and improved asthma rates and outcomes.

[34] 2021-2024 Rhode Island Department of Health Asthma Strategic Plan (ri.gov)

[35] 2021-2024 Rhode Island Department of Health Asthma Strategic Plan (ri.gov)

[36] 2021-2024 Rhode Island Department of Health Asthma Strategic Plan (ri.gov)

[37] 2021-2024 Rhode Island Department of Health Asthma Strategic Plan (ri.gov)(pg.36)

Environmental Justice and Public Health

Environmental Justice (EJ) is defined as the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, policies, and activities and with respect to the distribution of environmental benefits. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, or local programs and policies or receive an inequitably low share of resources and environmental benefits.

Presence of Environmental Justice Populations

Pursuant to federal regulations, and for the purposes of this project, EJ communities are defined as census tracts where the percentage of the population is greater than 50% minority and/or where the proportion of individuals living below 200% of the poverty line exceeds the state average of 25.16%.

According to data pulled from the 2017-2021 American Community Survey (ACS) 5-year Estimates, the study area exhibits significant disparities in the level of poverty as compared to the state. The study area presents a higher level of poverty relative to its size, with approximately 33% of residents falling into this category (seeTable 7-2).

Table 7-2 Poverty Status of Population

Rhode Island			Study Area			
Total Population	Population Living Below 200% of the Poverty Line	Percent of Rhode Island Population Living Below 200% of the Poverty Line	Total Population	Population Living Below 200% of the Poverty Line	Number of residents living in Census Tracts where total percent of residents living below 200% of the poverty line is greater than 25.16%	Percent of Study Area Population Living Below 200% of the Poverty Line
1,050,314	264,326	25.16%	375,891	125,269	107,348	33.32%

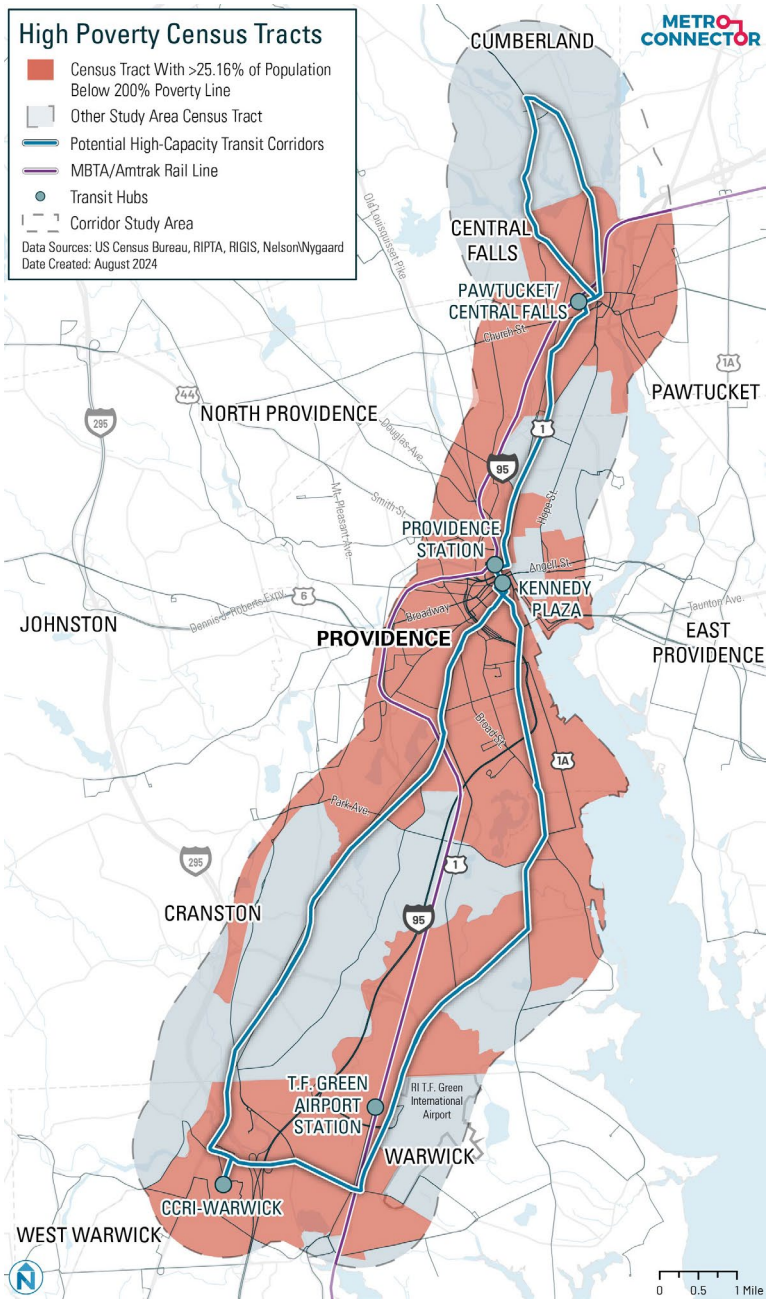


Figure 7-8 Areas with High Rates of Poverty

Demographic data also reveals a significant contrast in minority status between the state and the study area. Approximately 29% of Rhode Island residents have minority status, compared to 48% of residents in the study area (see Table 7-3).

Overall, approximately 67% (66 out of 90) of the census tracts located within the study area are considered EJ communities through poverty and/or minority status. These communities face heightened environmental justice challenges that necessitate focused interventions and policies to promote equitable living conditions. A HCT project would improve access to transportation within these traditionally underserved communities, which may allow for an improvement in economic and social wellbeing.

Table 7-3 Minority Status of Population

Rhode Island			Study Area			
Total Population	Minority Population (Total minus White Only)	Percent of Rhode Island Population that is Minority	Total Population	Minority Population	Number of residents living in EJ Census Tracts where the minority population is greater than 50% of the total	Percent of Study Area Population that is Minority
1,091,949	321,249	29.41%	391,512	186,483	181,848	47.63%

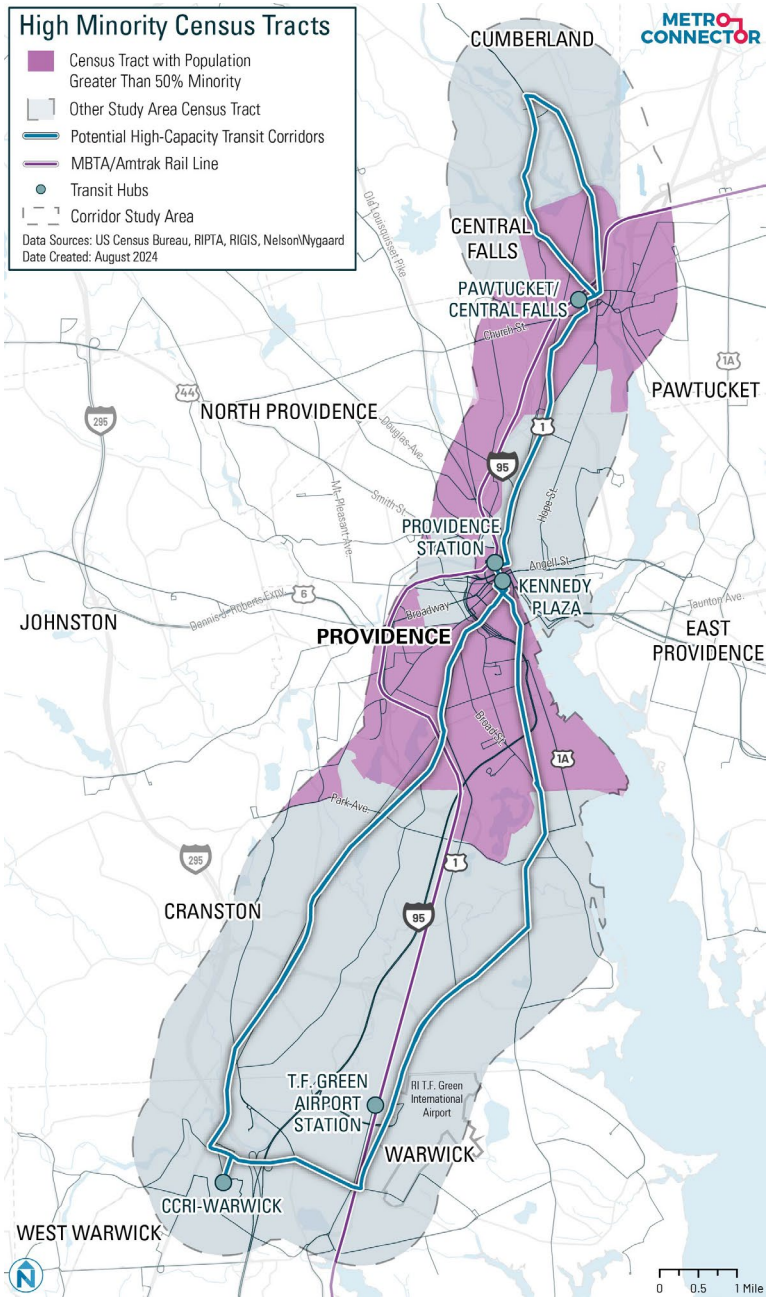


Figure 7-9 Areas with High Minority Population

Noise and Vibration

An analysis of RIGS GIS layers featuring libraries, schools and hospitals, which are sites that are particularly sensitive to noise and vibration, indicates that there are many sensitive sites within the study area.[38, 39, 40] The largest concentrations of these sites are located within the municipal centers of Providence and Central Falls, but some are located on properties adjacent to various segments of the proposed HCT corridors.

While there may be temporary construction-related noise and vibration impacts to various sites throughout the study area, the project could also result in an overall net decrease to the noise and vibration generated from existing traffic conditions. Additional screening and analysis would be needed to confirm the difference between the proposed and existing conditions. There may also be noise and vibration attenuation measures required during construction in areas proximate to particularly sensitive locations.

[38] Libraries (2014) | Libraries (2014) | RIGIS

[39] Schools (2023) | Schools (2023) | RIGIS

[40] Hospitals (2023) | Hospitals (2023) | RIGIS

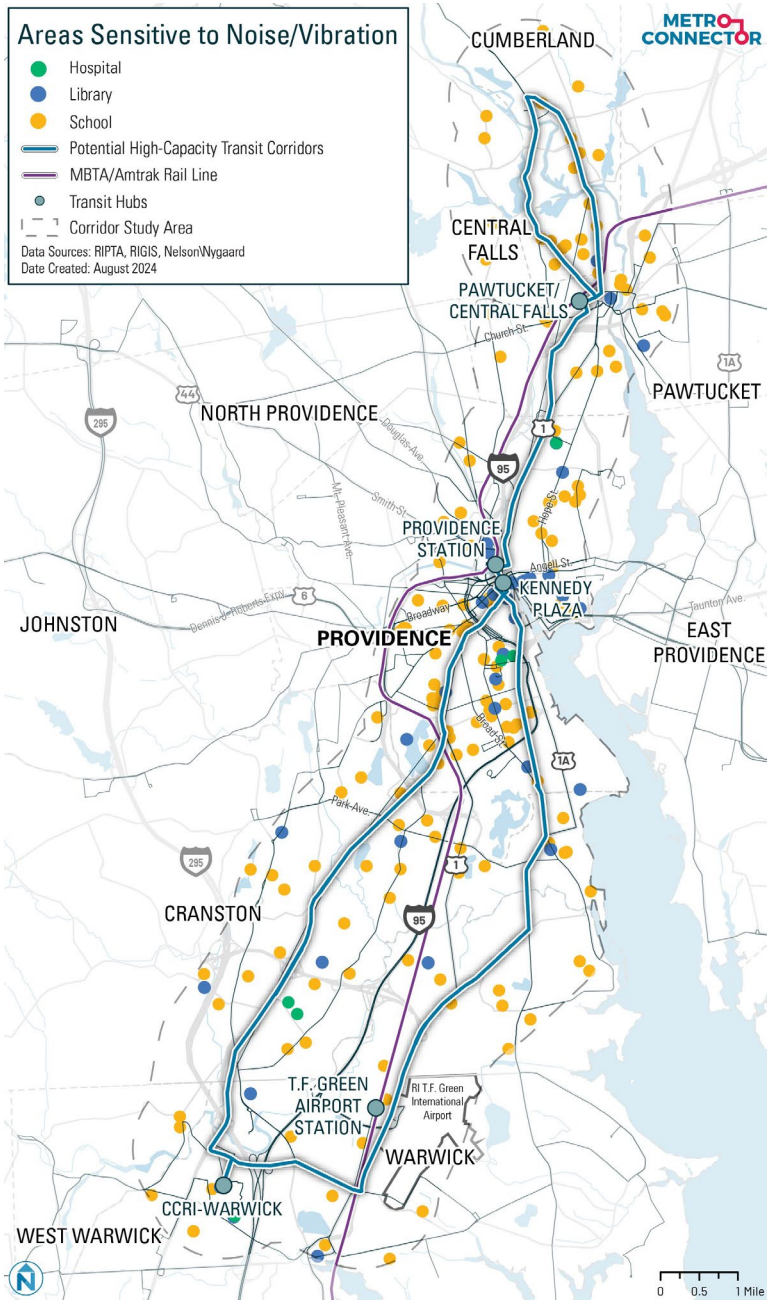


Figure 7-10 Areas Sensitive to Noise and Vibration

Summary and Opportunities

The Environmental Review chapter considers environmental factors that may impact or may be impacted by the implementation of a high-capacity transit project in the study area. The analysis found several environmental advantages in the study area that would be supportive of a HCT project:

- There is no designated critical habitat along the proposed HCT corridors.
- All proposed HCT corridors comprise existing and paved roadways that would limit potential for wetland and stormwater impacts.
- The proposed HCT corridors would serve several cities that have socioeconomic disparities compared to the rest of Rhode Island, including higher rates of childhood asthma than the rest of the state. A HCT project would likely facilitate mode shift, leading to improved air quality, asthma and health outcomes in these cities and across the study area.
- Of the 90 census tracts in the study area, 66 meet federal environmental justice criteria, as they have higher concentrations of people of color or people below 200% of the poverty line than the state average. A HCT project would improve access to transportation within these traditionally underserved communities, which may allow for an increase in economic and social wellbeing.
- The project may result in an overall net decrease to noise and vibration due to reduced VMT.

While a HCT project is likely to have a positive environmental impact overall, the analysis identified the following environmental sensitivities that need to be managed through the project's construction and operation:

- Protection of communities in the study area from contamination during HCT construction and operation
- Protection of the four threatened, endangered, proposed endangered, or candidate species along the study corridors.
- Proactive planning measures to avoid disruption of bicycle traffic on separated bike paths near the proposed HCT corridor.
- Project construction may result in temporary impacts to parks, areas sensitive to noise and vibration, EJ communities, and ecological resources.

Building on the findings of this chapter, the following considerations and steps can be explored further as the HCT corridors become refined:

- Potential for real property acquisitions and site assessments
- Potential traffic impacts and roadway capacity
- Provisions of the Americans with Disabilities Act (ADA) to ensure services, vehicles, and facilities are accessible to and usable by individuals with disabilities
- Additional screening to identify critical wildlife habitats, waterbodies, and floodplains near proposed corridors
- Execution of a cultural resources survey and consultation with the Rhode Island Historical Preservation and Heritage Commission (RIHPHC)

8 Next Steps and Conclusion

The purpose of the Metro Connector Study is to consider options for providing fast, reliable, and frequent transit that connects major transportation hubs, regional activity centers, and residential neighborhoods in metropolitan Providence while achieving other State goals related to climate, sustainable housing growth, and economic development in an equitable manner. This Existing Conditions Report is a key piece of the Metro Connector Study; it provides an overview of opportunities and constraints within the study area, identifies the most relevant information and sets the stage for development and evaluation of rapid transit alternatives.

The Existing Conditions Report will be regularly referenced as the Metro Connector Study produces alternatives for high-capacity transit and refines those ideas to arrive at a Locally Preferred Alternative (LPA) or Alternatives that can be advanced for implementation.

The first application of the findings described in this report was during the first round of public outreach in the fall of 2024, where existing conditions data was presented to the public to inform initial scoping of potential high-capacity transit corridors. The Existing Conditions Report will guide other parts of the Metro Connector Study, as well. For example, factors like current zoning and land use will be used to assess the development potential of land near potential rapid transit corridors, and the market analysis will be used to estimate future demand for transit on potential high-capacity transit corridors.