

GORHAM-WESTBROOK-PORTLAND RAPID TRANSIT STUDY

Final Report

LPA approved by PACTS Policy Board on January 25, 2024

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Cover photo credit: GPCOG

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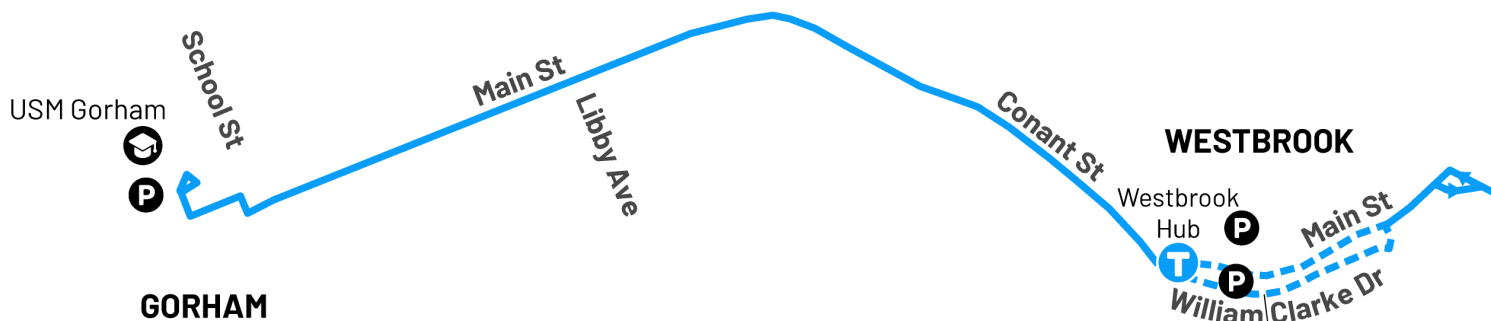
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Executive Summary

Investing in a regional rapid transit network is a key part of Greater Portland’s transportation future. Rapid transit is competitive with or better than driving, and convenient for many kinds of trips, throughout the day. Statewide, regional, and local planning identifies transit investment as a key strategy to reduce greenhouse gas (GHG) emissions and vehicle miles traveled.

In 2022 and 2023, The Greater Portland Council of Governments (GPCOG) conducted the Gorham–Westbrook–Portland Rapid Transit Study (‘the study’). The outcome of this study is a “Locally Preferred Alternative” (LPA), which outlines a mode and alignment for a future rapid-transit line connecting these three communities. The study’s recommended LPA is a

Figure ES-1: Gorham–Westbrook–Portland Rapid Transit Line Locally Preferred Alternative

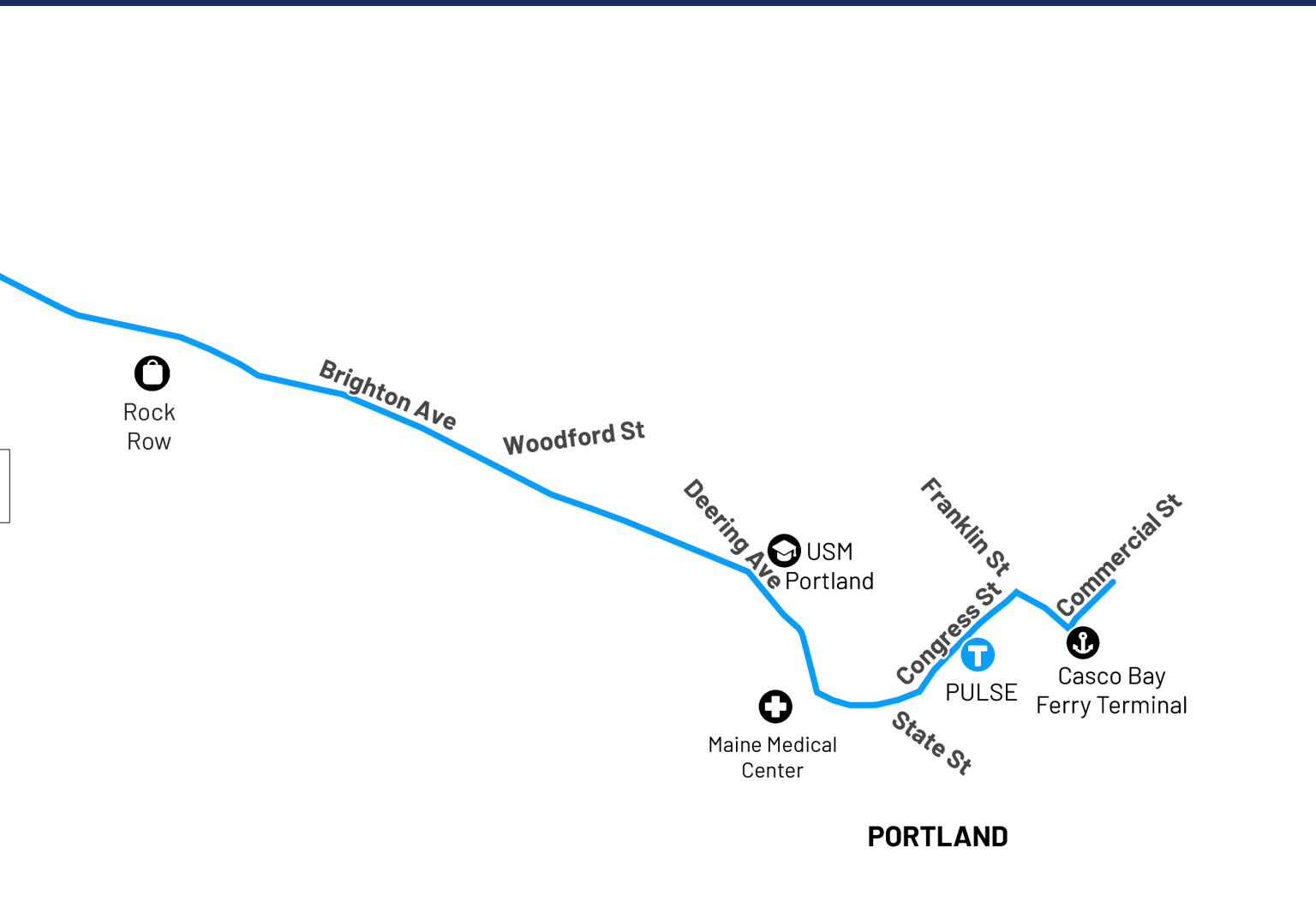


Exact routing in downtown Westbrook to be determined.

- T** Major Transfer Point
- P** Potential Parking Location

rapid bus service connecting Gorham, Westbrook, and Portland, primarily via Main Street, Brighton Avenue, and Congress Street. This alignment is in Figure ES-1, and most closely resembles “Alternative 1–Brighton Ave” from the study’s alternatives evaluation.

From west to east, the LPA connects USM Gorham, Gorham Village, downtown Westbrook, Rock Row, USM Portland, Maine Medical Center, downtown Portland at the GP Metro PULSE, and the Eastern Waterfront. The LPA will provide 10-minute, all-day service between downtown Portland and downtown Westbrook, and 20-minute all-day service between downtown Portland and USM Gorham. High-frequency, all-day service means riders do not need to check a schedule before heading to a station. Real-time arrival information at stations means riders know with confidence when the next bus arrives. Transit signal priority and dedicated bus lanes mean service is fast and reliable, getting people where they need to go, when they need to get there.



The LPA serves many of the region’s main residential, employment, academic, and commercial centers. Key service characteristics are in Figure ES-2.

Figure ES-2: Key Statistics of the LPA

Length of the LPA: 12 miles	Time Spent at Each Station: 30 seconds
Number of Stations: 19	Average Daily Ridership (2045): 4,600
Hours of Operation: 5:00 AM – 11:00 PM Weekday 7:00 AM – 11:30 PM Saturday 7:00 AM – 8:00 PM Sunday	Major Transfer Locations: Westbrook Hub GP Metro PULSE Casco Bay Ferry Terminal
Frequency: On weekdays from 6:00AM to 7:00PM, every 10 mins. between Portland and Westbrook and every 20 mins. between Portland and Gorham, via Westbrook. Every 15 to 40 mins. at all other times.	Number of Buses Needed: 12 buses Assumed Maximum Vehicle Load: 80 passengers
Estimated Extent of Operation in Exclusive Transit Right-of-Way: 50% (6 miles)	Residents and Jobs along the Corridor: Jobs (2019): 51,400 Residents (2020): 47,200

Note: These figures are based on the current LPA; as stakeholder conversations continue, these key statistics will likely evolve.



Project Purpose, Goals and Objectives

This project purpose statement guided all the study’s efforts, and was developed based on feedback from project stakeholders, the Project Advisory Group, and public outreach. The project’s goals and objectives served as the framework in which ideas were evaluated. These goals and objectives are in Figure ES-3.

PURPOSE STATEMENT

The purpose of the Gorham-Westbrook-Portland rapid transit project is to provide fast, reliable, and frequent transit service that connects Gorham, Westbrook, and Portland’s major transportation and/or activity centers.

Figure ES-3: Project Goals and Objectives

Goal	Objective
Improve Mobility	<ul style="list-style-type: none"> • Make transit time-competitive with auto travel • Improve the speed, frequency, and reliability of transit
Grow Transit Ridership	<ul style="list-style-type: none"> • Encourage mode shift away from single-occupant vehicles • Decrease auto dependency and GHG emissions
Support Sustainable Growth	<ul style="list-style-type: none"> • Provide opportunities for transit-oriented development • Serve future developments with sustainable transportation options
Enhance Connectivity	<ul style="list-style-type: none"> • Improve connections to the pedestrian network • Improve connections to local and regional transit
Focus on Equity	<ul style="list-style-type: none"> • Provide rapid transit to people that most need it
Provide New Opportunities	<ul style="list-style-type: none"> • Serve regional employment and activity centers • Enhance access for regional residents • Support reverse commutes
Focus on Practical and Implementable Solutions	<ul style="list-style-type: none"> • Achieve local consensus • Balance costs and benefits • Align with local goals

Statewide, regional, and local plans identify transit investment as a key way to reduce GHG emissions and vehicle miles traveled. *Transit Tomorrow*, the region’s long-range transit plan, envisions that by 2050 using transit is faster and more affordable than driving, and that transit is supported by focusing new homes and jobs in existing downtown and neighborhood centers. Developing a network of fast, reliable, high-capacity transit corridors is crucial to achieving the plan’s vision. The Gorham-Westbrook-Portland corridor is the first of the four corridors identified in *Transit Tomorrow* for study.

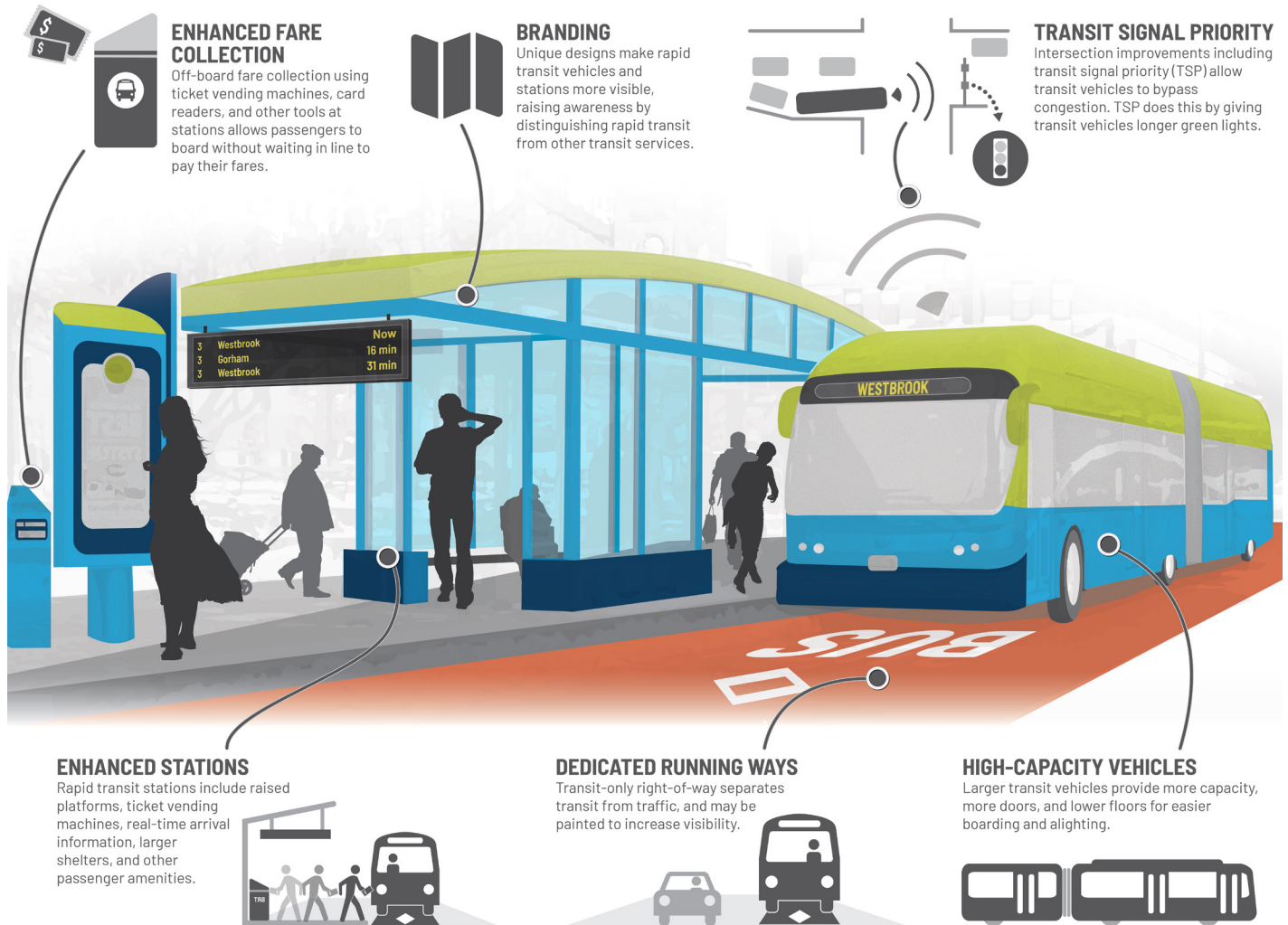


What is Rapid Transit?

Rapid transit has service and infrastructure characteristics that make public transit competitive with or better than auto travel. Key features of rapid transit are illustrated in Figure ES-4 and outlined below:

- **High-frequency service:** Service every 15 minutes or better is convenient and reliable for riders, and eliminates the need to plan around a bus schedule.
- **Dedicated right-of-way:** Transit-only lanes make buses faster and more reliable on congested roads.
- **Transit signal priority:** Priority signals make buses faster and more reliable at congested intersections.
- **Off-board fare payment:** Ticket vending machines, card readers, and other tools allow riders to board without waiting in line to pay their fares, which reduces delay.
- **Enhanced stations:** Raised platforms speed up boarding, real-time signage keeps riders informed, and other amenities (benches, shelters, etc.) make using transit more comfortable.
- **Branding:** An easily distinguishable brand makes the public more aware of the service.

Figure ES-4: Key Features of Rapid Transit



How Did we Get Here?

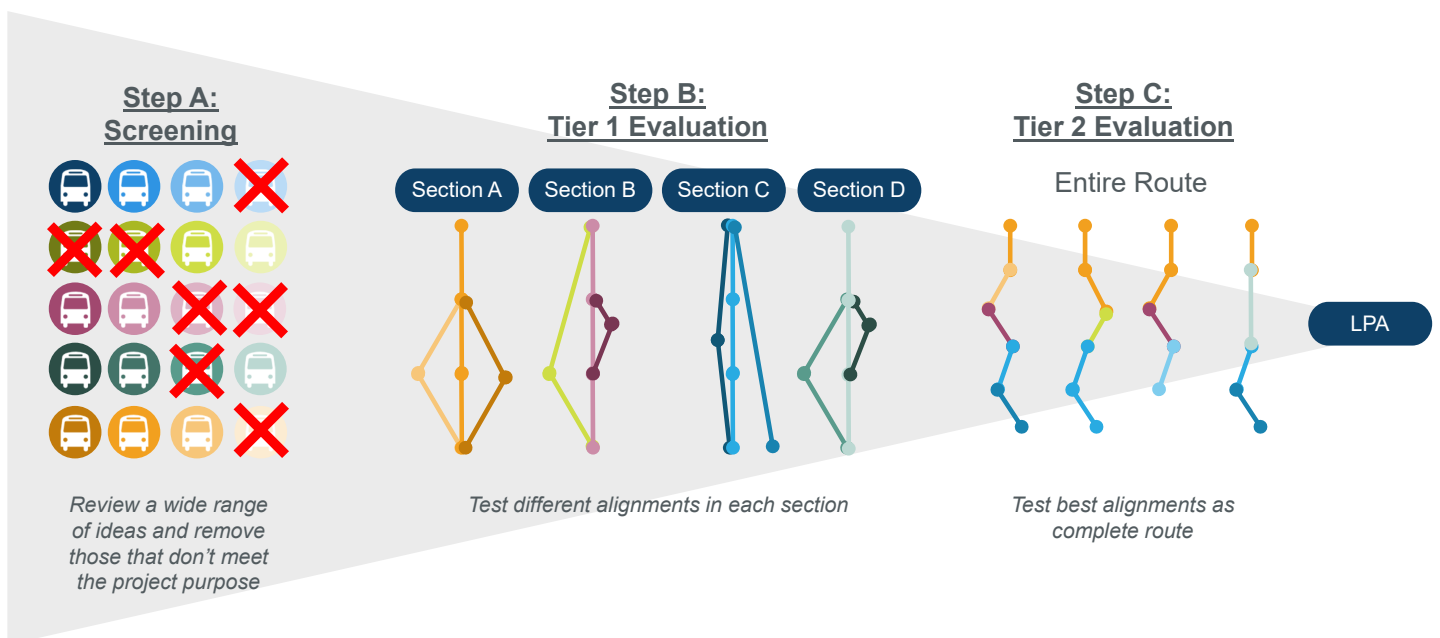
The study explored many possible concepts for serving Gorham, Westbrook, and Portland, before narrowing to an LPA. The process started by documenting needs and opportunities, and talking with the community about what they wanted to see in a rapid transit service. This early analysis and outreach generated many ideas that could meet the purpose of the project. The study then evaluated the ideas using a three-step process shown in Figure ES-5 and described below.

Step A: Screening – a first-pass, high-level screening of all project ideas collected in early analysis and outreach. The screening step determined whether project ideas met the project’s purpose.

Step B: Tier 1 Evaluation – an assessment of the project concepts that passed through the screening. The Tier 1 evaluation split the corridor into three geographic sections (Gorham to downtown Westbrook, downtown Westbrook to Rock Row, and Rock Row to downtown Portland) and analyzed how well each idea met the project’s goals and objectives. The Tier 1 analysis resulted in four alignment alternatives for further study.

Step C: Tier 2 Evaluation – evaluated the four alignment alternatives against project goals and objectives, but to a more robust extent than the Tier 1 Evaluation. Step C developed infrastructure assumptions, cost estimates, ridership forecasts, and travel-time estimates. The result of the Tier 2 Evaluation is the LPA.

Figure ES-5: Evaluation Framework



Why Bus instead of Rail?

The study explored both rail and bus-based modes, including the potential to use existing rail corridors for rapid transit service. Once Tier 1 Evaluation corridors were identified, the costs and benefits of using the corridor for rail versus bus-based service were considered.

Existing rail corridors were not recommended for rapid transit service, mainly due to current use by freight and/or Downeaster passenger rail services, and strict FRA regulations related to shared rights-of-way. Existing rail corridors also provide limited access to key destinations, could create environmental impacts to sensitive sites, and are susceptible to sea-level rise. Ultimately, we found that using an existing rail corridor would require major rail construction and reconstruction to support rapid transit service, which would be considerably more costly and complicated than a bus-based service, while providing less access and mobility to the public.

A more detailed description of the mode-choice analysis can be found in Chapter 4 of the final report. More detailed key reasons for recommending a rapid bus-based LPA were determined in the Tier 2 evaluation, and include:

Capital Costs: A rail alternative is likely to cost four to twelve times more to construct than a BRT alternative.

Operating Costs: It is generally more than twice as costly to operate rail transit on a per-hour basis than it is to operate bus transit.

Ridership and Capacity: In the Greater Portland context, a street-running rail service is unlikely to produce enough added ridership to justify the higher cost of building and operating rail service instead of BRT.

Overall: BRT is assumed to provide similar benefits as street-running rail service at substantially lower per-rider cost.



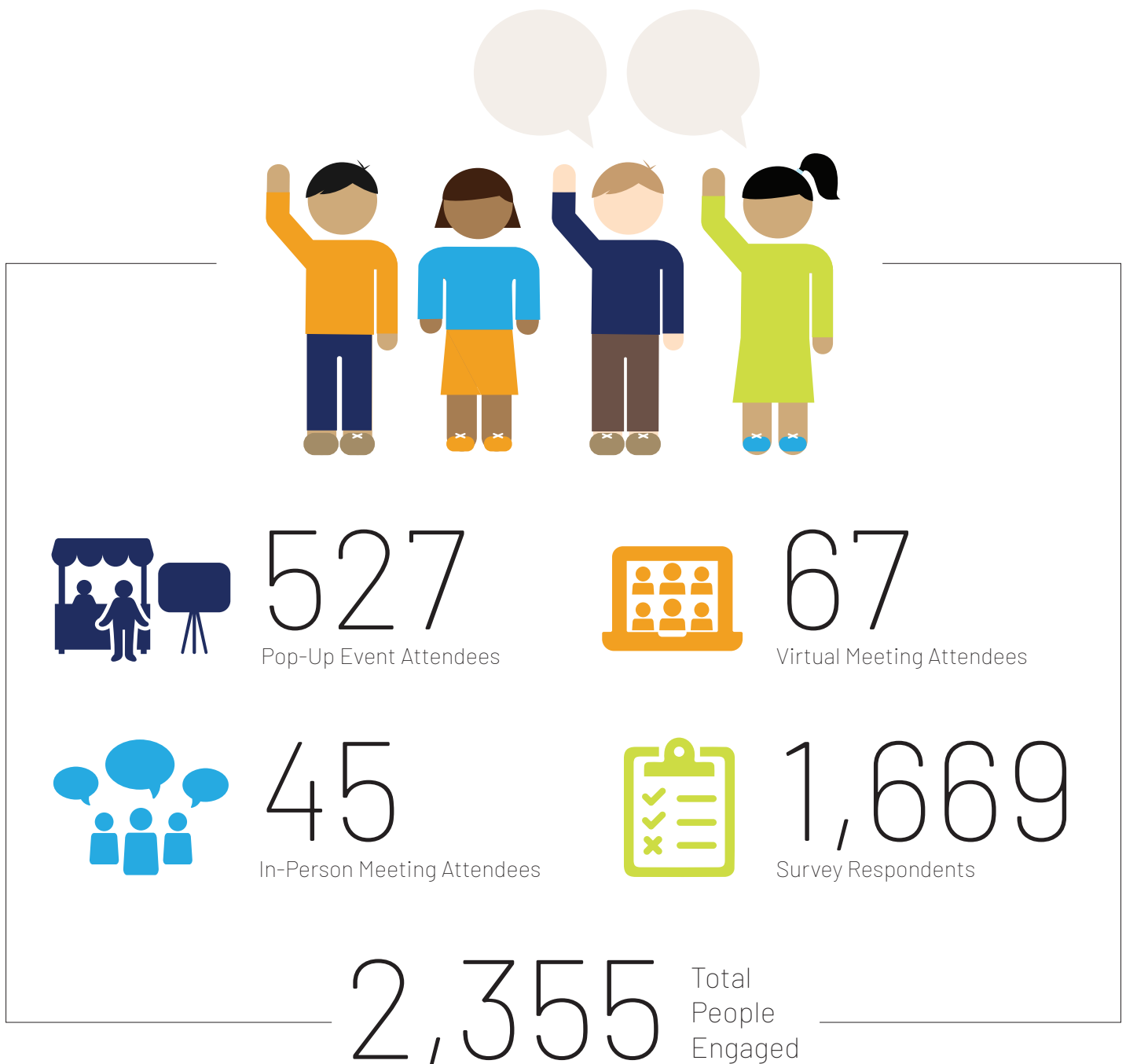


Robust Community Engagement, Broad Community Support

The LPA received strong support from the community. A snapshot of public outreach conducted during the study is in Figure ES-6 below. The study offered multiple and varied opportunities for public idea-sharing, participation, and feedback, including meetings, open houses, pop-ups, online surveys, and stakeholder interviews. The study team also reached out to underserved populations in partnership with

community organizations. Public support for the LPA is exceptionally high. In a survey of 590 respondents, more than 85% indicated support. Robust outreach and strong support for the LPA provide confidence in our recommendations.

Figure ES-6: Public Engagement Snapshot





Source: "Westbrook, Maine sign and gazebo.jpg" By Kenneth C. Zirkel is licensed under CC BY-SA 4.0.

What is Next?

The outcome of this study is a recommended Locally Preferred Alternative—that is, only a mode and alignment—for a rapid transit service along the Gorham-Westbrook-Portland corridor. The LPA has been developed to the conceptual design level based on geographic information system (GIS) mapping, aerial imagery, and limited field measurements, and includes illustrative cross sections and generalized overall transit infrastructure along the alignment.

Those conceptual plans require additional analysis, design, and engineering in 'preliminary design,' which is the next phase of the project. The preliminary design process will include collection of engineering survey, utility information, property data, traffic counts, traffic signal documents, and roadway plans. Key stakeholders from this study—including Gorham, Westbrook, Portland, USM, MaineDOT, and GP Metro—are developing the details for the next phase of this project.

Funding sources are being identified to move the project forward into the next phase. There are several promising funding alternatives this rapid-transit project may qualify for, as the project aligns with state and national objectives to reduce GHG emissions, strengthen climate resilience, and avoid adverse environmental impacts to the natural and human environment.

Alternatively, local funds could support more planning work to address questions raised by the municipalities and other stakeholders, with the hopes of enhancing regional coordination and support for the project, and perhaps making a RAISE Planning Grant application more successful in the future. Key decision makers and staff are working to determine a preferable course of action.

1 Introduction

The Gorham–Westbrook–Portland Rapid Transit Study assessed the potential for rapid transit connecting Gorham, Westbrook, and Portland. Greater Portland Metro’s (GP Metro’s) Husky Line is the only existing transit service connecting the three communities, with stops at the University of Southern Maine’s (USM’s) Gorham and Portland campuses, as well as in Westbrook and Portland. The study was led by GPCOG, in concert with the City of Portland, the City of Westbrook, the Town of Gorham, GP Metro, the Northern New England Passenger Rail Authority (NNEPRA), the Maine Department of Transportation (MaineDOT), other agency and community stakeholders, and the public.

Investing in a regional rapid transit network is an important goal in Transit Tomorrow, the region’s long-range transit plan, and the Gorham–Westbrook–Portland corridor is the first of four corridors identified in that plan (see Figure 1) to be assessed in more detail. This assessment encompasses a needs and opportunities assessment; development of transit mode and alignment alternatives; an evaluation of costs, impacts and benefits; and an implementation plan. The outcome of the study is a Locally Preferred Alternative (LPA) that is recommended for moving into project development. Work on this study began in spring 2022 and continued into early 2024.

Figure 1: The Four Rapid Transit Corridors Identified in Transit Tomorrow



What is Rapid Transit?

Rapid transit emphasizes being more competitive with auto travel than local transit service. This is achieved by focusing on transit vehicle speed, reliability, capacity, convenience, and experience. Common features of rapid transit are described in Figure 2, with forms of rapid transit service defined in greater detail in Figure 3.

Figure 2: Common Features of Rapid Transit

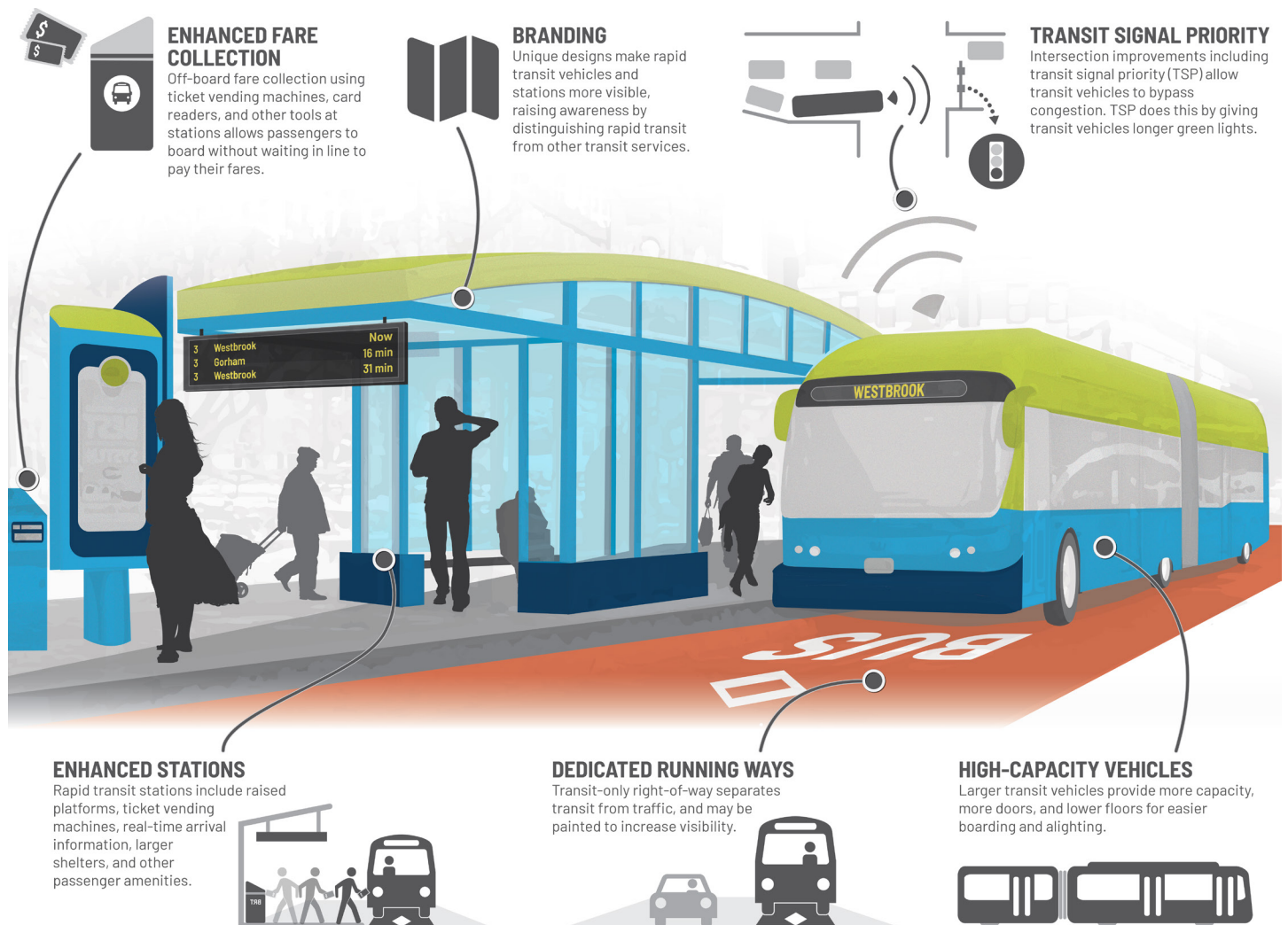








Figure 3: Feature Differentiation among Transit Modes

		Rapid Transit		
		Local Bus	Bus Rapid Transit	Light Rail
 Service design	Simple route design	✓	✓	✓
	Less frequent stops		✓	✓
	Frequent service	✓	✓	✓
	Early morning to late night	✓	✓	✓
 Branding	Special branding		✓	✓
 Transit priority	Transit signal priority	✓	✓	✓
	Queue jump lanes	✓	✓	
	Exclusive right-of-way	○	●	●
 Stops	Enhanced stops	✓	✓	✓
	Real-time passenger information	✓	✓	✓
	Off-board fare collection		✓	✓
	Level platform boarding		✓	✓
 Vehicles	Passenger capacity	👤👤	👤👤👤	👤👤👤

 Typical features
  Potential features

Project Purpose

The purpose of the Gorham-Westbrook-Portland rapid transit project is to provide fast, reliable, and frequent transit service that connects Gorham, Westbrook, and Portland’s major transportation and/or activity centers. This project purpose statement guided all the study’s efforts, and was developed based on feedback from project stakeholders, the Project Advisory Group, and public outreach. A full documentation of the project’s Purpose, Need, Goals, and Objectives is in Appendix A.

Project Need

This study is a response to the following unmet needs in the Gorham-Westbrook-Portland area:

- A transit system that has not kept pace with high population and job growth
- Relatively infrequent, slow (compared to driving), and inconvenient existing transit service
- Worsening traffic congestion that impacts people using autos and riding transit

- Limited access to opportunity at nearby universities, hospitals, and large employers
- Transportation inequity, as people with low incomes and of color disproportionately rely on transit
- State and regional goals to reduce greenhouse gases (GHG) and achieve carbon neutrality by 2045

These project needs are a backbone of how we evaluate transit concepts and alternatives. The LPA identified through this study is the project that best meets the project purpose and needs.

Project Goals and Objectives

The project’s goals and objectives are in Figure 4. The goals were developed by the Project Advisory Group, based on the project’s purpose and need. These goals are also aligned with regional goals from Connect 2045 and Transit Tomorrow, and with statewide goals from the State of Maine’s Climate Action Plan.

Figure 4: Project Goals and Objectives

Project Goal	Objectives	Connection to Other Regional Goals
Improve Mobility	<ul style="list-style-type: none"> • Make transit time-competitive with auto travel • Improve speed, frequency, and reliability of transit 	<ul style="list-style-type: none"> • Create frequent corridors • Improve safety • Expand choices
Grow Transit Ridership	<ul style="list-style-type: none"> • Encourage mode shift away from single-occupancy vehicles • Reduce auto dependency and GHG emissions 	<ul style="list-style-type: none"> • Create frequent corridors • Expand choices • Reduce GHG emissions and vehicle miles travelled
Support Sustainable Growth	<ul style="list-style-type: none"> • Provide opportunities for transit-oriented development • Serve future developments with sustainable transportation options 	<ul style="list-style-type: none"> • Create transit-friendly places • Support great places • Foster economic opportunity
Enhance Connectivity	<ul style="list-style-type: none"> • Improve connections to pedestrian network • Improve connections to local and regional transit 	
Focus on Equity	<ul style="list-style-type: none"> • Provide rapid transit to critical populations 	<ul style="list-style-type: none"> • Provide equitable access
Provide New Opportunities	<ul style="list-style-type: none"> • Serve regional employment and activity centers • Enhance access for regional residents • Support reverse commutes 	
Focus on Practical and Implementable Solutions	<ul style="list-style-type: none"> • Achieve local consensus • Balance costs and benefits • Align with local goals 	<ul style="list-style-type: none"> • Optimize infrastructure

Evaluation Framework

The evaluation process to determine the LPA involved three steps, which are described below and illustrated in Figure 5:

Step A: Screening – a first pass, high-level screening of all project ideas raised through the project’s early scoping process. These ideas were brought forward from the community, project technical team members, and the Project Advisory Group. Step A determined whether project ideas met the project’s purpose.

Step B: Tier 1 Evaluation – an assessment of project concepts that passed through the screening step. Based on the project’s goals and objectives, the Tier 1 Evaluation organized the corridor into three geographic sections (Gorham to downtown Westbrook, downtown Westbrook to Rock Row, and Rock Row to downtown Portland) and evaluated how well each geographic concept addressed the project goals and objectives. The Tier 1 analysis produced four alignment alternatives for further study.

Step C: Tier 2 Evaluation – refines the Tier 1 Evaluation by developing infrastructure assumptions, cost estimates, ridership forecasts, and travel-time estimates for the alternatives produced by the Tier 1 Evaluation. The result of the Tier 2 Evaluation is the LPA.

Project Study Area

The Gorham–Westbrook–Portland Rapid Transit Study Area is illustrated as Figure 6 and includes a ½-mile buffer around the major road and railway connections between Gorham Village (including USM Gorham as a likely service anchor) and the Portland Peninsula.

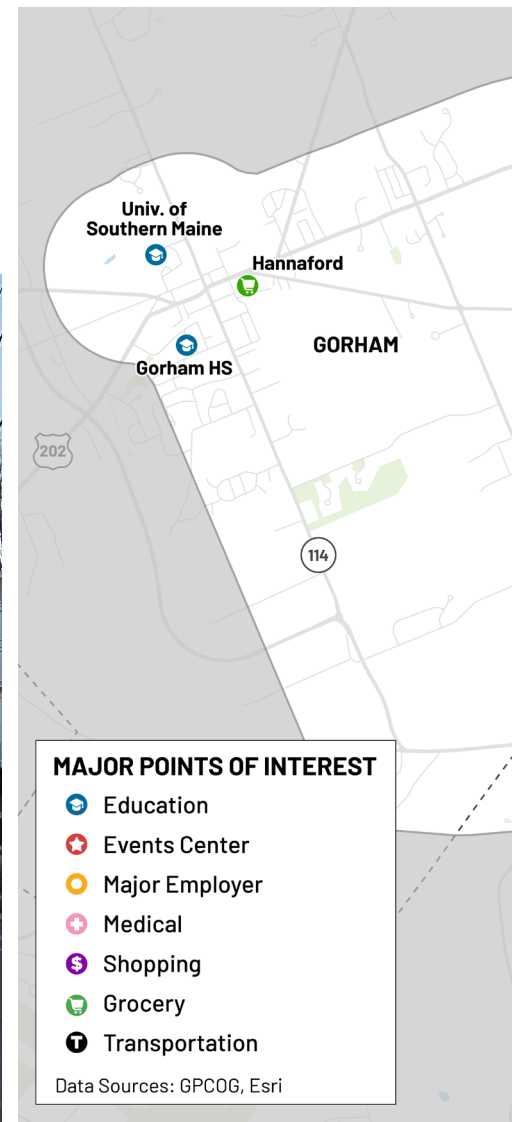


Figure 5: Study Evaluation Framework

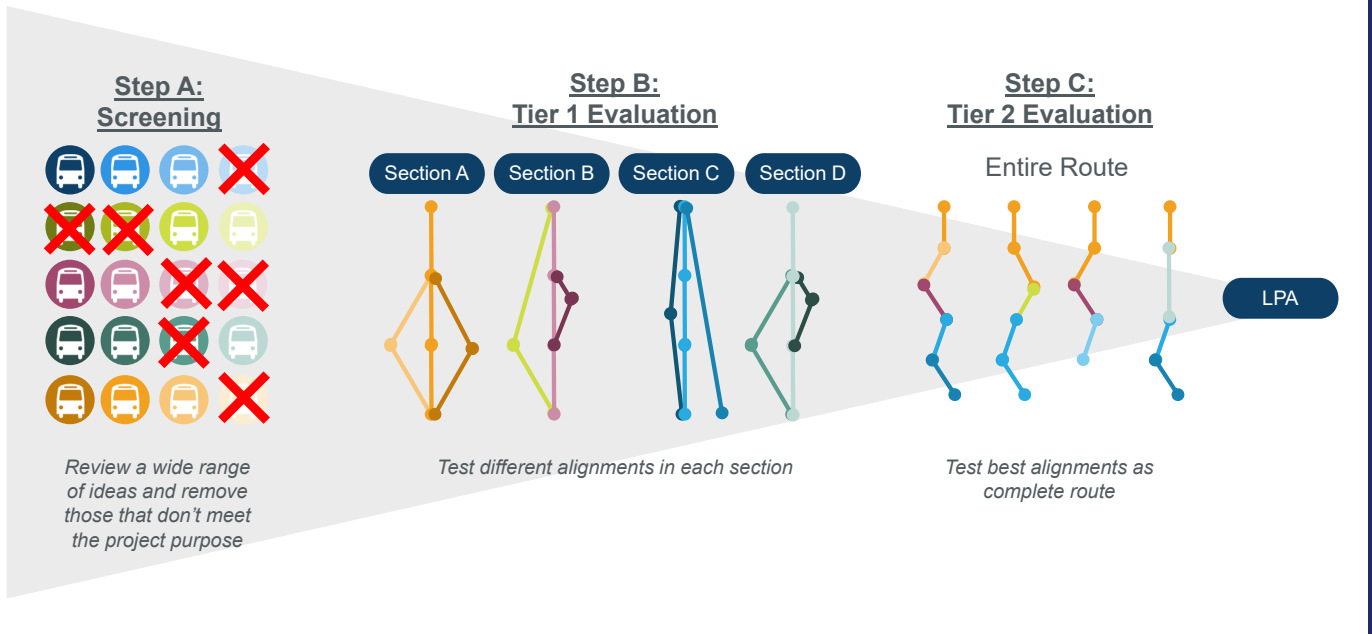
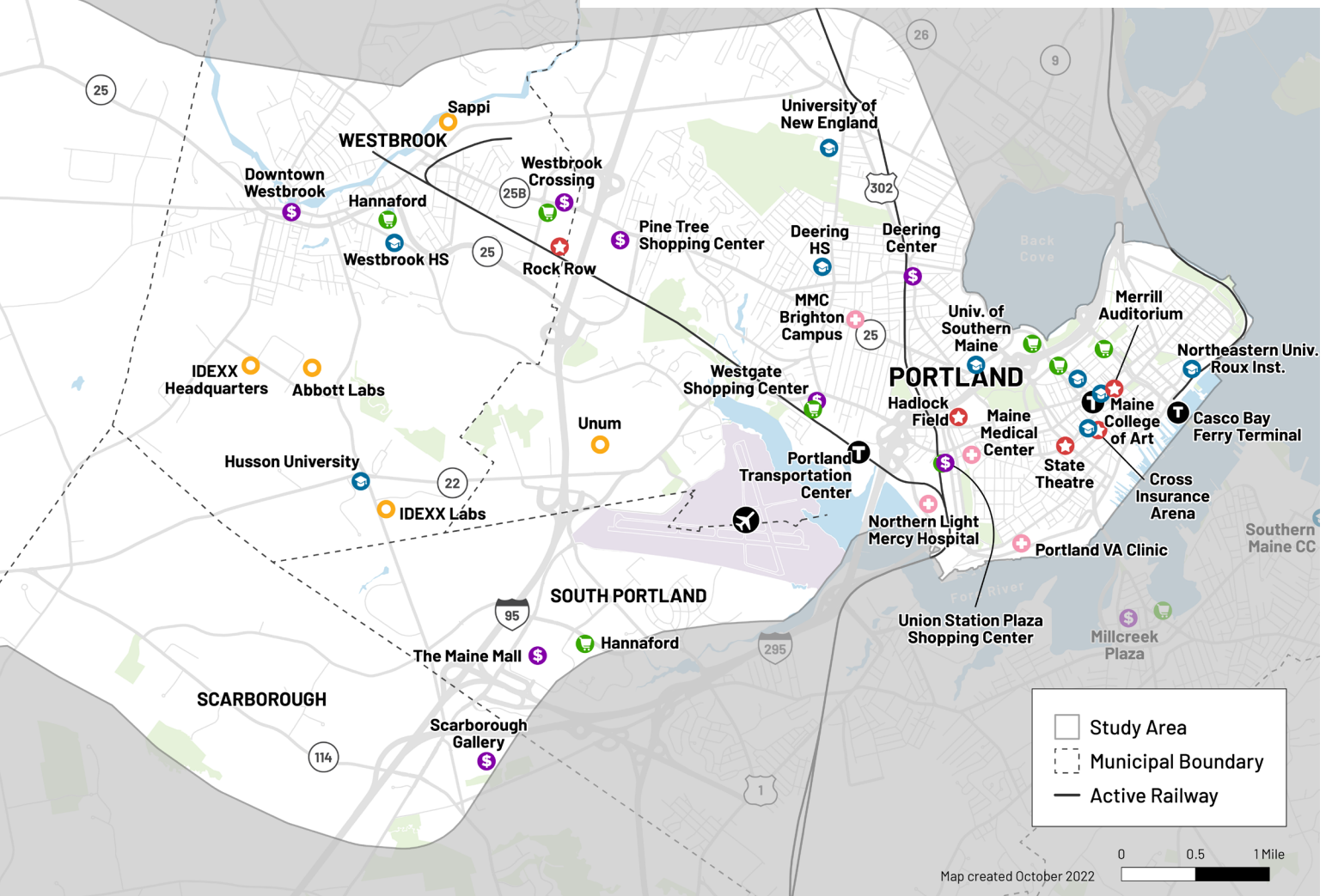


Figure 6: Gorham-Westbrook-Portland Rapid Transit Study Area



2 Public Outreach

Public outreach and engagement conducted as part of the Gorham-Westbrook-Portland Rapid Transit Study was robust and effective. The study offered multiple and varied opportunities for public idea-sharing, participation, and feedback, including meetings and open houses, pop-ups, online surveys, and stakeholder interviews. The study team also reached out to underserved populations in partnership with community organizations. By the study's end, engagement staff had reached over 2,300 people, in five languages.

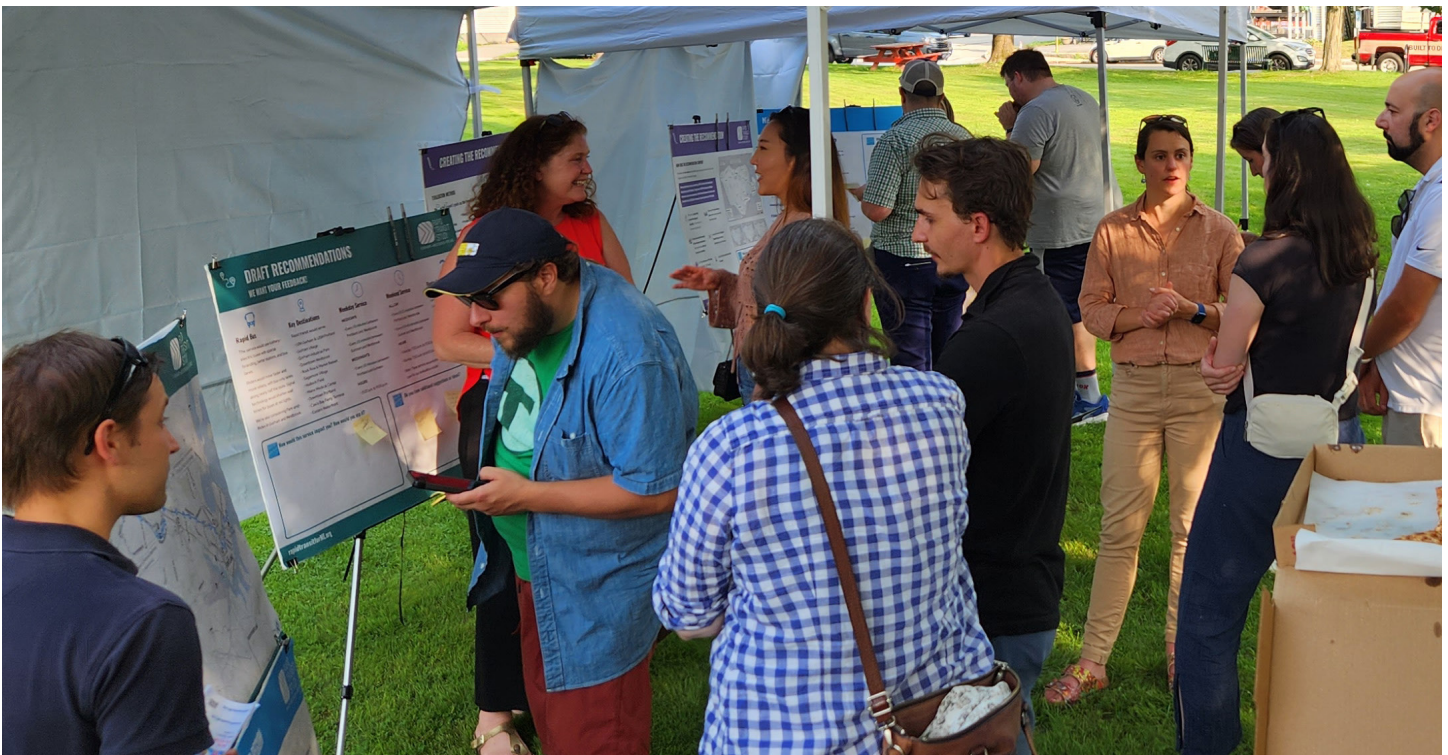
Community support for this study's draft recommendations was extraordinarily strong, with 85% of survey respondents supporting the draft rapid transit service.

This chapter summarizes key methods and findings from the study's public outreach. A complete Public Engagement Summary is in Appendix B.



Left: Pop-Up Event at the GP Metro PULSE;

Below: In-person public meeting at Riverbank Park.

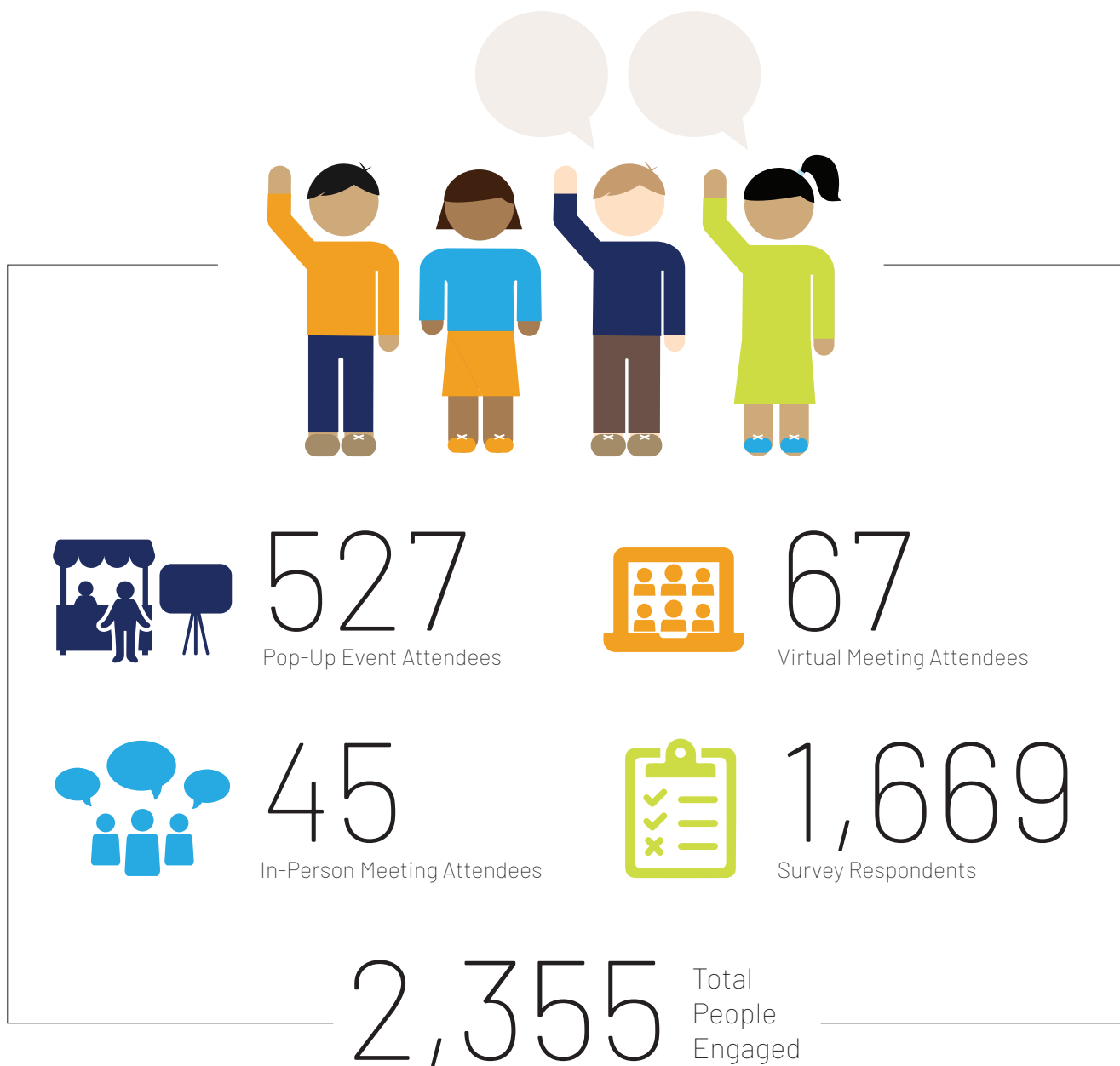


How Did We Conduct Outreach?

There were four public engagement phases in this study, based on technical milestones:

- **Phase 0** established the study's context within existing outreach and did the legwork to understand communities and stakeholders.
- **Phase 1** gathered public input on transit use patterns, preferences, and motivators.
- **Phase 2** solicited feedback on four rapid transit alignment alternatives.
- **Phase 3** presented the findings from the Tier 2 Evaluation and a draft recommended service for feedback.

Figure 7: Public Engagement Snapshot



Phase 0: Setting the Stage

In Outreach Phase 0, the study team cataloged existing outreach and engagement mechanisms in Gorham, Westbrook, and Portland, and identified trusted voices in the community to act as local conveners, advocates, and representatives.

The team conducted stakeholder interviews with staff from the Town of Gorham, City of Westbrook, City of Portland, GP Metro, NNEPRA, MaineDOT, the Maine Turnpike Authority, and USM. Interviews were also conducted with 10 community organizations, including those working with and for immigrants, seniors, youth, and residents with disabilities and substance-use disorders. These interviews further identified key underrepresented voices and built relationships between community-based organizations and the study team.

Phase 1: Discovery

This phase introduced the rapid transit study to general stakeholders and the public, and occurred in fall 2022 before the Step A Screening. The study team engaged the public in five languages (English, Spanish, French, Lingala, and Portuguese), presenting the draft study area, project purpose, goals, and objectives, and seeking feedback on potential alignments for the rapid transit corridor through a survey, pop-ups, and public meetings. The team collected feedback on where rapid transit could operate, opportunities and issues in the study area, and other community considerations related to rapid transit.

Community partners with connections in Gorham, Westbrook, or Portland were identified, with special care given to identify trusted points of information for transit-dependent populations. These community partners were then given flyers, graphics, and sample text for distributing study information and encouraging people to attend events or take the survey.

The team conducted an online survey asking questions about goals for the project, seeking feedback on the draft study area, and asking where rapid transit service should operate. The survey received about 350 responses showing general support for draft project goals and a desire for higher levels of public transportation service in the region.

78% of survey respondents felt that the study area does not have enough transit service.

The engagement team held pop-up events at USM Gorham, the Rock Row Market Basket, downtown Westbrook, the GP Metro PULSE, the Portland Transportation Center, and Greater Portland Health on Park Avenue in Portland. At pop-ups, about 150 people interacted with boards illustrating potential places for rapid transit and provided feedback.

Lastly, the study team hosted two public meetings, one in person and one virtual, reaching over 30 people. Both meetings included information explaining the project and possible rapid-transit alignment ideas, asking people to take the project survey and soliciting feedback on the project's purpose, need, goals, and objectives.

The Project Advisory Group

This study was guided by a Project Advisory Group, or PAG. The PAG consisted of representatives from key government, community, and business stakeholder organizations, such as the FTA, MaineDOT, USM, MaineHealth, the Portland Housing Authority, and the Bicycle Coalition of Maine. The PAG also included representatives from public transportation providers and host municipalities that could be directly involved in operating a rapid-transit service. The PAG was convened at key milestones throughout the study to provide feedback. A full list of participating PAG organizations is at the beginning of this document.

Phase 2: Exploring Options

Phase 2 occurred in spring 2023 and collected feedback on four alternatives for a rapid transit service in Gorham, Westbrook, and Portland. These alternatives were a product of the Tier 1 Evaluation and were to be evaluated as part of the Tier 2 Evaluation.

In Phase 2, the study team held a virtual public meeting to give stakeholders and the public an opportunity to consider the results of and share their thoughts on the Tier 1 Evaluation process. The meeting also solicited feedback on the four alternatives to be assessed in the Tier 2 Evaluation.

Special-focus workshops were held with municipal and agency staff to discuss alternative refinement, station locations, and other topics that informed the alternatives analysis.

A second survey was conducted to gauge support for the four alternatives emerging from the Tier 1 Evaluation, and to assess the public's interest in specific rapid-transit features. The survey received over 725 responses in total.

Phase 3: Decision-Making

Phase 3 occurred in summer 2023 and focused on collecting public feedback on a draft recommended rapid transit service produced by the Tier 2 Evaluation. This outreach phase included pop-up events, public meetings, and a third survey.

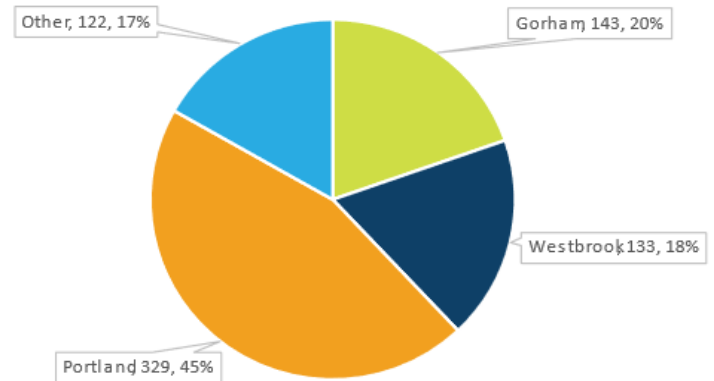
Phase 3 pop-ups occurred at the Portland Farmers Market, Portland Transportation Center, Rock Row Market Basket, GP Metro PULSE, Greater Portland Health on Park Avenue in Portland, the Gorham Hannaford, and Gorham Summer Thursdays. The pop-ups engaged over 380 people.

The Phase 3 survey was open for approximately one month, and received over 590 responses. The survey primarily collected feedback on the draft recommended transit service.

The engagement team held an in-person public meeting at Westbrook's Riverbank Park, engaging 41 attendees. This open-house style meeting allowed participants to review information on boards, post comments on sticky notes, and have informal discussions with project staff. The engagement team also held a virtual public meeting over Zoom, covering the same content and allowing a similar opportunity for public comment.

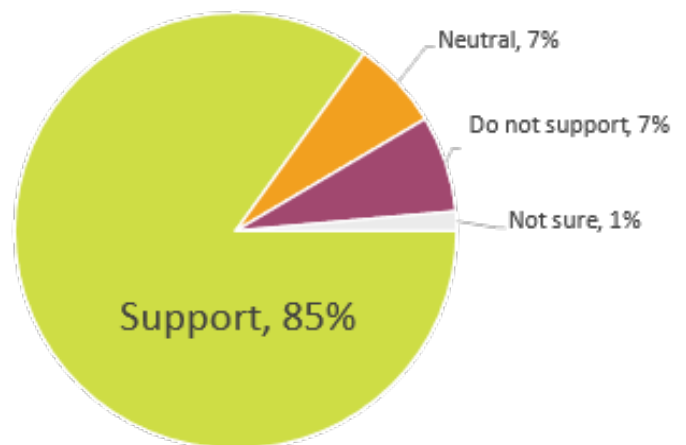
In total, the Phase 3 engagement team conducted seven pop-up events, two public meetings, and a survey, engaging over 1,000 people in the study area. Phase 3 also saw media coverage of the study and the draft recommended route, with articles published by the American Journal, Maine Public, and the Bangor Daily News. This coverage amplified the study's reach, increasing regional awareness of the project.

Respondent Home Location

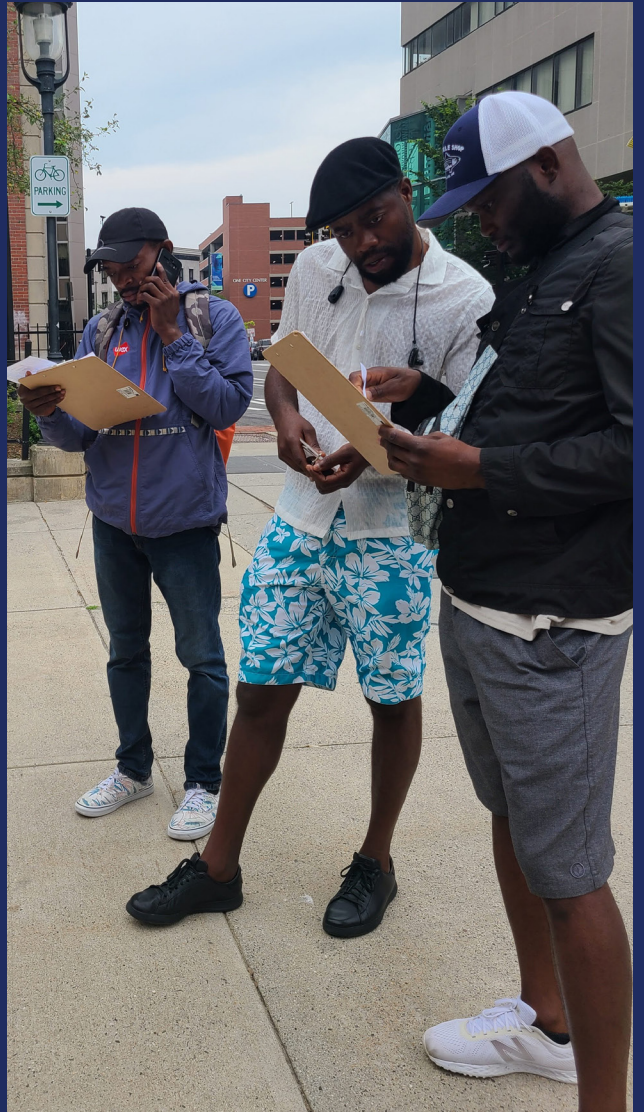


Over 700 people took the project's second survey, with most self-reporting as residents of the study area.

How Much Do You Support The Recommended Service?



A vast majority of the approximately 590 respondents to our third survey voiced support for the service recommendations.





WHERE CAN WE BUILD DENSITY?

The following map shows us how communities can build: What type of use is permitted and how dense development is allowed to be.

Transit-oriented development is when more development is added near transit service without large amounts of parking.

This helps build a community where more people are encouraged to use transit.

GORHAM • WESTBROOK • PORTLAND

rapidtransitforME.org



3 Existing and Future Conditions

This chapter summarizes existing conditions in the study area and outlines assumptions for future-condition forecasting completed as part of the analysis. This study’s existing and future conditions work created essential inputs for the study team’s assessment of rapid-transit alternatives and draft recommended service. The complete Existing Conditions Report is in Appendix C and the full Environmental Inventory Report is Appendix D.

Plan and Policy Review

The study team reviewed relevant previous plans and policies, listed in Figure 8, to better understand the region’s transportation and land-use context. The plans identified multiple opportunities to improve transit, a desire for better public transit connections, creative strategies to invest in transit, goals to improve public perception of transit, and recommendations for municipalities to update land-use policies to further support better transit service. This plan review also provided important insights into key details related to rapid transit, such as considerations related to the Mountain Division railway’s suitability for transit service.

Connect 2045: Connect 2045 is the long-range transportation plan for the Greater Portland region. It calls for expanding public transit and identifies “Priority Corridors” in the rapid transit study area that would benefit the greatest number of modes while maintaining a regional focus on transit.

Transit Tomorrow: Transit Tomorrow is the Greater Portland region’s long-range transit plan. It establishes a vision for the future of the transit network in the Portland area and outlines an investment strategy to meet increased transportation demands by reducing congestion and increasing affordable options. One plan goal identifies four corridors on which to implement rapid transit, including the Gorham-Westbrook-Portland corridor.

Transit-Supportive Development Study: This transit-supportive development study reviews long-term transportation best practices for the region, including the rapid transit study area. The document highlights an increased desire among residents to live in transit-accessible places, and notes reluctance by Gorham and Westbrook residents to support growth due to currently limited service. The study describes the mismatch between housing demand and existing transit service as an opportunity for additional transit.

Plan 2030: Plan 2030 is the City of Portland’s comprehensive plan outlining the City’s vision and goals through 2030. The plan identifies several ‘nodes’ and ‘corridors’ in the rapid transit study area as priority growth areas for new real-estate development.

Westbrook Comprehensive Plan: This plan outlines the City of Westbrook’s goals through 2021, including improving transit service, easing congestion, and better coordinating land-use planning and transportation. Much of Westbrook’s housing stock is identified to be downtown and close to transit routes but not adequately served by existing transit. Recommended improvements include expanding the transit service

Figure 8: Plans and Policies Reviewed

Plan Year	Plan Name	Plan Source
2016	Connect 2045	GPCOG
2021	Transit Tomorrow	GPCOG
2015	Transit Supportive Development Study	GPCOG
2017	Portland’s Plan 2030	City of Portland
2012	Westbrook Comprehensive Plan	City of Westbrook
2016	Gorham Comprehensive Plan Update	Town of Gorham
2019	Westbrook to Portland Conceptual Rail Transit Study	NNEPRA
2020	High-Crash Locations Study	GPCOG

area, increasing frequency, and adding transit priority infrastructure.

Gorham Comprehensive Plan Update: This plan outlines the vision and goals for the Town of Gorham through 2026, including an interest in expanding transit. It recommends improved transit, including more bus service and better connections between Gorham and Portland.

Westbrook to Portland Conceptual Rail Transit Study: This conceptual study evaluated the potential for rail transit between Westbrook and Portland along existing rail right-of-way. It examined necessary system improvements and estimated project costs and ridership.

High Crash Locations Study: This study identifies areas in the region with high crash volumes to make safety-improvement recommendations. Three locations from this study are within the rapid transit study area.

Transit Network Analysis

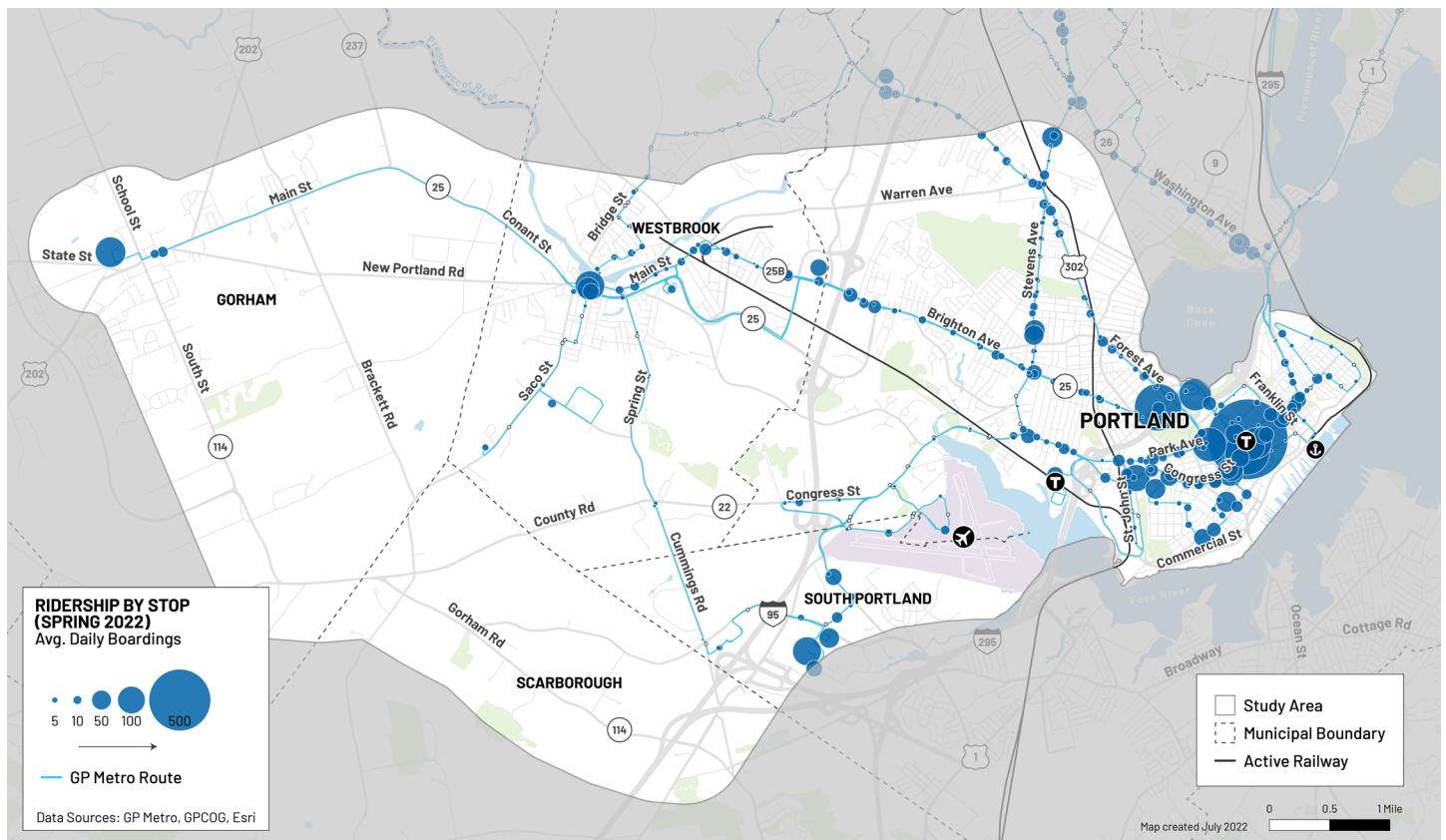
The study team assessed existing transit service on the Gorham-Westbrook-Portland corridor, as well as that service’s interaction with the regional transit network. Understanding how riders use existing service is an essential part of planning future service.

The study area is primarily served by GP Metro’s Route 4 and Husky Line, which connect to additional fixed-route services at the GP Metro PULSE in downtown Portland and the Westbrook Hub in downtown Westbrook. The study area is also served by the Amtrak Downeaster and intercity bus service at the Portland Transportation Center, and ferry service at the Casco Bay Ferry Terminal. Transfers between local and regional buses and some intercity buses are also available at or near certain bus stops in the study area.

Ridership

Existing stop-level ridership volumes along the study corridor are important context for planning future rapid transit and show where demand for transit is already strong. High-ridership stops include the GP Metro PULSE, USM Portland, Westbrook Hub, some grocery stores, Maine Medical Center, and USM Gorham.

Figure 9: Existing (Spring 2022) Transit Ridership by Stop in the Study Area



At the route level, the Husky Line and Route 4 recovered ridership during the pandemic better than the GP Metro systemwide average, which indicates strong and resilient transit demand along those routes. Both Route 4 and the Husky Line also show strong ridership from morning through early evening, indicating demand for all-day transit service. The transit connection between USM campuses is also critical; university staff estimate 40% of trips between USM's Gorham and Portland campuses are made by bus.

Road and Railway Characteristics

A rapid transit line in Gorham, Westbrook, and Portland would need to complement existing infrastructure, as it would likely occupy part of the current rail and/or road right-of-way, interact with pedestrian and bicycle networks, and would affect auto traffic.

This study's road and railway analysis found that rapid transit would be possible to implement on much of the existing right-of-way. At a later point in the study, rail right-of-way was ruled out as a good rapid transit right-of-way for several reasons.

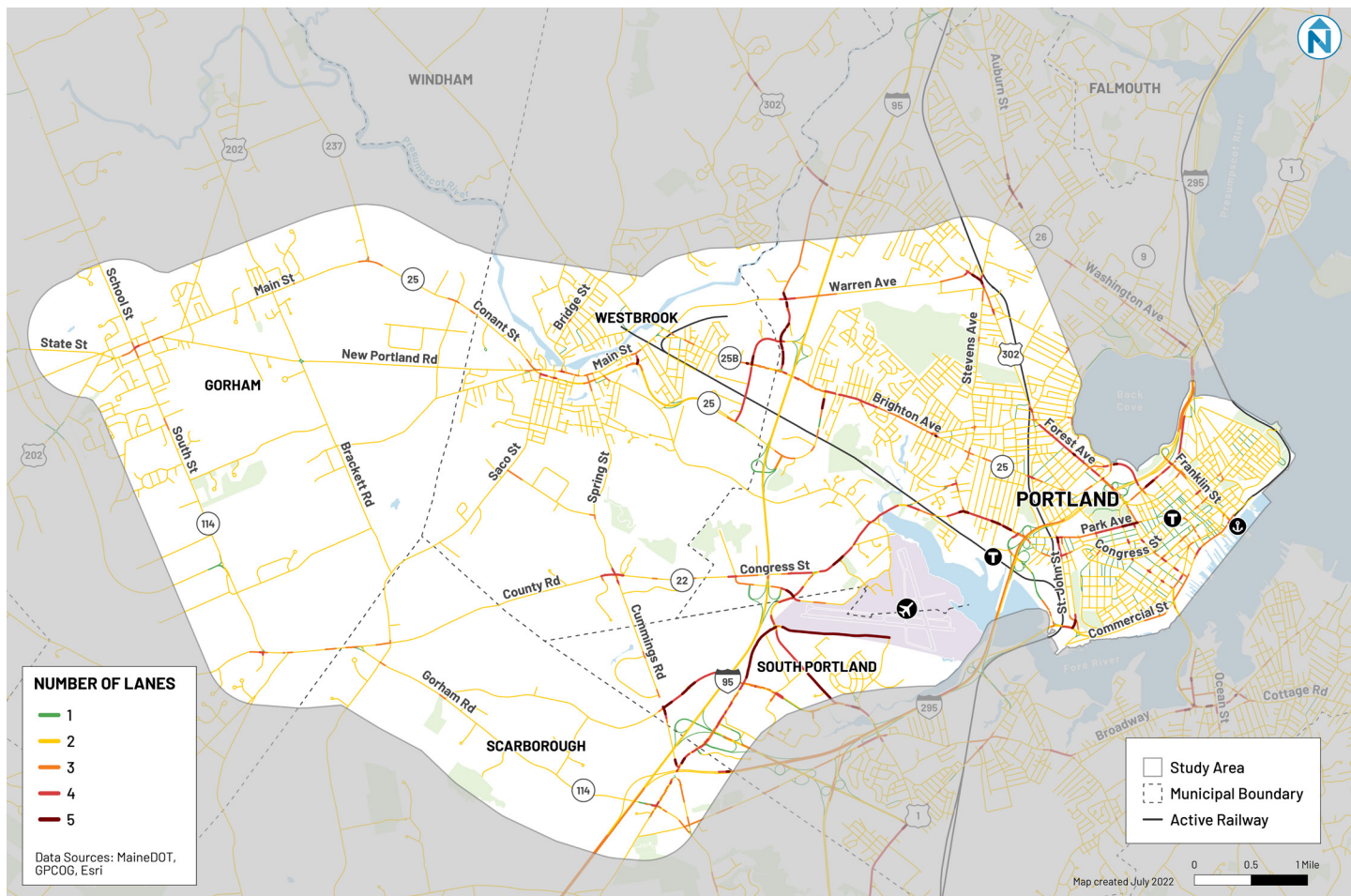
Travel Lanes and Congestion

Roadways wider than two travel lanes have more opportunities to install transit infrastructure such as dedicated transit lanes and transit stations. An analysis of road widths found several potential opportunities for rapid transit corridors in the study area (see Figure 10).

Several road segments and key corridors in the study area can become congested with high traffic volumes, including Main Street in Gorham, Main Street and William Clarke Drive in Westbrook, and Brighton Avenue, Congress Street, and Forest Avenue in Portland. GP Metro staff have identified places where traffic congestion reduces speed and reliability, as well as where more intensive improvement measures such as transit signal priority (TSP) or bus lanes would improve transit service. All these considerations were incorporated into the rapid transit alternatives evaluation.

An overall finding from the road and railway existing conditions analysis was that several roadways have available right-of-way for rapid transit infrastructure.

Figure 10: Roadways by Number of Lanes in the Study Area



Pedestrian and Bicycle Access to Transit

Convenient access to transit for pedestrians and bicyclists is important for successful transit service, as it enhances riders' ability to reach their destinations, thereby increasing the number of people for whom transit is the best travel choice. The study team analyzed pedestrian access primarily in terms of intersection density, which is a good proxy for non-auto mobility. There are several places in the study area with high intersection density, mainly in Portland and parts of Westbrook. Other parts of the study area have modest to very low intersection density.

Bicycle access to transit is also important in growing the ridership market for rapid transit—especially a service that operates on a long corridor or in a relatively low-density environment, as many people will choose to bike to a transit station, or to load their bicycle on the bus as part of their trip. The only place in the study area with relatively robust existing on-street bicycle lanes is Portland, although there are multi-use paths in Gorham, Westbrook, and Portland. Existing bicycle infrastructure in the study area does not provide adequate connections to a likely future rapid transit route; this is a growth area and opportunity for improvement in the region.

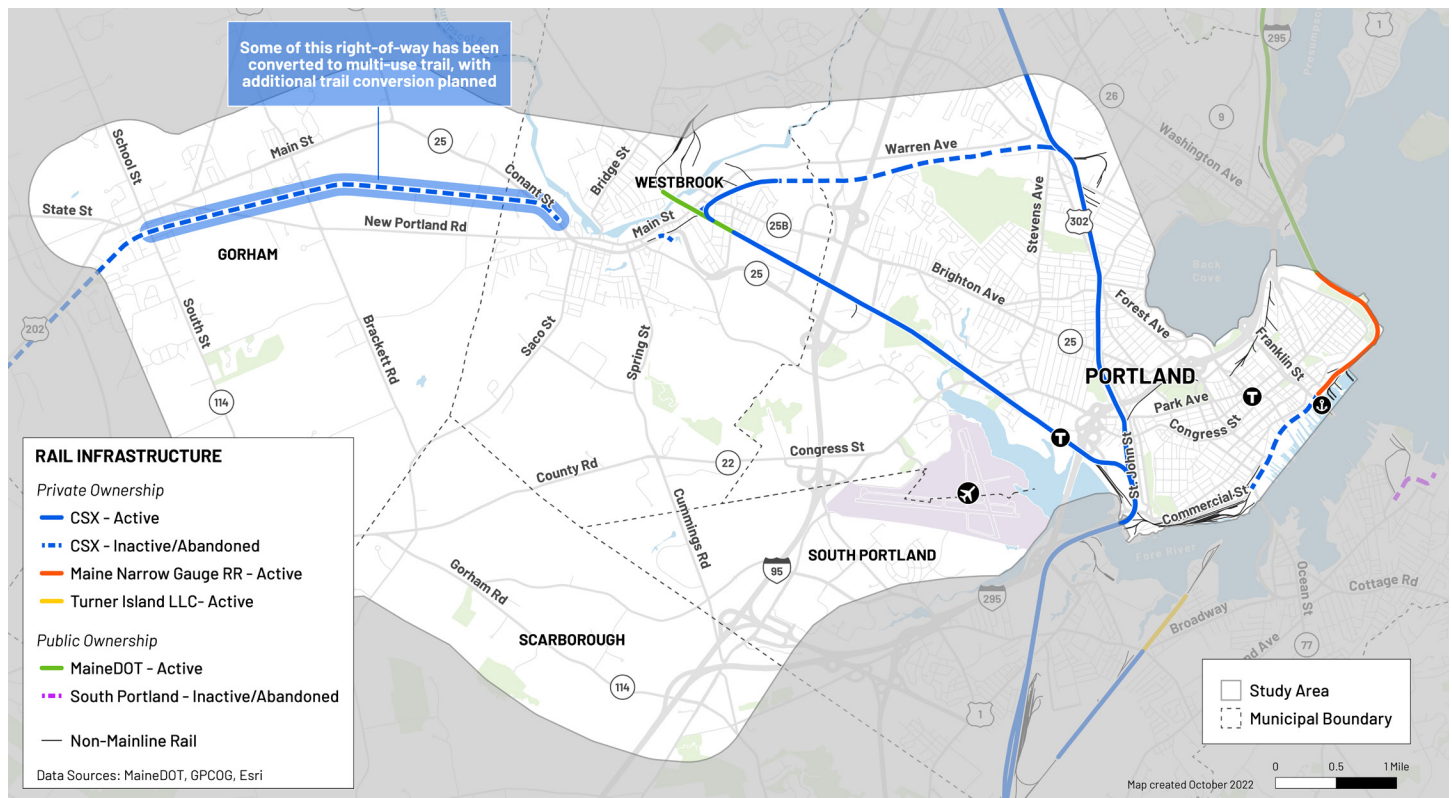
Safety

Safety is a concern for everyone interacting with transit, including people walking, biking, and rolling to a transit route; those riding transit; and those driving or riding in autos near transit. High-crash locations were identified as part of this study's existing conditions work. A future rapid transit project that interacts with these high-crash intersections will need to ensure it improves safety conditions. Existing high-density crash locations include downtown Portland, near USM Portland, Main Street in Westbrook, and parts of Gorham Village.

Rail Infrastructure

This study considered existing active and unused rail right-of-way for part or all of a potential rapid transit route. The rail infrastructure in the study area, shown as Figure 11, is a combination of privately owned, inactive, and abandoned right-of-way. A key active passenger and freight rail line runs north-south through Portland, carrying the Amtrak Downeaster. When stopping at the Portland Transportation Center, the Downeaster uses part of the active Mountain Division line, which extends between Portland and Westbrook. An abandoned rail right-of-way runs east-west through Gorham and has been partly converted into a multi-use path. A mostly abandoned right-of-way runs from Westbrook to Morrill's Corner in Portland.

Figure 11: Rail Infrastructure in the Study Area



Market Profile

The market profile created for this rapid transit study looks at the composition of existing residents and jobs in the study area. Analyzing the demographics of residents and characteristics of jobs in a transit market area is crucial to understanding the amount and type of transit demand. Where people live and work is central to understanding what kinds of transit services are feasible. Figure 12 shows several of the key characteristics that are incorporated into the market profile.

Figure 12: Transit Critical Demographic Makeup of the Study Area

	Study Area	Gorham	Westbrook	Portland
Total population	68,940	17,590	18,610	61,610
<i>Racial/ethnic minority population</i>	16%	5%	11%	17%
<i>Low-income population</i>	31%	16%	28%	31%
Total households	30,680	6,020	8,060	28,020
<i>Zero-vehicle households</i>	15%	3%	10%	15%
Total jobs	87,930	6,060	15,620	63,170
<i>Low-income jobs</i>	19%	22%	16%	18%

Sources: U.S. Census Bureau. 2019 5-Year ACS. Tables B03002, C17002, B25044. 2019 LEHD. Counts rounded to the nearest 10.

Note: Study area population is not the sum of the three municipalities, as only parts of each municipality are included in the study area.

Study area includes portions of the Town of Gorham and the cities of Westbrook and Portland.

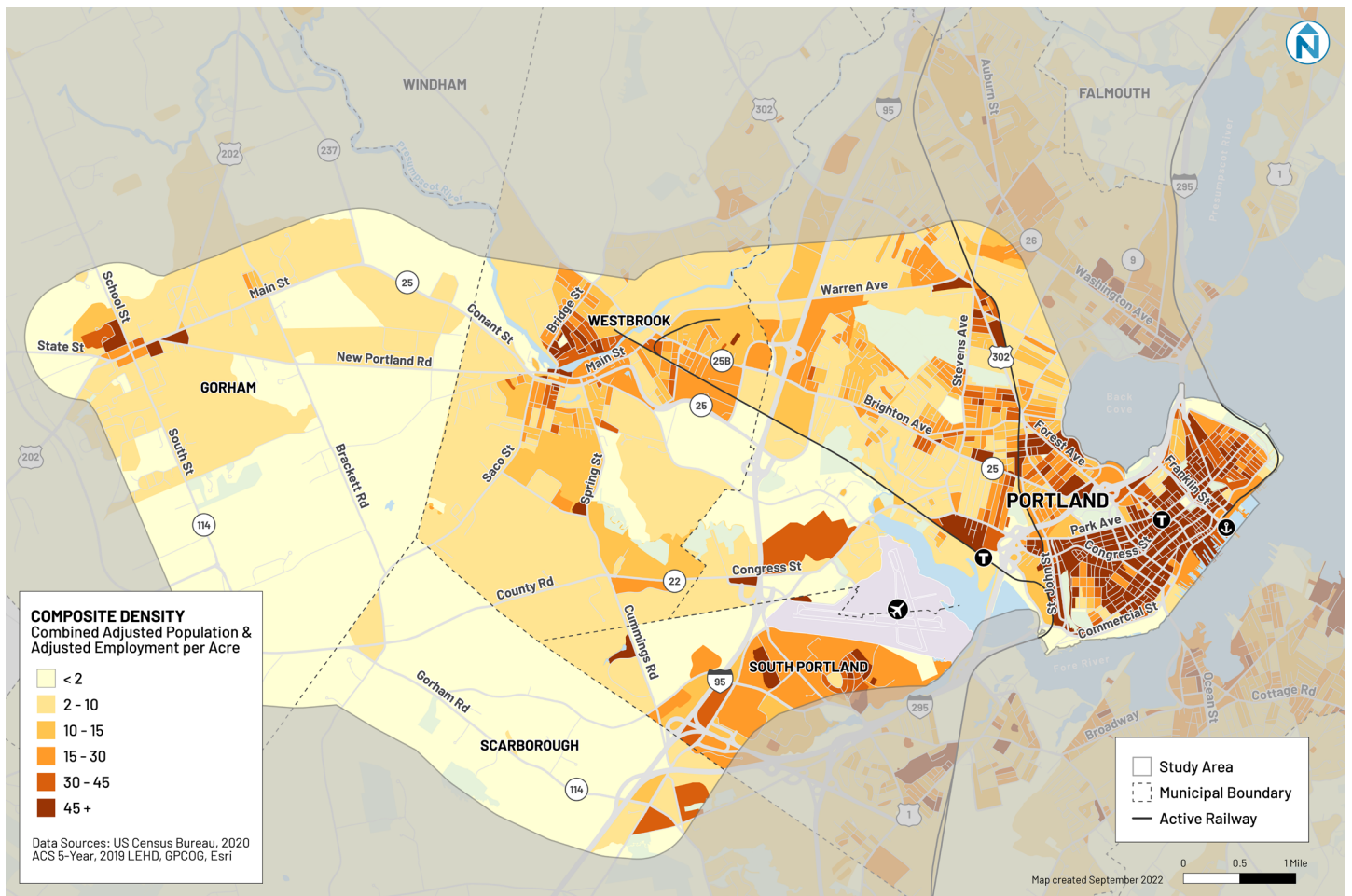
Population Density

Overall, the market profile indicates sufficient demand to support rapid transit service in Gorham, Westbrook, and Portland. Based on the demographic characteristics of the region, those who would most benefit from increased high-quality transit are concentrated in Portland and Westbrook. Population density is greatest in Portland (especially on the Peninsula), in Westbrook, and at USM Gorham. When transit-critical demographic factors are considered in addition to population density, the densest areas of Portland and Westbrook continue to show high levels of transit demand.

Socioeconomic Characteristics

Understanding where low-income residents live is important for determining where transit would serve the most riders because low-income people are more likely to use transit. Most low-income residents in the study area live in Portland and central parts of Westbrook. Residents without access to a vehicle are also more likely to ride transit, and downtown Portland has more than three times the rate of zero-vehicle households than the regional average.

Figure 13: Composite Density (Adjusted Population and Employment per Acre) in the Study Area



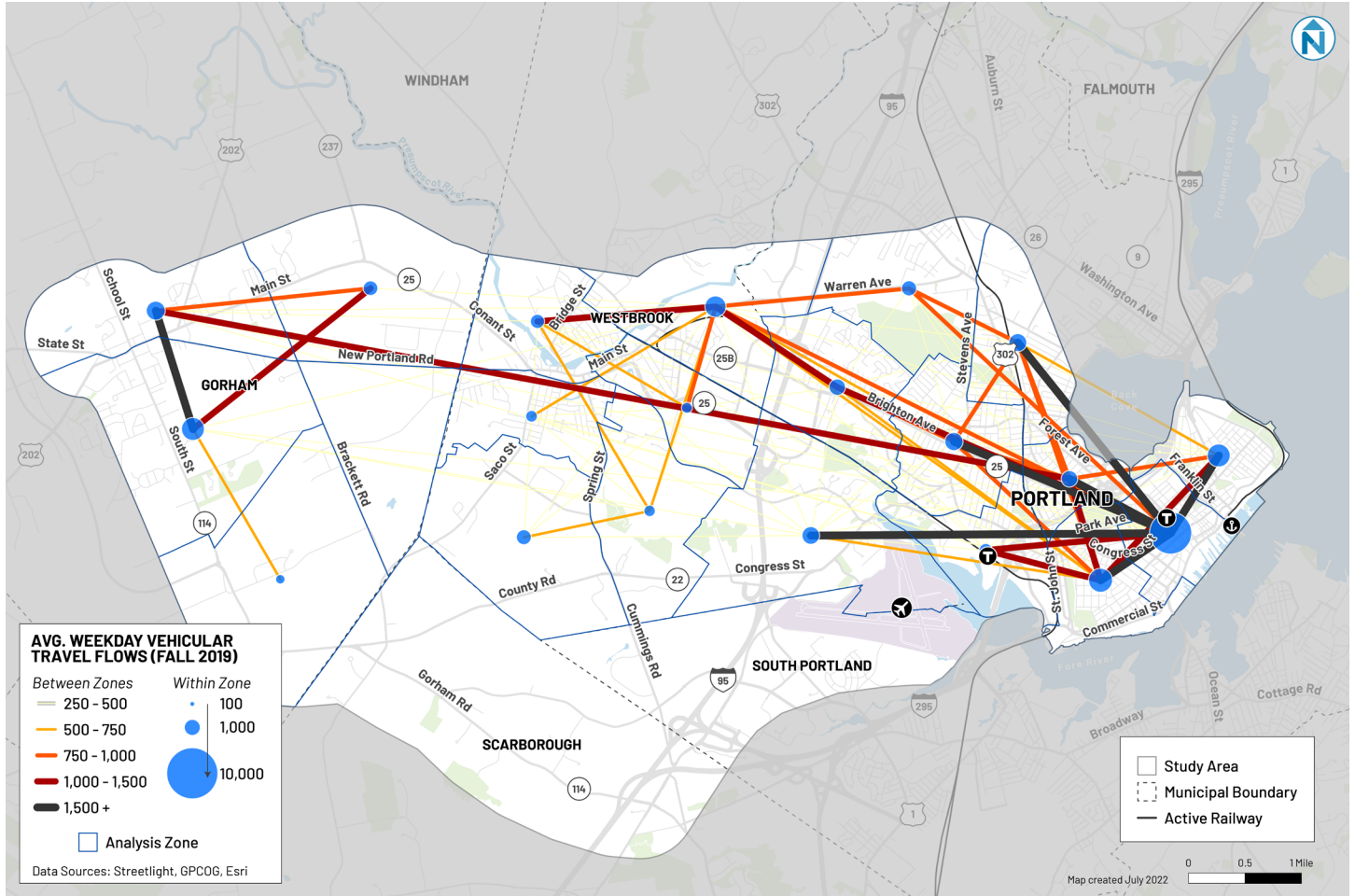
Job characteristics also impact transit demand. White-collar, 'nine-to-five'-type jobs are more likely to drive peak-hour demand for transit, while service, manufacturing, construction, and other jobs are more likely to begin and end outside the nine-to-five peaks. Understanding where there are job concentrations that require all-day transit service (not just peak-hour service) is helpful in identifying where rapid transit can be successful. These types of jobs are also more likely to continue being done in person, whereas many office workers have transitioned to partial or entirely 'work from home', reducing or eliminating their transit use.

The market for the type of frequent off-peak service that rapid transit would provide is strongest near USM Gorham, near downtown Westbrook, and in downtown Portland. Figure 13 shows 'composite density' in the study area, where darker colors show more demand for transit.

Travel Flows

Understanding where people currently travel to and from is critical information for planning rapid transit, as a future rapid transit route should serve the travel needs of existing—as well as potential future—travelers well. This study’s examination of regional travel flows, illustrated in Figure 14, shows that the largest number of trips are made to and from downtown Portland, but there are also substantial volumes (more than 500 vehicles per day) of weekday vehicle trips within Westbrook and Gorham. The high volume of travel flows to and from downtown Portland make clear that rapid transit needs to serve the Peninsula to be regionally successful.

Figure 14: Map Showing Average Weekday Vehicle Travel Flows in the Study Area



Another important metric to consider when planning rapid transit service is major travel flows in areas where zero-vehicle and low-income households make a high percentage of overall trips. Trips of this type are largely between neighborhoods within Portland, between downtown Portland and Westbrook, and between neighborhoods within Westbrook, but not in Gorham. Downtown Portland, the Forest Avenue corridor, and downtown Westbrook have the highest densities of trip origins to other locations in the study area, suggesting that these areas are highly connected and would benefit from rapid transit.

Land-Use Assessment

Land use is one of the most important drivers of transit demand, so understanding current land use in Gorham, Westbrook, and Portland is essential to assessing where rapid transit could best operate in the study area. In general, Portland's land-use is most supportive of rapid transit, followed by Westbrook, and then Gorham.

Portland has the most developed land in the study area, and the most common land-use is high-density residential, which is supportive of rapid transit. Low-density residential is the most common land use in Gorham and the second most common land use in Westbrook, where industrial is the most common land use. This land use is less supportive of rapid transit, but major corridors and nodes in Westbrook and Gorham have transit-supportive land uses.

The Town of Gorham is exploring opportunities to increase density in its downtown area, and Westbrook has two areas that are particularly transit-supportive: a "Heart of Downtown" mixed-use zoning district, and the mixed-use Rock Row development on Main Street. Portland's zoning code has an overlay encouraging higher-density multi-family dwellings, and the City is making zoning changes to increase the amount of housing allowed on single-family lots, while also reducing parking requirements.

Key trip generators in the study area are generally concentrated on the Portland Peninsula and include grocery stores, major event centers, and medical facilities. Other key trip generators include both USM campuses, grocery stores in Westbrook and Gorham, and downtown or village districts.

Anticipated Future Conditions

There are several ongoing planning and real-estate development efforts that may impact transit demand in the study area. In some cases, these projects will likely increase demand for transit, or change the way transportation connections occur.

- ReCode Portland is the first full rewriting of Portland's zoning code in more than 50 years. The plan categorized "Priority Growth Areas" appropriate for new development, "Evaluate" nodes serving as centers for complete neighborhoods, and "Enhance" nodes that are already experiencing plan implementation. These places are likely to be supportive of rapid transit in the future.

New and future real-estate developments in the study area include Rock Row, sites on the Portland Peninsula, the Portland Amtrak station relocation, and the Gorham Industrial Park.

- The completed Phase One of Rock Row is a typical auto-oriented shopping mall, but future phases will likely generate considerable transit demand, with hundreds of thousands of square feet each of office, medical, retail, restaurant, and residential space.
- Several major commercial, institutional, and mixed-use projects are planned on the Portland Peninsula and will be within walking distance of a potential rapid transit corridor.
- Regional transportation actors have been evaluating the relocation of the Portland Amtrak station along the mainline, potentially putting it closer to a major bus corridor.
- The Town of Gorham is planning to expand its industrial park by 141 acres, increasing employment and associated transit demand.

4 Evaluation Process

This study recommends a rapid-transit service based on information from a variety of sources, including community input, key stakeholder feedback, and a technical alternatives analysis. The alternatives analysis, which provided much of the critical

information used to develop a recommendation, was conducted in a three-stage process that is summarized below, diagrammed in Figure 15, and described in more detail throughout this chapter, and described in full in Appendix F.

Evaluation Summary

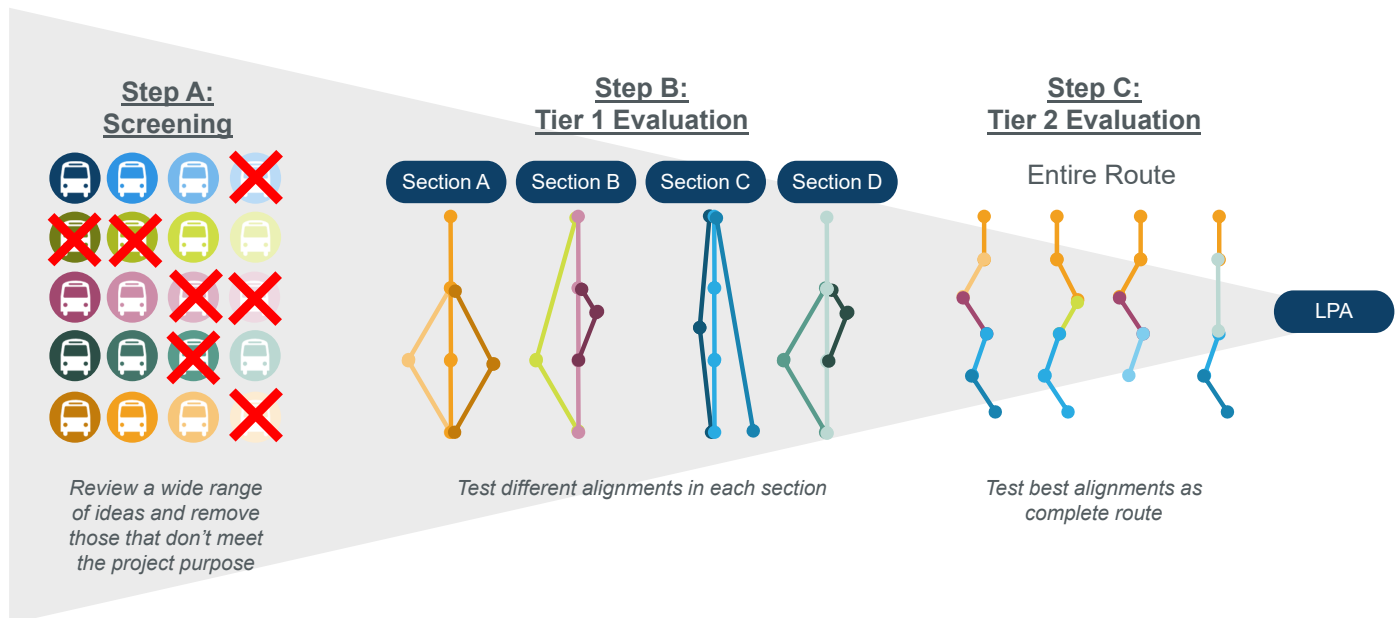
The technical alternatives analysis for this study was conducted in three steps:

Step A: Screening – a first pass, high-level screening of all project ideas raised in the project’s fall 2022 early scoping process. These project ideas were supplied by the community, the project technical team, and members of the Project Advisory Group (PAG). The screening step ensures project ideas meet the project’s basic purpose.

Step B: Tier 1 Evaluation – an assessment of the ideas that passed through the screening in Step A. The Tier 1 Evaluation aligned with the project’s goals and objectives, and used high-level, GIS-based metrics. The Tier 1 Evaluation was completed in three geographic sections (Gorham to downtown Westbrook, downtown Westbrook to Rock Row, and Rock Row to downtown Portland).

Step C: Tier 2 Evaluation – the Tier 2 Evaluation was the most robust analytical step, developing infrastructure assumptions, cost estimates, ridership forecasts, and travel-time estimates for four end-to-end alternatives that emerged from the Tier 1 Evaluation. The Tier 2 Evaluation also aligned with project goals and objectives. The result of the Tier 2 Evaluation was a draft LPA.

Figure 15: Evaluation Framework Design



Step A: Screening Against Project Purpose

Step A was a first-pass, high-level test that ensured project alignment alternatives met the project purpose. This analysis was based on four qualitative criteria tied to the project purpose, and was completed in three geographic sections of the corridor: Gorham to downtown Westbrook; downtown Westbrook to Rock Row; and Rock Row to the Peninsula. The screening was conducted for all project ideas raised in the project’s fall 2022 early scoping process. These project ideas were supplied by the community, project technical team, and PAG members.

Screening Criteria

The screening criteria included the following questions, which are tied to the project’s purpose:

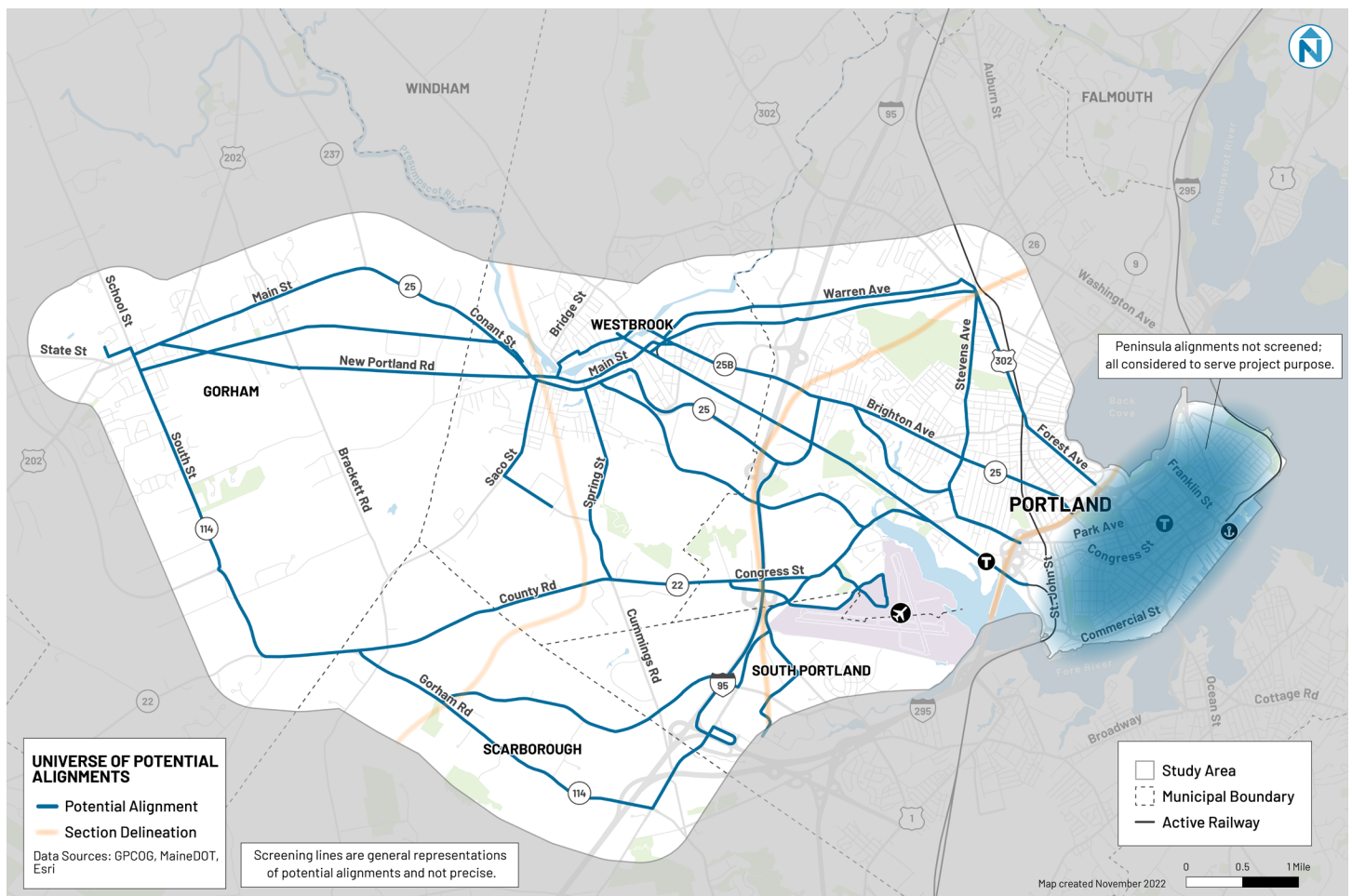
1. Does the section alignment begin and end in Gorham, Westbrook, or Portland?

2. Does the section alignment connect key existing and/or planned activity centers in Gorham, Westbrook, or Portland?
3. Does the section alignment serve areas with land-use density to support rapid transit (i.e., does it serve areas with composite density to support 30-minute frequency or better)?
4. Does the section alignment serve places in Gorham, Westbrook, or Portland zoned for transit-supportive land uses?

Universe of Alignments

The universe of alignments that were screened included 22 major road and rail corridors that run through and connect the study area (Figure 16). Alignments on the Peninsula were not screened because they were all considered to meet the project purpose; Peninsula alignments were assessed later in the study.

Figure 16: Universe of Alignments, Pre-Screening

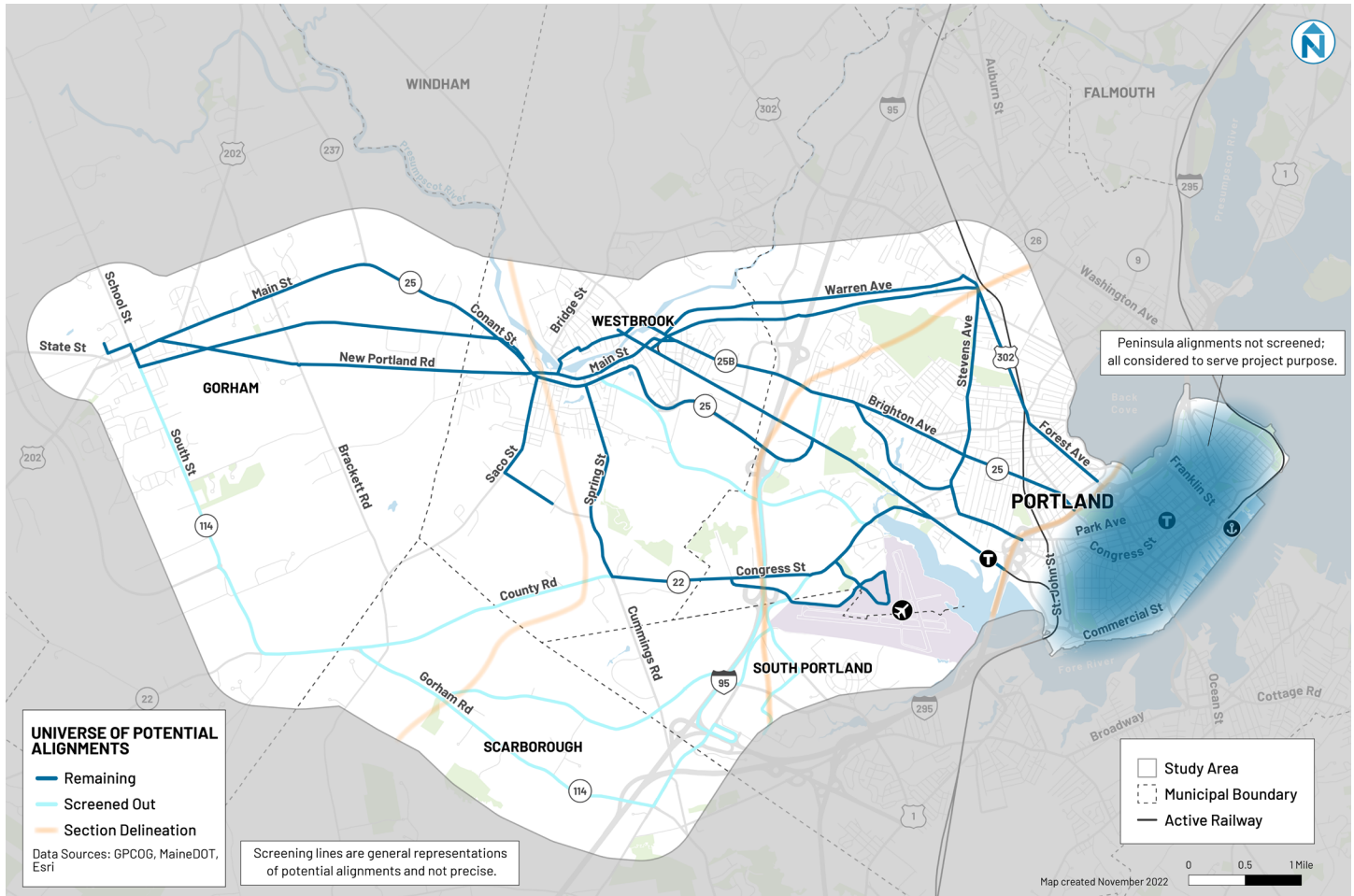


Screening Results

Five of the alignments that entered screening did not meet all four criteria and were removed from further consideration. Most were screened out due to a lack of connection to key activity centers or because they did not connect to Gorham Village, downtown Westbrook,

and downtown Portland. These alignments did not meet the project purpose. Remaining alignments moved on to the next step in the evaluation process, the Tier 1 Evaluation.

Figure 17: Universe of Alignments, Post-Screening



Step B: Tier 1 Evaluation

The Tier 1 Evaluation assessed the alignments that passed through the screening—plus Peninsula alignments that were skipped in the screening—against the seven project goals, each of which had between two and four criteria. The results of the Tier 1 Evaluation were a smaller set of alignments to be advanced into Tier 2 Evaluation, as well as a decision to advance only bus-transit alternatives.

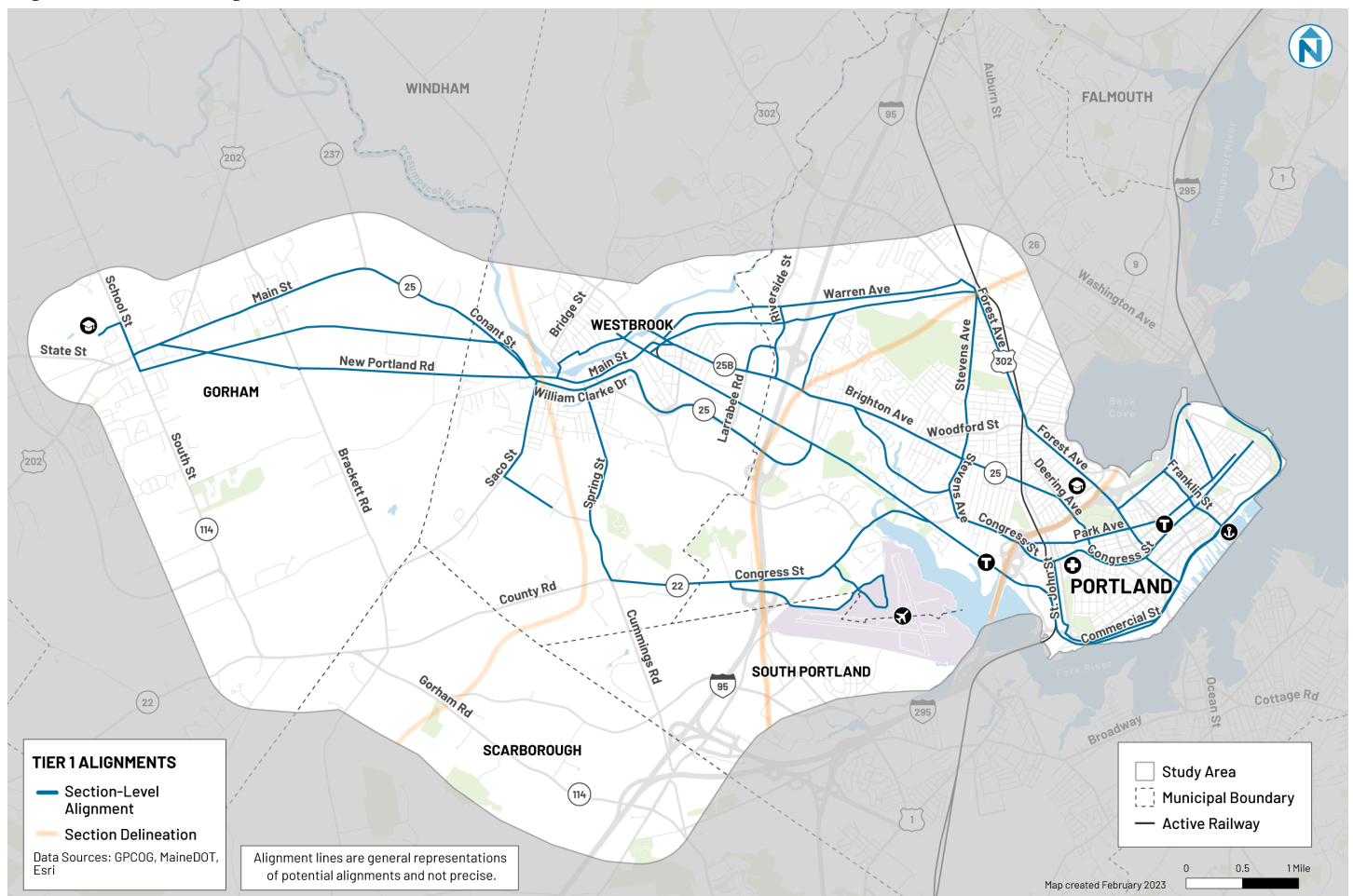
Evaluation Criteria

The Tier 1 Evaluation used a robust set of 17 evaluation criteria in seven goal areas. These criteria, outlined in Figure 18, were developed to align with the study's purpose, need, goals and objectives.

Figure 18: Tier 1 Evaluation Criteria

Goal Area	Evaluation Criteria
<p>1. Improve Mobility: Provide rapid transit service that is time-competitive with driving alone.</p>	<p>1.1 Potential/plans for exclusive right-of-way or other transit priority (e.g., multiple lanes, rail RoW, queue-jump lanes) 1.2 Percentage of signalized intersections that are TSP capable</p>
<p>2. Grow Transit Ridership: Encourage mode shift away from single-occupancy vehicles and decrease auto dependency and greenhouse gas emissions by providing rapid transit service where it is likely to have the highest ridership.</p>	<p>2.1 Average composite transit demand within 1/4 mile (using methods in market analysis; based on pop. density, socio-economic characteristics, emp. density, and industry type), weighted by geography area 2.2 Percent of acres within 1/4 mile that can support 30-min. or better all-day service</p>
<p>3. Support Sustainable Growth: Provide opportunities for transit-oriented development in areas aligned with local community plans, future development, and jurisdictional support, and serve these areas with more sustainable transportation options.</p>	<p>3.1 Average future composite transit demand (2045) 3.2 Percent of future acres within 1/4 mile that can support 30-min. or better all-day service (2045) 3.3 Corridor has jurisdictional support for upzoning, TOD, transit priority, and/or rapid transit service generally 3.4 Percent of acres within 1/4 mile that have transit-supportive zoning</p>
<p>4. Enhance Connectivity: Provide rapid transit that connects to a high-quality pedestrian network and other local and regional transit services.</p>	<p>4.1 Intersection density per acre within 1/4 mile 4.2 Connects to existing transportation hub (PTC, PULSE, Casco Bay Ferry Terminal, Jetport)</p>
<p>5. Focus on Equity: Provide rapid transit where and when transit-critical populations are traveling.</p>	<p>5.1 Transit index factor (weighted likelihood for residents to take transit based on race/ethnicity, vehicle ownership, and income) 5.2 Off-peak commuter density within 1/4 mile</p>
<p>6. Provide New Opportunities: Serve regional employment, education, shopping, social services, and other activities to enhance access to opportunities for regional residents. Support reverse commutes to employment, residential, and recreation opportunities in Westbrook and Gorham.</p>	<p>6.1 Employment density within 1/4 mile 6.2 Density of jobs with customers, clients, patients, and students within 1/4 mile (centers of activity)</p>
<p>7. Focus on Practical and Implementable Solutions: Achieve local consensus on an option that balances costs and benefits, aligns with local goals, and can be reasonably implemented.</p>	<p>7.1 Is not likely to have extraordinarily complex infrastructure requirements 7.2 Is not likely to face major political barriers (e.g., major land acquisitions, complex right-of-way use negotiations) 7.3 Does not impact sensitive environmental features</p>

Figure 19: Tier 1 Alignments



Evaluation Alignments

The Tier 1 Evaluation assessed alignments in Figure 19 in four geographic sections: three in the Gorham to downtown Westbrook section, 12 in the downtown Westbrook to Rock Row section, eight in the Rock Row to I-295 section, and 16 on the Portland Peninsula.

Front-Door Service

'Front-door' service is when transit operates on the main streets in a central business district, putting transit riders in the closest possible place to the largest number of potential destinations. 'Front-door' service typically produces higher ridership than transit that operates on roads that are a block or more from major destinations, as it is more visible and reduces the amount of time it takes riders to access a service.

Evaluation Results

The Tier 1 Evaluation scored each section-level alignment against the criteria in Figure 18, and then re-scaled the scores to a range of 0 through 100. Alignment-level scores for all the criteria were then averaged for each alignment, producing an overall score that was used to compare the alignments to one another. Results are shown in Figure 20.

In general, alignments in Portland scored higher than those in Westbrook and Gorham, although alignments in downtown Westbrook and near Rock Row scored well. High levels of population and employment density were a major factor in Portland alignments' strong scores. Alignments that served the 'front door' of town and city centers (e.g., Main Street in Westbrook and Congress Street in Portland) tended to score highest, while alignments in Gorham scored the lowest. Although the overall alignments in Gorham received low scores, USM Gorham remains a major anchor point; this was an important consideration throughout the study.

Alignments on existing roadways tended to score higher than those along railways for several key reasons:

- Rail corridors in this service area typically serve the ‘back door’ of the community; riders wouldn’t be dropped off at the front entrance of businesses or apartment buildings. Some of the rail corridors in question are also located in low-density or undeveloped areas, meaning there are long stretches of alignment that would be useful to relatively few people as a rapid transit service.
- Alignments on railways would provide fewer transfer opportunities to other transit services, because rail corridors don’t travel along roadways where other transit services are.
- Existing rail corridors generally don’t meet the project purpose of connecting to major activity centers without running in a roadway or taking property.
- The rail corridors did not meet the project goal of being practical and feasible, because using them for rapid transit may pose risks to sensitive

environmental features, and is likely to be infrastructurally and politically challenging, due to existing track conditions and/or the difficulty of sharing right-of-way with the existing freight and passenger rail services.

The study team conducted a ‘red-flag analysis’ as part of the Tier 1 Evaluation (Figure 21). This analysis identified alignments that might score well in the evaluation but yet contain ‘fatal flaws.’ The primary measures that the red-flag analysis considered were the potential for major environmental impacts, the level of complication involved in designing and building rapid transit on the alignment, and the risk of major political barriers to the project. Alignments highlighted as problematic in the red-flag analysis were primarily existing railroad rights-of-way, as building rapid transit in those places would likely either have environmental impacts, require taking of private property, be susceptible to sea-level rise/ storm surge, and involve complicated interactions with regional and federal rail stakeholders, given there are existing passenger and freight rail users within some of the right-of-way. Some rail right-of-way has already been converted to multi-use path.

Figure 20: Tier 1 Evaluation Average Index

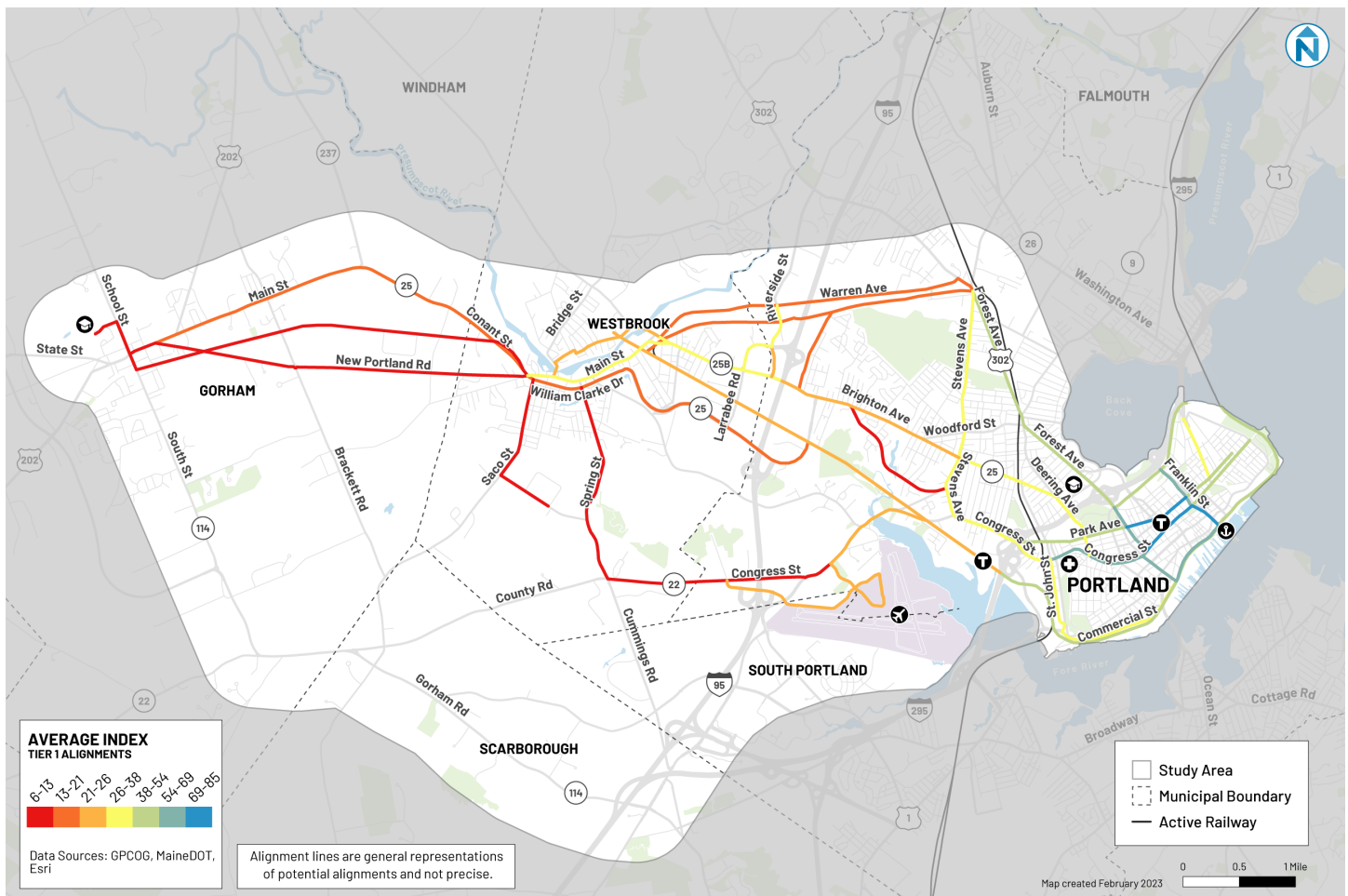
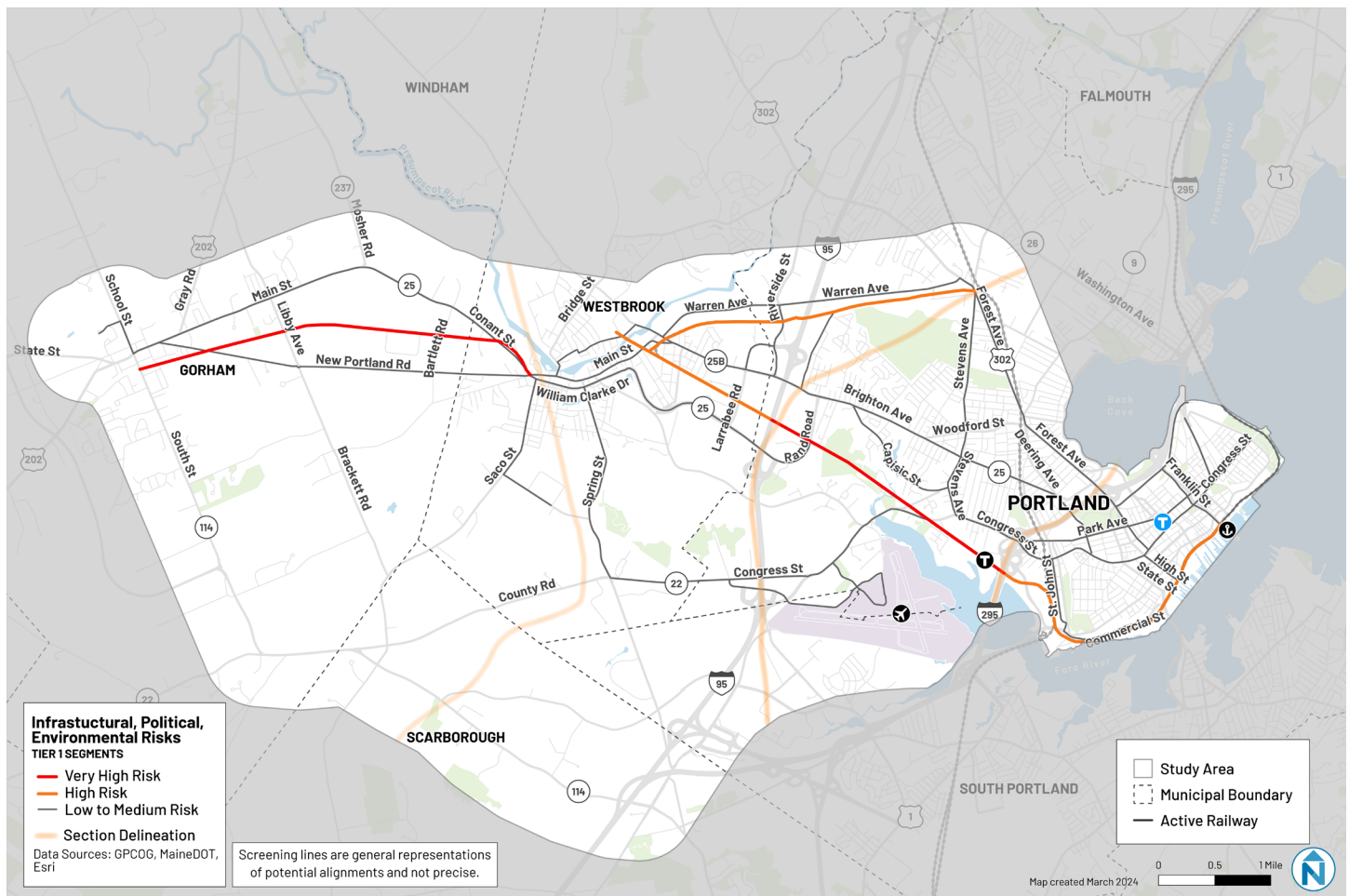


Figure 21: Tier 1 Red Flag Analysis



The Tier 1 Evaluation results were used to create four end-to-end alignments to be evaluated in the Tier 2 Evaluation. To create these end-to-end alignments, the highest scoring segment or segments in each geographic section were combined into alignments. The four alignments developed for the Tier 2 Evaluation are shown in the next section of this report.

Mode Selection

The Tier 1 Evaluation was the stage at which a decision was made regarding what mode would be best for a Gorham-Westbrook-Portland rapid transit service. Based on findings from the Tier 1 Evaluation—including the red-flag analysis and additional quantitative and qualitative work—the study team advanced bus transit as the mode for the project. The study team discussed the mode analysis and findings with the Northern New England Passenger Rail Authority (NNEPRA) and GP Metro.

The study team ruled out rail as a mode for the following key reasons:

- **Freight/passenger rail interaction:** Operating a passenger rail service on the Mountain Division and along the Portland waterfront likely would involve passenger rail sharing tracks with existing freight and Downeaster service, which is highly regulated by the Federal Railroad Administration (FRA) and could add major costs and limit the usefulness of passenger rail.
- **Limited access to jobs, key destinations, and low-income housing:** Operating on existing railways would give limited access to most key destinations in the study area, miss job-heavy districts like downtown Portland completely, and connect to few residential centers, particularly those with low-income housing.
- **Environmental impacts to sensitive sites and sea-level rise:** Because much of the existing rail that could be used by a passenger rail service is single-track, there would likely be a need to expand

rail right-of-way, potentially in environmentally sensitive areas. Additionally, sea level rise is predicted to heavily impact parts of the Mountain Division rail bed. Resiliency upgrades for this right-of-way would be costly and complicated to construct.

- **Property/easement acquisition:** To operate passenger rail service between Westbrook and Portland, property would need to be acquired. Acquiring this land could be politically and financially challenging. This includes siting a vehicle maintenance facility.
- **Track upgrades and at-grade crossings:** Much of the existing rail that would be used for rapid transit rail service would need to be rebuilt or upgraded to accommodate the proposed transit service, along with ongoing maintenance. Building at-grade crossings for street-running rail would be costly and complicated.

The team also assessed if new, street-running rail should be considered as a mode. The key reasons for assuming a bus-based mode over street-running rail include:

- **Capital Costs:** A rail alternative is likely to cost several times more to construct than a rapid-bus alternative.
- **Operating Costs:** It is generally more than twice as costly to operate rail transit on a per-hour basis than it is to operate bus transit.
- **Ridership and Capacity:** In the Greater Portland context, a street-running rail service is unlikely to produce enough added ridership to justify the higher cost of building and operating rail service instead of rapid bus.
- **Overall,** a rapid-bus alternative is assumed to provide similar benefits as street-running rail service at approximately one-half to one-eighth the per-rider cost. Put another way, rail service may cost two to eight times as much to build and operate on a per-passenger basis, even assuming considerably higher ridership on rail.

Unconventional Transit Modes

Community input during this study included a request to consider an untested, unconventional transit mode that operates as a suspended, magnetic-levitation monorail with on-demand stops and approximate four-person capacity. The study team considered the pros and cons of this hypothetical technology for rapid transit in the region, ultimately determining that the risk of constructing rapid transit using an untested technology—as well as likely operational issues with the concept—were too great for it to be advanced as the assumed mode in this study.



Image source: GPCOG

Step C: Tier 2 Evaluation

The Tier 2 Evaluation is the final stage of the rapid transit alternatives analysis process. This step evaluated four end-to-end alignments that emerged from the Tier 1 Evaluation, and the result of this evaluation was the draft LPA. To conduct this evaluation, considerably more detail as ascribed to the alternatives. The study team estimated travel times; assumed service levels; levels of transit priority, and changes to the regional transit network; and used the FTA Simplified Trips-On-Project Software (STOPS) to estimate ridership, among other details.

Evaluation Criteria

The Tier 2 Evaluation used the most detailed evaluation criteria of any stage in the alternatives analysis, assessing each alignment based on 17 criteria in seven goal areas that were tied closely to the study's purpose, need, goals, and objectives (Figure 22). The study team also looked at many other descriptive statistics related to each alternative.



Figure 22: Tier 2 Evaluation Criteria

Goal Area	Evaluation Criteria
<p>1. Improve Mobility: Provide rapid transit service that is time-competitive with driving alone.</p>	<p>1.1 Ratio of transit time to drive travel time, peak time and direction. 1.2 Percent of roadway with assumed dedicated transit right-of-way.</p>
<p>2. Grow Transit Ridership: Encourage mode shift away from single-occupancy vehicles and decrease auto dependency and greenhouse gas emissions by providing rapid transit service where it is likely to have the highest ridership.</p>	<p>2.1 Average weekday passenger trips (2019 ridership). 2.2 Serves major travel flows (as identified in Existing Conditions Report). 2.3 Average composite transit demand within 1/2 mile of stations (using methods in market analysis; based on pop. density, socio-economic characteristics, emp. density, and industry type), weighted by geography area within 1/2-mile buffer.</p>
<p>3. Support Sustainable Growth: Provide opportunities for transit-oriented development in areas aligned with local community plans, future development, and jurisdictional support, and serve these areas with more sustainable transportation options.</p>	<p>3.1 Weighted score indicating acreage zoned for TOD (commercial, developable, higher-density residential, residential, mixed-use, and vacant) within 1/2 mile of proposed stations. The value of acreage within 1/4 mile is doubled, as closer proximity has a higher probability of TOD. 3.2 Net change in kilograms of vehicle emissions (increased transit miles, decreased auto miles). Pollutants evaluated are carbon monoxide, atmospheric CO₂, CO₂ equivalent, methane, nitrogen oxides, total small particulate matter (PM_{2.5}), and volatile organic compounds. 3.3 Average composite 2045 transit demand within 1/2 mile of stations (using methods in market analysis; based on pop. density, socio-economic characteristics, emp. density, and industry type), weighted by geography area within 1/2-mile buffer.</p>
<p>4. Enhance Connectivity: Provide rapid transit that connects to a high-quality pedestrian network and other local and regional transit services.</p>	<p>4.1 Intersection density within 1/2 mile of stations.</p>
<p>5. Focus on Equity: Provide rapid transit where and when transit-critical populations are traveling.</p>	<p>5.1 Serves major zero vehicle population and low-income travel flows (as identified in Existing Conditions Report). 5.2 Adjusted population density within 1/2 mile of stations (adjusted by socioeconomic factors per acre).</p>
<p>6. Provide New Opportunities: Serve regional employment, education, shopping, social services, and other activities to enhance access to opportunities for regional residents. Support reverse commutes to employment, residential, and recreation opportunities in Westbrook and Gorham.</p>	<p>6.1 Density of jobs within 1/2 mile of stations. 6.2 Density of jobs with customers, clients, patients, and students within 1/2 mile of stations.</p>
<p>7. Focus on Practical and Implementable Solutions: Achieve local consensus on an option that balances costs and benefits, aligns with local goals, and can be reasonably implemented.</p>	<p>7.1 Estimated operating cost per weekday boarding. 7.2 Estimated capital cost. 7.3 Estimated annualized federal-share capital cost per unlinked passenger trip. 7.4 Corridor has jurisdictional support for service.</p>

Evaluation Alignments

The four alignments evaluated in this step are shown in Figure 23 and described in Figure 24. All four alignments would operate in the same fashion between USM Gorham and downtown Westbrook (Main Street and Conant Street/Route 25), between downtown Westbrook and Rock Row (Main Street) and between the GP Metro PULSE and Eastern Waterfront (Congress Street, Franklin Street, and Commercial Street). Aside from those locations, the alternatives differed as shown and described.

Figure 23: Tier 2 Alignments

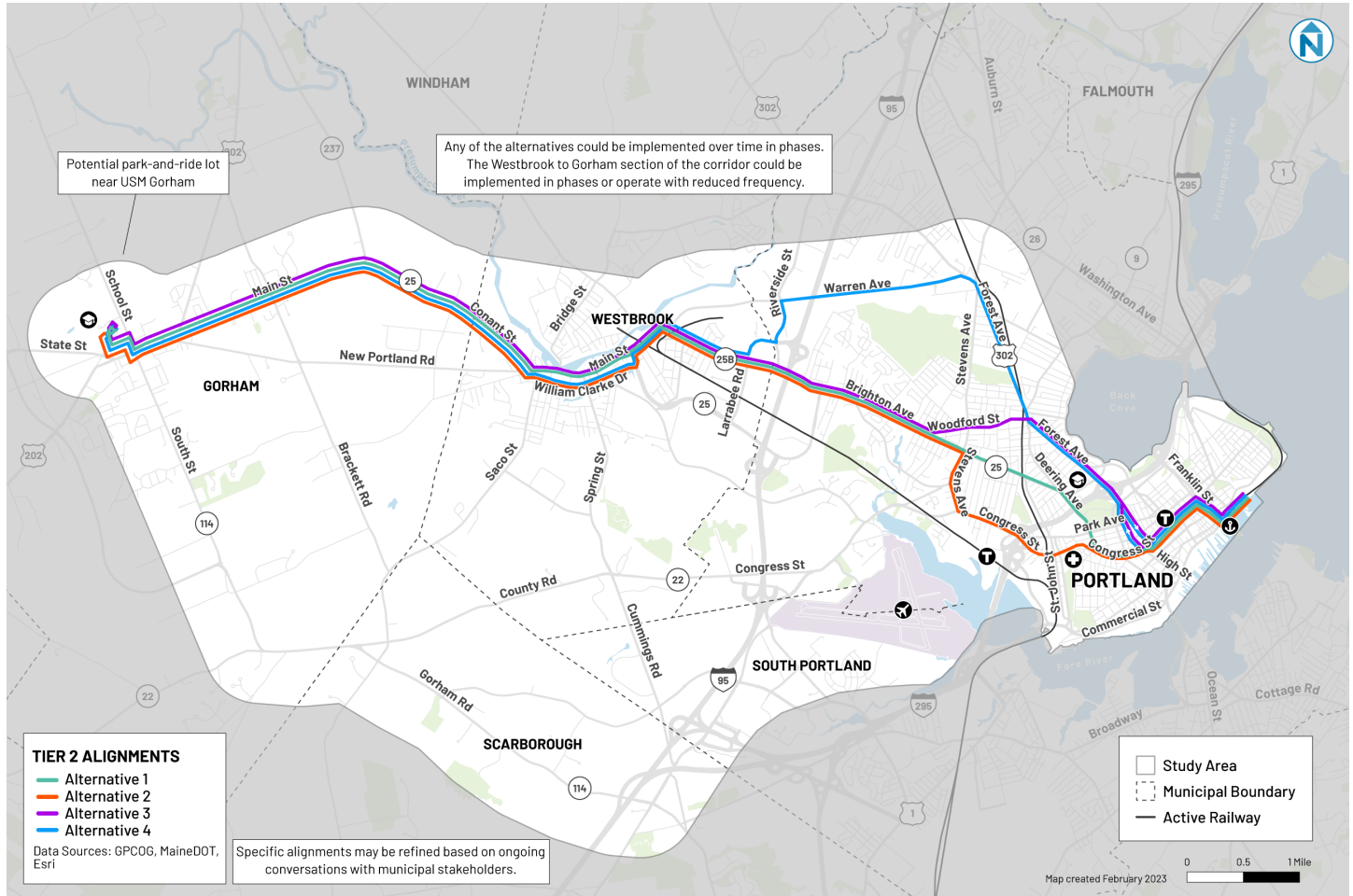


Figure 24: Tier 2 Alternatives

Alternative	Description
Alternative 1	Provides what is considered the most direct route between USM Gorham and downtown Portland and largely follows the alignment of the existing Husky Line. The alignment in downtown Westbrook uses William Clarke Drive outbound and Main Street inbound. In Portland, the alignment uses Brighton Avenue and Deering Avenue to access Congress Street.
Alternative 2	Differs from Alternative 1 in two ways: (1) the alignment in downtown Westbrook uses William Clarke Drive in both directions; and (2) more directly serves the current Portland Transportation Center by diverging from Brighton Avenue to Stevens Avenue and outer Congress Street.
Alternative 3	Identical to Alternative 2 between Gorham and Westbrook, but (1) uses Main Street/William Clarke Drive in Westbrook, and (2) Woodford Street to shift over to lower Forest Avenue and onto the Peninsula.
Alternative 4	Most like Alternative 2 between Gorham and Rock Row, but connects with Portland via Warren Avenue and Forest Avenue, instead of Brighton Avenue.

Service Levels in Gorham

Because Gorham alignments scored considerably lower than those in other municipalities in the Tier 1 Evaluation, the study team determined that rapid-transit service to Gorham would not need to be as robust as service in Westbrook and Portland. This is largely due to lower population and jobs densities in Gorham. In the Tier 2 Evaluation, the team used two sets of assumptions to model this lower level of service:

1. Assume initial rapid-transit service operates only between Westbrook and Portland, with the potential to open a 'Phase 2' of the project to Gorham at a later date.
2. Operate reduced—but still relatively frequent—rapid-transit service in Gorham. During peak hours, this means half of outbound buses from Portland would turn around at Westbrook and half would continue to Gorham.

To conduct these tests, each alternative was tested twice: once with no service in Gorham and once with reduced service levels.

Transit Priority Assumptions

The Tier 2 Evaluation assumed slightly different transit priority would be provided, depending on the alternative. By assuming transit priority, the study team was able to lower travel times for the buses, which typically increases the number of people for whom the service is useful. The types of transit priority assumed in this evaluation were:

- **Dedicated transit lanes**, which give right-of-way exclusively to transit vehicles.
- **Part-time transit lanes**, which give right-of-way exclusively to transit vehicles, but not for the whole day (e.g., only during rush hour). These lanes operate as general-purpose travel lanes or parking during the other part of the day.
- **Queue jumps**, which are short transit lanes at lights that help transit bypass traffic caused by vehicles queuing at an intersection.
- **Transit signal priority (TSP)**, which interacts with traffic signals to give preference to transit vehicles and prevent them from being delayed at signalized intersections.

When applying transit priority strategies to the alignments, the study team took the following approach:

- Where constraints existed, the team considered tradeoffs between general-purpose traffic and on-street parking with transit priority. The team generally assumed a rapid-transit project would operate within existing curb-to-curb right-of-way.
- Where constraints did not exist, the team sought transit priority.
- Where rapid transit must operate in mixed traffic, the team sought transit priority at signalized intersections and with queue jumps, where possible/needed.

Details about the level of transit priority assumed for each of the four shortlisted alternatives are included as Appendix G.

Operating and Design Assumptions

The study team developed service-level assumptions for each alternative to estimate operating cost and vehicle requirements, and to inform the STOPS ridership model. These assumptions are in Figure 25.

Figure 25: Tier 2 Evaluation Frequency and Hours of Operation Assumptions

<p>Hours of Operation: 5:00 AM – 11:00 PM Weekday 7:00 AM – 11:30 PM Saturday 7:00 AM – 8:00 PM Sunday</p>
<p>Frequency: On weekdays from 6:00AM to 7:00PM, every 10 mins. between Portland and Westbrook and every 20 mins. between Portland and Gorham, via Westbrook. Every 15 to 40 mins. at all other times.</p>

Design Assumptions

As part of the estimates made for each alternative in the Tier 2 Evaluation, the team used the following assumptions:

Stop Assumptions

- Rapid-transit stops are spaced farther apart than is typical for GP Metro local bus routes.
- Rapid-transit would use far-side stops where possible, as they are shown to increase transit speed and reliability, and improve pedestrian safety.

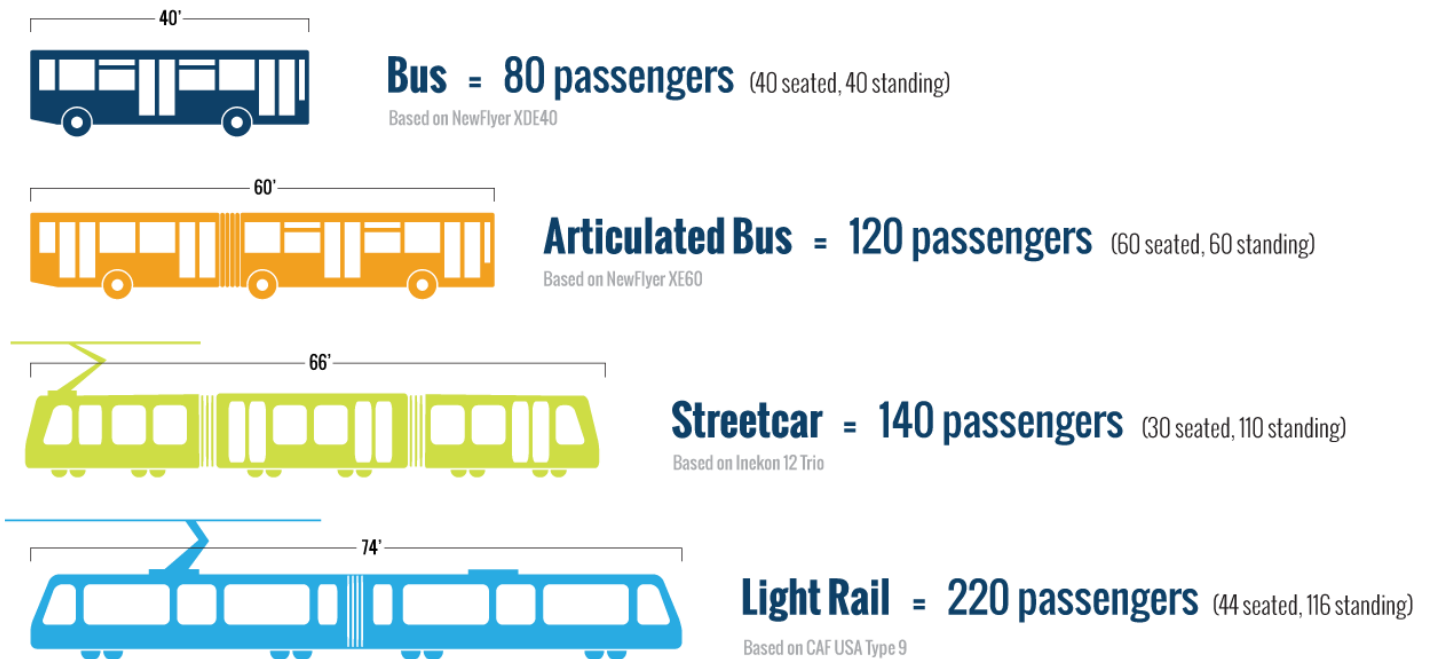
Operating Assumptions

- Rapid transit has all-door boarding and off-board payment at most stops.
- Rapid transit uses 60' articulated buses, allowing a maximum of 120 passengers per vehicle (see Figure 26 for various rapid-transit vehicle capacities).

- Changes were made to the underlying transit service network to avoid service duplication where local bus routes overlapped with a rapid-transit alternative.
 - » Alternative 1 assumed the Husky Line and Route 4 transition to the rapid transit line.
 - » Alternative 2 assumed Route 4 transitions to the rapid transit line.
 - » Alternative 3 assumed the Husky Line transitions to the rapid transit line and Route 4 operates with 60-minute headways on weekdays.
 - » Alternative 4 assumed the Husky Line transitions to the rapid transit line and Route 2 operates with 60-minute headways on weekdays.

Note: Service assumptions were adjusted during the LPA process; see Scenario Testing on page 46.

Figure 26: Rapid Transit Vehicle Capacities



Note: passenger volumes are approximate. Standing passenger capacity assumes vehicles are at or near crush capacity.

Evaluation Results

The four alternatives were assessed by the 17 evaluation criteria that aligned with the project goals. Each alternative was tested twice: once assuming service operated between Portland and Westbrook, and once assuming service operated between Portland and Gorham. The full evaluation results are described in Appendix E, and the evaluation's key measures are reported in Figure 27.

Figure 27: Tier 2 Evaluation Results Key Metrics

	Gorham-Portland				Westbrook-Portland			
Ridership	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
Daily Ridership (today)	3,300	2,900	2,600	2,400	2,800	2,500	2,100	2,000
Daily Ridership (future)	4,900	4,100	4,000	3,700	4,200	3,700	3,100	2,900
Other Metrics								
Pop. and Jobs Density	●	●	●	●	●	●	●	●
Equity Travel Flows Served	●	●	●	●	●	●	●	●
Route Cost Efficiency	●	●	●	●	●	●	●	●
Systemwide Cost Efficiency	●	●	●	●	●	●	●	●

The alternatives compared to study goals in the following ways:

- **Improve Mobility:** Westbrook-Portland alternatives have higher percentages of roadway with assumed dedicated transit right-of-way, which leads to higher transit speeds. Alternative 3 scores best on this metric.
- **Grow Transit Ridership:** Alternatives 1 and 2 have higher ridership, serve more travel flows, and have higher underlying demand.
- **Support Sustainable Growth:** Transit-oriented development potential and high levels of GHG reduction are why Alternative 2 scores highest in this goal.
- **Enhance Connectivity:** The pedestrian network is similar among alternatives, and is best in the more urban parts of Portland and Westbrook.
- **Focus on Equity:** All alternatives served equity travel flows well, but alternatives 1 and 4 provided the most mobility for disadvantaged populations.
- **Provide New Opportunities:** Because all alternatives serve downtown Portland, Rock Row, and downtown Westbrook, there was a high amount of job density around stations in all alternatives.
- **Focus on Practical and Implementable Solutions:** Alternatives scored similar on this metric, with Alternative 3 receiving the lowest score, based on relatively high costs per rider, and likely challenges implementing transit priority on Woodford Avenue.

Where do the Results Take Us?

The Tier 2 Evaluation results point the region's first rapid transit project in two directions:

1

Rapid Transit Should Serve Gorham

The results show that serving Gorham with rapid transit is a good idea, for several reasons:

- **Serving Gorham considerably increases the number of people that would benefit from a rapid-transit line, both in the Town of Gorham and at USM Gorham.**
- **Rapid-transit service to Gorham would be considerably more cost-efficient for the region to provide, as a rapid transit line could take over existing Husky Line service, allowing GP Metro to put its Husky Line resources towards rapid-transit service. If rapid-transit did not service Gorham, GP Metro would need to support both the Husky Line and a rapid-transit line.**
- **Serving Gorham brings two important regional transportation stakeholders on board: the Town of Gorham and USM. These project partners can help advocate for the service, provide capital or operating resources for the route, and ensure the region's transit network develops cohesively as more people and jobs come to Maine.**

2

Alternative 1 is the Most Promising Alternative

Although there are pros and cons to each alternative, Alternative 1 achieved the strongest results, and is the most promising alternative, for several reasons:

- **Ridership: Alternative 1 has 15% more daily ridership than the next-closest alternative.**
- **Travel Time: Alternative 1 has slightly faster travel times between Westbrook and the Portland Peninsula.**
- **Alternative 1 has a higher-density service area than other alternatives**
- **Public Input: Alternatives 1 and 2 were the highest-ranked alternatives during our last round of public input. Alternative 1 was the highest-ranked alternative for Portland residents.**
- **Key Destinations: Alternative 1 is the only alternative to serve both Maine Medical Center and USM Portland, projected to be two of the highest-ridership stops on the route.**
- **Equity: Alternative 1 serves more equity travel flows than other alternatives (tied for first)**
- **Efficiency: Operating cost per passenger is about 20% lower on Alternative 1 than next-closest alternative**
- **Capital Costs: Because Alternative 1 is so direct, it has lower capital cost than other alternatives.**



Image source: GPCOG

Scenario Testing

After receiving community and key stakeholder feedback about the underlying service assumptions, the study team conducted a 'scenario testing' exercise where the assumptions for Gorham-Portland alignments were changed and the alternatives re-evaluated, including in the STOPS ridership model. In particular, Route 4 service was retained with 60-minute or better 'overlay' (a type of local service that can accompany rapid or express bus) in alternatives 1, 2, and 3.

The scenario testing results showed that the relative performance of the alternatives did not change; **Alternative 1 remained the most promising**. Ridership on alternatives that overlaid Route 4 did decline slightly, under the assumption that some riders would continue to use Route 4 for select trips.

5 The Locally Preferred Alternative

The study team’s analysis finds Alternative 1 –Brighton Avenue to be the strongest alternative in terms of meeting the project’s goals and being the most competitive for federal funding. This chapter describes the key factors that allowed this alternative to emerge from the Tier 2 Evaluation as

the foundation of the LPA, as well as the LPA itself. The LPA in this section assumes that the sensitivity testing described in Chapter 4 is incorporated into the LPA, so numbers reported here for the four alternatives, as well as the LPA, assume those underlying service revisions.

Figure 28: Average Weekday Ridership by Alternative

Metric	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Current Ridership (2019)	3,140	2,710	2,640	2,450
Future Ridership (2045)	4,610	3,830	3,980	3,660

Note: These ridership numbers reflect adjustments in underlying transit service assumptions made during the LPA process.

Ridership

Figure 28 compares average weekday ridership by alternative. According to FTA’s STOPS ridership modeling software, Alternative 1 has the highest ridership for both current and future conditions. Current conditions assume 2019; future conditions assume 2045 and incorporate growth assumptions included in Connect 2045 and account for real-estate development that is planned or under way. Alternative 3–Brighton Avenue to Forest Avenue is the third-highest scoring alternative.

Ridership is highest for Alternative 1 primarily due to it serving Maine Medical Center with a station near the intersection of Congress Street and Deering Avenue—just under a quarter-mile from both the current main entrance off Bramhall Street and the planned entrance on Congress Street. To maximize the trip generation potential of Maine Medical Center, the City of Portland, MaineDOT, GP Metro, and the study team discussed whether a station serving the hospital’s future main entrance on Congress Street would be more effective.

To add a station at the planned Congress Street entrance, the route could run between Congress Street and Park Avenue via St. John Street. In each direction, this deviation would add approximately three-quarters of a mile and four minutes to the route, or nearly a 10% travel-time increase.

The FTA STOPS ridership modeling software does not accurately calculate how this increased time and distance might change ridership estimates, as

the underlying data is zone-based and both station locations are in the same zone. However, the study team believes the increased travel time would likely reduce ridership, as those riders not going to and from Maine Medical Center would see lower utility in the service because of the eight-minute round-trip deviation.

Nationally, a 1/4-mile walk from a rapid transit station to a major employment center is very common. For example, some of the busiest rapid-transit stations in Boston’s Longwood Medical Area are 1/2-mile or more from workplaces.

The above reasoning leads the study team to recommend service operate bi-directionally on Deering Avenue, with a deviation to Weymouth Street during winter weather events.

Travel Time

Figure 29 compares end-to-end travel time by alternative. Alternatives 1 and 3 have the shortest travel times based on route length, speed limits, assumed right-of-way treatments, signal delay, and dwell time at proposed stations.

The assumed right-of-way treatments are a critical part of travel-time estimates. To develop these assumptions, the study team met with each municipality in April 2023 to discuss what level of transit priority (e.g., dedicated lanes, queue jumps,

signal priority) might be appropriate for various segments of the four alternatives. While those conversations informed the study team’s preliminary travel-time estimates, a refined estimate depends on a better shared understanding of what level of transit priority will be used and where.

We anticipate the next steps of project development will continue right-of-way research, surveying, engineering, and public outreach to determine which transit-priority treatments will be most effective and appropriate given the project’s context. Rapid- and high-capacity transit projects depend on priority treatments to the maximum extent feasible to reduce travel time and maximize reliability, which helps make transit a more favorable travel choice than driving.

Operational Efficiency

Efficient transit serves as many people as possible for as little operating cost as possible. Figure 30 compares several efficiency measures by alternative. Alternatives 1, 3, and 4 have equal annual revenue hours—a proxy for operating cost—but each were assumed to impact the underlying transit network in different ways:

- Alternative 1 assumes the Husky Line transitions to the rapid transit line, and Route 4 operates with 60-minute headways.
- Alternative 2 assumes no change in the underlying network.
- Alternative 3 assumes the Husky Line transitions to the rapid transit line.
- Alternative 4 assumes the Husky Line transitions to the rapid transit line, and Route 2 operates with 60-minute headways.

Accounting for these assumptions, Alternative 1 would have the smallest net increase in systemwide annual revenue hours, and therefore the smallest increase in systemwide operating cost. In contrast, alternatives 3 and 4 have a greater net increase in systemwide annual revenue hours, and a higher increase in systemwide operating cost.

When accounting for ridership, Alternative 1 is nearly twice as efficient on a boarding-per-revenue-hours basis than Alternative 3; it requires fewer new revenue hours to provide more overall boardings.

Figure 29: End-to-End Travel Time (mins.) by Alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Inbound Travel Time	47	49	46	48
Outbound Travel Time	50	52	49	51

Figure 30: Operational Efficiency by Alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Annual Rapid-Transit Revenue Hours	49,900	54,100	49,900	49,900
Systemwide Net Change in Annual Revenue Hours	+28,700	+54,100	+36,000	+30,400
Percent Change in Systemwide Revenue Hours per Boarding	+14%	+30%	+22%	+19%

The assumption that the rapid transit service would subsume the Husky Line (and potentially Route 4) may benefit from further discussion through project development. Key questions include:

Can the rapid transit service subsume the Husky Line? USM is committed to continued direct service between its Gorham and Portland campuses. If the rapid transit service can accomplish this (as is the case in the LPA), the study team and GP Metro are confident that existing agreements between GP Metro and USM can be maintained or modified such that a rapid-transit service would take the place of the Husky Line.

Can the rapid transit service subsume Route 4? Transit riders will typically walk up to ¼-mile to local service and ½-mile to rapid-transit service. If a rapid-transit line were to operate in place of Route 4, some existing Route 4 riders might have a slightly longer walk to access the rapid transit service. A short, relatively low-ridership segment of Route 4 on Saco Street in Westbrook could lose service, although this service could be replaced with a short-turn shuttle or other service.

Social Equity

One goal of this project is to provide rapid transit where and when transit-critical populations are traveling, thereby improving access to opportunity for some of the region’s most vulnerable residents. We measure this by the number of ‘equity travel flows’—existing travel patterns of people with low incomes and/or without access to a vehicle—each alternative would serve. In other words, an alternative is considered to have positive social equity outcomes if it serves the travel needs of low-income people and/or people without vehicles. Figure 31 compares equity travel flows served by alternative. Alternatives 1 and 4 serve the most equity travel flows. Alternative 3 serves the fewest.

Economic Impact

Rapid-transit investments around the world have led to significant positive economic impacts in both traveler time and money savings, as well as in real-estate

development. Figure 32 compares two important economic impact measures by alternative. One measure is rider ‘time-value’ savings, which is the value of time saved by riders due to the speed of rapid transit compared to a ‘no-build’ transit travel time. Based on an estimated average local wage, Alternatives 1 and 3 save riders the most time-value.

Another measure of economic impact is the ‘TOD opportunity score’, which rates the land near proposed stations in terms of opportunity for transit-oriented development (TOD). A higher TOD opportunity score indicates greater opportunity for TOD. This score is highest for alternatives 1 and 3, representing greater development potential near Maine Medical Center in Portland and along lower Forest Avenue. The score is a weighted score indicating acreage zoned for TOD (i.e., commercial, higher-density residential, residential, or mixed-use zoning on vacant and/or developable land) within ½-mile of proposed stations. The value of acreage within ¼-mile is doubled, as closer proximity has a higher probability of TOD.

Figure 31: Equity Travel Flows Served by Alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Equity Travel Flows Served	11	10	8	11

Figure 32: Economic Impact by Alternative

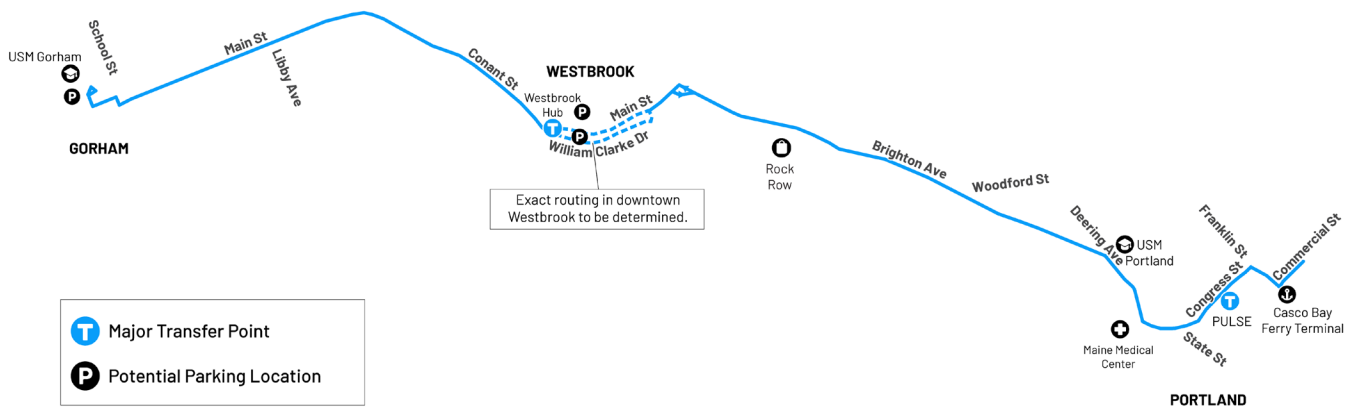
Metric	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Annual Value of Worker Time Saved	\$1,649,000	\$687,500	\$1,489,500	\$877,000
TOD Opportunity Score*	16.9	16.5	17.3	13.7

*A higher score indicates more TOD opportunity.

A Closer Look: The Locally Preferred Alternative

This study's LPA is a fast and direct rapid-bus service connecting Gorham, Westbrook, and Portland, primarily via State Route 25/25B in Gorham and Westbrook, and Brighton Avenue and Congress Street in Portland. This alignment is in Figure 33, and most closely resembles "Alternative 1—Brighton Ave" from the study's alternatives evaluation.

Figure 33: Map of LPA Alignment



From west to east, the LPA connects USM Gorham, Gorham Village, downtown Westbrook, Rock Row, USM Portland, Maine Medical Center, downtown Portland at the GP Metro PULSE, and the Eastern Waterfront. The LPA will provide 10-minute, all-day service between downtown Portland and downtown Westbrook, and 20-minute all-day service between downtown Portland and USM Gorham. Key service characteristics are in Figure 34.

Figure 34: Key Statistics of the LPA

The Locally Preferred Alternative: Key Statistics	
Length of the LPA: 12 miles	Time Spent at Each Station: 30 seconds
Number of Stations: 19	Average Daily Ridership (2045): 4,600
Hours of Operation: 5:00 AM – 11:00 PM Weekday 7:00 AM – 11:30 PM Saturday 7:00 AM – 8:00 PM Sunday	Major Transfer Locations: Westbrook Hub GP Metro PULSE Casco Bay Ferry Terminal
Frequency: On weekdays from 6:00 AM to 7:00 PM, every 10 mins. between Portland and Westbrook and every 20 mins. between Portland and Gorham, via Westbrook. Every 15 to 40 mins. at all other times.	Number of Buses Needed: 12 buses Assumed Maximum Vehicle Load: 80 passengers
Estimated Extent of Operation in Exclusive Transit Right-of-way: 50% (6 miles)	Residents and Jobs along the Corridor Jobs (2019): 51,400 Residents (2020): 47,200

Note: These figures are based on the current LPA; as stakeholder conversations continue, these key statistics will likely evolve.

Costs

This rapid-transit study includes high-level operating and capital costs for the LPA. Operating costs are based on the project's projected levels of service and operating characteristics (e.g., travel times). Capital costs are based on planning-level assumptions of the quantity and type of facilities, transit-priority treatments, vehicles, and professional services.

Operating Costs

Operating costs (Figure 35) are estimated on a per-revenue hour basis, under assumptions that include the project span of service, frequency of service, travel times, speed, and a 10% minimum layover time.

Figure 35: Estimated Annual Operating Costs by Day Type

Day Type	Estimated Annual Operating Costs
Weekdays	\$4,381,000
Saturdays	\$611,000
Sundays	\$363,000
Total Annual	\$5,355,000

Capital Costs

Capital costs are provided as a range in Figure 36. A range is used due to the planning-level nature of the estimates, as well as uncertainty around certain specifics of the project. Details such as the exact extents of transit-priority treatments, number of traffic signals at which transit-signal priority will be installed, and elements installed at each station will be determined as part of the preliminary design of the project; those decisions will have a significant impact on the project's cost. Cost estimates are in 2023 dollars.

Figure 36: Estimated Annual Capital Cost Range

Cost Category	Estimated Cost, Low End	Estimated Cost, High End
Roadway Reconstruction	\$14,680,000	\$24,300,000
Stations, Stops, and Terminals	\$5,820,000	\$7,500,000
Site Work and Special Conditions	\$14,520,000	\$22,300,000
Transit Signal Systems	\$7,650,000	\$14,850,000
Allocated Construction Contingency	\$19,200,000	\$31,030,000
Vehicles	\$8,640,000	\$15,120,000
Professional Services	\$31,860,000	\$53,740,000
Allocated Vehs. & Services Contingency	\$6,480,000	\$11,020,000
<i>Subtotal</i>	<i>\$108,850,000</i>	<i>\$179,860,000</i>
Unallocated Contingency	\$4,700,000	\$7,990,000
Finance Charges	\$2,350,000	\$3,990,000
Grand Total	\$116,000,000	\$192,000,000

Municipal Benefit

Much of the work completed as part of the LPA will benefit everyone who travels along the project corridor—not just people riding rapid transit. Roadway resurfacing and re-striping conducted as part of the project will benefit people driving and biking along a road, as well as people riding the bus. Traffic signal upgrades to accommodate TSP will benefit all users of a traffic signal, even if they are not on a bus. These elements of the LPA can be described as ‘municipal benefits’, as they are transportation improvements produced as part of the LPA that would otherwise need to be paid for and conducted by local or state government.

Figure 37 shows a range of estimated improvement values related to roadway and traffic signal work that would be completed as part of the rapid-transit project. The range is based on the same approach used in the capital cost estimating for the rapid-transit project. Roadway improvements include resurfacing and restriping, and traffic signal improvements include controller and other equipment upgrades.

Figure 37: Estimated Value of Improvements to Municipal and/or State Infrastructure Under LPA

Metric	Roadway	Traffic Signals	Total
Gorham	\$1,550,000 to \$3,190,000	\$60,000 to \$2,320,000	\$1,610,000 to \$5,510,000
Westbrook	\$3,170,000 to \$4,590,000	\$140,000 to \$10,440,000	\$3,310,000 to \$15,030,000
Portland	\$11,720,000 to \$36,930,000	\$11,190,000 to \$14,870,000	\$22,910,000 to \$51,800,000
Total	\$16,440,000 to \$44,710,000	\$11,390,000 to \$27,630,000	\$27,830,000 to \$72,340,000

The LPA could involve over \$70M of improvements to local infrastructure that would otherwise need to be covered by local governments and/or MaineDOT.



Image source: GPCOG

What is Contingency?

Contingency is a budget value that is set aside to cover unexpected costs in a project, and is a major part of capital cost estimates for transit projects, especially in the planning stages. Cost estimates in this study include two contingency types:

Allocated contingency accounts for yet-to-be-determined costs that will occur during specific parts of a project. For example, a more expensive glass may be chosen for bus stations than initially assumed. As a project becomes further defined, allocated contingency is reduced.

Unallocated contingency accounts for costs that may occur due to unforeseen occurrences over the course of a project. For example, previously unknown site conditions may be identified when construction begins.

6 Implementation Plan and Next Steps

This chapter provides an overview of how the Gorham-Westbrook Portland rapid transit LPA could be implemented over time, as well as details of what could be covered in the next phase of the project.

Implementation Plan

The process of bringing a rapid-transit study from the planning to operational phases involves several steps, each of which builds on previous work. Broadly speaking, the next steps towards operationalizing this rapid transit project are:

- **Traffic and Right-of-Way Refinements:** A deeper dive into traffic and right-of-way analyses, to resolve any remaining uncertainty.
- **Preliminary Engineering:** Early design work and project definition.
- **Design Completion:** Completing the design of the project and preparing for construction.
- **Construction:** Building the project and preparing for operationalization.

The first two major next steps are described below.

Traffic and Right-of-Way Refinements

At the conclusion of this rapid-transit study, there is some uncertainty around several key questions, such as potential impacts of rapid-transit service to traffic movements in select locations, and right-of-way availability for various rapid-transit elements (e.g., stations and bus lanes). Finding consensus around these questions is important to prepare the project to move into Preliminary Engineering. As part of answering these questions, the project team will conduct key stakeholder outreach, research, and analysis. When refinements to traffic and right-of-way understanding are complete, the project will move into Preliminary Engineering.

Preliminary Engineering

The next phase of this project is Preliminary Engineering (PE). The PE phase covers a wide range of activities, including engineering survey, traffic engineering, entering into the FTA Project Development process, identifying any necessary design exceptions, identifying any right-of-way needs, and obtaining environmental clearance. Critical questions that will be addressed in the PE phase are:

- What opportunities exist to provide infrastructure that allows transit vehicles to provide a high level of service, while minimizing impacts to other modes, particularly active transportation?
- How can such outcomes as land acquisition be weighed against the desire for mode-specific facilities, such as transit lanes or separated bicycle lanes?
- How do various transit operational parameters, such as side-running versus center-running, impact outcomes along various sections of the proposed route?

The conclusion of the PE phase is a full definition of the project, with 30% design plans for each section of the alignment, the identification of stop locations, the design of stops and stations, completion of environmental clearance, the identification of permits required, updated cost estimates, and updated ridership analysis. This additional analysis will give GP Metro, the municipalities, MaineDOT, and other key stakeholders a clearer vision of how the project fits within the existing urban fabric of Gorham, Westbrook, and Portland, including where dedicated bus lanes can be provided, how transit service will interact with other multimodal infrastructure, and how the project might be phased over time. Design choices should reflect the context of individual roadway segments, such as street width, roadway speed, active transportation needs, adjacent land uses, right-of-way availability, and community vision.

Once the team has conducted an engineering survey, more detailed traffic analysis and engineering can occur. A traffic simulation model such as Synchro or VISSIM is developed for the preferred alignment,

with traffic counts collected along the corridor to understand existing and future no-build traffic conditions, as well as the composition of activity along the corridor (e.g., heavy-vehicle volumes and movements, bicycle and pedestrian activity, and changes in traffic volumes throughout the day). Civil engineering is conducted to develop transit movements in the context of overall traffic flow. Some concept development would likely continue into the PE phase, especially in locations where some uncertainty exists, including:

- **Downtown Portland**, especially along the Congress Street corridor, where there is uncertainty around how buses would operate and where they would gain transit priority. Serving as the 'spine' of the Portland Peninsula, Congress Street plays a unique role in the transportation network for the City, and is generally highly constrained, with building frontages typically along the right-of-way. With its dense mix of institutional, commercial, and residential uses, maintaining facilities that support a high level of pedestrian activity and street activation is essential. Work will be done to identify ways to provide transit priority while maintaining pedestrian space. Additional analysis must also determine potential parking impacts. Lastly, the majority of Congress Street along this route is within a historic district, so the appropriate design and outreach will be required during the review and approvals process.
- **End-of-line locations** such as Ocean Gateway and USM Gorham (or points west), to better understand layover space, driver comfort facilities, turnaround locations, and whether any non-revenue space is needed. The long-term needs of Ocean Gateway must be considered; this may require the exploration of nearby alternatives.
- **Brighton Avenue**, where engineering survey data is needed to better define the project and its level of transit priority, working in concert with the traffic analysis to find the optimal solution for transit, bicyclists, pedestrians, and general purpose traffic. Brighton Avenue can be thought of as two distinct portions of roadway. The first portion is from the Westbrook/Portland boundary to Rand Road. This is a wide section of street with five general-purpose travel lanes and bike lanes that discontinue at Taft Avenue, with fewer than 20,000 vehicles using the road daily. The City of Portland's goal has been

extending bike facilities to the east of Taft Avenue. From Rand Road to Park Avenue, there is a need to focus on integrating all modes with transit—especially cycling. Connect 2045 identifies the Brighton Avenue Multimodal Modernization project as a regional priority. Given the higher traffic speeds on this section of roadway and the presence of building setbacks from the existing right-of-way line, separated bicycle facilities are a priority for the City.

- **Downtown Westbrook**. Here, the operation of transit vehicles on William Clarke Drive must be clarified, as well as if any would operate on Main Street. Other key questions include where outbound buses turning around in Westbrook would lay over, as well as level of transit priority.
- **Parking and park-and-ride locations** in Gorham and Westbrook, including the size, location, and pricing levels.

Also included in this phase is the environmental documentation. During this study, GPCOG ascertained support from FTA Region 1 that the project would fit within the category of a Categorical Exclusion under the National Environmental Policy Act (NEPA). In the Preliminary Engineering phase, environmental paperwork would be completed and submitted, with approvals received from the FTA. A Categorical Exclusion is a checklist without need for substantial environmental analysis, as the project largely fits in available right-of-way. That being said, some additional documentation is assumed in the areas of historic and cultural significance, traffic and transportation, and air quality. Environmental and other permits that will be required for construction will be identified in this phase.

The engineering team will be required in PE to think through construction staging and temporary traffic control, meaning what will construction of the project look like and what temporary impacts will be incurred by residents and businesses during construction. Typical construction impacts include traffic congestion, noise, light pollution, and air quality impacts caused by dirt and dust. Temporary economic impacts and mitigation strategies could also be identified.

Funding Opportunities

This project's capital costs are anticipated to be funded in large part through federal grant programs, all or some of which may be competitive. Winning a competitive federal grant will require our region to put its best foot forward; federal funders want their grant award to have the highest benefit and serve the most people per dollar invested.

While projected ridership may not be in the same league as that on big-city transit systems, other aspects of the project tell a compelling story:

- The project is supported by two major institutional partners: MaineHealth and USM.
- The project supports regional priorities as outlined in plans like *Connect 2045*, *Transit Tomorrow*, and *Transit Together*.
- The project advances statewide and local climate planning efforts as outlined in plans like *Maine Won't Wait*, *Connect 2045*, and Portland/South Portland's *One Climate Future*.
- The project has received significant public support, with 85% of the almost 600 respondents to our latest survey saying that they support Alternative 1.

In addition, as a member of our project advisory group, FTA is aware of the results of the study team's analysis and has underscored the importance of a united group of key stakeholders advancing the strongest project possible. The study team is hopeful public support will translate into political support from local, state, and federal leaders.

Next Steps

The LPA has been developed to the intermittent conceptual design level, based on GIS mapping, aerial imagery, and limited field measurements. This conceptual design illustrates intended cross-sections and overall transit infrastructure along the alignment. These conceptual plans will need to undergo more detailed engineering based on professional field survey, including detailed utility and right-of-way information. The overall steps in the design process will include data collection for survey data, utilities, property information, and more. Traffic counts will need to be conducted for existing and proposed traffic signal and roadway plans. This information will inform detailed analysis and designs.

All planning efforts must adapt to changing circumstances. For example, this project team can reevaluate rapid-transit plans if there is a demonstrated shift in demographic or development patterns in the coming few years. The team cautions, however, that minor adjustments to alternatives evaluation methods or assumptions at this stage in the project are unlikely to have a significant impact on the alternatives and their projected benefits.

The specific process for engineering each segment will vary based on roadway jurisdiction and funding source. For much of the alignment, this means working closely with MaineDOT and the cities of Westbrook and Portland.

Elements of the project may also be implemented in phases, allowing Husky Line service to transition to rapid-transit service over time. Early implementation elements may include signal-timing improvements or TSP implementation that would require review and approval by the appropriate agency or municipality.





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