

CHAPTER 4: PRIORITIZING PEDESTRIAN IMPROVEMENTS

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PRIORITIZATION FRAMEWORK

Full implementation of all pedestrian needs across the city will take many years. This makes it important to develop a framework for selecting an equitable and realistic set of prioritized projects to complete over the course of the 20-year Plan. If we can only afford to build or improve a certain number of sidewalks or crossings each year within the timeline of the Plan, which ones should we build first, and where?

The PMP prioritization is our 20-year blueprint for providing a suite of pedestrian improvements across the city. The intent is to focus resources in areas where conditions are difficult, and where people need to be able to walk the most. The process is based on an analysis of factors related to the Plan's goals of vibrancy, safety, equity, and health. This data-driven prioritization framework helps us provide targeted improvements that reflect community priorities, SDOT and City policy objectives, current data, and projected funding.

KEY ELEMENTS IN THE 2016 PMP PRIORITIZATION

We have “re-grounded” the prioritization in the Plan’s goals and ensured that it continues to reflect City policy objectives, national and international best practices, and community priorities. The key elements include:

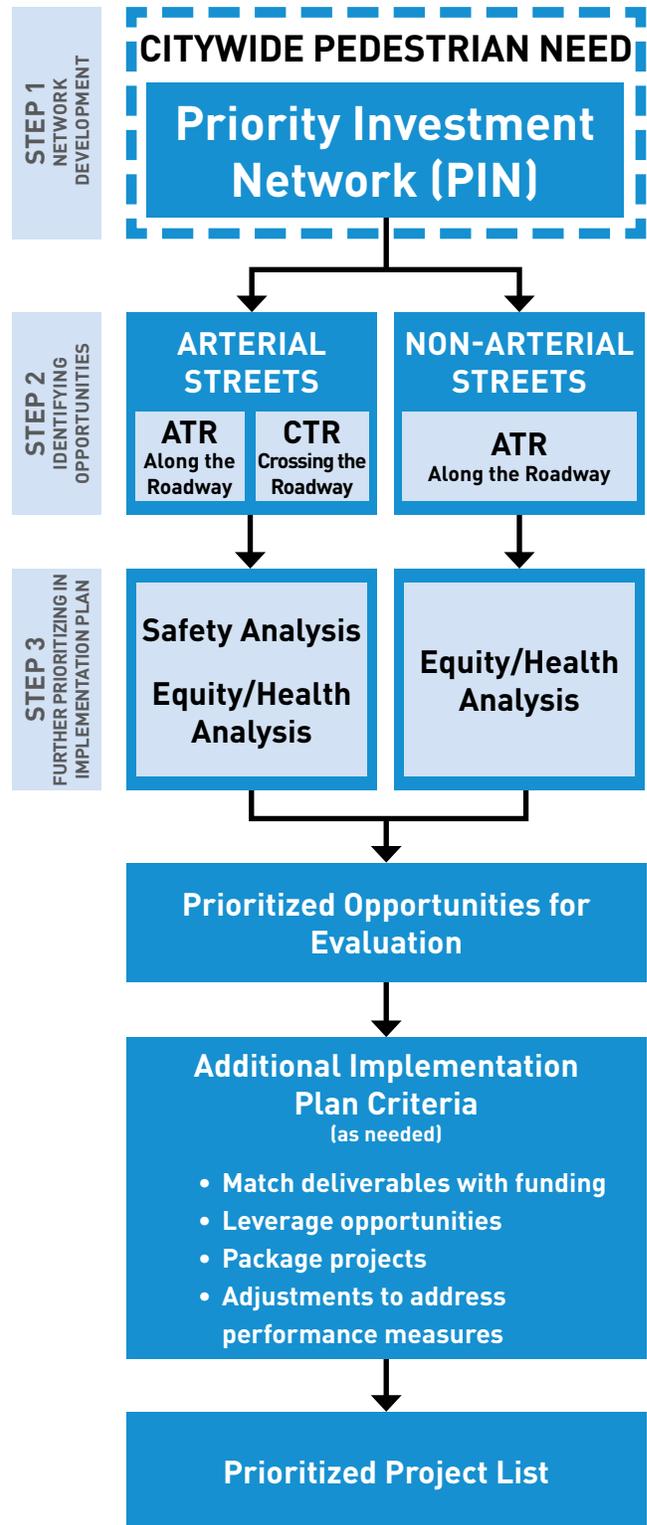
- A focus on schools and transit as key pedestrian destinations, directing resources to the most critical components of the pedestrian network
- A clear, connected network of streets connecting pedestrians to key destinations; investments will be directed to this Priority Investment Network (PIN)
- Updated data to measure vibrancy, safety, equity, and health to more accurately identify locations most in need of pedestrian improvements. This includes using new Vision Zero traffic safety data to ensure that the PMP contributes toward the City’s vision of eliminating fatal and serious injuries on Seattle streets by 2030
- Clarity about the location, number, and type of “along-the-roadway” and “crossing-the-roadway” improvement opportunities within the PIN

To narrow citywide need into a 20-year plan, the prioritization framework includes three steps as diagrammed in Figure 4-1:

- **Step 1:** we developed a citywide “Priority Investment Network” (PIN) using vibrancy (or demand) factors; these streets will be prioritized for pedestrian improvements
- **Step 2:** we identified specific opportunities for improvement within the PIN to improve conditions both along and across these streets
- **Step 3:** we established the criteria by which these opportunities will be prioritized as the Plan is implemented, applying safety and equity/health analyses to identify which opportunity areas within the network to evaluate first for pedestrian improvements

Full technical details of the 2016 PMP prioritization methodology are available in Appendix 7.

FIGURE 4-1: PRIORITIZATION FRAMEWORK



To ensure that PMP investment priorities accurately reflect those of Seattle residents, we engaged community members to help us better understand where to focus finite resources to improve pedestrian conditions in Seattle. This was done through a series of public outreach activities designed to gather feedback, and included a citywide public survey where we asked three key questions about pedestrian conditions in Seattle:

- What makes it difficult or unpleasant for you to walk?
- Where should the City prioritize walking improvements first?
- What types of pedestrian improvements should we build first?

Community responses (over 4,700) were clear, directing us to prioritize investments for:

- Streets connecting families and children to schools
- Streets connecting people to transit stops
- Sidewalks and crossings on busy arterial streets
- Residential streets where sidewalks are missing
- Locations where pedestrians are injured

This public input is reflected in the PMP prioritization process and will guide how we allocate resources and where we provide improvements moving forward.

See Appendix 2 for the full PMP Public Survey Report.

NETWORK DEVELOPMENT: THE PRIORITY INVESTMENT NETWORK

To focus improvements and investments to locations most in need, the PMP defines a “Priority Investment Network” (PIN). The PIN is composed of streets that serve as key pedestrian routes to k-12 public schools and frequent transit stops, two types of destinations dispersed throughout all areas of the city. This network reflects the Plan’s “vibrancy” (or demand) goal by ensuring that pedestrian improvements are directed to locations to which people most need to walk across the city.

Schools and transit stops are arguably the most important pedestrian destinations in the city. Public feedback confirms that residents want to prioritize improvements on streets connecting people to transit stops and on streets connecting families and children to schools. As such, the foremost priority of the PMP is ensuring that streets connecting people to these key destinations provide a safe and comfortable pedestrian environment. These same streets also often provide key connections to and within urban centers and urban villages.

Connecting families and children to public schools and people to frequent transit stops has multiple positive outcomes, as it:

- Focuses on some of our most vulnerable residents and improves the health of our children by providing safe options to walk to school
- Creates transportation options by providing safe and comfortable connections to transit, providing pedestrians access to destinations across the city
- Distributes investment priorities across the city, as schools and transit stops are important destinations in all neighborhoods

The PIN's foundation is "walksheds" – streets that serve as important walking routes to each school and frequent transit stop in the city. We established walksheds within a prescribed distance of each of these destinations, and then overlaid these routes to create a clearly identified, interconnected Priority Investment Network. Table 4.1 shows the walkshed distances we used for public schools and frequent transit stops. Every city street located within a walkshed to a school or frequent transit stop is included as part of the PIN.

TABLE 4-1: WALKSHED DISTANCES

Pedestrian generator	Distance (miles)
K-12 Public Schools	1/4
Frequent Transit Network Stops	
Existing or planned transit hubs*	1/2
Link Light Rail (LRT)	1/2
RapidRide, future Bus Rapid Transit (BRT) and Streetcar	1/4
Frequent/priority bus	1/8

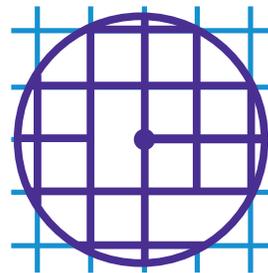
*Transit hubs are where an existing or planned LRT, RapidRide, BRT, or streetcar route, as identified in the Transit Master Plan, intersects with at least one other of these routes.

The frequent transit stop locations we used to develop the PIN were derived from the City's Transit Master Plan (TMP). The TMP provides detailed information on both routes and stops for existing and future Link Light Rail, Seattle Streetcar, and RapidRide / Bus Rapid Transit (BRT) service. The TMP also identifies "priority bus corridors" where existing transit ridership is high and planned growth will continue to drive transit ridership demand. The TMP calls for transit speed and reliability improvements along these priority bus routes in order to upgrade these high ridership routes to frequent service levels. The PMP Priority Investment Network assumes that as these existing bus routes are upgraded, existing bus stops will be consolidated to approximately 1/4 mile spacing.

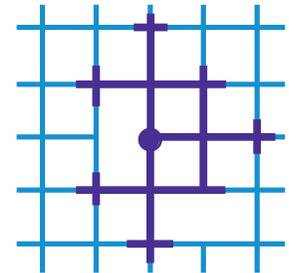
WHAT IS A WALKSHED?

A "walkshed" is the network of streets within a defined walking distance of a specified location, such as a transit stop. They are a more accurate way to identify actual walking routes and distances to destinations. Unlike approaches that measure straight-line distance to a destination "as the crow flies," walksheds attempt to consider gaps in the network where streets don't connect and physical barriers like water bodies. Mapping walksheds on the street network helps identify individual street segments that pedestrians are likely to take to a specified destination within a given walking time or distance.

Crow Flies Radius Network



Walkshed Network



This stop spacing assumption is consistent with the planning assumptions underlying Metro's long range transit plan. While it is not entirely possible to know which existing stops will be consolidated in the future and which will remain, the PIN assumes that high ridership stops located at arterial intersections would likely remain. As priority bus routes are upgraded to frequent service in the future, updated stop locations will be integrated into future updates of the PMP, along with any other changes to frequent transit stop locations.

WHAT IS THE FREQUENT TRANSIT NETWORK?

While quality pedestrian connections to all transit stops within the city are important, the PMP prioritizes connections to stops on the Frequent Transit Network (FTN), as identified in the City's Transit Master Plan (TMP). This approach aligns investments between the PMP and the TMP, maximizing impacts to both modes.

The TMP defines the FTN as “a network of top-quality services provided by bus and rail modes, connecting residents and workers to the regional transit system via transportation centers that are well integrated with urban village life.”

Frequent Transit is service occurring every 15 minutes or less at least 18 hours a day, 7 days a week. It includes light rail, streetcar, RapidRide and bus rapid transit, and frequent bus service.

Because the PMP seeks to direct pedestrian improvements to streets connecting people to both existing and future frequent transit stops, the PIN also includes streets within walksheds to all sited Link Light Rail stations (both existing and planned). As new light rail stations are sited, we will identify streets to be added to the pedestrian Priority Investment Network, consistent with the methodology outlined in this Plan. Sound Transit will be responsible for assessing and providing pedestrian improvements within that walkshed consistent with the Sound Transit Board Station Access Policy.

In addition to walksheds to schools and frequent transit stops, the PIN also includes all frequent transit corridors themselves. This helps to ensure that there are good pedestrian conditions both along and across all frequent transit routes, including between transit stops. Because frequent transit corridors traverse some of the city's key arterial corridors, focusing resources to improve conditions both along and across these corridors also reflects the public's desire to prioritize sidewalk and crossing conditions along busy arterial streets.

The PIN includes both arterial and non-arterial streets. Arterial streets tend to be roadways with more cars and higher speeds, while non-arterial streets are neighborhood roadways with lower speeds and volumes.

Together, these streets create a clearly identified, interconnected pedestrian network that connects people to important destinations. Funding to improve conditions both along-the-roadway and crossing-the-roadway will be directed to the streets within this network.

The PIN is shown by city sector in Figures 4-2 through 4-7.

FIGURE 4-2: PRIORITY INVESTMENT NETWORK, NORTHWEST SECTOR

Priority Investment Network

- Arterial Street
- Non-arterial Street
- Arterial Missing Sidewalk
- Non-arterial Missing Sidewalk
- Public School
- Lightrail Station
- Transit Hub
- Frequent Transit Bus Stop
- Rapid Ride Stop
- Future BRT Stop
- ▲ Streetcar Station

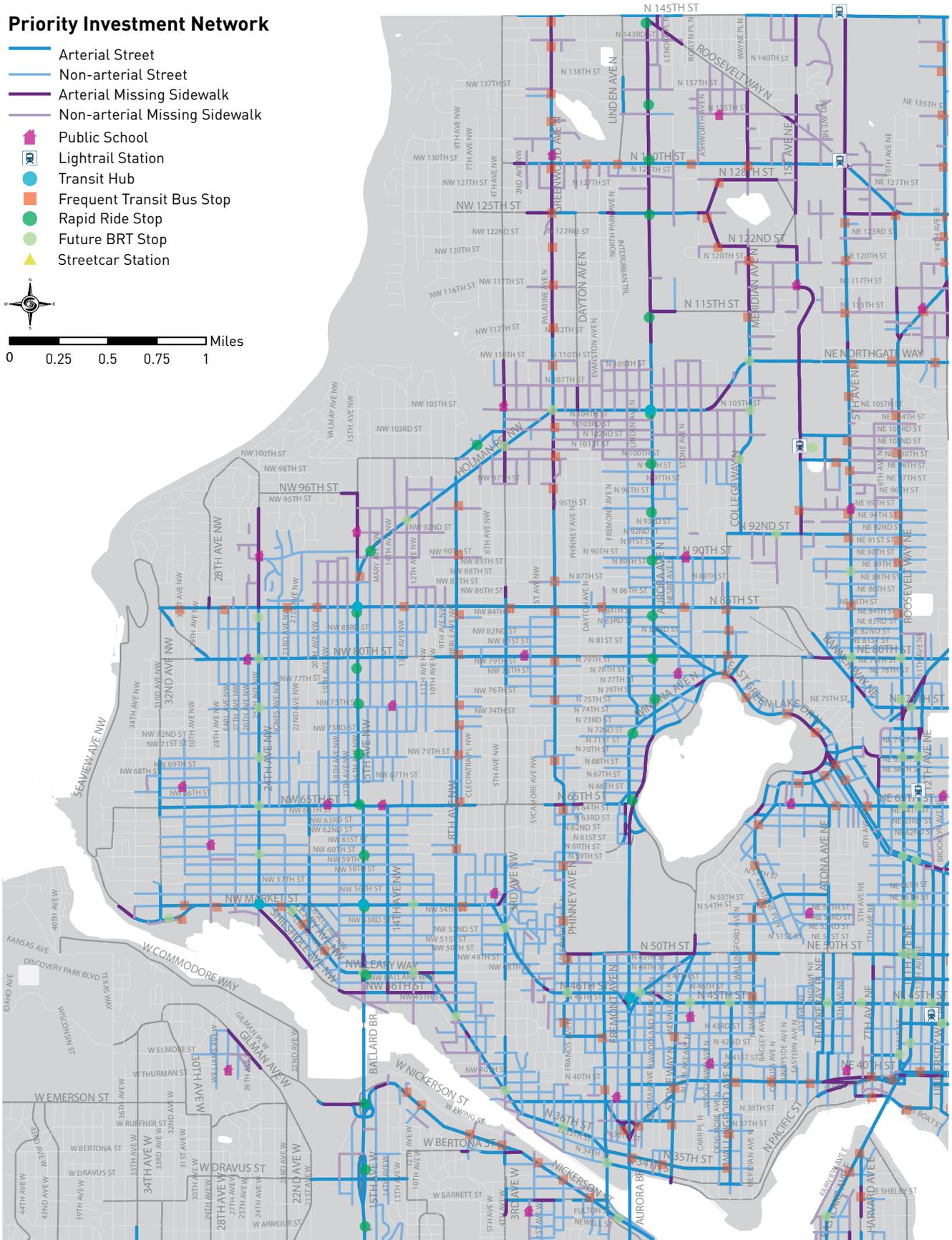
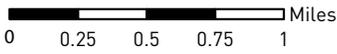


FIGURE 4-3: PRIORITY INVESTMENT NETWORK, NORTHEAST SECTOR

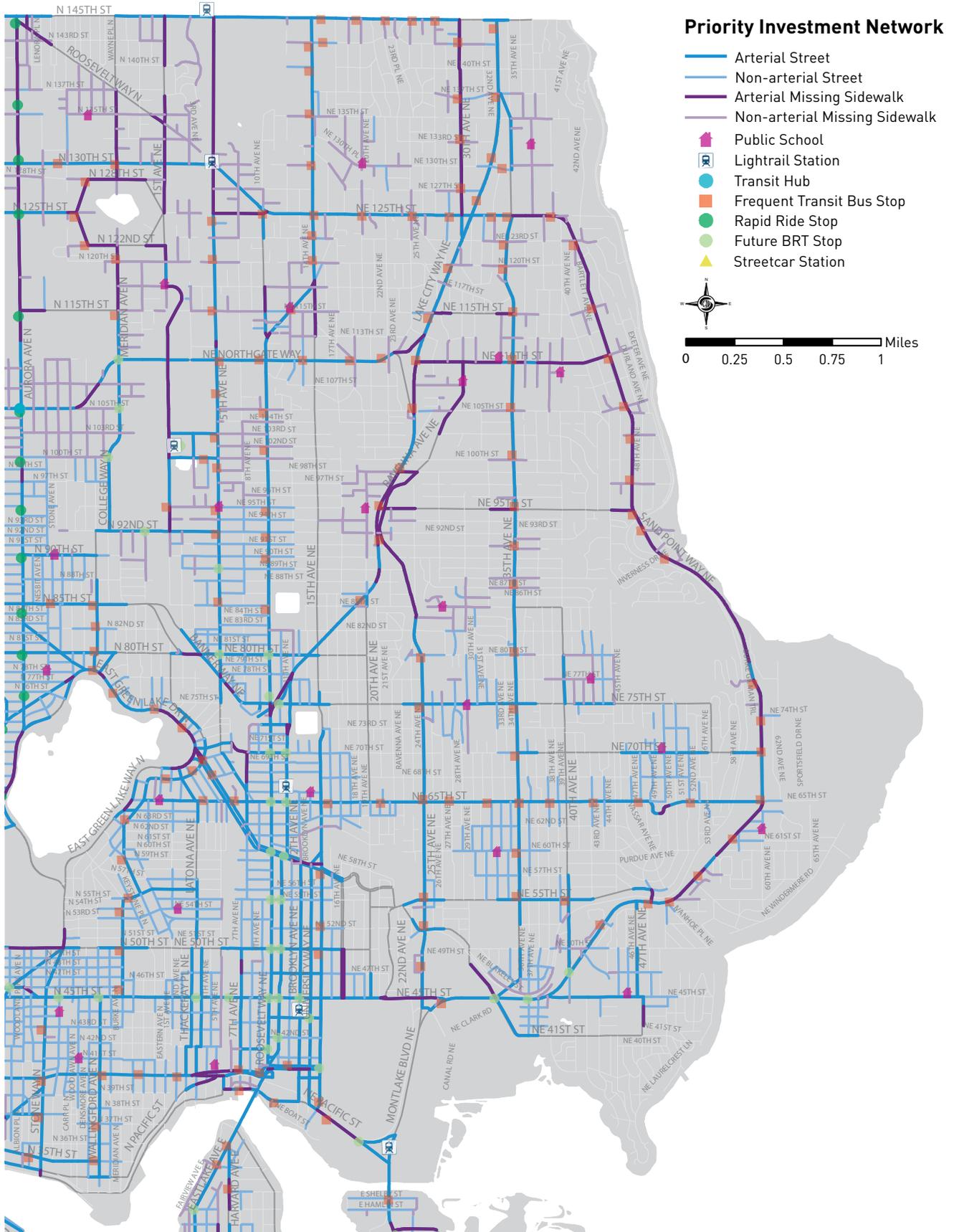


FIGURE 4-4: PRIORITY INVESTMENT NETWORK, WEST SECTOR

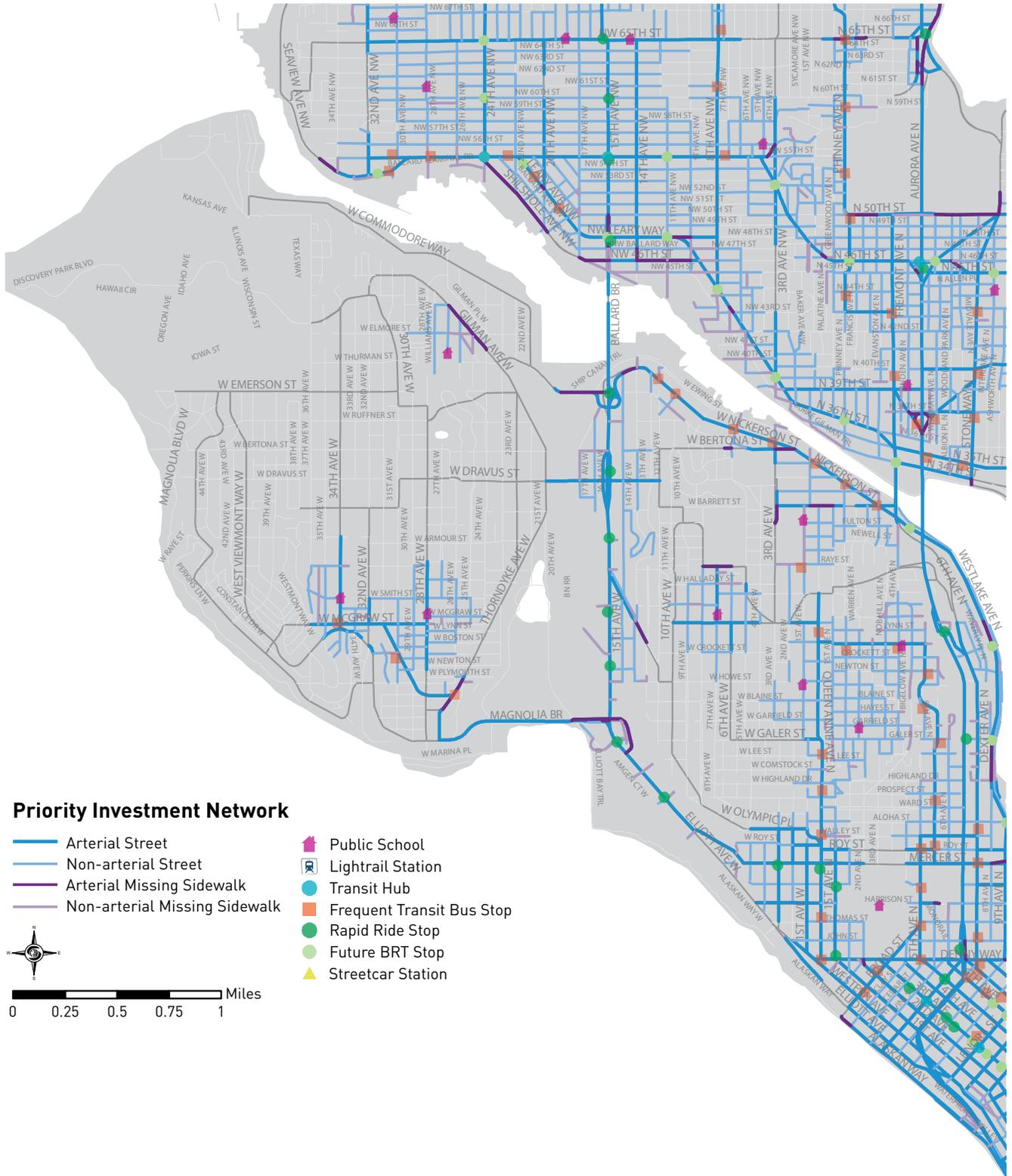


FIGURE 4-5: PRIORITY INVESTMENT NETWORK, EAST SECTOR

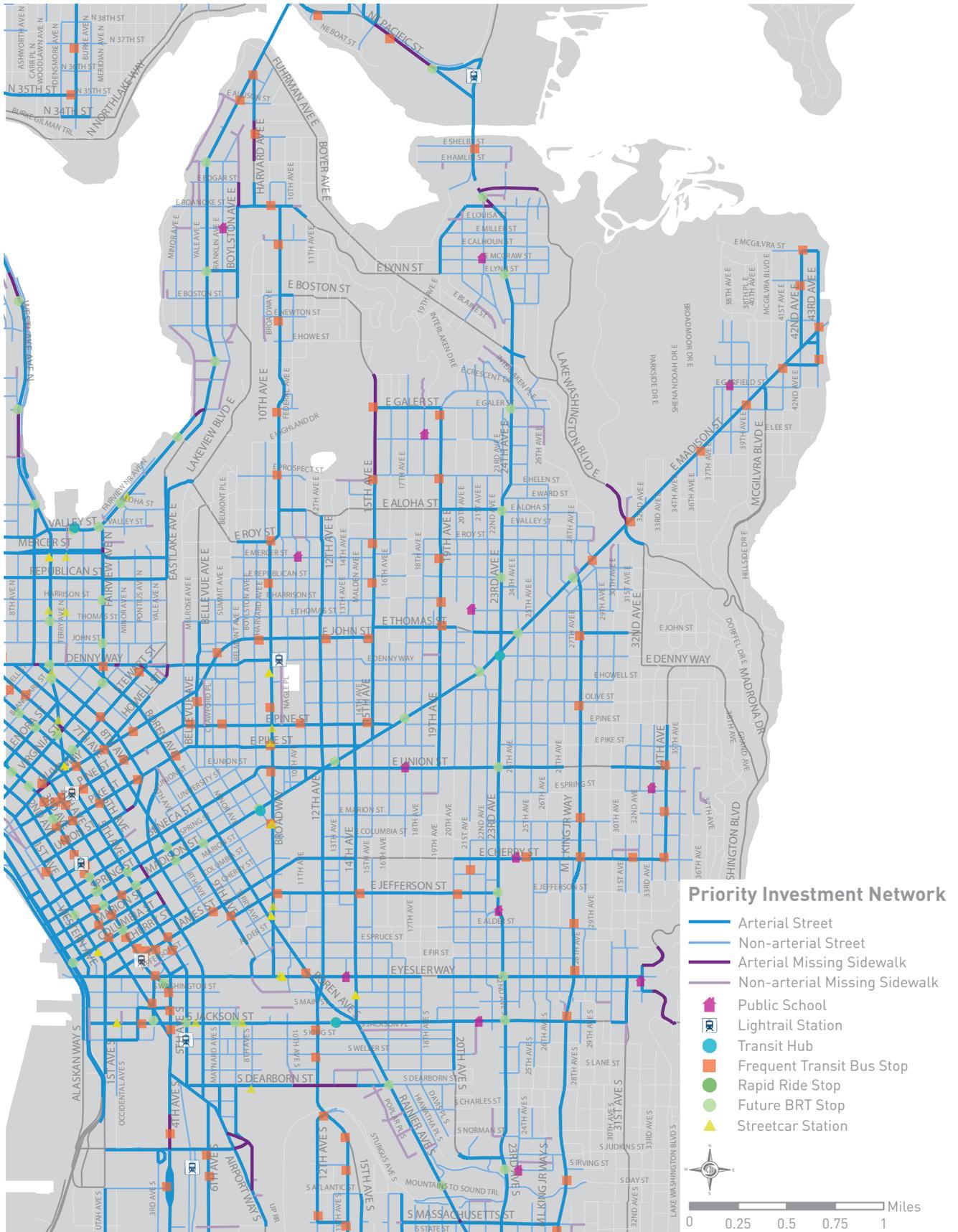


FIGURE 4-6: PRIORITY INVESTMENT NETWORK, SOUTHWEST SECTOR

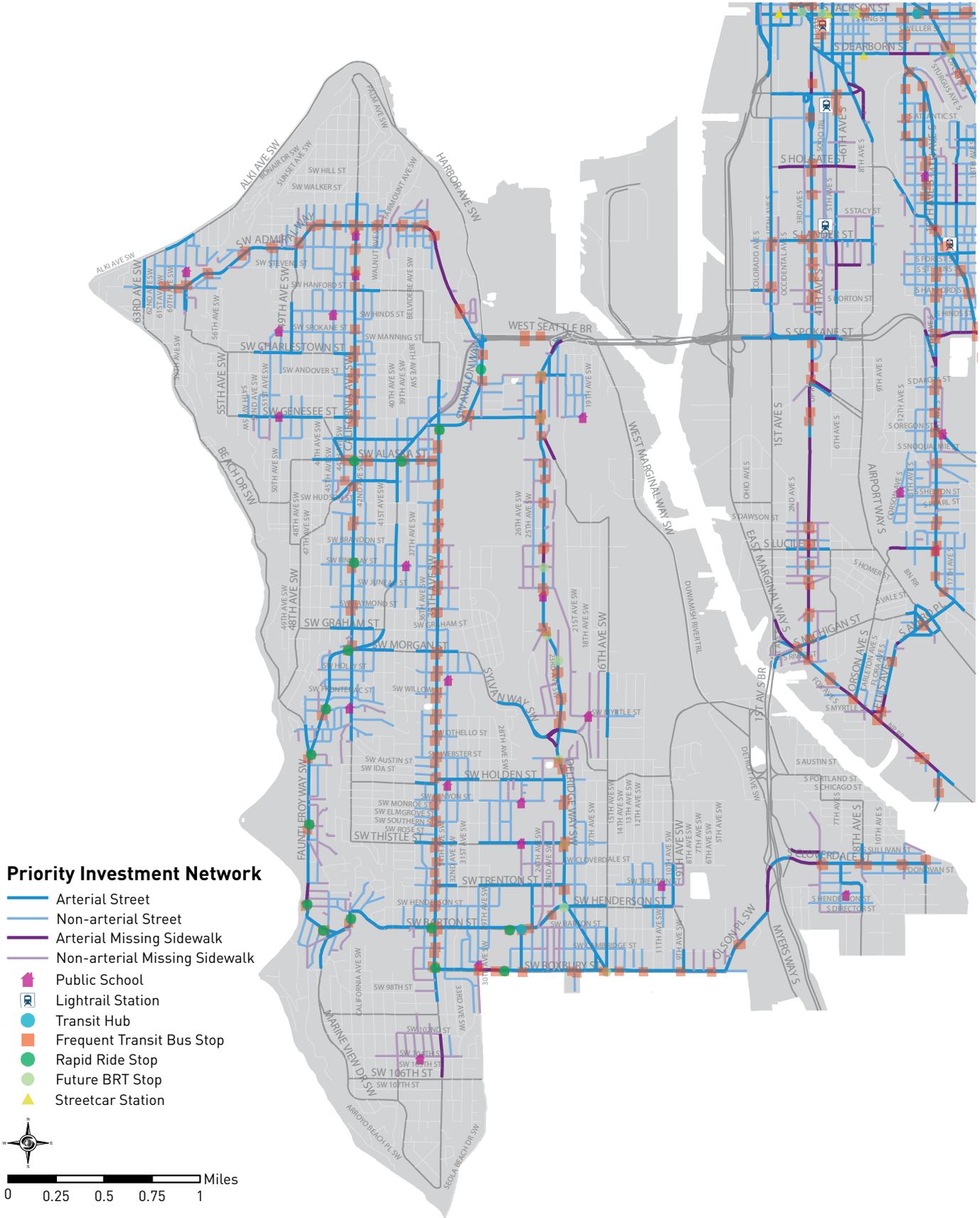
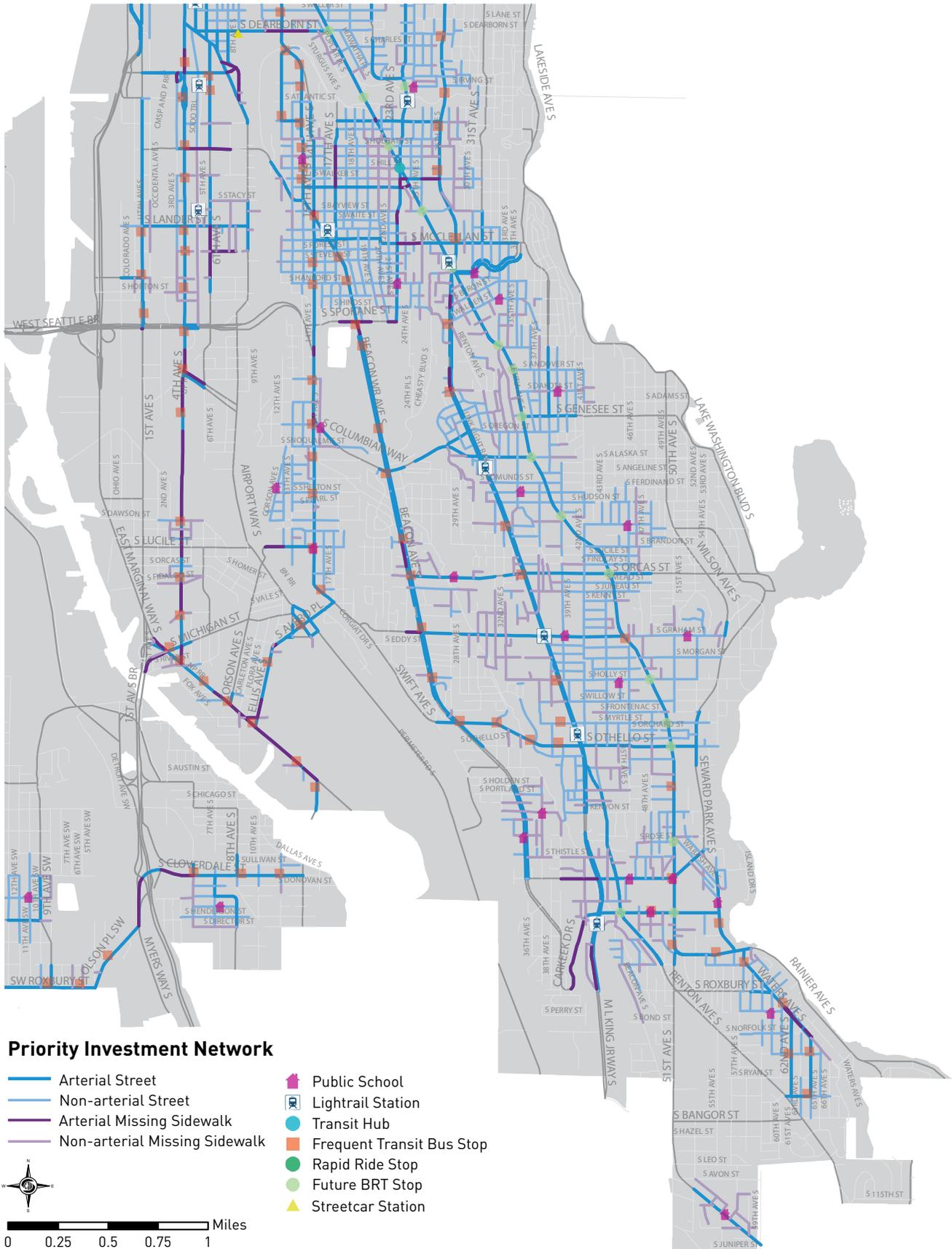


FIGURE 4-7: PRIORITY INVESTMENT NETWORK, SOUTHEAST SECTOR



OPPORTUNITIES FOR PEDESTRIAN IMPROVEMENTS

With a Priority Investment Network (PIN) defined in Step 1, our next step was to evaluate the needs and opportunities to improve conditions both along- and crossing-the-roadway within that network. Such improvements may take the form of providing new sidewalks or paths where they are missing and improving existing or providing new infrastructure at crossings to make it make it safer and more comfortable to cross busy arterials.

The opportunity analysis helps identify the infrastructure needs within the PIN that the PMP will address over the next 20 years.

Along-the-roadway opportunities

This evaluation identifies locations within the PIN where there may be opportunities to improve conditions for pedestrians moving along the roadway. Specifically, it identifies locations where pedestrian walkways are missing along arterial and non-arterial streets. Opportunities to improve conditions for people moving along-the-roadway include constructing sidewalks on arterial streets and pedestrian walkways on non-arterial streets where they are missing. The sector maps in Figures 4-2 – 4-7 identify streets within the PIN where sidewalks or walkways are missing.

It is important to note that not all locations where our data indicates a sidewalk is missing are necessarily feasible or desirable locations for new sidewalks. For example, data may show a sidewalk is missing in a location that closely parallels an off-street path or trail, or on a block located along a steep embankment. As we implement the PMP, we will evaluate the along-the-roadway opportunity locations to determine if new sidewalks are technically and financially feasible.

Table 4-2 lists the number of blockfaces of missing sidewalks both citywide and within the PIN. We use the term “blockface” as the measurement for missing sidewalks or walkways. This is the average length of one side of a city block. In Seattle, that typically measures 300 feet, or the length of a football field without end zones.

As shown in Table 4-2, there are more than 45,000 blockfaces in the city, and nearly 24,000 are part of the Priority Investment Network. More than 70% of all arterial blockfaces and 45% of all non-arterial blockfaces citywide are designated as part of the PIN.

Along all arterial blockfaces within the PIN, 6% (570 blockfaces) are estimated to be missing sidewalks, and almost 21% (3,109 blockfaces) of the non-arterial blockfaces lack a sidewalk or pedestrian walkway.

TABLE 4-2: BLOCKFACES WITH MISSING SIDEWALKS ¹

	Arterials		Non-arterials ²	
	Citywide	Priority Investment Network	Citywide	Priority Investment Network
Total blockfaces	12,835	9,220	32,609	14,884
Blockfaces missing sidewalks ³	1,804	570	9,990	3,109
Percent missing sidewalks	14.1%	6.2%	30.6%	20.9%

¹ Based on SDOT Asset Management database. Not all locations may be feasible or desirable locations for new sidewalks.

² The total number of missing non-arterial sidewalks includes all blockfaces, and therefore may include both sides of a single street segment. As we develop the PMP Implementation Plan, it may be determined that the most feasible approach to improving conditions along a non-arterial street is to provide a walking path on one side of the street only.

³ Full or partial blockfaces

Because the prioritization criteria, funding sources, and design solutions for arterial and non-arterial streets differ, the sidewalk opportunities for each are outlined separately. Arterial streets tend to have higher traffic volumes and speeds, so most new sidewalks provided along arterials will be traditional, curb-separated concrete sidewalks. The along-the-roadway assessment for arterial streets identifies all blockfaces or partial blockfaces where there is not a curb-separated sidewalk.

Non-arterial streets tend to have lower speeds and volumes. Therefore, low-cost improvements, like an asphalt path, may be an appropriate type of facility for many of these streets. Low-cost improvements can be as little as one-half the cost of traditional concrete sidewalks, and providing them on non-arterial streets will allow us to provide more pedestrian improvements to more neighborhoods at a faster rate.

Examples of low-cost improvements are shown and described in more detail in Chapter 5. Chapter 6 provides more detail on funding available to address these along-the-roadway needs.



Crossing-the-roadway opportunities

We conducted an evaluation to identify intersections within the PIN where there may be opportunities to provide improvements to make crossing the roadway safer and more comfortable for pedestrians. The analysis evaluates crossing conditions at arterial intersections, including locations where arterial streets intersect with other arterial streets and locations where non-arterial streets intersect with arterial streets. This is because arterial streets tend to be higher-volume, higher-speed streets with wider crossing distances, making them a higher priority than low-speed, low-volume residential streets where there are typically fewer pedestrians crossing. This focus on providing safe crossings across busy arterials echoes the feedback received in the PMP Public Survey.

Crossing-the-roadway improvements can take the form of enhancements to existing infrastructure or the provision of missing infrastructure. We looked at the following arterial intersection issues:

- **Crossing distance:** Locations where crossing distances at intersections are wide, and where pedestrians may experience a longer time exposed within the roadway when crossing.
- **Controlled-crossing spacing:** Locations where traffic control devices that stop vehicular traffic to allow pedestrians to cross may be too widely spaced for comfortable pedestrian access.
- **Curb ramp status:** Locations where there are opportunities to provide curb ramps where they are missing.

While the PMP focuses on infrastructure conditions, there are other types of pedestrian safety improvements that can be provided at crossings, including modifications to signal phasing and improving lighting conditions. While these types of improvements are outside of the PMP crossing-the-

roadway analysis, other SDOT programs (including the Vision Zero program) will continue to evaluate opportunities to provide these types of safety improvements.

The maps in Figures 4-8 and 4-9 identify opportunity areas within the PIN where pedestrian improvements should be further evaluated. As with the along-the-roadway evaluation, these locations may not necessarily be feasible locations for new curb bulbs, traffic signals, or other improvements, but will be evaluated as the Plan is implemented.

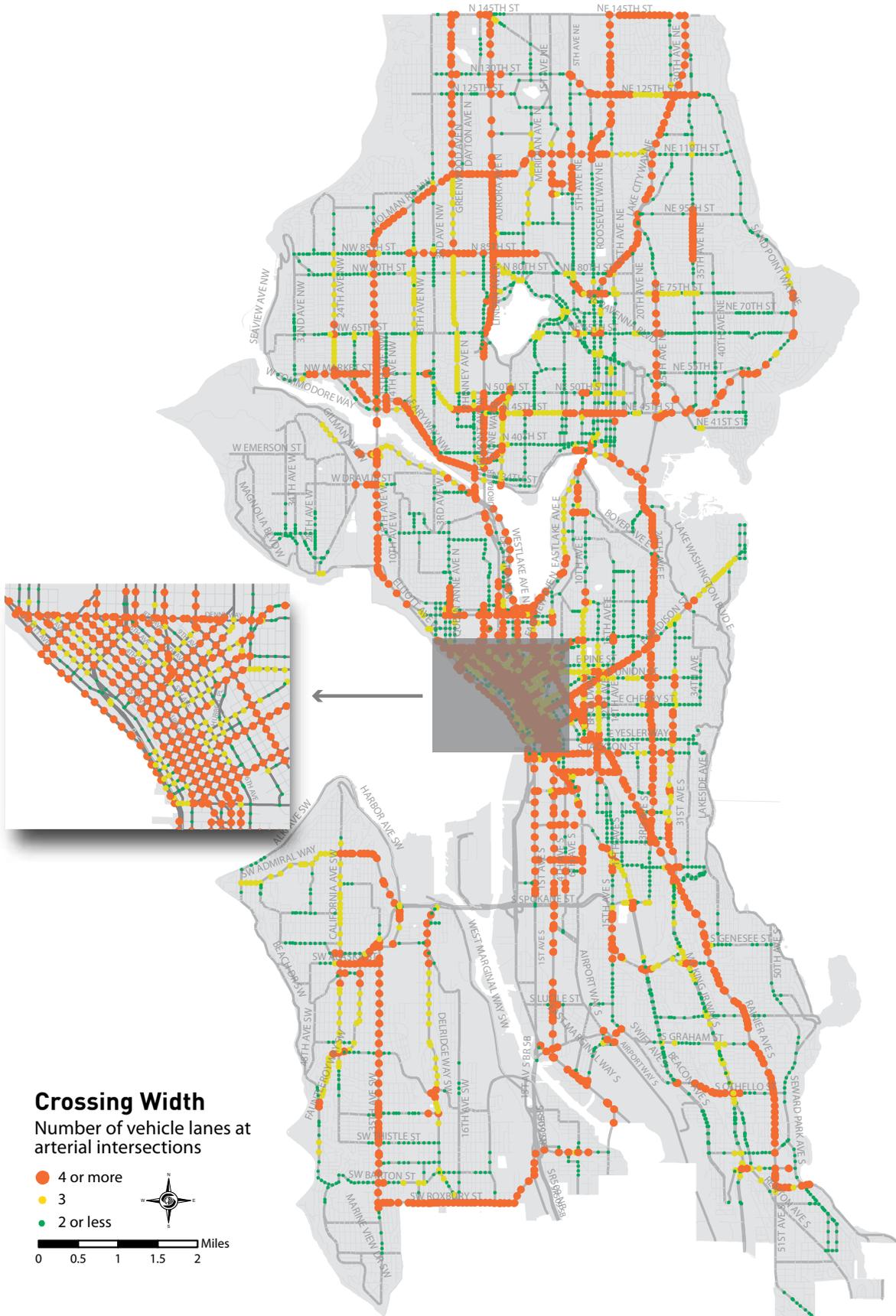
Chapter 5 discusses the types of crossing-the-roadway improvements that may be provided at prioritized intersections within the PIN in greater detail.

Crossing Distance

Crossing distance refers to how long a pedestrian must be in the roadway in order to cross; the longer the crossing, the more the pedestrian is exposed to vehicles in the roadway. Shorter crossing distances increase pedestrian safety by minimizing exposure.

Figure 4-8 shows arterial intersections within the PIN where pedestrians must cross a number of vehicle travel lanes to reach the other side of the street. A variety of treatments can be provided to minimize crossing distances and the amount of time a pedestrian is exposed to vehicles in the roadway, including medians, pedestrian refuge islands, curb bulbs, and roadway lane reductions. As we implement the PMP, we will prioritize arterial crossings within the PIN where pedestrians must cross four or more vehicle lanes for potential improvements to narrow crossing distances.

FIGURE 4-8: NUMBER OF VEHICLE LANES AT PIN ARTERIAL INTERSECTIONS



Controlled Crossing Spacing

Traffic control devices stop vehicles to provide an opportunity for pedestrians to cross the roadway. Widely spaced distances between controlled crossings can force pedestrians to go out of their way to safely cross a street, and can result in non-compliant behavior such as people crossing busy arterial streets at unpredictable locations.

Appropriate traffic control devices can include traditional traffic signals, pedestrian-actuated “half signals,” crossing beacons, and stop signs. Half signals are activated by a pedestrian waiting to cross the street and are used to stop traffic in only two directions at an intersection. Crossing beacons are devices placed on both sides of a crosswalk with pedestrian-actuated flashing LED lights that alert drivers to the presence of someone crossing the street.

Figure 4-9 shows locations where controlled arterial crossings are widely spaced within the PIN and identifies opportunities to evaluate intersections for new traffic control devices. Locations where controlled crossing opportunities are 1/4 mile or more apart will be prioritized for further study as the Plan is implemented.

Curb Ramp Status

Curb ramps make it easier to access the street from the sidewalk for all people, particularly for wheelchair and stroller users, seniors, and people with visual impairments. SDOT is proactively transitioning intersections to provide curb ramps that are compliant with the Americans with Disabilities Act (ADA).

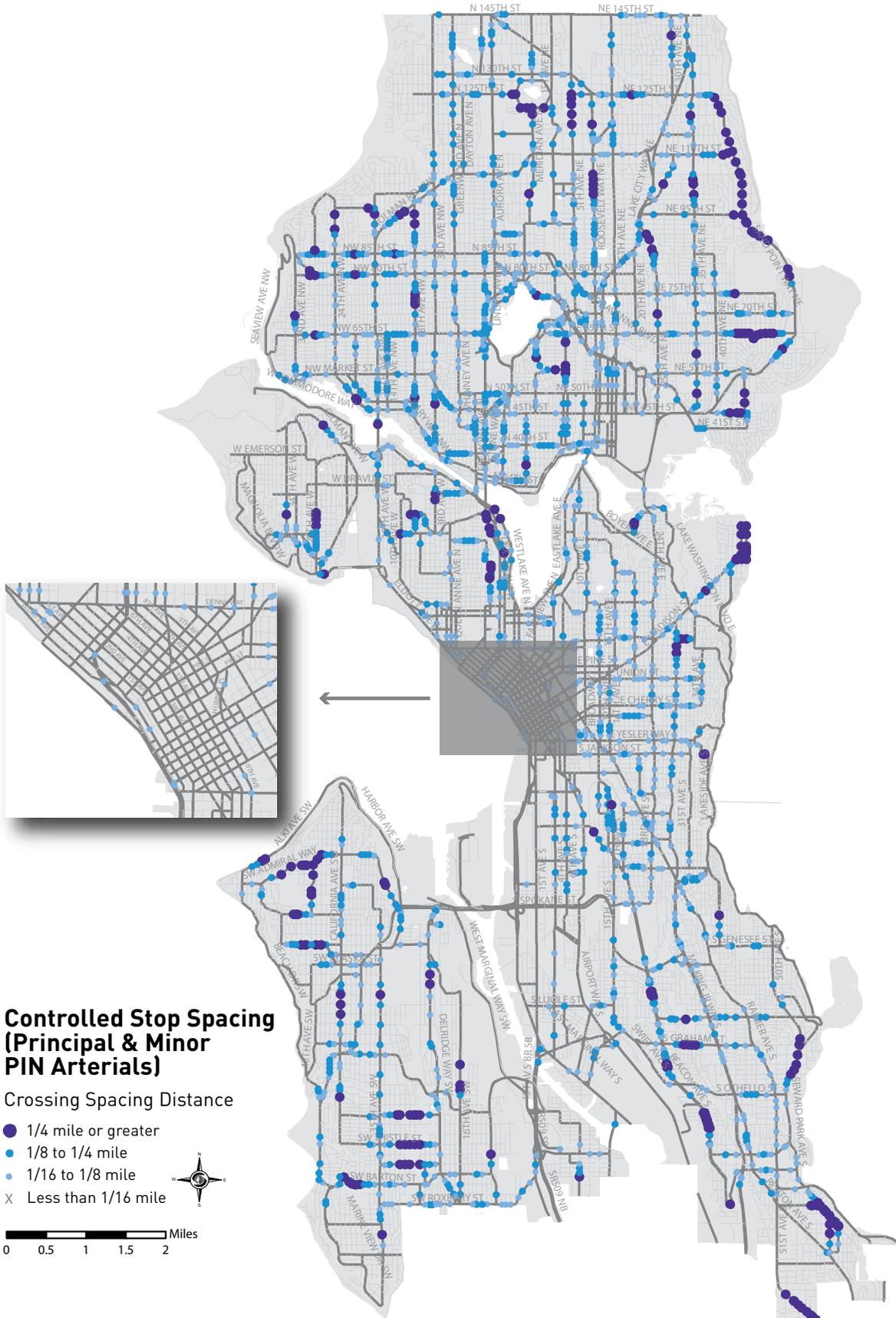
We are currently conducting a citywide curb ramp audit and conditions assessment. Upon completion, this up-to-date data will be incorporated into the crossing-the-roadway analysis to identify locations where there are opportunities to provide or upgrade curb ramps at arterial intersections within the PIN.

An updated ADA transition plan will identify locations where curb ramp and other accessibility improvements will be provided throughout the city. While the PMP prioritization seeks to improve access to schools and transit, an ADA transition plan considers a broader array of destinations and access needs when prioritizing accessibility improvements. The PMP Priority Investment Network and curb ramp opportunity analysis will be used as an input in developing an updated ADA transition plan.

WHEN IS A NEW TRAFFIC SIGNAL APPROPRIATE?

For an intersection to be eligible for a new traffic signal, it must meet minimum thresholds, or “warrants,” based on pedestrian demand and traffic volumes, as set forth in the Manual on Uniform Traffic Control Devices (MUTCD). In lieu of traffic signals, high-visibility crossing beacons can be an effective tool at intersections that do not meet signal warrants, though, to be eligible, intersections must meet thresholds based on the number and speed of people driving on the street, and the number of traffic lanes a person has to cross. Chapter 5 discusses these types of improvements in greater detail.

FIGURE 4-9: DISTANCE TO NEAREST CONTROLLED CROSSING OPPORTUNITY ON PIN ARTERIAL STREETS



FURTHER PRIORITIZING PEDESTRIAN OPPORTUNITIES

The PMP prioritization framework identifies the Priority Investment Network (Step 1) and the locations within that network where opportunities exist to improve conditions along- and crossing-the-roadway (Step 2). The final step is to further prioritize these opportunities to identify locations where we will develop improvement projects first (Step 3).

To further prioritize where we should focus our efforts to provide sidewalk and crossing improvements within the PIN, we will use factors based on the PMP's safety, equity, and health goals. This ensures that new pedestrian improvements help to mitigate potential safety concerns and health and equity disparities in the city, reflecting the Plan's goals as well as public input.



To meet this need, we will develop a PMP Implementation Plan to accompany the 20-year needs identified in this Plan. The implementation plan will consider how to prioritize improvements within the PIN based on:

- **Safety** factors, to ensure pedestrian improvements are prioritized in locations where the most pedestrians are injured and in locations where roadway design characteristics appear correlated with pedestrian crashes
- **Equity and Health** factors that look at underlying socioeconomic conditions, including self-reported health outcomes, race, and income, so we can provide pedestrian improvements in areas with the greatest need

Because most of our safety data is limited to arterial streets, and because most fatal and serious-injury collisions occur on arterials, the PMP safety analysis will be used to prioritize improvements on arterials within the PIN in conjunction with the Equity and Health analysis. Improvements on non-arterial streets within the PIN will be prioritized using the Equity and Health analysis.

The sections below describe the safety and equity/health analyses that will be used to prioritize improvements within the implementation plan and how they will be applied to the along-the-roadway and crossing-the-roadway opportunities identified within the PIN.

PMP IMPLEMENTATION PLAN

The implementation plan will be developed after PMP adoption and will be similar to those developed for our other modal master plans. Implementation plans typically identify near-term improvements (3 to 5 years) and are regularly updated to ensure we can best:

- Match projects with annual funding availability
- Leverage opportunities with other projects and programs to strategically stretch our resources
- Secure and meet delivery commitments for grants and funding partnerships
- Package projects for efficient delivery
- Make implementation plan adjustments based on performance measurement and evaluation

The implementation plan will identify particular locations within the Priority Investment Network for near-term improvements. Because it will be updated regularly, the safety and equity/health inputs we use to prioritize improvements within the PIN can also be updated as new data is available.

Projected funding for PMP implementation and potential program leveraging opportunities that the implementation plan will consider are discussed in greater detail in Chapter 6.



Safety analysis

The PMP prioritizes improvements on arterial street segments where infrastructure modifications appear likely to make streets even safer for pedestrians. To help identify these opportunities, the PMP safety analysis evaluates pedestrian crash locations over the last five years as well as roadway design characteristics that may be related to pedestrian crashes.

The analysis data is derived from a model that identifies design and behavioral factors that may be correlated with pedestrian crashes. These factors include arterial classification, roadway width, vehicle speeds, and controlled crossing spacing. This effort helps us spend City money where it will have the most impact, and furthers the Vision Zero goal of eliminating fatal and serious injuries on Seattle Streets by 2030.

Figure 4-10 shows the results of this arterial safety prioritization analysis. The street segments with the greatest opportunities to provide pedestrian safety improvements based on the factors above are shown in orange. This subset of streets represent the top 20% of PIN arterials where infrastructure spending is most likely to have a significant impact. Along- and crossing-the-roadway opportunities within the PIN will be prioritized in these locations.

SDOT BICYCLE AND PEDESTRIAN SAFETY ANALYSIS (BPSA)

Since the Plan's adoption in 2009, we have collected a wealth of new data on where and how pedestrians are injured on Seattle streets each year. In order to proactively improve locations where we can make Seattle's streets even safer, SDOT's Bicycle and Pedestrian Safety Analysis (BPSA) is developing a safety prioritization model to identify opportunities for spot and corridor improvement projects. The BPSA is studying all bicycle and pedestrian crashes in the city over the last eight years to identify the roadway design and behavioral characteristics most highly correlated with non-motorized crashes in Seattle. Understanding potential causes of bicycle and pedestrian crashes will better allow us to work towards the goals of Vision Zero. The report will be released in late 2016.



Equity and Health analysis

Consistent with the PMP goals related to equity and health, we will prioritize pedestrian improvements where people rely on our sidewalks and crossings the most. This includes people who are more dependent upon pedestrian and transit networks to get around, and people in need of quality pedestrian infrastructure to help improve health outcomes.

The PMP Equity and Health analysis assesses socio-economic data to identify populations most reliant on the pedestrian network, including income, race, and disabled communities. To ensure that improvements are prioritized to facilitate better health outcomes across the city, the analysis also includes self-reported health data provided by King County Health, including self-reported physical activity rates and rates of obesity and diabetes.

The equity and health analysis assesses the following socio-economic data (from the 2010-2014 American Community Survey) and health data (from Public Health - Seattle & King County) to identify populations most reliant on the pedestrian network. Factors evaluated include:

- Income level
- Disability
- Race
- Physical activity rates (self reported)
- Obesity rates
- Diabetes rates

Figure 4-11 depicts the results of this equity and health analysis. The areas of the city that would benefit the most from pedestrian infrastructure to improve equity and health disparities are shown in dark purple. Along- and crossing-the-roadway opportunities within the PIN will be prioritized in these locations.



Photo credit: Rainier Valley Greenways

