

October 2024

At-Grade Crossing Program

Draft Master Plan

Rainier Valley Focus



CENTRAL PUGET SOUND
REGIONAL TRANSIT AUTHORITY

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AT-GRADE CROSSING PROGRAM
DRAFT MASTER PLAN: RAINIER VALLEY FOCUS
OCTOBER 24, 2024



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1 Executive Summary

1.1 Purpose and Background

The systemwide **At-Grade Crossing Program** (Program) was launched in August 2021 to enhance safety near at-grade crossings, focusing on reducing unintentional acts where trains intersect on the same level with people walking, biking, and rolling, as well as vehicles. Safety enhancements in the Rainier Valley are a priority and have been the initial focus of the Program because eight of the 11 fatalities involving a train striking cars or pedestrians have occurred in that at-grade segment since Link service began in 2009.

As of June 2024, Sound Transit, in partnership with the Seattle Department of Transportation (SDOT), has **completed nine at-grade safety enhancement projects in the Rainier Valley segment**. Early data indicates positive findings in incident reduction are occurring as the agency targets zero fatalities.

Towards this target, Sound Transit is continuing to accelerate progress on its current projects and has developed this **2025–2029 At-Grade Crossing Program Master Plan** (the Master Plan). In addition to identifying recently completed and current projects, the Master Plan establishes Program priorities and processes to identify, evaluate, and prioritize potential safety enhancements allowing for the development and implementation of projects throughout its duration. Processes follow industry standards and best practices with the goal of continuous safety enhancement.

The Master Plan applies to all current and future planned Link lines and the Sound Transit-owned Lakewood subdivision on which the Sounder operates. The Sound Transit system includes multiple transit lines with at-grade crossings. Crossings exist in many different geographic areas, each with its own environmental, cultural, and infrastructural characteristics. Because of these differences, safety enhancements must be tailored to effectively address the specific needs of each location. However, maintaining a consistent safety framework across the entire system remains a key priority.

1.2 AGC Master Plan Approach and Objectives

The work to develop this Master Plan is broken up into two phases. Phase 1 encompasses the Program’s earlier groundwork, with document development beginning in July 2024. It will conclude with a presentation of the draft Master Plan to the Board in November 2024, with Rainier Valley components presented in October 2024. In Phase 2, the final Master Plan will integrate feedback from the Board and community outreach. This will shape the final plan for Board adoption in Q2 2025. Phase 2 will also include the launch of the Program’s three-year Communications and Engagement Plan, ongoing implementation of near-term Program-adopted projects, and continued

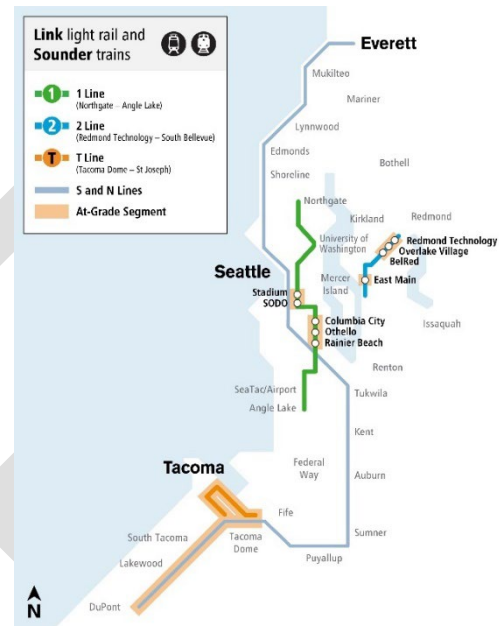


Figure 1 Map of Sound Transit System

coordination with SDOT.

The objectives of the Master Plan are:

- Establish criteria for identifying, assessing, and prioritizing safety enhancements.
- Provide a transparent process for Program and project decisions.
- Collaborate with the public and regional partners to ensure all voices, especially those from underserved and historically marginalized communities, are included in Program decision-making.
- Identify safety enhancement projects, considerations, timing, and associated costs.
- Summarize safety data and trends before and after project implementation.

1.3 Results Summary

The Master Plan identifies ten safety enhancement projects in the Rainier Valley with a total cost of approximately \$50M to \$60M set for implementation over the next five years beginning in 2025. The safety projects will:

- Deliver dependable regional transit service.
- Provide safe, consistent, and reliable crossings for all users, including those walking, biking, rolling, and driving.
- Build positive, lasting relationships with communities Sound Transit serves.
- Enhance access to Sound Transit service and connections to surrounding communities.
- Increase public awareness of safety behaviors around tracks and trains.

Table 1-1 below shows the anticipated total cost range for each of the one-year target project completion windows between 2025 and 2029.

The At-Grade Crossing Program currently has a Program Budget of \$11.3M. The Program is actively seeking and evaluating grant opportunities, both independently and in partnership with S and regional collaborators. As project costs are refined, updates will be presented to the Board to request additional funding to implement the 2025–2029 AGC Master Plan.




	Target Project Completion	Safety Focus Areas	Total Projects	Total Cost
Near	2025		3	\$3M-\$8M
	2026		5	\$25M-\$32M
Mid	2027		1	\$10M-\$11M
	2029		1	\$7M-\$9M

Table 1-1 Summary of Total Project Costs by Target Completion Time

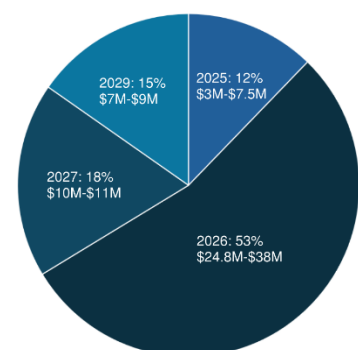


Figure 2 Project Costs by Target Completion Time

2 Results

This section outlines the Program’s currently identified, fully funded and adopted 2025–2029 ACG Master Plan projects that resulted from the selection and ranking process as well as proposed projects. For more details explaining the project selection and ranking process refer to Section 3 below. See Appendix E, Project Pages, for more detailed project descriptions.

2.1 Master Plan Projects

Between 2021 and June 2024, Sound Transit, in partnership with SDOT, **completed nine at-grade crossing enhancement projects** in the Rainier Valley. Early data findings show a reduction in total pedestrian safety events by 33 percent and reduction in total vehicle safety events by 3 percent. Total events include both vehicle and pedestrian near misses and collisions. Long-term monitoring is required to fully assess the effectiveness of the enhancements, and the final Master Plan will include updated data.



To continue this work and support the current positive trends, the Master Plan currently includes **ten projects**, focused on the Link light rail in the Rainier Valley segment, that are being fast-tracked for implementation over the next five years.

The projects are organized into two construction time frames:

- **Near-term projects:** Expected to be completed by 2025 or 2026.
- **Mid-term projects:** Scheduled for completion between 2027 and 2029.

Additionally, projects fall into three different status groups:

- **Proposed:** Projects under consideration and not yet programmed. They will require further coordination, data analysis, and, in some cases, community engagement and communications. Proposed projects were identified through data analysis, user observations, engineering assessments, and emerging technologies and information.
- **Adopted:** Projects in the development or design phase but not yet fully funded for construction.
- **Fully Funded:** Adopted projects with secured funding and an approved budget for full implementation.

Project Type	Project Name	Safety Focus Area	Status	Cost Range	Target Completion Date
Near-Term Projects (2025–2026)					
Pavement Marking	Trackway Visibility Pavement Markings Pilot		Fully Funded ¹	\$800k–\$1M	Q3 2025
Technology	SMART Grant: Rainier Valley Safe Project Pilot, Phase 1		Fully Funded	\$2.5M	Q3 2025









Project Type	Project Name	Safety Focus Area	Status	Cost Range	Target Completion Date
Signage Enhancement	Another Train Coming Signage Between Stations		Adopted ²	\$2M-\$3M	Q4 2025
Train Enhancement	Alternating (Wig Wag) Train Headlights		Adopted	\$2.5M	Q1 2026
Infrastructure Project	Automatic Pedestrian Gate Pilot, Phase 1		Adopted	\$8M-\$9M	Q2 2026
Infrastructure Project	SMART Grant: Rainier Valley Safe Project Pilot, Phase 2		Proposed ³	\$16M-\$18M	TBD
Signage Enhancement	Additional Static Signage and Delineators		Proposed	\$400k-\$1M	TBD
Signage Enhancement	Another Train Coming Sign Enhancements		Proposed	\$400k-\$1M	TBD
Mid-Term Projects (2027-2029)					
Infrastructure Project	Automatic Pedestrian Gate Pilot, Phase 2		Adopted	\$10M-\$11M	Q1 2027
Infrastructure Project	Pedestrian Crossing Upgrades Between Stations		Proposed	\$7M-\$9M	TBD

Table 2-1 Near-Term and Mid-Term At-Grade Crossing Projects
¹Fully Funded: [Funded through construction] ²Adopted: [Funded through design] ³Proposed: [Not yet programmed]

For additional detailed information on the projects listed in table 2-1, please refer to Appendix E.

Program Funding

The At-Grade Crossing Program currently has a Program Budget of \$11.3M. The projected cost to implement the 2025-2029 AGC Master Plan projects is \$50M to \$60M. The Program will further refine project costs in Phase 2 as the team continues to evaluate delivery methods and project packaging, with the goal of further expediting the work.

The Program is actively seeking and evaluating grant opportunities, both independently and in partnership with other Sound Transit project teams and regional collaborators. One of the Master Plan’s adopted projects is funded by a grant. As project costs are refined, the Program will return to the Board to request the additional funding needed to implement the 2025–2029 AGC Master Plan.

2.2 Regional and Internal Coordination

Project selection and successful implementation require close coordination both with agency partners and within Sound Transit.

Regional Coordination

Sound Transit relies heavily on its strong partnerships with regional agencies that oversee vehicular traffic flow, road safety, and physical infrastructure for vehicles and pedestrians. These collaborations are essential for successful project planning and implementation, particularly where street and transitway solutions must integrate seamlessly due to separate infrastructure responsibilities and authorities. For instance, SDOT is generally responsible for changes to its roadways. This includes car speed limit changes, lane reductions, vehicle gates, restricted vehicle movements, and closing or consolidating intersections. While these ideas are outside Sound Transit's jurisdiction, we remain committed to collaborating with SDOT to understand the feasibility of further exploring such ideas. As updates become available, we will provide additional details as part of the Final Master Plan.

The scope, timeline, and overall progress of the Master Plan projects depend on close coordination with regional agencies, and in many cases, their formal approval is required at key stages. SDOT, in particular, is a crucial partner regarding the work in the Rainier Valley. Significant progress in this area has been achieved through formal and informal collaboration with SDOT, including a 2022 Partnership Agreement focused on safety enhancements in the Rainier Valley. This partnership has already delivered key enhancements, including pavement markings, LED signs, traffic signal modifications, additional studies on treatments, and analysis of risks and costs.

This collaboration has included brainstorming sessions with SDOT staff to identify potential safety enhancements and improvements. Additionally, the partnership has involved coordinating on permitting and determining long-term responsibilities for operations and maintenance, ensuring that both agencies are aligned on sustainable solutions for the future.

Beyond technical coordination, Sound Transit has opportunities to partner with SDOT and other agencies on community outreach efforts. Leveraging joint engagement opportunities with the community fosters transparency and trust and creates efficiencies for participants.

Internal Coordination

The Program actively shares updates and lessons learned with other departments and projects to ensure alignment and consistency. This cross-department collaboration yields other significant benefits, particularly in identifying project efficiencies and streamlining processes. This approach uncovers redundancies, optimizes resource allocation, improves service delivery, and minimizes impacts to the public.

In addition, the Program's direct participation in developing agency standards for at-grade crossings ensures the early adoption of best practices, resulting in smoother implementation. By establishing processes that adhere to industry standards, safety is enhanced, efficiency is continuously improved, and more effective solutions are delivered across the agency.

2.3 Long-Term Considerations

Longer-term considerations for the Program extend beyond the 2025-2029 AGC Master Plan. The Program has conducted preliminary conceptual studies for some long-term considerations. However, advancing additional work will depend on several factors, including community preferences, adherence to NEPA requirements, right-of-way availability, and a cost-benefit analysis based on project results. Extensive public engagement and coordination with other agencies is essential in building consensus and broad support for future enhancements, such as grade-separated segments or pedestrian structures. Additionally, further studies are needed to assess the scope of impacts, costs, and appropriate mitigation strategies.

In October 2023, Sound Transit conducted a high-level study to understand the potential risk, utility conflicts, potential impacts, and to develop a rough order of magnitude estimate for three grade-separated options along the Rainier Valley segment: an elevated guideway, tunnel, and open trench. The study also evaluated pedestrian grade-separated options at the three existing stations and two non-station pedestrian crossings. It reviewed assumptions for construction and service impacts and potential mitigations for each grade-separated option.

The outcomes from near- and mid-term Master Plan projects will help guide future decisions regarding at-grade crossings, including whether grade-separated segments or pedestrian structures should be further considered for potential implementation.

The Program will also continue coordinating with SDOT on integrated long-term considerations for at-grade crossings that leverage both Sound Transit and SDOT-owned infrastructure while recognizing each agency's authority.

2.4 Final Master Plan Development

The development of the Master Plan occurs in two phases: Phase 1 is a draft Master Plan, which will be presented to the Board in two stages. The first stage, focused on the Rainier Valley, will occur in October 2024, followed by a systemwide presentation incorporating the Rainier Valley in November 2024. Phase 2 will be a final systemwide Master Plan, which will be shared with the Board in Q2 2025. Although work on the Master Plan had already started, the timeline was accelerated following Board Motion 2024-45 approval in July 2024. See Appendix B for the Board Motion.

The Program began development on the draft Master Plan document in Phase 1, beginning in July 2024 and building on preliminary Master Plan work already started. Phase 1 will conclude with presenting the draft Master Plan to the Board in November 2024. Phase 2 will integrate feedback from Board reviews and community outreach, shaping the work needed to finalize the Master Plan for Board adoption in Q2 2025. Phase 2 will also include the launch of the Program's three-year Communications and Engagement Plan, continued implementation of near-term Program-adopted projects, and continued coordination with SDOT. See Section 3 for more details on the Master Plan development process.

3 Master Plan Development Process

This section outlines the process used to develop the Master Plan. The objectives of the Master Plan are to:

- Establish criteria for identifying, assessing, and prioritizing safety enhancements.
- Provide a transparent process for Program and project decisions.
- Collaborate with the public and regional partners to ensure all voices, especially those from underserved and historically marginalized communities, are included in Program decision-making.
- Identify safety enhancement projects, considerations, timing, and associated costs.
- Summarize safety data and trends before and after project implementation.

The Master Plan document is being developed in two phases. Phase 1 began in July 2024 and runs through November 2024, though groundwork to create the content of the Master Plan has been in progress since the Program’s establishment. Phase 2 spans from December 2024 through May 2025. Figure below illustrates the process and stages for the Master Plan development.

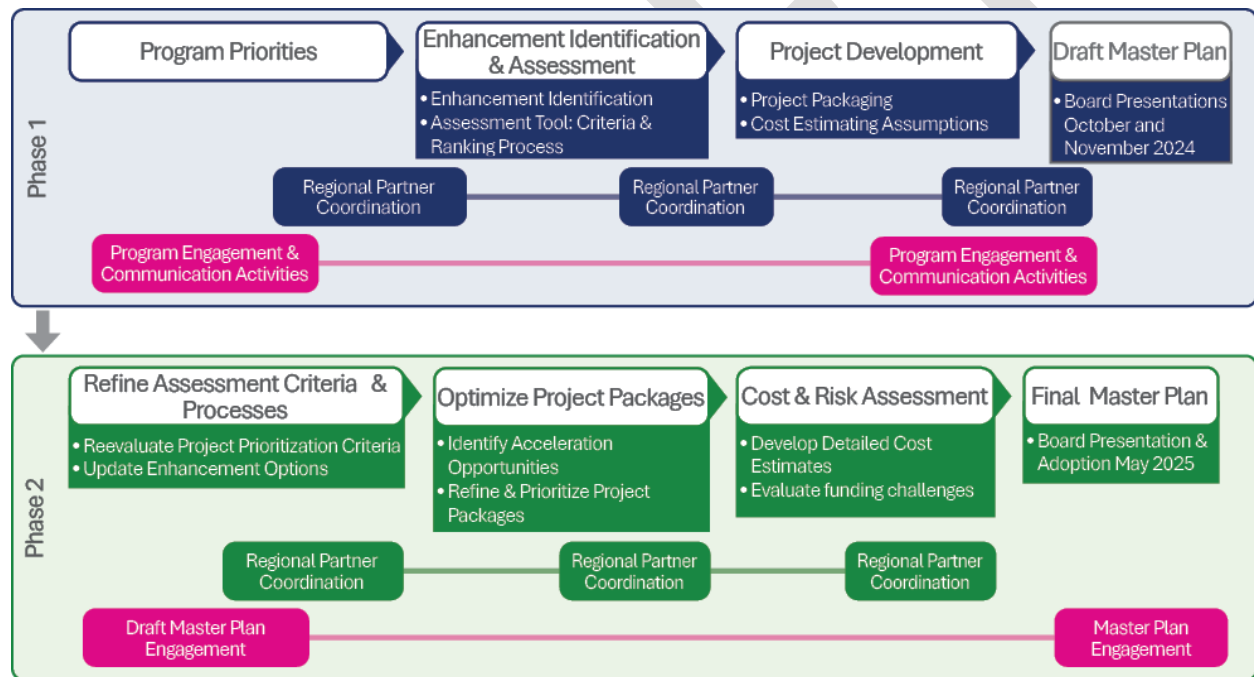


Figure 3 Master Plan Development Process

Phase 1: Draft Master Plan

Phase 1 involved compiling and distilling completed work, conducting research to identify additional proposed projects, and documenting processes for developing the enhancement and risk mitigation strategies assessment criteria. This phase also included coordination with SDOT and community outreach to gather feedback on completed projects and refine the overall engagement approach.

Phase 2: Final Master Plan

Phase 2 will focus on refining the assessment criteria and processes as needed, optimizing project packages to identify additional opportunities to accelerate Program work, and completing a comprehensive cost and risk assessment. This phase will integrate feedback from the Board, gather and integrate community feedback on assessment criteria and enhancements, and continue coordination with SDOT to progress the work outlined in this Master Plan.

3.1 Phase 1: Draft Master Plan

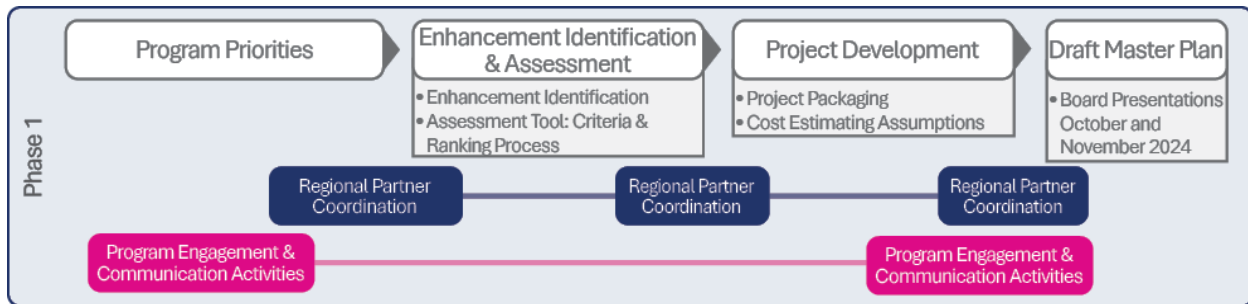


Figure 4 Phase 1: Draft Master Plan

Program Priorities

Identifying priorities helps align Program goals with Sound Transit’s mission and values, improves decision-making, and ensures that critical objectives are addressed first. It guides effective monitoring and evaluation and ensures the Program remains adaptable to changing data trends.

Mission: Connecting more people to more places to make life better and create equitable opportunities for all.

Values: To accomplish this mission, agency activities are driven by six values:

- **Collaboration:** We share each other’s successes and challenges and invite the involvement of all toward the achievement of common goals. We are one agency; no single department defines our business.
- **Passenger Focus:** We always start with our passengers’ needs and work back from there. They are the focus of everything we do.
- **Inclusion and Respect:** We foster a culture where everyone is treated fairly, diverse perspectives are welcomed, and every voice is heard.
- **Safety:** We ensure the safest transit trip and work environment for every rider, employee, and contractor each and every day.
- **Integrity:** We build trust by keeping commitments and taking ownership—demonstrating honesty, accountability, and transparency.
- **Quality:** As stewards of public resources, we do our best work every day and take great pride in the efficient, sustainable, and equitable delivery of our services and projects.

To ensure alignment with the agency’s values, the following five priorities have been identified to guide the focus and development of the Program:

- Reduce collisions and near misses with vehicles and pedestrians.
- Provide a consistent and safe passenger experience systemwide.
- Provide reliable service without degradation to operational performance.
- Increase accessibility of the Sound Transit network for all.
- Build positive, proactive relationships with surrounding communities that foster trust and increase perception of safety of Sound Transit’s service.

Enhancement Identification and Assessment

This section illustrates the process used to identify, evaluate, and prioritize potential safety enhancements, which include risk mitigation strategies. Input was gathered from various sources, including community and regional partner feedback, segment analyses, and industry research. Each proposed enhancement was assessed using a standardized set of criteria, ensuring a consistent and transparent evaluation. This approach allowed the team to prioritize enhancements based on their potential safety impact, feasibility, and alignment with Program priorities.

Enhancement Identification

The Program uses a combination of strategies to enhance safety, including infrastructure changes (or “enhancements”), operational procedures, training, and promoting safer behaviors to reduce the risk of future incidents. Identification is informed by extensive research, segment monitoring, community engagement, and collaboration with regional partners. Enhancements were identified through several channels, such as:

- **Industry Best Practices:** Proven methods with established data supporting their effectiveness.
- **Peer Agency Research:** Insights from similar transportation agencies that faced comparable challenges.
- **Data Analysis:** Safety event reports (including collisions, near misses, and violations), traffic volumes, and field data collected from at-grade intersections.
- **Field Visits and Team Input:** Observations made during site visits, complemented by feedback from engineers, operations staff, safety experts, and consultants.
- **Community and Partner Agency Feedback:** Ideas and concerns shared by the public, partner agencies who operate Sound Transit service, and regional partners during outreach efforts.

Example: Dynamic LED “Another Train Coming” signs was an enhancement that was identified via research on industry best practices and peer agency mitigations. These signs have been implemented at other transit agencies and seem to yield positive results in reducing train vs. pedestrian conflicts based on data analysis.

See Appendix C for more details on Program data and prior work, including the 2022 Peer Analysis using data from the National Transit Database.

Assessment Tool: Criteria and Ranking Process

The assessment criteria are based on the Program priorities and use a systematic, data-driven approach to rank safety enhancements, which includes risk mitigation strategies, for at-grade crossings. This allows the team to evaluate potential improvements quickly and consistently while maintaining transparency. The goal is to focus on improvements that would provide the most meaningful and lasting safety impacts. The team followed a three-step process: an initial safety review to ensure compliance with standards, a high-level risk assessment, and a final ranking process to prioritize enhancements.



Figure 5 Phase 1 - Enhancement and Project Packaging Steps

Step 1 Pre-Screen

Pre-screening quickly filtered out ideas or proposals that failed to meet basic safety requirements or regulatory standards.

- *Safety Impact:* Assessment of whether the enhancement improves or maintains agency and industry safety requirements and if it presents any critical risks.
- *Compliance with Regulatory Standards:* Confirmation that the enhancement adheres to federal, state, and local guidelines.

Step 2 Risk Assessment Screening

The risk assessment screening aimed to identify challenges, evaluate the likelihood and impact of those risks, and determine whether proposed enhancements negatively impact operations, cost, or timelines.

- *Proven History:* Evidence of successful implementation in other regions or applications.
- *Implementation Timeline:* How quickly the enhancements can be deployed.
- *Cost:* Determined initial and ongoing costs associated with the enhancement.
- *Third-Party Approvals:* Identified any necessary approvals from regional partners and other agencies.

Step 3 Ranking

The ranking process prioritized the most effective solutions using a weighted evaluation criterion, prioritizing pedestrian safety to ensure the most critical improvements were addressed first.

- *Overall Safety Impact:* The idea evaluated significantly improves safety for pedestrians, motorists, and light rail vehicles.
- *Operational Reliability:* Assurance that enhancements will function effectively with minimal disruptions.

Example: Updated "Another Train Coming" signs, which have a proven track record of reducing pedestrian risky behavior, scored highly due to their anticipated positive impact on pedestrian safety, low ongoing maintenance costs, training impacts and ease of implementation. This data-driven evaluation allowed the team to prioritize high-impact enhancements effectively.

- *Community Impacts:* Consideration of how enhancements affect local communities, focusing on those with disabilities, businesses, and commuters both during construction and after implementation.
- *Ongoing Maintenance Costs:* Evaluation of the long-term maintenance requirements.
- *Training Impacts:* Assessment of personnel training needs for proper use and maintenance of new systems or equipment.

These criteria were applied uniformly to all options evaluated. Appendix E offers more details on the options evaluated and their descriptions.

Project Development

Enhancement options were bundled into project packages with preliminary cost estimates developed to facilitate future prioritization, funding, and implementation as described below.

Projects include a single ranked enhancement or a group that provides efficiencies if implemented together for timing and cost purposes. Project Packages are presented in Appendix E.

The goal was to bundle projects for faster delivery while minimizing operational impacts and service disruptions. Factors considered include:

- **Safety Event Data:** Areas with the highest incidents of collisions, near misses, or violations were prioritized.
- **Traffic and Pedestrian Volume:** Intersections with high vehicle and pedestrian traffic volumes were preferred, particularly those adjacent to transit stations, which consistently ranked high in safety incidents.
- **Implementation Feasibility:** Enhancements that could be implemented quickly and with minimal disruption to existing operations were prioritized, especially at locations near stations where work could be bundled for efficiency.
- **Operational Efficiency:** Grouping projects to avoid repeated disruptions at the same locations or segments.
- **Cost Efficiency:** Consolidating projects to reduce cost and maximize the use of available resources, considering grant opportunities.
- **Speed of Implementation:** Favoring enhancements and locations where enhancements could be deployed swiftly, aligning with the agency’s goal of accelerating safety improvements.

Example: Station locations were prioritized for "Another Train Coming" sign installation due to high crossing volumes and a history of pedestrian violations. Data analysis indicates that intersections near stations frequently appeared in the top ten for safety events, making them a high priority for immediate action. \

Using the assessment tool and the project prioritization framework, the Program ensures that enhancements are implemented where they are most needed while balancing cost, efficiency, and community impact. Phase 2 will involve updating the criteria. The process will evolve based on community feedback and corridor monitoring to ensure alignment with public expectations and safety requirements.

In response to the Board’s July motion to accelerate work, the team is restructuring project packages to fast-track all currently adopted projects. This includes reevaluating cost considerations and streamlining approval processes to meet the agency’s expedited timeline.

Cost-Estimating Assumptions

The cost-estimating framework used for this first iteration of the Master Plan breaks down costs into specific categories. Cost estimates for Phase 1 were calculated based on:

- **Total Project Cost:** All costs associated with the project are included in the cost estimate, including Sound Transit and Consultant labor, permitting, construction, and project integration.
- **Historical Unit Costs:** Data from recent similar infrastructure projects were analyzed to establish a baseline for typical expenditures.
- **Production-Based Unit Costs:** Each enhancement option, such as signal upgrades, signage, and pedestrian safety measures, was assigned a unit cost based on expert estimates or recent project bids (if available), material market prices, and labor rates.
- **Contingency:** Construction contingency was added to account for design growth due to the early design phase. As design advances, this contingency will be modified.
- **Construction Delivery Method:** Design-Bid-Build delivery assumed in cost estimates.
- **Escalation Factors:** Given the anticipated multi-year timeline, inflation and cost escalation were factored into the estimates at an average annual rate of 5%, consistent with trends observed in recent infrastructure projects.
- **Contractor Selection:** The contractor’s size, availability, and capability influence bid markups (indirects, contingencies, and profits). Larger, in-demand general contractors that can perform several scopes of work will bid with higher markups than smaller, specialized contractors. Due to the variable size of the AGC projects, the estimating was done assuming that the work would be performed by a medium sized general contractor.

Regional Partner Coordination and Community Engagement

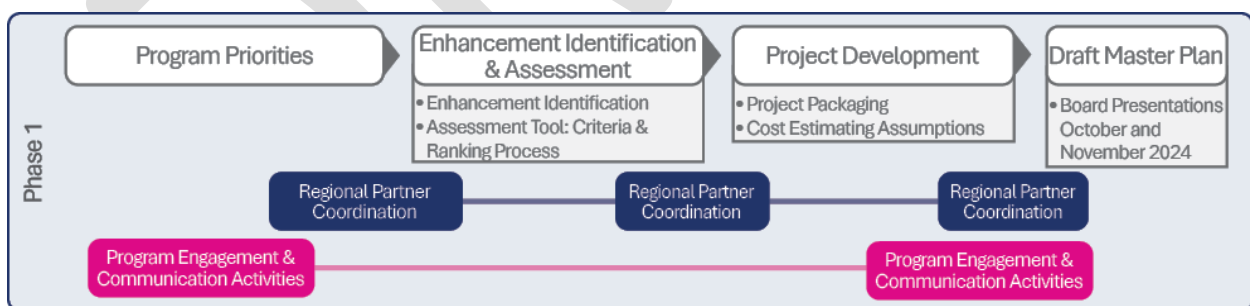


Figure 6 Phase 1: Regional Partner Coordination and Community Engagement

Regional Partner Coordination

As outlined in Section 2.2, regional partner coordination is a key component of Phase 1 of the Master Plan. Coordination and approval from these partners are critical to advancing projects under this Program. Much of the work, particularly in the Rainier Valley, has been conducted in close collaboration with SDOT.

Equity-Centered Public Engagement

A key Program goal is to meaningfully engage with the community while prioritizing safety as a top Sound Transit concern and core value. The Program aims to build long-term relationships, enhance two-way communication, and establish the agency as a dedicated and trusted part of the community. The Program strives to achieve equitable safety outcomes by using accessible and convenient ways to connect with people where they are.

Rainier Valley Community Survey

A Rainier Valley Safety Survey was conducted between July and October 2024 to gather community feedback on the level of awareness and perspectives around different at-grade crossing safety enhancements made in the Rainier Valley, as well as on general perceptions about at-grade safety. The survey opened on August 10, 2024, and will close on November 1, 2024. The survey was offered in Arabic, Chinese, English, Somali, Spanish, Tagalog, and Vietnamese languages. It was available online and promoted and offered at community events throughout the summer and fall of 2024, including at the Othello Park International Festival, the Rainier Beach Back2School Bash, Rail Safety Week, the Talipapa Market Cultural Festival, and the Rainier Boo Bash. In addition, Sound Transit staff conducted surveys at Rainier Beach, Othello, and Columbia City stations on five days at different times and days of the week in September and October. Feedback received will inform potential refinement to criteria or projects in Phase 2.

Three-Year Communications and Engagement Plan

An engagement consultant has been retained to develop and implement a three-year Communications and Engagement Plan, continuing to advance engagement conducted in Phase 1, building on and expanding the agency's existing engagement efforts (see Appendix D). Developed during Phase 1, it will be implemented in Phase 2 and beyond, incorporating feedback from the Board, community discussions, and partnerships with community-based organizations. The plan will focus on being present at community gatherings, offering interpretation services, providing translated materials, and creating opportunities for public participation online and in person.

The Program prioritizes engaging communities of color, low-income groups, individuals with limited English proficiency, and vulnerable populations. Centering equity is critical for the success of these engagement efforts. The Program has and will dedicate appropriate resources and provide meaningful and diverse ways for the community to learn about the Program and help shape the Master Plan and planned and future projects.

During the development of the Master Plan, representatives from Sound Transit's Office of Civil Rights, Equity, and Inclusion provided essential input to ensure an equity focus throughout the Program. This includes applying Sound Transit's Equitable Engagement Tool, which provides a framework to help achieve desired outcomes.

3.2 Phase 2: Final Master Plan

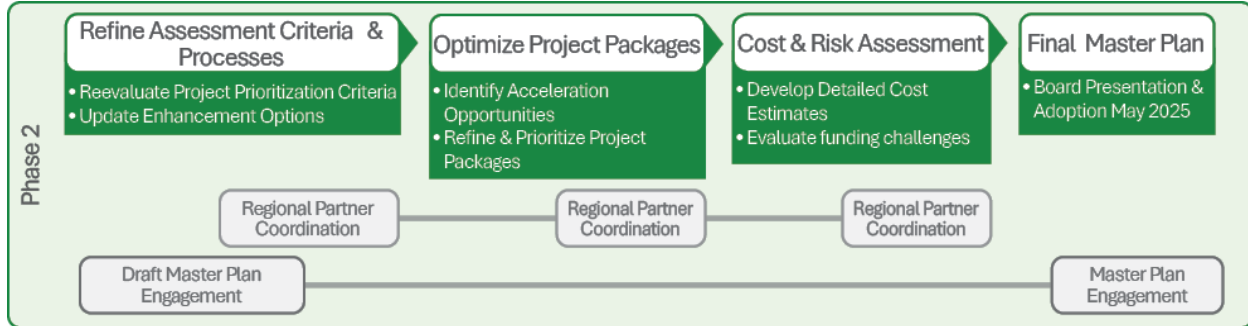


Figure 7 Phase 2: Final Master Plan

The sections below provide a brief description of future activities. This section will be revised during Phase 2 development of the Master Plan.

Refine Assessment Criteria and Processes

When Phase 2 begins, the team will determine if the assessment criteria require refinement and reassessment based on feedback about the enhancements, which include risk mitigation strategies, and criteria. This feedback will come from three key sources:

- Community and agency partners, including a recent survey and conversations with community interests and agency partners.
- Sound Transit Board guidance.
- Engineering subject matter experts' ongoing assessment.

If needed, the team will apply refined criteria to enhancement and risk mitigation strategies, which may result in an updated list of enhancements, including new enhancements not previously considered in Phase 1.

Optimize Project Packages

The team will consider the refined enhancements list to optimize project packages, possibly include new packages, and identify additional opportunities to accelerate Program work.

Optimization will also include strategically selecting contract delivery methods to accelerate the schedule.

As previously noted, the team is restructuring and refining project packages to fast-track all currently adopted projects in response to the Board's July motion to accelerate work.

Cost and Risk Assessment

For any project, it is essential to understand the current cost and the risk of cost changes. From Phase 1 to Phase 2, the Program will move from higher-level cost ranges to detailed cost estimates to provide more certainty using initial design information. These estimates will help optimize refined project packaging as the Program moves forward. The Program will also conduct a comprehensive cost and risk assessment to evaluate potential financial challenges, contingencies, and mitigations.

Agency Coordination and Public Engagement

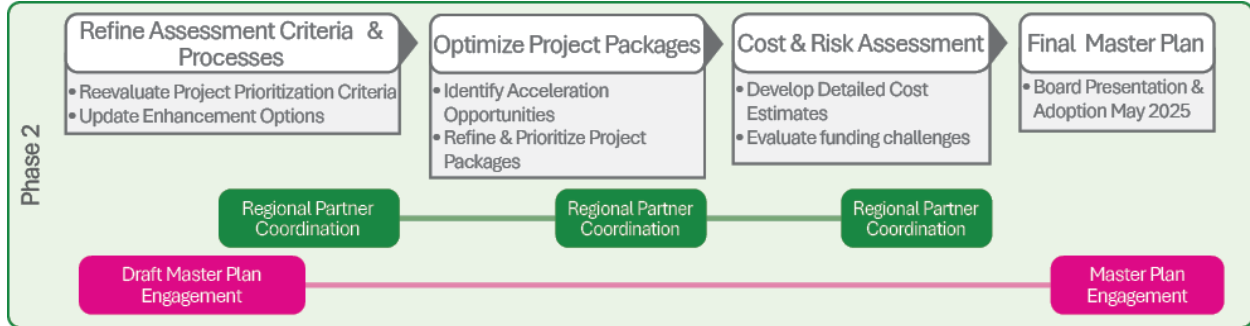


Figure 8 Phase 2: Agency Coordination and Public Engagement

Regional Partner and Internal Agency Coordination

Collaboration will continue with internal and external partners such as the City of Seattle, Sound Transit Board, and other local agencies, as discussed previously in Section 2.1.2. The Sound Transit Board will review and be involved in finalizing and adopting the Program’s Master Plan and budget.

Equity-Centered Public Engagement

As described in Section 3.1.4, the three-year Communications and Engagement Plan will launch at the start of Phase 2, building on Phase 1 engagement (see Appendix D) and focus on three main topics:

- Draft Master Plan Engagement (Fall 2024–April 2025): Phase 2
- Master Plan Project Development and Construction Outreach and Communications (Beginning as early as Winter 2024): Phase 2 and beyond
- Safety Awareness and Education (throughout the three-year plan): Phase 2 and beyond

The Program will provide several accessible, comfortable, and convenient options to inform and engage the community. This will include connecting with people “where they are,” whether at light rail stations, community events, community-based meetings, or just going about their daily lives.

The Program will report on engagement efforts at the end of Phase 2, including feedback received, ensuring transparency.

Continuous Safety Enhancements

The Master Plan establishes Program priorities and processes to identify, evaluate, and prioritize potential safety enhancements allowing for the continuous development and implementation of projects throughout its duration. Pilot projects will inform new enhancements, as will ongoing monitoring of system safety as part of the agency's safety and security risk management program, community and regional partner feedback, emerging information, best practices and technology advancements.



Figure 9 – Process of Continuous Safety Enhancements

Appendix A Geographic Segments

The Sound Transit system has multiple transit lines with designated at-grade crossings across various locations.

Light rail transit technology allows Sound Transit’s Link light rail network to be designed to operate partially on streets. Commuter rail, including Sound Transit Sounder service, gives individuals a dependable, congestion-free commute using dedicated heavy rail tracks. Modern streetcar technology, such as the T Line in Pierce County, with its low-floor boarding, means it can operate in curbside or a median right-of-way, as well as in mixed traffic or a dedicated right-of-way.

Each transit mode operates in unique geographic areas with distinct environmental, cultural, and infrastructural features that may influence the design and implementation of safety enhancements. Tailored approaches may be appropriate to address local needs, but enhancing system consistency across the system remains a cornerstone of the Program. The geographical context of the different system segments is provided below. The AGC three-year Communications and Engagement Plan includes details regarding community context and regional partners, and approaches to engage and coordinate throughout the Master Plan process and beyond.



Figure A-1
Applicable Geographic Areas

Link Light Rail

Link light rail offers fast and reliable transit service 20 hours a day, seven days a week. Each train operates three or four-car light rail trains carrying approximately 600 to 800 passengers. King County Metro is a partner agency that operates Link service.

The 1 Line currently serves Lynnwood to south of Sea-Tac Airport. The 2 Line currently serves S Bellevue to the Redmond Technology Center, and in 2025 will connect to downtown Seattle and downtown Redmond.

With voter approval of system expansion in 2008 and 2016, the Link light rail system will eventually grow to 116 miles and five lines.

1 Line

The Link light rail 1 Line (initially called Central Link) opened in July 2009, connecting 13 stations from Westlake Station in downtown Seattle to Tukwila International Boulevard Station. The line was extended to Sea-Tac/Airport Station in December 2009.

Rainier Valley

Link light rail service operates for 4.5 miles in semi-exclusive right-of-way at-grade along MLK Jr Way S in the Rainier Valley, spanning from S Walden Street in the north to S Norfolk Street in the south. There are 28 signalized intersections, of which 10 are full intersections with no vehicle left-hand turn restrictions, 10 are pedestrian-only intersections, one intersection has prohibited vehicle left turns in both the northbound and the southbound direction, and seven intersections have either a northbound or a southbound vehicle left-hand turn restriction. There are also three at-grade stations: Columbia City, Othello, and Rainier Beach.

A mix of residential and commercial zones, diverse communities, and a rich cultural landscape characterize this geographic area. The segment faces unique challenges, such as high pedestrian activity, traffic congestion, and environmental considerations related to the urban setting. Tailored safety and infrastructure enhancements may be necessary to address these local needs while maintaining consistency with the broader system. This section of the Link service plays a critical role in connecting the Rainier Valley to the wider transit network, supporting regional mobility and access.

This section of track is also the largest source of variability in the Link light rail system due to delays and service disruptions caused by traffic signals and other safety events. The variability in the Rainier Valley can result in “train bunching,” which can cause crowding and other operational challenges up and down the alignment, including the future operational movement to interline trips for both the 1 and 2 lines between International District Station and Lynwood City Center. In addition, variability can result in needing additional light rail trainsets to accommodate slower travel times. Improving reliability in the Rainier Valley would support Sound Transit’s ability to meet federal grant commitments related to service levels as the system expands.

Appendix B July 2024 Board Motion

Motion M2024-45

A motion of the Board of the Central Puget Sound Regional Transit Authority directing the chief executive officer to: (1) expand the geographic scope of Sound Transit's At-Grade Crossing Program to not only include all Link light rail at-grade crossings, but also Tacoma Link and Sound Transit-owned Sounder at-grade crossings while still prioritizing improvements in the Rainier Valley; (2) accelerate current at-grade projects, and expand projects as needed (3) conduct a comprehensive study of at-grade crossings in the Rainier Valley identifying short-, mid-, and long-term at-grade crossing safety improvements; and (4) deliver a Rainier Valley Safety Master Plan of potential at-grade crossing safety improvements to the Board in October 2024 that prioritizes at-grade crossing safety improvements where the most collisions occur (e.g. along MLK Jr. Way S. in the Rainier Valley), followed by a systemwide at-grade crossing safety plan in November 2024, and provide regular progress reporting to the Rider Experience and Operations and System Expansion Committees until the safety master plans are transmitted.

Background

Public transportation is critical in increasing mobility, especially for individuals and families who lack private transportation, have no- or low-income, live in communities without essential goods and services, and must travel for school, work, and other opportunities. As Sound Transit expands its Link light rail, the agency must continue to improve rider and pedestrian safety at at-grade crossings along the existing lines, especially where service has disproportionately impacted BIPOC communities.

In 2022, Sound Transit and SDOT signed a partnership agreement reaffirming a shared commitment to enhance safety, equity, community access, and mobility in the Rainier Valley. This motion seeks to build upon that partnership to study and expeditiously implement enhancements for at-grade stations in the area.

When the 1 Line was constructed, it was built at grade through the Rainier Valley with three stations along Martin Luther King Jr. Way South: Columbia City, Othello, and Rainier Beach. MLK Jr. Way S is one of the two main roadways in the Rainier Valley, making it a vital and highly used corridor for various modes of transportation. The Rainier Valley is also historically one of the most diverse zip codes in the Puget Sound region.

The at-grade design along MLK Jr. Way S means that pedestrian and vehicle collisions with the light rail can and have occurred. The Seattle Times has reported that since service began in 2009, light rail vehicles have collided with a vehicle, person, or object at least 136 times in the Rainier Valley. In 2023, Sound Transit reported 26 collisions with light rail vehicles for the year. Of these collisions, 20 occurred at-grade crossings, and 18 occurred along the MLK Jr. Way S corridor. Of the 11 collision-related fatalities throughout the Link's operating history, eight individuals have tragically lost their lives in the Rainier Valley.

Collisions in the MLK corridor also significantly affect overall Link system operations. When collisions occur, trains may be one-tracked, but the disruption and delay often interrupt scheduled service for the entire 1 Line. This poses future service and rider experience concerns as the Link system expands and new lines are integrated with this corridor. This section of track is the largest source of variability in the Link light rail system performance due to delays and service disruptions

caused by traffic signals and collisions. The variability in the Rainier Valley can result in “train bunching,” which can cause crowding and other operational challenges up and down the alignment, including the interlining of trips for both the 1 and 2 Lines between International District Station and Lynnwood City Center. In addition, variability can result in additional light rail fleets needing to maintain service levels across the system while accommodating slower travel times. Having improved reliability in the Rainier Valley will assist in Sound Transit’s ability to meet federal grant commitments related to service levels as the system expands.

A disproportionate amount of train collisions occur along the MLK Jr. Way S corridor, negatively impacting communities that live, work, and commute through this region. Sound Transit and SDOT have affirmed that reducing collisions and near misses is a top priority for both agencies. The direction provided by this motion will expand upon the current work to better understand the feasibility of safety enhancements to at-grade crossings that can help achieve these goals.

Sound Transit’s Link light rail includes 27 at-grade Link light rail crossings in the MLK Jr. Way S corridor. Outside the corridor there are an additional 22 at-grade Link light rail crossings. The Sounder commuter rail service has 16 at-grade crossings on the Sound Transit-owned Lakewood subdivision, and Tacoma Link includes 47 at-grade crossings.

Train safety is an important issue in the U.S., where every three hours in the U.S., a person or vehicle is hit by a train, and more than 60% of collisions occur at crossings equipped with lights and/or gates.

In light of safety issues related to at-grade crossings in August of 2021, Sound Transit unified work across the agency into one multi-disciplinary work group that focuses specifically on at-grade crossing safety.

Sound Transit’s At-Grade Crossing Program focuses on Link light rail at-grade crossings. It reduces the safety risk to the lowest practical level as defined by the Federal Transit Administration on the existing operational system and voter-approved projects currently under construction. While Tacoma Link and Sound Transit-owned Sounder at-grade crossings are not currently within the Program’s scope, they are planned to be incorporated.

Sound Transit, in partnership with SDOT, has completed work in the Rainier Valley Corridor, including pavement markings, LED signs, traffic signals, additional studies on treatments, and analysis of risks and costs. Sound Transit has many active studies, pilot projects, and projects underway in the Rainer Valley Corridor, including but not limited to an eye-tracking study/analysis, a signal reprioritization pilot, an audible warning modification pilot, paint to enhance trackway visibility pilot, a pilot for automated pedestrian gates at station locations, and light rail vehicle wig wag headlights, as well as traffic modeling.

In recognition of the series of efforts underway, as well as continuing community concerns related to at-grade crossing safety in communities in King, Pierce, and Snohomish Counties where Sound Transit rail service operates, the agency must accelerate the pace and expand the geographic scope of these at-grade crossing safety projects, intensify focus on the short-term at-grade crossing safety concerns on existing corridors, and identify medium and long-term issues and opportunities that impact at-grade crossing safety, and system operations and reliability of Sound Transit service. Identifying these medium and long-term issues could present significant opportunities for system expansion and future needs for rolling-stock acquisition.

Because Sound Transit-owned at-grade crossings intersect with the rights-of-way of jurisdictions, including Seattle, Bellevue, Redmond, Tacoma, Lakewood, and DuPont, it is necessary to ensure strong agency relationships with partner jurisdictions.

Motion

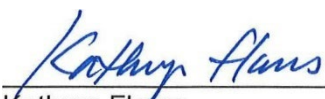
It is hereby moved by the Board of the Central Puget Sound Regional Transit Authority that the chief executive officer is directed to expand the geographic scope of Sound Transit's At-Grade Crossing Program to include not only all Link light rail at-grade crossings but also Tacoma Link and Sound Transit-owned Sounder at-grade crossings while prioritizing improvements in the Rainier Valley and accelerate the execution of current at-grade crossing projects underway to improve near-term at-grade crossing safety and expand current projects as needed.

The chief executive officer is further directed to conduct a comprehensive study in which Sound Transit staff will (a) analyze past at-grade crossing safety incidents on MLK Jr. Way S; (b) identify and evaluate short-, mid-, and long-term at-grade crossing safety improvements that could be implemented at at-grade stations along MLK Jr. Way S.; (c) explore the feasibility of different options in their evaluation such as gates, pedestrian spaces, reduced speed limits for cars, lane reductions, grade separation, and other possible upgrades, as well as develop a potential funding plan identifying any possible grant sources; (d) build upon work already underway to work collaboratively with SDOT and other regional partners where appropriate to assess at-grade crossing safety enhancements; (e) identify any opportunities to accelerate actions under their current at-grade crossing safety studies/planning work.

The chief executive officer is further directed to develop and compile a Rainier Valley Safety Master Plan with a focus on the Rainier Valley and a systemwide at-grade crossing safety plan in which staff will (a) evaluate the feasibility, costs, benefits, and potential impacts of each proposed potential improvement including recommendations for project prioritization based on the highest risk areas; (b) ensure the language used in the document is easily understandable or use layman's terms if highly technical language must be utilized; (c) detail what actions would be needed to implement improvements including any required collaboration with other agencies; and (d) work to improve at-grade crossing safety on projects under construction, projects in planning, and any long-range plans.

Staff will transmit a report on the Rainier Valley Safety Master Plan to the Board in October 2024, followed by a systemwide at-grade crossing safety plan in November 2024, and must provide monthly updates to the Rider Experience and Operations Committee and System Expansion Committee on the progress of all current work on at-grade crossing projects until the safety master plans are transmitted.

APPROVED by the Board of the Central Puget Sound Regional Transit Authority at a regular meeting thereof held on July 25, 2024.



Kathryn Flores
Board Administrator



Dow Constantine
Board Chair

Appendix C Data Analysis and Prior Studies

Evaluating and understanding data provides meaningful insights to compare Sound Transit to other peer agencies, identify trends and areas for improvement, assess enhancement effectiveness, and encourage data-driven decision-making. Data is integral to the safety risk management process, guiding efforts to identify improvement opportunities, informing research such as industry best practices and peer analyses, prioritizing locations for implementation, and enabling continuous monitoring. This appendix includes and is organized in a way to articulate initial Program work like the 2021 Rainier Valley Corridor Analysis and the 2022 Peer Analysis, which led to the development of the Assessment Tool in 2022 and, ultimately, the list of completed projects through June 2024 and a summary of key prior studies. The last section is the ongoing data monitoring piece and includes an initial look at a draft data analysis of the Rainier Valley with updated data through June. Long-term monitoring is required to fully assess the effectiveness of the enhancements, and the final Master Plan will include updated data.

2021 Rainier Valley Corridor Analysis

This analysis, conducted in Phase 1 during the enhancement identification step identified in Section 3.1, established a baseline of existing conditions and data trends for at-grade crossings in the Rainier Valley. It reviewed safety events on the Sound Transit Link light rail, using both Sound Transit and SDOT data to identify trends, prioritize locations, and develop mitigation strategies. The review suggested potential strategies such as warning signs, dynamic pavement markings, adaptive signal recovery, illuminated markers, turn gates, photo enforcement, and education. These recommendations were further evaluated using the assessment tool outlined in Section 3.1.



Figure C-1
Total Events
(2009-2021)



Figure C-2
Total Collisions
(2009-2021)



Figure C-3
Pedestrian Near
Misses and Close
Calls (2009-2021)

Key Take-Aways

The map in Figure C-1 visualizes the number of reported safety events at each crossing along MLK Jr Way S from 2009 to 2021. Figure C-2 shows that the S Graham Street and S Dawson Street intersections experienced the greatest collisions, mostly due to illegal motor vehicle left-turn movements. Illegal left turns account for 63% of all collisions, while 15% involve pedestrians.

A near miss refers to an event or situation where a transit vehicle operator must take evasive maneuvers or other actions to avoid striking a pedestrian, vehicle, or object. Among the five most frequent intersections for pedestrian near misses between 2009-2021, four are station locations and one is Graham Street, a future station location.

This data underscores the importance of prioritizing safety enhancements for left turning vehicles corridor-wide and pedestrian access at station locations.

2022 Peer Analysis from the National Transit Database

Conducting peer reviews of other agencies offers insight into safety incidents across similar systems. Compared to other light rail transit agencies nationwide, Sound Transit has fewer grade crossings than many peer agencies but ranks near the middle when comparing numbers of injury and fatality incidents. This information highlights peer agencies that may have applicable lessons learned that Sound Transit can incorporate into potential solutions to improve safety.



Total Grade Crossings															
San Francisco Municipal Transportation Agency (SFMTA)	335														
Tri-County Metropolitan Transportation District of Oregon (TriMet)	212														
Utah Transit Authority (UTA)	203														
Los Angeles Metro Rail (Metro)	197														
Valley Metro Regional Public Transportation Authority (Valley Metro)	192														
Santa Clara Valley Transportation Authority (VTA)	168														
The Metropolitan Transit Authority of Harris County (Metro)	165														
Minneapolis Metro Transit	154														
Sacramento Regional Transit District (SacRT)	137														
Dallas Area Rapid Transit (DART)	136														
San Diego Metropolitan Transit System (MTS)	131														
Massachusetts Bay Transportation Authority (MBTA)	55														
Pittsburgh Regional Transit (PRT)	51														
Maryland Transit Administration (MTA)	44														
Hampton Roads Transit (HRT)	40														
Denver Regional Transportation District (RTD)	40														
Charlotte Area Transit System (CATS)	39														
Sound Transit	37														
St. Louis Metro Transit	25														
Greater Cleveland Regional Transit Authority (GCRTA)	25														
New Jersey Transit Corporation (NJT)	15														
Niagara Frontier Transportation Authority (NFTA)	8														
Vehicle and Passenger Car Revenue Miles		Total Injuries		Total Fatalities		Injuries per 100K Vehicle Revenue Miles		Fatalities per 100K Vehicle Revenue Miles							
Los Angeles Metro Rail (Metro)	42,421,824	Dallas Area Rapid Transit (DART)	292	Dallas Area Rapid Transit (DART)	25	Minneapolis Metro Transit	1.90	Santa Clara Valley Transportation Authority (VTA)	0.21						
San Diego Metropolitan Transit System (MTS)	32,269,209	Minneapolis Metro Transit	238	Minneapolis Metro Transit	21	The Metropolitan Transit Authority of Harris County (Metro)	1.57	Niagara Frontier Transportation Authority (NFTA)	0.16						
Denver Regional Transportation District (RTD)	28,711,253	Los Angeles Metro Rail (Metro)	172	Los Angeles Metro Rail (Metro)	21	Valley Metro Regional Public Transportation Authority (Valley Metro)	0.89	Dallas Area Rapid Transit (DART)	0.09						
Dallas Area Rapid Transit (DART)	28,591,610	The Metropolitan Transit Authority of Harris County (Metro)	137	Los Angeles Metro Rail (Metro)	21	Dallas Area Rapid Transit (DART)	1.02	Valley Metro Regional Public Transportation Authority (Valley Metro)	0.08						
Tri-County Metropolitan Transportation District of Oregon (TriMet)	25,118,646	Massachusetts Bay Transportation Authority (MBTA)	126	Tri-County Metropolitan Transportation Authority (VTA)	16	Niagara Frontier Transportation Authority (NFTA)	0.86	Minneapolis Metro Transit	0.06						
Utah Transit Authority (UTA)	18,775,948	Tri-County Metropolitan Transportation District of Oregon (TriMet)	123	Tri-County Metropolitan Transportation District of Oregon (TriMet)	13	Massachusetts Bay Transportation Authority (MBTA)	0.78	Charlotte Area Transit System (CATS)	0.06						
Sound Transit	17,979,075	San Diego Metropolitan Transit System (MTS)	113	San Diego Metropolitan Transit System (MTS)	9	St. Louis Metro Transit	0.58	Sacramento Regional Transit District (SacRT)	0.06						
St. Louis Metro Transit	16,601,709	St. Louis Metro Transit	96	Valley Metro Regional Public Transportation Authority (Valley Metro)	7	Tri-County Metropolitan Transportation District of Oregon (TriMet)	0.49	The Metropolitan Transit Authority of Harris County (Metro)	0.05						
Massachusetts Bay Transportation Authority (MBTA)	16,058,450	Valley Metro Regional Public Transportation Authority (Valley Metro)	82	Utah Transit Authority (UTA)	7	New Jersey Transit Corporation (NJT)	0.47	Tri-County Metropolitan Transportation District of Oregon (TriMet)	0.05						
Minneapolis Metro Transit	12,555,876	Utah Transit Authority (UTA)	67	Sacramento Regional Transit District (SacRT)	7	Maryland Transit Administration (MTA)	0.47	Maryland Transit Administration (MTA)	0.05						
San Francisco Municipal Transportation Agency (SFMTA)	12,185,190	Maryland Transit Administration (MTA)	65	Denver Regional Transportation District (RTD)	5	Los Angeles Metro Rail (Metro)	0.41	Los Angeles Metro Rail (Metro)	0.04						
San Francisco Municipal Transportation Agency (SFMTA)	12,185,190	New Jersey Transit Corporation (NJT)	36	The Metropolitan Transit Authority of Harris County (Metro)	4	New Jersey Transit Corporation (NJT)	0.38	New Jersey Transit Corporation (NJT)	0.04						
Niagara Frontier Transportation Authority (NFTA)	12,185,190	San Francisco Municipal Transportation Agency (SFMTA)	33	Niagara Frontier Transportation Authority (NFTA)	4	Utah Transit Authority (UTA)	0.36	Utah Transit Authority (UTA)	0.03						
Sacramento Regional Transit District (SacRT)	10,817,110	Niagara Frontier Transportation Authority (NFTA)	22	Niagara Frontier Transportation Authority (NFTA)	4	San Diego Metropolitan Transit System (MTS)	0.35	San Diego Metropolitan Transit System (MTS)	0.03						
Valley Metro Regional Public Transportation Authority (Valley Metro)	9,243,948	Santa Clara Valley Transportation Authority (VTA)	20	Maryland Transit Administration (MTA)	4	San Francisco Municipal Transportation Agency (SFMTA)	0.27	San Francisco Municipal Transportation Agency (SFMTA)	0.02						
The Metropolitan Transit Authority of Harris County (Metro)	8,707,233	Sacramento Regional Transit District (SacRT)	13	St. Louis Metro Transit	3	Santa Clara Valley Transportation Authority (VTA)	0.27	San Francisco Municipal Transportation Agency (SFMTA)	0.02						
Maryland Transit Administration (MTA)	8,581,174	Denver Regional Transportation District (RTD)	13	New Jersey Transit Corporation (NJT)	3	Greater Cleveland Regional Transit Authority (GCRTA)	0.25	Denver Regional Transportation District (RTD)	0.02						
New Jersey Transit Corporation (NJT)	7,608,562	Charlotte Area Transit System (CATS)	11	San Francisco Municipal Transportation Agency (SFMTA)	3	Pittsburgh Regional Transit (PRT)	0.21	Massachusetts Bay Transportation Authority (MBTA)	0.00						
Santa Clara Valley Transportation Authority (VTA)	7,531,138	Pittsburgh Regional Transit (PRT)	10	Charlotte Area Transit System (CATS)	3	Charlotte Area Transit System (CATS)	0.21	Hampton Roads Transit (HRT)	0.00						
Charlotte Area Transit System (CATS)	5,327,490	Hampton Roads Transit (HRT)	4	Massachusetts Bay Transportation Authority (MBTA)	0	Greater Cleveland Regional Transit Authority (GCRTA)	0.12	Greater Cleveland Regional Transit Authority (GCRTA)	0.00						
Pittsburgh Regional Transit (PRT)	4,781,918	Greater Cleveland Regional Transit Authority (GCRTA)	4	Hampton Roads Transit (HRT)	0	Denver Regional Transportation District (RTD)	0.05	Pittsburgh Regional Transit (PRT)	0.00						
Niagara Frontier Transportation Authority (NFTA)	2,555,244	Hampton Roads Transit (HRT)	4	Pittsburgh Regional Transit (PRT)	0										
Greater Cleveland Regional Transit Authority (GCRTA)	1,589,117														
Hampton Roads Transit (HRT)	1,045,615														

Figure C-4 Peer Review

Assessment Tool (2022)

The Program enhances safety using strategies like infrastructure changes, operational updates, training, and promoting safer behaviors to reduce the likelihood of safety incidents. Enhancements were identified through research, monitoring, community engagement, and regional collaboration. Sources included:

- Industry Best Practices: Proven effective methods.
- Peer Agency Research: Insights from similar agencies.
- Data Analysis: Safety reports, traffic volumes, and field data.
- Field Visits: Observations and feedback from staff and consultants.
- Community and Partner Agency Feedback: Input from public outreach and partner agencies.

See Section 3.1 Enhancement Identification and Assessment for additional details on the process.

The Program's initial round of enhancement identification began in late 2021/early 2022. Ideas were collected as part of reviewing the 2021 Rainier Valley Corridor Analysis, the regional partner and community outreach process, and ideas collected as part of peer agency research. The group surveyed operators, contacted nearly three dozen community-based organizations, held nine virtual community conversations, surveyed the ADA community for feedback, and collaborated with SDOT to collect enhancement ideas.

Below are some example ideas received. Some of the ideas received are outside of Sound Transit authority. Some scored highly in the initial assessment and were ready for immediate implementation, while others are more complex, requiring further research, feasibility and traffic studies, consultation with federal regulations, and a review of industry best practices. Ideas that did not meet the criteria or scored poorly were deprioritized. As new enhancement ideas are received, they will undergo the same evaluation process and be compared against all previously submitted ideas—including those that were initially deprioritized—with updates reflecting any new information or regulatory guidance.

Administrative Controls		Engineering Controls		Roadway Redesign
<p>Safety Education</p> <ul style="list-style-type: none"> • 5 Core Safety Messages • Safety campaigns with partners • Safety education campaigns • Engagement activities • Outreach and training on specific mitigations <p>Encouragement</p> <ul style="list-style-type: none"> • Rainier Area Security Emphasis Team • Crossing guards • Using red light cameras to mail education materials 	<p>Operations Procedures</p> <ul style="list-style-type: none"> • Audible warning signage for operators • Training emphasis 	<p>Audible</p> <ul style="list-style-type: none"> • Enhance wayside bells • Localized audible announcements <p>Visual</p> <ul style="list-style-type: none"> • Updated static signage • Dynamic no left turn warning signs • Dynamic “Another Train Coming” warning signs • Retroreflective tape around signal heads • Refreshed pavement markings • Paint to visually emphasize trackway • In pavement lights <p>Physical Infrastructure</p> <ul style="list-style-type: none"> • Pedestrian gates at station locations • Channelization / fencing 	<p>Technology</p> <ul style="list-style-type: none"> • Leading pedestrian intervals • Traffic signal reprioritization pilot • Video Analytics • V2X • Touchless pedestrian push buttons • Smarter traffic signal controller • Signal system battery backup • ROW detection <p>Vehicle</p> <ul style="list-style-type: none"> • Adjust LRV bell volume • Wig-wag headlights 	<ul style="list-style-type: none"> • Consolidate crossings • Eliminate crossings • Grade separate • Full corridor quad gates & flashers • 2 Phase crossing • Larger pedestrian refuge areas • Other traffic calming measures

Figure C-5 Enhancement Ideas

Completed Projects Through June 2024

Between 2021 and June 2024, as part of Phase 1 outlined in Section 3.1, Sound Transit, in partnership with SDOT, **completed ten at-grade crossing enhancement projects** in the Rainier Valley, summarized in Table C-3 below. The collaboration with SDOT was crucial, as some projects fall under SDOT’s jurisdiction while others are within Sound Transit’s authority. Data from these projects is continuously monitored to assess project effectiveness and identify overall trends in the corridor, which will guide future enhancements. Early data shows positive trends in incident reduction.
















Project Type	Project Name	Safety Focus Area	Completion Date
Signage Enhancement	LED flashing no left turn signs	 	Mar 2022
Signage Enhancement	LED flashing another train coming signs at station intersections	 	Sep 2023
Signage Enhancement	Other signage updates	 	Jan 2024
Pavement Markings	R X R pavement markings in left turn pockets		Jun 2021
Pavement Markings	“LOOK” pavement markings		Sep 2023
Pavement Markings	Corridor pavement marking refresh	  	Sep 2023
Traffic Signal Enhancements	Leading pedestrian intervals		Aug 2023
Traffic Signal Enhancements	Retroreflective tape added to signal heads		May 2024
Traffic Signal Enhancements	Signal reprioritization pilot	 	Jun 2024

Table C-1 At-Grade Crossing Program Completed Projects

2024 Rainier Valley Corridor Analysis

As the table above indicates, Sound Transit and SDOT have introduced several safety enhancement treatments to the Rainier Valley Corridor over the past few years. This report was intended to update safety data within the corridor and provide a preliminary assessment of the effectiveness of mitigation projects implemented since 2021.

Key Take-Aways

As shown in Figure C-1, S Graham and S Dawson have the highest recorded number of total collisions, unchanged since the 2021 analysis. Also unchanged since the 2021 analysis, of the top five intersections with the highest total pedestrian events, three are located at station intersections, and one is a future station location.

Most train versus vehicle collisions occur when the train and vehicle travel in the same direction. This is likely due to obstructed driver visibility when making prohibited left turns. Collisions and near misses are most frequent during the evening peak hour.

Between 2021 and June 2024, Sound Transit, in partnership with SDOT, **completed ten at-grade crossing enhancement projects** in the Rainier Valley. Early data findings show a reduction in total pedestrian safety events by 33 percent and reduction in total vehicle safety events by 3 percent. Total events include both vehicle and pedestrian near misses and collisions.

Long-term monitoring is required to fully assess the effectiveness of the enhancements, and the final Master Plan will include updated data. This data will inform future projects.



Figure C-6
Total Rail Events
(2009–Jun 2024)

Summary of Key Prior Studies

The timeline on the following page highlights work completed and incorporated into the development of this Master Plan, including several reports and studies on enhancement ideas collected as part of activities to conduct further research. This appendix outlines key studies and their summarized outcomes, which have contributed to the continued development of Program activities.

Study	Date	Summary	Key Outcomes
Potential At-Grade Crossing Treatments: Final Memorandum	Sep 2023	Presents research on at-grade crossing treatments including pedestrian crossings, left-turn gates, in-pavement lights, increased visibility of the trackway utilizing paint on pavement and/or fencing, audible messaging (verbal messages), alternating (wig wag) headlights on LRV, a navigation safety mobile app, Bluetooth beacons for mobile phones to alert peds near the tracks of oncoming LRV, ROW presence detection, and a V2X vehicle communication system.	<p>Studies helped form the basis for the following projects:</p> <ul style="list-style-type: none"> • Signalized Pedestrian Crossing Upgrades • Trackway Visibility Pavement Markings • Alternating Train Headlights • SMART: Rainier Valley Safe Project Phase 1
MLK Link light rail Automatic Pedestrian Gates: Feasibility Study (Stations – Columbia City, Othello, Rainier Beach)	Sept 2023	Documents the feasibility of installing either parking lot-style ped gates or typical automatic railroad-style gates at existing at-grade pedestrian crossings on the 1 Line at three stations (including five ped crossings) in the Rainier Valley. The study focused on analyzing existing physical space constraints based on the proposed project improvements. Results indicated that it is physically feasible to install either style of gate at S. Alaska St., S. Edmunds St., S. Myrtle St., and S. Othello St. There is a lack of regulatory support or guidance for non-typical installations, which leaves open what type of support infrastructure should be included (i.e., backup power, additional control cabinets).	<p>Ongoing coordination with SDOT to advance planning and design of automatic pedestrian gate pilot at the three Rainier Valley stations:</p> <ul style="list-style-type: none"> • Phase 1 (Columbia City and Othello) and Phase 2 (Rainier Beach) Automatic Pedestrian Gates project identification • Phase 1 scope of work developed through design • Phase 2 scope of work through design

Study	Date	Summary	Key Outcomes
		<p>Locating this infrastructure would require additional study and need to evaluate the need for additional ROW. There is limited room at S. Henderson St., and future work here will need to include traffic analysis and the feasibility of shifting overhead catenary system poles. Installing ped gates controlled by traffic signals would be considered a novel treatment with no industry practice.</p> <p>Using parking lot-style gates would not be considered fail-safe and is not recommended. ST needs to coordinate with SDOT and Federal partners to determine whether a path forward is to install railroad-style ped gates and flashers. The study suggests that adding gates for automobiles would be advisable to provide consistent operation and control.</p>	
<p>Potential AGC Treatments: Research and Evaluation of Grade-Separated Structures Memorandum</p>	<p>Oct 2023</p>	<p>This study assessed the feasibility of eliminating all at-grade crossings between light rail tracks and vehicular and pedestrian at-grade crossings within the Martin Luther King Way Jr Corridor. Three grade-separated options were evaluated along the MLK corridor, including an elevated guideway, tunnel, and open trench option. The study also assessed pedestrian grade-separated options at the three existing stations and two other non-station pedestrian crossings.</p>	<ul style="list-style-type: none"> • Identification of critical utilities underneath tracks in Rainier Valley • Order of magnitude cost estimates for various grade-separated options • Identification of construction phasing duration and impacts on the MLK Jr Way corridor

Table C-2 Summary of Key Prior Studies

Appendix D Rainier Valley At-Grade Crossing Community Engagement Memo, July 2024

Memo

July 29, 2024

To:	Goran Sparrman, CEO Sound Transit
Thru:	Moises Gutierrez, Deputy CEO, Chief Program Oversight Officer Branden Porter, Acting Chief Safety Officer
From:	Victoria Morris, Acting Project Director - Safety Leda Chahim, Deputy Executive Director - Government & Community Relations Seth Daphne Esmeson, Program Manager - Transit Safety
Subject:	Rainier Valley at-grade crossing community engagement

At-Grade Crossing engagement background

In 2022, Sound Transit (ST) transformed its engagement in the Rainier Valley to be more proactive and intentional than the previous incident-responsive engagement and communication efforts. An important goal of the At-Grade Crossing (AGC) program is to meaningfully engage the Rainier Valley community, with an emphasis on safety as ST’s top priority and one of the agency’s core values. We do this by:

- building and sustaining relationships with community
- increasing two-way communication between community and ST
- establishing ST as a long-term member of the Rainier Valley community.

Centering our work around equitable safety outcomes is critical, and our engagement approach is designed to meet community where they are, providing a diversity of convenient and accessible points of connection. Our AGC program spans all the at-grade segments ST owns and operates, and we brought on an engagement and communications consultant in 2024 to continue to grow our program emphasis in Rainier Valley and beyond. See below for additional information on our previous engagement efforts (i.e. 2022-2023).

Methods and strategies

As part of the current 2024 AGC Engagement Plan, ST is continuing to build on previous engagement strategies to reach community members where they are to inform the future of safety enhancements in the area. We plan to employ a variety of engagement strategies that meaningfully engage communities in the Rainier Valley. Our current engagement plan includes:

- *Qualitative survey*—ST is deploying a survey about safety enhancements made in the corridor, possible improvements, and how ST is communicating about AGC work.
- *Listening sessions*—ST is reaching out to approximately fifty organizations, groups, and businesses in Rainier Valley to listen to concerns about safety in the area and share information about potential safety enhancements and current projects. We’ll also ask about other groups and venues where community gathers to learn about future opportunities to reach communities in the Rainier Valley.

Memo

- *Fairs and festivals*—ST is attending fairs and festivals from Columbia City to Rainier Beach this summer share out progress, hear concerns, and collect feedback from community members about safety around tracks and trains in Rainier Valley.
- *Safety ambassadors*—every year during Rail Safety Week, ST staffs a strong presence of safety ambassadors to highlight our safety messaging and spread information about the latest improvements or projects. Moreover, ST Security staff are trained to encourage riders to interact safely around trains throughout the year.
- *Community events, such as transit safety town halls*—as Board members, community, and agency partners schedule community events or town halls, Sound Transit engages with community about current and upcoming projects.

ST is planning to develop a longer-term engagement strategy that will be informed by upcoming Board and community conversations. We are also thinking about how to incorporate additional events informed by our engagement with community-based organizations and partners to broaden our reach—showing up where communities gather, providing interpretation and translated materials, and engaging online and in-person.

Equitable engagement

We understand the importance of reaching communities of color as well as low income, limited English proficiency, and other vulnerable populations that must be centered in our outreach efforts. Centering equity is essential for the success of engagement in Rainier Valley.

One significant barrier to engagement is language and translation. Our qualitative survey is translated into six languages: Arabic, Chinese, Somali, Spanish, Tagalog, and Vietnamese. These languages are the most spoken in Rainier Valley according to our internal GIS analysis using American Community Survey data.

In addition to translating our engagement materials into the most spoken languages, we also offer interpreter services at community briefings and tailored listening sessions. Offering interpretation services is one of many ways that we can tailor our engagement for an organization or community group. Additional ways we tailor our outreach are:

- *Timing*—conventional business hours are not often the most convenient for community members to give feedback. In addition to attending after-hours fairs and festivals, our group listening sessions are available after work hours and weekends. Whichever time works best for community members, we strive to accommodate.
- *Format*—presentation-style briefings are not always the most accessible to community members. From conversations and listening sessions to briefings on specific AGC projects, we can find a way to communicate that works best for community members.
- *Online vs in-person*—not everyone has access to the internet. So, when we collect survey responses or provide information, we offer a physical version of our materials.

Memo

- *Atmosphere*—before hosting listening sessions, we ask: does the venue we chose invite participation and engagement? When we join community members at their events, we ask: does our process reflect, honor, and welcome the community?
- *Location*—town halls on Sound Transit’s campus can be hard for community members to attend, so much of our engagement is designed to meet community members where they are. With that in mind, we think about convenience and ease of accessibility when selecting locations.
- *Partnerships* – Partnering with community-based organizations to join events they already host, or to be the convener can improve comfort amongst attendees and provide valuable insights into the best approach for successful engagement.

Previous engagement from 2022—2023

Annually, the AGC program sponsors events and seeks partnerships in the Rainier Valley as part of the ongoing at-grade crossing programmatic work. Planned activities focus on participating in established community events. During 2022 and 2023 events included:

- Community Safety Walks
- Cinema Under the Stars
- Columbia City Farmer’s Market
- Othello International Festival
- Rainier Beach Back2School Bash
- Rainier Beach Boo Bash
- Rail Safety Week staff ambassador presence in partnership with Operation LifeSaver

Additionally, in 2022, the AGC team contacted over 30 community-based organizations, either located in the Rainier Valley or serving the area, inviting them to participate in conversations with ST staff. The project team held nine virtual community conversations with those who were interested in participating in conversations. The project team also surveyed operators and the ADA community for feedback and collaborated with SDOT to collect enhancement ideas.

In July of 2023, Sound Transit deployed a security emphasis team in the Rainier Valley to enhance overall passenger safety and security at stations. This security team also builds positive relationships, encouraging compliance with laws and regulations, and promoting safety around tracks and trains. In the second half of 2023 the team made 462 crossing education contacts. Overall, this program has received positive feedback from the community.

Appendix E Project Pages

The Master Plan projects are organized into three categories:

- **Proposed:** Projects under consideration and not yet programmed. They will require further coordination, data analysis, and, in some cases, community engagement and communications. Proposed projects were identified through data analysis, user observations, engineering assessments, and emerging technologies and information.
- **Adopted:** Projects in the development or design phase but not yet fully funded for construction.
- **Fully Funded:** Adopted projects with secured funding and an approved budget for full implementation.

Fully Funded Projects

Trackway Visibility Pavement Markings Pilot

SMART Grant: Rainier Valley Safe Project Pilot, Phase 1

Adopted Projects

Automatic Pedestrian Gate Pilot, Phase 1

Automatic Pedestrian Gate Pilot, Phase 2

Another Train Coming Signage Between Stations

Alternating (Wig Wag) Train Headlights

Proposed Projects

SMART Grant: Rainer Valley Safe Project Pilot, Phase 2

Additional Static Signage and Delineators

Another Train Coming Sign Enhancements

Pedestrian Crossing Upgrades Between Stations

Trackway Visibility Pavement Markings Pilot

Description

This pilot project will install high-visibility pavement markings within the LRT dynamic envelope. The dynamic envelope is the region between and immediately adjacent to the tracks at a grade crossing. The project will also include new “DO NOT STOP ON TRACKS” signage. The goal of piloting the markings is to reduce the number of vehicles that come to a stop within the dynamic envelope, thus reducing the possibility that a vehicle is present on the tracks when a train approaches and to increase general visibility of the trackway encouraging drivers, pedestrians, and cyclists to pay attention regardless of the presence of a train.

Markings will provide visual contrast from the surrounding concrete or asphalt surface and utilize slip-resistant material. Two types of markings will be piloted—markings that adhere to MUTCD 8C.06—Dynamic Envelope and Do Not Block pavement markings guidelines and markings similar to those used in the 2014 FRA study titled [Effect of Dynamic Envelope Pavement Markings on Vehicle Driver Behavior at a Highway-Rail Grade Crossing](#).

Coordination Required

Coordination with SDOT is required in the following areas:

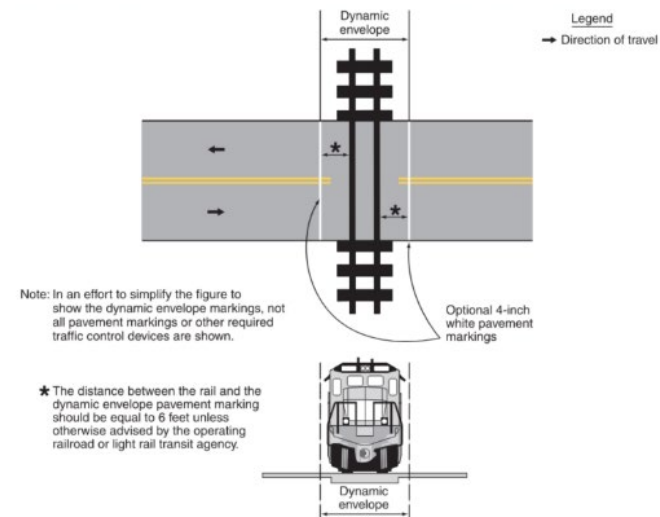
- Street Improvement Permit
- Ensure pavement markings meet SDOT standards for not conflicting with existing pavement markings in the area (e.g., bike lanes, lead lines, crosswalks)
- Responsibility for maintenance and periodic marking refresh

Impacts to Public

Installation of pavement markings may require shutdowns of crossings for less than one day, impacting vehicles, pedestrians and Link light rail service. Temporary detours will be in place.

Figure E-1 Example of LRT dynamic envelope

Figure 8B-8. Example of Dynamic Envelope Pavement Markings at Grade Crossings



Trackway Visibility Pavement Markings Pilot

Project Type:

- Pavement markings

Safety Focus Areas:



Milestones:

- 30% design: Q3 2024
- Final design: Q4 2024
- Start construction: Q4 2024
- End construction: Q3 2025
- Pilot completion (includes data collection): 2027

Location(s):

- Pilot FRA example pavement marking: S Dawson Street and S Branden Street
- Pilot MUTCD example pavement marking: S Kenyon Street and S Cloverdale Street

Cost Range:

- \$800k–\$1M

Grant Opportunities:

- None identified

Figure E-2 (left) Sample DO NOT STOP ON TRACKS signage
Figure E-3 (right) Sample dynamic envelope pavement markings



SMART Grant: Rainier Valley Safe Project Pilot, Phase 1

Description

Phase 1 of the Rainier Valley Safe project, funded by a USDOT Strengthening Mobility and Revolutionizing Transportation (SMART) grant and secured in partnership with SDOT, is focused on testing innovative technology in the MLK corridor. The project aims to enhance safety for all users while maintaining a high level of access and mobility.

The project will test the following technologies:

- Video analytics
- Vehicle-to-Everything (V2X) communications
- Enhanced signal controllers
- Traffic signal battery backup
- Touchless pedestrian push buttons

Evaluation of this project will inform applicability to employ technologies at a larger and systematic scale. If Phase 1 is successful, it could lead to submitting an application for Phase 2 of the grant (up to \$15M over 36 months) to roll out technologies on a broader scale, integrating with the existing transportation system and refining the concept such that it could be replicated by others.

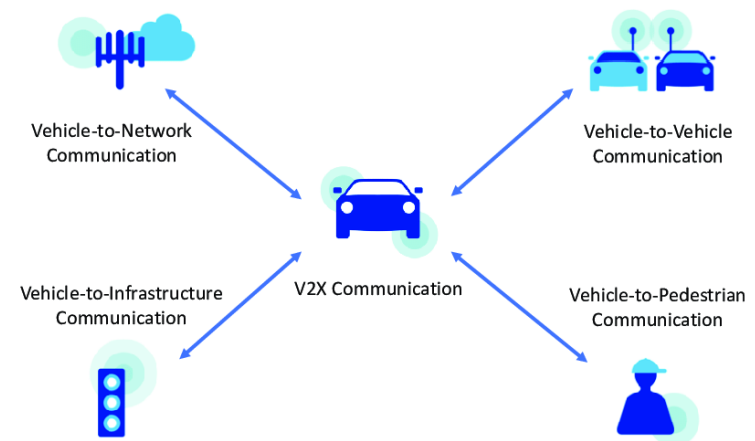
Coordination Required

Coordination with SDOT is required to ensure tested technologies do not interfere with existing signals or traffic monitoring technology already active in the corridor. The traffic department would need to be involved in implementing enhanced signal controllers, battery backups, or any other technology that augments existing signal hardware. The project is also working toward a partnership with the University of Washington to assist with data collection and analysis.

Impacts to Public

Technology installation may require short shutdowns of crossings, less than one day. Temporary detours will be in place.

Figure E-4 Graphic showing examples of V2X communications



SMART Grant: Rainier Valley Safe Project Pilot, Phase 1

Project Type:

- Technology

Safety Focus Areas:



Milestones:

- Data collection and design specifications: Q1 2024
- Final analysis and report: Q2 2025
- Equipment procurement: Q3 2025

Location(s):

At-Grade Crossings on MLK Jr. Way S. at these cross streets:

- S Columbian Way / Oregon Street
- S Alaska Street
- S Edmunds Street
- S Hudson Street
- S Myrtle Street
- S Othello Street
- S Trenton Street
- S Henderson Street

Cost Range:

- \$2.5M

Figure E-5 Touchless pedestrian push button



Automatic Pedestrian Gate Pilot, Phase 1 *(Columbia City and Othello Stations)*

Description

This pilot project will install automatic pedestrian gates at the Columbia City and Othello Stations at the north and south pedestrian access points of each station. Automatic pedestrian gates are physical barriers designed to operate in coordination with approaching trains, encouraging pedestrian compliance with traffic signals. Gates are installed on either side of the dynamic envelope at pedestrian crossings and activate when a train approaches the station. Associated infrastructure to support the design may also be included in the project.

The project will also include emergency swing gates that allow pedestrians on the tracks to exit to safety if the gates begin to descend, as well as any needed pedestrian and ADA improvements near the project. The gates and signals will require backup battery power for a minimum of 90 minutes. Ongoing data collection will help evaluate the project's impact on safety and the traveling public. The insights gained from this analysis will guide long-term decisions regarding the potential for permanent adoption and expansion to other locations across the system.

Coordination Required

The Seattle Transit Way Agreement from 2002 requires formal SDOT approval for these projects. Additional coordination with SDOT has already begun and will need to address several critical aspects of the project to ensure its successful implementation. These include:

- Updates or possible replacement of traffic signal cabinets
- Controlled integration of phased pedestrian crossings, signals for vehicle movements, and train controls
- ADA ramp improvements or installations, including detectable warning surfaces
- Street Improvement Permit
- Battery backup compatibility with traffic signal and train systems
- Construction easements

This project requires Sound Transit and SDOT alignment on the operational feasibility of gates and agreement that no major fatal flaws are present. The schedule includes a project milestone reflecting this consensus point.

Impacts to Public

Installing pedestrian gates may require one or more full rail shutdowns or single tracking events, impacting train service and rider experience. To manage pedestrian traffic during the installation, temporary detours will be in place.

After construction, the public may notice increased noise from the pedestrian gate signal bells and additional lighting due to the new warning lights, especially at night. Potential impacts to all road users are currently being analyzed.

Project Type:

- Infrastructure projects

Safety Focus Area:



Milestones:

- 30% design: Q4 2024
- ST and SDOT consensus on operational feasibility: Q1 2025
- Final design: Q2 2025
- Long lead time equipment procurement: Q2 2025
- Start and end construction : Q2 2026
- Pilot end date: 2028

Location(s):

- Columbia City Station and Othello Station

Cost Range:

- \$8M-\$9M

Grant Opportunities:

- Reconnecting Communities federal grant application submitted September 27, 2024

Figure E-6 Example pedestrian gate with hanging bar

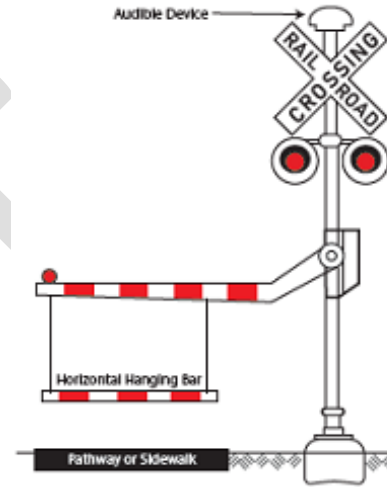
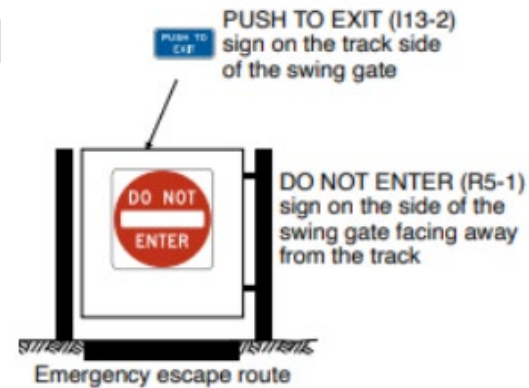


Figure E-7 Example emergency exit swing gate



Automatic Pedestrian Gate Pilot, Phase 2 *(Rainier Beach Station)*

Description

This pilot project will install automatic pedestrian gates at the Rainier Beach station. Automatic pedestrian gates are physical barriers designed to operate in coordination with approaching trains, encouraging pedestrian compliance with traffic signals. Gates are installed on either side of the dynamic envelope at pedestrian crossings and activate when a train approaches the station. Associated infrastructure to support the design may also be included in the project.

The project will also include emergency swing gates that allow pedestrians on the tracks to exit to safety if the gates begin to descend, as well as any needed pedestrian and ADA improvements near the project. The gates and signal will require backup battery power for a minimum of 90 minutes. Ongoing data collection will help evaluate the project's impact on safety and the traveling public. The insights gained from this analysis will guide long-term decisions regarding the potential for permanent adoption and expansion to other locations across the system.

Coordination Required:

The Seattle Transit Way Agreement from 2002 requires formal SDOT approval for these projects. Additional coordination with SDOT includes:

- Updates or possible replacement of traffic signal cabinets
- Controlled integration of phased pedestrian crossings, signals for vehicle movements, and train controls
- ADA ramp improvements or installations, including detectable warning surfaces
- Street Improvement Permit
- Battery backup compatibility with traffic signal and train systems
- Right-of-way and construction easements
- Potential relocation of a station art installation
- Potential relocation of an Overhead Catenary System pole

This project requires Sound Transit and SDOT alignment on the operational feasibility of gates and agreement that no major fatal flaws are present. The schedule includes a project milestone reflecting this consensus point.

Impacts to Public

Installing pedestrian gates may require one or more full rail shutdowns or single tracking events, impacting train service and rider experience. To manage pedestrian traffic during the installation, temporary detours will be in place.

After construction, the public may notice increased noise from the pedestrian gate signal bells and additional lighting due to the new warning lights, especially at night. Potential impacts to all road users are currently being analyzed.

Project Type:

- Infrastructure projects

Safety Focus Area:



Milestones:

- 30% design: Q2 2025
- ST and SDOT consensus on operational feasibility: Q3 2025
- Final design: Q4 2025
- Construction procurement: 9 months
- Start construction: Q3 2026
- End construction: Q1 2027
- Pilot end date: 2028

Location(s):

- Rainier Beach Station

Cost Range:

- \$10M–\$11M

Grant Opportunities:

- Still evaluating potential grant opportunities / None identified at this time

Figure E-8 Example pedestrian gate with hanging bar

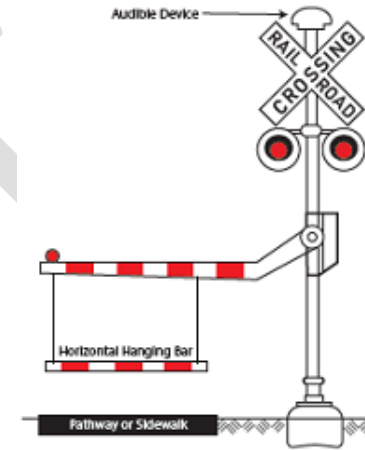
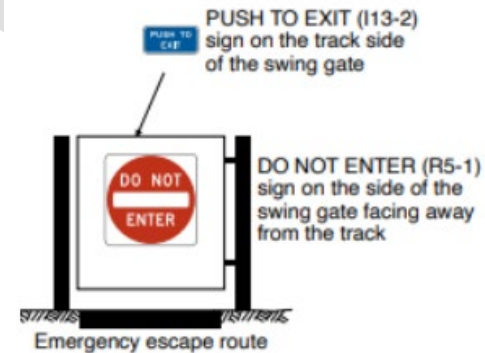


Figure E-9 Example emergency exit swing gate



Another Train Coming Signage Installation Between Stations

Description

The project will replace all existing signs with train icons with the new “another train” warning signs at all non-station crosswalks in the MLK corridor. Signs alert pedestrians of approaching trains and highlight when a second train is approaching from the other direction. This project will support signage consistency at all crossings, not just those adjacent to stations.

Another Train Coming signage is an illuminated LED, dynamic sign. The lower half of the sign (the train icon) is triggered by an approaching train. Both the lower half and the upper half (ANOTHER TRAIN COMING text) are triggered in the event a second train is approaching. Because these signs are “blank-out,” they are dark when not in use and are meant to garner attention from pedestrians when an alert is triggered.

Coordination Required

Coordination with SDOT is required to integrate into the traffic signal system and ensure signs follow all applicable SDOT standards.

Impacts to Public

Installation of signs may require shutdowns of crossings for less than one day, impacting pedestrians and occasionally vehicles. Temporary detours will be in place.

Figure E-10 Another Train Coming Current Blank-Out Sign



Another Train Coming Signage Installation Between Stations

Project Type:

- Signage enhancement

Safety Focus Area:**Milestones:**

- 30% design: completed Q2 2024
- Final design: Q4 2024
- Construction procurement: 6 months
- Start construction: Q3 2025
- End construction: Q4 2025

Location(s):

- Non-station crosswalks in the MLK corridor

Cost Range:

- \$2M–\$3M

Grant Opportunities:

- Connecting Communities

Alternating (Wig Wag) Train Headlights

Description

The project will retrofit existing LRVs, or trains, with the capability to flash headlights in an alternating pattern (aka wig wag) when audible warnings like train bells or horns are deployed.

Alternating train headlights are a visibility mechanism that strobes train headlights on/off or high/low when a train approaches an intersection, and the train’s audible signals are deployed. Industry studies indicate that trains equipped with alternating headlights are detected sooner by pedestrians and vehicles. Other peer agencies, such as Metro Transit in Minneapolis, have implemented alternating headlights, and coordination is ongoing with them to inquire about lessons learned, implementation strategies, and successes.

Coordination Required

None

Impacts to Public

No impact. Alternating headlight functionality would be installed while trains are not in service.

Figure E-11 Wig Wag Train headlights as implemented by Metro Transit



Alternating (Wig Wag) Train Headlights

Project Type:

- Train enhancements

Safety Focus Areas:



Milestones:

- Begin manufacture integration: Q3 2024
- Retrofit complete: Q1 2026

Number of Vehicles:

- 62 Series 1 Kinkisharyo LRVs
- 124 Series 2 Siemens LRVs

Cost Range:

- \$2.5M

Grant Opportunities:

- None identified

Figure E-12 Example of Link headlights



SMART Grant: Rainier Valley Safe Project Pilot, Phase 2

Description

Phase 2 of the Rainier Valley Safe Project, with proposed funding by a USDOT SMART grant in partnership with SDOT, is focused on implementing innovative technology tested in Phase 1 of the Rainier Valley Safe Project Pilot at 28 at-grade crossings. Technologies will be evaluated in Phase 1 and, if determined to be successful, will be included in the wider roll-out of Phase 2. The project aims to enhance safety in the MLK corridor for all users while maintaining a high level of access and mobility.

Technologies being tested in Phase 1 and will be considered for Phase 2 include:

- Video analytics
- Vehicle-to-Everything (V2X) communications
- Enhanced signal controllers
- Traffic signal battery backup
- Touchless pedestrian push buttons

If Phase 1 (described in project pages above) is successful, it will provide the basis for the application for Phase 2 of the grant (up to \$15M over 36 months) to roll out technologies to 28 intersections in the MLK Jr. Way corridor. The project will integrate with the existing transportation signal system, providing 24/7/365 real-time data and feedback for multi-modal users in the corridor while refining the V2X concept and possibly replicating at other areas in the Sound Transit system.

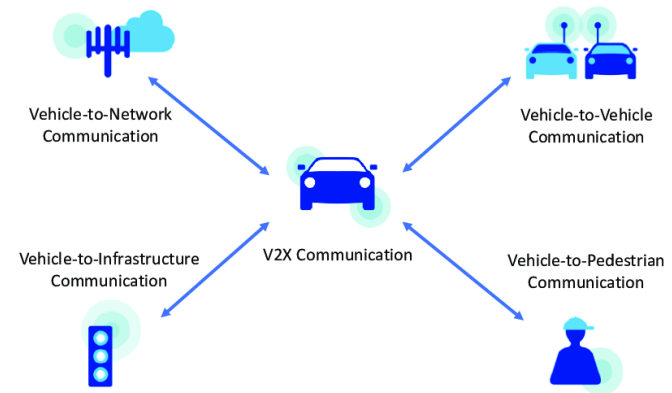
Coordination Required

Coordination with SDOT is required to ensure tested technologies do not interfere with existing signals or traffic monitoring technology already active in the corridor. The SDOT traffic department would need to be involved in implementing enhanced signal controllers, battery backups, or any other technology that augments existing signal hardware. The project is also working toward a partnership with the University of Washington to assist with data collection and analysis.

Impacts to Public

Technology installation may require short shutdowns of crossings, less than one day. Temporary detours will be in place.

Figure E-13 Graphic showing examples of V2X communications



SMART Grant: Rainier Valley Safe Project Pilot, Phase 2

Project Type:

- Technology

Safety Focus Areas:



Milestones:

- Phase 2 grant submission: Q2 2025
- If awarded:
 - Equipment installation: Q1 2026
 - Data collection and testing: Q2 2026
 - Pilot completion: 2029

Location(s):

At-grade crossings on MLK Jr. Way S. and 28 cross-street intersections from S. Walden St. in the north to S. Norfolk St. in the south.

Cost Range:

- \$16M–\$18M

Figure E-14 Touchless pedestrian push button



Additional Static Signage and Delineators

Description

There are several intersections in the corridor where vehicular left turns are prohibited. Currently “NO LEFT TURN” signs are on the signal arm, several feet overhead. The agency has partnered with SDOT, which is considering the installation of traffic delineators and eye-level “NO LEFT TURN” signs at intersections to enhance driver visibility of signage.

The placement of delineators leading to eye-level “No Left Turn” signs provides the opportunity to reinforce the existing “No Left Turn” signage that is high-mounted with traffic signals and other warning signage. The eye-level sign allows the driver to see and process the safety-critical information independent of the array of the other information conveyed at the intersection.

Coordination Required

Coordination with SDOT is required to utilize existing poles or signposts and to install delineators at intersections with restricted left turns.

Impacts to Public

Installation of signs and delineators may require shutdowns of traffic lanes for less than one day, impacting vehicle traffic. Detours will be in place.

Figure E-15 Example of eye-level “NO LEFT TURN” signage and delineator



Additional Static Signage and Delineators

Project Type:

- Signage enhancement

Safety Focus Area:



Milestones:

- TBD in coordination with SDOT

Location(s):

- Intersections where left turns are not permitted

Cost Range:

- \$400k-\$1M

Grant Opportunities:

- None identified

Another Train Coming (ATC) Sign Enhancements

Description

This project will replace existing ATC signs at all pedestrian crosswalks in the MLK corridor with an enhanced signage design.

ATC signage is an illuminated LED, dynamic sign. The lower half of the sign (the train icon) is triggered by an approaching train. Both the lower and upper half (ANOTHER TRAIN COMING text) are triggered in the event a second train is approaching. Because these signs are “blank-out,” they are dark when not in use and are meant to garner attention from pedestrians when an alert is triggered.

Based on feedback from current installation locations, the Program will consider modifying the signs to be true ‘Blank-Out’ when not triggered. Currently, the signs can be read under some lighting conditions when not triggered. The Program may also modify the signs so the arrows point left, right, or both directions predicated on the pedestrian/train direction of travel.

Coordination Required

Coordination with SDOT would be required to ensure signs follow all applicable SDOT standards. The project would need to be coordinated with the adopted Another Train Coming Signage Between Stations project, as that project will order new ATC signs to replace existing signs at non-station locations.

Impacts to Public

Installation of signs may require the shutdown of crossings for less than one day, impacting pedestrian traffic.

Figure E-16 ATC Current Blank-Out Sign



Another Train Coming (ATC) Sign Enhancements

Project Type:

- Signage enhancement

Safety Focus Area:



Milestones:

- Preliminary planning
- Run through assessment in Master Plan Phase 2

Location(s):

- All pedestrian crossings

Cost Range:

- \$400k–\$1M

Grant Opportunities:

- None identified

DRAFT

Pedestrian Crossing Upgrades Between Stations

Description

This project removes existing bedstead barrier infrastructure (channelization, markings, tactile domes, static and dynamic signage) from within the LRT guideway at non-station intersections. A bedstead barrier, also known as a modified Z-crossing, is a channelization method that requires approaching pedestrians to deviate from their approach path in advance of the crossing to force them to look in both directions before crossing. The bedstead barriers do not provide a straight walking pathway to pedestrians and may be more challenging to navigate for visually impaired users and those rolling through the intersection.

Removing bedstead barriers at signalized intersections would discourage pedestrians from waiting in the holding area in the median and would also provide a more consistent crossing experience similar to other crosswalks in the corridor.

The curb-to-curb pedestrian pathway would be straightened upon removing the bedstead barriers. The project would also install pavement markings within the LRT guideway to discourage pedestrians from waiting or congregating within or between the tracks.

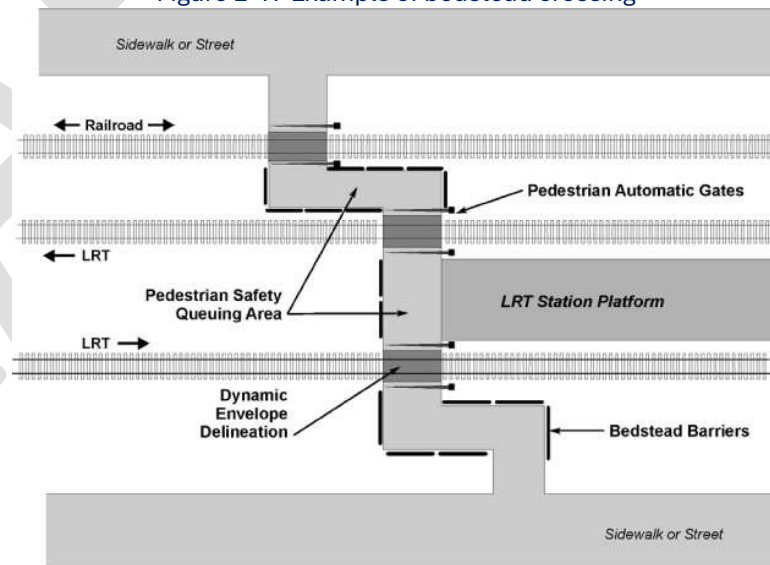
Coordination Required:

Coordination with SDOT is needed with an agreement to modify the pedestrian pathway and the issuance of a Street Improvement Permit.

Impacts to Public

Pedestrian crossings may be closed for up to a week during construction. Adjacent crossings would remain open, allowing nearby options for detoured pedestrian crossings.

Figure E-17 Example of bedstead crossing



Pedestrian Crossing Upgrades Between Stations

Project Type:

- Single enhancement

Safety Focus Area:



Milestones:

- Preliminary planning
- Run through assessment in Master Plan Phase 2

Location(s):

- All signalized pedestrian crossings with existing bedstead barriers

Cost Range:

- \$7M-\$9M

Grant Opportunities:

- None identified

Figure E-18 Example of Look Both Ways pavement markings

