June 2025

At-Grade Crossing Program

Master Plan

2025-2029

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At-Grade Crossing Program Master Plan (2025 – 2029)

June 5, 2025

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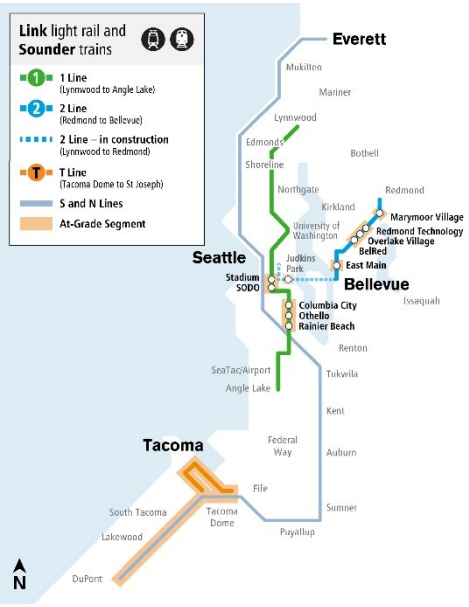
1 Executive Summary

1.1 Purpose and Background

The **At-Grade Crossing Program** (Program) was launched in August 2021 to enhance safety near designated at-grade crossings, focusing on reducing unintentional acts where trains intersect on the same level with people walking, biking, and rolling, and vehicles.

The 2025–2029 At-Grade Crossing Program Master Plan (Master Plan) applies to multiple transit lines with at-grade crossings, including all current and future planned Link lines and the Sound Transit-owned Lakewood Subdivision on which Sounder operates. However, safety enhancements in the Rainier Valley are a priority and have been the Program's initial focus, as this area has experienced the highest concentration of at-grade incidents since Link service began in 2009.

Figure 1-1. Map of Sound Transit System Highlighting At-Grade Segments



Crossings exist in many different geographic areas, each with environmental, cultural, and infrastructural characteristics. These differences require Sound Transit to tailor safety enhancements to effectively address the specific needs of each location while maintaining a consistent safety framework across the entire system.

Sound Transit, in partnership with the Seattle Department of Transportation (SDOT), completed 10 at-grade safety enhancement projects in the Rainier Valley segment as of June 2024. Early data indicate positive findings in incident reduction are occurring as the agency targets zero fatalities. Toward this target, Sound Transit continues accelerating progress on its current projects and has developed this Master Plan. In addition to identifying recently completed and current projects, the Master Plan establishes Program priorities and processes to continuously 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.

1.2 Master Plan Approach and Objectives

This Master Plan was developed in two phases, parallel with the ongoing implementation of near-term projects. Phase 1 encompassed the Program's earlier groundwork and concluded with presenting the draft Master Plan to the Board in November 2024, with Rainier Valley components provided in October 2024. During Phase 2, the team integrated feedback from the Board and considered feedback collected from the community on the draft Master Plan and Program project work as part of the Program's three-year Communications and Engagement Plan. Phase 2 will conclude with action taken by the Board.

The objectives of the Master Plan are to:

- Establish criteria for identifying, assessing, and prioritizing safety enhancements for designated at-grade crossings.
- Provide a transparent process for Program and project decisions.
- Engage and communicate with the public and collaborate with regional partners to ensure all voices, especially those from directly and disproportionately impacted 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 an initial set of 10 projects that includes safety Link light rail enhancement projects on the 1 Line, an assessment of Sounder crossings on the Lakewood Subdivision, and initial planning work to develop Tacoma Link design standards with a total cost of approximately $74.5M set for completion 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 safe behaviors around tracks and trains.

Table 1-1. Summary of Project Costs by shows the anticipated total cost range for each year of expenditure according to an accelerated delivery schedule. Table 2-1 and Appendix D Project Pages include the full list of projects.

The Program is asking the Board to approve a budget amendment to increase the Program's authorized allocation by $70.8M to provide funding to continue project work through implementation. As new projects are identified, future budget requests will be submitted through the annual agency budget process.

Table 1-1. Summary of Project Costs by Year of Expenditure.

	Year of Expenditure	Safety Focus Areas	Total Cost
Near	2025		$9.5M
	2026		$20.5M
Mid	2027		$22.5M
	2028		$10M
	2029		$12M
Total			**$74.5M**

2 Results

This section outlines the Program's currently identified 2025–2029 Master Plan projects. The Program will continuously identify, assess, develop, and deliver systemwide safety enhancements for Link, Sounder, and T Line throughout the duration of this Master Plan and beyond. Refer to Section 3 for more details explaining the safety enhancement selection process.

2.1 Master Plan Projects

Completed Projects and Initial Results. Between 2021 and June 2024, Sound Transit, in partnership with SDOT, completed ten at-grade crossing safety enhancement projects in the Rainier Valley. A recent analysis of safety data within the Rainier Valley Corridor evaluated the impact of these enhancements. Preliminary findings show a reduction in total pedestrian safety events by 33 percent and 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.

Safety Enhancements. The current Master Plan projects, discussed below, continue to advance the Program's safety goals. Projects are composed of a single enhancement or a group that provides time and cost efficiencies if implemented together. Descriptions of these individual enhancements are included in the Safety Enhancements Toolbox in Appendix C. The locations of current individual enhancements are illustrated in the SODO and Rainier Valley segment maps below, Figures 2-1 and 2-2. The Program will continue to identify safety enhancements throughout the duration of the Master Plan, as outlined in Section 4.

Figure 2-1. Current Enhancements planned in the SODO segment of Link Light Rail

Figure 2-2. Current Enhancements planned in the Rainier Valley segment of Link Light Rail

Current Projects. The Master Plan includes an initial set of seven projects comprising different safety enhancements on the 1 Line, three planning projects that include an assessment of Sounder at-grade crossings on the Lakewood Subdivision, and work to develop Tacoma Link design standards. Phase 1 projects were optimized and repackaged to form these current projects, as described in Section 3.2.

These projects fall 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:

- **Planning:** Projects that include diagnostics, studies and analysis, regional coordination, and other work that helps to identify new potential safety enhancements.
- **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.

Table 2-1. Near-Term and Mid-Term At-Grade Crossing Projects

Project Type	Mode	Project Name / Status	Safety Focus Area	Estimated Cost	Target Risk-Adjusted Completion Date	Target Accelerated Completion Date
Planning	Sounder	Crossing Evaluation and safety analysis at Bridgeport Way S, S 74th St., S 56th St. (Sounder Lakewood Subdivision) **Planning**		$250k	N/A	Q1 2026
Planning	Sounder	Crossing Evaluation and safety analysis on 16 at-grade crossings (Sounder Lakewood Subdivision) **Planning**		$1M	N/A	Q1 2026
Pavement Marking	Link	Dynamic Envelope Pavement Markings Pilot **Fully Funded**		$800k	N/A	Q3 2025
Technology	Link	SMART Grant: Rainier Valley Safe Project Pilot, Phase 1 (**Fully Funded**) & Phase 2 (**Adopted**)		$2.5M (Ph 1) $15M (Ph 2)	N/A	Q4 2025 (Ph 1) Q3 2027 (Ph 2)

Project Type	Mode	Project Name / Status	Safety Focus Area	Estimated Cost	Target Risk-Adjusted Completion Date	Target Accelerated Completion Date
Planning	Link	Data collection, inventory, and input on new standards (T Line) **Planning**		$750k	N/A	Q4 2026
Train Enhancement	Link	Alternating (Wig Wag) Train Headlights **Adopted**		$5M	N/A	Q4 2026
Infrastructure	Link	Automatic Pedestrian Gates, Stadium Station **Adopted**		$9M	Q2 2028	Q1 2028
Infrastructure	Link	1-Line Enhancements **Adopted**		$15M	Q2 2028	Q1 2028
Infrastructure Project	Link	Automatic Pedestrian Gate Pilot, Columbia City & Othello **Adopted**		$14.2M	Q4 2029	Q2 2028
Infrastructure	Link	Automatic Pedestrian Gate Pilot, Rainier Beach **Adopted**		$11M	Q2 2029	Q3 2028

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

Program Funding

The projected cost to implement the 2025-2029 AGC Master Plan projects is $74.5M. The team performed a risk-based cost assessment using initial project cost ranges to develop each project's final cost estimate and schedule, reflected in Table 2-1 above. Potential financial and schedule risks and escalations are reflected in the updated budget. For reference, initial project cost ranges are included in Appendix D, Project Pages, and the assumptions used to develop the cost ranges are outlined in section 3.1.

The Program is actively seeking and evaluating grant opportunities, both independently and in partnership with other Sound Transit project teams and regional collaborators. Two of the Master Plan's adopted projects are grant-funded. The Program is asking the Board to approve a budget amendment to increase the Program's authorized allocation by $70.8M, which will provide funding to continue current project work from planning through implementation. The funding will also provide continued communications and engagement efforts and other program support. As new projects are identified, future budget requests will be submitted through the annual agency budget process.

2.2 Regional and Internal Coordination

Successful Master Plan implementation requires 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. Sound Transit has performed preliminary studies and traffic analyses to explore the feasibility of implementing these treatments and has shared this data with SDOT. While some of these treatments show early promise, more work is needed to determine the best path forward in coordination with SDOT. While these ideas are outside Sound Transit's jurisdiction, we remain committed to collaborating with regional partners to understand the feasibility of further exploring such ideas.

The scope, timeline, and overall progress of the Master Plan projects depend on close coordination with regional agencies. In many cases, key stages require their formal approval. SDOT is a crucial partner regarding the work in the Rainier Valley and SODO segments. Significant progress in this area has been achieved through formal and informal collaboration with SDOT, including a 2022 Partnership Agreement reaffirming our two agency's commitment to shared values and the goals of enhancing safety, community access, and mobility in the Rainer 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.

The Program will also collaborate with our other regional partners, such as the Washington Utilities Transportation Commission and the cities of Tacoma, Lakewood, and DuPont, on planning activities and identifying proposed safety enhancements for the T Line and Sounder commuter rail in the Lakewood Subdivision.

The East Link Project brings all the East Link at-grade crossings up to the 2023 Sound Transit design requirements as part of their current project work, anticipated to be complete in 2025. Once the East Link Extension project has completed this at-grade crossing work on the 2 Line, the responsibility for implementing safety enhancement projects, including coordination with regional partners, will transition to the Program.

Collaboration with our regional partners will include brainstorming sessions with staff to identify potential safety enhancements and improvements, coordinating permits, 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 our regional partners on community outreach efforts. Leveraging joint engagement opportunities with the community fosters transparency and trust and creates efficiencies for participants.

Internal Coordination

The Program collaborates with other agency departments and projects, such as East Link Extension, Graham Street Station, West Seattle, and Ballard Link Extension, to share updates, lessons learned, and strategies 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, influences design requirements, 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 for Link Light Rail in the Rainier Valley

The agency will include longer-term considerations in future updates to its long-range transit plan, led by the Chief Strategy Officer. In the interim, the Program will continue engaging the community, exploring innovative mitigation strategies, and continuing to focus on implementing the identified short- and mid-term safety enhancements.

In October 2023, Sound Transit conducted a high-level study to understand the potential risk, utility conflicts, and 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. Further studies are needed to assess the scope of impacts, costs, and appropriate mitigation strategies.

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.

3 Master Plan Development Process

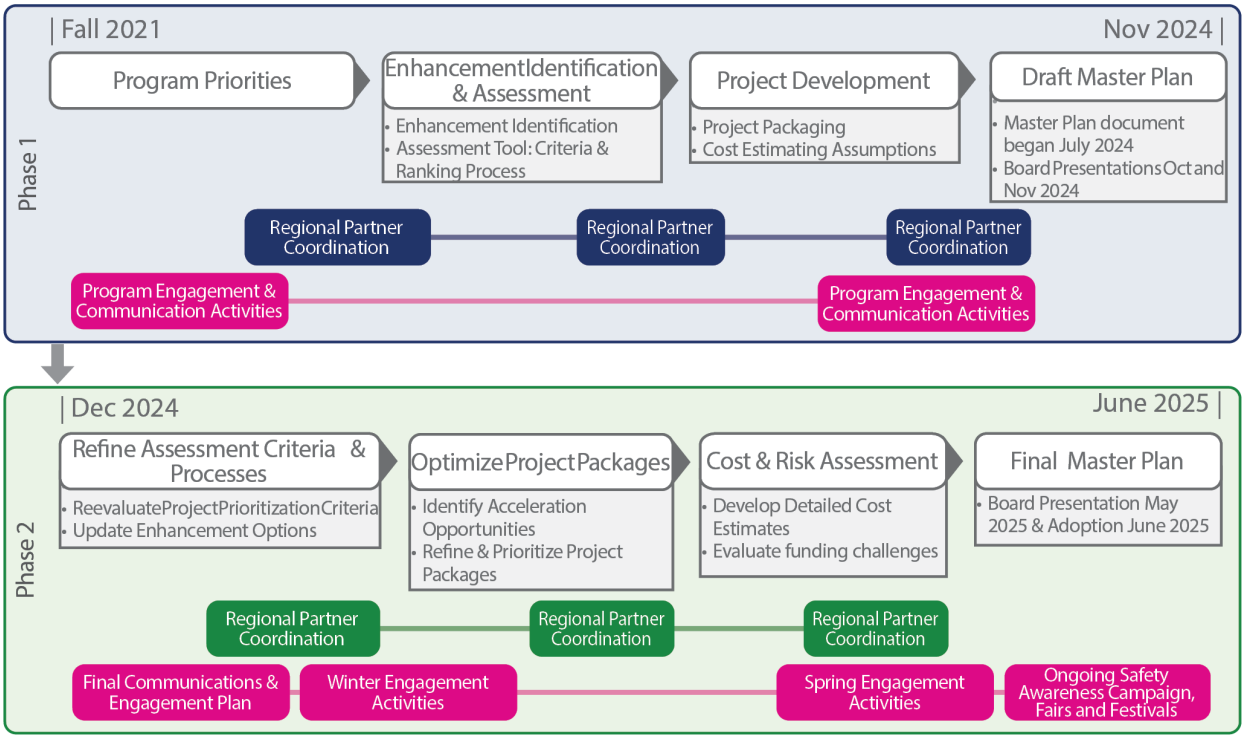
This section outlines the process used to develop the Master Plan. The objectives of the Master Plan are to:

- 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 directly and disproportionately impacted 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.

Development of the Master Plan was accelerated following Board Motion 2024-45 approval in July 2024. The Master Plan was developed in two phases: Phase 1 included a draft Master Plan that the Board received in two stages. The first stage focused on the Rainier Valley in October 2024. The second stage delivered a draft systemwide Master Plan incorporating the Rainier Valley in November 2024.

Phase 2 spanned from December 2024 through June 2025. It integrated feedback from Board reviews of the draft plan and community outreach, which shaped the work needed to deliver the Master Plan for Board adoption in Q2 2025. The team optimized project packages, refined costs, and engaged the community. Phase 2 also continued implementation of near-term, fully funded, and adopted projects, continued identification, evaluation, and prioritization of potential safety enhancements, and continued coordination with regional partners. Figure 3-1 below illustrates the process and stages for the Master Plan development.

Figure 3-1. Master Plan Development Process



Phase 1: Draft Master Plan

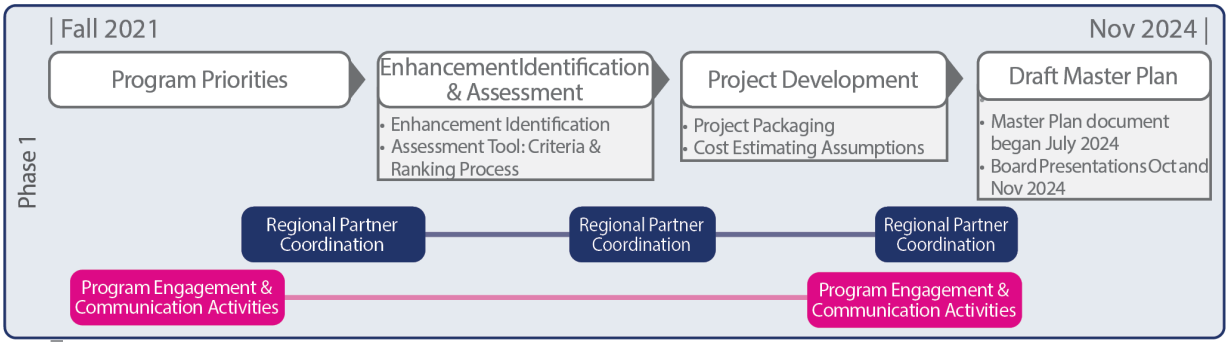
Phase 1 involved compiling and distilling completed work, researching additional proposed enhancements, including diagnostics and other planning work, and documenting processes for developing the assessment criteria for the enhancement and risk mitigation strategies. Coordination with SDOT on near- and mid-term projects in the SODO and Rainier Valley segments occurred, and community outreach was conducted to gather feedback on completed Rainier Valley segment projects and to refine the overall engagement approach.

Phase 2: Final Master Plan

Phase 2 confirmed the assessment criteria and processes, optimized project packages to accelerate Program work, and completed a comprehensive cost and risk assessment. The team also integrated feedback from the Board, gathered and integrated community feedback on enhancements, and broadened coordination with regional partners to progress the projects and planning work outlined in this Master Plan.

3.1 Phase 1: Draft Master Plan

Figure 3-2. 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.

To ensure alignment with the agency's values, the following five priorities 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 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 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. Throughout the Master Plan, enhancement identification will use 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 other industry experts.

Example: Dynamic LED "Another Train Coming" signs were an enhancement identified via research on industry best practices and peer agency mitigations. Other transit agencies have implemented the signs and they appear to yield positive results in reducing train vs. pedestrian conflicts based on data analysis.

- **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.

See Appendix B for more details on Program data and prior work, including the 2024 Peer Analysis using data from the National Transit Database.

Assessment Tool: Criteria and Ranking Process

The assessment criteria are based on Program priorities and use a systematic, data-driven approach to rank safety enhancements, which includes risk mitigation strategies, for at-grade crossings. This process allows the team to evaluate potential improvements quickly and consistently while maintaining transparency. The goal is to focus on enhancements that 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.

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 risks.
- **Compliance with Regulatory Standards***:* Confirmation that the enhancement adheres to federal, state, and local guidelines.

Figure 3-3. Phase 1 Enhancement Assessment Steps

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***:* Initial and ongoing costs associated with the enhancement.

- **Third-Party Approvals***:* 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 address the most critical improvements first.

> 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.

- **Overall Safety Impact***:* The idea evaluated significantly improves safety for pedestrians, motorists, and trains.
- **Operational Reliability***:* Assurance that enhancements will function effectively with minimal disruptions.
- **Community Impacts***:* Consideration of how enhancements affect local communities, focusing on those with physical impairments, 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 enhancements evaluated.

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. Projects are presented in Appendix D. The goal was to bundle projects for faster delivery while minimizing operational impacts and service disruptions. Factors considered include:

> 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.

- **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 to the community 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.

Using the assessment tool and the project prioritization framework, the Program ensures implementation enhancements where they are most needed while balancing cost, efficiency, and community impacts. 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 restructured project packages to accelerate all currently adopted projects. This change included reevaluating cost considerations and streamlining approval processes to meet the agency's expedited timeline.

Cost-Estimating Assumptions

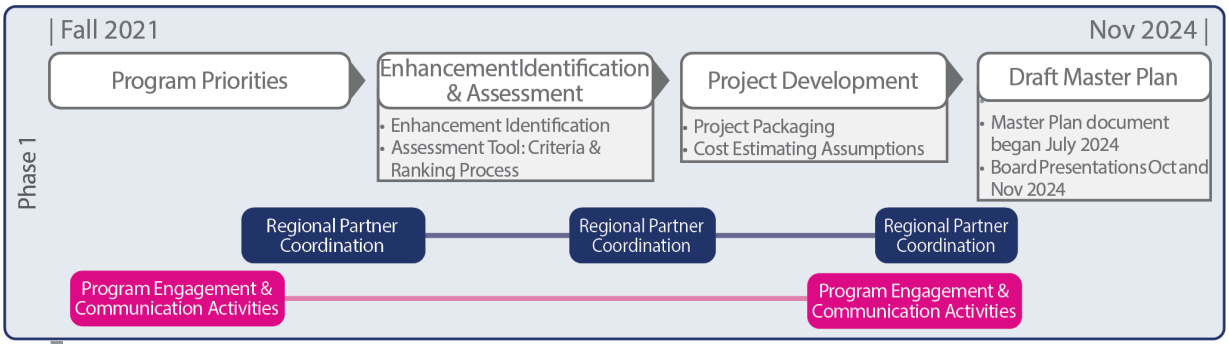
The cost-estimating framework for the draft Master Plan breaks costs into specific categories. Cost estimates for Phase 1 were calculated based on:

- **Total Project Cost:** The cost estimate accounts for all costs associated with the project, including Sound Transit and Consultant labor, permitting, construction, third-party costs, 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 percent, consistent with trends observed in recent infrastructure projects.
- **Construction Constraints:** Constraints on construction timing due to avoidance of service interruptions and to protect public safety may have a significant effect on project construction costs. Working at night with a condensed work zone, limiting working hours, paying overtime or off-hour wages, and mobilizing and demobilizing certain aspects of daily operations can all contribute to costs during project construction.
- **Contractor Selection**: The contractor's size, availability, and capability influence bid markups (administrative and operating expenses, 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 a medium-sized general contractor would perform the work.

- **Cost Allowances**: To determine cost allowances and develop project estimate ranges, the team also derived guidance from the WSDOT Cost Estimating Manual, which focuses on contingencies, risks, and allowances based on the level of design completion.

Regional Partner Coordination and Community Engagement

Figure 3-4. Phase 1 Regional Partner Coordination and Community Engagement



Regional Partner Coordination

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

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 targeted 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. Most survey respondents reported being aware of safety enhancements and perceived these enhancements as effective.

Three-Year Systemwide Program Communications and Engagement Plan

A three-year Communications and Engagement Plan was developed for implementation in Phase 2, which builds on and expands the Program's engagement efforts. The plan focuses on three key elements:

- Draft Master Plan Engagement.
- Project Development and Construction Outreach and Communications.
- Safety Awareness and Education.

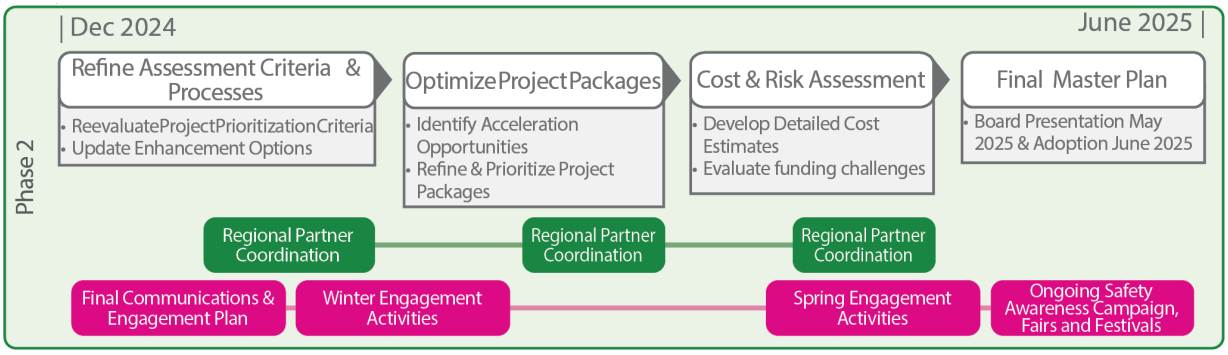
The Program prioritizes engaging communities directly impacted by at-grade service, in the immediate vicinity of the service areas, and those disproportionately impacted by safety incidents.

Centering impacted communities is critical for the success of these engagement efforts. The Program is committed to dedicating appropriate resources and providing meaningful and varied ways for the community to learn about the Program and shape the Master Plan with planned and future projects.

During the development of the Master Plan, Sound Transit focused on soliciting feedback in accordance with the agency's current engagement policies, practices, procedures, and industry best practices to obtain input from the affected communities.

3.2 Phase 2: Final Master Plan

Figure 3-5. Phase 2 Final Master Plan



Feedback from three key sources informed the team's Phase 2 work related to prioritization criteria, enhancement options, project packages, and risk mitigation strategies, discussed in the following sections:

- Community engagement conducted in 2025 and collaboration with agency partners.
- Sound Transit Board guidance from November 2024.
- Engineering subject matter experts' ongoing assessment.

Assessment Criteria and Processes

Feedback and assessments confirmed that the Master Plan's assessment criteria and processes were appropriate and did not require any adjustments. Safety improvements were evaluated using the approved criteria and ranked according to their overall safety impact while ensuring the efficiency of trains, vehicles, and pedestrians and their ability to integrate into the system.

Optimized Project Packages

The team optimized the project packages to effectively and efficiently advance safety enhancement across the system and identified additional opportunities to accelerate Program work in response to the Board's July motion.

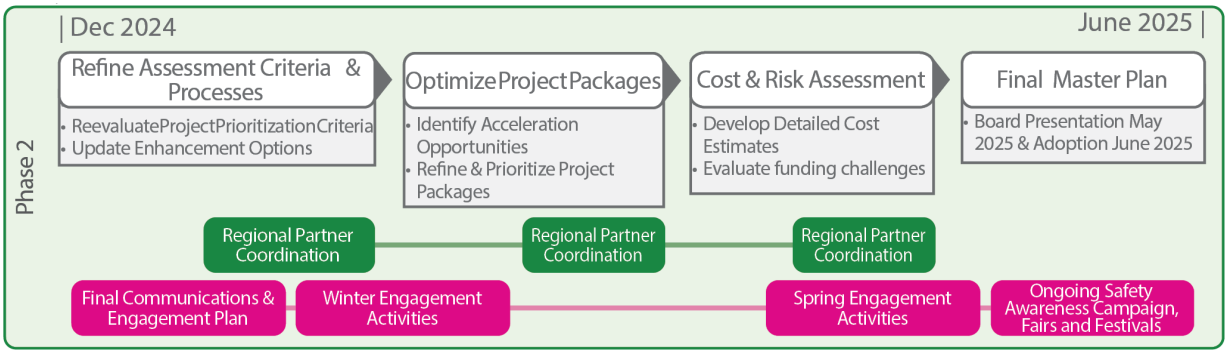
This included strategically selecting a contract delivery method focused on accelerated delivery while considering impacts to the community, third-party coordination, and permitting.

Cost and Risk Assessment

For any project, it is essential to understand the current cost and the risk of cost changes. The team developed detailed cost estimates using initial design information. The Program then conducted a comprehensive cost and risk assessment workshop that evaluated potential financial and schedule risks, contingencies, and mitigations. This was reflected in an updated budget.

Regional Partner Coordination and Community Engagement

Figure 3-6. Phase 2 Regional Partner Coordination and Community Engagement



Regional Partner and Internal Agency Coordination

Collaboration has continued with internal and external partners and local agencies, as discussed previously in Section 2.2.

Public Engagement

During Phase 2, the Program implemented elements of the three-year AGC Program Systemwide Communications and Engagement Plan, summarized below.

Winter 2024/2025 Outreach

In January and February 2025, the team conducted community engagement efforts to inform, consult with, and involve business owners, community organizations, and people who live and work near at-grade crossing segments of Link service about the Program Master Plan and associated projects.

Engagement strategies included an online forum, community briefings, and targeted canvassing near SODO and the Rainier Valley station locations. The primary objective of the engagement was to bring awareness to safety enhancement projects, gather feedback, and inspire dialogue around unique needs and specific considerations of communities that frequently interact with at-grade crossings.

Key feedback themes. Among all comments received via the online forum, most enhancements received positive or neutral responses. Other key themes that addressed project location-specific input and additional feedback on crossing safety systemwide included:

- Physical barriers, like bollards, vehicle gates, and pedestrian gates, would help support safe behavior.
- Traffic along the MLK corridor creates a safety issue; traffic calming measures would improve the pedestrian experience.

- Grade separation of the train or the pedestrian walkways would create a safer experience.
- Pedestrian and train movements should be prioritized over vehicle movements.

All comments were shared with Program leadership to consider as new enhancements are identified and with project teams for consideration during development and construction. Comments related to enhancements and issues within SDOT authority were shared with our partners.

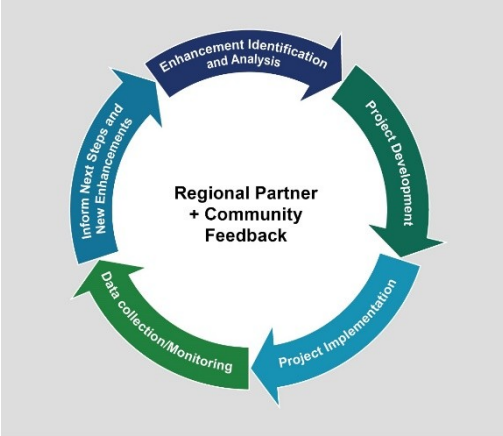
Spring Community Safety Fair (April 26th)

The Program hosted the Spring Community Safety Fair at the Odessa Brown Children's Clinic. Approximately 200 community members participated at this youth-focused event. The safety fair engaged and educated about the Program and at-grade crossing safety enhancements offered interactive activities encouraging safe behavior near tracks and trains, and reinforced Sound Transit's commitment to community safety. Attendees received giveaway prizes and enjoyed free refreshments. Project information regarding the completed and upcoming safety enhancements was also available for public input.

4 Continuous Process for Systemwide Safety Enhancements

The Master Plan establishes Program priorities and processes to identify, evaluate, and prioritize potential safety enhancements. This process will guide the Program in maintaining a safe, secure, and continuously improving system for all users.

Figure 4-1. Process of Continuous Safety Enhancements



Throughout the Master Plan timeframe, pilots and other projects will inform new enhancements, as will community and regional partner feedback, emerging information, best practices, and technology advancements. Once safety mitigations are implemented, the agency's Enterprise Safety Department actively monitors safety data, conducts regular safety inspections, and tracks all safety-related incidents. These ongoing activities are essential components of the agency's comprehensive Hazard Management Program, allowing for the assessment of mitigation effectiveness and continuous improvement in safety performance. The monitoring process is outlined in the Agency Safety Plan Section 3, Safety Risk Management, and Section 4, Safety Assurance.

At any point in the Master Plan's duration, activity in each part of the continuous safety enhancement shown in Figure 4-1 can occur simultaneously.

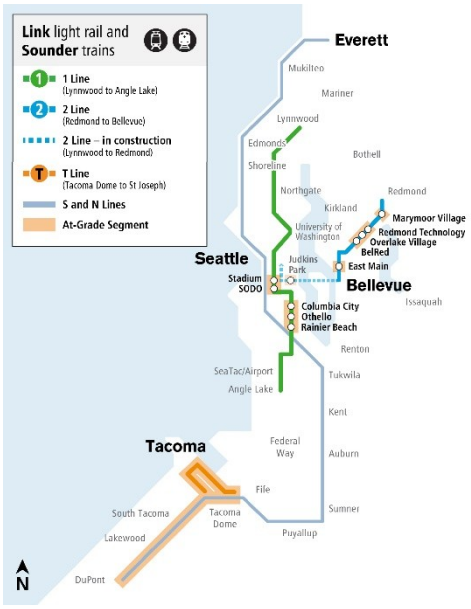
In addition to the process to identify and assess proposed enhancements, the Program will also:

- Develop detailed cost and risk analysis.
- Continue to develop and implement current and future enhancement projects systemwide.
- Continuous data monitoring and evaluation in partnership with the agency's Safety and Security Management Program.
- Use information gathered to inform future enhancements.

5 Appendix A Geographic Segments

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

Figure 5-1. Map of Sound Transit System Highlighting At-Grade Segments



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. The T Line in Pierce County, with its low-floor boarding, means it can operate curbside or along a median right-of-way, as well as in mixed traffic or a dedicated right-of-way.

Each at-grade crossing within each system segment is a unique geographic area 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 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.

5.1 Link Light Rail

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; some are pedestrian-only. There are also three at-grade stations: Columbia City, Othello, and Rainier Beach.

A mix of residential and commercial zones, varied 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 the 1 and 2 lines between International District Station and Lynnwood 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.

SODO

The SODO segment of the 1 Line has four at-grade crossings, one of which is pedestrian-only, and two at-grade stations: Stadium and SODO. The Link light rail service operates for approximately one mile in the semi-exclusive right-of-way along the SODO busway, a transit-only corridor from S Royal Brougham Way in the north to S Lander Street in the south. A multi-use trail for pedestrian and bicycle use runs parallel to the light rail tracks on the east side of the trains.

This geographic area is part of Seattle's industrial district with a small residential population. This area is also home to Lumen Field and T-Mobile Park, two major sports/event stadiums. The Stadium station is adjacent to the Seattle Greyhound station directly east of the platform and serves as a connection point from long-distance bus lines to the local transit network. The light rail is a major service provider for eventgoers to access these stadiums, and both Stadium and SODO stations see drastic increases in ridership on event days. High ridership and increased pedestrian activity during peak times pose safety challenges that should be tailored to this unique location and the riders it serves.

This section of track contains four at-grade crossings and is bookended by grade-separated segments to the north and the south. These at-grade crossings can increase delays, conflict points with vehicles/pedestrians, and decrease reliability throughout the corridor.

2 Line

The 2 Line is a light rail line serving the Eastside region of the Seattle metropolitan area. It runs for 6.6 miles in the cities of Bellevue and Redmond. The initial segment serves eight stations between S Bellevue and Redmond Technology stations and opened on April 27, 2024. The full line is scheduled to open in 2025 and is planned to include 18 miles and serve 12 stations in downtown Seattle, Mercer Island, Bellevue, and Redmond. The 2 Line will continue through the downtown Seattle Transit Tunnel and share stations with the 1 Line through to Lynnwood City Center station.

There are 17 at-grade crossings and six at-grade stations on the 2 Line: Judkins Park, East Main, BelRed, Overlake Village, Redmond Technology, and Marymoor Village Station. Judkins Park Station is located in the City of Seattle, East Main and BelRed Station are located in the City of Bellevue, and Overlake Village, Redmond Technology, and Marymoor Village Station are located in

the City of Redmond. Judkins Park station is located between the westbound and eastbound lanes of I-90. There is a single at-grade pedestrian-only crossing at the west end of the station platform, which provides access for users coming from Rainier Ave S. This station is likely to serve users who are blind, deafblind, or blind with other physical impairments as they access The Lighthouse for the Blind, which is located approximately 0.6 miles away. BelRed and Overlake Village Stations are located close to large park-and-ride lots. Redmond Technology Station is located on the headquarters campus of Microsoft. The transit center is served by Sound Transit Express, King County Metro, and Microsoft's private shuttle buses. The light rail station is the eastern terminus of the 2 Line.

T Line

Sound Transit's first light rail line, the T Line, opened in 2003 with five stations. There are currently 47 at-grade crossings and 12 stations. The T Line generally runs at-grade in mixed traffic with an exclusive lane for its single-track section. As with any at-grade running line in a downtown core, there are numerous crossings and conflict points for trains, vehicles, pedestrians, and cyclists. This system has 12 stations on a 4-mile track, running from the Tacoma Dome to the Hilltop neighborhood. The 2.4-mile extension, which opened in 2023, to the Stadium District and the Hilltop area west of downtown included seven additional stations and added a geographic area with a high concentration of schools, hospitals, and community gathering spaces. An extension to Tacoma Community College, which will add six new stations and increase the total track length to 8.4 miles, is expected to open between 2039 and 2041. The light rail is a major service provider for eventgoers to access special events scheduled at the Tacoma Dome or hosted in downtown Tacoma and connects to the University of Washington campus in Tacoma. Each train can carry 85-100 passengers, depending on the car model.

5.2 Sounder Lakewood Subdivision

Sound Transit owns the 20-mile segment of tracks from Tacoma to the Nisqually Valley, of which Sounder operates from Tacoma to Lakewood. The Sound Transit Sounder S Line, Amtrak Cascades, Amtrak Coast Starlight, Tacoma Rail, and BNSF Railway lines trains operate through this corridor. This section of track was formerly owned by BNSF and was purchased by Sound Transit for commuter rail use in 2003, with BNSF retaining a freight easement.

Sounder commuter service to Lakewood began in 2012. Sound Transit plans to extend Sounder commuter service to DuPont by 2045, adding additional stations at Tillicum and DuPont. The Tillicum Station location is planned in close proximity to Joint Base Lewis–McChord. The terminus at the planned DuPont Station is near an existing park-and-ride lot. WSDOT is also working on the I-5 Grade Separation Projects, which include grade separating three existing crossings; two are completed, and one is currently in development.

6 Appendix B 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, which led to the development of the Assessment Tool in 2022 and, ultimately, the list of completed projects through June 2024. The last section includes a 2024 Peer Analysis and ongoing data monitoring that 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. A summary of key prior studies is also included.

Figure 6-1. Total Events (2009-2021)

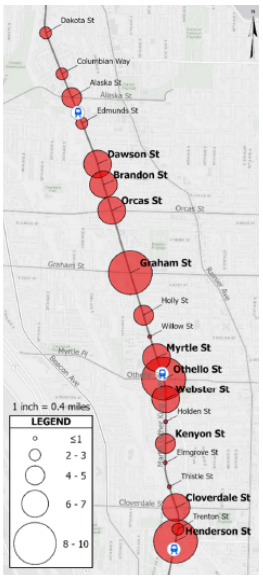


Figure 6-2. Total Collisions (2009-2021)

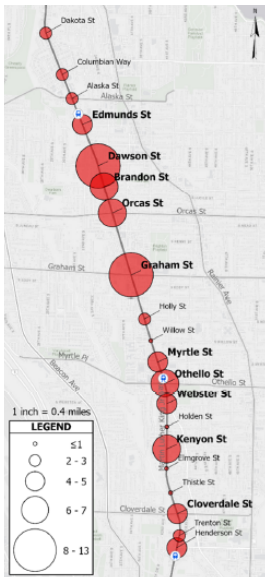
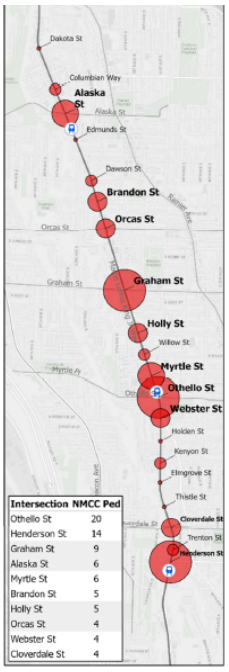


Figure 6-3. Pedestrian Near Misses and Close Calls (2009-2021)



6.1 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.

Key Take-Aways

The map in Figure 6-1 visualizes the number of reported safety events at each crossing along MLK Jr Way S from 2009 to 2021. Figure 6-2 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 percent of all collisions, while 15 percent 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.

6.2 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 initially deprioritized—with updates reflecting any new information or regulatory guidance.

Table 6-1. Enhancement Ideas

Administrative Controls		Engineering Controls		Roadway Redesign
Safety Education • 5 Core Safety Messages • Safety campaigns with partners • Safety education campaigns • Engagement activities • Outreach and training on specific mitigations **Encouragement** • Rainier Area Security Emphasis Team • Crossing guards • Using red light cameras to mail education materials	**Operations Procedures** • Audible warning signage for operators • Training emphasis	**Audible** • Enhance wayside bells • Localized audible announcements **Visual** • 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 **Physical Infrastructure** • Pedestrian gates at station locations • Channelization/ fencing	**Technology** • Leading pedestrian intervals • Traffic signal reprioritization pilot • Video Analytics • V2X • Touchless pedestrian push buttons • Smarter traffic signal controller • Signal system battery backup • ROW detection **Vehicle** • Adjust Light Rail Vehicle bell volume • Wig wag headlights	• Consolidate crossings • Eliminate crossings • Grade separate • Full corridor quad gates & flashers • Two-phase crossing • Larger pedestrian refuge areas • Other traffic calming meas ures

6.3 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 6-2 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.

Table 6-2. At-Grade Crossing Program Completed Projects

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
Train Enhancements	Light Rail Vehicle Audible Warning Bells Pilot		Dec 2024

6.4 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 6-4, S Graham Street and S Dawson Street have the highest recorded 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 10 at-grade crossing enhancement projects** in the Rainier Valley. Early data findings show a reduction in total pedestrian safety events by 33 percent and a 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.

Figure 6-4. Total Rail Collisions (2009–Jun 2024)

6.5 2024 Peer Analysis from the National Transit Database

Conducting peer reviews of other agencies offers insight into safety incidents across similar systems. The team consulted the Federal Transit Administration's National Transit Database (NTD) for peer data. The NTD is the repository of data about the financial, operating, and asset conditions of American transit 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.

Figure 6-5. Peer Review

DATA SOURCES FROM NTD DATABASE

Number of At-Grade Crossings: Includes information for 2023, the latest information available.

Vehicle and Passenger Revenue Miles: Includes information for 2024 for all rail modes (Light Rail, Heavy Rail, Streetcars, Commuter Rail, Hybrid Rail, and Cable Cars).

Total Injuries/Total Fatalities: Includes the total number of injuries or fatalities at rail facilities in 2024.

Injuries per 100K Miles/Fatalities per 100K Miles: 2024 rates of injuries or fatalities per 100,000 miles calculated based on total revenue miles and corresponding injuries and fatalities for each agency, year, and mode of transport.

Higher

Lower

Number of At-Grade Crossings (All Rail, 2023)	
San Francisco Municipal Transportation Agency (SFMTA)	494
New Jersey Transit Corporation (NJT)	456
Massachusetts Bay Transit System (MBTA)	426
Utah Transit Authority (UTA)	288
Tri-County Metropolitan Transportation District of Oregon (TriMet)	239
Los Angeles Metro Rail (LACMTA)	230
Valley Metro Regional Public Transportation Authority (Valley Metro)	211
Dallas Area Rapid Transit District (DART)	187
Minneapolis Metro Transit (Metro Transit)	184
Santa Clara Valley Transportation Authority (VTA)	168
The Metropolitan Transit Authority of Harris County (METRO)	165
Sound Transit	**139**
Sacramento Regional Transit District (SacRT)	137
Maryland Transit Administration (MTA)	136
San Diego Metropolitan Transit System (MTS)	131
Denver Regional Transportation District (RTD)	78
Pittsburgh Regional Transit (PRT)	51
Hampton Roads Transit (HRT)	40
Charlotte Area Transit System (CATS)	39
Greater Cleveland Regional Transit Authority (GCRTA)	25
St. Louis Metro Transit (Metro St. Louis)	25
Niagara Frontier Transportation Authority (NFTA)	8

Vehicle and Passenger Car Revenue Miles (2024)	
NJT	51,456,673
MBTA	42,340,955
LACMTA	20,710,384
RTD	11,468,443
MTA	11,330,749
MTS	10,444,852
DART	9,610,503
Sound Transit	**9,427,998**
UTA	9,106,309
TriMet	6,451,735
SFMTA	4,598,571
Metro St. Louis	4,279,142
Metro Transit	3,033,776
SacRT	3,030,781
Valley Metro	2,717,522
METRO	2,581,445
GCRTA	2,359,318
VTA	2,185,704
CATS	1,434,575
PRT	1,360,707
NFTA	557,920
HRT	291,754

Total Injuries (2024)	
MBTA	297
LACMTA	188
DART	148
MTS	135
METRO	90
Sound Transit	**53**
UTA	50
Metro Transit	48
TriMet	48
Metro St. Louis	46
MTA	38
NJT	36
VTA	24
Valley Metro	22
SFMTA	22
GCRTA	19
NFTA	13
SacRT	9
CATS	4
HRT	1
RTD	0
PRT	0

Total Fatalities (2024)	
LACMTA	12
UTA	4
MBTA	3
METRO	3
Metro Transit	3
MTS	3
SacRT	3
VTA	3
DART	2
NJT	2
Sound Transit	**2**
GCRTA	1
Metro St. Louis	1
MTA	1
Valley Metro	1
CATS	0
HRT	0
NFTA	0
PRT	0
RTD	0
SFMTA	0
TriMet	0

Injuries per 100K Miles (2024)	
METRO	3.49
NFTA	2.33
Metro Transit	1.58
DART	1.54
MTS	1.29
VTA	1.10
Metro St. Louis	1.07
LACMTA	0.91
Valley Metro	0.81
GCRTA	0.81
TriMet	0.74
MBTA	0.70
Sound Transit	**0.56**
UTA	0.55
SFMTA	0.48
HRT	0.34
MTA	0.34
SacRT	0.30
CATS	0.28
NJT	0.07
PRT	0.00
RTD	0.00

Fatalities per 100K Miles (2024)	
VTA	0.14
METRO	0.12
SacRT	0.10
Metro Transit	0.10
LACMTA	0.06
UTA	0.04
GCRTA	0.04
Valley Metro	0.04
MTS	0.03
Metro St. Louis	0.02
Sound Transit	**0.02**
DART	0.02
MTA	0.01
MBTA	0.01
NJT	0.00
CATS	0.00
HRT	0.00
NFTA	0.00
PRT	0.00
RTD	0.00
SFMTA	0.00
TriMet	0.00

6.6 Summary of Key Prior Studies

This appendix outlines key studies and their summarized outcomes, which have contributed to the continued development of Program activities.

Table 6-3. Summary of Key Prior Studies

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 light rail vehicles, a navigation safety mobile app, Bluetooth beacons for mobile phones to alert peds near the tracks of oncoming light rail vehicles, ROW presence detection, and a V2X vehicle communication system.	Studies helped form the basis for the following projects: • 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). Locating this infrastructure would require additional study and need	Ongoing coordination with SDOT to advance the planning and design of an automatic pedestrian gate pilot at the three Rainier Valley stations: • Phase 1 (Columbia City and Othello) and Phase 2 (Rainier Beach) Automatic Pedestrian Gates project identification • Decision to develop Phase 1 and Phase 2 through design

Study	Date	Summary	Key Outcomes
		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. 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.	
Potential AGC Treatments: Research and Evaluation of Grade-Separated Structures Memorandum	Oct 2023	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.	• 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

7 Appendix C Toolbox of Safety Enhancements

This toolbox includes a list of Sound Transit enhancements along with descriptions/benefits and graphic illustrations or photo examples. These enhancements serve as a toolbox and may not be implemented on all modes or at all locations.

Safety Enhancements Included

Wig Wag Headlights

Dynamic Another Train Coming Signage

Eye-level "No Left Turn" Signs

Automatic Pedestrian Gates

Dynamic Envelope Pavement Markings

AI Video Analytics

Vehicle-to-Everything Communications

Enhanced Signal Controllers

Touchless Pedestrian Push Buttons

Flangeway Filler

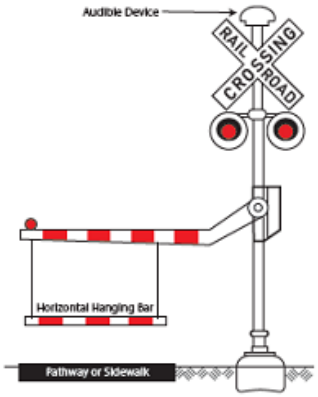
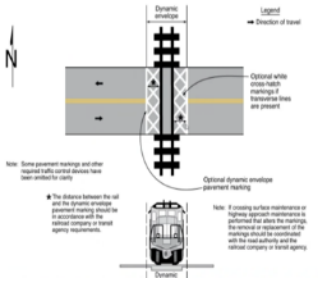
Fencing Enhancements

Tactile Warning Strips

Pavement Markings

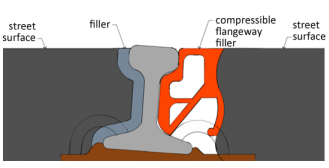
Table 7-1. Toolbox of Safety Enhancements

Enhancement	Description	Benefit	Example Illustration
Wig Wag Headlights	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.	Increased awareness of the presence of trains for people walking, biking, rolling, or driving.	
Dynamic Another Train Coming Signage	Illuminated Another Train Coming LED, a dynamic sign that indicates a train is approaching. 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 when a second train is approaching. These signs are "blank-out" when not in use and are meant to garner attention from people walking or rolling when an alert is triggered.	Dynamic signs draw the eye and attention of people walking or rolling, alerting them to the presence of an oncoming train.	
Eye-level "No Left Turn" signs	Static "No Left-Turn" signs are located at driver-eye height with delineators to lead a driver's eye to the sign. These would be located where left turns are prohibited to reinforce existing "No Left Turn" signage high-mounted with traffic signals and other warning signage.	Reinforce prohibited turning movements while allowing the driver to see and process safety-critical information independent of the array of the other information conveyed at the intersection.	

Enhancement	Description	Benefit	Example Illustration
Automatic Pedestrian Gates	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. Also included are emergency swing gates that allow people walking or rolling between the tracks to exit safely if the gates begin to descend.	These gates prevent people walking or rolling on sidewalks from accessing the tracks while a train is approaching and provide a physical barrier in case of distracted pedestrians.	
Dynamic Envelope Pavement Markings	This enhancement installs high-visibility pavement markings within the light rail train 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 pavement marking applications will be a white crosshatch on the outside of the tracks to denote the dynamic envelope of the train per traffic control standards.	The goal of dynamic envelope pavement markings is to prevent people walking, biking, rolling, or driving from coming to a stop within the dynamic envelope or traveling through it when a train is present or approaching, thereby reducing the number of incidents. General visibility and added caution around tracks are secondary goals for which efficacy has not been studied.	

Enhancement	Description	Benefit	Example Illustration
AI Video Analytics	AI video analytics enables real-time detection and classification of various road users, including pedestrians, vehicles, bicycles, and light rail vehicles. These systems will: • Track the precise movement and location of objects several times per second. • Classify objects into types (pedestrians, cyclists, vehicles, trains) and analyze their behavior. • Identify conflicts or unsafe conditions (e.g., pedestrians in the train's path), log near misses, and generate alerts.	By having more advanced tracking and technologies it will allow for more data tracking, which could inform future targeted enhancements.	

Enhancement	Description	Benefit	Example Illustration
Vehicle-to-Everything Communications (V2X)	V2X enables communication between vehicles, infrastructure, and other road users. The system can generate and transmit Basic Safety Messages and Personal Safety Messages to alert connected vehicles and infrastructure about hazardous conditions. Key capabilities include: • Sending real-time notifications to vehicles (via On-Board Units) about potential conflicts, such as an approaching train or pedestrians crossing against the signal. • Transmitting hazard alerts to infrastructure, such as activating field devices like LED strips.	By implementing AI-based smart sensors and V2X communications, the new system will provide real-time situational awareness of all road users, including light rail and people walking, biking, rolling, or driving. This will allow for proactive detection of potential conflicts and the issuance of safety alerts to both operators and vulnerable users, significantly reducing the likelihood of collisions.	

Enhancement	Description	Benefit	Example Illustration
Enhanced Signal Controllers	The integration between AI video detection and the signal control system to dynamically adjust signal timing based on real-time traffic conditions. The system should: • Extend signal phases for pedestrians or vehicles when needed. • Provide phase extension for light rail vehicles when they are slow to clear the intersection. • Read signal status and interact with traffic controllers to ensure safe and efficient signal management.	Advanced signal control strategies will be introduced, enabling real-time adjustments to signal timing based on multimodal traffic conditions. This will optimize traffic flow for all modes of transportation, reducing delays and improving the efficiency of both light rail and general vehicle operations. Vulnerable road users will benefit from better signal timing coordination, enhancing their safety at intersections.	
Touchless Pedestrian Push Buttons	Touchless Pedestrian Push Buttons are pedestrian signal technology in which a signal can be activated by nodding or waving without the need for pushing a button. It also triggers an audible function that says “wait” or “walk sign is on.”	These buttons provide additional safety information, such as the amount of walking time remaining or the street name, to assist the blind or visually impaired in navigating more safely and comfortably. The touchless buttons can also be easier to use for users in wheelchairs.	
Flangeway Filler	Flangeway filler reduces or eliminates the flange gap (the gap between the rail and adjacent road surface) by inserting or compressible rubber strip.	Reducing the gap between the rail and adjacent pavement makes pedestrian, bicycle, and wheelchair crossing experience safer by reducing the tripping hazard.	

Enhancement	Description	Benefit	Example Illustration
Fencing Enhancements	Fencing enhancements would consist of removing/realigning existing fence lines, especially at non-station at-grade crossing locations.	Fencing provides channelization for non-motorized users, directs them to safe crossing locations, and discourages areas from being used as pedestrian storage that were not designed for that use (e.g., in between tracks at non-station crossings) to make for a safer crossing experience.	
Tactile Warning Strips	Tactile Warning Strips are designed with a pattern of raised bumps that are detectable by people using canes or by those walking with their feet.	These warning strips would alert people who may be distracted or those with visual impairments of changes in the walking surface and the presence of a hazard such as light rail tracks.	
Pavement Markings	Pavement marking is the application of paint or thermoplastic with messages or symbols in the pedestrian access route prior to the location of the tracks. The intent is to bring awareness to a route change or impending hazard.	These pavement markings could be a variety of messages such as “STOP HERE” or “LOOK” and alert people walking, biking, or rolling who may be looking down or distracted to alert them of the presence of the light rail tracks.	

8 Appendix D Project Pages

The Master Plan projects are organized into three categories:

- Planning: Projects that may include diagnostics, studies and analysis, regional coordination, and other work that helps identify potential safety enhancements.
- 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.

Planning Project

Crossing Evaluation at Bridgeport Way S, S 74th St., S 56th St. (Sounder Lakewood Subdivision)

Crossing Evaluation at 16 At-Grade Crossings (Sounder Lakewood Subdivision)

Data Collection, Inventory, and Input on New Standards (T Line)

Adopted Project

1-Line Enhancements

Automatic Pedestrian Gates Pilot (Columbia City and Othello Stations)

Automatic Pedestrian Gates Pilot (Rainier Beach Station)

Alternating (Wig Wag) Train Headlights

Automatic Pedestrian Gates (Stadium Station/Royal Brougham)

Fully Funded Project

Dynamic Envelope Pavement Markings Pilot

SMART Grant: Rainier Valley Safe Project Pilot (Phase 1 – Fully Funded, Phase 2 – Adopted)

Crossing Evaluation at Bridgeport Way S, S 74th St., S 56th St.

(Sounder Lakewood Subdivision)

Description

This project will conduct a crossing evaluation at three Sounder at-grade crossings in the Lakewood Subdivision, which can include a diagnostic review. A diagnostic review typically involves a detailed, multidisciplinary assessment to ensure the safety, efficiency, and compliance of the crossing. These reviews are critical to identify potential hazards, evaluate operational effectiveness, and recommend potential mitigations. Below is an outline of the key activities involved:

- Preliminary data collection including traffic volumes, safety incidents, and current signage and infrastructure present.
- Conducting site inspections and field reviews, checking the visibility of warning devices and signage from train operator, pedestrian, and driver perspectives, and assessing the condition of crossing surfaces.
- Conducting a functional and operational assessment focusing on signal coordination, pedestrian or bicycle movements, analyzing vehicle queue lengths and whether vehicles block the crossing, and observing driver behavior for compliance with signals and signage.
- Conducting risk and safety assessments as needed.
- Collecting interested party input and feedback like rail operators, local government, and community feedback.
- Ensuring regulatory compliance and comparing with most recently adopted agency standards.
- Preparing recommendations for potential mitigations as needed.

If additional mitigations are identified as part of the crossing evaluation work, the Program will advance these mitigations, which may require additional budget.

Third-Party Coordination Required

Coordination to conduct the diagnostic is required with state and federal oversight agencies, as well as the local jurisdiction that owns the roadway.

Coordination may be required with local jurisdictions for the installation of traffic monitoring equipment.

Impacts to Public

None

Crossing Evaluation at Bridgeport Way S, S 74th St., S 56th St.

(Sounder Lakewood Subdivision)

Project Type

- Planning

Safety Focus Areas

Milestones

- Planning and Development – Q2 2024
- Crossing Evaluation – Q4 2025
- Recommendations – Q1 2026

Location(s)

- Bridgeport Way S, S 74th Street, S 56th Street

Cost Range

- $200K - $250K

Grant Opportunities

Potential Section 130 funding (Federal Railway Highway Crossing Program) or WUTC GCPF funding (Washington Utilities and Transportation Commission Grade Crossing Protective Fund)

Crossing Evaluation at 16 At-Grade Crossings *(Sounder Lakewood Subdivision)*

Description

This project will conduct crossing evaluations at 16 Sounder at-grade crossings in the Lakewood Subdivision, which can include a diagnostic review. A diagnostic review typically involves a detailed, multidisciplinary assessment to ensure the safety, efficiency, and compliance of the crossing. These reviews are critical to identify potential hazards, evaluate operational effectiveness, and recommend potential mitigations. Below is an outline of the key activities involved:

- Preliminary data collection includes traffic volumes, safety incidents, and current signage and infrastructure present.
- Conducting site inspections and field reviews, checking the visibility of warning devices and signage from train operator, pedestrian, and driver perspectives, and assessing the condition of crossing surfaces.
- Conducting a functional and operational assessment focusing on signal coordination, pedestrian or bicycle movements, analyzing vehicle queue lengths and whether vehicles block the crossing, and observing driver behavior for compliance with signals and signage.
- Conducting risk and safety assessments as needed.
- Collecting interested party input and feedback like rail operators, local government, and community feedback.
- Ensuring regulatory compliance and comparing with most recently adopted agency standards.
- Preparing recommendations for potential mitigations as needed.

If additional mitigations are identified as part of the crossing evaluation work, the Program will advance these mitigations, which may require additional budget.

Third-Party Coordination Required

Coordination to conduct the diagnostic is required with state and federal oversight agencies, as well as the local jurisdiction that owns the roadway.

Coordination may be required with local jurisdictions for the installation of traffic monitoring equipment.

Impacts to Public

None

Crossing Evaluation at 16 At-Grade Crossings *(Sounder Lakewood Subdivision)*

Project Type

- Planning

Safety Focus Areas

Milestones

- Planning and Development – Q2 2025
- Peer Review Study – Q3 2025
- Final Report – Q1 2026

Location(s)

- Sixteen at-grade crossings on Lakewood Subdivision

Cost Range

- $700K - $1M

Grant Opportunities

Potential Section 130 funding (Federal Railway Highway Crossing Program) or Washington Utilities and Transportation Commission Grade Crossing Protective Fund

Data Collection, Inventory, and Input on New Standards *(T Line)*

Description

In coordination and partnership with the City of Tacoma, this project will develop at-grade crossing design standards for the T Line and may include activities like data collection, peer analysis, and field observations to provide the basis for these standards. The project will also ensure consistency with Sound Transit Link and Sounder design requirements (as applicable) and incorporate lessons learned from other parts of the system. Developing design standards ensures uniform content in the design of T Line at-grade crossings for Sound Transit's future projects and consistent application of at-grade crossing enhancements. Coordination with the City of Tacoma is critical for this work.

Third-Party Coordination Required

City of Tacoma

Impacts to Public

None

Project Type

- Planning

Safety Focus Areas

Milestones

- Peer Review Documentation – Q3 2025
- Planning and Development, including identifying potential agreements – Q3 2025
- Draft – Q2 2026
- Final – Q4 2026

Location(s)

- At-grade crossings for T Line in downtown Tacoma

Cost Range

- $500k-$750k

Grant Opportunities

None Identified

1-Line Enhancements

Description

This project would make multiple improvements at each non-station crossing, which may include the addition of eye-level static No Left-Turn signage and dynamic blank-out Another Train Coming (ATC) signage. Also proposed for non-station crossings are a variety of pedestrian improvements, which could include fencing upgrades, pavement markings, tactile warning strips, and additional static train signage. These improvements would create more visibility and alert non-motorized users to the presence of an approaching train.

The enhancements for this project are proposed preliminary enhancements and will need further data and study to assess which treatments would be most effective prior to issuing a final recommendation.

See the graphic toolbox for detailed descriptions of this enhancement and its benefits.

Third-Party Coordination Required

The project will coordinate with SDOT on the following: permitting, controller integration for dynamic LED ATC signs, signage manufacturing and installation, and right-of-way and construction easements.

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 pedestrians. The public will notice upgraded enhancements at crossings and a more consistent crossing experience throughout the corridor.

Figure: Example of no left-turn signage

1-Line Enhancements

Project Type:

- Various enhancements

Safety Focus Area

Milestones

- Preliminary planning – Q4 2025
- Final Design – Q3 2026
- Construction – Q4 2027
- Testing & Implementation – Q1 2028

Location(s)

- Non-station At-Grade Crossings along 1-line

Cost Range

- $7M – $16M

Grant Opportunities

- Evaluating potential grant opportunities

Figure: Current ATC Signs

Figure: Example of tactile warning and pavement marking

Automatic Pedestrian Gates Pilot *(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. Associated infrastructure to support the design may also be included in the project.

Part of this pilot project will include upgrading signal equipment and software at key intersections along MLK as required to support the more complex signal operations needed with APGs. The pilot project will explore running a live simulation prior to installation of gates to test signal operation and optimization that can support reliable train operations and multi-modal safety.

Ongoing data collection on corridor operations and automatic pedestrian gates in service 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.

See the graphic toolbox for detailed descriptions of this enhancement and its benefits.

Third-Party 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.

Automatic Pedestrian Gates Pilot *(Columbia City and Othello Stations)*

Project Type

- Infrastructure

Safety Focus Area

Milestones

- 30% design – Q2 2025
- ST and SDOT conditional agreement on parameters for operational feasibility – Q4 2025
- Final design – Q3 2026
- Potential signal infrastructure installation – Q4 2026
- Long lead time equipment procurement – Q2 2027
- Finish construction – Q1 2028
- Testing & Implementation – Q2 2028
- Pilot end date – 2029

Location(s)

- Columbia City Station and Othello Station

Cost Range

- $10M–$14M

Grant Opportunities

- Evaluating potential grant opportunities

Figure: Example automatic pedestrian gate with hanging bar

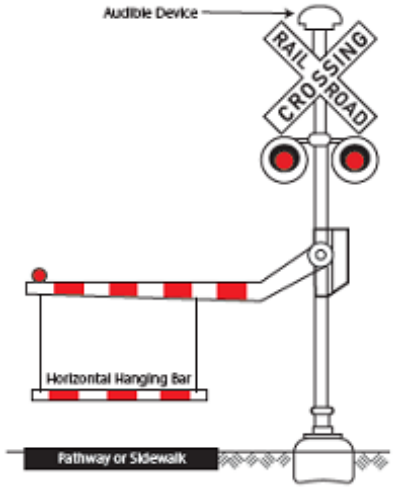
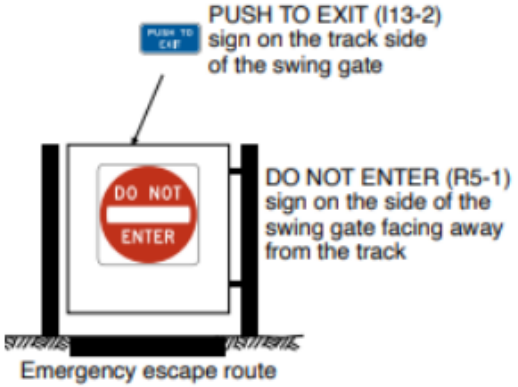


Figure: Example emergency exit swing gate



Automatic Pedestrian Gates Pilot *(Rainier Beach Station)*

Description

This pilot project will install automatic pedestrian gates at the Rainier Beach station. Associated infrastructure to support the design may also be included in the project.

Part of this pilot project will include upgrading signal equipment and software at key intersections along MLK as required to support the more complex signal operations needed with APGs. The pilot project will explore running a live simulation prior to installation of gates to test signal operation and optimization that can support reliable train operations and multi-modal safety.

Ongoing data collection on corridor operations and automatic pedestrian gates in service 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.

See the graphic toolbox for detailed descriptions of this enhancement and its benefits.

Third-Party 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

Safety Focus Area

Milestones

- 30% design – Q4 2025
- ST and SDOT conditional agreement on parameters of operational feasibility – Q4 2025
- Potential signal infrastructure installation – Q4 2026
- Final design – Q4 2026
- Construction procurement – 18 months
- Start construction – Q3 2027
- End construction – Q2 2028
- Testing & Implementation – Q3 2028
- Pilot end date – 2029

Location(s)

- Rainier Beach Station

Cost Range

- $8M–$15M

Grant Opportunities

- Evaluating potential grant opportunities

Figure: Example automatic pedestrian gate with hanging bar

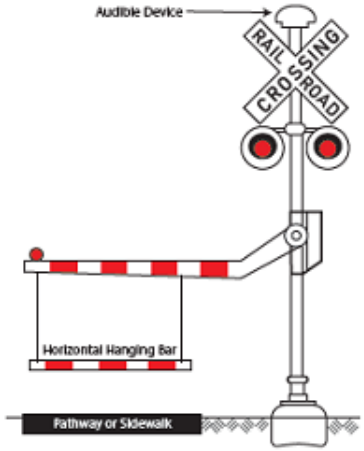
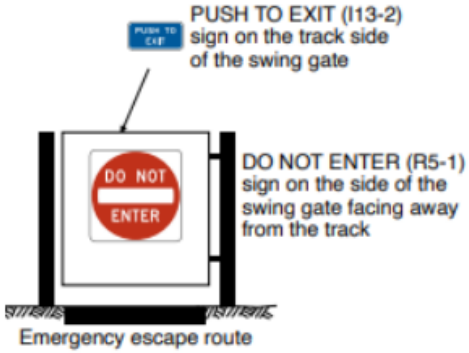


Figure: Example emergency exit swing gate



Alternating (Wig Wag) Train Headlights

Description

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

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.

See the graphic toolbox for detailed descriptions of this enhancement and its benefits.

Third-Party Coordination Required

None

Impacts to Public

No impact. Alternating headlight functionality would be installed while trains are not in service. The public will notice the retrofitted lights, particularly at night, making the train more easily discernible from other vehicular traffic.

Project Type

- Train enhancements

Safety Focus Areas

Milestones

- Begin manufacture integration – Q3 2024
- Prototypes Complete – Q2 2026
- Retrofit complete – Q4 2026

Number of Vehicles

- 62 Series 1 Kinkisharyo light rail vehicles
- 124 Series 2 Siemens light rail vehicles

Cost

- $5M

Grant Opportunities

- None identified

Figure: Wig Wag Train headlights as implemented by Metro Transit

Automatic Pedestrian Gates *(Stadium Station)*

Description

This project will install automatic pedestrian gates and other safety enhancements and will serve the pedestrian track crossings on the north and south sides of the intersection. Updated signage, ATC LED signage, flangeway filler, and other pedestrian improvements are included. See the graphic toolbox for detailed descriptions of these enhancements and their benefits.

Third-Party Coordination Required

Coordination with Seattle DOT has already begun and will need to address several critical aspects of the project to ensure its successful implementation. These include:

- Addition of upgraded 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.

Impacts to Public

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

After construction, the public may notice an increase in noise from the pedestrian gate signal bells and additional lighting, especially at night, due to the new warning lights.

Automatic Pedestrian Gates *(Stadium Station)*

Project Type

- Infrastructure

Safety Focus Areas

Milestones

- 30% design – Q1 2024
- Final design – Q2 2025
- ST and SDOT consensus on operational feasibility – Q2 2025
- Construction procurement – 18 months
- Start construction – Q1 2027
- Construction completed – Q4 2027
- Testing & Implementation – Q1 2028

Location(s)

- Royal Brougham Way @ SODO Busway

Cost

- $6M-$9M

Grant Opportunities

- Section 5307 earned share funds from the FTA

Dynamic Envelope Pavement Markings

Description

This project will install high-visibility pavement markings within the light rail dynamic envelope. The goal of the project is to reduce near misses and collisions with the train by clearly marking safe distances and helping prevent people driving, walking, rolling, or biking from stopping too close or traveling in the buffer zone when the train is present.

This aims to reduce the possibility that anyone is present on the tracks when a train approaches and increase the 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. The markings consist of white lines delineating the dynamic envelope and white crosshatching between the tracks and the outside limit of the dynamic envelope. See the example figure for visualization.

See the graphic toolbox for detailed descriptions of this enhancement and its benefits.

Third-Party Coordination Required

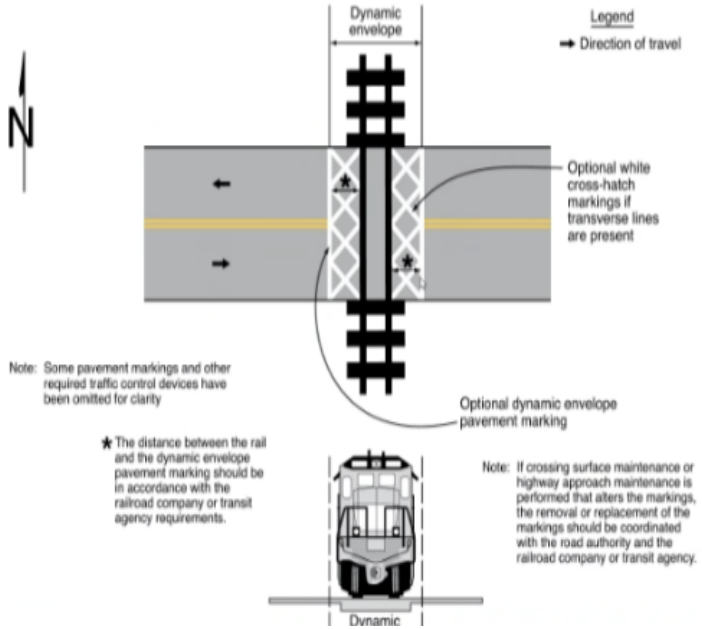
Coordination with SDOT is required in the following areas:

- Permits.
- Ensure pavement markings meet SDOT standards for not conflicting with existing pavement markings in the area (e.g., bike lanes, lead lines, crosswalks).

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. The public can expect to see a more visibly highlighted light rail crossing delineating the dynamic envelope of the train. Traffic operations will not be impacted as part of this project.

Figure: Example of light rail dynamic envelope



Dynamic Envelope Pavement Markings

Project Type

- Pavement markings

Safety Focus Areas

Milestones

- 30% design – Q3 2024
- Final design – Q1 2025
- Start construction – Q2 2025
- End construction – Q3 2025

Location(s)

- S Dawson Street, S Brandon Street, S Kenyon Street, and S Cloverdale Street

Cost Range

- $500k–$800K

Grant Opportunities

- None identified

Figure (left): Sample DO NOT STOP ON TRACKS signage
Figure (right): Sample dynamic envelope pavement markings

SMART Grant: Rainier Valley Safe Project Pilot

Description

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.

See the graphic toolbox for detailed descriptions of this enhancement and its benefits.

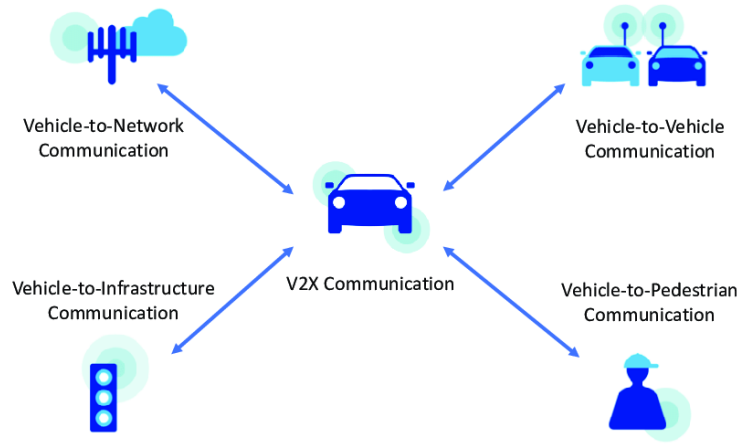
Third-Party Coordination Required

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. The public can expect upgraded equipment at crossings and a more consistent crossing experience through the corridor.

Figure: Graphic showing examples of V2X communications



SMART Grant: Rainier Valley Safe Project Pilot

Project Type

- Technology

Safety Focus Areas

Milestones

- Data collection and design specifications – Q1 2024
- Final analysis and report – Q2 2025
- Equipment procurement – Q3 2025
- Equipment installation – Q4 2025
- Phase 2 grant submission – Q4 2025
- If awarded:
  - Equipment installation – Q4 2026
  - Data collection and testing – Q3 2027
  - Pilot completion – 2029

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

Phase 2 is planned to be deployed at other At-Grade crossing locations on MLK Jr. Way S.

SMART Grant: Rainier Valley Safe Project Pilot

Cost Range

- $2.5M (Phase 1)
- $15M (Phase 2)

Figure: Touchless pedestrian push button