145th Street Station Access Nonmotorized Crossing Options

Feasibility Analysis

FINAL
SEPTEMBER, 2017

PREPARED BY

ch2m

CITY OF SHORELINE

Contents

Executive Summary

The overall objective of this study is to evaluate and recommend alternatives for a new pedestrian and bicycle bridge crossing Interstate 5 (I-5) and linking the area on the west side of the freeway to a future light rail station on the east side of the freeway to the north of 145th Street.

By 2023, light rail transit serving the 145th Street Station[1] will open, transforming the way Shoreline residents and commuters travel from Shoreline to downtown Seattle, the airport, and beyond. Traffic in the station area is projected to increase more than 25 percent over current conditions thus creating a need for multimodal access improvements that would provide safety and separation from vehicular traffic for pedestrians and bicyclists.

Five alternative alignments were selected for initial feasibility study of nonmotorized crossing options. Consideration was given to potential bridge span lengths, horizontal and vertical clearance from I-5 lanes, requirements for slopes and landings, walkshed (i.e. half mile walking range) to the station, costs, and constructability/compatibility with the light rail guideway and station.

The result of the study is a preferred crossing alignment which starts at the vicinity of N 148th Street. The alignment ramps up to a bridge crossing of I-5 then passes under the Lynnwood Link Extension (LLE) guideway to a touchdown ramp and staircase on the north side of the 145th Street Station plaza. The touchdown landing of the bridge just east of the LLE guideway also provides a landing and connection for the future Trail Along the Rail.

A table that summarizes and compares various bridge alignments, structural lengths, and other factors, including walkshed, constructability, and costs has been included in this report. The 148th Street Option was selected from the options considered as the preferred alternative for the following reasons:

- Presents the least expensive option
- Provides the shortest bridge/ramp connection to the light rail station from the west side of I-5, which in turn, provides the shortest walk time
- Provides the greatest increase in walkshed
- Offers the closest option for a mid-point crossing between the 145th Street bridge and 155th Street undercrossing, thereby more evenly supporting local nonmotorized access to the station

The estimated cost for the preferred alignment at 148th Street, including design costs and construction costs, is estimated around $13.4 million.

On February 27, 2017, City Council approved the 148th Street Option as the Preferred Alternative for the 145th Station nonmotorized crossing of I-5. City Council directed staff to move forward with developing a capital improvement project for this crossing option at 148th Street. In 2017, the City of Shoreline will initiate the 30 percent design and environmental analysis for the project.

As Sound Transit is in the process of finalizing the design of the 145th Street light rail station, it is important to specifically advance the design of the 148th Street nonmotorized bridge to 30 percent design in 2017. Advancing the design and obtaining environmental clearances will provide Sound Transit with the design parameters and costs needed to avoid preclusion of nonmotorized facilities to the 145th Street Station.

Key advances under the 30 percent design phase will include determining the type of bridge structure, identifying design constraints, studying vehicular and nonmotorized circulation scenarios, advancing aesthetic design / art integration, performing environmental analysis, confirming constructability with the LLE guideway, and identifying forward compatible design elements. In addition, outreach to the directly affected property owners, the local neighborhood, the surrounding community, and public agencies will be essential to the development of how the bridge and ramp configurations will look, function, and integrate into the community on both sides of I-5.

[1] During the time of this feasibility analysis the official names of the light rail stations in Shoreline has not been announced. In this report, the stations are referred to by their working title of 145th Street Station and 185th Street Station.

Introduction and Project Goal

Introduction

By 2023, light rail transit serving the 145th Street Station and 185th Street Station will open, transforming the way Shoreline residents and commuters travel from Shoreline to downtown Seattle, the airport, and beyond. To maximize multimodal access to the future light rail station at 145th Street, the City of Shoreline conducted a feasibility study of design options for a nonmotorized bridge to connect the City west of I-5 to the light rail station in the vicinity of 148th Street. This report provides a briefing on the findings of the feasibility study and next steps to advance the project into 30 percent design and environmental analysis.

Problem Statement

City staff are currently evaluating ways to strengthen and prioritize multimodal access within a half mile of the 145th Street and 185th Street light rail stations.

Recently, the City Council adopted Subarea Plans around the two Shoreline Sound Transit Lynnwood Link Extension (LLE) light rail stations that will be operational in 2023. These Subarea Plans incorporate Shoreline's Comprehensive Plan Transit-Oriented Communities (TOCs) principles to encourage mixed-use residential and commercial development to maximize multimodal access to these future light rail stations. Components of the 145th Street Station Subarea Plan include an "Off-Corridor/Green Network" - a network of slow-paced neighborhood streets, and a nonmotorized bridge to the 145th Street Station in the vicinity of 147th or 148th Streets (147th/148th Street nonmotorized bridge).

Vicinity Map

The 147th/148th Street Nonmotorized Bridge was also a component of the 145th Street Multi-modal Corridor Study Preferred Design Concept.

As Sound Transit is in the process of finalizing the design of the 145th Street light rail station, it is important to specifically advance the design of the 147th/148th Street nonmotorized bridge to 30 percent design in 2017. Advancing the design of this project and obtaining environmental clearances will accomplish the following:

- Provide Sound Transit with the design parameters and costs needed to avoid preclusion of nonmotorized facilities to the 145th Street light rail station. Providing this information in advance of the Sound Transit LLE project will support Sound Transit's "baseline" design milestone due to be completed in summer 2017 which establishes the light rail project costs.
- Foster design partnerships with Sound Transit and Washington State Department of Transportation (WSDOT).
- Prepare conceptual designs in 2017 to be competitive in the 2018 - 2020 federal and state grant funding cycle.

The 30 percent design advancement of the 147th/148th Street nonmotorized bridge and Trail Along the Rail projects in 2017 will help position the City for the 2018 – 2020 grant funding cycle.

Project Goals

The goals for this study include:

Identify feasible ways to improve multimodal access to the 145th Street light rail station in the vicinity of 147th/148th Street that will improve the walkshed to the station, prioritize nonmotorized connections, and be compatible with Sound Transit facilities and construction.

Background

Relevant Policies

The following City policies provide direction on the development of multimodal access to the future light rail stations and throughout the Station Subareas:

Shoreline Comprehensive Plan's Transit-Oriented Communities (TOCs)

- Encourages mixed-use residential and commercial development that maximizes multimodal access to the future light rail stations.

145th Street Station Subarea Plan

- Transportation Policy #11 calls for dedicated and separated pedestrian and bicycle facilities.
- Community Design Policy #2 seeks to enhance public spaces, including bicycle and pedestrian amenities and other placemaking elements.
- Adopted Plan includes the concept of a trail as part of the Subarea Plan's Off-Corridor/Green Network.

Guiding Principles for Light Rail Facility Design

Principle #1. Multimodal – stations should be full-service transit hubs and provide great access inviting convenient connections for trains, buses, bikes, and pedestrians through options such as:

- Ensuring that all modes of nonmotorized users can easily access the stations from both sides of I-5 and NE 185th and 145th Streets.
- Providing safe nonmotorized access to and from the stations and garages, including consideration of a pedestrian/bicycle bridge connecting the 145th Street light rail station to the west side of I-5.
- Providing well-marked way-finding in the station areas, including pedestrian pathways.

Principle #2. Neighborhood Character – stations should connect to the surrounding community to encourage and enhance vibrant place-making by such means as:

- Providing gathering places, such as plazas, that could be used for a variety of functions within the station footprint.
- Consider making use of areas under powerlines or trackways where feasible, including a potential trail connecting both stations (ex. City-managed public open spaces and/or trails).

Council Goals Addressed

The study of the nonmotorized bridge options to the 145th Street light rail station as well as the Trail Along the Rail addresses:

- Council Goal No. 2: Improve Shoreline's utility, transportation, and environmental infrastructure.
- Council Goal No. 3: Prepare for two Shoreline light rail stations.
- Council Goal No. 5: Promote and enhance the City's safe community and neighborhood programs and initiatives.

Relevant Plans – 145th Street Corridor Study and Trail Along the Rail

Relevant Plans – 145th Street Multimodal Corridor Study

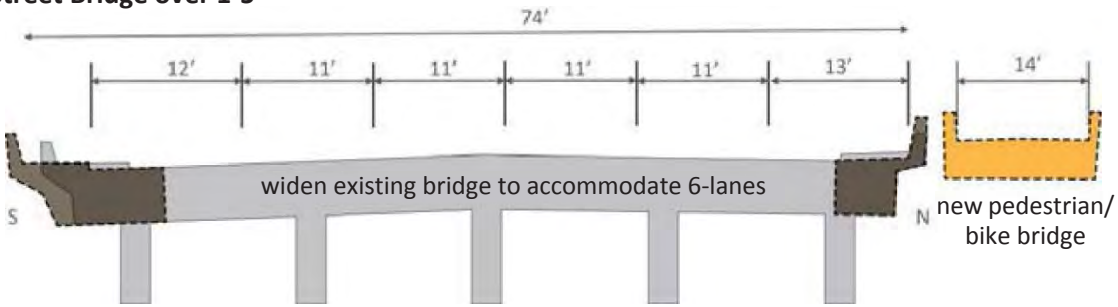
In 2016, the City of Shoreline completed the 145th Street Multimodal Corridor Study and developed a Preferred Design Concept for the corridor from 3rd Avenue NW to Bothell Way NE/ Lake City Way (SR 522) through a comprehensive process that included community, stakeholder, and agency involvement and technical analysis.

Within the Study's I-5 interchange area, staff worked with WSDOT and Sound Transit to develop a Preferred Design Concept that will improve mobility and safety for all transportation modes and improve nonmotorized access to the future light rail station. The 145th Street bridge over I-5 is currently five (5) lanes. The concept proposes to modify the bridge to provide for six (6) lanes. This allows more left-turn storage, which will improve the east-west traffic flow. In addition, the Preferred Design Concept proposes an eastbound 145th Street to northbound I-5 button hook ramp so that vehicles will be able to turn right and loop under the bridge to access I-5 northbound, which will help improve traffic flow at the 145th Street/5th Avenue intersection.

WSDOT has confirmed that reconfiguration of the existing 145th Street bridge deck over I-5 will require a new nonmotorized bridge immediately adjacent to the north side of 145th Street. This 145th Street nonmotorized bridge will tie into the Off-Corridor Network and will connect to the future light rail station via a diagonal shared-use path (see "Plaza Path" label on Attachment A).

In addition, 5th Avenue walkways and crosswalks will be upgraded to provide ADA accessibility to the station. This design concept supports nonmotorized connectivity to the future 145th Street light rail station. As an added benefit, the Plaza Path concept provides the opportunity to utilize the northwest corner of the 145th Street/5th Avenue intersection as a gateway entrance to Shoreline and the 145th Street light rail station.

145th Street Multimodal Corridor Study
Cross section of 145th Street Bridge over 1-5



Relevant Plans – Trail Along the Rail Study

The development of the LLE light rail presents Shoreline with a unique and rare opportunity to study the feasibility of an approximately 2.5 mile shared-use path (referred to as the Trail Along the Rail, a.k.a. "the Trail") that would parallel the LLE alignment on the east side of I-5 from 145th Street to the NE 195th Street. The Trail will enhance pedestrian and bicyclist access to the planned 145th Street and 185th Street Stations, as well as connect to the existing NE 195th Street Pedestrian Bridge over I-5. In addition, the Trail will connect to local streets, parks, open spaces, and schools within the neighborhoods adjacent to the LLE track alignment.

In 2016, the City of Shoreline initiated a feasibility study of the Trail Along the Rail. The City gained feedback on the development of the trail alignment through multi-agency coordination meetings, stakeholder meetings, and public meetings. The outreach process provided stakeholders and the public an opportunity to learn about the trail's potential to improve pedestrian and bicycle access and mobility to the light rail stations and local destinations and allowed for their input on the trail's design.

Based on the project team's preliminary review of existing conditions and the Sound Transit LLE Preliminary Engineering set, two typical cross sections have been developed to test out the potential for a 16-foot wide (12 foot trail with 2 foot shoulders on both sides) shared-use path with a 6-inch sub-base to support occasional maintenance vehicles. In some locations, the trail could be located under the LLE guideway and in other locations it could be located adjacent to a LLE sound wall. In other situations, where a roadway closely parallels the LLE (e.g. 5th Avenue as it approaches the 185th Street Station), the roadway could be retrofitted to incorporate a trail on the west side. In other situations, where there are physical challenges, such as steep topography or right-of-way pitch points, that trail may be redirected to the local street network.

Traffic Safety Needs

Traffic is projected to increase:

- 185th Street Subarea = more than double the traffic in comparison to current conditions
- 145th Street Subarea = more than 25 percent increase in traffic in comparison to current conditions

Therefore, increased safety and separation from vehicular traffic for pedestrians and bicyclists in the form of multimodal access improvements will be needed.

Subarea Population Projections

The adopted 145th and 185th Station Subarea Plans encourage the concentrated growth (see population projections below) of a diverse mix of residential and commercial uses around the light rail station. In order to create Transit Oriented Communities that support walking and bicycling for recreation and transportation, a low-stress network of pedestrian and bicycle facilities are needed.

145th Street Station Subarea		
2014 Population	2023 Population Projection	Increase in Population
8,321	11,207 to 13,635	2,886 to 5,314
185th Street Station Subarea		
2014 Population	2023 Population Projection	Increase in Population
7,944	10,859 to 13,343	2,915 to 5,399

Transit Ridership Projections

147th/148th Street nonmotorized bridge and The Trail Along the Rail projects have the potential to provide pedestrian and bicyclists with easy access to stations from both sides of I-5 as well as easy access from points north and south of the stations. This helps support the LLE Final Environmental Impact Statement's 2035 pedestrian and bicycle ridership projections listed below. As shown later in this report, these nonmotorized access improvements significantly increase the walkshed to the 145th Street Station.

Sound Transit Pedestrian and Bicycle Ridership Projections:

- 145th Street Station – 360 pedestrian and 30 bicyclist boardings/alightings anticipated per peak hour
- 185th Street Station – 165 pedestrian and 30 bicyclist boardings/alightings anticipated per peak hour

Concepts and Feasibility Analysis

In advancing the 145th Street Station Subarea Plan policy goal for a nonmotorized bridge to the 145th Street Station, a feasibility analysis of five options was conducted based on a planning-level assessment of constructability, cost, walkshed impacts, and projected increase of pedestrian/bicycle commuters to the 145th Street Station. This analysis assumes a baseline condition of a future 145th Street nonmotorized bridge (separate from the 147th/148th nonmotorized bridge studied in this report) and Plaza Path as part of the 145th Street/I-5 Interchange improvements. This feasibility study seeks to meet Guiding Principles for Light Rail Facility Design – Principle #1 for multimodal access north of 145th Street with a more direct nonmotorized route (via a bridge crossing) to the station.

Methodologies

Design Constraints

The design of a nonmotorized bridge crossing over I-5 to the 145th Street Station has the following constraints:

- Bridge must maintain a 17.5 foot minimum vertical clearance over I-5 and the on/off ramps per Washington State Department of Transportation (WSDOT) Bridge Design Manual, AASHTO LRFD Bridge Design Specifications

- Bridge must maintain a 10 foot minimum vertical clearance under the LLE Guideway per AASHTO Guide to Bicycle Facilities

- Within WSDOT right of way for I-5, WSDOT has established a line that is offset from the edge of pavement that allows for future expansion of the interstate. This line is referred to as the WSDOT "compatibility line."

  The construction of structures that would conflict with widening of I-5, such as the LLE guideway and stations, are constrained by this line. For overcrossing structures (such as the bike/pedestrian bridge options in this study), that typically cross perpendicular to the mainline, bridge piers are not allowed within the mainline and ramp shoulders. However, bridge structures and piers are permitted within the compatibility line outside of the I-5 lanes and shoulders.

- WSDOT discourages the construction of bridge piers within the I-5 center median or within the compatibility line of adjacent shoulders due to traffic control challenges during construction and impacts to the highway geometry. A center median bridge pier may be feasible provided that there is sufficient space to push the I-5 southbound and northbound lanes apart to create space for a center pier and traffic barriers. Placement in the center median would increase project costs and may require the approval of design deviations for this segment of I-5.

Study of Crossing Concepts

Five crossing concepts were studied in context with walkshed, project constraints, and other proposed improvements such as the Trail Along the Rail project, the station plaza layout, and the 145th Street Corridor project. The crossing concepts studied are briefly described below. Concept plans and profiles are provided in Appendix A.

- 147th Street Crossing - Option A
  147th Option A alignment starts at the east end of N 147th Street, ramps up to a bridge crossing over the southbound off-ramp and I-5, turns south when it reaches the east side of I-5, then turns east as it passes under the LLE guideway, and continues as a shared-use path to 5th Avenue where it crosses the northbound on-ramp and then connects with the 145th Street Station.
- 147th Street Crossing - Option B
  147th Option B alignment starts at the east end of N 147th Street, ramps up to a bridge crossing over the southbound off-ramp and I-5, passes under the LLE guideway, and continues as an aerial bridge until it connects with the 3rd floor of the 145th Street Light Rail Station parking garage. From there, pedestrians and bicyclists can access the station plaza level via the garage stairs, elevators, or ramp. The details of whether the ramp is internal or external to the garage would need to be developed, if this option moves forward.
- 147th Street Crossing – Option C (Refined)
  147th Option C concept was developed in response to an initial review of 147th Option A and Option B concepts. 147th Option C alignment starts at the east end of N 147th Street, ramps up to a bridge crossing over the southbound off-ramp and I-5, passes under the LLE guideway, continues as an aerial bridge over the northbound on-ramp, and ramps down to connect with the south plaza area of the 145th Street Station.
- 148th Street Crossing (Refined)
  148th Street Crossing alignment conceptually (details to be developed through outreach with property owners) starts at the parking and access road area of three churches at the end of N 148th Street, namely Phillippi Presbyterian Church, Shoreline Unitarian Universalist Church, and Church of Christ. The alignment ramps up to a bridge crossing of I-5, passes under the LLE guideway, and then ramps down to the 145th Street Station plaza level. The refined option has an improved ramp and stair configuration to the north of the station that ties into the station plaza level, as well as the proposed Trail Along the Rail conceptual alignment.
- 149th Street Crossing
  149th Street Crossing alignment starts at the parking and access road area of the Church of Christ Shoreline Congregation Church. The alignment ramps up to a bridge crossing of I-5, however the crossing alignment was found to be geometrically infeasible because it does not meet the required 10 foot vertical height clearance to pass under the LLE guideway.

Walkshed

To analyze the benefit of each crossing option, the project team modeled how each option affects pedestrian travel time and the half mile walkshed around the 145th Street light rail station. The table below summarizes the findings of the analysis (see Attachment F for Walkshed Analysis Maps):

Option	Length	Pedestrian Travel Time**	Total Walkshed Acreage	Acreage Gain over Baseline Walkshed
Baseline*	N/A	N/A	218.66	N/A
147th Street – Option A	1,407 ft.	5.8 minutes	218.66	0.0
147th Street – Option B	880 ft.	3.6 minutes	229.97	11.31
147th Street – Refined Option	860 ft.	3.5 minutes	235.97	17.31
148th Street – Refined Option	580 ft.	2.4 minutes	290.86	72.2
149th Street *(Infeasible)*	N/A	N/A	N/A	N/A

* The Baseline Walkshed defines the half mile catchment area around the 145th Street light rail station that a pedestrian could access using the existing street network.
** Pedestrian travel time is based on the length of each option's alignment (the bridge and ramps/walkways from the west side neighborhood over I-5 to the light rail station's plaza level) using *The Manual on Uniform Traffic Control Devices' (MUTCD)* suggested normal walking speed of four feet per second.

Cost Estimates

To create planning level cost estimates (see Attachment F), the project team used the following cost methodology:

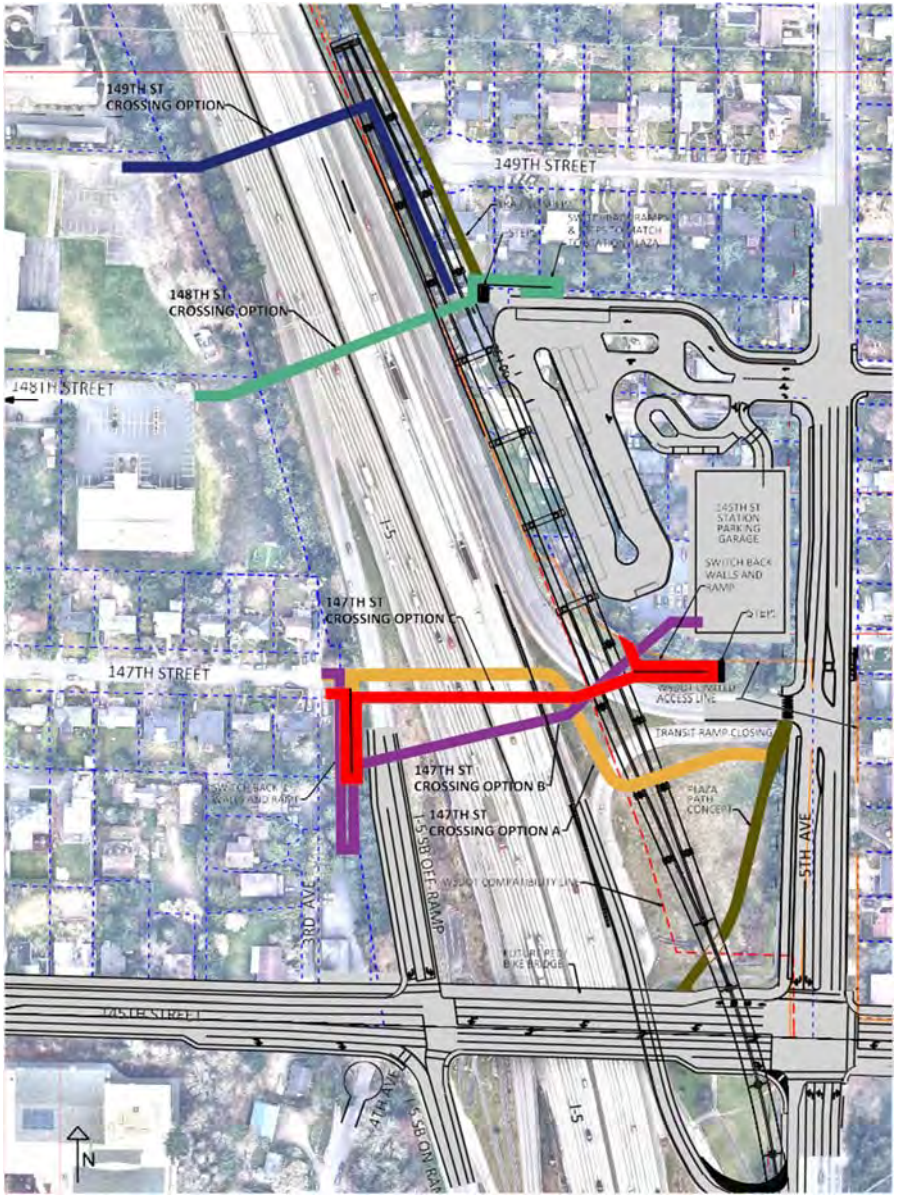
- Unit prices used for the bridge square foot (SF) unit price are per the WSDOT Bridge Design Manual

Non-bridge project elements with additional costs:

- Upgrades to 147th or 148th Street connection to 1st Avenue are required to get pedestrians to the bridge, including walkway, illumination, and other
- Switchback ramp, walls, and grading are significant for each option
- Construction within the I-5 limited access requires a high level of traffic control measures adding significant costs to the project estimate
- Railing along the alignment was assumed, adding considerable costs
- Costs include project development, agency administration, construction, and construction management
- Costs include escalation
- Due to the low level of project development and detail, there is a reasonably large contingency of 35 percent applied

The following table provides an overview of cost estimates for each crossing option:

Option	Cost Estimate
147th Street - Option A	$17,512,000
147th Street - Option B	$18,732,000
147th Street - Option C (Refined)	$16,687,000
148th Street (Refined)	$13,331,000
149th Street (Note: option found to be infeasible)	N/A



Option Overview Map

Alternatives Analysis

The following table provides a comparative analysis of the nonmotorized crossing options:

Alignments Considered	Opinion of Cost Summary (2022)	Walk Time	Walkshed Summary	Considerations
147th Street - Option A	$17,512,000	5.8 min	No Increase	• Requires sidewalk construction and illumination on 147th Street. • Truss options require closure of I-5 to erect trusses. • Location of east side pier provides for most convenient location to erect truss due to clearance from aerial LLE guideway. • 147th Street will function as kiss-n-ride, increasing vehicle traffic. Traffic impacts were not studied. Further study of vehicular circulation will be required if this option moves forward.
147th Street - Option B	$18,792,000	3.6 min	Modest Increase	• Requires sidewalk construction and illumination on 147th Street. • Tallest crossing over I-5 due to crossing the SB off-ramp at the highest point. Results in higher visual impact and larger foundations due to seismic inertial forces of taller structure. • Truss options require closure of I-5 to erect trusses. • Constructability of erecting trusses under the guideway structure - will need to be partially launched from temporary supports, taking more time and longer closure of I-5. • Extensive coordination is required for this option to connect with the planned station parking garage. • 147th Street will function as kiss-n-ride, increasing vehicle traffic. Traffic impacts were not studied. Further study of vehicular circulation will be required if this option moves forward.
147th Street - Option C (Refined)	$16,687,000	3.5 min	Modest Increase	• Requires sidewalk construction and illumination on 147th Street. • Geometry of the profile requires 5 percent grade of overcrossing structure over I-5. • Truss options require closure of I-5 to erect trusses. • Location of east side pier provides for most convenient location to erect truss due to clearance from LLE aerial guideway. • Constructability of erecting trusses under the guideway structure - will need to be partially launched from temporary supports. • 147th Street will function as kiss-n-ride, increasing vehicle traffic. Traffic impacts were not studied. No additional accommodations for vehicle turn-around were provided at the east end of 147th Street. • No property acquisition is assumed for this option.
148th Street Option (Refined)	$13,331,000	2.4 min	Greatest Increase	• Truss options require closure of I-5 to erect trusses. • Constructability of erecting trusses under the LLE aerial guideway - will need to be partially launched from temporary supports, taking more time and longer closure of I-5. • Methodology of bridge construction is impacted by timing of LLE guideway construction. There is little space west of the LLE guideway for construction staging. • Requires pathway construction and illumination from 1st Ave to I-5, requiring permanent property easements. • Access to the two churches and the parking lot at Phillippi Presbyterian Church will function as kiss-n-ride, increasing vehicle traffic. Traffic impacts were not studied. Further study of vehicular circulation will be required if this option moves forward.
149th Street Option	Not Feasible		N/A	• Due to geometric constraints of grades to get over I-5 and the northbound on-ramp, and pass under the LLE aerial guideway, this option is not geometrically feasible.

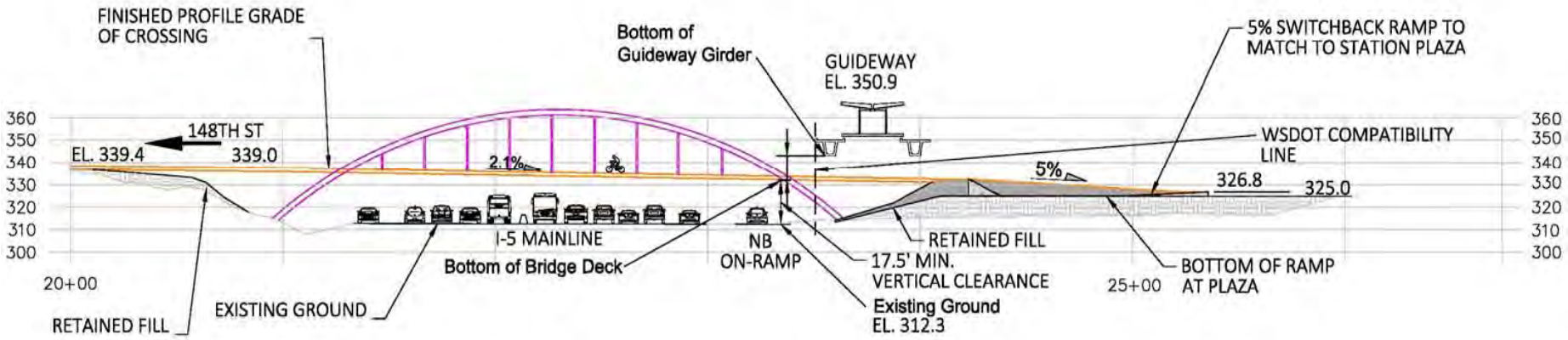
Discussion and Summary of Findings

Based on the comparative analysis of the viable crossing options studied, and in light of the project goals of identifying feasible ways to improve multimodal access to the 145th Street light rail station (improving the walkshed, prioritizing nonmotorized connections, and compatibility with the Sound Transit facilities and construction), two options rose to the top for further consideration and refinement - 147th Street Option C and 148th Street Option.

After further analysis and discussion with the City Council on December 12, 2016, and February 27, 2017, the 148th Street Option was selected as the preferred alternative for the following reasons:

- Presents the least expensive option.
- Provides the shortest bridge/ramp connection to the light rail station from the west side of I-5, which in turn, provides the shortest walk time.
- Provides the greatest increase in walkshed.
- Offers the closest option for a mid-point crossing between the 145th Street Bridge and 155th Street Undercrossing, thereby more evenly supporting local nonmotorized access to the station.

148th Street Option Profile



Conclusion

On February 27, 2017, City Council approved the 148th Street Option as the Preferred Alternative for the 145th Street light rail station nonmotorized crossing of I-5. As a next step, the City of Shoreline will initiate the 30 percent design phase and environmental analysis for the 148th Street nonmotorized bridge.

Advancing the design of this project and obtaining environmental clearances will accomplish the following:

- Provide Sound Transit with the design parameters and costs needed to avoid preclusion of nonmotorized facilities to the 145th Street light rail station in advance of the Sound Transit LLE project and support Sound Transit's "baseline" design milestone
- Foster design partnerships with Sound Transit and WSDOT
- Prepare conceptual designs to be competitive in the 2018 - 2020 federal and state grant funding cycle
- Engage stakeholders and the community with how the bridge and ramp configurations integrate into the local street network on both sides of I-5
- Explore with directly affected property owners ways to accommodate the bridge and ramp configurations with potential property easements and/or acquisitions

Next Steps

The 148th Street concept is integral with the design of the LLE guideway, the 145th Street Station design, and the Trail Along the Rail design concept. Design of the 148th Street crossing concept must be developed in close coordination with Sound Transit as the design of the guideway and station progresses. The following paragraphs discuss critical path items to be developed and coordinated with project stakeholders.

Public/Stakeholder Engagement

Extensive outreach to the directly affected property owners, the local neighborhood, the surrounding community, stakeholders, and public agencies will be essential to the development of how the bridge and ramp configurations will look, function, and integrate into the community on both sides of I-5.

LLE Guideway

The 148th Street concept crosses over I-5 and under the LLE guideway. Bridge foundation abutment and/or pier will be located under the guideway. For constructability reasons, the foundations for the 148th bridge may need to be constructed in advance of the LLE guideway construction. For this reason, it is imperative to understand that there may be a one-time opportunity to coordinate the design of the 148th bridge structure with the Sound Transit LLE design team.

145th Street Station

The 148th Street concept includes a touchdown landing that interfaces with the north side of the 145th station plaza. The design and configuration of the touchdown landing needs to be developed with the 30 percent design effort so that the design parameters, grades, ADA accessibility, stairs, railings, etc., are coordinated with the design of the station plaza. In addition, property impacts, if necessary at the touchdown landing area, need to be identified.

West side Property Access

The 148th Street concept assumes a pathway connection to 1st Ave NE through property owned by three churches. A key element of the 30 percent design effort will be to coordinate with the property representatives to develop a plan to provide access to the 148th Street nonmotorized bridge from 1st Ave. NE. This may include acquisition of a permanent easement or right of way for the nonmotorized pathway. In addition to resolving property access, traffic circulation from 1st Ave NE needs to be studied to identify potential impacts and mitigation associated with the project.

Environmental Clearance

As part of the 30 percent design effort, the City will achieve environmental clearance for the project. It is anticipated that environmental documentation will include a cultural resources review, traffic analysis, social/economic review, and land use. Environmental documentation will need to be coordinated with the approving agencies including WSDOT and the City of Shoreline.

Bridge Type

A key decision in the 30 percent design development will be determining the type of bridge structure for the crossing over I-5. A Type, Size, and Location (TS&L) memorandum will be included in the 30 percent design project to aid the decision making for the type of bridge structure. Several factors will be considered including soil properties, span length, aesthetics, vertical alignment constraints, and constructability considerations.

Project Funding

The 30 percent design development of the 148th Street nonmotorized bridge project in 2017 will also help position the City for the 2018 – 2020 grant funding cycle. Key to positioning the project for funding include developing reliable cost estimates at the 30 percent level and building partnerships around the project to increase the awareness of the project benefits.

Potential grant funding opportunities for the project include:

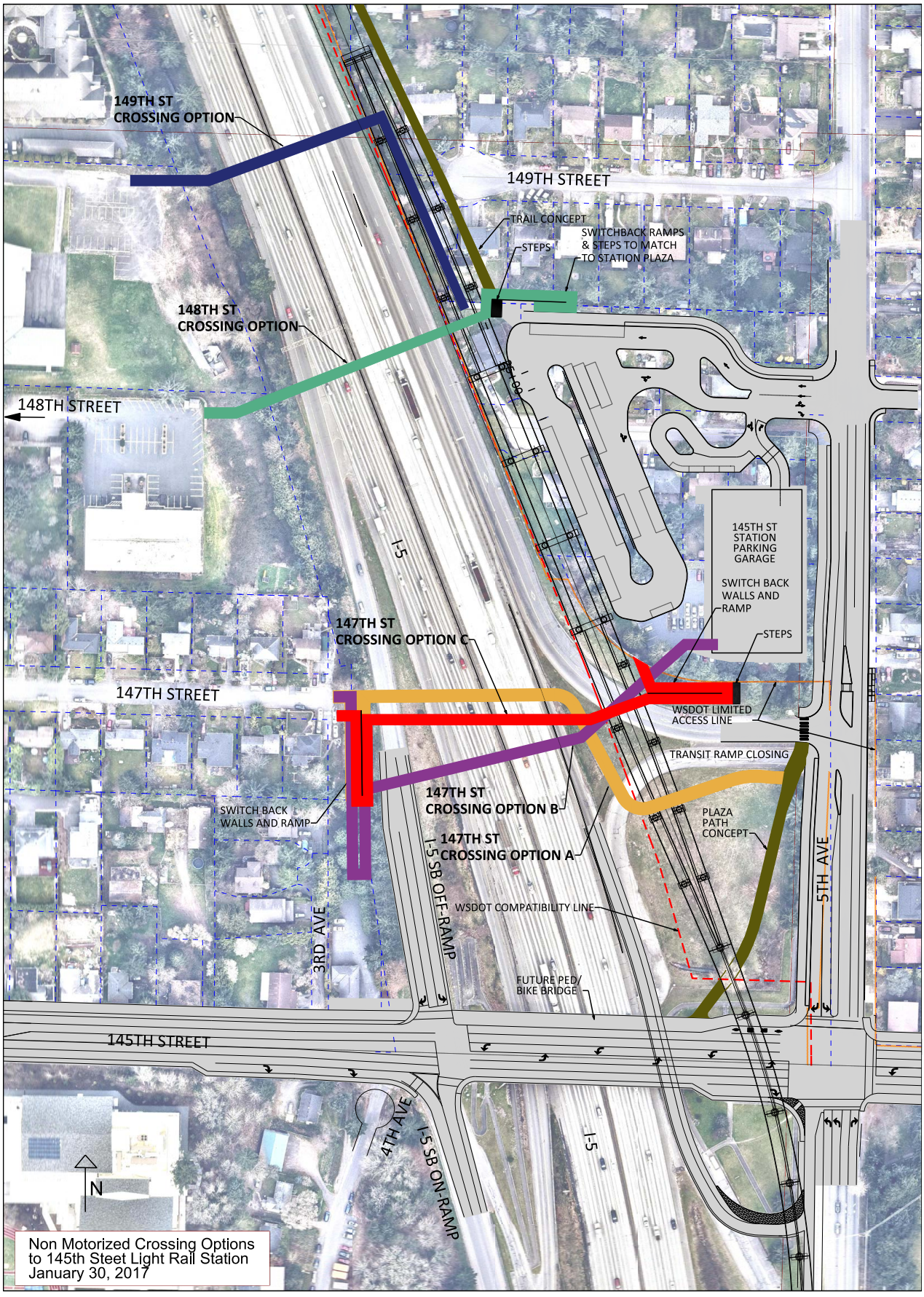
- Transportation Alternatives Program (TAP) – minimum 13.5% match
- Nexus between Sound Transit Multimodal Access Assessment Improvements within ½ mile of the 145th and 185th Street Stations
- WA State Recreation and Conservation Office (RCO) – 50 percent match
- WSDOT Pedestrian and Bicycle Program – no match required
- STP/CMAQ – Regional Competition – minimum 13.5 percent match
- STP/CMAQ – Countywide Competition – minimum 13.5 percent match
- Federal Transit Administration – FAST – New Starts Grant for trails up to 3 miles from light rail stations

Attachments

A. Plan - Crossing Options
B. Plan - Preferred and Refined Concepts
C. Profiles - Crossing Options
D. Ped/Bike Connections Map
E. Trail Along the Rail Typical Section
F. Walkshed Analysis Maps
G. Opinion of Cost Estimates

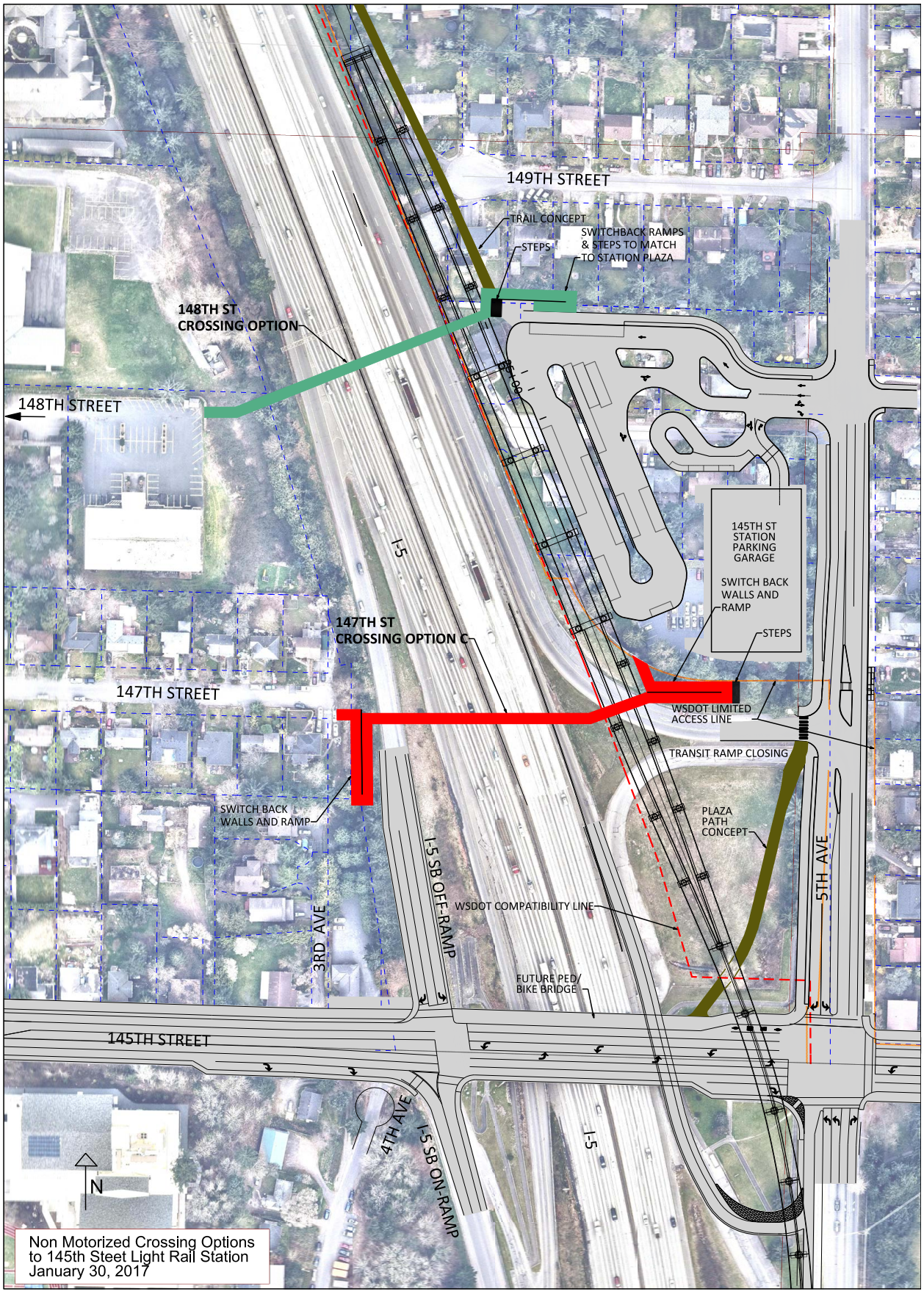
Attachment A

Plan – Crossing Options


149TH ST
CROSSING OPTION
149TH STREET
TRAIL CONCEPT
STEPS
SWITCHBACK RAMPS
& STEPS TO MATCH
TO STATION PLAZA
148TH ST
CROSSING OPTION
148TH STREET
I-5
145TH ST
STATION
PARKING
GARAGE
SWITCH BACK
WALLS AND
RAMP
STEPS
147TH ST
CROSSING OPTION C
147TH STREET
WSDOT LIMITED
ACCESS LINE
TRANSIT RAMP CLOSING
147TH ST
CROSSING OPTION B
147TH ST
CROSSING OPTION A
SWITCH BACK
WALLS AND RAMP
PLAZA
PATH
CONCEPT
I-5 SB OFF-RAMP
WSDOT COMPATIBILITY LINE
5TH AVE
3RD AVE
FUTURE PED/
BIKE BRIDGE
145TH STREET
4TH AVE
I-5 SB ON-RAMP
I-5
N
Non Motorized Crossing Options
to 145th Steet Light Rail Station
January 30, 2017

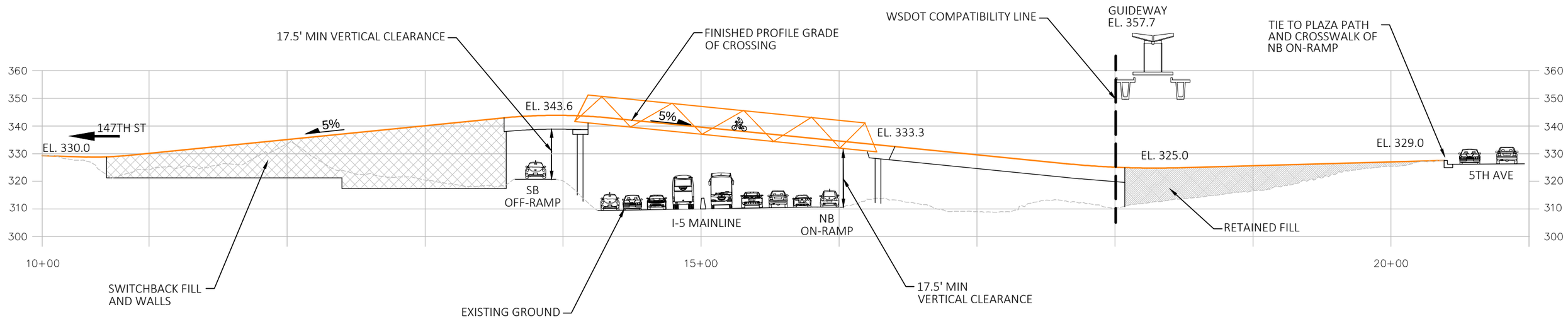
Attachment B

Plan – Preferred and Refined Concepts


149TH STREET
TRAIL CONCEPT
STEPS
SWITCHBACK RAMPS & STEPS TO MATCH TO STATION PLAZA
148TH ST CROSSING OPTION
148TH STREET
I-5
145TH ST STATION PARKING GARAGE
SWITCH BACK WALLS AND RAMP
STEPS
147TH ST CROSSING OPTION C
147TH STREET
WSDOT LIMITED ACCESS LINE
TRANSIT RAMP CLOSING
SWITCH BACK WALLS AND RAMP
PLAZA PATH CONCEPT
I-5 SB OFF-RAMP
5TH AVE
3RD AVE
WSDOT COMPATIBILITY LINE
FUTURE PED/ BIKE BRIDGE
145TH STREET
4TH AVE
I-5 SB ON-RAMP
I-5
N
Non Motorized Crossing Options to 145th Steet Light Rail Station
January 30, 2017

Attachment C

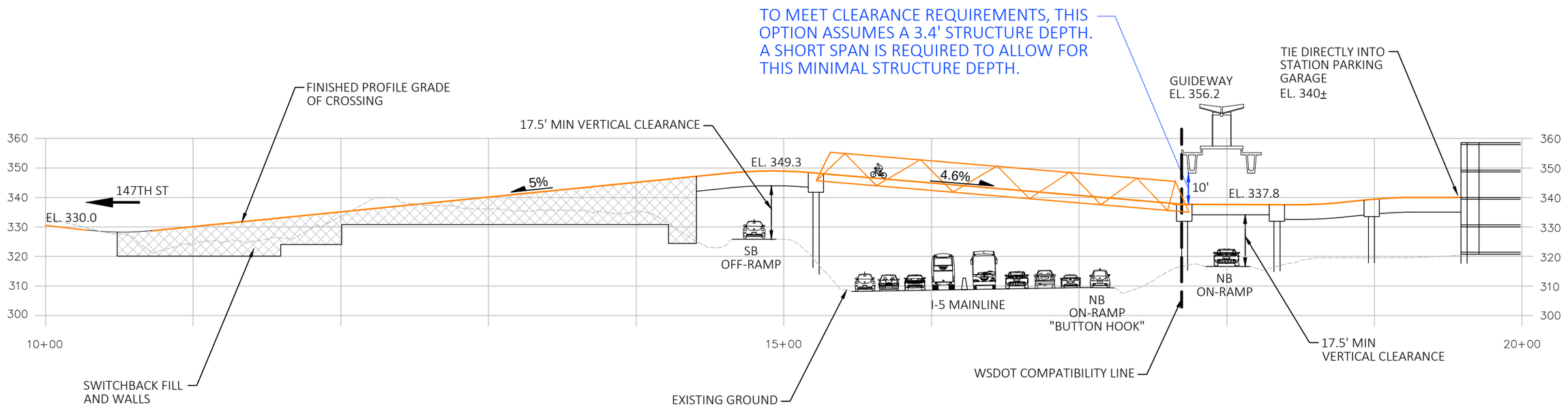
Profiles – Crossing Options



NOTES:
1. STEEL TRUSS STRUCTURE ASSUMED OVER I-5 DUE TO LENGTH OF SPAN.

2. FOR BRIDGE SPANS NOT OVER I-5, 4.5' STRUCTURE DEPTH ASSUMED BASED ON WSDOT BRIDGE DESIGN MANUAL

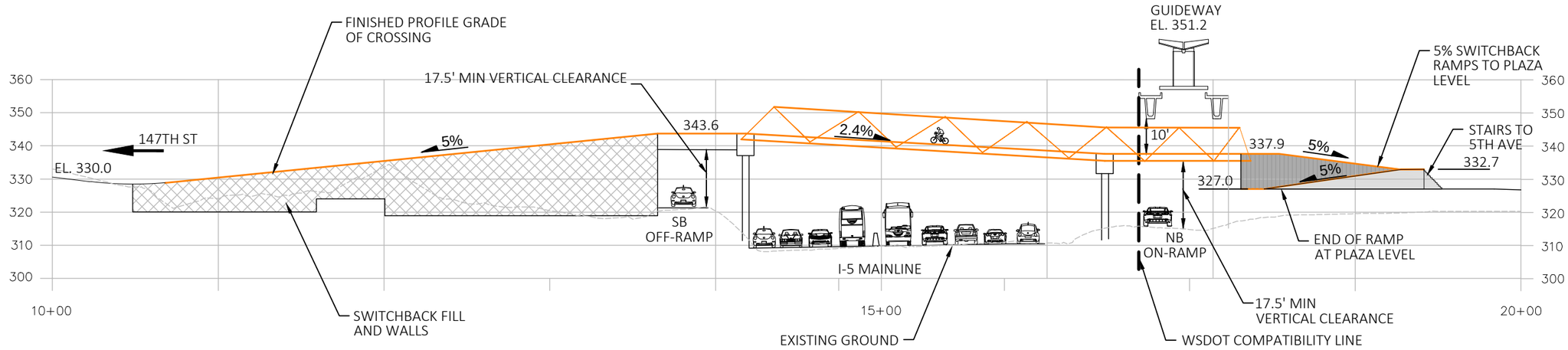
3. PROFILES AND PLANS ARE CONCEPTUAL LEVEL FOR THE PURPOSE OF GEOMETRIC FEASIBILITY STRUCTURE. SOILS AND UNDERGROUND CONDITIONS HAVE NOT BEEN STUDIED TO DETERMINE STRUCTURE TYPE AND OTHER FACTORS THAT MAY AFFECT THE FEASIBILITY.



NOTES:
1. STEEL TRUSS STRUCTURE ASSUMED OVER I-5 DUE TO LENGTH OF SPAN.

2. FOR BRIDGE SPANS NOT OVER I-5, 4.5' STRUCTURE DEPTH ASSUMED BASED ON WSDOT BRIDGE DESIGN MANUAL

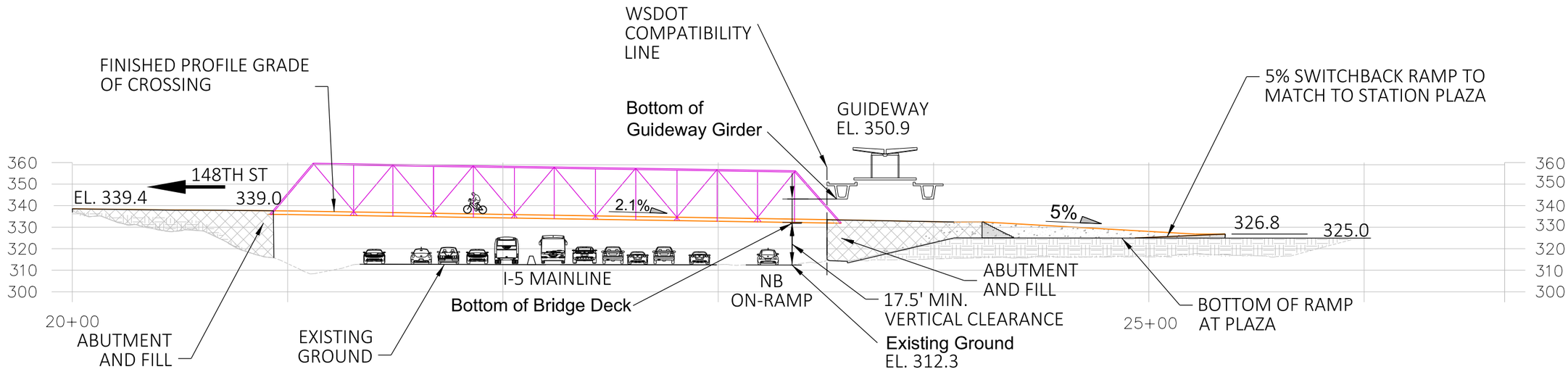
3. PROFILES AND PLANS ARE CONCEPTUAL LEVEL FOR THE PURPOSE OF GEOMETRIC FEASIBILITY STRUCTURE. SOILS AND UNDERGROUND CONDITIONS HAVE NOT BEEN STUDIED TO DETERMINE STRUCTURE TYPE AND OTHER FACTORS THAT MAY AFFECT THE FEASIBILITY.



NOTES:
1. STEEL TRUSS STRUCTURE ASSUMED OVER I-5 DUE TO LENGTH OF SPAN.

2. FOR BRIDGE SPANS NOT OVER I-5, 4.5' STRUCTURE DEPTH ASSUMED BASED ON WSDOT BRIDGE DESIGN MANUAL

3. PROFILES AND PLANS ARE CONCEPTUAL LEVEL FOR THE PURPOSE OF GEOMETRIC FEASIBILITY STRUCTURE. SOILS AND UNDERGROUND CONDITIONS HAVE NOT BEEN STUDIED TO DETERMINE STRUCTURE TYPE AND OTHER FACTORS THAT MAY AFFECT THE FEASIBILITY.



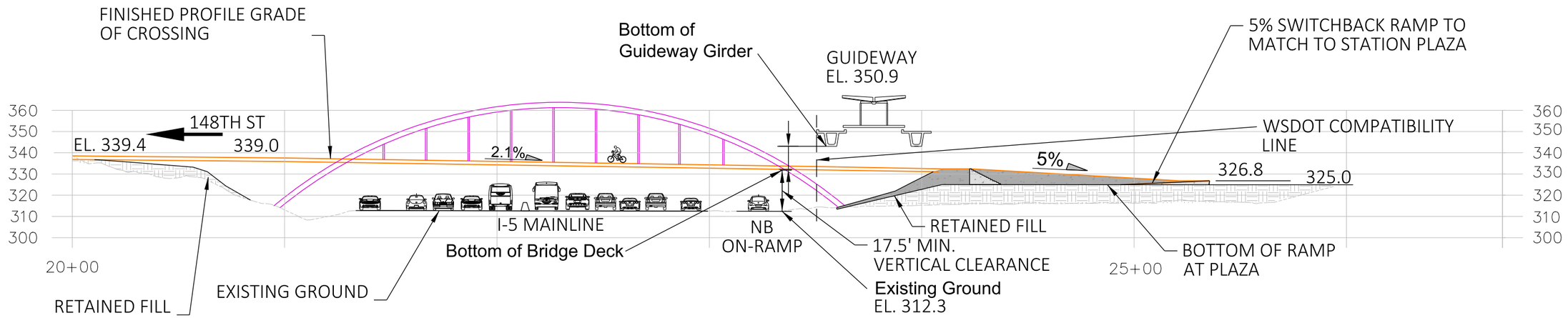
NOTES:

1. STEEL TRUSS STRUCTURE ASSUMED OVER I-5 DUE TO LENGTH OF SPAN. BRIDGE PIER OR ABUTMENT AT WSDOT COMPATIBILITY LINE.

2. PROFILES AND PLANS ARE CONCEPTUAL LEVEL FOR THE PURPOSE OF GEOMETRIC FEASIBILITY STRUCTURE. SOILS AND UNDERGROUND CONDITIONS HAVE NOT BEEN STUDIED TO DETERMINE STRUCTURE TYPE AND OTHER FACTORS THAT MAY AFFECT THE FEASIBILITY.

148th Street Refined Crossing Option - **TRUSS**
Non-motorized Crossing Option
FEASIBILITY STUDY
MAY 2017

ch2m



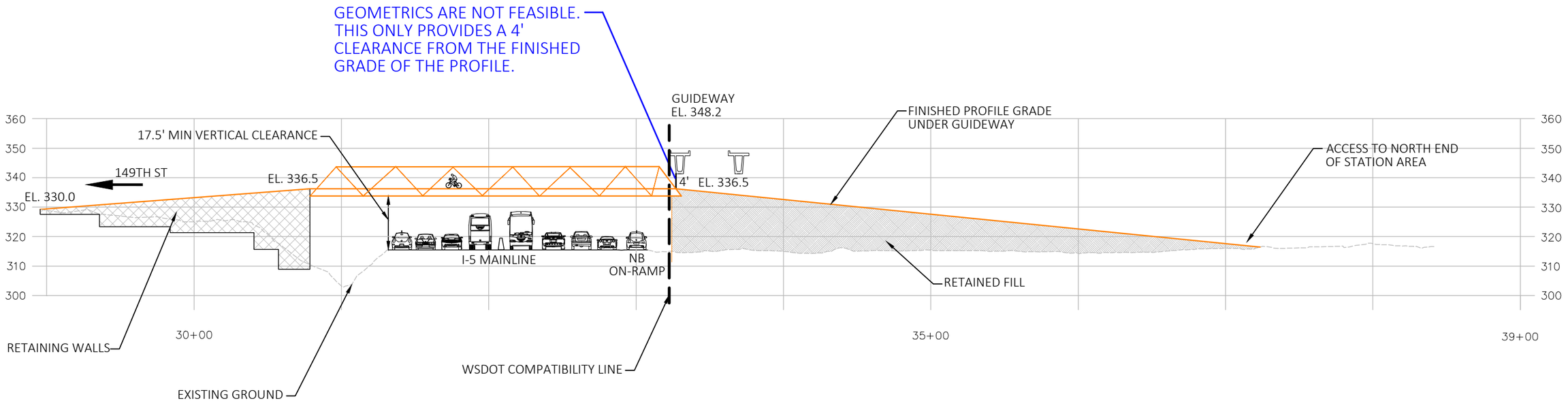
NOTES:
1. STEEL ARCH STRUCTURE ASSUMED OVER I-5 DUE TO LENGTH OF SPAN.

2. PROFILES AND PLANS ARE CONCEPTUAL LEVEL FOR THE PURPOSE OF GEOMETRIC FEASIBILITY STRUCTURE. SOILS AND UNDERGROUND CONDITIONS HAVE NOT BEEN STUDIED TO DETERMINE STRUCTURE TYPE AND OTHER FACTORS THAT MAY AFFECT THE FEASIBILITY.

148th Street Refined Crossing Option - **ARCH**
Non-motorized Crossing Option
FEASIBILITY STUDY

MAY 2017

ch2m



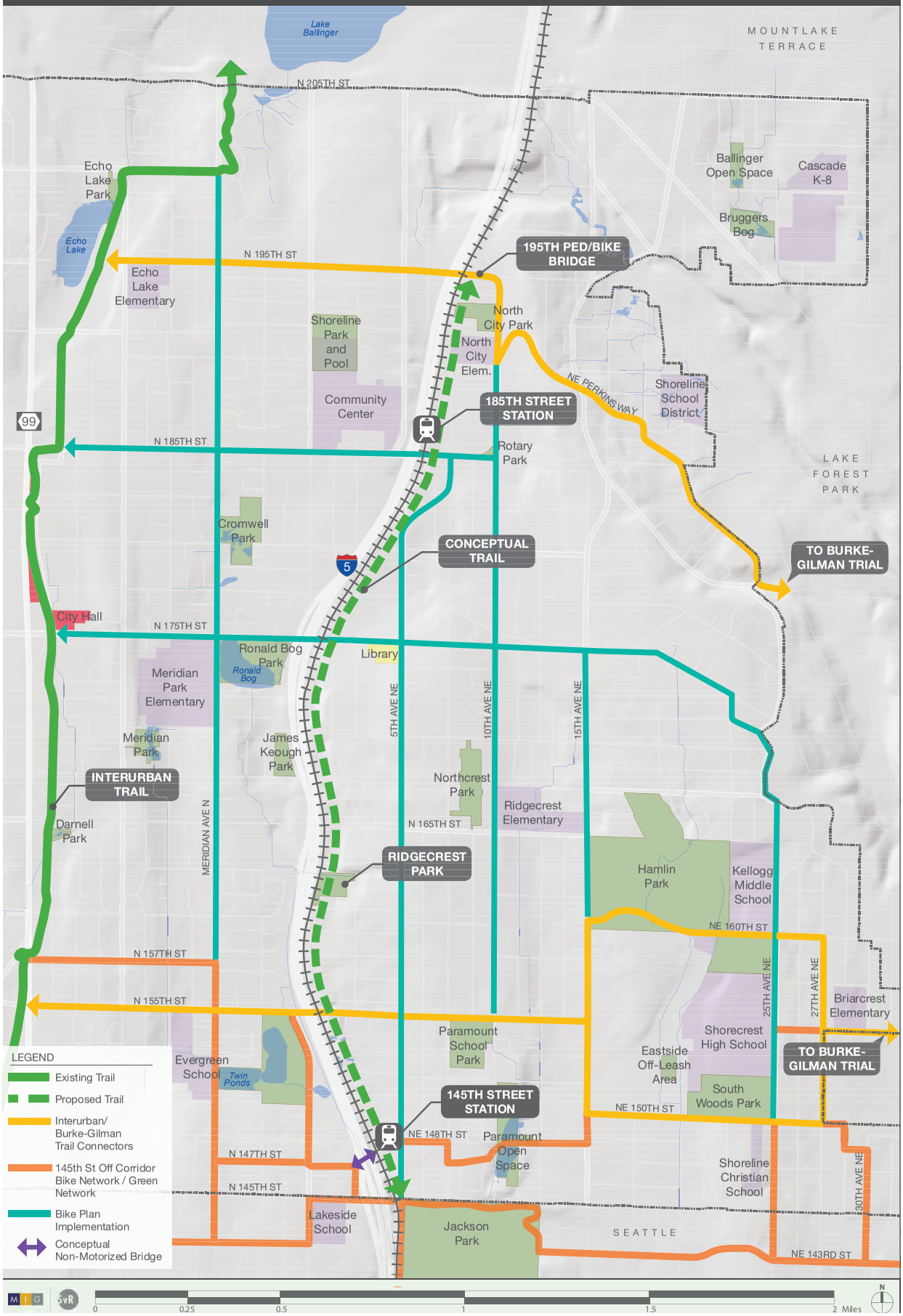
NOTES:
1. STEEL TRUSS STRUCTURE ASSUMED OVER I-5 DUE TO LENGTH OF SPAN.
2. FOR BRIDGE SPANS NOT OVER I-5, 4.5' STRUCTURE DEPTH ASSUMED BASED ON WSDOT BRIDGE DESIGN MANUAL
3. PROFILES AND PLANS ARE CONCEPTUAL LEVEL FOR THE PURPOSE OF GEOMETRIC FEASIBILITY STRUCTURE. SOILS AND UNDERGROUND CONDITIONS HAVE NOT BEEN STUDIED TO DETERMINE STRUCTURE TYPE AND OTHER FACTORS THAT MAY AFFECT THE FEASIBILITY.

Attachment D

Ped/Bike Connections Map

PEDESTRIAN / BIKE CONNECTIONS

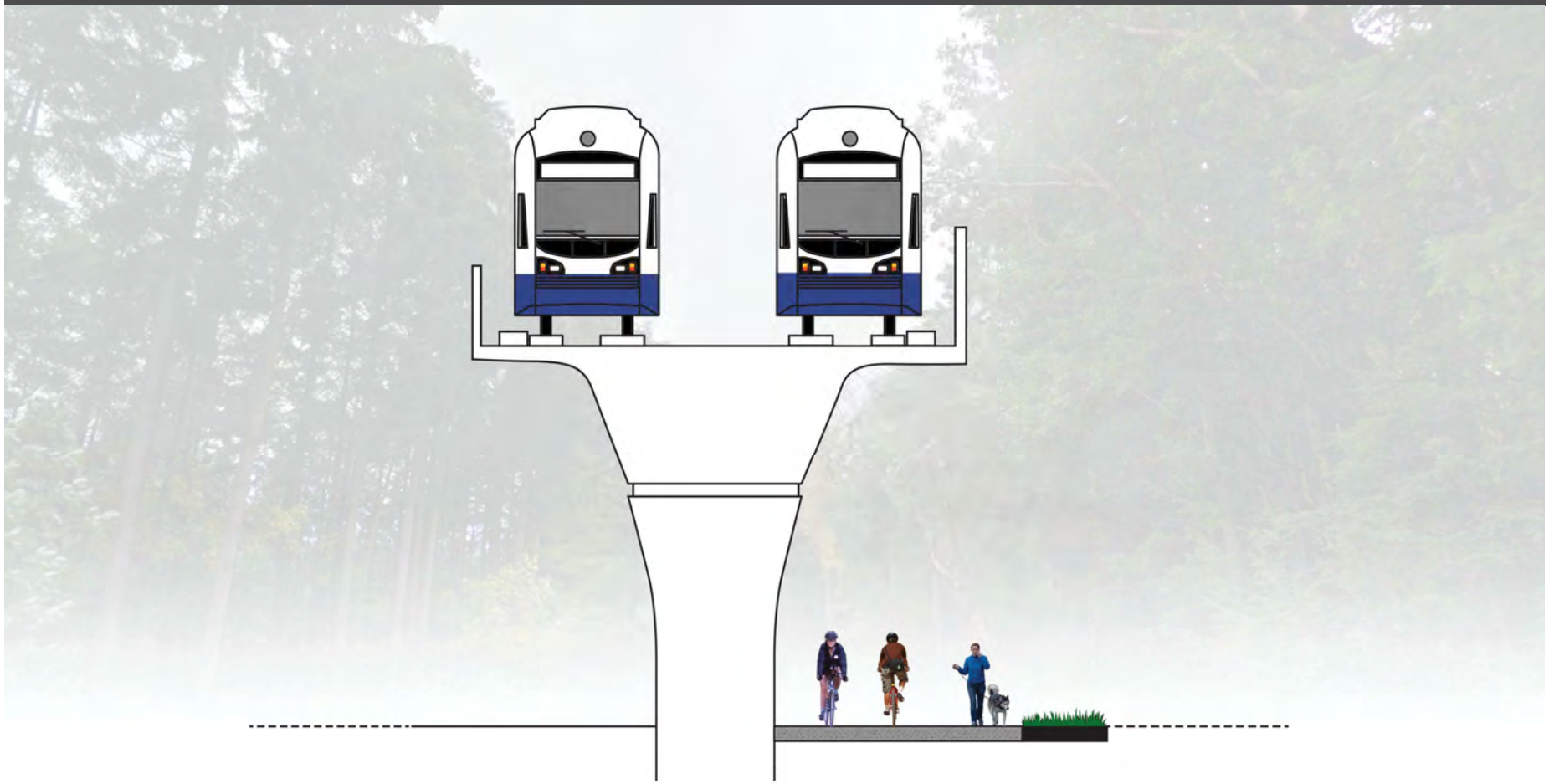
CITY OF SHORELINE



Attachment E

Trail Along the Rail Typical Section

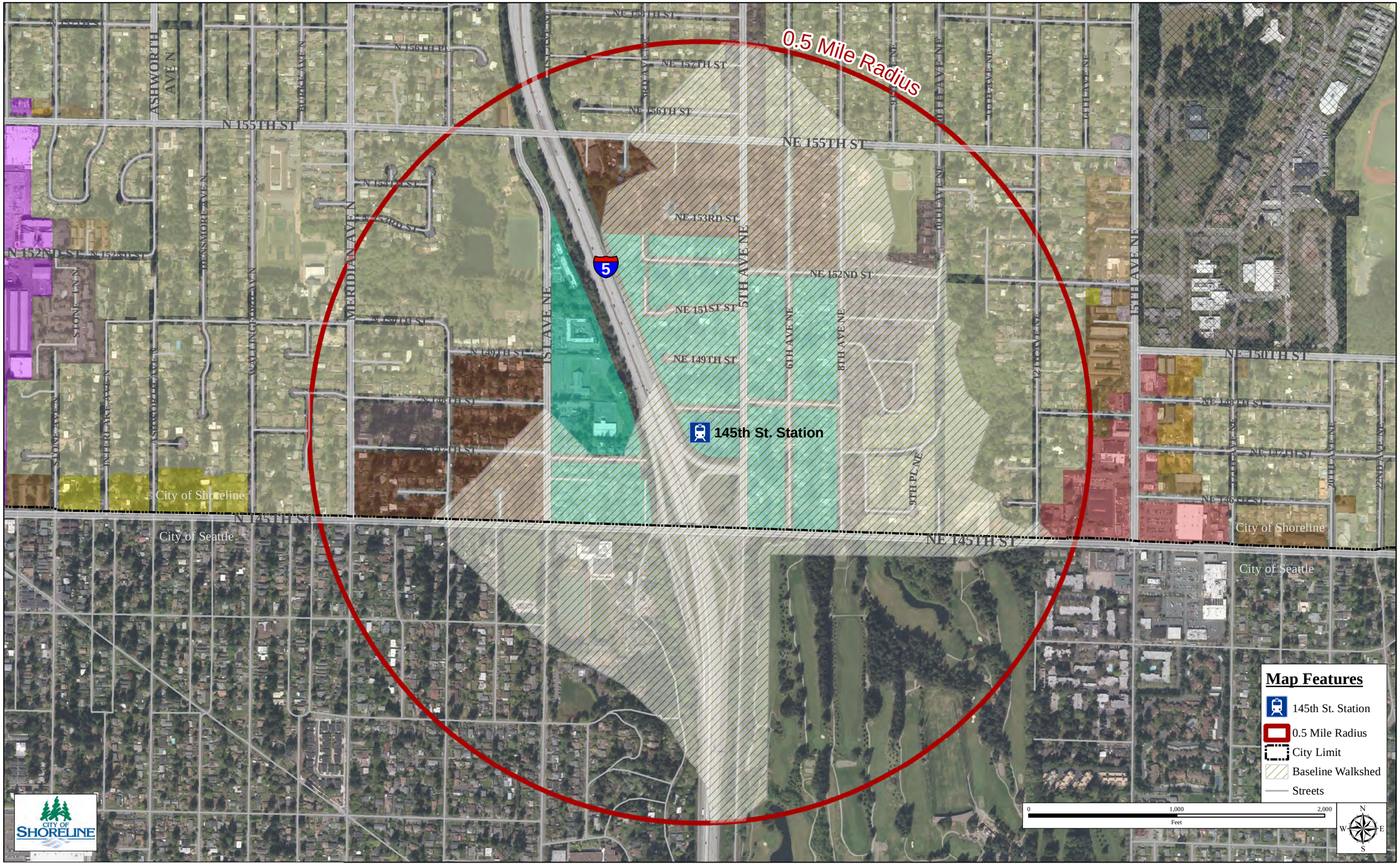
TRAIL UNDER RAIL



TRAIL ALONG THE RAIL

Attachment F

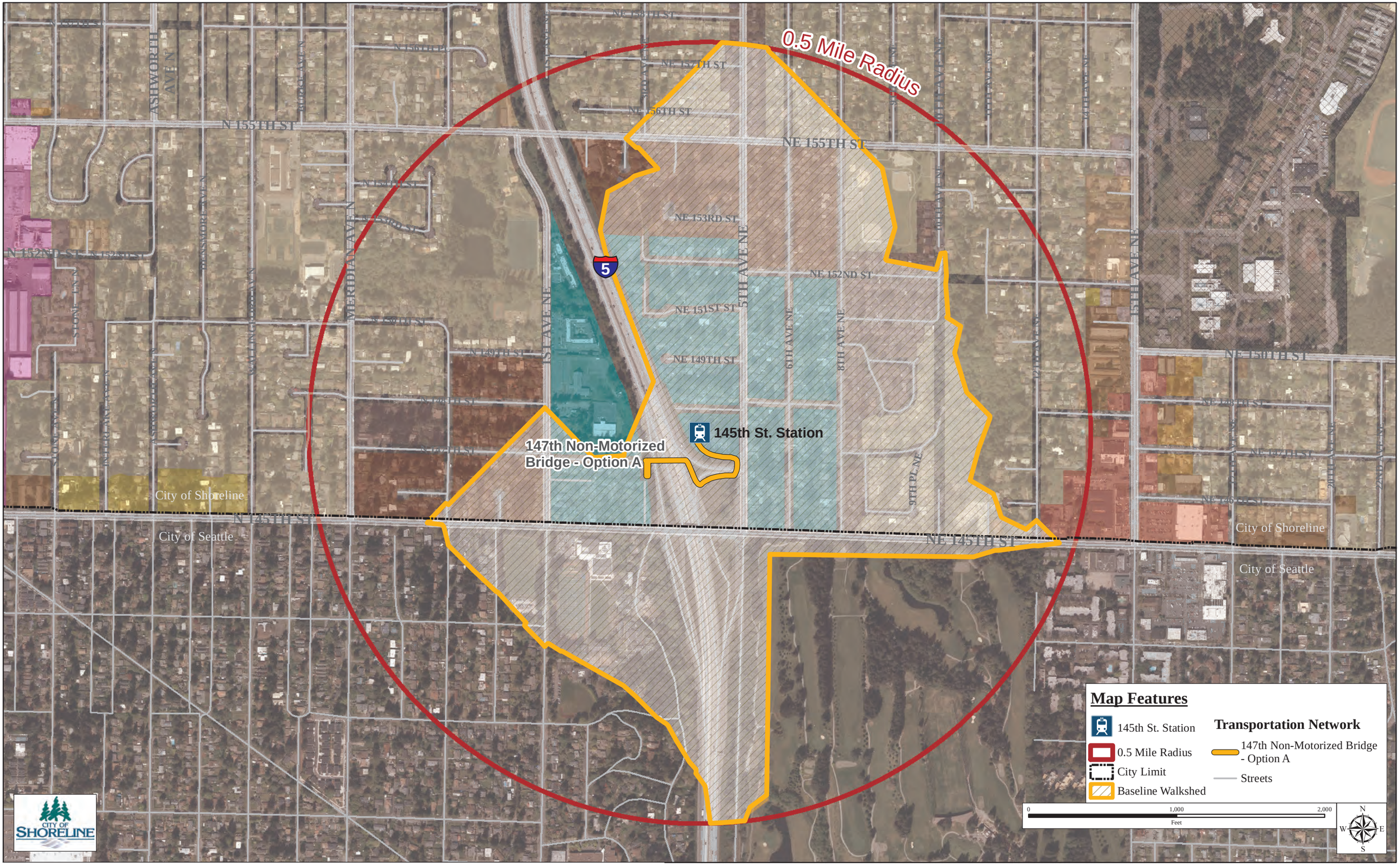
Walkshed Analysis Maps



Baseline Walkshed

145th St. Station Subarea Phase 1 Zoning

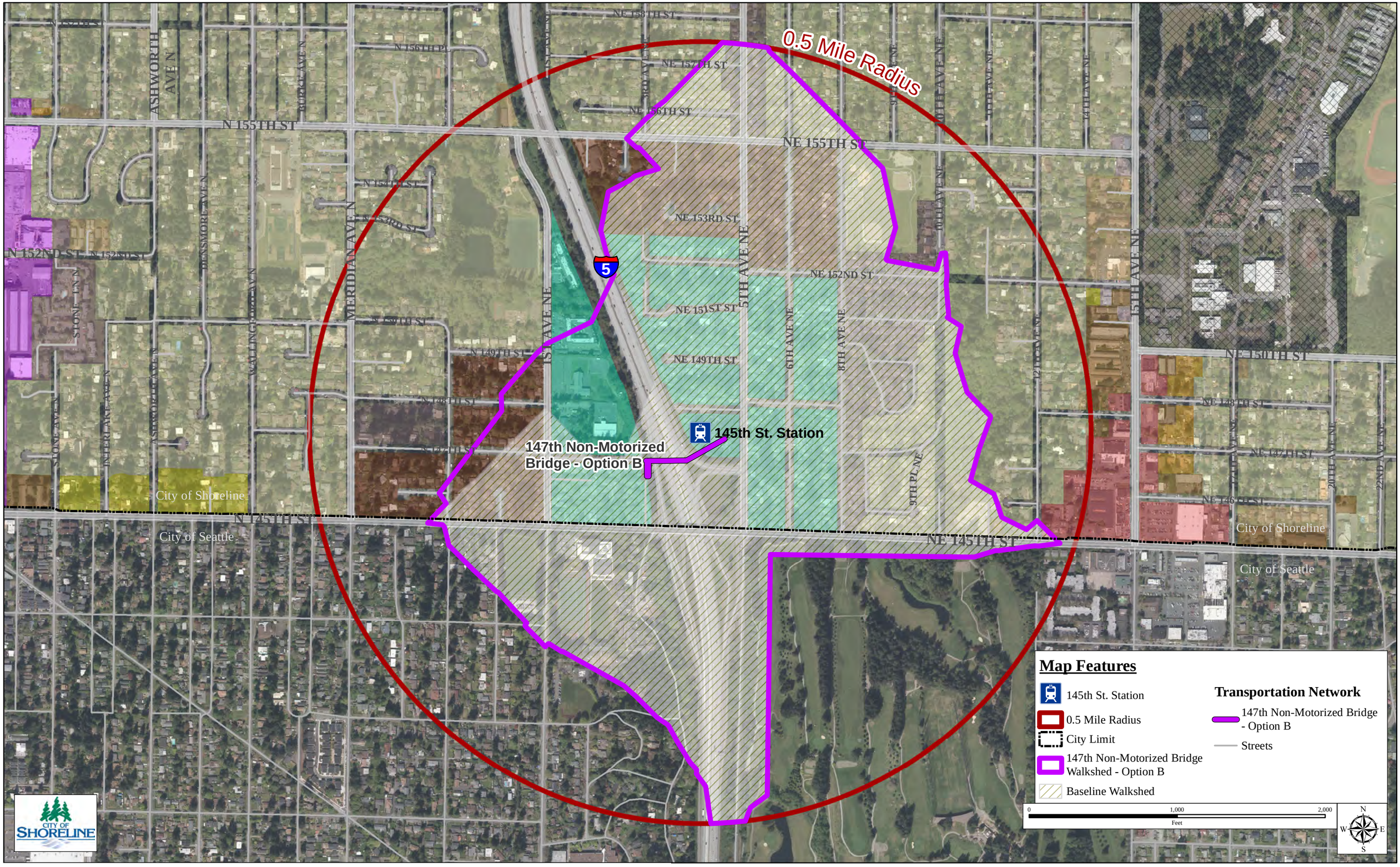
Date: 1/31/2017



147th St Non-Motorized Bridge Walkshed - Option A

145th St. Station Subarea Phase 1 Zoning

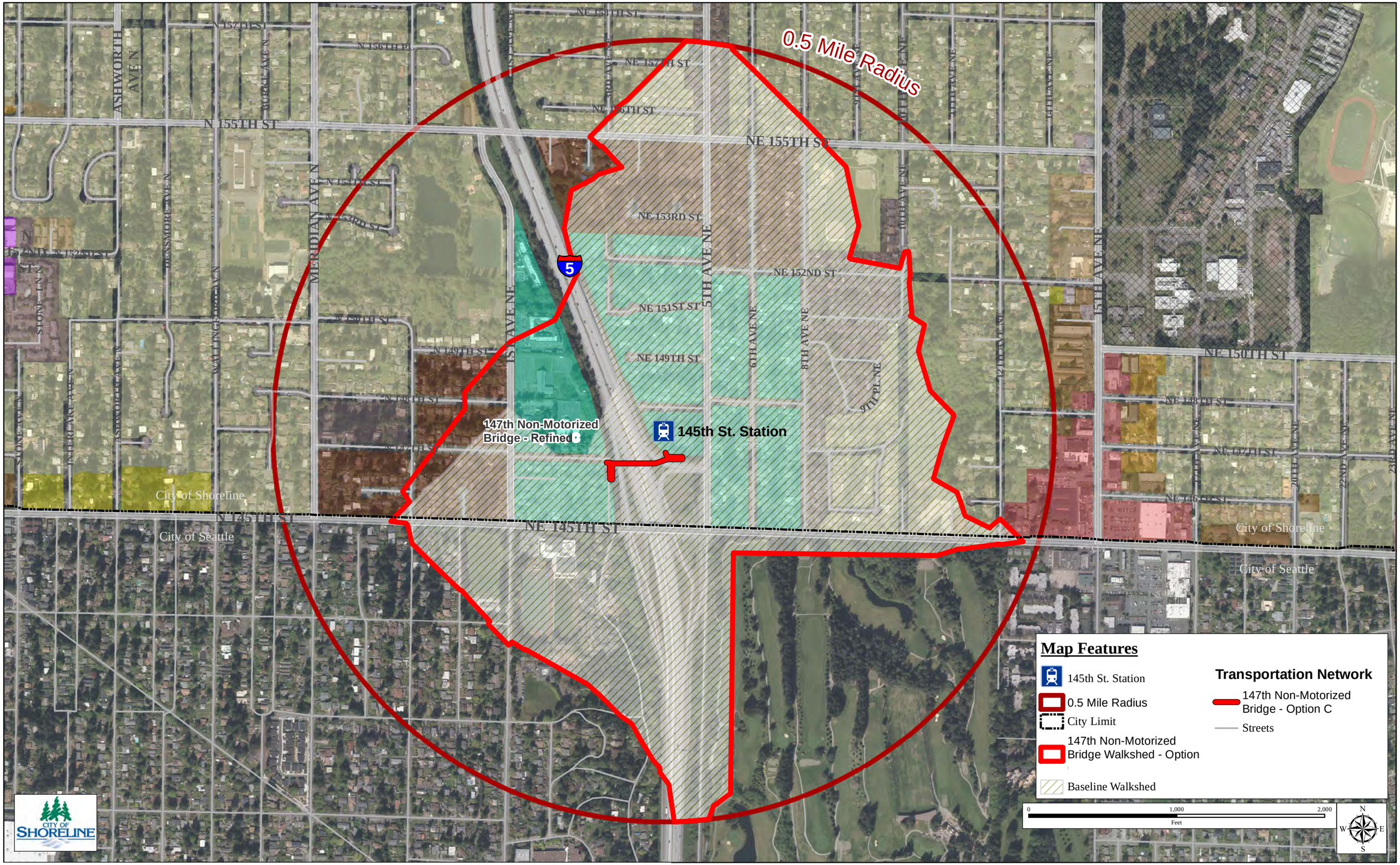
Date: 9/14/2017



147th St. Non-Motorized Bridge Walkshed - Option B

145th St. Station Subarea Phase 1 Zoning

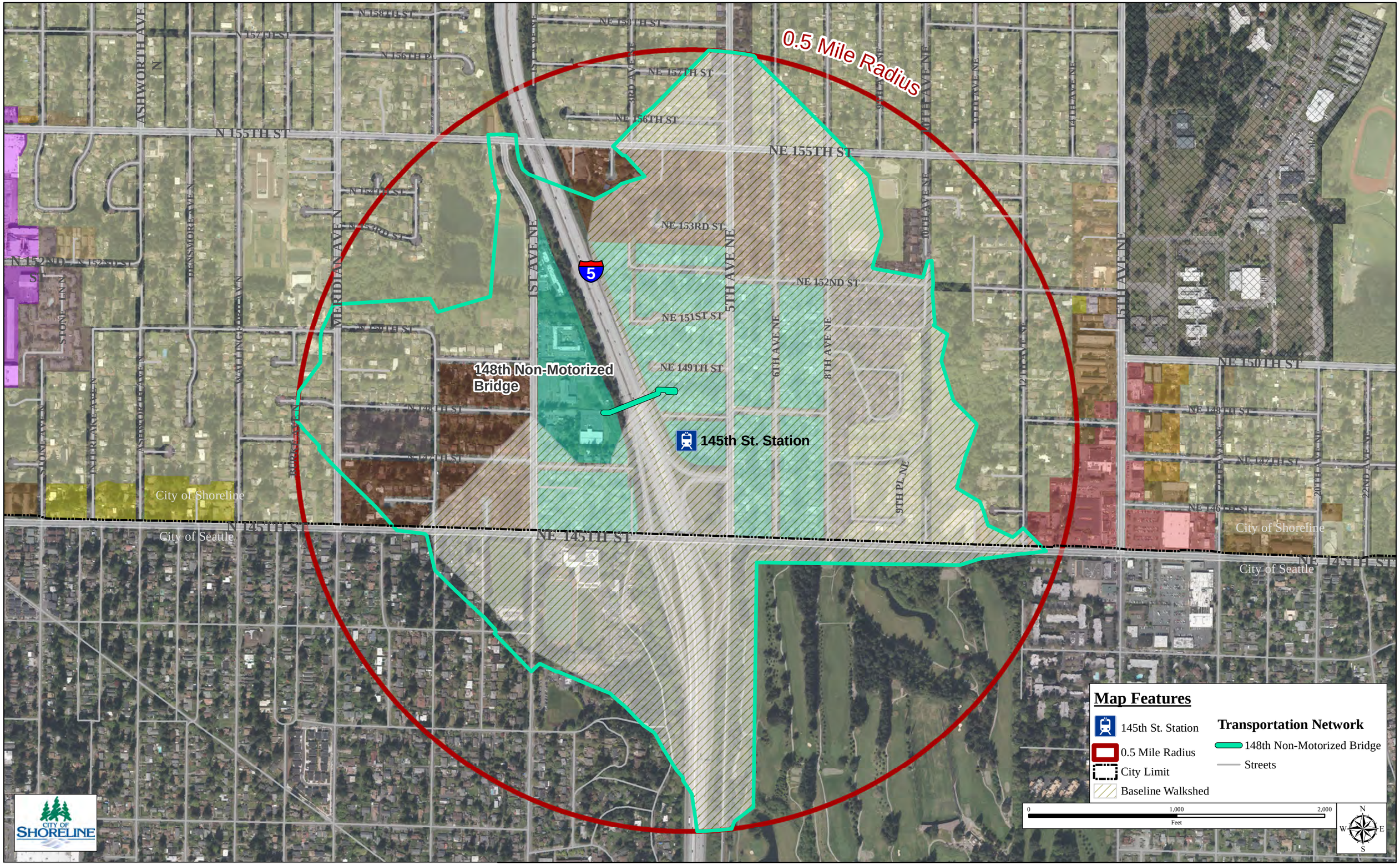
Date: 11/18/2016



147th St. Crossing Option C Walkshed

145th St. Station Subarea Phase 1 Zoning

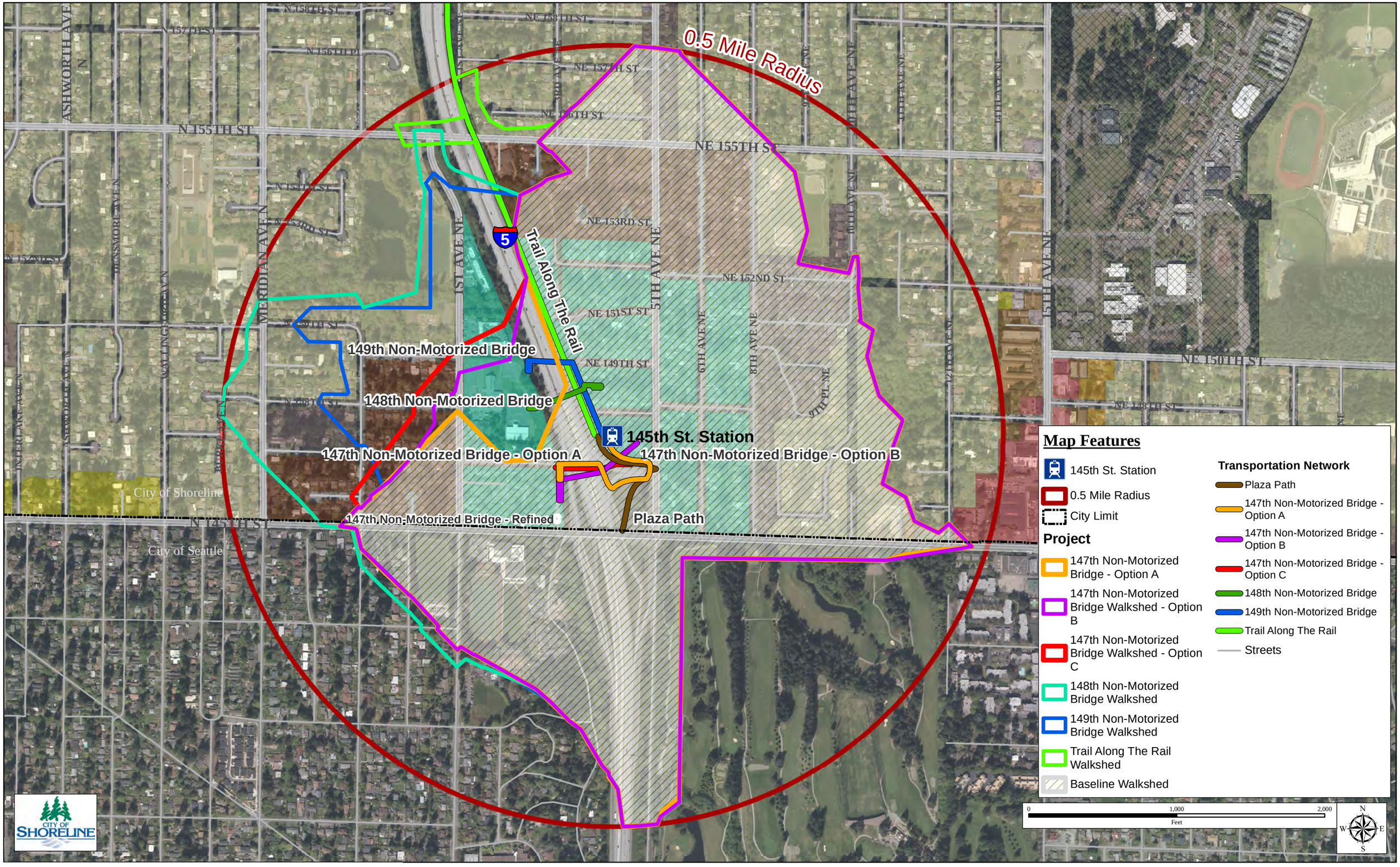
Date: 1/31/2017



148th St. Crossing Option Walkshed

145th St. Station Subarea Phase 1 Zoning

Date: 1/31/2017



Composite of Walksheds

145th St. Station Subarea Phase 1 Zoning

Date: 1/31/2017

Attachment G

Opinion of Cost Estimates

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	145th Street Station Pedestrian/Bike Access	Entered by:	GMS
Project ID:	147th Street Option A	Reviewed by:	JAM
Concept #:	1	Updated:	11/14/2016

	Cost	Risk Assessment	Contingency %	Contingency Amount	Total
I. Right of Way	$0	MEDIUM	30%	$ -	**$0**
II. Construction	$6,737,201	MEDIUM-HIGH	35%	$ 2,358,020.52	**$9,096,000**
III. Project Development	$2,762,253	MEDIUM-HIGH	35%	$ 966,788.41	**$3,730,000**
IV. Construction Management	$1,684,300	MEDIUM-HIGH	35%	$ 589,505.13	**$2,274,000**
V. Estimate of Probable Cost (2016)			**Subtotal**		**$15,100,000**

VI. Escalation		**Project Escalation**	**$2,412,000**
Year of cost index	2016		
Midpoint of Construction	2022		
Escalation Rate	**2.50%**		

TOTAL ESTIMATE OF PROBABLE COST	**$17,512,000**

See sheet 3 for Assumptions

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	147th Street Option A	Reviewed by:	JAM
Concept No.:	1	Updated:	11/14/2016

		Neighborhood:		Residential	
I.	**RIGHT OF WAY**	**Unit**	**Quantity**	**Unit Cost**	**Total**
1	Land Purchase (excludes full takes)	**SF**		$ 30.00	$0
2	Damage / Cure	**%**	10%	of line 1	$0
3	Partial Building Take	**SF**	-	$ 150.00	$0
4	Full Acquisitions (sum up of assessed values)	**LS**			$ -
5	Relocation	**EA**		$ 10,000.00	$0
6	Acquisition Admin. Costs (per Parcel)	**EA**		$ 3,000.00	$0
7	Condemnation Contingency (Estimated)		20%	of lines 1 through 6	$0
8	**Right of Way Sub-Total**				$0

II.	**CONSTRUCTION**	**Unit**	**Quantity**	**Unit Cost**	**Total**
9	Demolition/Clearing	**SF**	30,000	$ 1.00	$30,000
10	Gravel Borrow	**TON**	7,708	$ 20.00	$154,167
11	Bridge Demolition & Disposal	**SF**		$ 60.00	$0
12	Pedestrian Bridge - Steel Truss	**SF**	3,000.00	$ 550.00	$1,650,000
13	Pedestrian Bridge - Concrete	**SF**	3,750.00	$ 400.00	$1,500,000
14	Curb Ramps	**EA**	6	$ 2,900.00	$17,400
15	New Pavement - HMA	**LANE-MILE**		$ 480,000.00	$0
16	Pavement Overlay	**LANE-MILE**		$ 150,000.00	$0
17	Asphalt Path	**SY**	871	$ 20.00	$17,422
18	Sidewalks	**SY**	596	$ 60.00	$35,733
19	Curb and Gutter	**LF**	670	$ 25.00	$16,750
20	Walls - Cut (Soil Nail)	**LF**		$ 100.00	$0
21	Walls - Fill (MSE)	**SF**	6,800	$ 50.00	$340,000
22	Drainage / Stormwater	**LANE-MILE**	0.34	$ 180,000.00	$61,364
23	Stormwater Management	**LANE-MILE**	0.34	$ 160,000.00	$54,545
24	Utility Modifications	**LS**	1	$ 30,000.00	$30,000
25	Utility Undergrounding (SCL)	**LF**		$ 770.00	$0
26	Landscaping	**SY**	556	$ 70.00	$38,889
27	Traffic Signal New	**EA**		$ 340,000.00	$0
28	Traffic Signal Modification	**EA**		$ 150,000.00	$0
29	Channelization / Signing	**LANE-MILE**	0.25	$ 25,000.00	$6,345
30	Illumination	**MILE**	0.34	$ 500,000.00	$170,455
31	TESC	**LS**	3%	of lines 9 through 29	$123,692
32	*Railing*	**LF**	1,800.00	$ 150.00	$270,000
33	*user custom*			$ -	$0
34	*user custom*			$ -	$0
35	*user custom*			$ -	$0
36	Construction Traffic Control	**%**	13%	of lines 9 through 35	$587,179
37	Miscellaneous / Allowance	**%**	20%	of lines 9 through 36	$1,020,788
38	Mobilization	**%**	10%	of lines 9 through 37	$612,472.86
39	WA State Sales Tax (Non-city utilities)	**%**	10%	of line 23 & 24	$0
40	**Construction Sub-Total**				$6,737,201

Assumptions listed on next page

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include escalation, financial costs, or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	147th Street Option A	Reviewed by:	JAM
Concept No.:	1	Updated:	11/14/2016

	III. Project Development	Unit	Quantity	Unit Cost	Total	
41	PE and Environmental Documentation	%	5%	of line 40	$336,860	$437,918.10
42	Design Engineering	%	20%	of line 40	$1,347,440	
43	Agency Administration	%	12%	of line 40	$808,464	
44	Public Art	%	2%	of line 40	$134,744	
45	Community Engagement	%	2%	of line 40	$134,744	
46				of line 40	$0	
47	**Project Development Sub-Total**				$2,762,253	

	IV. Construction Management	Unit	Quantity	Unit Cost	Total
48	Construction Management	%	25%	of line 40	$1,684,300
49	*user custom*			of line 40	$0
50	*user custom*			of line 40	$0
51	Monitoring agreement cost	%		of line 40	$0
52	**Construction Management Sub-Total**				$1,684,300

Assumptions:

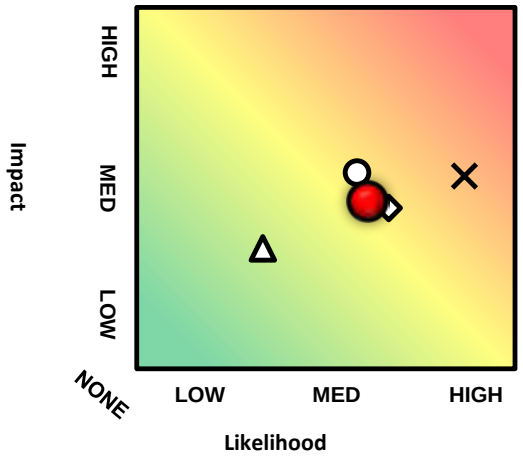
* based on conceptual layout 147th Crossing Option A
* assumes steel truss bridge over I-5, pre-fabricated and delivered to site
* assumes new sidewalks on 147th Street from 1st Ave NE to the I-5 SB off-ramp
* does not include costs for detailed architecture, special fabrication, or special art features

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include escalation, financial costs, or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	147th Street Option A	Reviewed by:	JAM
Concept No.:	1	Updated:	11/14/2016

Risk Considerations	Likelihood	Impact	Risk Assesment
Environmental Permitting			**MEDIUM-HIGH**
Presence of wetlands	Med	Low	LOW
Impacts to ecological sensitive areas	Low	Low	LOW
Multi-agency approvals needed	High	Med	HIGH
Design and Construction			**MEDIUM-HIGH**
Unknown soil conditions	Med	Low	LOW
Contaminated soils	Low	Med	LOW
Unknown utilities	High	Med	HIGH
Underground utility project elements	Low	Low	LOW
Significant structures	High	High	HIGH
Work within water table	Low	Low	LOW
Little project definition, many unknowns	High	High	HIGH
New technology	None	None	NONE
Right of Way			**MEDIUM**
Significant property impacts	Low	Low	LOW
Other Factors			**MEDIUM-HIGH**
Project scope affected by other projects	High	Med	HIGH
Controversial project	Med	Low	LOW
Multi-jurisdictional project	High	Med	HIGH
Federal funding	High	Med	HIGH
Time constraint	Med	Low	LOW



Risk Matrix

- Environmental Permitting
- Design and Construction
- Right of Way
- Other Factors
- Aggregate Project Risk

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	145th Street Station Pedestrian/Bike Access	Entered by:	GMS
Project ID:	147th Street Option B	Reviewed by:	JAM
Concept #:		Updated:	11/14/2016

	Cost	Risk Assessment	Contingency %	Contingency Amount	Total
I. Right of Way	$0	MEDIUM	30%	$ -	**$0**
II. Construction	$7,230,051	MEDIUM-HIGH	35%	$ 2,530,517.77	**$9,761,000**
III. Project Development	$2,964,321	MEDIUM-HIGH	35%	$ 1,037,512.29	**$4,002,000**
IV. Construction Management	$1,807,513	MEDIUM-HIGH	35%	$ 632,629.44	**$2,441,000**
V. Estimate of Probable Cost (2016)			**Subtotal**		**$16,204,000**

VI. Escalation		**Project Escalation**	**$2,588,000**
Year of cost index	2016		
Midpoint of Construction	2022		
Escalation Rate	**2.50%**		

TOTAL ESTIMATE OF PROBABLE COST	**$18,792,000**

See sheet 3 for Assumptions

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	147th Street Option B	Reviewed by:	JAM
Concept No.:	0	Updated:	11/14/2016

		Neighborhood:		Residential	
I.	**RIGHT OF WAY**	**Unit**	**Quantity**	**Unit Cost**	**Total**
1	Land Purchase (excludes full takes)	**SF**		$ 30.00	$0
2	Damage / Cure	**%**	10%	of line 1	$0
3	Partial Building Take	**SF**	-	$ 150.00	$0
4	Full Acquisitions (sum up of assessed values)	**LS**			$ -
5	Relocation	**EA**		$ 10,000.00	$0
6	Acquisition Admin. Costs (per Parcel)	**EA**		$ 3,000.00	$0
7	Condemnation Contingency (Estimated)		20%	of lines 1 through 6	$0
8	**Right of Way Sub-Total**				$0

II.	**CONSTRUCTION**	**Unit**	**Quantity**	**Unit Cost**	**Total**
9	Demolition/Clearing	**SF**	22,000	$ 1.00	$22,000
10	Gravel Borrow	**TON**	4,988	$ 20.00	$99,763
11	Bridge Demolition & Disposal	**SF**		$ 60.00	$0
12	Pedestrian Bridge - Steel Truss	**SF**	3,300.00	$ 550.00	$1,815,000
13	Pedestrian Bridge - Concrete	**SF**	4,500.00	$ 400.00	$1,800,000
14	Curb Ramps	**EA**	6	$ 2,900.00	$17,400
15	New Pavement - HMA	**LANE-MILE**		$ 480,000.00	$0
16	Pavement Overlay	**LANE-MILE**		$ 150,000.00	$0
17	Asphalt Path	**SY**	622	$ 20.00	$12,444
18	Sidewalks	**SY**	596	$ 60.00	$35,733
19	Curb and Gutter	**LF**	670	$ 25.00	$16,750
20	Walls - Cut (Soil Nail)	**LF**		$ 100.00	$0
21	Walls - Fill (MSE)	**SF**	5,750	$ 50.00	$287,500
22	Drainage / Stormwater	**LANE-MILE**	0.34	$ 180,000.00	$61,364
23	Stormwater Management	**LANE-MILE**	0.34	$ 160,000.00	$54,545
24	Utility Modifications	**LS**	1	$ 30,000.00	$30,000
25	Utility Undergrounding (SCL)	**LF**		$ 770.00	$0
26	Landscaping	**SY**	-	$ 70.00	$0
27	Traffic Signal New	**EA**		$ 340,000.00	$0
28	Traffic Signal Modification	**EA**		$ 150,000.00	$0
29	Channelization / Signing	**LANE-MILE**	0.25	$ 25,000.00	$6,345
30	Illumination	**MILE**	0.34	$ 500,000.00	$170,455
31	TESC	**LS**	3%	of lines 9 through 29	$132,879
32	*Railing*	**LF**	1,900.00	$ 150.00	$285,000
33	*user custom*			$ -	$0
34	*user custom*			$ -	$0
35	*user custom*			$ -	$0
36	Construction Traffic Control	**%**	13%	of lines 9 through 35	$630,133
37	Miscellaneous / Allowance	**%**	20%	of lines 9 through 36	$1,095,462
38	Mobilization	**%**	10%	of lines 9 through 37	$657,277.34
39	WA State Sales Tax (Non-city utilities)	**%**	10%	of line 23 & 24	$0
40	**Construction Sub-Total**				$7,230,051

Assumptions listed on next page

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include escalation, financial costs, or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	147th Street Option B	Reviewed by:	JAM
Concept No.:	0	Updated:	11/14/2016

	III. Project Development	Unit	Quantity	Unit Cost	Total	
41	PE and Environmental Documentation	%	5%	of line 40	$361,503	$469,953.30
42	Design Engineering	%	20%	of line 40	$1,446,010	
43	Agency Administration	%	12%	of line 40	$867,606	
44	Public Art	%	2%	of line 40	$144,601	
45	Community Engagement	%	2%	of line 40	$144,601	
46				of line 40	$0	
47	**Project Development Sub-Total**				$2,964,321	

	IV. Construction Management	Unit	Quantity	Unit Cost	Total
48	Construction Management	%	25%	of line 40	$1,807,513
49	*user custom*			of line 40	$0
50	*user custom*			of line 40	$0
51	Monitoring agreement cost	%		of line 40	$0
52	**Construction Management Sub-Total**				$1,807,513

Assumptions:

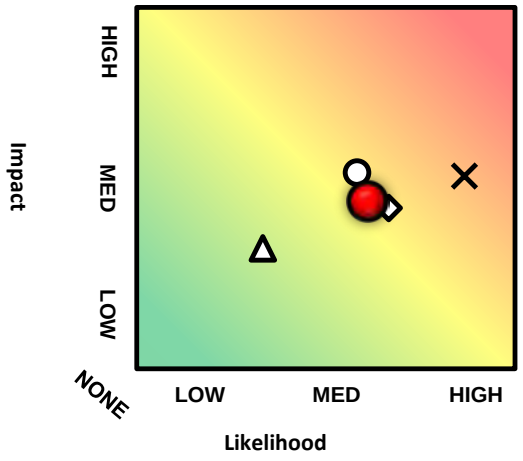
* based on conceptual layout 147th Crossing Option B, November 2016
* assumes steel truss bridge over I-5, pre-fabricated and delivered to site
* assumes new sidewalks on 147th Street from 1st Ave NE to the I-5 SB off-ramp
* assumes new illumination on 147th Street from 1st Ave NE to the I-5 SB off-ramp
* does not include costs for detailed architecture, special fabrication, or special art features
* assumes direct connection to the light rail station parking garage structure. No additional costs are included for building modification.

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include escalation, financial costs, or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	147th Street Option B	Reviewed by:	JAM
Concept No.:	0	Updated:	11/14/2016

Risk Considerations	Likelihood	Impact	Risk Assesment
Environmental Permitting			**MEDIUM-HIGH**
Presence of wetlands	Med	Low	LOW
Impacts to ecological sensitive areas	Low	Low	LOW
Multi-agency approvals needed	High	Med	HIGH
Design and Construction			**MEDIUM-HIGH**
Unknown soil conditions	Med	Low	LOW
Contaminated soils	Low	Med	LOW
Unknown utilities	High	Med	HIGH
Underground utility project elements	Low	Low	LOW
Significant structures	High	High	HIGH
Work within water table	Low	Low	LOW
Little project definition, many unknowns	High	High	HIGH
New technology	None	None	NONE
Right of Way			**MEDIUM**
Significant property impacts	Low	Low	LOW
Other Factors			**MEDIUM-HIGH**
Project scope affected by other projects	High	Med	HIGH
Controversial project	Med	Low	LOW
Multi-jurisdictional project	High	Med	HIGH
Federal funding	High	Med	HIGH
Time constraint	Med	Low	LOW



Risk Matrix

- Environmental Permitting
- Design and Construction
- Right of Way
- Other Factors
- Aggregate Project Risk

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	145th Street Station Pedestrian/Bike Access	Entered by:	GMS
Project ID:	147th Street Option C	Reviewed by:	JAM
Concept #:	1	Updated:	3/27/2017

	Cost	Risk Assessment	Contingency %	Contingency Amount	Total
I. Right of Way	$0	MEDIUM	30%	$ -	**$0**
II. Construction	$6,420,674	MEDIUM-HIGH	35%	$ 2,247,235.97	**$8,668,000**
III. Project Development	$2,632,476	MEDIUM-HIGH	35%	$ 921,366.75	**$3,554,000**
IV. Construction Management	$1,605,169	MEDIUM-HIGH	35%	$ 561,808.99	**$2,167,000**
V. Estimate of Probable Cost (2016)			**Subtotal**		**$14,389,000**
VI. Escalation			**Project Escalation**		**$2,298,000**
Year of cost index	2016				
Midpoint of Construction	2022				
Escalation Rate	**2.50%**				
TOTAL ESTIMATE OF PROBABLE COST					**$16,687,000**

See sheet 3 for Assumptions

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	147th Street Option C	Reviewed by:	JAM
Concept No.:	1	Updated:	3/27/2017

		Neighborhood:		Residential	
I.	**RIGHT OF WAY**	**Unit**	**Quantity**	**Unit Cost**	**Total**
1	Land Purchase (excludes full takes)	**SF**		$ 30.00	$0
2	Damage / Cure	**%**	10%	of line 1	$0
3	Partial Building Take	**SF**	-	$ 150.00	$0
4	Full Acquisitions (sum up of assessed values)	**LS**			$ -
5	Relocation	**EA**		$ 10,000.00	$0
6	Acquisition Admin. Costs (per Parcel)	**EA**		$ 3,000.00	$0
7	Condemnation Contingency (Estimated)		20%	of lines 1 through 6	$0
8	**Right of Way Sub-Total**				$0

II.	**CONSTRUCTION**	**Unit**	**Quantity**	**Unit Cost**	**Total**
9	Demolition/Clearing	**SF**	24,000	$ 1.00	$24,000
10	Gravel Borrow	**TON**	5,653	$ 20.00	$113,056
11	Bridge Demolition & Disposal	**SF**		$ 60.00	$0
12	Pedestrian Bridge - Steel Truss	**SF**	4,650.00	$ 550.00	$2,557,500
13	Pedestrian Bridge - Concrete	**SF**	750.00	$ 400.00	$300,000
14	Curb Ramps	**EA**	6	$ 2,900.00	$17,400
15	New Pavement - HMA	**LANE-MILE**		$ 480,000.00	$0
16	Pavement Overlay	**LANE-MILE**		$ 150,000.00	$0
17	Asphalt Path	**SY**	622	$ 20.00	$12,444
18	Sidewalks	**SY**	596	$ 60.00	$35,733
19	Curb and Gutter	**LF**	670	$ 25.00	$16,750
20	Walls - Cut (Soil Nail)	**LF**		$ 100.00	$0
21	Walls - Fill (MSE)	**SF**	9,280	$ 50.00	$464,000
22	Drainage / Stormwater	**LANE-MILE**	0.34	$ 180,000.00	$61,364
23	Stormwater Management	**LANE-MILE**	0.34	$ 160,000.00	$54,545
24	Utility Modifications	**LS**	1	$ 30,000.00	$30,000
25	Utility Undergrounding (SCL)	**LF**		$ 770.00	$0
26	Landscaping	**SY**	556	$ 70.00	$38,889
27	Traffic Signal New	**EA**		$ 340,000.00	$0
28	Traffic Signal Modification	**EA**		$ 150,000.00	$0
29	Channelization / Signing	**LANE-MILE**	0.25	$ 25,000.00	$6,345
30	Illumination	**MILE**	0.34	$ 500,000.00	$170,455
31	TESC	**LS**	3%	of lines 9 through 29	$117,074
32	*Railing*	**LF**	1,900.00	$ 150.00	$285,000
33	*user custom*			$ -	$0
34	*user custom*			$ -	$0
35	*user custom*			$ -	$0
36	Construction Traffic Control	**%**	13%	of lines 9 through 35	$559,592
37	Miscellaneous / Allowance	**%**	20%	of lines 9 through 36	$972,829
38	Mobilization	**%**	10%	of lines 9 through 37	$583,697.65
39	WA State Sales Tax (Non-city utilities)	**%**	10%	of line 23 & 24	$0
40	**Construction Sub-Total**				$6,420,674

Assumptions listed on next page

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include escalation, financial costs, or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	147th Street Option C	Reviewed by:	JAM
Concept No.:	1	Updated:	3/27/2017

	III. Project Development	Unit	Quantity	Unit Cost	Total
41	PE and Environmental Documentation	%	5%	of line 40	$321,034
42	Design Engineering	%	20%	of line 40	$1,284,135
43	Agency Administration	%	12%	of line 40	$770,481
44	Public Art	%	2%	of line 40	$128,413
45	Community Engagement	%	2%	of line 40	$128,413
46				of line 40	$0
47	**Project Development Sub-Total**				$2,632,476

	IV. Construction Management	Unit	Quantity	Unit Cost	Total
48	Construction Management	%	25%	of line 40	$1,605,169
49	*user custom*			of line 40	$0
50	*user custom*			of line 40	$0
51	Monitoring agreement cost	%		of line 40	$0
52	**Construction Management Sub-Total**				$1,605,169

Assumptions:

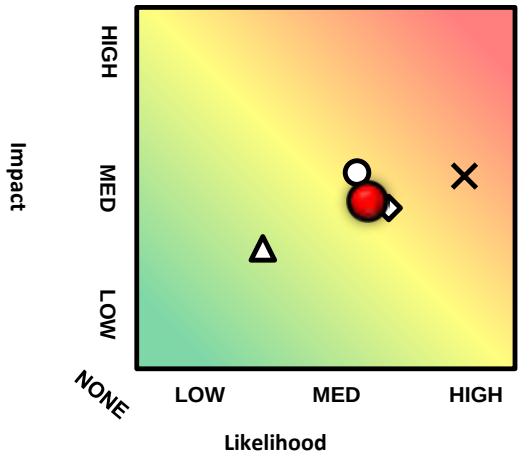
* based on conceptual layout 147th Crossing Option C, January 2017
* assumes steel truss bridge over I-5, pre-fabricated and delivered to site
* assumes new sidewalks on 147th Street from 1st Ave NE to the I-5 SB off-ramp
* does not include costs for detailed architecture, special fabrication, or special art features
* includes switchback, walls, and landing south of the LRT Station

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include escalation, financial costs, or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	147th Street Option C	Reviewed by:	JAM
Concept No.:	1	Updated:	3/27/2017

Risk Considerations	Likelihood	Impact	Risk Assesment
Environmental Permitting			**MEDIUM-HIGH**
Presence of wetlands	Med	Low	LOW
Impacts to ecological sensitive areas	Low	Low	LOW
Multi-agency approvals needed	High	Med	HIGH
Design and Construction			**MEDIUM-HIGH**
Unknown soil conditions	Med	Low	LOW
Contaminated soils	Low	Med	LOW
Unknown utilities	High	Med	HIGH
Underground utility project elements	Low	Low	LOW
Significant structures	High	High	HIGH
Work within water table	Low	Low	LOW
Little project definition, many unknowns	High	High	HIGH
New technology	None	None	NONE
Right of Way			**MEDIUM**
Significant property impacts	Low	Low	LOW
Other Factors			**MEDIUM-HIGH**
Project scope affected by other projects	High	Med	HIGH
Controversial project	Med	Low	LOW
Multi-jurisdictional project	High	Med	HIGH
Federal funding	High	Med	HIGH
Time constraint	Med	Low	LOW



Risk Matrix

- Environmental Permitting
- Design and Construction
- Right of Way
- Other Factors
- Aggregate Project Risk

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	145th Street Station Pedestrian/Bike Access	Entered by:	GMS
Project ID:	148th Street	Reviewed by:	JAM
Concept #:	1	Updated:	3/27/2017

	Cost	Risk Assessment	Contingency %	Contingency Amount	Total
I. Right of Way	$291,600	MEDIUM-HIGH	35%	$ 102,060.00	**$394,000**
II. Construction	$4,952,991	MEDIUM-HIGH	35%	$ 1,733,546.88	**$6,687,000**
III. Project Development	$2,030,726	MEDIUM-HIGH	35%	$ 710,754.22	**$2,742,000**
IV. Construction Management	$1,238,248	MEDIUM-HIGH	35%	$ 433,386.72	**$1,672,000**
V. Estimate of Probable Cost (2016)			**Subtotal**		**$11,495,000**

VI. Escalation		**Project Escalation**	**$1,836,000**
Year of cost index	2016		
Midpoint of Construction	2022		
Escalation Rate	**2.50%**		

TOTAL ESTIMATE OF PROBABLE COST	**$13,331,000**

See sheet 3 for Assumptions

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	148th Street	Reviewed by:	JAM
Concept No.:	1	Updated:	3/27/2017

		Neighborhood:		Residential	
I.	**RIGHT OF WAY**	**Unit**	**Quantity**	**Unit Cost**	**Total**
1	Land Purchase (excludes full takes)	**SF**	8,400	$ 25.00	$210,000
2	Damage / Cure	**%**	10%	of line 1	$21,000
3	Partial Building Take	**SF**	-	$ 150.00	$0
4	Full Acquisitions (sum up of assessed values)	**LS**		$	-
5	Relocation	**EA**		$ 10,000.00	$0
6	Acquisition Admin. Costs (per Parcel)	**EA**	4.00	$ 3,000.00	$12,000
7	Condemnation Contingency (Estimated)		20%	of lines 1 through 6	$48,600
8	**Right of Way Sub-Total**				$291,600

II.	**CONSTRUCTION**	**Unit**	**Quantity**	**Unit Cost**	**Total**
9	Demolition/Clearing	**SF**	36,000	$ 1.00	$36,000
10	Gravel Borrow	**TON**	6,934	$ 20.00	$138,681
11	Bridge Demolition & Disposal	**SF**		$ 60.00	$0
12	Pedestrian Bridge - Steel Truss	**SF**	3,750.00	$ 550.00	$2,062,500
13	Pedestrian Bridge - Concrete	**SF**	-	$ 400.00	$0
14	Curb Ramps	**EA**	3	$ 2,900.00	$8,700
15	New Pavement - HMA	**LANE-MILE**		$ 480,000.00	$0
16	Pavement Overlay	**LANE-MILE**		$ 150,000.00	$0
17	Asphalt Path	**SY**	933	$ 20.00	$18,667
18	Sidewalks	**SY**	-	$ 60.00	$0
19	Curb and Gutter	**LF**	-	$ 25.00	$0
20	Walls - Cut (Soil Nail)	**LF**		$ 100.00	$0
21	Walls - Fill (MSE)	**SF**	11,880	$ 50.00	$594,000
22	Drainage / Stormwater	**LANE-MILE**	0.17	$ 180,000.00	$30,600
23	Stormwater Management	**LANE-MILE**	0.17	$ 160,000.00	$27,200
24	Utility Modifications	**LS**	1	$ 30,000.00	$30,000
25	Utility Undergrounding (SCL)	**LF**		$ 770.00	$0
26	Landscaping	**SY**	667	$ 70.00	$46,667
27	Traffic Signal New	**EA**		$ 340,000.00	$0
28	Traffic Signal Modification	**EA**		$ 150,000.00	$0
29	Channelization / Signing	**LANE-MILE**	-	$ 25,000.00	$0
30	Illumination	**MILE**	0.17	$ 500,000.00	$85,227
31	TESC	**LS**	3%	of lines 9 through 29	$92,347
32	*Railing*	**LF**	1,000.00	$ 150.00	$150,000
33	*user custom*			$ -	$0
34	*user custom*			$ -	$0
35	*user custom*			$ -	$0
36	Construction Traffic Control	**%**	13%	of lines 9 through 35	$431,677
37	Miscellaneous / Allowance	**%**	20%	of lines 9 through 36	$750,453
38	Mobilization	**%**	10%	of lines 9 through 37	$450,271.92
39	WA State Sales Tax (Non-city utilities)	**%**	10%	of line 23 & 24	$0
40	**Construction Sub-Total**				$4,952,991

Assumptions listed on next page

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include escalation, financial costs, or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	148th Street	Reviewed by:	JAM
Concept No.:	1	Updated:	3/27/2017

	III. Project Development	Unit	Quantity	Unit Cost	Total
41	PE and Environmental Documentation	%	5%	of line 40	$247,650
42	Design Engineering	%	20%	of line 40	$990,598
43	Agency Administration	%	12%	of line 40	$594,359
44	Public Art	%	2%	of line 40	$99,060
45	Community Engagement	%	2%	of line 40	$99,060
46				of line 40	$0
47	**Project Development Sub-Total**				$2,030,726

	IV. Construction Management	Unit	Quantity	Unit Cost	Total
48	Construction Management	%	25%	of line 40	$1,238,248
49	*user custom*			of line 40	$0
50	*user custom*			of line 40	$0
51	Monitoring agreement cost	%		of line 40	$0
52	**Construction Management Sub-Total**				$1,238,248

Assumptions:

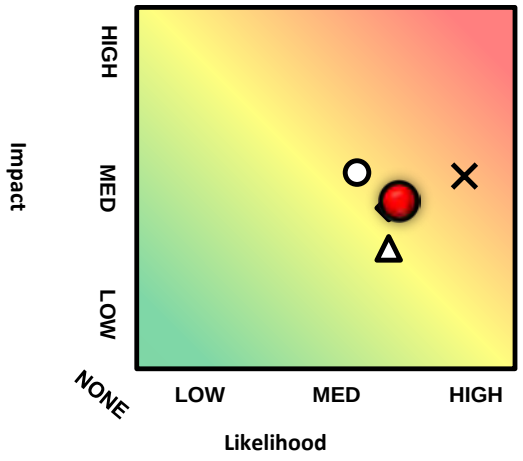
* based on conceptual layout 148th Crossing Option, January 2017
* assumes steel truss bridge over I-5, pre-fabricated and delivered to site
* assumes new pathway from 1st Ave NE the bridge approach ramp, west of the I-5 Southbounb off-ramp
* assumes new illumination from 1st Ave NE the bridge approach ramp, west of the I-5 Southbound off-ramp
* does not include costs for detailed architecture, special fabrication, or special art features
* assumes switchback and landing adjacent to the north side of the LRT Station.
* assumes partial property acquisition from two parcels east of I-5 for the footprint of the switchback and landing. Partial strip acquisition is assumed, not full acquisition and relocation.

The above cost opinion is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include escalation, financial costs, or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order of magnitude cost opinion shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CITY OF SHORELINE Planning Level Opinion of Cost

Project:	**145th Street Station Pedestrian/Bike Access**	Entered by:	**GMS**
Project ID:	148th Street	Reviewed by:	JAM
Concept No.:	1	Updated:	3/27/2017

Risk Considerations	Likelihood	Impact	Risk Assesment
Environmental Permitting			**MEDIUM-HIGH**
Presence of wetlands	Med	Low	LOW
Impacts to ecological sensitive areas	Low	Low	LOW
Multi-agency approvals needed	High	Med	HIGH
Design and Construction			**MEDIUM-HIGH**
Unknown soil conditions	Med	Low	LOW
Contaminated soils	Low	Med	LOW
Unknown utilities	High	Med	HIGH
Underground utility project elements	Low	Low	LOW
Significant structures	High	High	HIGH
Work within water table	Low	Low	LOW
Little project definition, many unknowns	High	High	HIGH
New technology	None	None	NONE
Right of Way			**MEDIUM-HIGH**
Significant property impacts	Med	Low	MEDIUM
Other Factors			**MEDIUM-HIGH**
Project scope affected by other projects	High	Med	HIGH
Controversial project	Med	Low	LOW
Multi-jurisdictional project	High	Med	HIGH
Federal funding	High	Med	HIGH
Time constraint	Med	Low	LOW



Risk Matrix

- Environmental Permitting
- Design and Construction
- Right of Way
- Other Factors
- Aggregate Project Risk