

# Green River Trail – Alternative Alignment Analysis

Prepared for  
King County Parks and Recreation



May 2018

Prepared by  
**Parametrix**

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# CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.



5-2-18

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# TABLE OF CONTENTS

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Project Goals .....	2
1.2	Benefits of the Green River Trail.....	2
1.3	What is a Regional Trail?.....	2
1.4	How Were Alternatives for the Green River Trail North Extension Identified? .....	5
1.5	Criteria for Evaluating Alternatives.....	6
1.5.1	Information Collected to Evaluate Data .....	8
1.6	What Would This Regional Trail Look Like? .....	8
1.6.1	Trail Widening Alternative.....	8
1.6.2	One-Way Alternative .....	9
1.6.3	Off-Road Alternative.....	10
1.6.4	New Trail Alternative .....	11
<b>2.</b>	<b>ALTERNATIVE ALIGNMENT ANALYSIS FOR GREEN RIVER TRAIL NORTH EXTENSION .....</b>	<b>12</b>
2.1	Segment 1: Trail Widening Alternative .....	12
2.1.1	Description.....	12
2.2	Segment 2: One-Way Alternative .....	14
2.2.1	Description.....	14
2.3	Segment 2: Off-Road Alternative .....	18
2.3.1	Description.....	18
2.4	Segment 3: New Trail Alternative .....	20
2.4.1	Description.....	20
<b>3.</b>	<b>CRITERIA FOR RANKING TRAIL ALTERNATIVES .....</b>	<b>21</b>
<b>4.</b>	<b>CONCLUSION .....</b>	<b>27</b>

## LIST OF FIGURES

1	Green River Trail Location.....	3
2	Typical Widening of Existing Trail Segment .....	9
3	Typical One-Way Segment 2 .....	9
4	Typical Boardwalk Segment 2 .....	10
5	Typical Sidewalk Section Segment 2 .....	10
6	Typical Utility Corridor Segment 2 .....	11
7	Typical New Trail Segment 3.....	11
8	Segment 1 Alignment.....	13
9	Segment 2 One-Way Alternative Alignment.....	15
10a.	One-Way Alternative Roundabout .....	16
10b.	One-Way Alternative Enhanced Off-Ramp .....	16

# TABLE OF CONTENTS (CONTINUED)

11	Segment 2 Off-Road Alternative Alignment .....	19
12	Segment 3 Alignment.....	20

## LIST OF TABLES

1	Segment Overview .....	1
2	Regional Trails Program Criteria for Ranking Trail Alternatives – Segment 1 .....	23
3	Regional Trails Program Criteria for Ranking Trail Alternatives – Segment 2 .....	24
4	Regional Trails Program Criteria for Ranking Trail Alternatives – Segment 3 .....	25

## LIST OF PHOTOGRAPHS

1	The Green River Trail and 27th Avenue South at the edge of Cecil Moses Park, facing northwest. ....	12
2	West Marginal Place South at the edge of the Duwamish River, facing northwest.....	14
3	West Marginal Place South at the southern edge of the Seattle City Light facility, facing northwest. ....	18
4	14th Avenue South at the South Director Street intersection, facing south.....	20

## APPENDICES

A	Regional Trail Standard
B	Cost Estimate and Conceptual Plans of Alternatives

# ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
NACTO	National Association of City Transportation Officials
SR	State Route
WSDOT	Washington State Department of Transportation

# 1. INTRODUCTION

The Green River Trail is among the longest regional trails in the Puget Sound, with 19 paved miles of trail that will, with the proposed north extension, connect the southern edge of Seattle to the cities of Tukwila and Kent. The trail also serves as a commuting corridor for the neighboring business parks. The varied landscape and the bird watching opportunities offered by the trail encourage recreational use.

The Green River Trail North Extension is intended as a regional trail to connect the existing Green River Trail near the Cecil Moses Park to South Director Street, and ultimately to the Duwamish Trail in the South Park vicinity. The Green to Duwamish Trail Feasibility Study provided a starting point for planning since it included potential alignments, including a preferred alignment. The proposed trail design was divided into several segments, each of which had between one and three alignment alternatives developed and analyzed for feasibility throughout the preliminary design phase of the project.

This project was separated into three segments for analysis. Segment 1 is from Cecil Moses Park to just north of Dick’s Towing, inside Tukwila city limits. Segment 2 begins just north of Dick’s Towing to South 96th Street, starting inside Tukwila city limits but extending into unincorporated King County. Segment 3 runs from South 96th Street to South Director Street, in unincorporated King County.

Only one alternative was evaluated for Segments 1 and 3. For Segment 1, this alternative is widening the existing pathway to meet regional trail standards within the road right-of-way. For Segment 3, this alternative is a new trail constructed to meet regional trail standards within the road right-of-way. The focus of this alternatives analysis was, therefore, on the alignment alternatives for Segment 2.

Alternatives for Segment 2 include an Off-Road Alternative or a One-Way Alternative.

The Off-Road Alternative uses three different design layouts:

1. Boardwalk meeting regional trail standards,
2. Enhanced striping on the roadway and/or a sidewalk that would not meet regional trails standards, and
3. A trail meeting regional trail standards constructed following an existing utility corridor.

The One-Way Alternative includes converting the road to one-way southbound to make room for a trail meeting regional trail standards within the right-of-way.

Figure 1 is an overview of the proposed Green River Trail North Extension and the location of Segments 1 through 3. Table 1 shows the start/end points of each segment with notes for each segment.

**Table 1. Segment Overview**

Name	Start Point	End Point	Notable Features
Segment 1	Cecil Moses Park	North of Dick’s Towing	Ends at pullout inside Tukwila City Limits
Segment 2	North of the property currently used by Dick’s Towing	South 96th Street	Starting inside Tukwila City Limits and extending into unincorporated King County, Adjacent to W. Marginal Place S. Duwamish Waterway and Seattle City Light
Segment 3	South 96th Street	South Director Street	Inside unincorporated King County



## 1.1 Project Goals

This analysis was commissioned as part of the preliminary design phase of the project to consider which, if any, of the proposed alternatives was feasible, and which design should be selected for extending the Green River Trail Extension to ultimately connect with the Duwamish Trail. The project team for this process consisted of Parametrix designers in consultation with representatives from King County, City of Tukwila, City of Seattle, WSDOT, and Seattle City Light. The team evaluated a range of alternatives to meet several goals for the trail:

- Balance right-of-way needs and constraints, ecological considerations, and other considerations to make an excellent trail.
- Serve local and regional non-motorized transportation needs and provide access to the trail for local communities.
- Connect people between communities in a way that encourages healthy living, recreation, robust mental health, and stress reduction.

Costs, constraints, and other key characteristics were identified using field observations, consultation with local jurisdictions, and review of existing studies and analyses.

## 1.2 Benefits of the Green River Trail

Before presenting the findings on the feasibility of the different alignment alternatives for the north extension of the Green River Trail, reviewing the potential benefits of achieving the trail goals is appropriate as a reminder of the vision for this trail.

The Green River Trail North Extension would be beneficial to neighboring communities by providing an alternative to motorized commuting, promoting physical activity, offering connections to other trails, extending the commuting potential to more workplaces, and providing a venue to bring the communities together. These benefits are only present if the alternative developed is an improvement on the status quo and creates an opportunity for all ages and abilities to enjoy the trail.

## 1.3 What is a Regional Trail?

Regional trails are shared use, regionally significant trails that offer enhanced regional mobility, recreational opportunities, and travel. The trail facilities should meet regional trail development standards (see Appendix A for the Regional Trail Standard) in regard to width, grade, and other characteristics in order to be suitable for a wide variety of non-motorized uses, such as walking, bicycling, jogging, roller-blading, and other similar activities. Regional trails are typically built to a high standard to accommodate high-user volumes and a wider variety of activities than smaller local paths and trails are expected to accommodate.

Ideally, a regional trail would be a separated off-road path. In urban areas such as the Green River Trail North Extension project area, however, providing separated off-road paths is not always possible, and in those areas, streets can be used as an interim solution. Whether trails are on- or off-road, user safety and convenience should be considered paramount. Regional trails should provide opportunities for travel for all user groups, whatever age or skill level.

King County manages a system of more than 175 miles of regional trails throughout the county. These trails have a variety of surfaces but are built to high-development standards with limited grades and a wide cross section to accommodate a full spectrum of user types with minimal conflicts. These common shared features help provide a uniformly safe and enjoyable experience for the public.

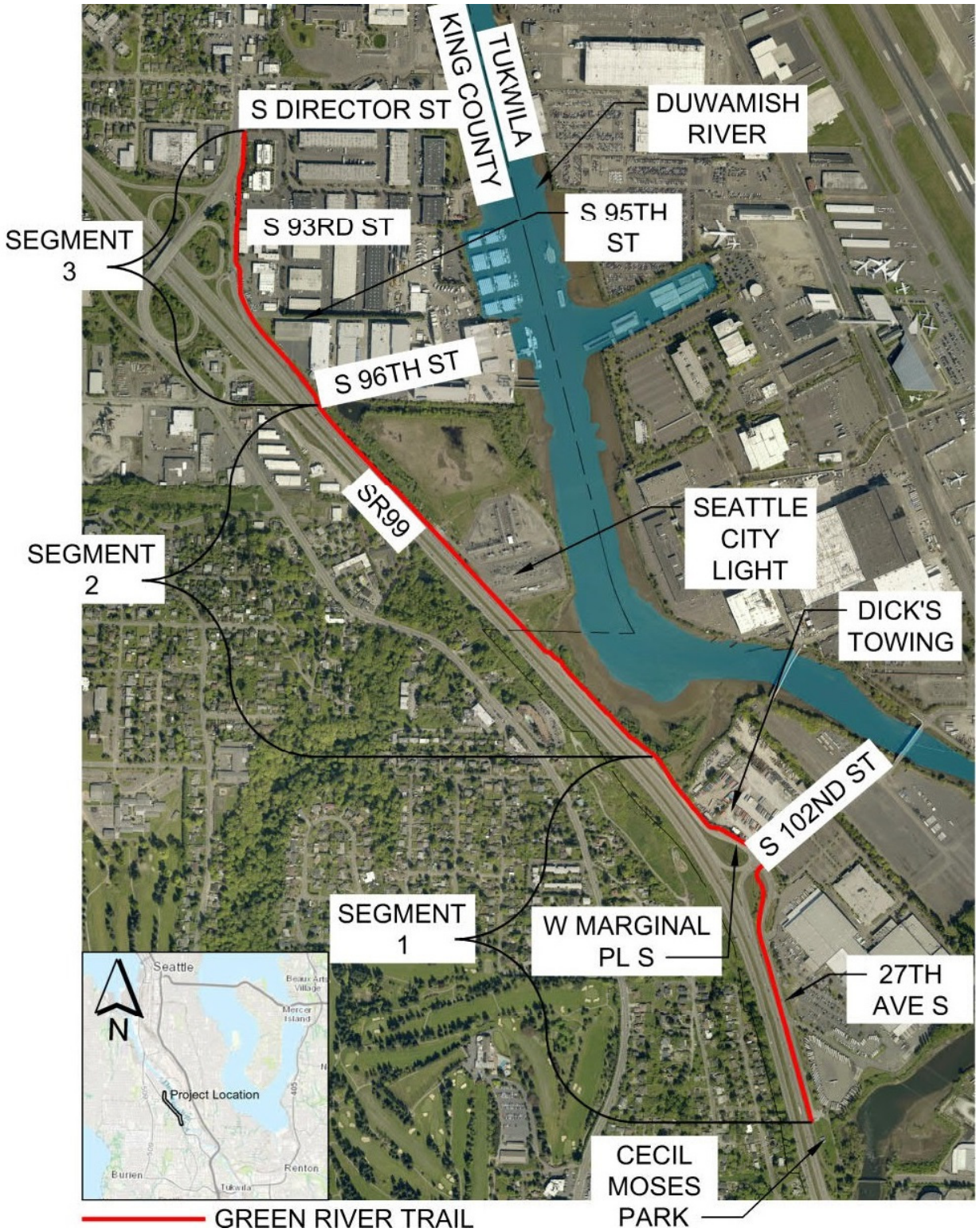


Figure 1. Green River Trail Location

For regional trails within urban growth areas, King County prefers a trail with a minimum width of 12 feet of pavement and 2-foot shoulders on both sides, separated from motorized facilities such as roads. However, in densely developed urban areas, opportunities to develop such a corridor may be limited. New trail alignments are often limited to circumstances where linear corridors already exist, such as the following:

- Linear utility corridors, such as those associated with transmission lines or pipelines, can often accommodate a trail. For this section of the trail, there are a few separated corridor alternatives that could be considered.
- Railroad corridors are attractive for trail use when constructed at grade, because these corridors are built with a horizontal and vertical geometry that lends itself to trails. Rail corridors also often have fewer crossings and intersections than other types of corridors. However, for trail use, rail companies must be agreeable to such an arrangement or have abandoned the corridor. If rail use remains along with a new trail, there must be adequate right-of-way to accommodate the negotiated separation between the tracks and the trail. No rail corridor has been identified within the Green River Trail North Extension study area.
- Road rights-of-way may accommodate a variety of non-motorized designs, including an off road, two-way path located adjacent to the roadway; bike lanes and sidewalks on the side of the road; wider paved shoulders (preferably on both sides); or shared use roadway with motor vehicles. The choice of facility type depends on the amount of right-of-way available, the utility conflicts, the number of driveways and roads crossed, and other safety factors. A variety of combinations of alternatives could be used, although options where space is limited do not meet regional trail development guidelines and, strictly speaking, would not be considered regional trails.

## 1.4 How Were Alternatives for the Green River Trail North Extension Identified?

The idea of developing trails in this county is not new. The project consultant reviewed planning documents prepared by the jurisdictions within the study area and met with them to understand the perspectives and insights of each document. Several overarching principles guided these efforts:

- Where available, the preferred alternative would be a regional trail—a two-way, paved, shared-use path separated as much as possible from roadway traffic and conflicts such as driveways. However, where property ownership, utility conflicts, parking, loading or business access, or other right-of-way use and cost could substantially delay development of a trail segment (10 years or more), the project consultant offered non-regional trail alternatives for consideration.
- The objective for non-regional, shorter-term trail alternatives was to minimize the level of investment and potential known conflicts. Routes selected generally required less property acquisitions or easements, had a lower construction cost, and would leave behind a need for eventual construction of the preferred alignment.
- The project consultant attempted to provide more continuity and consistency for trail users by minimizing the number of times a facility type is switched along a given segment. For example, one goal was to minimize switching between off-road and on-road facilities.
- Existing non-motorized conditions were also a consideration for identifying alternatives for the Green River Trail North Extension. In choosing and developing a proposed alternative, a

preference for connecting to and utilizing existing non-motorized facilities was maintained to maximize the utilization of previous investments. The existing facilities considered include sidewalks, bicycle facilities, transit stops, crosswalks, trails, lighting, and more. The existing facilities were also evaluated to determine if they meet existing guidelines for facility development, state of repair, and whether or not good sense dictated incorporation of the facilities as part of the proposed trail alignment.

In general, recommendations for potential alignments and facility types considered guidelines such as:

- The *King County Parks Regional Trail Standards* (March 20, 2017).
- The *Guide for the Development of Bicycle Facilities* (American Association of State Highway and Transportation Officials [AASHTO] 2012).
- The *Guide for the Planning, Design, and Operation of Pedestrian Facilities* (AASHTO 2004).
- The *Design Manual Chapter 1515* (Washington State Department of Transportation [WSDOT] 2014).
- The *Urban Bikeway Design Guide* (National Association of City Transportation Officials [NACTO] 2012).
- The *King County Road Design and Construction Standards* (2007).
- And best professional judgment based on project consultant experience in other locations.

## 1.5 Criteria for Evaluating Alternatives

Key challenges for project implementation remain. The trail segments to be constructed are at different stages of readiness. The designers identified and evaluated alignments and layouts while considering the criteria discussed below. Where constraints could potentially be addressed in future design, some of the options to do so are identified.

- Good Steward of Public Funds

This criterion evaluates how well an alternative meets the project purpose and need, budget, and schedule.

For example, there is potential cost escalation caused by modifying or creating a structure such as a bridge, retaining wall, boardwalk, or other high-cost design element. Alignment of the trail facility should consider the need for these high-cost design elements versus safety and convenience (e.g., relocate column or create pinch-point or narrowing of the facility, grade separated or at-grade crossing) to minimize the construction cost. Alignment should also consider the cost of the solution versus the overall benefit that it could provide to all users, including motorized users and adjacent property owners. In recommending layouts for the trail, a higher level of cost was often accepted if the outcome was a safer, more enjoyable trail with better separation from adjacent uses.

Another major cost and schedule consideration is utility relocation. The proximity of the Seattle City Light facilities to the project presents a substantial challenge, as numerous poles and a fence crowd close to the roadway right in the path that would otherwise be a suitable place for a separated trail. Relocation of these utilities would be extremely expensive, possibly cost prohibitive; however, avoiding utility conflicts by adjusting the design adds considerable constraints to the trail placement and size. Balancing these two constraints is a challenge.

The proportion of the proposed alignment within public or private right-of-way was also a major cost consideration. A trail alignment within private property requires additional right-of-way acquisition, increasing both the cost and possibly the timeline for construction of the trail. Use of public property may not always be compatible with the proposed trail system, but discussion of the right-of-way should be part of the decision-making process.

- Be a Good Neighbor

This criterion evaluates the level of support from the public and stakeholders for a design, as well as amount of negative impact to the community (if any). For example, the designs with high levels of agency, stakeholder, and public support will score the highest. Designs that minimize the needs for property easements and acquisitions also score highly. Impacts to existing traffic conditions are also considered in this criterion.

- Design for Safety

This criterion evaluates whether a design alternative meets the King County Regional Trail Standards for width, site lines, buffers, etc. It also considers AASHTO/NACTO Guidelines.

For example, trail facilities, either on-road or off-road, should provide an environment with a reduced chance of confusion and conflicts among all ages and abilities of users. Difficult and narrow sections should be avoided. Separation from vehicular use should be maximized. However, where the trail facility must interact with other uses, the consistent use of applicable design standards and guidelines would improve safety in many situations.

Safety and comfort of a trail facility can be evaluated by identifying the number of road crossings, type of road crossing (high versus low volume, signalized crossing versus non-signalized crossing), possible trail and road separation, volume of users on adjacent road, spacing for trail, parking, and any existing non-motorized facilities.

A continuous route and right-of-way with a single trail treatment is desirable to increase the ability of the traveling public to use and follow the trail and reduce the likelihood of conflicts. For example, if a separated path configuration switches to bike lanes and sidewalks, bicyclists may fail to cross the street to cycle in the direction of traffic. However, this is sometimes not possible due to right-of-way constraints. These right-of-way constraints can sometimes be addressed during design, though additional costs may make that prohibitive. For example, boardwalks navigating wet areas may be a way to avoid a right-of-way conflict, but have additional costs associated with construction.

- Meet Regulatory Requirements

This criterion considers impacts to resources including critical areas and cultural resources.

Alignment of the trail facility should minimize impacts to critical areas and cultural resources. Proximity to critical areas has potential effects on the transportation system, drainage, and the natural environment in undeveloped areas. Any impacts on the Duwamish Waterway must also be carefully considered, as the area is a designated Superfund site and has been the focus of hazardous materials cleanup and restoration efforts for decades. Sometimes these effects can be an acceptable tradeoff for creating a safer, more enjoyable trail, and many of the impacts can be minimized through design or mitigation.

- This criterion also evaluates the likelihood/ease of obtaining the permits to construct the project. Obtaining permits to build a trail with the right-of-way will be substantially easier than obtaining a permit to build an off-road facility near a Superfund site along major waterway.

### 1.5.1 Information Collected to Evaluate Data.

A variety of information was collected to contribute to the development and analysis of these design alternatives. A surveyed basemap established current site conditions and the location of utilities and formed the basis for drafting design alternatives. A field walk helped establish what these alternatives would look like in the field. Geographic Information Systems (GIS) parcel maps helped locate stakeholders who should have input into the regional trail. Interviews were conducted with neighboring property owners to determine the types of vehicles and entry requirements of each individual businesses. Traffic counts determined the amount and types of vehicles that must be accommodated and was used to support projections of future requirements for the road and trail to ensure the final design will meet needs long term.

## 1.6 What Would This Regional Trail Look Like?

Four layout alternatives were initially identified. These four layouts may be characterized as follows:

- **Trail Widening Alternative.** This layout simply involves widening of an existing trail within the existing road right-of-way to a fully separated multi-use trail meeting the required standards for a regional trail.
- **One-way Alternative.** This layout involves converting a segment of road to one vehicle lane southbound to create room for a trail within the existing right-of-way that meets regional trail standards. To mitigate traffic impacts associated with converting the road to one-way, this alternative required the addition of a roundabout or enhanced off-ramp from State Route (SR) 99 in Segment 3.
- **Off-Road Alternative.** This layout involves keeping the road two-way but narrowing the vehicle lanes slightly and constructing the trail partially outside the right-of-way. To implement this alternative, a section of boardwalk meeting regional trail standards would be constructed adjacent to the Duwamish Waterway. Another section of trail meeting regional trail standards would be constructed following an existing utility corridor. However, to implement this alternative, there would still be a short trail section in front of the Seattle City Light substation where the only option would be to temporarily redirect all trail users back onto the roadway with either enhanced safety striping, or to construct a 5-foot sidewalk for pedestrians while still redirecting bicycles onto the roadway. Neither option would meet the regional trail standards.
- **New Trail Alternative.** A new trail would be constructed primarily within the existing right-of-way meeting the required standards for a regional trail.

### 1.6.1 Trail Widening Alternative

This was the only alternative evaluated for Segment 1. The typical section is a separate 12-foot-wide trail bounded by 2-foot shoulders. Buffers between the road and the trail are present where space allows.

Where space does not allow for a buffer, some special features (e.g., a barrier) might need to be incorporated to reduce potential conflicts with motor vehicles. A traffic barrier is proposed between SR 99 and the trail throughout most of Segment 1 in the current design.

See Figure 2 for a visual representation of this layout.

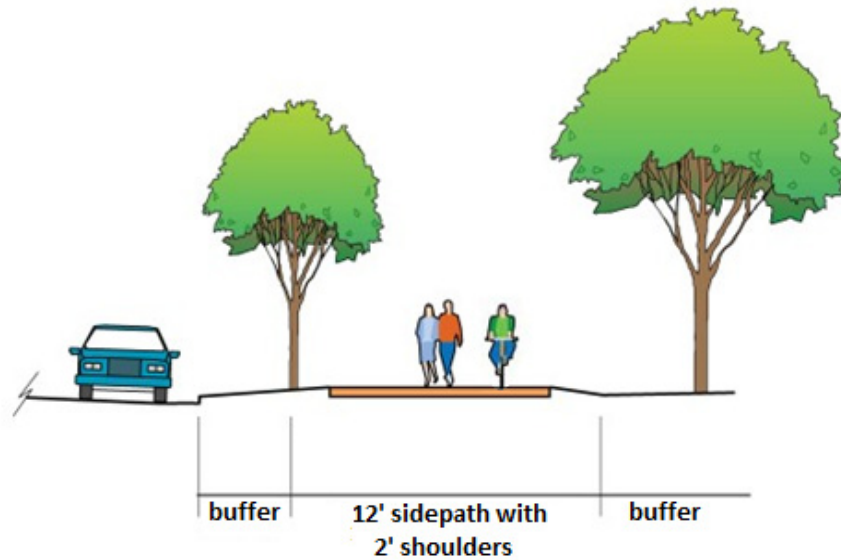


Figure 2. Typical Widening of Existing Trail Segment

### 1.6.2 One-Way Alternative

This is one of two alternatives evaluated for Segment 2. The typical section for the one-way alternative is one 11-foot-wide southbound-only vehicle lane with a 9- to 12-foot-wide shared-use path bounded by 2-foot-wide shoulders. Due to right-of-way and utility constraints, no buffer between the vehicle lane and trail is possible, so safety options will need to be incorporated into the design to reduce potential conflicts with motor vehicles. A traffic barrier is proposed in some parts of Segment 2, but the specific type of barrier has not been decided yet.

See Figure 3 on the next page for a visual representation of this layout.

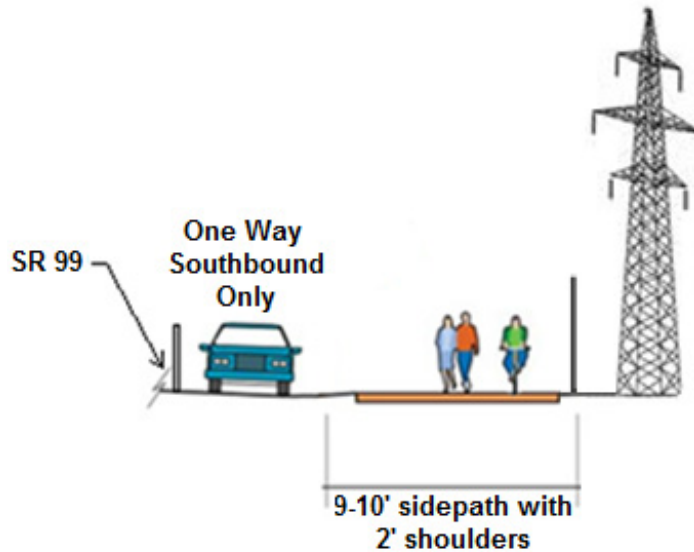


Figure 3. Typical One-Way Segment 2

### 1.6.3 Off-Road Alternative

The Off-Road Alternative is comprised of three different sections: a boardwalk, an on-road/sidewalk section, a section with only improved signage and striping, and a trail following an existing utility corridor. This is the second alternative evaluated for Segment 2.

The typical section for the shared-use separated boardwalk portion in Segment 2 is a separate 16-foot-wide boardwalk. Buffers are present between the road and the boardwalk throughout the section to allow for utility poles to be avoided.

See Figure 4 for a visual representation of this layout.

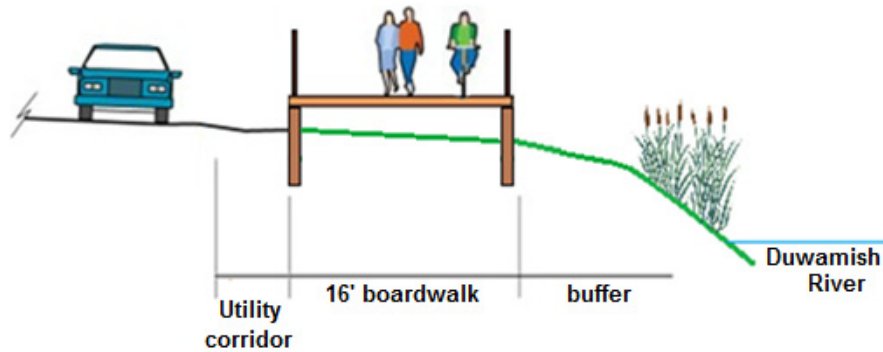


Figure 4. Typical Boardwalk Segment 2

To the north of the boardwalk trail, users would have to be temporarily redirected onto the roadway in front of the Seattle City Light substation. Constructing an off-road trail is not possible in this location due to the space constraints and the prohibitive cost associated with acquiring property from Seattle City Light and relocating substation facilities. Additional signage and striping could be added to the road to indicate that all trail users will be on the roadway, or a 5-foot-wide sidewalk could be constructed for pedestrians only while still redirecting only the bicycles onto the roadway, as shown in Figure 5. Neither option meets the regional trail standards.

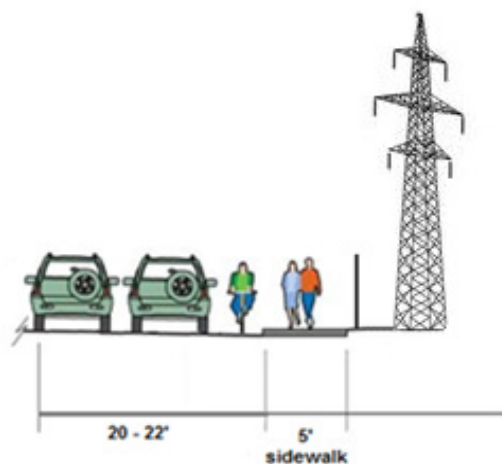


Figure 5. Typical Sidewalk Section Segment 2



North of the Seattle City Light substation, the typical section for the utility corridor portion in Segment 2 is a separate 12-foot-wide trail bounded by 2-foot shoulders. Buffers are present throughout to allow for avoidance of utility poles. This option has no impact on the roadway. See Figure 6 for a visual representation of this layout.

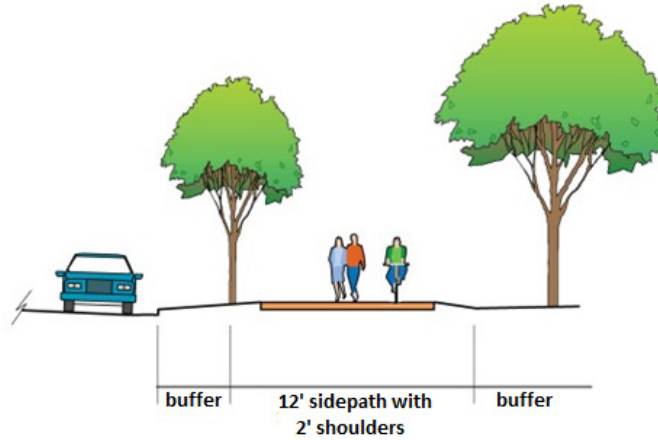


Figure 6. Typical Utility Corridor Segment 2

#### 1.6.4 New Trail Alternative

This alternative was the only one considered for Segment 3. It consists of a 12-foot-wide paved section, bounded by 2-foot-wide soft shoulders and 1-foot-wide buffers on both sides. This layout would be consistent with regional trail standards.

See Figure 7 for a visual representation of this layout.

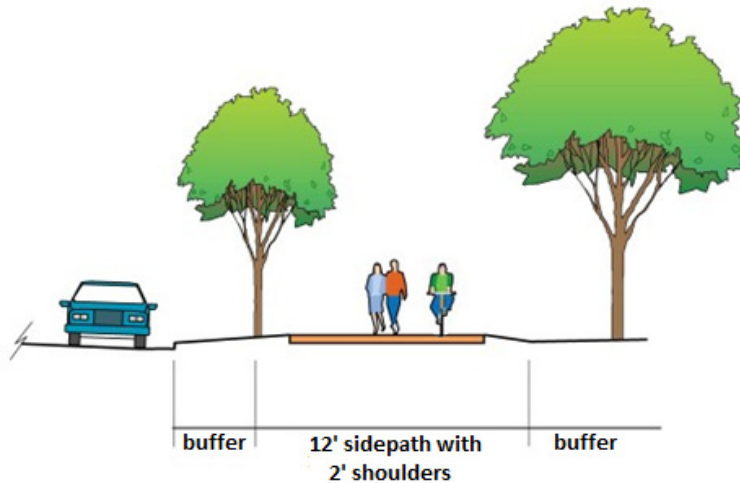


Figure 7. Typical New Trail Segment 3

## 2. ALTERNATIVE ALIGNMENT ANALYSIS FOR GREEN RIVER TRAIL NORTH EXTENSION

Several alternative alignments were originally considered for the connection between the Green River and Duwamish Trails along West Marginal Place South. Through analysis and coordination with King County, WSDOT, City of Seattle, City of Tukwila, Seattle City Light, and other stakeholders, these alternatives were reduced to those described in Section 1.6.

This analysis evaluated these alternatives using the four criteria described in Section 1.6. Pros and cons of each alignment are analyzed for each of the four criteria.

The planning level cost estimates included for each alignment alternative are preliminary and for planning purposes only. The estimates do not include all project costs (e.g., design, permitting, right-of-way acquisition, mitigation, and owner administration). Instead, the cost estimates represent a comparative analysis focusing on areas of substantial difference between alternative alignments to give an impression of the scale of the difference.

### 2.1 Segment 1: Trail Widening Alternative

#### 2.1.1 Description

The alignment for Segment 1 follows the existing Green River Trail, widening it from Cecil Moses Park northwest to just north of the property currently used by Dick’s Towing. The alignment mostly follows adjacent to the existing street network, except for the approach to the intersection at South 102nd Street.

There was only one alternative considered for this segment. The preferred design layout for Segment 1 is the Widening of Existing Trail Alternative between 27th Avenue South and West Marginal Way South until the South 102nd Street intersection, where the trail will cross 27th Avenue South and run along the easterly side of the road.

Figure 8 shows the alignment of Segment 1.



**Photograph 1. The Green River Trail and 27th Avenue South at the edge of Cecil Moses Park, facing northwest.**

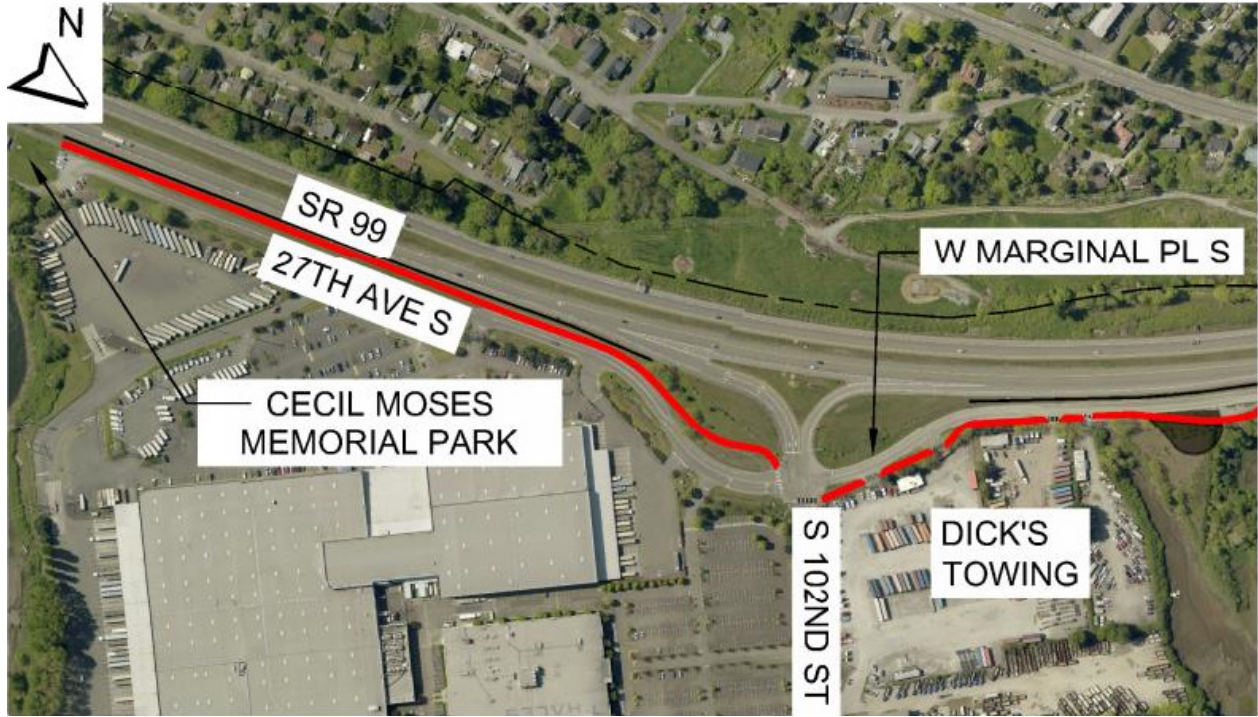


Figure 8. Segment 1 Alignment

### 2.1.1.1 Planning-Level Cost Estimate

Segment 1: \$510,500

#### **Evaluation**

##### *Good Steward of Public Funds*

- Pros: High-cost design elements such as bridges and boardwalks are not needed in this segment. The segment is within existing right-of-way. The design of this segments meets the project purpose by improving conditions and is constructible in the expected timeline.
- Con: The traffic barrier is an additional expense but is recommended due to the proximity to SR 99 and the expected higher volume of foot traffic that trail improvements would bring and the narrow gap between the two roads.

##### *Be a Good Neighbor*

- Pros: The Segment 1 Widening of Existing Trail Alternative provides an opportunity to construct most of the trail in public right-of-way. Sufficient space allows for a 12-foot-wide paved-trail path and 2-foot-wide shoulder throughout this entire portion of the trail, meeting the design criteria of a regional trail. This segment is specifically routed to avoid Seattle City Light poles. This segment has minimal impacts on existing traffic conditions.
- Con: Existing roadway does not allow for buffer between the road and the trail at spots along the alignment. While this segment minimizes impacts on existing utilities, a few sanitary sewer manholes and a valve will need to be relocated.

### *Design for Safety*

- Pros: The majority of the Segment 1 alignment provides a regional shared use path cross section with a 12-foot-wide paved trail and 2-foot-wide shoulders, with at least some separation from existing vehicular traffic along the majority of this segment. The roadway profile does not exceed 4.9 percent for rider and walker comfort.
- Con: Much of the trail is adjacent to existing roadways and busy traffic and includes one major intersection crossing. SR 99 in this area is particularly busy and noisy with vehicles traveling at freeway speeds. This can be mitigated by replacing the existing chain link fence alongside SR 99 with a traffic barrier.

### *Meet Regulatory Requirements*

- Pros: Segment 1 runs along an existing trail, with minimal buffer area impacts and no impacts on the Duwamish Waterway.
- Con: While minimal, there are still minor critical buffer area impacts in this segment.

## 2.2 Segment 2: One-Way Alternative

### 2.2.1 Description

Segment 2 follows where Segment 1 leaves off and starts north of Dick’s Towing and continues to South 96th Street. It starts inside of Tukwila city limits and ends in unincorporated King County.

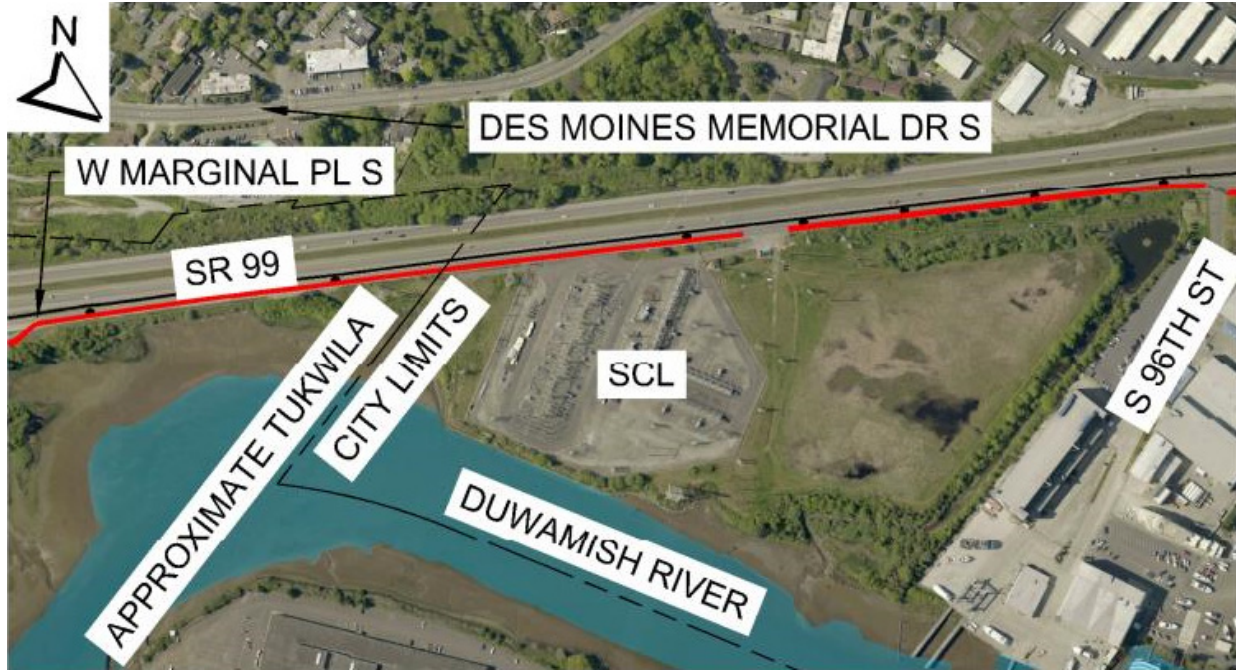
There are two layout options being considered for this segment: this One-Way Alternative and an Off-Road Alternative. The One-Way Alternative begins to the north of Dick’s Towing, including space for a paved vehicle turnaround, and continuing northwest until South 96th Street, crossing one pullout.

The new pathway would parallel the existing West Marginal Place South roadway on the east side of the road, where the northbound vehicle lane now exists. Some minor road widening would still be required, and a traffic barrier between SR 99 and West Marginal Place South is recommended. This alternative would narrow the road to a single 11-foot-wide southbound-only lane.

Figure 9 shows the layout of the Segment 2 One-Way Alternative.



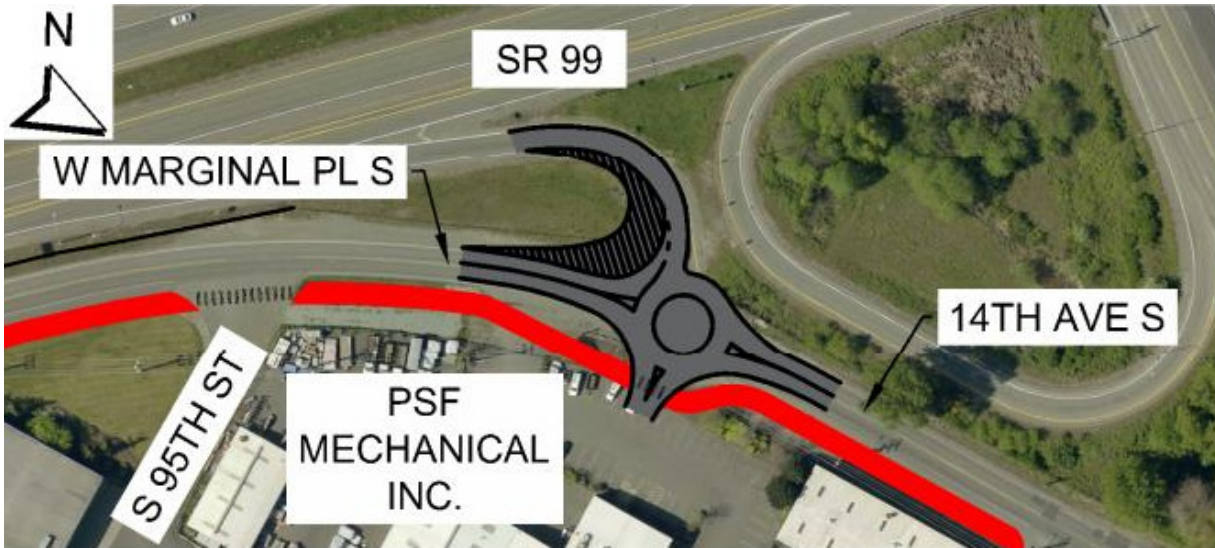
**Photograph 2. West Marginal Place South at the edge of the Duwamish River, facing northwest.**



**Figure 9. Segment 2 One-Way Alternative Alignment**

For the One-Way Alternative, a turnaround is needed to accommodate any large vehicles that may accidentally turn north onto West Marginal Place South. In addition, a roundabout (shown in Figure 10a) or an enhanced off-ramp at the interchange in Segment 3 will need to be constructed to mitigate identified traffic impacts caused by converting the road to one-way southbound.

The roundabout would be placed at the northbound off ramp of SR 99 to 14th Avenue South. The traffic study showed that this ramp would have a failing level of service with the One-Way Road Alternative if left in the current configuration. Since signal warrants are not met, a roundabout was considered. Alignment layout would consist of four roundabout legs, from the north, south, parking lot, and an entrance-only leg from the northbound ramp. The circulating lane is 16 feet to accommodate larger trucks, with a fully mountable center island and channelization island. The parking lot entrance for the neighboring property, PSF Mechanical, Inc., could be moved to coincide with the roundabout to minimize points of conflict. The entrance from the northbound lane has a large sliver of pavement painted for use by trucks making a right turn. The new trail in Segment 3 would have to be routed around the roundabout, crossing it at the driveway leg to minimize conflicts.



**Figure 10a. One-Way Alternative Roundabout**

An enhanced off-ramp addition was briefly considered at the northbound off ramp of SR 99 to 14th Avenue South as an alternative to the roundabout. Alignment layout would consist of a 140-foot earlier start of the exit ramp, matching into the existing turn for the intersection with 14th Avenue South. The ramp and shoulder widths were assumed to match the existing roadway, 16 feet wide for the lane with an 8-foot-wide shoulder. However, the off-ramp addition would not be able to address concerns raised by the results of the traffic analysis showing that this ramp would have a failing level of service if the intersection is left in the current configuration and the One-Way Alternative is selected. Enhancing the off-ramp would keep traffic from backing up on SR 99 but would not address the additional delay noted from a traffic study. A very rough construction cost estimate for the enhanced off-ramp equaled \$200,000 to \$250,000. There are several utility conflicts with this plan, including two light poles, a power vault, and a catch basin. In addition, Delta Marine, a nearby business, expressed concern that the existing intersection configuration would be difficult to navigate with boat trailers should the northbound direction of West Marginal Place South be eliminated as required by the One-Way Alternative. Considering these issues, the roundabout was chosen over the enhanced off-ramp. See Figure 10b.



**Figure 10b. One-Way Alternative Enhanced Off-Ramp**

### 2.2.1.1 Planning-Level Cost Estimate

Segment 2, One-Way Alternative, Including Roundabout and Turn-around: \$2,810,000

#### **Evaluation**

##### *Good Steward of Public Funds*

- Pros: High-cost design elements such as bridges and boardwalks are not needed in this alternative. The segment is within existing right-of-way. This segment is constructible in the expected timeline and meets the project purposes by improving the trail user experience and extending the trail past the existing end of the Green River trail.
- Con: The traffic barrier is an additional expense but is necessary for the proximity to SR 99 and the expected higher volume of foot traffic that trail improvements would bring. The turn-around and roundabout would be an added expense. Any barrier used to separate the trail from the roadway will need to be designed to allow for emergency vehicle access northbound along the entire one-way segment. This may require unique design solutions at additional cost.

##### *Be a Good Neighbor*

- Pros: The Segment 2 One-Way Alternative provides an opportunity to construct most of the trail in the public right-of-way. The roundabout addition maximizes the use of the publicly owned right-of-way, but there would still be some private property acquisitions necessary. There are no Seattle City Light utility poles inside the existing roadway, allowing the One-Way Alternative to avoid poles, aside from the poles to be relocated for the roundabout.
- Con: The roundabout would shift the trail, eliminating four parking spots, though reconfiguration of the driveway entrances may allow for some of the parking spots to be relocated. There will be utility poles immediately on the edge of the proposed trail, restricting the size and location of the trail and the one-way roadway width. This segment has a minimal impact on existing utilities, including wastewater manholes, a catch basin, and a valve; however, the associated roundabout conflicts with three utility poles, two of those poles with luminaires, six gas valves, a power box, a water valve, a catch basin, and a hydrant, all of which would have to be moved or adjusted.

##### *Design for Safety*

- Pros: Compared to the existing intersection, a modern roundabout is expected to reduce the likelihood and degree of severity of accidents. The roadway and trail width is narrowed. It is ideal to have a 12-foot-wide paved trail with 2-foot-wide shoulders throughout the entire length of the project in order to meet design criteria for a regional trail. The trail varies in width in this segment and typically does not meet that standard due to right-of-way and utility constraints.
- Con: This segment of trail is adjacent to existing roadways and busy traffic and includes an intersection crossing at South 95th Street. SR 99 in this segment is particularly busy with vehicles traveling at freeway speeds, which is mitigated by the traffic barrier. A turn-around is required to allow fire trucks and any large vehicles that accidentally turn northbound to navigate this area. West Marginal Place South will be narrow in places, as will the trail.

### Meet Regulatory Requirements

**Pros:** This alternative is proposed over an existing roadway with minimal buffer area impacts except for the paved turn-around at the pullout just north of the property used by Dick’s Towing. No impacts occur on the Duwamish Waterway.

**Con:** While this alternative has the least critical buffer area impacts of options for this segment, in the area the one-way trail meets the widened trail, there are some buffer area impacts plus a more substantial amount required for paving the turnaround (between 680 and 5,110 square feet, depending on the option chosen for the turnaround).

## 2.3 Segment 2: Off-Road Alternative

### 2.3.1 Description

This is an alternative to the Segment 2 One-Way Alternative. The first section of this alternative alignment connects to the widened trail in Segment 1, continuing it northwest until the grade change between the road and the Duwamish River gets too steep. At this point, the road widening layout transitions into the boardwalk layout. Alignment would consist of a 16-foot-wide boardwalk.



**Photograph 3. West Marginal Place South at the southern edge of the Seattle City Light facility, facing northwest.**

When the boardwalk approaches the Seattle City Light substation, as shown on the right, pedestrians and cyclists would have to be transitioned back to the roadway with improved signage and striping. As shown in the picture, there is no room to widen the roadway to incorporate a trail meeting regional trail standards without substantial relocation of the substation facilities at a prohibitive cost. Bikes and pedestrians would be forced to share the roadway with large vehicles. This is not an improvement on the status quo and may even decrease safety because of the improvements along the rest of the corridor encouraging non-motorized use in this area. Improved striping to indicate a shared lane and improved signage to warn vehicles of the conflict will be of limited use in mitigating that increased risk. A 5-foot pedestrian-only sidewalk could be squeezed into the right-of-way, but that does not solve the entire safety problem because bicyclists would still be redirected onto the roadway.

The third section of the Off-Road Alternative diverts cyclists and pedestrians off the roadway at the north end of the Seattle City Light substation and into an existing utility corridor also owned by Seattle City Light, continuing it northwest until South 96th Street. This alignment would not affect the configuration of the existing roadway. The alignment layout would consist of a 12-foot-wide trail with 2-foot shoulders with a buffer possible between the trail and the roadway.

A traffic barrier between SR 99 and West Marginal Place South is recommended, particularly in the section along the Seattle City Light property where traffic would be redirected onto the roadway. Unlike the One-Way Alternatives, minimal road widening is necessary.

Figure 11 illustrates the plan view of the Segment 2 Off-Road Alternative.



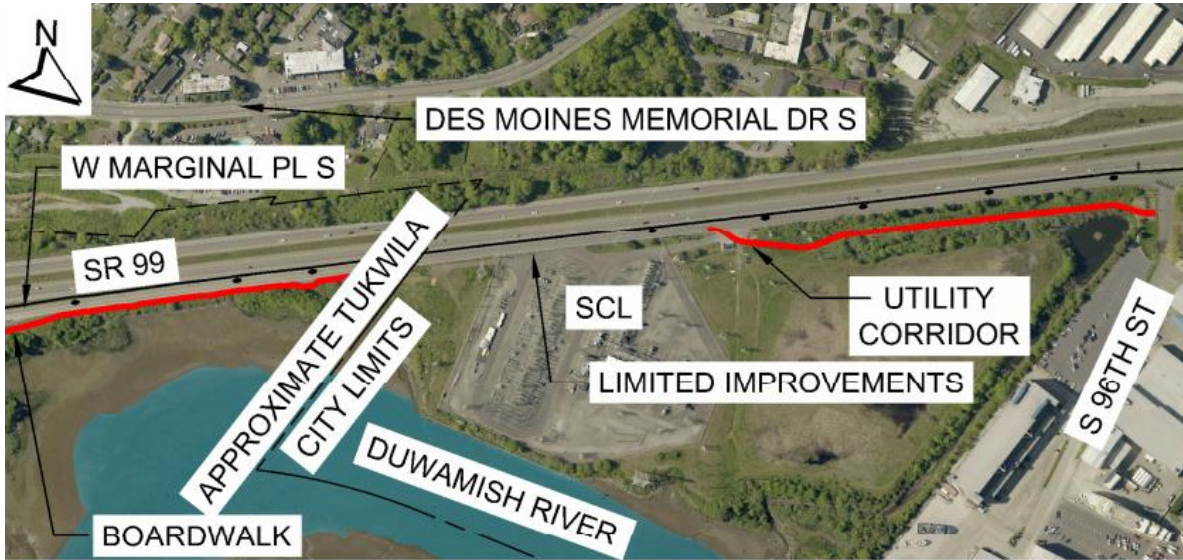


Figure 11. Segment 2 Off-Road Alternative Alignment

### 2.3.1.1 Planning-Level Cost Estimate

Segment 2 Off-Road Alternative: \$4,610,000

#### **Evaluation**

##### *Good Steward of Public Funds*

Con: The boardwalk and the utility corridor in this segment is a high-cost design element. The traffic barrier is an additional expense but is necessary for the proximity to SR 99 and the expected higher volume of non-motorized traffic that constructing trails to the north and south would bring. This segment is not entirely within the existing right-of-way and would require right-of-way acquisition.

##### *Be a Good Neighbor*

Pros: All utility poles but three are avoided in this section, though doing so requires right-of-way acquisitions and a jog in the boardwalk.

Con: To avoid power poles, a hydrant, and a manhole, the boardwalk must swing wide, requiring minor right-of-way acquisitions. The segment in front of Seattle City Light substation does not meet regional trail standards since pedestrians and/or cyclists would still be sharing the road.

##### *Design for Safety*

Pros: The Off-Road Alternative meets regional trail standards (a 12-foot-wide paved trail with 2-foot-wide shoulders or a 16-foot-wide boardwalk with a buffer) except for the section next to the Seattle City Light substation, where it transitions to the roadway.

Con: The second section, where non-motorized traffic is transitioned to the roadway, is not an improvement over existing conditions because bicycles and/or pedestrians have to share lanes with motorized transportation. Enhanced striping and signage would not be enough to mitigate the safety risks.

### Meet Regulatory Requirements

- Pros: No impacts will occur on the Duwamish Waterway.
- Con: The Off-Road Alternative has the most significant buffer impacts, a total of 12,470 square feet for the boardwalk and a total of 18,400 square feet for the utility corridor. This impact is also in the area of a designated Superfund site with hazardous materials that could adversely affect construction or permitting.

## 2.4 Segment 3: New Trail Alternative

### 2.4.1 Description

This is the only alternative evaluated for Segment 3. This alignment is a full-width regional trail. This segment connects Segment 2, continuing the trail northwest in the New Trail Alternative layout paralleling the far-right lane of West Marginal Place South as it turns more northerly and becomes 14th Avenue South. Alignment would consist of a 12-foot-wide trail with 2-foot shoulders and 5-foot buffers where space allows. The project formally ends at the intersection of 14th Avenue South and South Director Street; however, King County plans to coordinate with the City of Seattle to determine how to best connect this project to the Duwamish Trail in the city limits.



**Photograph 4. 14th Avenue South at the South Director Street intersection, facing south.**

The traffic barrier does not continue in this section. No road widening is necessary.

Figure 12 illustrates the plan view of the Segment 3 New Trail Alternative.



**Figure 12. Segment 3 Alignment**

### 2.4.1.1 Evaluation of Segment 3

Planning Level Cost Estimate for Segment 3 New Trail Alternative: \$360,300

#### **Evaluation**

##### *Good Steward of Public Funds*

Pros: None.

Con: This segment is not entirely within the existing right-of-way.

##### *Be a Good Neighbor*

Pros: The New Trail Alternative meets regional trail standards (a 12-foot-wide paved trail with 2-foot-wide shoulders), including a buffer. Minimal right-of-way acquisition is required.

Con: Some right-of-way acquisition will be necessary if the One-Way Alternative is selected and requires a roundabout. This trail goes over a gas and sewer utility, a valve, a hydrant, two storm sewer manholes, and one pole.

##### *Design for Safety*

Pros: This alternative has a buffer between the roadway and the trail where possible and meets the width requirements for a regional trail.

Con: Buffers are still not possible throughout the entirety of this segment.

##### *Meet Regulatory Requirements*

Pros: No impacts.

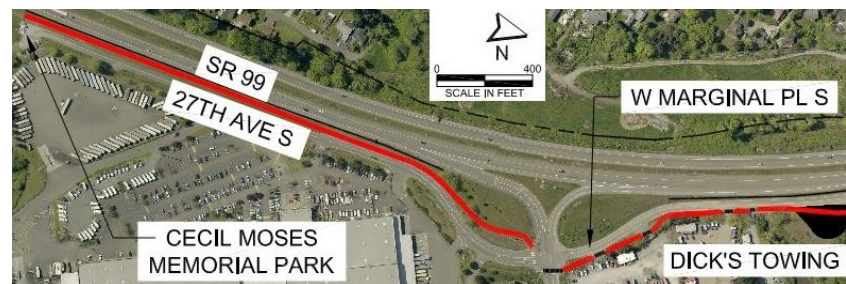
Con: None.

## 3. CRITERIA FOR RANKING TRAIL ALTERNATIVES

There were multiple factors to consider in ranking the trail alternatives and determining the direction for the project to move forward. These factors were summarized and quantified on a scale of one to three in a matrix shown below.

**Table 2. Regional Trails Program  
Criteria for Ranking Trail Alternatives – Segment 1**

CRITERIA	WIDEN TRAIL ALTERNATIVE
<b>Good Steward of Public Funds: 1=No, 2=Uncertain, 3=Yes</b>	
Constructible Within Expected Budget (<\$5 million, \$5 to \$10 million, >\$10 million)	3
Meets Project Purpose and Public Need (Trail User Experience, Improved Conditions, Connectivity, ESJ, etc.)	3
Constructible Within Expected Timeline (Ready to Ad by 2019, Construction 2020)	3
<b>Be a Good Neighbor: 1=No, 2=Neutral, 3=Yes</b>	
Public Support (still doing outreach)	3
City Support	3
Adjacent Property Owner Support (still doing outreach)	2
Inter-Agency Support	2
Improves Traffic Conditions	2
Property Easements and Acquisitions are Obtainable	2
Connectivity to Amenities, Transit, Civic, Commerce, Schools, or Other	3
<b>Design for Safety: 1=No, 2=Partially, 3=Yes</b>	
Meets Regional Trail Standards (Trail Width, Site Lines, Buffers, Signage, etc.)	3
Meets AASHTO/NACTO Guidelines	3
<b>Meet Regulatory Requirements: 1=No, 2=Maybe, 3=Yes</b>	
Avoids/Minimizes Critical Area Impacts	3
Avoids/Minimizes Cultural Resource Impacts	2
Provides Opportunities for Green Building	2
Permits Can Be Obtained	3
<b>Total Score (48 points possible)</b>	<b>42</b>



**Table 3. Regional Trails Program  
Criteria for Ranking Trail Alternatives – Segment 2**

CRITERIA	ONE-WAY ALTERNATIVE	OFF-ROAD ALTERNATIVE
<b>Good Steward of Public Funds: 1=No, 2=Uncertain, 3=Yes</b>		
Constructible Within Expected Budget (<\$5 million, \$5 to \$10 million, >\$10 million)	2	1
Meets Project Purpose and Public Need (Trail User experience, Improved Conditions, Connectivity, ESJ etc.)	3	1
Constructible Within Expected Timeline (Ready to Ad by 2019, Construction 2020)	3	1
<b>Be a Good Neighbor: 1=No, 2=Neutral, 3=Yes</b>		
Public Support (still doing outreach)	2	2
City Support	3	1
Adjacent Property Owner Support (still doing outreach)	2	1
Inter-Agency Support	2	2
Improves Traffic Conditions	2	3
Property Easements and Acquisitions are Obtainable	3	2
Connectivity to Amenities, Transit, Civic, Commerce, Schools, or Other	3	3
<b>Design for Safety: 1=No, 2=Partially, 3=Yes</b>		
Meets Regional Trail Standards (Trail Width, Site Lines, Buffers, Signage, etc.)	2	1
Meets AASHTO/NACTO Guidelines	3	1
<b>Meet Regulatory Requirements: 1=No, 2=Maybe, 3=Yes</b>		
Avoids/Minimizes Critical Area Impacts	3	1
Avoids/Minimizes Cultural Resource Impacts	3	1
Provides Opportunities for Green Building	3	3
Permits Can Be Obtained	3	1
<b>Total Score (48 points possible)</b>	<b>42*</b>	<b>25</b>

\* Needs roundabout, shown below.



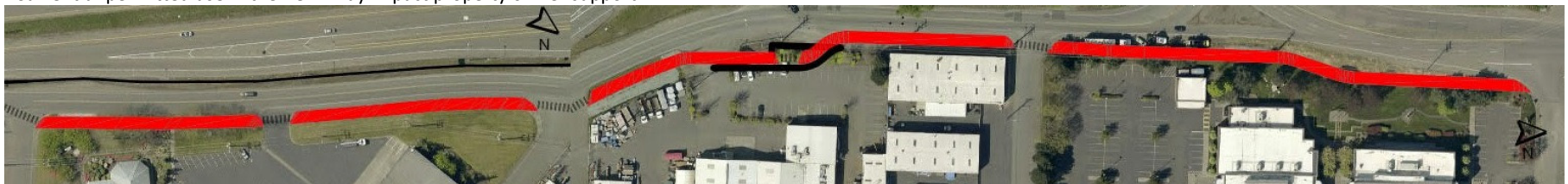
Roundabout (far left) or Enhanced Off-Ramp (left) is included with One-Way Alternative.

Off-Road Alternative shown in Yellow.

**Table 4. Regional Trails Program  
Criteria for Ranking Trail Alternatives – Segment 3**

CRITERIA	NEW TRAIL ALTERNATIVE
<b>Good Steward of Public Funds: 1=No, 2=Uncertain, 3=Yes</b>	
Constructible Within Expected Budget (<\$5 million, \$5 to \$10 million, >\$10 million)	3
Meets Project Purpose and Public Need (Trail User experience, Improved Conditions, Connectivity, ESJ, etc.)	1
Constructible Within Expected Timeline (Ready to Ad by 2019, Construction 2020)	3
<b>Be a Good Neighbor: 1= No, 2=Neutral, 3=Yes</b>	
Public Support (still doing outreach)	2
City Support	2
Adjacent Property Owner Support (still doing outreach)	2*
Inter-Agency Support	3
Improves Traffic Conditions	1
Property Easements and Acquisitions are Obtainable	2
Connectivity to Amenities, Transit, Civic, Commerce, Schools, or other	3
<b>Design for Safety: 1=No, 2=Partially, 3=Yes</b>	
Meets Regional Trail Standards (Trail Width, Site Lines, Buffers, Signage, etc.)	3
Meets AASHTO/NACTO Guidelines	3
<b>Meet Regulatory Requirements: 1=No, 2=Maybe, 3=Yes</b>	
Avoids/Minimizes Critical Area Impacts	3
Avoids/Minimizes Cultural Resource Impacts	3
Provides Opportunities for Green Building	3
Permits Can Be Obtained	3
<b>Total Score (48 points possible)</b>	<b>40</b>

\*Current unpermitted use in the ROW may impact property owner support.



## 4. CONCLUSION

Segment 1 proposes widening of the existing Green River Trail to regional trail standards from Cecil Moses Park to just north of the property used by Dick’s Towing.

Segment 2 runs from north of Dick’s Towing through South 96th Street, crossing the Tukwila city limits into unincorporated King County, with two viable alternatives for trail layout: constructing the trail in the right-of-way by converting the road to one-way southbound with a roundabout and turn-around, or constructing the trail off-road with a boardwalk, an on-road section, and a utility corridor.

The One-Way Alternative scored the highest using the evaluation criteria and is the preferred and recommended alternative moving forward. This alternative does still face several challenges that will have to be resolved in design related to emergency access and utility relocation. Substantial community outreach is also needed to help the public and adjacent businesses understand and plan for the change in traffic patterns. King County will continue to coordinate with these groups to understand concerns and incorporate design solutions to mitigate the concerns.

Segment 3 proposes constructing a new trail meeting regional trail standards with a buffer from South 96th Street to the intersection of 14th Avenue South and South Director Street.

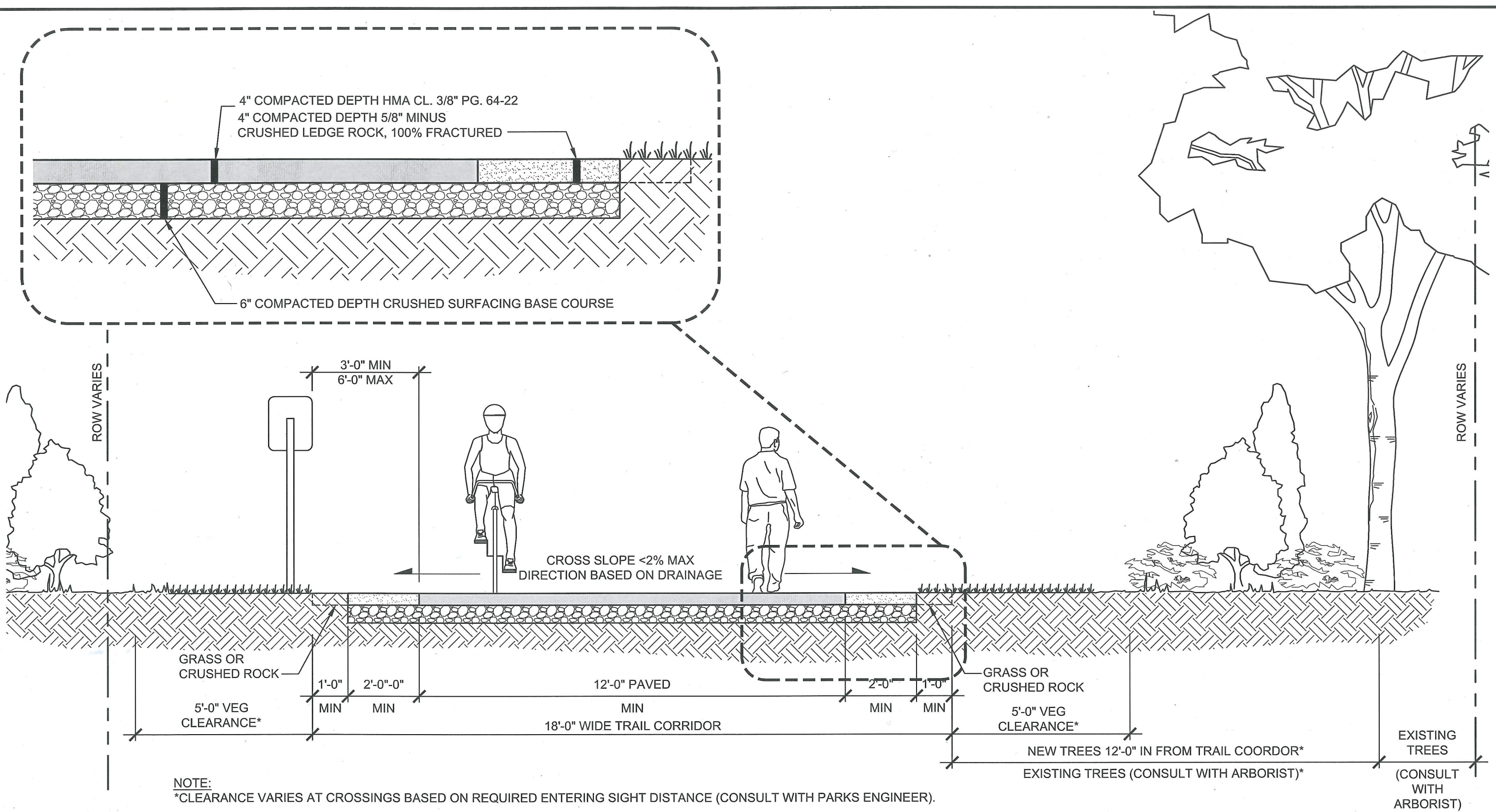
Cost estimates and alternative alignment conceptual plans are included in Appendix B.

Appendix A  
Regional Trail Standard





FILE: 2017-03-20 RTS1 LAYOUT: RTS1 PATH: X:\CIP Projects\Regional Trail Standards\CAD Standards\2017-03-01 Received PLOTTED BY: bradfordb DATE: Monday, March 20, 2017 9:32:14 AM



NOTE:  
\*CLEARANCE VARIES AT CROSSINGS BASED ON REQUIRED ENTERING SIGHT DISTANCE (CONSULT WITH PARKS ENGINEER).

1 REGIONAL TRAIL  
TYPICAL CROSS SECTION

NOT TO SCALE

REGIONAL TRAIL STANDARD

DWG # RTS-1

**King County**  
Department of Natural Resources & Parks  
Parks & Recreation Division

APPROVED FOR PUBLICATION  
*Kevin Brown* 3/20/17  
KEVIN BROWN, DIRECTOR DATE

ENG/ARCH APPROVAL: <i>[Signature]</i>	DATE 3/20/17	DATE ISSUED	2017-03-14	SHEET # 1 OF 1
OPERATIONS APPROVAL: <i>[Signature]</i>	DATE	DATE REVISED	2017-03-14	
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT		VERSION	2017-1	

REVISIONS OR ADDITIONS MAY OCCUR TO STANDARD DETAILS AT ANY POINT IN TIME. VERIFICATION OF COMPLIANCE WITH CURRENT REGULATIONS AND CODES IS SOLELY THE RESPONSIBILITY OF THE DESIGNER OR ENGINEER.

# Appendix B

## Cost Estimate and Conceptual Plans of Alternatives



## Green River Trail North Extension Draft Conceptual Construction Cost Estimate

### Off Road Estimate

Length (LF):	Description	Approx Widening (ft)	Basic Trail		Intersection Improvements	Intersection Location	Environmental Mitigation	ROW	Comments	Total
			Section Cost per LF of Widening	Basic Trail Section Material Cost						
Segment 1	3942	Widen Existing Trail	4	\$ 150	\$ 591,300	\$ 250,000	4 Driveways & Signal Crossing Enhancements at Interchange	\$ -		\$ 840,000
Segment 2	1473	Off-Road (Boardwalk)	16	\$ 900	\$ 1,325,700	\$ -		\$ 250,000	Environmental Mitigation is a very approximate guess. Boardwalk goes over a Superfund site.	\$ 1,580,000
Segment 2	618	Enhanced striping/signage only		\$ 25	\$ 15,450	\$ -		\$ -		\$ 20,000
Segment 2	1240	Off-Road (Utility Corridor/Boardwalk)	0	\$ 700	\$ 868,000	\$ 300,000	Enhancements at SCL entrance and at Delta Marine	\$ 100,000	Environmental Mitigation is a very approximate guess. Boardwalk goes through Hamm Creek buffer and crosses Hamm Creek.	\$ 1,270,000
Segment 3	1716	New 12 foot trail w/2-foot shoulders	16	\$ 350	\$ 600,600	\$ 300,000	Enhancements at 4 commercial driveways	\$ -		\$ 900,000
	8989								<b>Total:</b>	<b>\$ 4,610,000</b>

### One Way Estimate

Length (LF):	Description	Approx Widening (ft)	Basic Trail		Additional Improvements	Location	Environmental Mitigation	ROW	Comments	Total	
			Section Cost per LF of Widening	Basic Trail Section Material Cost							
Segment 1	3942	Widen Existing Trail	4	\$ 150	\$ 591,300	\$ 250,000	4 Driveways & Signal Crossing Enhancements at Interchange	\$ -		\$ 840,000	
Segment 2	1477	One-Way Conversion	0	\$ 50	\$ 73,850	\$ 60,000	Turnaround	\$ 30,000	\$ 20,000	ROW and Environmental Mitigation is needed for turnaround and is extremely approximate.	\$ 180,000
Segment 2	620	One-Way Conversion	0	\$ 50	\$ 31,000	\$ 350,000	Roundabout at Interchange	\$ -	\$ 150,000	ROW is needed for roundabout, and is extremely approximate.	\$ 530,000
Segment 2	1130	One-Way Conversion	0	\$ 50	\$ 56,500	\$ 300,000	Enhancements at SCL entrance and at Delta Marine	\$ -		\$ 360,000	
Segment 3	1716	New 12 foot trail w/2-foot shoulders	16	\$ 350	\$ 600,600	\$ 300,000	Enhancements at 3 commercial driveways	\$ -		\$ 900,000	
	8885								<b>Total:</b>	<b>\$ 2,810,000</b>	

SEGMENT ONE

SR 99

27TH AVE S

CECIL MOSES PARK

WIDEN EX. TRAIL ALTERNATIVE

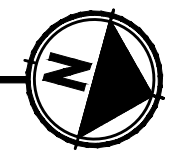
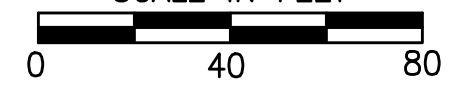
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2.0'

2.0'

PLAN

SCALE IN FEET



PROPOSED TRAFFIC BARRIER

SEGMENT ONE

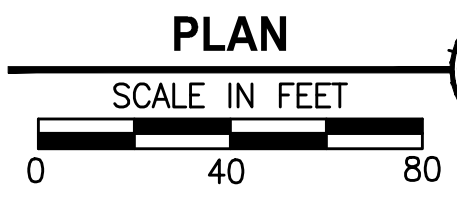
SR 99

WIDEN EX. TRAIL ALTERNATIVE 27TH AVE S

UPS DWY 2

UPS DWY 1

12.0'  
2.0' 2.0'



PROPOSED TRAFFIC BARRIER

SEGMENT ONE

SR 99

12.0'  
2.0' 2.0'

UPS DWY 3

WIDEN EX. TRAIL ALTERNATIVE

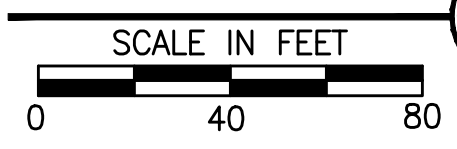
27TH AVE S

UPS DWY 4

BOEING DWY

UPGRADE RAMPS

PLAN



PROPOSED TRAFFIC BARRIER

SEGMENT ONE

SR 99

W MARGINAL PL S

S 102ND ST

UPGRADE RAMPS

SHIPPERS  
TRANSPORT  
EXPRESS  
DWY 1

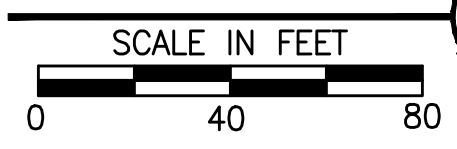
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TRANSPORT  
EXPRESS  
DWY 2

WIDEN EX. TRAIL ALTERNATIVE

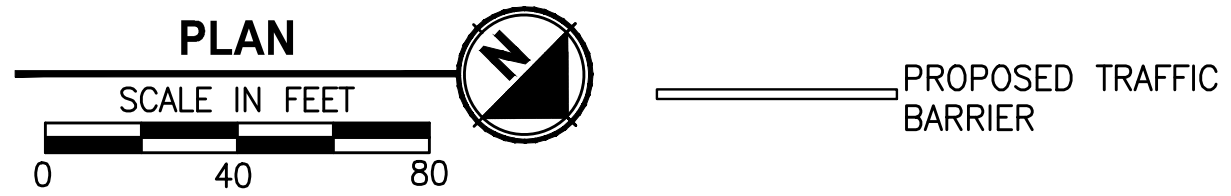
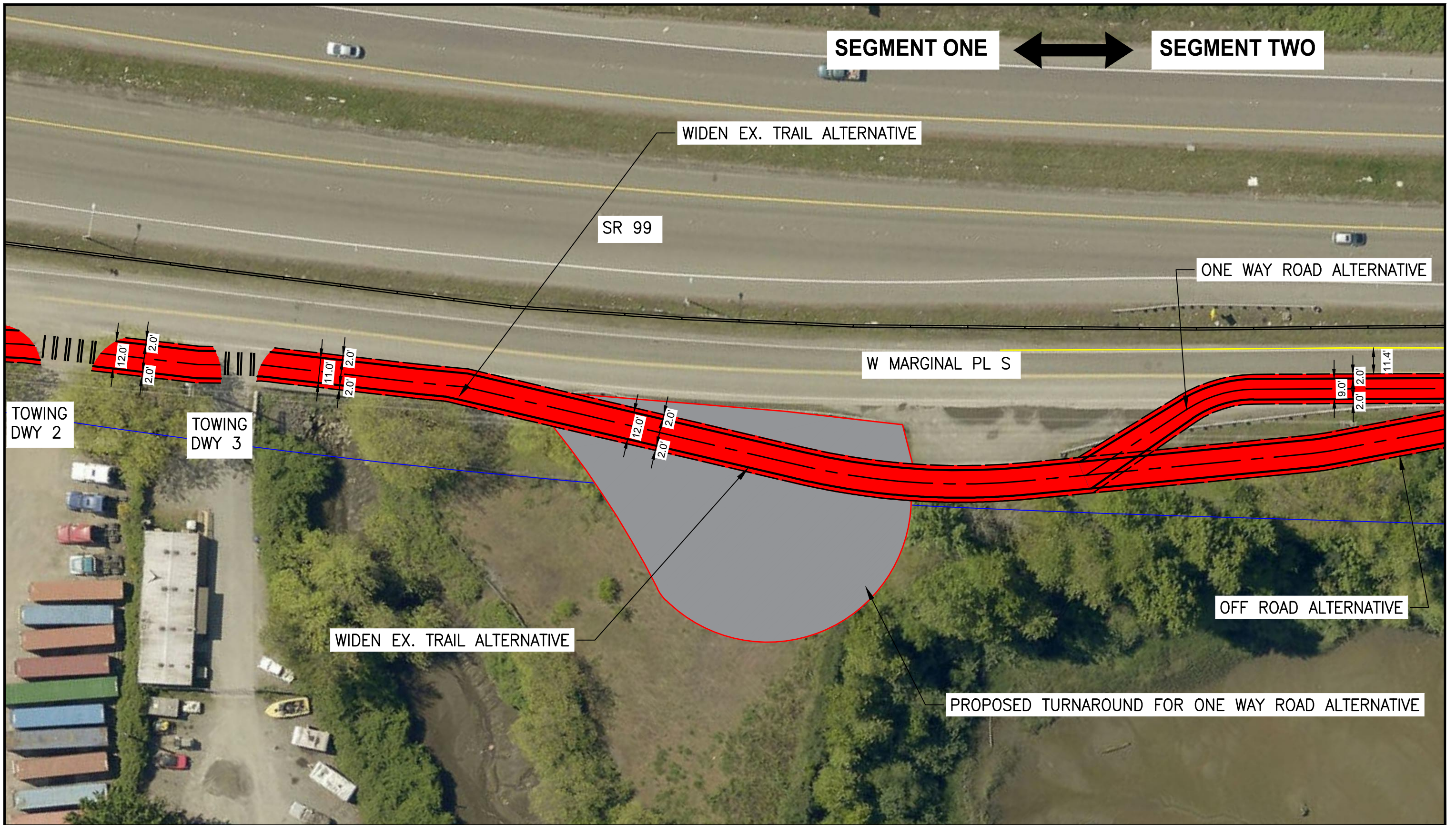
TOWING  
DWY 1



PLAN



PROPOSED TRAFFIC BARRIER



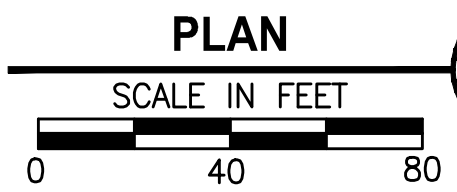
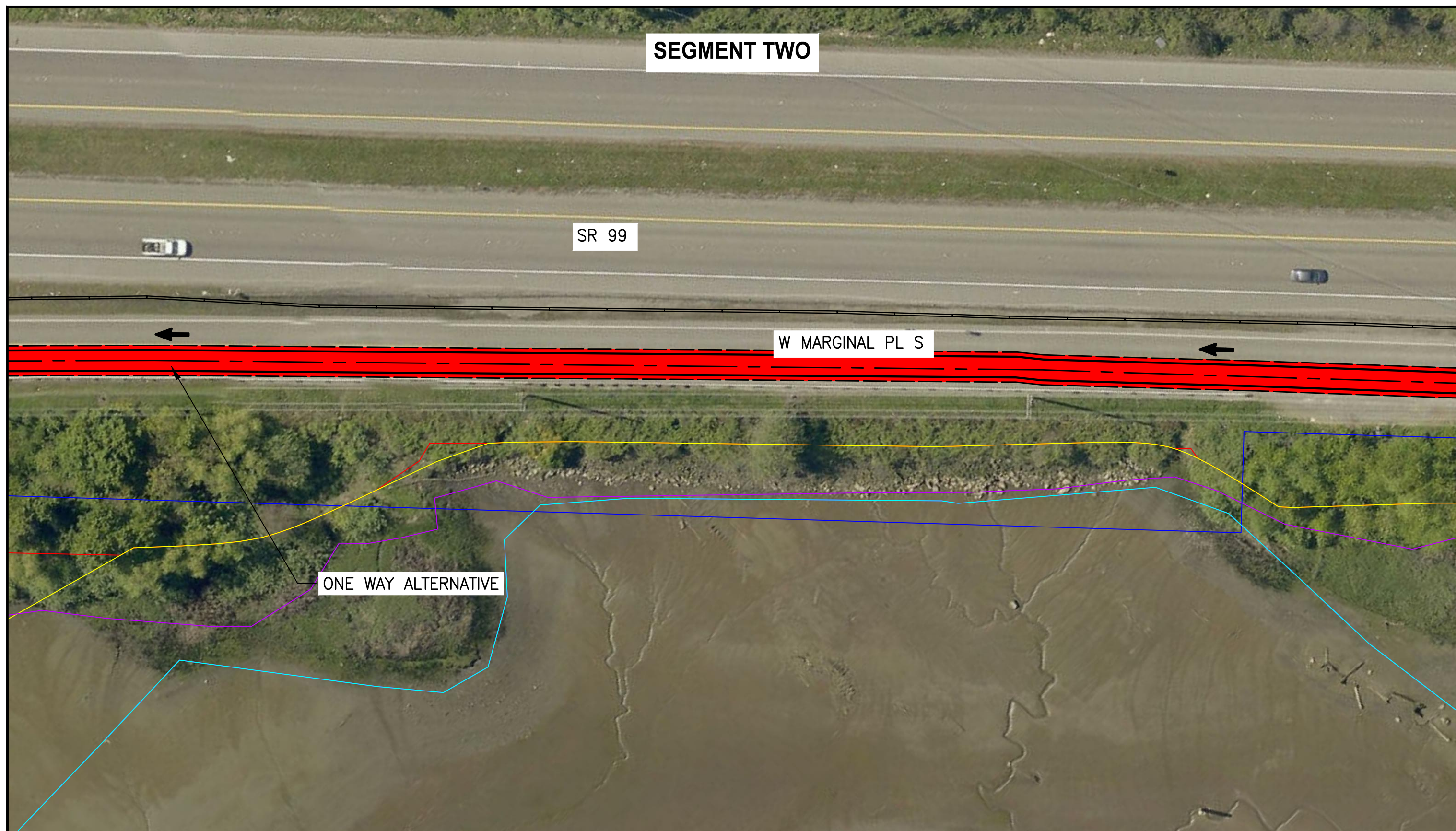


SEGMENT TWO

SR 99

W MARGINAL PL S

ONE WAY ALTERNATIVE



PROPOSED TRAFFIC BARRIER

SEGMENT TWO

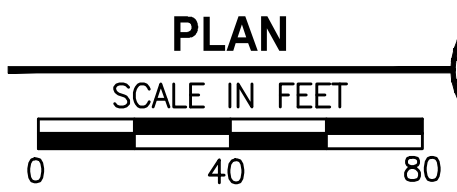
SR 99

W MARGINAL PL S

OFF ROAD ALTERNATIVE

12.0'  
2.0'

12.0'  
2.0'



PROPOSED TRAFFIC BARRIER

A symbol consisting of two parallel horizontal lines representing a proposed traffic barrier.

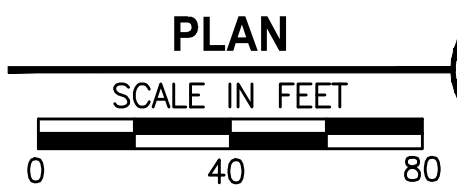
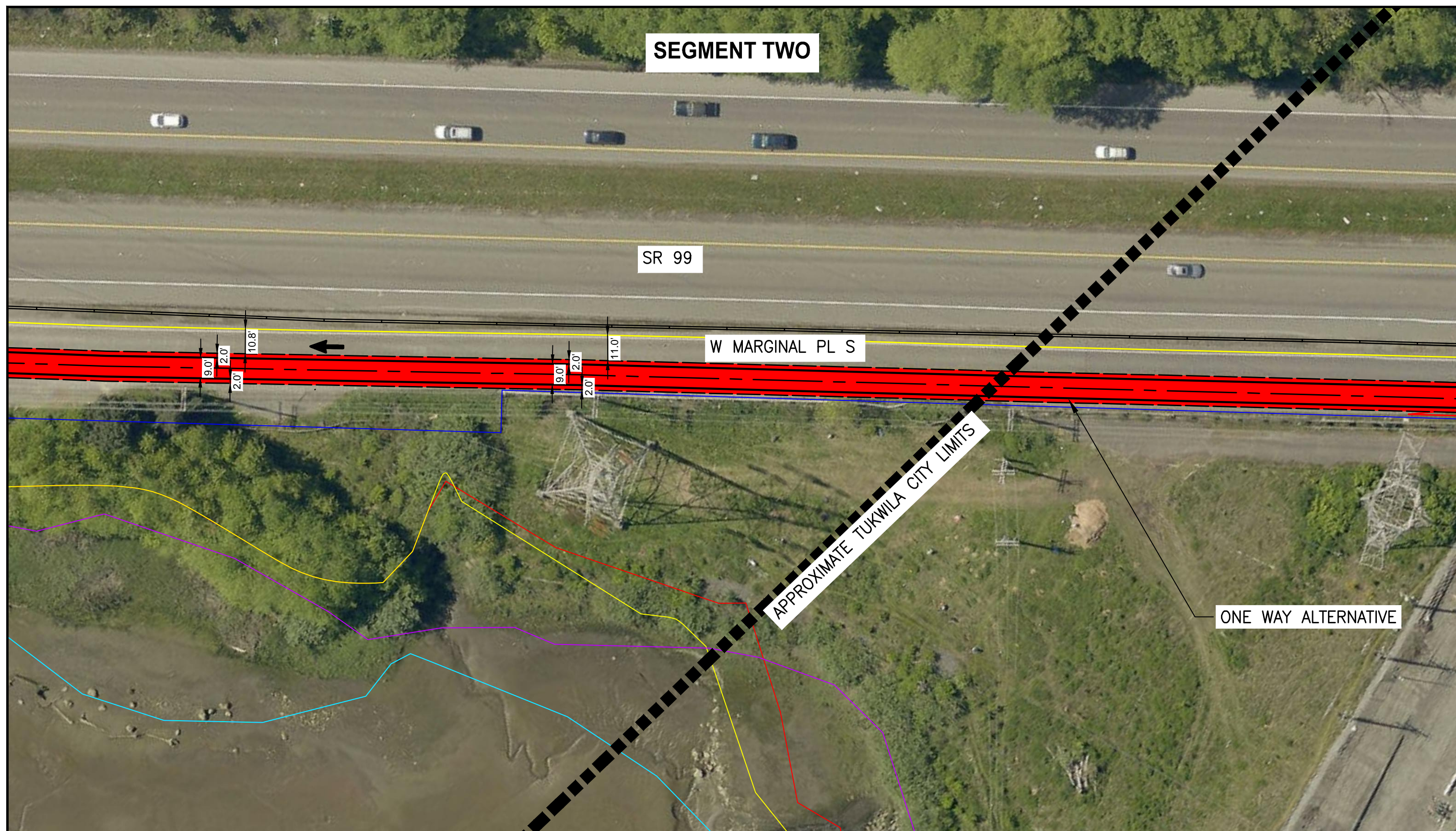
SEGMENT TWO

SR 99

W MARGINAL PL S

APPROXIMATE TUKWILA CITY LIMITS

ONE WAY ALTERNATIVE



PROPOSED TRAFFIC BARRIER

SEGMENT TWO

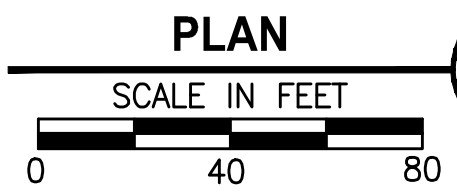
SR 99

W MARGINAL PL S

OFF ROAD ALTERNATIVE

APPROXIMATE TUKWILA CITY LIMITS

12.0'  
2.0'  
2.0'



PROPOSED TRAFFIC BARRIER

A symbol consisting of two parallel lines representing a proposed traffic barrier.

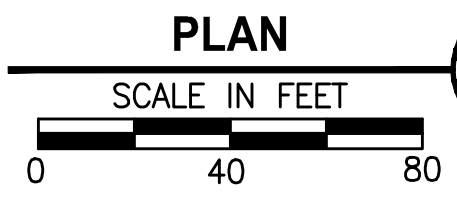
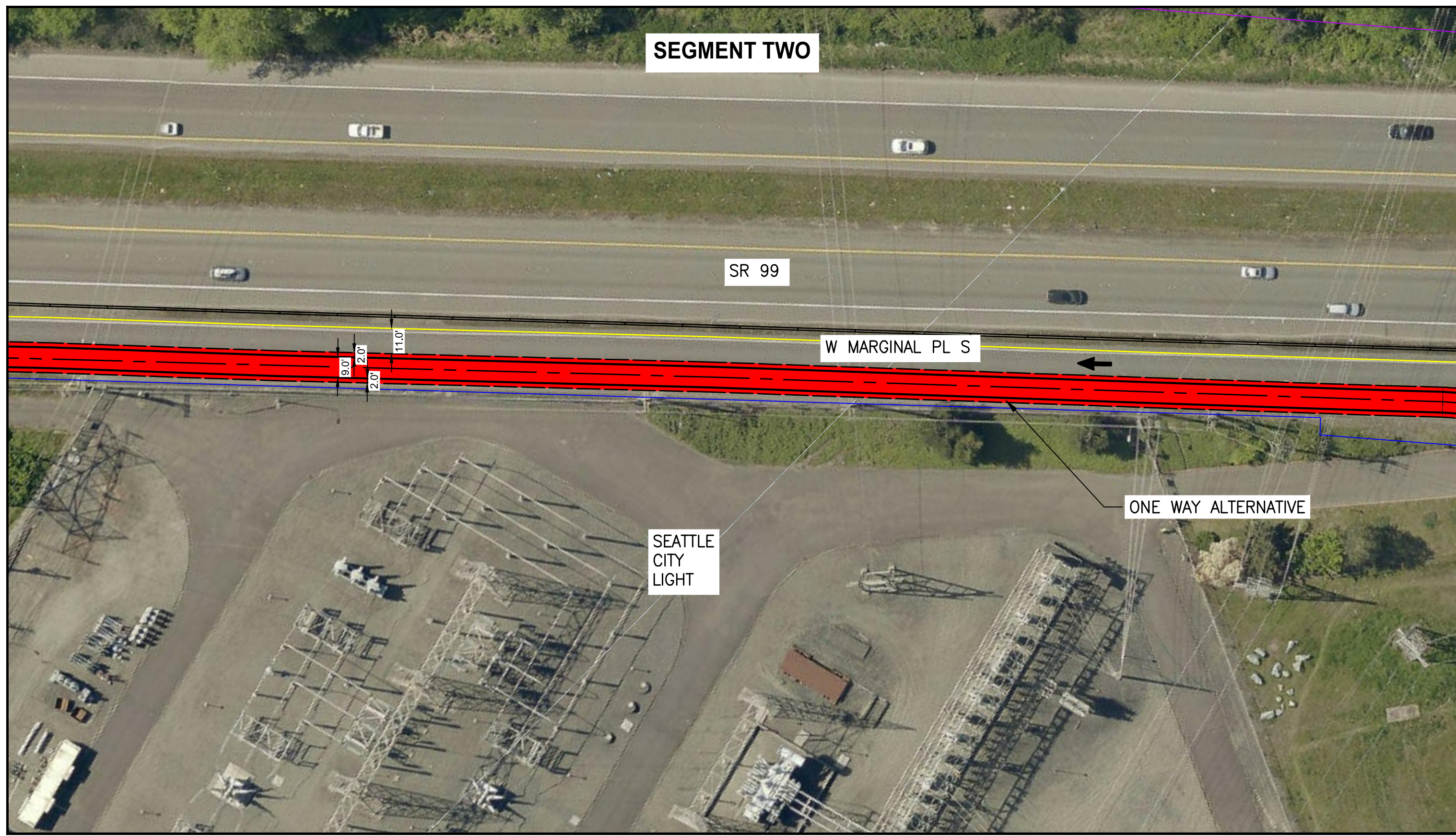
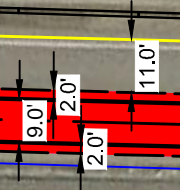
SEGMENT TWO

SR 99

W MARGINAL PL S

ONE WAY ALTERNATIVE

SEATTLE CITY LIGHT



PROPOSED TRAFFIC BARRIER

SEGMENT TWO

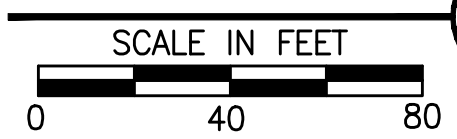
SR 99

W MARGINAL PL S

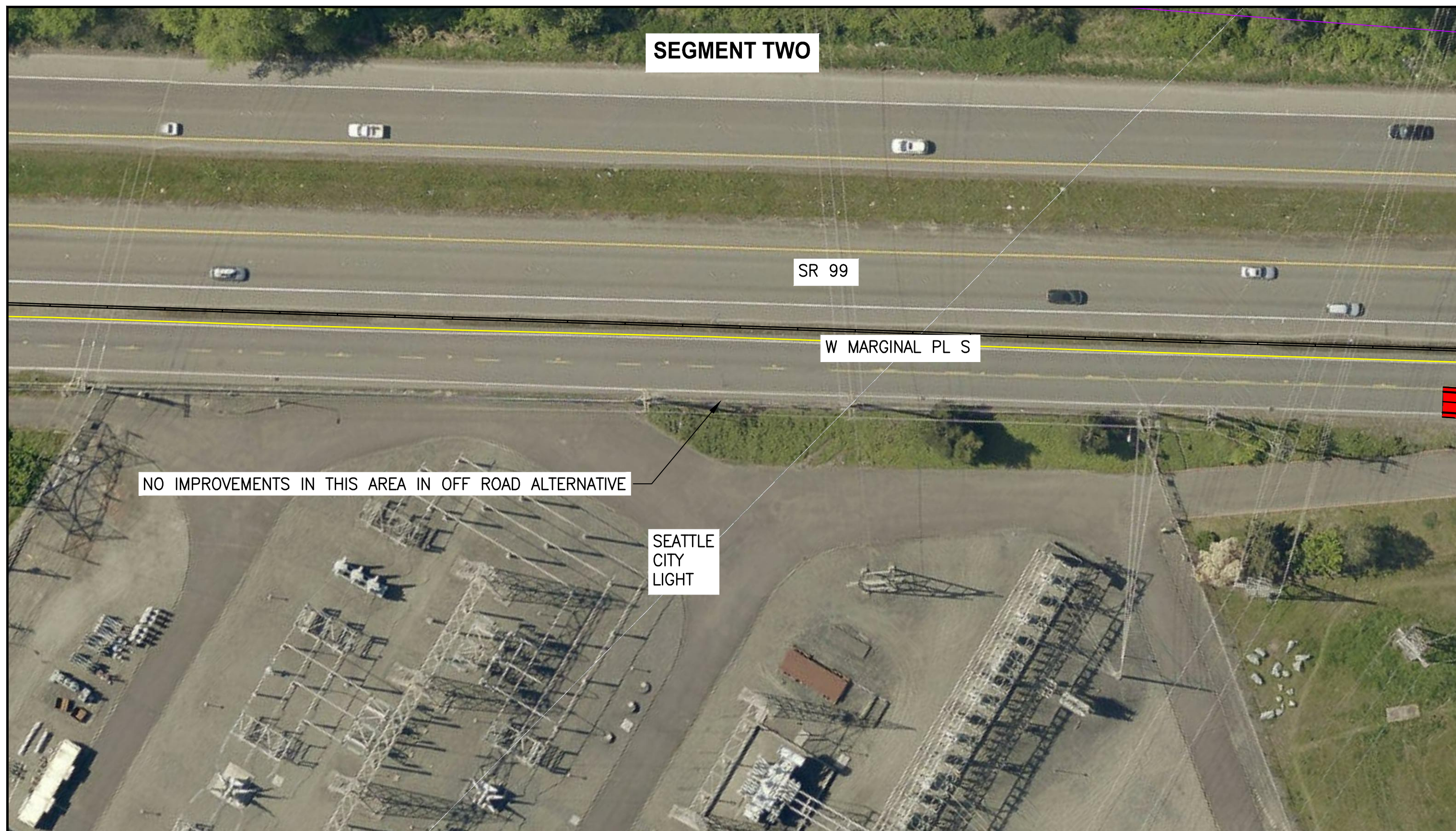
NO IMPROVEMENTS IN THIS AREA IN OFF ROAD ALTERNATIVE

SEATTLE CITY LIGHT

PLAN



PROPOSED TRAFFIC BARRIER



SEGMENT TWO

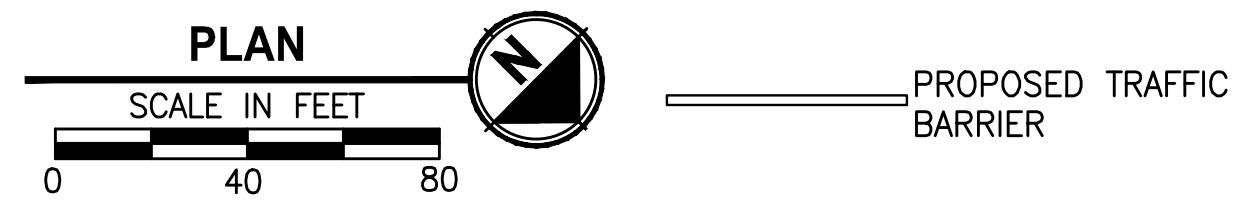
SR 99

W MARGINAL PL S

LIGHT AND POWER DWY

ONE WAY ALTERNATIVE

HAMM CREEK



SEGMENT TWO

SR 99

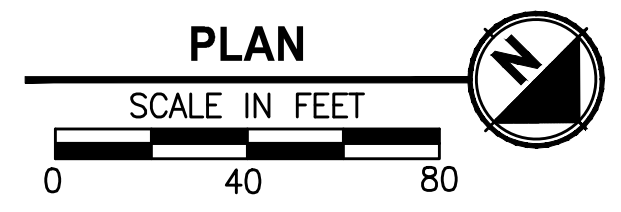
W MARGINAL PL S

LIGHT AND  
POWER DWY

OFF ROAD ALTERNATIVE

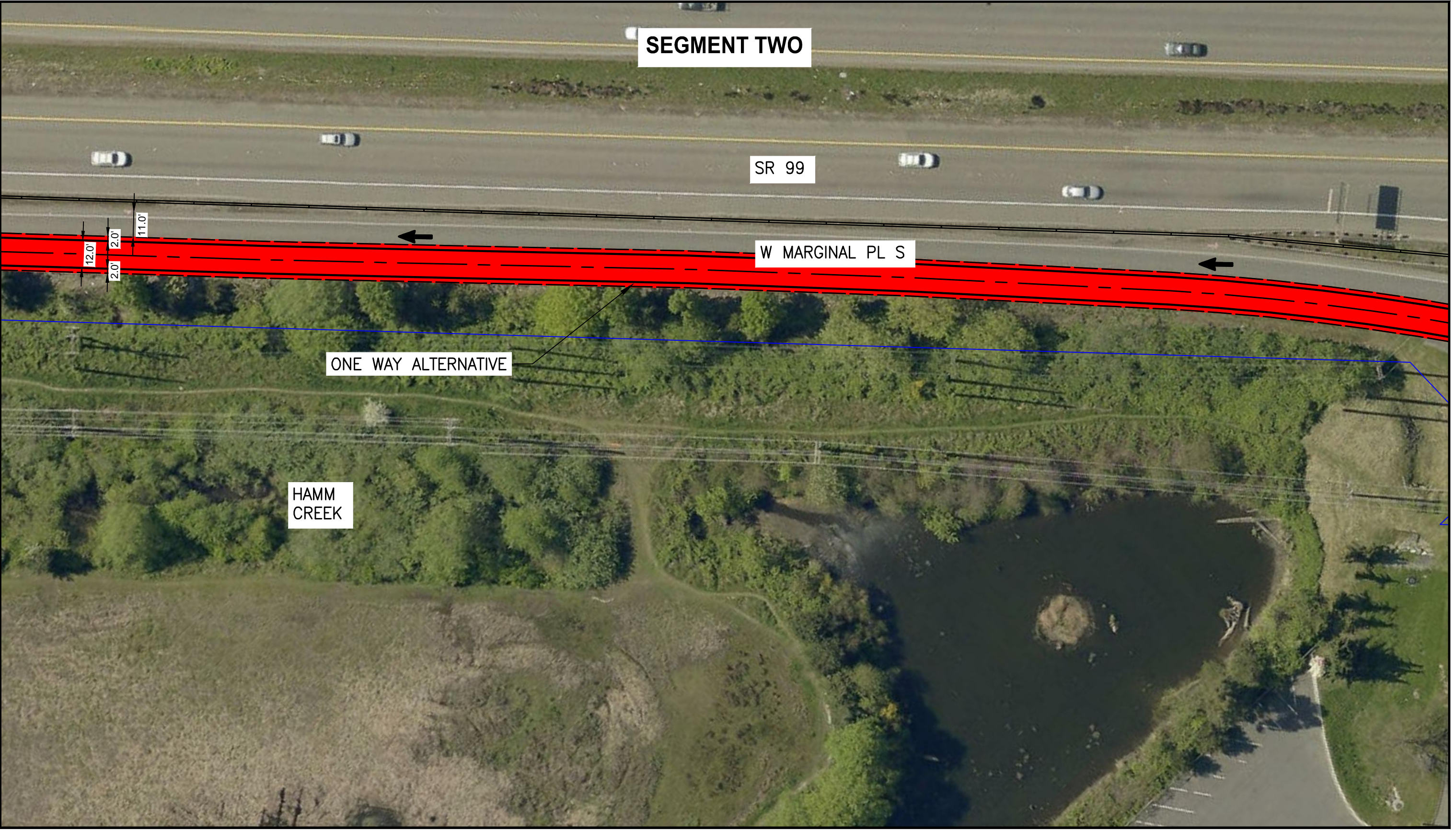
HAMM  
CREEK

12.0'  
2.0'



PROPOSED TRAFFIC BARRIER





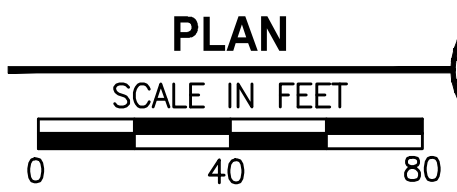
SEGMENT TWO

SR 99

W MARGINAL PL S

ONE WAY ALTERNATIVE

HAMM CREEK



PROPOSED TRAFFIC BARRIER

SEGMENT TWO

SR 99

W MARGINAL PL S

HAMM  
CREEK

OFF ROAD ALTERNATIVE

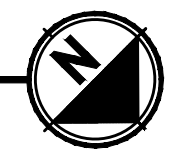
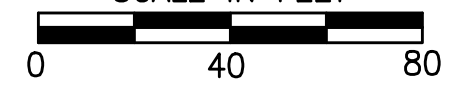
12.0'

2.0'

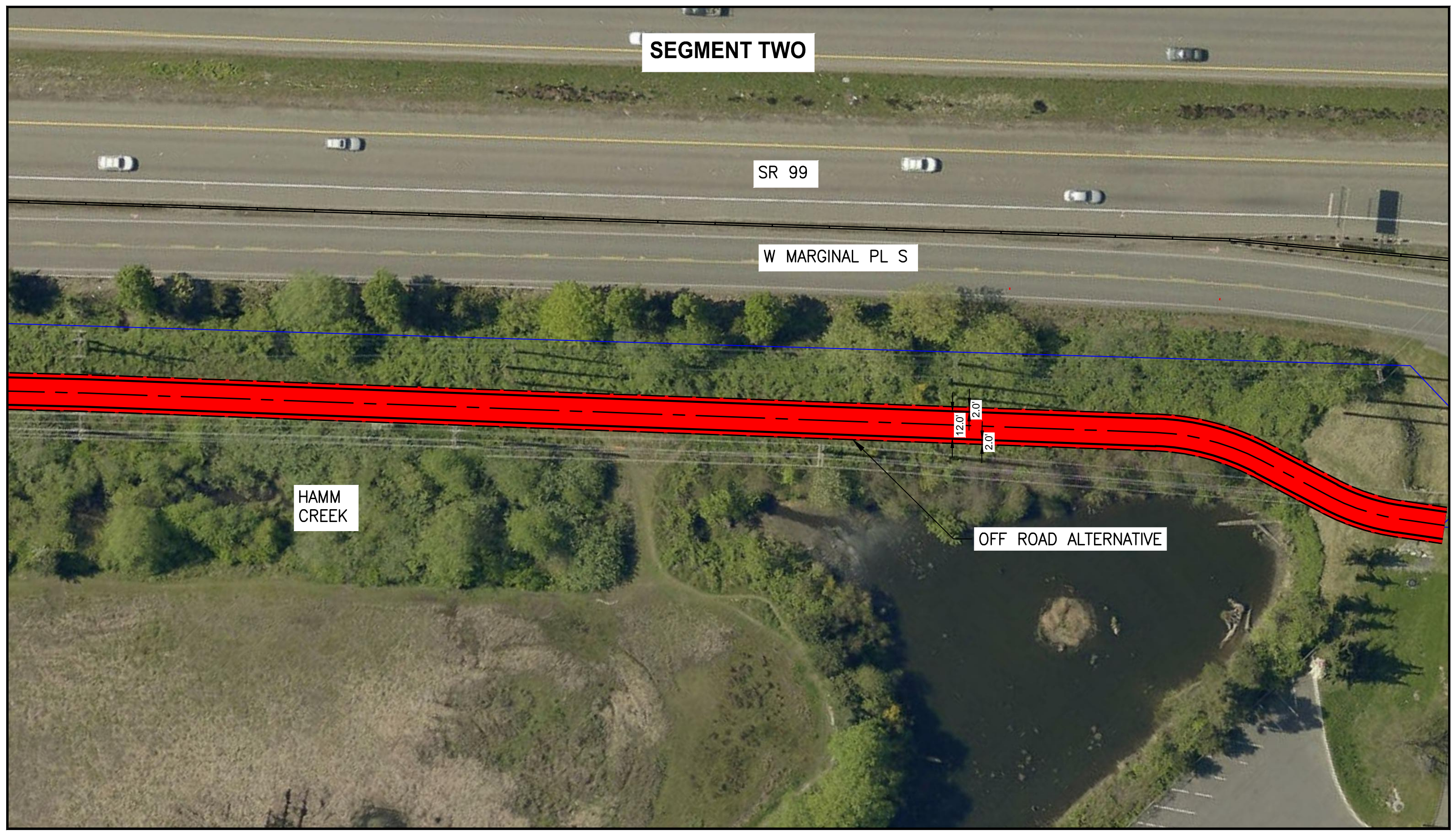
2.0'

PLAN

SCALE IN FEET



PROPOSED TRAFFIC BARRIER



SEGMENT THREE

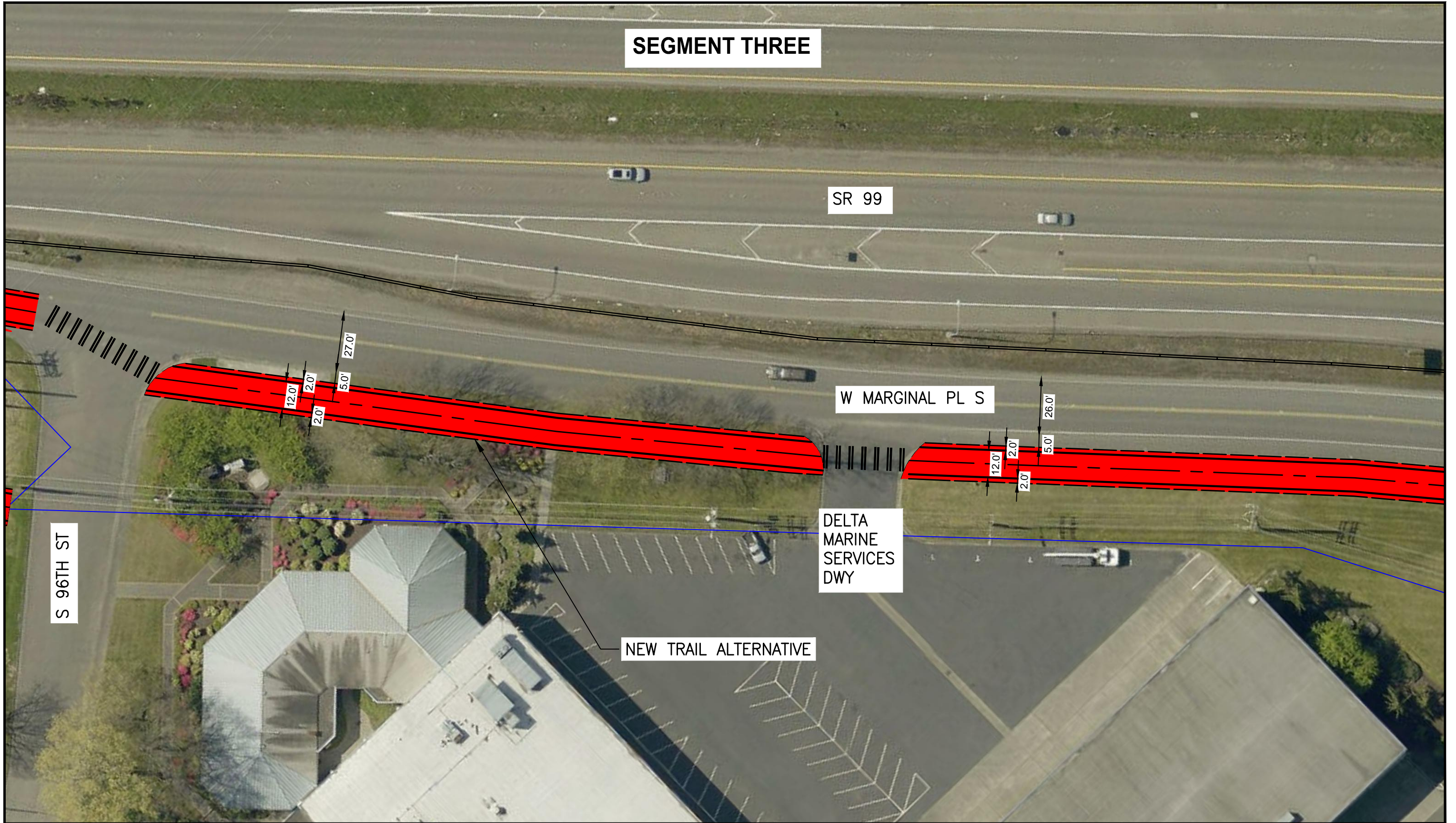
SR 99

W MARGINAL PL S

DELTA  
MARINE  
SERVICES  
DWY

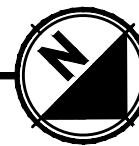
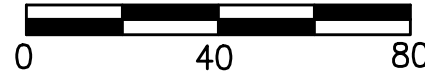
S 96TH ST

NEW TRAIL ALTERNATIVE

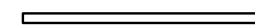


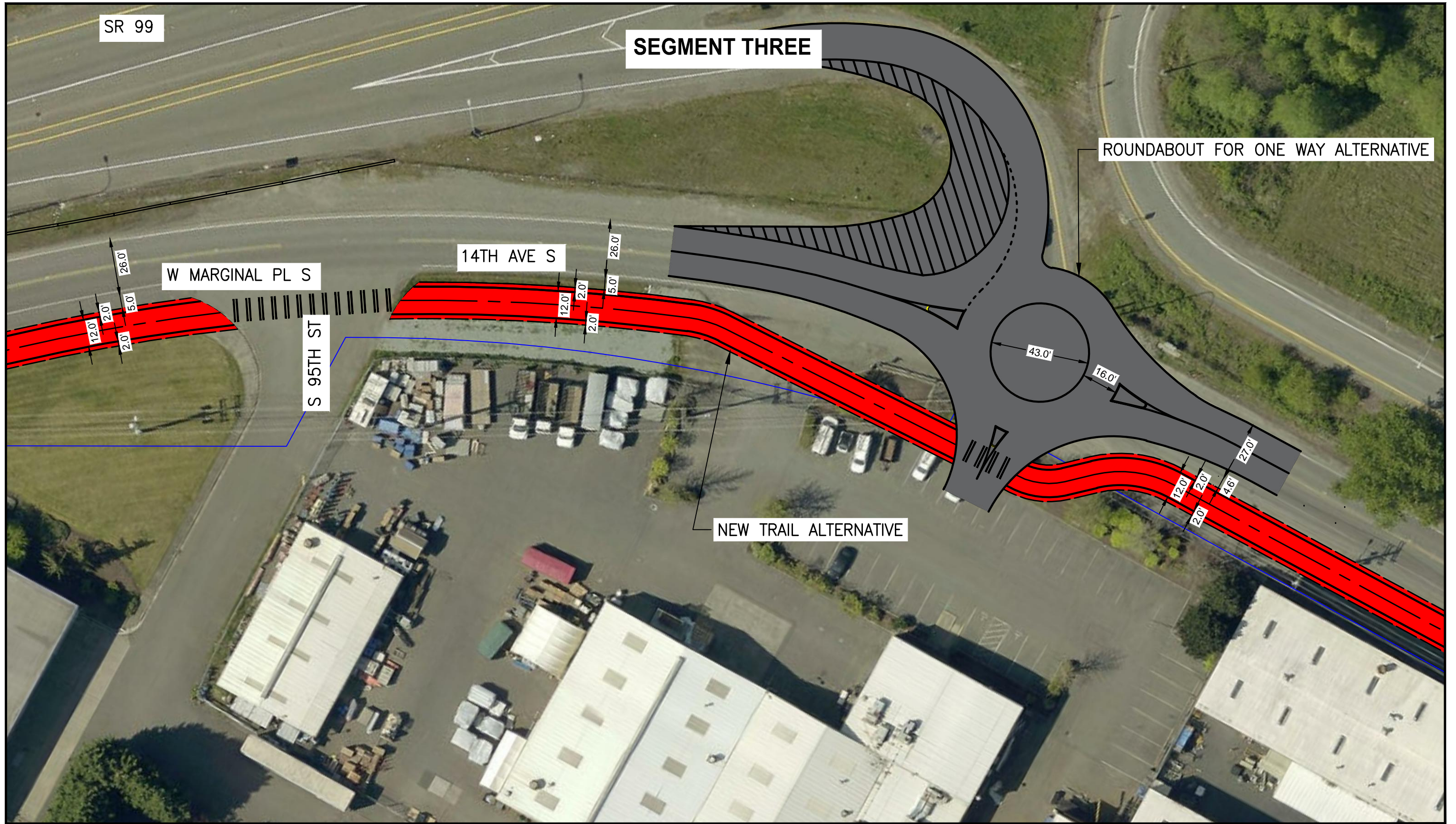
PLAN

SCALE IN FEET



PROPOSED TRAFFIC  
BARRIER





SR 99

SEGMENT THREE

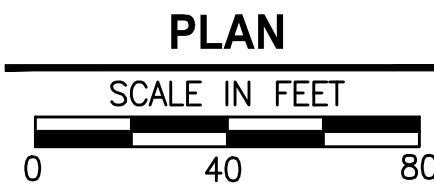
ROUNDAABOUT FOR ONE WAY ALTERNATIVE

W MARGINAL PL S

14TH AVE S

S 95TH ST

NEW TRAIL ALTERNATIVE



PROPOSED TRAFFIC BARRIER

PLAN

SCALE IN FEET

0 40 80

43.0'

16.0'

27.0'

12.0'

2.0'

4.6'

2.0'

26.0'

12.0'

2.0'

5.0'

2.0'

26.0'

12.0'

2.0'

5.0'

2.0'

