

Appendix H  
**Location of I-5 Alternative  
within I-5 Right-of-Way**

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# Location of I-5 Alternative within I-5 Right-of-Way

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## H.1 Introduction

The Federal Way Link Extension (FWLE) I-5 Alternative would extend south from the Angle Lake Station, cross over State Route (SR) 99 on an elevated structure, and continue along the south side of the future alignment of the Washington State Department of Transportation (WSDOT) proposed SR 509 extension until reaching I-5. The alignment would then turn south and generally follow the west side of I-5 to Federal Way.

The existing right-of-way width of I-5 varies within the project corridor. North of Kent-Des Moines Road, most of the available right-of-way would be required for future expansion of I-5 (as identified in the “I-5 - SR 509 Corridor Completion and Freight Improvement Project,” WSDOT, 2014). As such, the light rail alignment would be located largely outside of the existing I-5 right-of-way in this area. South of Kent-Des Moines Road, sufficient right-of-way exists to accommodate the I-5-SR 509 Corridor Completion and Freight Improvement Project (hereafter referred to as the “SR 509 Project”) and a light rail alignment.

The width of the undeveloped I-5 right-of-way under consideration for transit use varies from roughly 20 feet to 45 feet along the potential alignment. Given the project’s current level of conceptual design, it is premature to define the precise location of the light rail guideway within this strip of undeveloped right-of-way. If for the Final Environmental Impact Statement (EIS) Sound Transit identifies a Preferred Alternative within the I-5 right-of-way, additional analysis and more detailed design will help inform the specific siting of the guideway within the right-of-way.

To help decision-makers and the public understand potential impacts of an alignment within the undeveloped I-5 right-of-way, Sound Transit has assumed in this Draft EIS that the guideway will generally follow the western edge of the interstate right-of-way. This is to ensure that potential impacts neighboring properties and land uses are disclosed as fully as possible given the current level of design. It also reflects the general practice of agencies with jurisdiction over interstate highways (in Washington state, the Federal Highway Administration [FHWA] and WSDOT) to locate non-highway uses as far as possible from an existing highway. There are several reasons for this approach, including the following:

- **Safety:** As the distance diminishes between the proposed non-highway structure and the highway pavement, the risk to highway users increases. The amount of increased hazard at any location depends on factors like the specific highway configuration, location-specific highway volumes, average speeds, topography, and the distance from the edge of pavement to the structure/barrier. The effect could be a very slight increase in the accident rate a substantial increase, depending on the factors involved. Safety mitigation measures may help, but WSDOT and FHWA believe they will

not fully mitigate safety concerns. For example, a guardrail in front of the structure may mitigate the increased hazard of a non-highway use's large concrete pier, but guardrails themselves are potential hazards.

- **Future highway-related needs for the right-of-way:** The highway agencies must also determine that any use of the right-of-way leaves enough room to accommodate reasonably foreseeable highway expansion needs, considering the width of the right-of-way and the anticipated regional growth. Even if highway expansion is not precluded after the introduction of the non-highway use, such projects become more difficult and expensive if there is inadequate right-of-way in which to work. In addition to potentially needing right-of-way for new lanes, highway agencies may also need it for requirements including new or improved drainage/stormwater facilities, signage, new or existing technologies to improve traffic management, environmental mitigation, upgrading stormwater facilities, and innovative interchange designs. For example, grassy swales within a right-of-way provide an effective stormwater treatment. They can be replaced with concrete vaults, but vaults are more costly and require more maintenance.
- **Operations and maintenance:** The highway agencies must also maintain their roadways. As the amount of right-of-way decreases, the likelihood that maintenance will disrupt traffic increases. If maintenance vehicles have to use the highway shoulders, that also increases risk to motorists. And just as insufficient right-of-way can make new construction more costly, it can increase maintenance costs.

FHWA and WSDOT also recognize that site-specific constraints along the undeveloped right-of-way exist and may require flexibility to adjust the location of the transit guideway to avoid impacts or problems. For example, moving a guideway closer to the pavement from the edge of the right-of-way in some locations could reduce visual and noise impacts; it may avoid or reduce impacts to streams or wetlands or other natural features at a specific location; it may resolve constructability conflicts or serious cost problems due to working in or around existing infrastructure in the area; or it may mitigate or avoid other problems that would exist if the guideway were on the edge of the right-of-way.

To inform the definition of the I-5 Alternative and to provide an initial evaluation of the trade-offs described above, Sound Transit conducted an analysis to compare two potential alignment configurations of the I-5 Alternative south of Kent-Des Moines Road (Exhibit H-1). The western light rail alignment would generally be located along the western limit of the I-5 right-of-way. This configuration is analyzed in the main body of this Draft EIS as the I-5 Alternative (and portions of the SR 99 to I-5 Alternative that are located in the I-5 right-of-way). However, the western limit of the right-of-way is not a straight line. The boundary changes at 90-degree angles throughout the corridor, as shown in the aerial photo views on Exhibits H-2a through 2d. The light rail guideway cannot geometrically or operationally follow such angles. Accordingly, the I-5 Alternative alignment does not completely follow the extreme outer right-of-way edge in all locations in the corridor. The eastern light rail alignment would locate the I-5 Alternative 25 to 40 feet farther east of the western alignment. This appendix compares the implications of both configurations for environmental impacts as well as impacts on future use of the right-of-way for highway purposes as described above.

If the Sound Transit board identifies a preferred alternative that would use portions of the I-5 right-of-way, Sound Transit must secure from WSDOT and FHWA agreements and approvals for such use, or to modify other parts of the freeway, such as shoulders or existing noise walls. Sound Transit has coordinated with FHWA and WSDOT during conceptual design to identify where the alternatives evaluated in the Draft EIS could potentially use the I-5 right-of-way. If an alternative using I-5 right-of-way is identified as preferred, additional design coordination and analysis will occur during the development of the Final EIS. Ultimate approvals would not occur until final design of the FWLE. During final design, FHWA and WSDOT could require modifications or place other conditions on the project that might require other environmental reviews.

## **H.2 Comparison of Impacts**

The comparison of the western and eastern alignments focused on the resources for which there would likely be a difference in impacts between the two alignment configurations. Those resources included transportation (i.e., highway safety), property acquisitions (i.e., I-5 right-of-way), noise, visual quality, ecosystems, hazardous materials (i.e., Midway Landfill), and social.

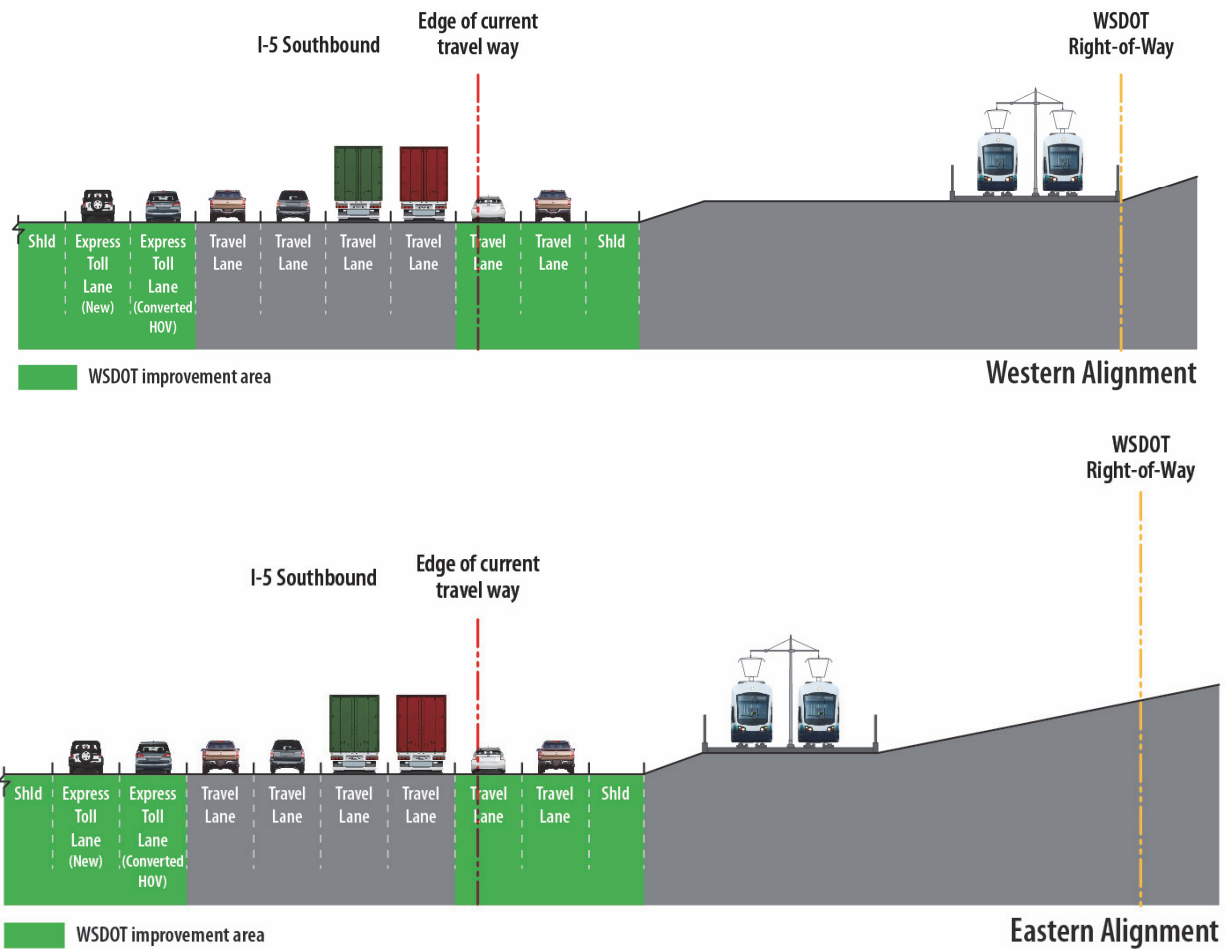
Exhibit H-1 is a representative cross section of the I-5 southbound lanes in the FWLE corridor, showing the western limits of I-5 right-of-way as well as the western limit of the current travel way. The WSDOT improvement area shown in green represents planned and potential WSDOT improvements. The outside two additional lanes and shoulder represent I-5 widening proposed as part of the I-5 - SR 509 Corridor Completion and Freight Improvement Project as designed and documented in FHWA's Record of Decision for that project (FHWA, 2003). The inside improvement area reflects the potential for converting an existing high-occupancy vehicle lane to an express toll lane and adding a second express toll lane and shoulder in the I-5 median. These latter potential improvements have not been studied in an environmental impact statement but have been considered as part of the WSDOT Gateway Program.

To facilitate an understanding of location-specific impacts, Exhibit H-2 documents the implications of both alignment configurations in six general areas along the corridor. These areas were defined based on the characteristics of the adjacent land uses (i.e., residential, landfill, wetland, etc.). The overall results of the analysis are summarized in Table H-1.<sup>1</sup>

### **H.2.1 Clear Zone Impacts**

The American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide (AASHTO, 2011) defines a clear roadside border area or clear zone as an unobstructed, relatively flat area beyond the edge of the traveled way that allows a driver to stop safely or regain control of a vehicle that leaves the traveled way.

<sup>1</sup> Quantified impacts identified in Chapter 4 of this Draft EIS assume the western alignment.



WSDOT improvement area includes additional lanes on the outside of the roadway as proposed in the *I-5 -SR 509 Corridor Completion and Freight Improvement Project* (not funded) as well as toll lanes in the shoulder and current HOV lane as proposed in the *SR 509, I-5 and SR 167 Puget Sound Gateway Project* (not funded).

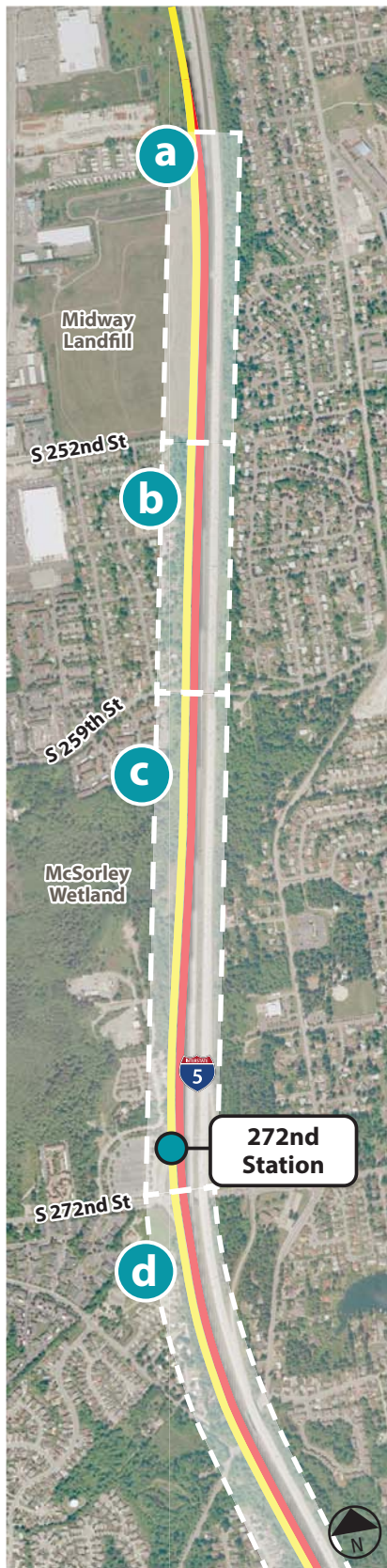
**EXHIBIT H-1**  
Potential Locations of I-5 Alternative within WSDOT Right-of-Way (looking south)

**TABLE H-1**

Comparison of Western and Eastern Alignment Configurations

| Resource                        | Measure                                                                           | Western Alignment        | Eastern Alignment        |
|---------------------------------|-----------------------------------------------------------------------------------|--------------------------|--------------------------|
| Transportation (Highway Safety) | Length (feet) of clear zone removed without SR 509 Project                        | 0                        | 2,300                    |
| Transportation (Highway Safety) | Length (feet) of clear zone removed with SR 509 Project                           | 800                      | 13,300                   |
| Property Acquisitions           | Acres of remnant right-of-way (limited or no use for future highway improvements) | 15.8                     | 30.1                     |
| Noise                           | Number of noise impacts                                                           | 122 moderate, 300 severe | 182 moderate, 217 severe |
| Ecosystems                      | Acres of vegetation removal                                                       | 39                       | 39                       |
|                                 | Acres of wetland impacts (McSorley Creek)                                         | 0.01                     | 0                        |
|                                 | Acres of wetland buffer impacts (McSorley Creek)                                  | 0.64                     | 0.59                     |





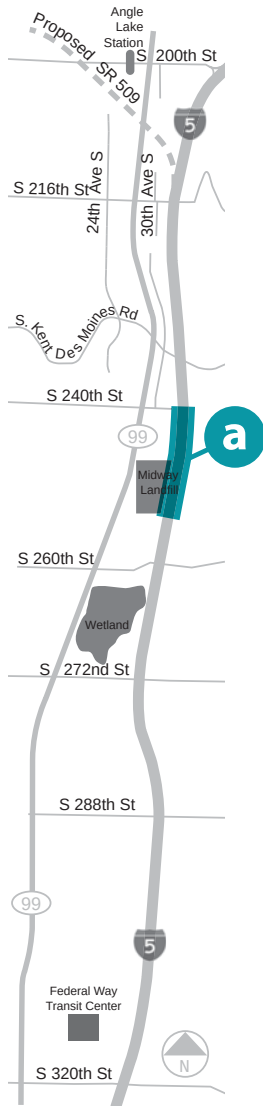
**LEGEND**

- Eastern Alignment
- Western Alignment
- Station
- a Section Key

Not to Scale

EXHIBIT H-2  
Key Map for Comparison of Impacts to I-5 Corridor

# a Midway Landfill – S 244th St to S 252nd St



## Existing Condition:

- No guardrail, slopes up to west, cleared grass area
- Approximate distance between edge of pavement and right-of-way limit is 190 feet for the section shown below

## Eastern Alignment:

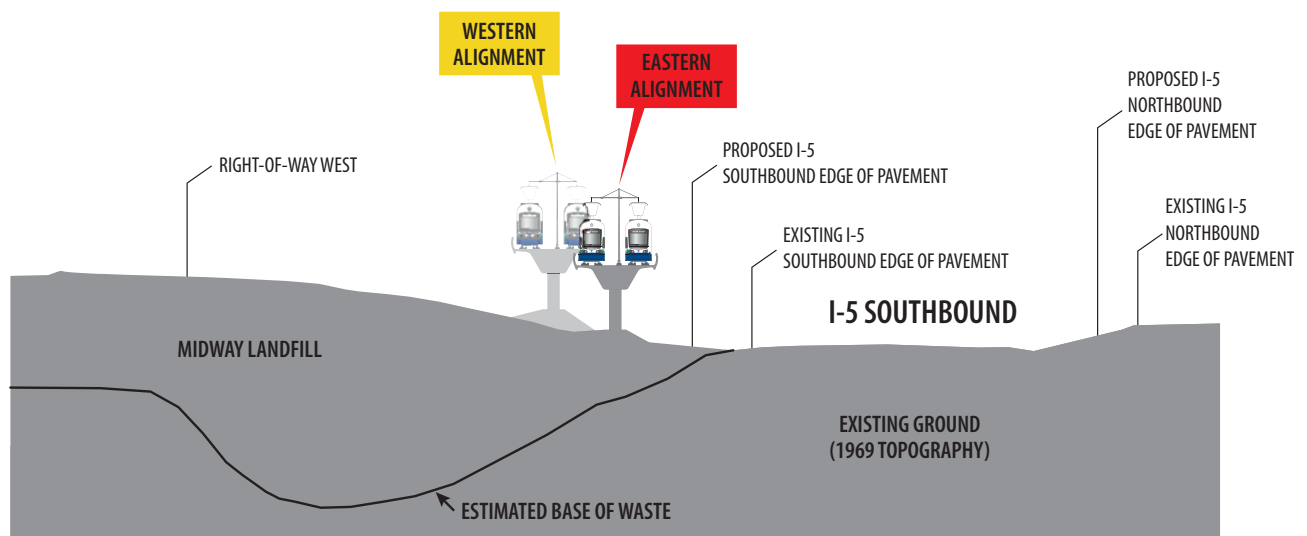
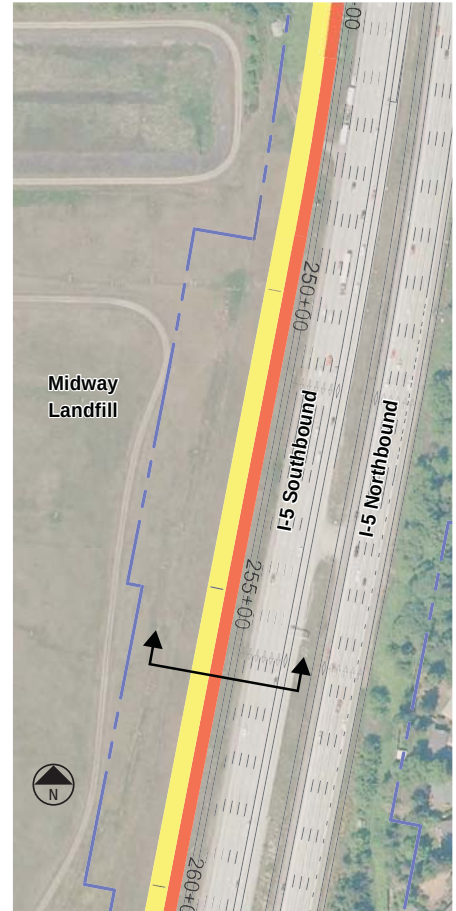
- Larger right-of-way remnant (in landfill)
- Less separation between roadway and structure
- Less space for future improvements
- Less space for right-of-way maintenance

## Western Alignment:

- Increased shaft depths
- Greater risk of encountering hazardous materials and groundwater
- Greater volume of waste removal

## Note:

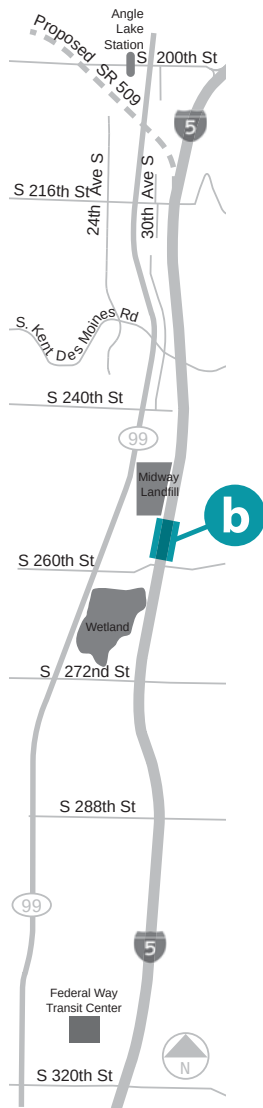
- Landfill length 2,000 ft; 15 shafts



Not to Scale



## b Single-Family Residences – S 252nd St to S 259th St



### Existing Condition:

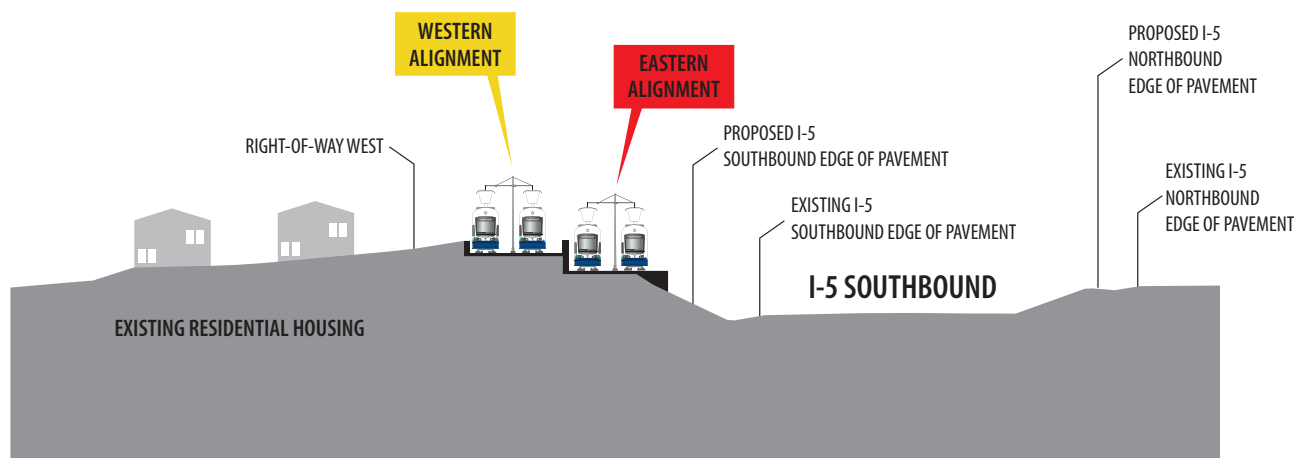
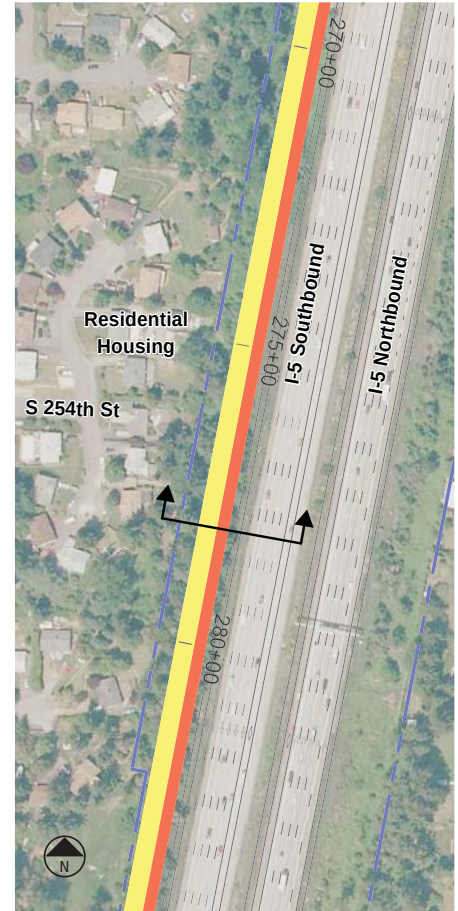
- Guardrail at S 259th St, slopes up to west, berm/bushes/mature trees
- Approximate distance between edge of pavement and right-of-way limit is 115 feet for the section shown below

### Eastern Alignment:

- Precludes opportunity for clear zone or other uses
- Larger right-of-way remnant (5.0 vs. 3.4 acres)
- Could potentially allow for more preservation of mature vegetation
- Less separation between roadway and structure
- Less space for future improvements
- Less space for right-of-way maintenance

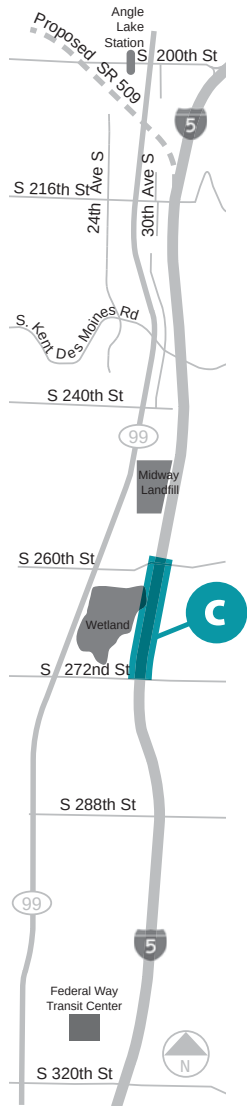
### Western Alignment:

- More transit noise impacts, but could be mitigated
- More potential for visual impacts from removal of mature vegetation closer to homes



Not to Scale

# C McSorley Creek Wetlands – S 259th St to S 272nd St



## Existing Condition:

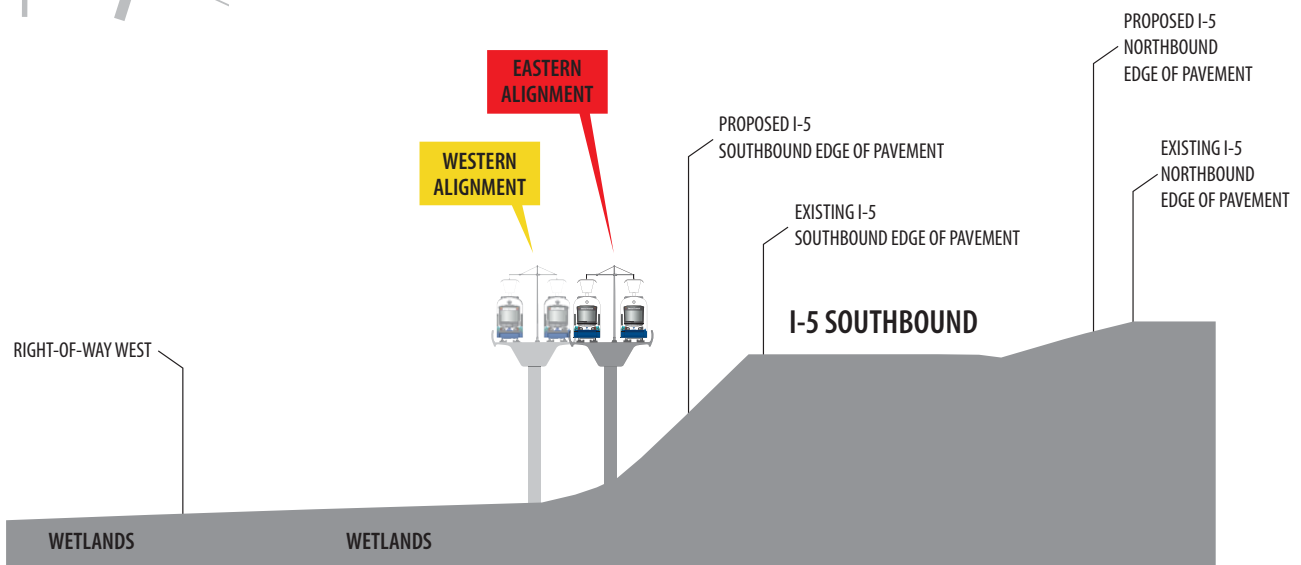
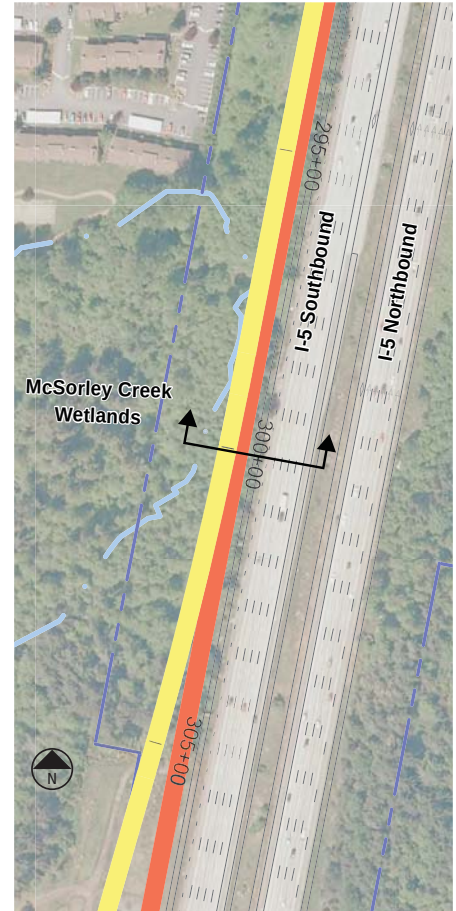
- Guardrail along north half, slopes down to west, mature trees, short detention basin clearing
- Approximate distance between edge of pavement and right-of-way limit is 190 feet for the section shown below

## Eastern Alignment:

- Larger right-of-way remnant (1.6 vs. 0.9 acres)
- Avoids wetland impact
- Less separation between roadway and structure
- Less space for future improvements
- Less space for right-of-way maintenance

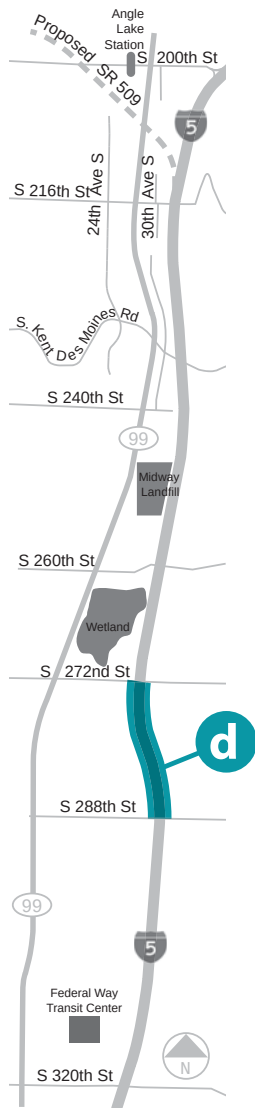
## Western Alignment:

- Some wetland impacts (0.01 acre permanent), could potentially be covered by Nationwide Clean Water Act Section 404 permit



Not to Scale

# **d** Single-Family Residences – S 272nd St to S 288th St



## **Existing Condition:**

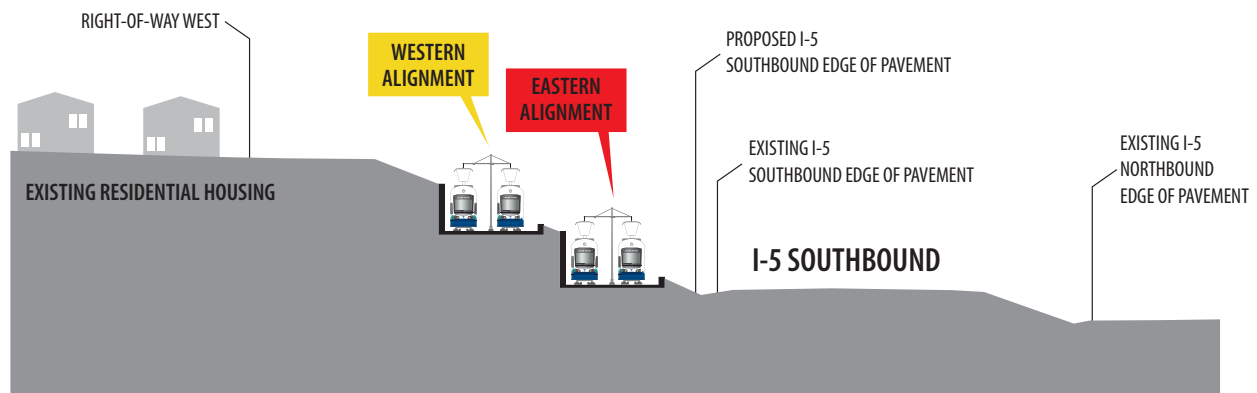
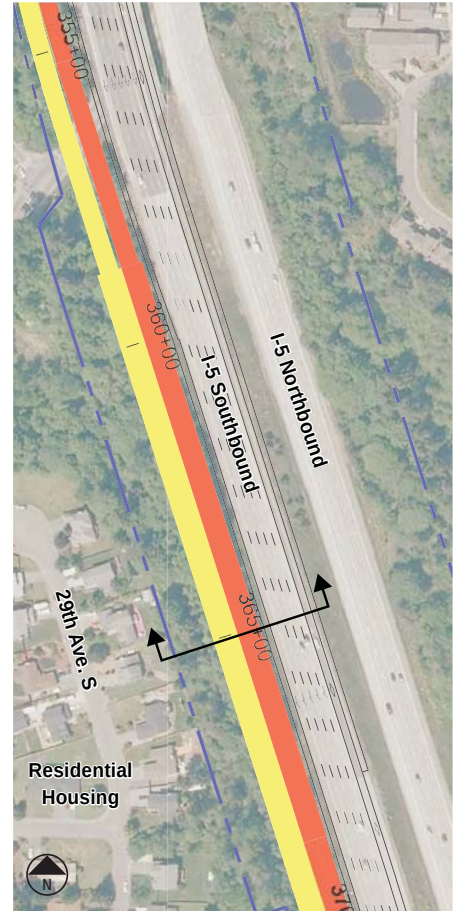
- Guardrail at S 272nd St and S 288th St, slopes up to west along north half, bushes/mature trees, creek at S 288th St
- Approximate distance between edge of pavement and right-of-way limit is 165 feet for the section shown below

## **Eastern Alignment:**

- Precludes opportunity for clear zone or other uses
- Larger right-of-way remnant (4.8 vs. 2.7 acres)
- Could potentially allow for more preservation of mature vegetation
- Less separation between roadway and structure
- Less space for future improvements
- Less space for right-of-way maintenance

## **Western Alignment:**

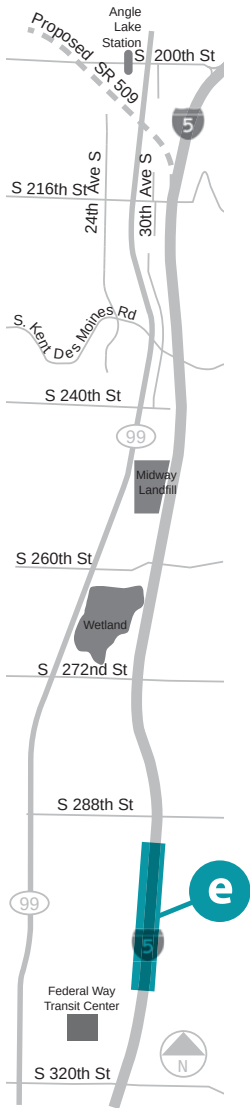
- More transit noise impacts, but could be mitigated
- More potential for visual impacts from removal of mature vegetation closer to homes



Not to Scale

e

# Mobile Home Park and Single-Family Residences – S 288th St to Military Road



## Existing Condition:

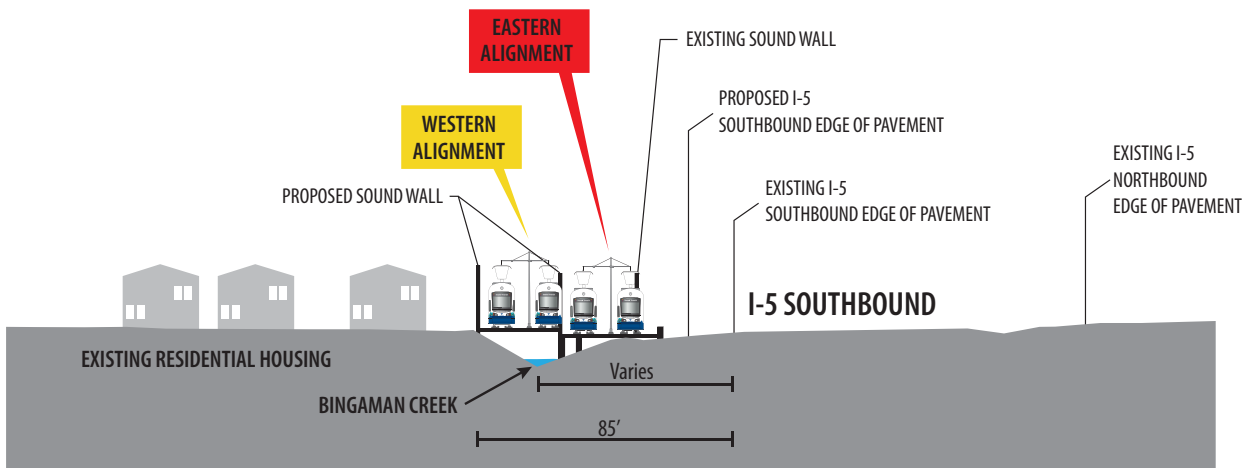
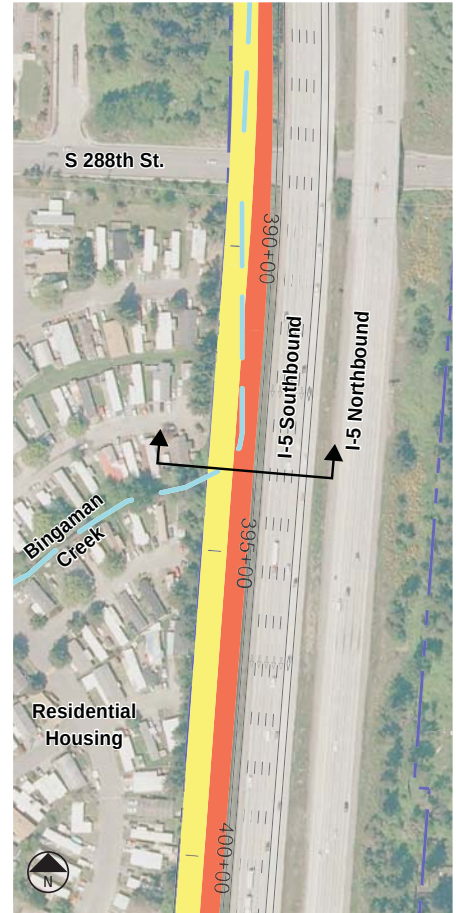
- Noise wall/concrete barrier at mobile home park, slopes down to west, mature trees/creek west of noise wall
- Approximate distance between edge of pavement and right-of-way limit is 95 feet for the section shown below

## Eastern Alignment:

- Precludes opportunity for clear zone or other uses
- Larger right-of-way remnant (6.0 vs. 0.9 acres)
- Impacts Bingaman Creek, could keep channel open
- Could potentially allow for more preservation of mature vegetation
- Less separation between roadway and structure
- Less space for future improvements
- Less space for right-of-way maintenance

## Western Alignment:

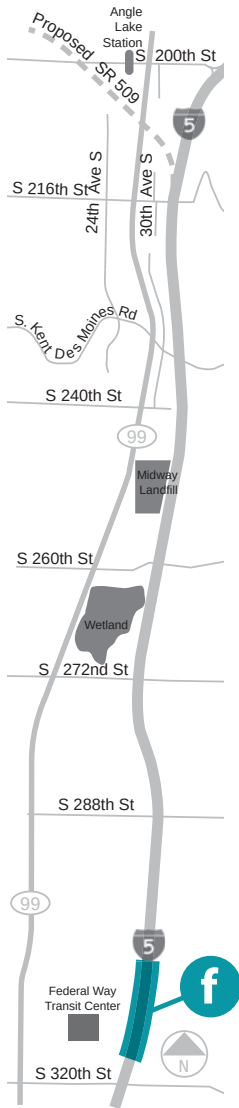
- More transit noise impacts, but could be mitigated
- Results in piping Bingaman Creek
- More potential for visual impacts from removal of mature vegetation closer to homes







# Multi-Family Residences – Military Road to S 317th St



## Existing Condition:

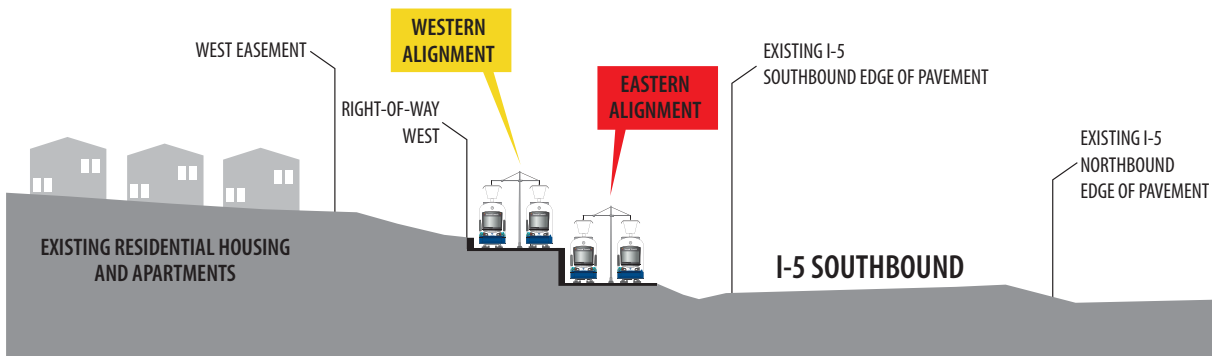
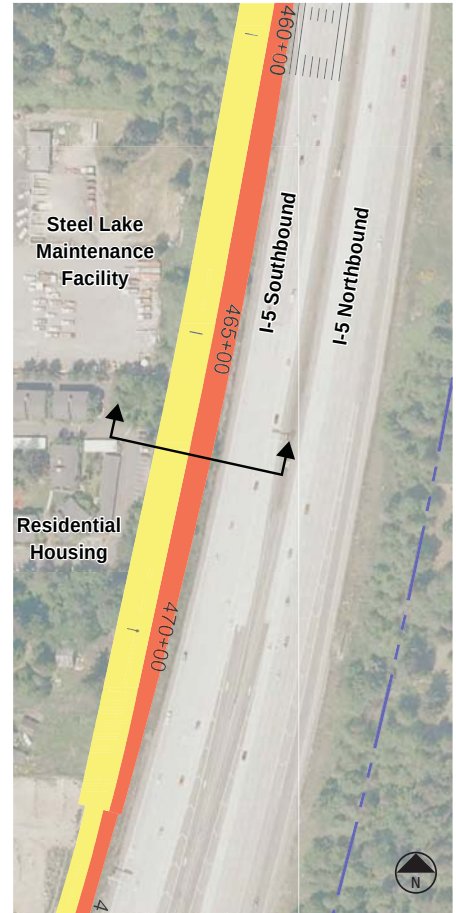
- Guardrail at Military Road and S 317th St, slopes up to west, berm bushes/mature trees
- Approximate distance between edge of pavement and right-of-way limit is 130 feet for the section shown below

## Eastern Alignment:

- Precludes opportunity for clear zone or other uses
- Larger right-of-way remnant (4.3 vs. 1.3 acres)
- Could potentially allow for more preservation of mature vegetation
- Less separation between roadway and structure
- Less space for future improvements
- Less space for right-of-way maintenance

## Western Alignment:

- More potential for visual impacts from removal of mature vegetation closer to homes



Not to Scale

A minimum clear zone area is defined by geometric considerations, including if a recoverable slope is present and if the area is free of fixed objects. The clear zone for I-5 through the FWLE study area varies between 20 feet and 45 feet, measured from the edge of the traveled way (WSDOT, 2013). The clear zone definition is based on posted speed limits, daily traffic volumes, and roadside geometrics. In areas where minimum clear zone conditions cannot be met, longitudinal barriers (guardrail, barrier, or walls) or impact attenuators can be provided to “shield” vehicles from roadside hazards. These hazards generally include:

- Non-recoverable slopes (slopes steeper than 1 foot vertical to 4 feet horizontal)
- Tree stands
- Signs and signal supports
- Communications cabinets
- Power poles
- Other landscaping elements
- Street grade separation

Table H-2 documents the southbound I-5 roadside conditions between S 211th Street and S 317th Street without and with the SR 509 Project and without and with the two FWLE I-5 Alternative alignments. The table includes the lengths of where barriers along I-5 are located or proposed with SR 509, the length of clear zone impact due to the FWLE alignments, and the resulting length of available clear zone along I-5. Exhibits H-3 and H-4 show where the western and eastern alignments would be located within a clear zone for the “without” and “with” SR 509 conditions, respectively.

TABLE H-2

Southbound I-5 No Build and I-5 Alternative Alignments Clear Zone Summary (between S 211th Street and S 317th Street)

| Condition                                             | Without SR 509 Project |                   |                   | With SR 509 Project |                   |                   |
|-------------------------------------------------------|------------------------|-------------------|-------------------|---------------------|-------------------|-------------------|
|                                                       | No Build               | Western Alignment | Eastern Alignment | No Build            | Western Alignment | Eastern Alignment |
| Length of Barrier Provided (in feet) <sup>a</sup>     | 11,500                 | 11,500 (+0)       | 13,800 (+2,300)   | 20,900              | 21,700 (+800)     | 34,200 (+13,300)  |
| Length of Available Clear Zone (in feet) <sup>b</sup> | 22,900                 | 22,900            | 20,600            | 15,100              | 14,300            | 1,800             |
| Total Segment Length (in feet) <sup>c</sup>           | 34,400                 | 34,400            | 34,400            | 36,000              | 36,000            | 36,000            |

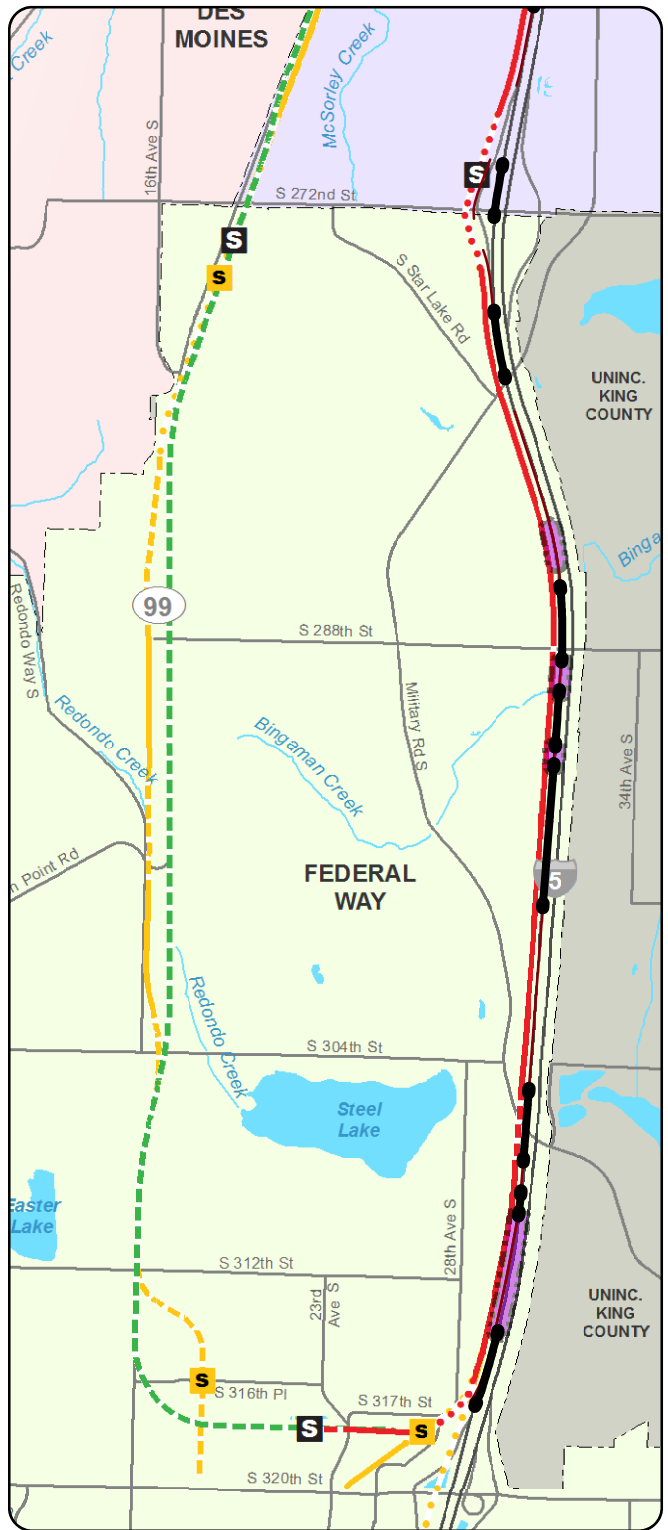
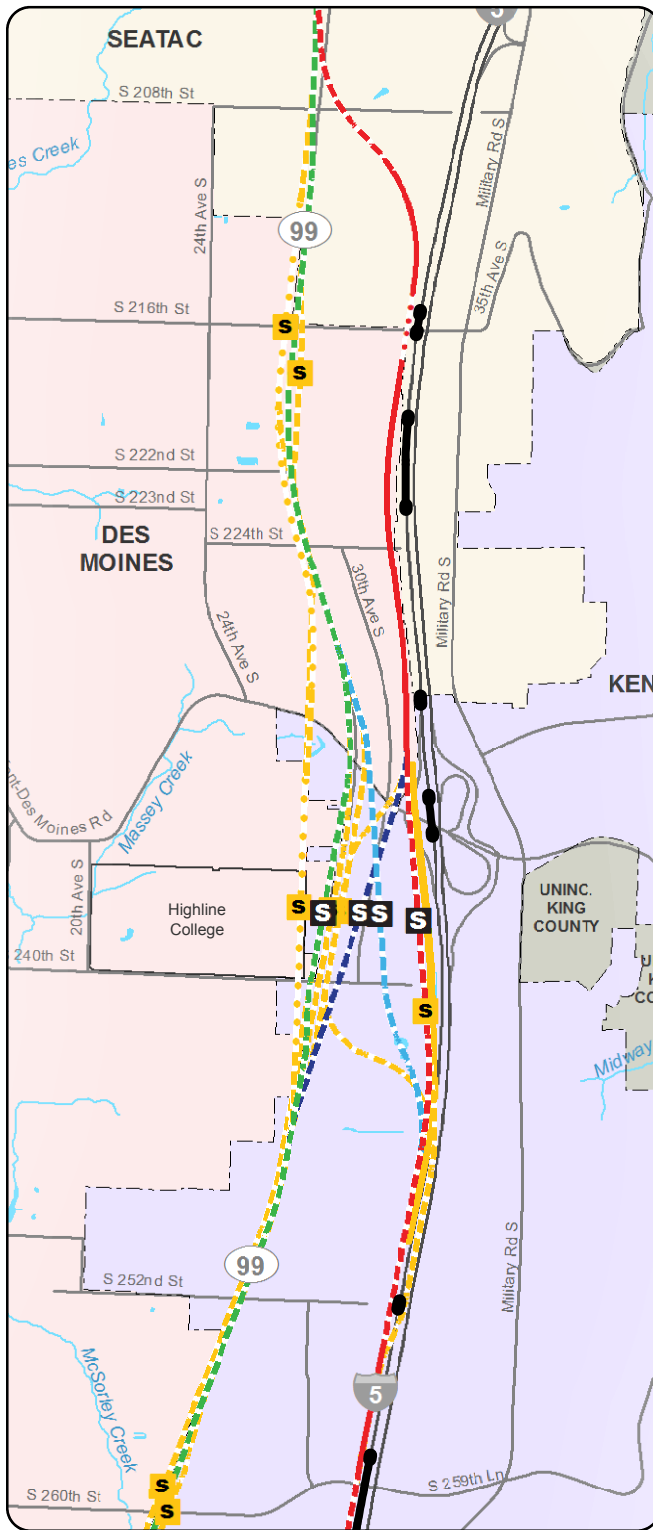
Note: Values shown in parentheses represent the additional length of the corridor where the FWLE would be located in an existing clear zone. Mitigation, such as barrier or guardrails, may be required with the project in these locations.

<sup>a</sup> Represents areas where barriers currently exist and/or are proposed with the SR 509 Project. These areas include shielding to protect highway infrastructure, tree stands, steep side slopes, or other landscaping elements, or are used to protect grade-separated crossings.

<sup>b</sup> Represents areas where existing or future conditions meet the definition of a clear zone.

<sup>c</sup> The clear zone distance with SR 509 is 1,600 feet longer because it accounts for the clear zone of the future SR 509 between SR 99 and I-5.





### Legend

**SR 99 Alternative**

— Elevated

**I-5 Alternative**

— Elevated

— At-Grade

... Trench

**SR 99 to I-5 Alternative**

— Elevated

— At-Grade

... Trench

**Options**

— Elevated

— At-Grade

... Trench

**Stations**

**S** Station for Alternatives

**S** Station for Options

Existing Barrier

Eastern Alignment Project Impacts

City Boundary

Street

Stream

Water Body

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).



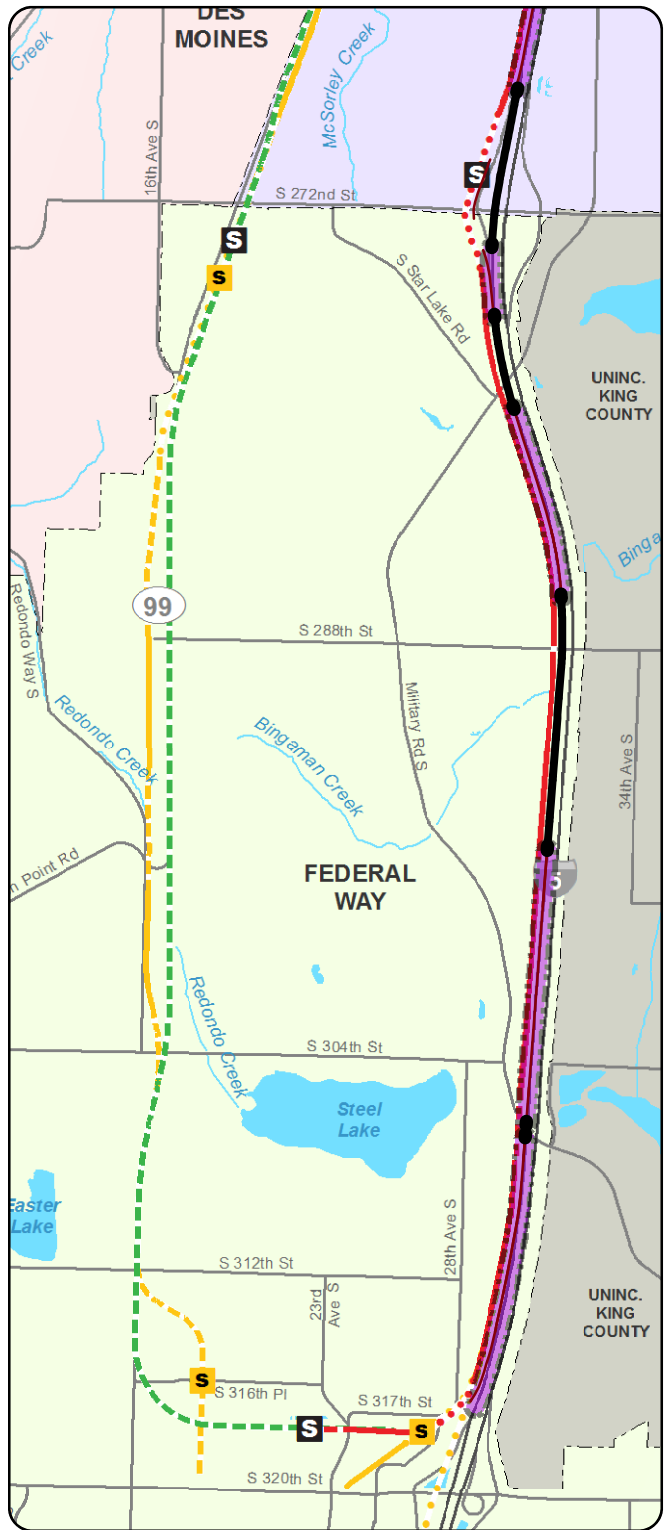
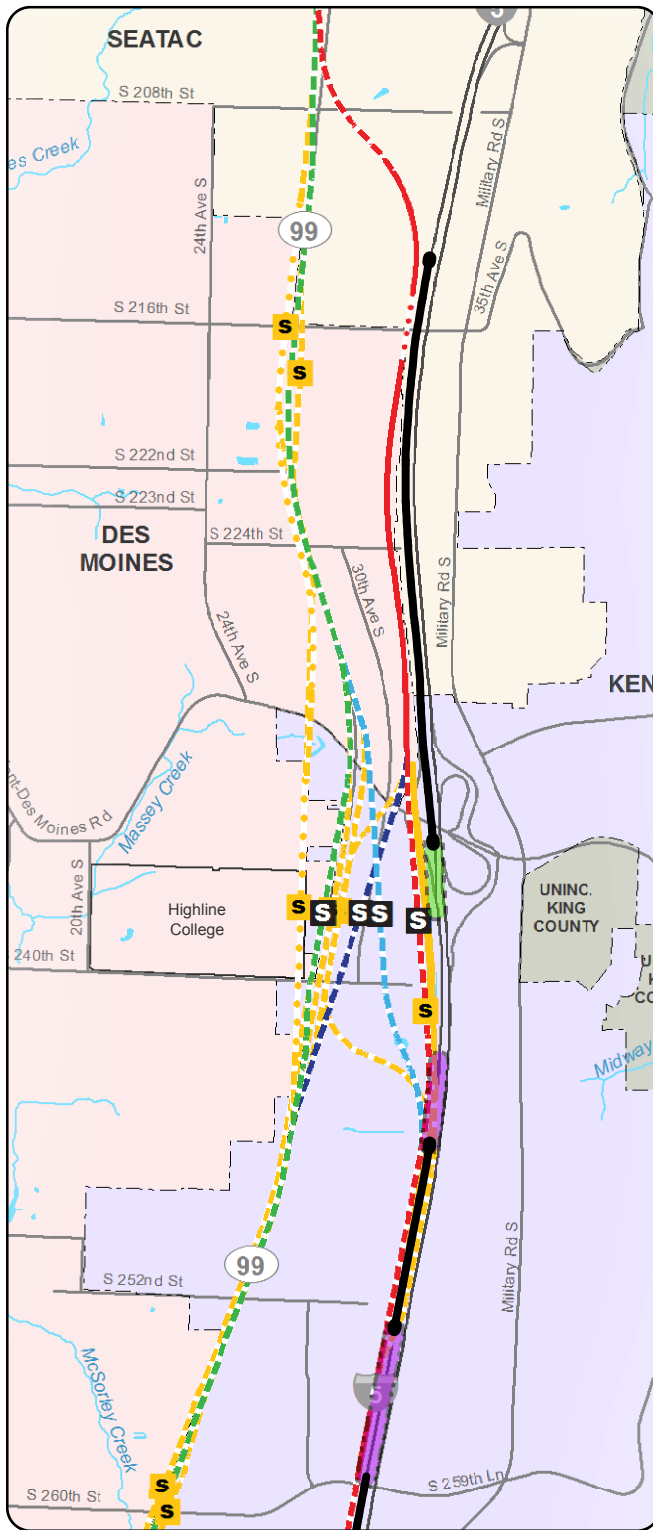
0 0.125 0.25 0.5 Miles

### EXHIBIT H-3

I-5 Clear Zone Impacts

Without SR 509

Federal Way Link Extension



### Legend

**SR 99  
Alternative**

— Elevated

**I-5 Alternative**

— Elevated

— At-Grade

— Trench

**SR 99 to I-5  
Alternative**

— Elevated

— At-Grade

— Trench

**Options**

— Elevated

— At-Grade

— Trench

**Stations**

**S** Station for Alternatives

**S** Station for Options

— SR 509 Barrier

— Western & Eastern

— Alignment Project

— Eastern Alignment

— Project Impacts

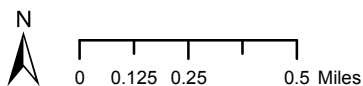
— City Boundary

— Street

— Stream

— Water Body

Data Sources: King County, Cities of Des Moines, Federal Way, Kent, SeaTac (2013).



### EXHIBIT H-4

I-5 Clear Zone Impacts

With SR 509

Federal Way Link Extension

Within the FWLE study area, an existing 22,900 feet of clear zone (approximately two thirds of the total length) is present along I-5 southbound without the SR 509 Project. The remaining one third (11,500 feet) is currently shielded by guardrail or barrier. The shielded segments of the southbound I-5 roadside include 9,300 feet where WSDOT could potentially create a clear zone by alteration of, removal, or relocation of the roadside hazards previously described. Approximately 2,200 feet of barrier currently shields grade-separated streets (e.g., bridges) and a clear zone cannot be created.

If the SR 509 Project is constructed prior to the FWLE project, 15,100 feet of clear zone would be provided along I-5 southbound. The SR 509 Project proposes about 20,900 feet of longitudinal barrier, increasing the shielded segments of southbound I-5 by 9,400 feet compared to the without SR 509 condition. Approximately 2,900 feet of the I-5 southbound roadside barrier would shield grade-separated streets (e.g., bridges) and a clear zone cannot be created.

The potential for impacts on the I-5 southbound clear zone are described below for the light rail operation and construction conditions. Both of these conditions are evaluated with and without the SR 509 Project in place to understand the potential cumulative impact of both projects.

### **H2.1.1 Operation**

The impacts on the clear zone identified in Table H-2 and an assessment of potential changes in crash rates associated with the changes in the clear zone are described in this section.

#### **Without SR 509 Project**

Without the SR 509 Project, the western alignment would always be located more than 46 feet away from the existing edge of traveled way. This alignment would maintain, and not impact, the existing clear zone along I-5 southbound. This alignment would also preserve the potential for developing any future clear zones along the I-5 southbound. There would be no change in crash rates in this condition and therefore no impacts on the safety conditions along I-5.

The eastern alignment would affect a short portion of the I-5 southbound clear zone if the SR 509 Project is not built. Approximately 2,300 feet of the existing clear zone would be eliminated. These locations are between S 284th Street and S 317th Street.

Based on the safety analysis using the methodologies described in the *Highway Safety Manual* (HSM; AASHTO, 2014), placing the eastern alignment within this clear zone for this distance could result in an increase of approximately one crash every 4 years on southbound I-5 between S 284th Street and S 317th Street. In this section of the highway, I-5 southbound had approximately 380 crashes in the 5-year period of 2007-2011.

#### **With SR 509 Project**

The following section assumes the current design of the SR 509 Project is constructed prior to the FWLE project. Refer to Table H-2 for the changes to the I-5 southbound clear zone with the SR 509 Project. In this condition, the western alignment would have a slight impact on the I-5 southbound clear zone. There would be a short distance (approximately 800 feet) on the Kent-Des Moines Road southbound on-ramp to I-5 where a clear zone would not be provided, and guardrails or barriers would be provided to protect the light rail guideway columns. No other I-5 southbound clear zones would be

impacted with the western alignment. The barriers along the Kent-Des Moines Road southbound on-ramp could result in an increase of up to one crash a year. This on-ramp had approximately one crash in the 5-year period of 2007-2011.

The eastern alignment would have a greater effect on the proposed clear zone of the I-5 southbound mainline. The eastern alignment would impact approximately 13,300 feet of this clear zone. These locations are dispersed along I-5 southbound mainline between S 211th Street and S 317th Street, including the same impact at the Kent-Des Moines Road southbound off-ramp described with the western alignment. Based on the safety analysis using HSM methodologies, constructing the eastern alignment in the proposed clear zones and installing barrier on the Kent-Des Moines southbound on-ramp could result in an increase of approximately one crash every 2 years along I-5 southbound between S 211th Street and S 317th Street. In this section, I-5 southbound had approximately 480 crashes in the 5-year period of 2007-2011.

### **Highway Maintenance Activities**

WSDOT routinely performs maintenance activities along I-5. Maintenance activities generally include mowing, stormwater facility maintenance, spraying noxious weeds, accessing Intelligent Transportation System equipment and signs, and removing invasive plant species. Typical maintenance activities, such as mowing, are generally performed within a 10-foot-wide area adjacent to the edge of pavement. To perform these maintenance activities, WSDOT will typically park vehicles on the shoulder and provide advance warning signage to drivers. For maintenance access west of the guideway, such as servicing stormwater facilities and removing invasive weeds, access from I-5 would be provided beneath the guideway where there would be vertical clearances of 10 feet or more, or in some areas the right-of-way could be accessed from local streets.

With the Landfill Median Alignment Option, in sections of the corridor where guardrail would be required, breaks in the guardrail may be needed to allow access for maintenance equipment. Beyond this, the Landfill Median Alignment Option would not affect property access, circulation, or traffic operations on I-5.

As currently designed, maintenance activities could be accommodated in all areas of the corridor with each alignment and condition. The most constrained condition would be the eastern alignment with the SR 509 Project. However, even in this condition a minimum 10-foot buffer between the edge of pavement and the light rail guideway would remain to facilitate maintenance activities.

#### **H.2.1.2 Construction**

This section provides a discussion of construction vehicle access, the impacts on the existing and potential clear zone during the FWLE construction period, and potential changes in crash rates associated with the changes in the clear zone. The construction period is expected to range from 1 to 4 years, depending on location.

Appendix G, Construction Staging Areas and Haul Route Assumptions, of the Transportation Technical Report (Appendix G1 of the Draft EIS) shows the proposed construction staging areas and truck haul routes. The proposed construction staging areas and truck haul routes would be the same regardless of

whether the western or eastern alignment is constructed. In general, the potential construction staging areas and truck haul routes would be adjacent to where project construction would occur, and the staging areas would generally be located in the vicinity of the station areas.

Access to the construction area would only be provided from arterials, local streets, and I-5 interchange areas. No direct access would be provided from the I-5 mainline for either the western or eastern alignment. Both alignments would have the same potential access points to the construction area along I-5 in the vicinity of:

- S 204th Street
- S 208th Street
- S 211th Street
- S 216th Street
- I-5 Kent-Des Moines Road southbound ramps
- 30th Avenue S
- S 259th Place
- S 272nd Street
- Military Road (two Locations)
- S 288th Street
- S 317th Street

### **Without SR 509 Project**

Without the SR 509 Project construction vehicle access would be provided via a temporary construction road adjacent to the guideway. This road would be at least 15 feet wide and may be up to 30 feet wide to allow for two-way construction vehicle traffic. With the western alignment, the temporary construction road would be located west of the alignment between S 204th Street and Kent-Des Moines Road and east of the alignment from Kent-Des Moines Road to S 317th Street. The construction road for the eastern alignment would be similar to the western alignment, except it would be located west of the alignment between S 288th Street and S 317th Street to maximize the distance between the I-5 edge of pavement and the guideway.

During construction, both the western and eastern alignments would have temporary impacts on the clear zone along I-5 southbound. The clear zone would be temporarily reduced along most of I-5 through the study area. A temporary construction barrier would be placed near the southbound I-5 edge of pavement for approximately 22,900 feet where barriers are not already present. Based on the safety analysis using HSM methodologies, placing a temporary barrier along I-5 southbound between S 211th Street and S 317th Street could result in an increase of up to four crashes per year for the western alignment, and up to five crashes per year for the eastern alignment during the construction period.

### **With SR 509 Project**

With the SR 509 Project construction vehicle access would be provided via a temporary construction road similar to the conditions without the SR 509 Project. The temporary construction road for the western alignment would be in the same location as the without SR 509 condition. For the eastern alignment, the temporary construction road would always be located west of the light rail alignment along the study area (between S 204th Street and S 317th Street).



As shown in Table H-2, the clear zone would already be reduced along many sections of I-5 through the study area if the current design of the SR 509 Project were constructed. Even so, both alignments would have temporary impacts on the I-5 southbound clear zone. About 1,000 feet of clear zone would remain during construction. A temporary construction barrier would be placed for approximately 15,100 feet near the southbound I-5 edge of pavement where barriers would not already be present. Based on the safety analysis using HSM methodologies, placing a temporary barrier along southbound I-5 between S 211th Street and S 317th Street could result in an increase of up to three crashes per year with the western alignment and up to four crashes per year with the eastern alignment during the construction period. This would be less than the condition without the SR 509 Project because more permanent barriers would already be present with the SR 509 Project.

### **H.2.1.3 Clear Zone Mitigation**

During operations, the available clear zone is less in the western alignment with SR 509 condition or in the eastern alignment with and without SR 509 conditions. Only in the western alignment without the SR 509 Project condition would the clear zone not be affected. In locations where the available clear zone is reduced and relocation of the guideway is not feasible, Sound Transit would work with WSDOT and FHWA to identify where mitigation would be required, such as regrading to re-establish a clear zone or installing guardrail, barriers, and/or walls. For impacted stormwater facilities, ponds may be relocated or modified and access for maintenance activities would be provided.

## **H.2.2 Property Acquisitions**

The analysis of impacts on property acquisitions quantified the area within the I-5 right-of-way that would be left unusable or with restricted access on the west side of the light rail, as shown in Exhibit H2 cross-sections a, c and d. This area would be almost twice as much with the eastern alignment (30.1 acres) as with the western alignment (15.8 acres). Therefore, although both alignment configurations would accommodate all currently planned highway improvements, use of the I-5 right-of-way for light rail would reduce the area available for use by currently undefined and unplanned highway projects in the future. These projects would not be limited to highway expansion and could include other infrastructure improvements such as stormwater facilities or sound walls. Limiting the space available for future projects could also increase the costs of these projects during construction if more expensive construction methods are needed or a more expensive design is needed, such as an enclosed stormwater system instead of drainage ditches.

## **H.2.3 Noise and Vibration**

The detailed noise and vibration analysis for the Draft EIS was performed for over 5,000 noise- and vibration-sensitive properties along the SR 99 corridor and approximately 3,100 properties along the I-5 corridor. For purposes of determining the potential difference in light rail noise impacts between the two I-5 alignment configurations, an eastern alignment 50 feet to the east of the I-5 Alternative analyzed in the EIS was assumed and a basic, less-detailed light rail noise analysis was completed for selected locations in order to provide a comparison. This basic noise analysis did not consider physical or topographical barriers to noise in the modeling and did not cover the full length of the I-5 Alternative; therefore, the results for the western alignment are different than what is documented in the Draft EIS.

Moving light rail farther away from noise sensitive receivers, as shown in Exhibit H-2, cross-sections b, d, and e, would reduce the number and severity of impacts based on the fact that doubling the distance between a receiver and a line noise source, like the light rail system, typically reduces noise by 3 dB, and can result in even greater noise reduction when the topography would provide shielding. Mature trees and dense vegetation do not provide measurable substantial noise reduction, but the presence of a dense vegetated buffer between homes and the transportation corridor does provide a visual barrier, which can help minimize the negative perceptions related to living next to a major freeway or rail corridor. Front-line noise-sensitive receivers along I-5 (e.g., receivers directly adjacent to I-5 with no structural shielding) are generally between 60 and 125 feet from the western alignment, with some as close as 25 to 50 feet. Therefore, shifting the light rail 25 to 40 feet to the east is expected to reduce noise levels by 2 to 5 dB, depending on the location and topographical conditions between the light rail alignment and the homes.

Overall, the EIS analysis shows that the I-5 Alternative would have over 1,400 noise impacts, although approximately 800 of these occur north of Kent-Des Moines Road and would not vary between the western and eastern alignments evaluated in this Appendix. Based on the assumptions described above, the eastern alignment would reduce the number and severity of noise impacts south of Kent-Des Moines Road at single-family neighborhoods, and the Camelot Mobile Home Park. At these locations (shown on Exhibit H2, cross sections b, d, and e) the western alignment would have 122 moderate and 300 severe noise impacts, while the eastern alignment would have 182 moderate and 217 severe impacts. All impacts could be mitigated with sound walls or other noise mitigation measures. Based on this analysis, an eastern alignment could reduce severe impacts by up to 28 percent, although many of those impacts would be reduced to moderate rather than avoided entirely. The overall number of impacts could be reduced by up to 6 percent. While noise impacts under either alignment can be mitigated to below FTA impact criteria, the cost of mitigation (height and length of sound walls) would be greater with the western alignment. In addition, mitigating to below impact criteria levels does not mean that noise from the light rail guideway is eliminated altogether. The closer the light rail guideway is to homes, the greater the chances that residents would be able to hear the trains, even if the noise levels are below levels that constitute an impact.

Although not quantified during the analysis, vibration impacts would also occur with the I-5 Alternative. Generally, all vibration impacts occur within 50 to 100 feet of the guideway. These impacts could also be expected to be less with an eastern alignment because of the increased distance from the guideway.

#### **H.2.4 Visual and Aesthetic Resources**

A similar area of vegetation would be cleared for both alignments and therefore the impacts on aesthetics would be similar. The mix of vegetation types varies in the undeveloped portion of the I-5 right-of-way. Closer to the existing travel lanes, the vegetation is a mix of mowed grass, shrubs, and trees. In general, mature trees and dense vegetation are most intact along the western boundaries of the right-of-way, adjacent to homes. The existing dense trees and vegetation currently provide a barrier or buffer between homes and the freeway. While both alignments would remove vegetation, the eastern alignment would likely allow for greater preservation of mature, dense trees on the western

edge of the right-of-way, directly adjacent to residences, as shown in Exhibit H-2, cross-sections b, d, e, and f. This could reduce visual impacts related to clearing of vegetation, as well as preserve a buffer between homes and the transportation corridor.

The western alignment would impact approximately 0.1 acre of designated state beautification areas (landscape area) located at the western edge of the I-5 right-of-way south of S 312th Street. The width of the project footprint on this property is approximately 35 feet. The eastern alignment would reduce or avoid this impact depending on how far east the alignment was shifted. These properties were purchased by WSDOT to provide a visual buffer and have specific mitigation requirements similar to those for areas purchased under the National Highway Beautification Act.

### **H.2.5 Ecosystems**

The western alignment would have a small impact (0.01 acre) on the McSorley Creek wetland complex and 0.46 acre impact on the McSorley Creek wetland buffer. An eastern alignment would avoid impacts on this wetland and would slightly reduce impacts on this buffer, as shown in Exhibit H-2, cross-section c. Additional wetland impacts at other locations within the I-5 right-of-way (approximately 0.6 acre of wetlands and 0.3 acre of wetland buffer) could also be reduced with an eastern alignment but were not quantified in this analysis. The remaining impacts on wetlands (0.3 acre) would still occur with either alignment because these wetlands are impacted when both alignments are located outside of the I-5 right-of-way.

A similar area of vegetation would be cleared for both alignments and therefore the impacts on ecosystem functions would be similar. The eastern alignment would likely affect more area that is currently grass and not as valuable as habitat as the forested areas that would likely be more affected with the western alignment. Bingaman Creek extends along I-5 for a distance of approximately 1,000 feet north and south of S 288th Street. With a western alignment, 0.2 acre of stream impact and 2.4 acres of stream buffer impacts would occur as a result of piping Bingaman Creek on the south side of S 288th Street and relocating it on the north side of S 288th Street. If the alignment were shifted to the east, it might be possible to maintain an open channel south of S 288th Street, although buffer impacts would still occur. Additional design work would be required to determine if maintaining the creek in its current location would be feasible with an eastern alignment. Preliminary consultation with resource agencies indicated that relocating the creek to the east between the light rail and I-5 would not be desirable and would not provide a functional stream buffer due to vegetation clearing requirements for both the highway and light rail. Relocating the creek to the west would likely impact several properties within a mobile home park, which would also not be desirable.

### **H.2.6 Hazardous Materials**

Both alignment configurations would cross the Midway Landfill, requiring either removal of the waste for drilled shafts for an elevated guideway or compaction of the waste to support an at-grade guideway, as shown in Exhibit H-2, cross-section a. The depth of landfill waste under the western alignment is estimated to be 65 feet, and under the eastern alignment it is estimated to be 40 feet. Because the depth of waste increases the farther the alignment is located from I-5, shifting the alignment to the east would reduce the amount of waste removed and drilled shafts (if used) would be farther from

groundwater in this area, reducing the potential for groundwater contamination (see Exhibit H-5). Deeper shafts also mean higher capital costs, and higher cost for waste removal. Another consideration relates to the permitting and approval process for crossing the landfill. As a closed Superfund site, any alteration to the capped landfill will require approvals from the site owner (Seattle Public Utilities), the Washington State Department of Ecology, and U.S. Environmental Protection Agency (EPA), as described in Section 4.12 of this Draft EIS. The conceptual designs for crossing the landfill have been reviewed and discussed with these agencies, and agency coordination is ongoing. WSDOT would be responsible for addressing these same issues (modification of the landfill cap, waste removal, approvals from U.S. EPA and others) for future I-5 improvements in the area. As such, there is potential for cost savings or other efficiencies if the light rail and highway improvements were located closer together and any modifications to the landfill cap along the western edge of the landfill were addressed collectively for both transportation projects.

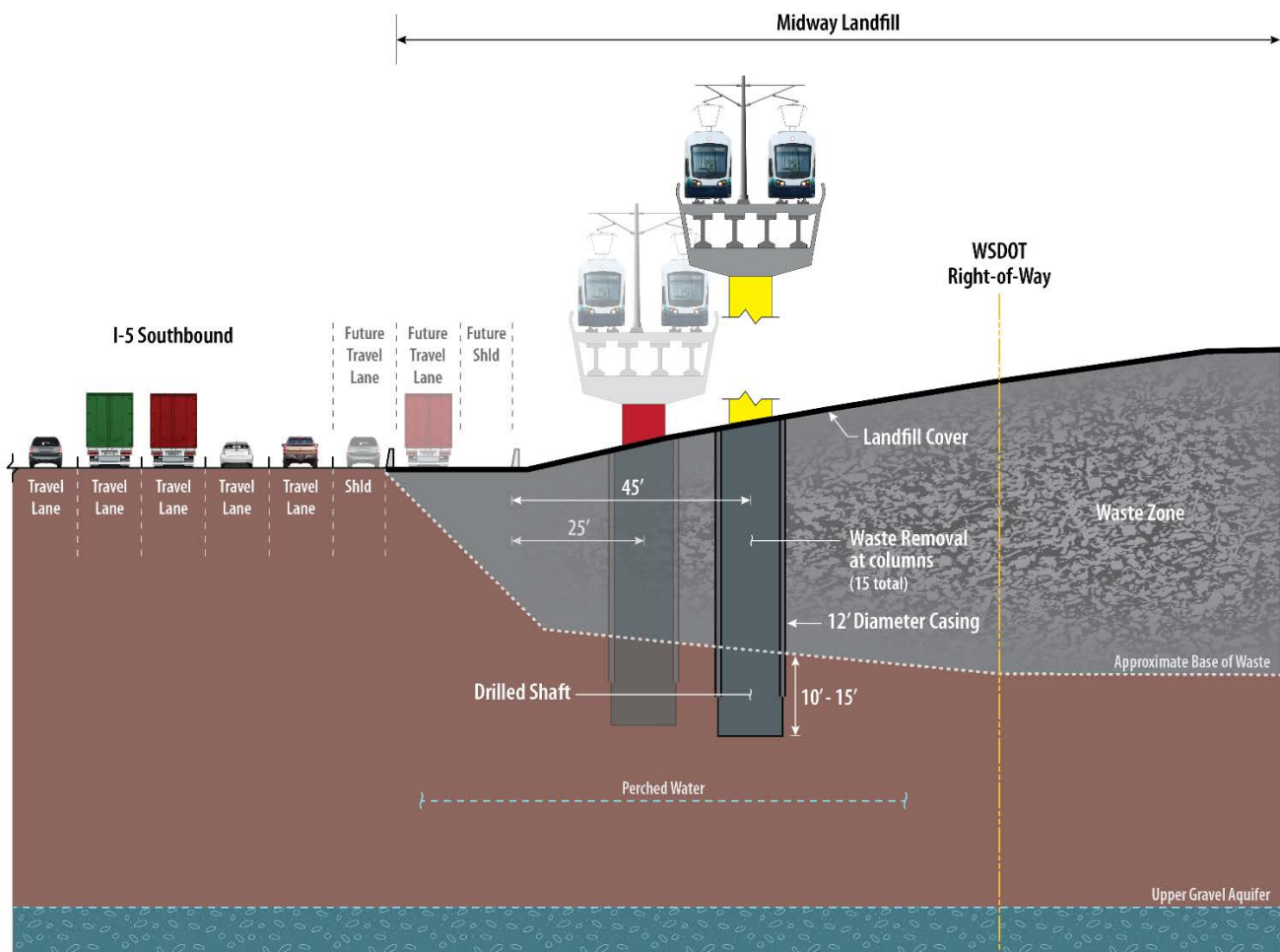


EXHIBIT H-5  
Cross-section of Western and Eastern Alignments at Midway Landfill

## H.2.7 Social

The western alignment would be closer to neighborhoods and therefore would have greater impacts on the neighborhoods due to the noise and vibration impacts described above and as shown in Exhibit H-2, cross-sections b,d, e and f. These impacts are related to the proximity of the alignment to the

residences. According to U.S. Census data, these neighborhoods may include over 50 percent minority and up to 50 percent low-income populations (see Chapter 7, Environmental Justice, for additional demographic information). In addition to long-term impacts, the intensity of construction-related impacts in adjacent neighborhoods would be greater with the western alignment. An alignment farther east could allow for more vegetative screening of the alignment and would decrease noise and vibration impacts on the residences.

### **H.3 Conclusion**

FHWA and WSDOT recognize that site-specific constraints along the undeveloped right-of-way exist and may require flexibility to adjust the location of the transit guideway to avoid impacts or problems. For example, moving a guideway closer to the pavement from the edge of the right-of-way in some locations could reduce visual and noise impacts; it may avoid or reduce impacts to streams or wetlands or other natural features at a specific location; it may resolve constructability conflicts or serious cost problems due to working in or around existing infrastructure in the area; or it may mitigate or avoid other problems that would exist if the guideway were on the edge of the right-of-way. Sound Transit, FTA, and the highway agencies acknowledge that if an alternative that uses I-5 right-of-way is identified as the Preferred Alternative, they will work collectively to perform this balancing of cost, complexity, and benefits with impacts to safety, future highway needs, and Interstate maintenance and operations.

Collectively, Sound Transit, FTA, and the highway agencies have already identified at least two places in the I-5 alignment where this balancing of would need to occur. One such location is where the light rail alignment approaches the Camelot Mobile Home Park south of S 288th Street (Exhibit H-2, cross-section d), where shifting the alignment east may be necessary to adequately mitigate impacts to residents and, perhaps, Bingaman Creek.

The other location is where the alignment crosses the Midway Landfill (Exhibit H-2, cross-section a) . A more eastern alignment may be proposed if it is determined that there are constructability risks with the western alignment in the vicinity of the Midway Landfill. In both of these locations, and perhaps others, more information will be developed, and FHWA and WSDOT will be consulted to determine the guideway location that best accommodates all of the concerns described in this section.

After the Sound Transit board identifies a Preferred Alternative, Sound Transit will prepare a Final EIS with more precise and detailed information and more refined designs for that alternative. This will occur whether the Preferred Alternative uses I-5 or SR 99 or both, as the project team performs more detailed analysis and refines the design to reduce the project's impacts and maximize its benefits. Still more design refinements will continue after the Record of Decision (ROD) during final design and permitting. Consultation with the highway agencies, other interested agencies, and the public will also continue in tandem with the design advancement. All post-ROD design refinements will be subject to additional environmental review, consistent with the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA).

## H.4 References

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