
Puget Sound Gateway Project

SR 509, I-5 and SR 167 Funding and Phasing Study: Strategic Corridor Design Review



Appendix C: Initial Design Workshop

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Appendix

C.1 Cost Estimate Review

1.0 EXECUTIVE SUMMARY

1.1 Purpose

The purpose of the Strategic Corridor Design Review is to further assess these three critical corridors from an integrated perspective, including the SR 509 Corridor Completion Project, I-5 Express Toll Lanes (ETL), and the SR 167 Corridor Completion Project. This review will consider approaches to completing the SR 509 and SR 167 connections to I-5 while utilizing I-5 ETL as a method to manage demand and improve I-5 operations between the new connections, improving access to the Seattle and Tacoma city centers and freight mobility to and from the Ports of Seattle and Tacoma and associated distribution centers. Compatible alternatives that consider the design work performed to date will be considered as well as new project phasing and practical design concepts. The objective of the review is to develop possible construction and phasing concepts that capitalize on primary strengths from all three projects; maximize mobility, connectivity and system demand management, and assemble alternatives that are attainable within a range of realistic funding investment levels. Ultimately, this will provide an expanded view of the possible synergies that can be achieved by connecting major regional port and transportation centers.

1.2 Summary of Current Actions

The Design Review timeline identifies that a final report will be developed and submitted by June of 2013, and that there will be interim reporting at key design review stages and when needed to support WSDOT communication needs. The initial effort assessed existing information and developed new approach ideas. The new approach ideas were developed in an Initial Design Workshop conducted on December 6 and 7, 2012. The resulting phasing concepts and construction cost estimates are being refined, and will be screened further based on preliminary traffic and revenue data. The initial screening using the updated information will be presented in a report in mid-January. Based on additional feedback on that report, and advancement of the traffic and revenue data, one or two preferred alternatives will be identified in the corridor for final evaluation and presentation in the final report.

The Initial Design Workshop involved a combination of consultant and WSDOT staff. The goal of the workshop was to identify changes in each of the three projects that could reduce the initial cost of construction and support a package from all three projects that could be built under different funding scenarios. This process involved the following steps that aim to maximize the initial and future function and benefits of the projects while lowering initial construction costs:

- First, start with a blank slate and identify possible construction phasing and new geometry alternatives that would save money but still meet priority goals
- Second, consider what might be modified in the current preferred alternative for each project and identify how they could be phased

Out of this process, the workshop team identified approximately 90 unique alternatives. These alternatives were categorized into five subcategories:

- Revenue
- Stakeholders
- Procurement

- Optimizations
- Phasing

Ideas in the first three subcategories were collected, but not developed further since they involve policy decisions that were beyond the scope of the design workshop. The Optimization and Phasing subcategories were ranked to focus the number of alternatives that would proceed into the next phase. Of the original 90 alternatives, 20 are being carried forward for consideration. Table C-1 lists the 20 alternatives and subdivides them into those that might save less than \$100 million and those that might save \$100 million or more.

Table C- 1 Alternatives Carried Forward from the Initial Design Workshop

| ALTERNATIVE | DESCRIPTION |
|---|--|
| Estimated Phasing or Construction Savings Less Than \$100 Million | |
| ALT. 167-1 | Don't build 70th connection - route traffic through city streets |
| ALT. 167-2 | Delay construction of 167 between Valley & SR 161 - Use Valley Ave. in the interim better connection from 167 to Valley East (117) |
| ALT. 167-7 | "DB concept" - D-C using combined ramp in NE quad., lowers I/C by one layer |
| ALT. 167-10 | 1/2-diamond at SR 167/SR 509 I/S. Upgrade connections later |
| ALT. 167-11 | NB167 ultimate with SB167 tie to signalized terminal. |
| ALT. 167-12 | Giant traffic circle with no signal, at grade |
| ALT. 167-13 | Eliminate (Phase 1) through 167 Roadway over valley/RR/Creek only ramp connections with signal at Valley |
| ALT. 167-14 | Change SR 167 grade separation to signalized intersection -> defer to later. (change bridges to signals in eastern end) |
| ALT. 509-1 | Make 509 connections to mainline and CDs later |
| ALT. 509-2 | Use Texas U-turn as an alternative to building Kent tunnel |
| ALT. 509-4 | Eliminate HOT Express lanes from 509 to I-5 (eliminate D/C from median) |
| ALT. 509-5 | S 188th Street partial I/C to north only - nothing at 24th/28th. |
| ALT. 5-1 | Squeeze in 2 HOT lanes on I-5 - minimal cost |
| Estimated Phasing or Construction Savings of \$100 Million or more | |
| ALT. 167-3 | Diverging Diamond at I-5/SR 167, with SB167 to NB5, using 70th |
| ALT. 167-4 | 70th to SR 167 (west to SR 509) with 1/2 diamond to north, toll connection, no eastern connection |
| ALT. 167-5 | 1/2 interchange to the north with flyover braided ramp, future link to 70th, no eastern connection |
| ALT. 167-6 | Build Port of Tacoma SR 509 to I-5 connection - [toll this?] (smaller initial investment , meeting 2 immediate needs, development potential, facilitates freight movement) |
| ALT. 167-8 | SR 167/ I-5 SPUI or alternative IC at SYSTEM IC |
| ALT. 167-9 | 3 level diamond I/C (5, Connections/ 167, bottom to top), layering phasable by running 167 through ramp lanes. |
| ALT. 509-3 | 24th/28th to I-5 connection, more perpendicular crossing of I-5. Allows median connection. First phase would connect to outside. "Texas-T" |

1.3 Next Steps and Workshop Outcomes

The 20 alternatives from the Initial Design Workshop will first be further evaluated to consider more inputs including additional technical information, funding and revenue, prior and on-going stakeholder input, and likely procurement alternatives. Then the new inputs will be used to reduce the total alternatives, screening out the least feasible or lower value. Through these steps, new combinations of alternatives may be developed that better integrate with the new input.

2.0 INTRODUCTION

2.1 Overview of the Initial Design Workshop

2.1.1 Workshop Purpose

The purpose of the workshop is to blend the local project knowledge of WSDOT key staff with national technical experts in brainstorming ideas to reduce project initial costs while meeting mobility and operational needs. From the range of ideas developed, values were assigned to indicate feasibility of implementation and the potential range of cost savings. The national experts' focus was on ideas to optimize or phase construction for initial cost reduction. WSDOT is taking the lead on revenue sources, including tolling, and stakeholder participation.

2.1.2 Workshop Objectives

The primary objectives of the Initial Design Workshop were to:

- Provide a high-level evaluation by select HNTB and other national experts to generate technical ideas for delivering the projects quickly and economically
- Generate high value technical ideas which will be further evaluated and refined for presentation at a second design workshop
- Generate ideas in a forum where everything is on the table and previous assumptions may be questioned

2.1.3 Workshop Plan

The Initial Design Workshop Plan included two main elements; the Pre-Workshop Activities and the Workshop Activities. The Pre-Workshop Activities occurred over the week prior to the Workshop Activities, and consisted of data collection, document review, and a field review of the project areas. The Workshop Activities occurred over a two-day period and included:

- Presentation of a Project Overview for each project area
- Description of the Workshop Purpose, Process and Objectives
- Discussion of the Team's Initial Questions
- Conducting two Breakout Sessions
- Summarizing the Breakout Sessions
- Grouping and valuing of the alternatives
- Finalizing the grouping and valuing of the alternatives
- Screening of the ranked alternatives

All of the Workshop Activities were completed by the mixed group of WSDOT, HNTB and other technical experts, except the initial sorting and ranking of the alternatives. The alternatives were initially sorted and ranked by the local and national experts from HNTB. The initial sorting and ranking was then presented for concurrence and modification by the larger, mixed group.

2.2 Pre-Workshop Activities

2.2.1 Data collection and review

WSDOT provided relevant design files, and design and environmental reports documenting project development, and the basis for current costs estimates. These represent baseline conditions for the SR 167 and the SR 509/I-5 corridors.

Cost estimate information includes the most recent Cost Estimate and Validation Process (CEVP®) available for each of the three projects. An initial assessment of the cost estimates is included in Appendix A of this report.

Based on review of the available data and the field review, the local and national HNTB team developed a series of initial questions prior to Day 1 of the Workshop that would provide additional background and framework for the workshop discussions.

2.2.2 Field review

HNTB workshop participants conducted field visits to the corridors on December 5, 2012. In addition to proposed highway alignments, area arterials were also reviewed to give familiarity with facilities either directly connected with the projects, or serving as corridor access in phasing alternatives.

3.0 WORKSHOP ACTIVITIES

3.1 Day 1 Project Overview

3.1.1 Individual projects

3.1.1.1 SR 509

The SR 509 corridor between S 188th Street and I-5 was initially designed without extensive expansion of the I-5 corridor. Modeled traffic operations showed the SR 509 traffic added to I-5 would result in significant congestion and delay. The project design added collector–distributor (C-D) lanes between the SR 509 connection and the SR 516 interchange to the south. The initial design work was based on forecast traffic without SR 509 tolling.

The project was funded for \$1.05 billion (year of expenditure) in the 2007 RTID package of regional highway and transit projects that was rejected by voters. Full funding for the project cleared in the 2003 Final EIS and Record of Decision remains unavailable.

The SR 509 corridor will provide a south access to Seattle-Tacoma International Airport to the I-5 corridor and will provide a direct route for freight and general traffic movements to and from the Puget Sound marine ports and the industrial areas of Seattle and South King County.

Toll studies underway indicate a tolled SR 509 connection to I-5 could reduce SR 509 traffic volumes by about 50 percent. Lower traffic volumes may allow a lower cost, phased construction while proving acceptable traffic operations.

3.1.1.2 I-5 Express Toll lanes

I-5 is the major commuting route connecting both the SR 509 and SR 167 projects. It has the most congestion in peak travel periods and is under study for implementation of express toll lanes, primarily through conversion of the existing inside HOV lanes to High Occupancy Tolerated (HOT) lanes. The region currently has one HOT lane project in operation on the north section of SR 167 as a pilot project, and has started construction of a 17-mile express toll lane (ETL) project on I-405 between Bellevue and Lynnwood.

3.1.1.3 SR 167 Extension

The SR 167 corridor location was set in a Tier 1 EIS completed in 1999. The project-level EIS and Record of Decision were completed in 2007 and about 70 percent of the right of way has been acquired. The project was funded for \$1.59 billion (year of expenditure) in the 2007 RTID package of regional highway and transit projects that was rejected by voters. It subsequently has been refined to reduce cost, but still lacks funding to start the initial phase of construction.

In the project's current configuration, full funding will not be available from the legislature. Tolling is now being considered. In 2010, initial toll feasibility review of toll revenue generation indicated it would fund up to 50 percent of a reduced project for one lane in each direction between I-5 and SR 161. A comprehensive toll revenue study is currently being conducted to refine the revenue estimates.

3.1.1.4 General comments

To date, phased construction of the projects has been for complete forward compatibility with corridor full build out. The requirement should be re-visited and possibly relaxed. More recent tolling studies indicate traffic volume reductions of up to 50 percent on a tolled facility compared to the un-tolled operation that was the basis for original project design through NEPA EISs and Records of Decision (RODs).

3.1.2 Team's initial questions

The following initial questions were developed by the local and national HNTB team to provide additional background and framework for the combined WSDOT, HNTB and other technical experts. The questions were presented and discussed by the larger group, providing additional understanding for all members prior to the breakout sessions.

1. What does success look like for you?

- The project will achieve or exceed project goals and expectations.
- WSDOT executives will have a menu of opportunities achievable under realistic revenue expectations.
- The project will identify opportunities to leverage stakeholder partnerships.
- There will be a clear roadmap to "get the show on the road."

2. What are the goals of the project?

a. Maximize truck mobility?

Marine port access is a priority. The SR 509 Extension will connect the Port of Tacoma to I-5 and the SR 167 Extension. The SR 509 corridor extension south of S 188th Street will connect Port of Seattle marine terminals to I-5. Truck access to the Seattle-Tacoma International Airport south entrance and to airport commercial and business park property is also important.

b. Maximize commuter mobility?

Both the SR 167 freeway extension and the SR 509/I-5 projects are important in managing freeway system demand for commuter traffic in peak periods. The use of tolling with congestion pricing will be an important demand management tool.

c. Combination by corridor?

This project will address the balance of freight and commuter use of the corridors. This may include showing how non-users benefit from these projects. For example, how trucks traveling in non-tolled lanes benefit from tolling?

3. Why were these three projects picked?

SR 509 is closely tied into the I-5 Express Toll Lanes project. As the project was initially developed, SR 509 can not be brought into I-5 without adding capacity between the connection and the Federal Way S 320th Street interchange. A tolled SR 509 connection may reduce volume to where I-5 expansion may not be needed initially or to a lesser extent.

The SR 509, I-5 and SR 167 projects are now linked as potential revenue generators.

Regional freeway capacity is constrained and modifications to any one affects demand, operating condition, and tolling revenue potential on the others. This also offers opportunities for system traffic demand management.

The projects have common themes including freight mobility. This provides an opportunity for “branding” the project for presentation to the public and stakeholders, and for pursuing funding.

4. What are the “sacred cows”?

The SR 167 corridor was selected and the alignment later refined to minimize impacts to property owned by the Puyallup Tribe of Indians. There is a Tribe-owned 5 acre property where the project may need a permanent easement.

Cultural resource sites have been identified in the SR 167 corridor and should be left undisturbed.

There is a contaminated soils disposal site (B&L Woodwaste) east of the SR 167/I-5 interchange area. This site should be avoided.

The SR 509 corridor crosses substantial wetlands south of S 118th Street. These wetlands have determined alignments and the amount of structures, rather than fill, used in the corridor.

Sea-Tac International Airport Runway Protection Zones (RPZs) have been a determinant in SR 509 corridor location.

5. What is your current status of right of way acquisition?

About 70 percent of the SR 167 corridor has been purchased, including most of the 400-foot wide roadway corridor, plus interchange areas, between SR 161 (Meridian Avenue) and I-5.

Substantially less of the SR 509 corridor has been purchased. Purchases are characterized as “low hanging fruit” as corridor properties come on the market. Portions in the western corridor were acquired for the original north-south SR 509 alignment before the new northwest to southeast alignment was selected.

6. How does rail fit in policy-wise?

No information at this time, though it is anticipated in the future for both heavy rail and light rail.

7. Are there opportunities with three railroads (BNSF, UPRR and Tacoma Rail) to help with cost sharing at the Port/SR 167?

The City of Tacoma-owned Tacoma Rail moves containerized goods between the Port of Tacoma cargo ship terminals and the UPRR and BNSF marine terminal rail yards. The SR 167 Extension project alignment connection between SR 509 in Port of Tacoma and I-5 may offer operations benefits to the three railroads that offer direct cost-sharing opportunities, or funding through federal or state freight mobility programs.

8. Are there other opportunities with P3 development to reduce costs/increase revenues?

Does a reduced-sized project provide opportunities of value for a P3 development? For example, property suitable for port-related development along the SR 167 Extension corridor or property suitable to the aviation commercial and business park land uses along the SR 509 extension to I-5 in the cities of SeaTac and Des Moines.

9. SR 509: How can we think about reducing wetland “no net loss” policy effect on structural costs?

Are there opportunities to permit and mitigate a larger direct impact to wetlands and wetland buffers that significantly reduce the costs to bridge over the wetlands?

3.2 Day 1 Breakout Sessions

Day 1 included two breakout sessions for three groups: A, B and C. Groups were a mix of WSDOT, HNTB and other technical experts and were tasked to generate ideas for project

optimization and phasing, and revenue generation. Other ideas were developed for stakeholder participation, incentives for public-private partnerships (P3), design criteria alternatives, and procurement alternatives. The workshops attendance table in Section 5.0 shows the group assignment for each individual.

Groups A and B were civil/roadway oriented and Group C was bridge and structures orientated. While each groups had a discipline specialty, they were asked to consider all elements rather than focus on discipline specific elements.

The breakout sessions were not provided a specific chronological agenda. The instructions provided for the first breakout session were to start with a blank slate and identify alternatives that would address the purpose and need in the project areas irrespective of previously identified constraints. In the second breakout session, the groups were asked to review the current preferred alternatives, and use information developed in the first session to develop new approaches to the preferred alternative, identifying new phasing or layout alternatives that still provided the purpose and need of the original project.

3.2.1 Breakout session groups

3.2.1.1 Group A - Roadway

Group A generated 27 potential alternatives, starting with an evaluation of the SR509 Extension project area, then moving on to focus on the SR 167 and I-5 Corridor areas. Many of the alternatives utilized the current corridors and purchased right of way areas, and identified more phased or potentially forward compatible layout optimizations, rather than completely new connections or concepts.

3.2.1.2 Group B – Roadway

Group B created 34 potential alternatives, starting with a review of the I-5 corridor and proceeding to a review of the SR 509 and SR 167 corridors. Many of the initial alternatives identified focused on revenue generation and stakeholder involvement or planning. The alternatives that provided a layout optimization or phasing change varied from minor interchange or access revisions to major concept changes where segments of the highway are deferred to future construction.

3.2.1.3 Group C – Bridge/Structures

Group C created approximately 40 potential alternatives, but approached the process differently than Group A or B. This group systematically reviewed the overall project strategies, implementation and procurement methods, and the technical and staging approaches. This group also started with a review of the gross construction costs for the project areas to help identify high impact cost strategies. Through this effort, Group C identified a few alternatives that included elements and factors that affect all the projects, but are also applicable to the freeway system beyond the SR 509/SR 167/I-5 project vicinities.

3.2.2 Breakout session reporting

At the closing of Day 1 of the workshop, the large group reconvened to report a broad overview of their findings. Additional input was also provided in preparation for Day 2 of the workshop.

3.3 Day 1 Idea Grouping and Value Designations

The consultant team held an evening session on Day 1 to organize the approximately 90 ideas developed in the breakout sessions. The team eliminated duplications, clarified the descriptions as necessary and assigned the alternatives to one of five strategy groups, then assigned each of the alternatives in the groups a value from 1 to 5, with 5 being the highest. The goal of this session was an initial screening to identify lower value ideas. The initial grouping was presented to the large group during Day 2 for concurrence and modification.

3.3.1 *Strategies menu*

To screen the 90 alternatives developed, they were first assigned to one of five groups using a Strategies Menu. This is an initial, high-level screening that assigns the alternatives into Revenue, Stakeholders, Procurement, Optimization, and Phasing strategies. Each of these strategies is described below.

1. **Revenue** (WSDOT) – alternatives that modify the revenue stream, either in timing or source. Examples include tolling sections of I-5 as a first phase to generate funding for future phases, acquiring funding through a gas tax or local tax district program, and adding revenue generating retail elements at a weigh station.
2. **Stakeholders** (WSDOT) – alternatives that directly affect or require specific input from project stakeholders. Examples include partnering with a local agency to develop alternative modes of transportation that help improve highway traffic and modifying the configuration to accommodate stakeholder requests.
3. **Procurement** (WSDOT) – alternatives that identify specific procurement choices. Examples include alternatives that specifically prepare the project for design-build or public-private-partnership procurement.
4. **Optimization** (building blocks) – alternatives that modify the layout and likely revise forward compatible elements. Examples include changing interchange type or location, eliminating movements or connections permanently.
5. **Phasing** – alternatives that propose to delay an element or connection until a future phase of the development without significantly affecting forward compatibility. Examples include delaying construction of a segment or element until a future date, building the most critical elements as a first phase.

3.3.2 *Initial value assignment*

After the alternatives were assigned to one of the five groups, the Optimizations and Phasing alternatives were carried forward for further evaluation. The alternatives categorized as Revenue, Stakeholder, and Procurement were saved and will be set aside for the remainder of the initial assessment since they involve policy decisions and potentially legislative changes that are beyond the evaluation scope of the Initial Design Workshop. The Optimization and Phasing alternatives were evaluated on a scale of one (lowest value) to five (highest value). The evaluation was based on a qualitative assessment of the feasibility and the potential for each alternative to meet the project goals and needs.

The Revenue, Stakeholder, and Procurement alternatives will be considered in the further evaluation of the Optimization and Phasing alternatives. Alternatives may be recombined to offer additional alternatives.

3.4 Day 2 Final Workshop Recommendations

Based on the screening that was completed at the end of the Day 1 session, and the additional work completed in the first half of the second day, all the alternatives were sorted by value. The highest value alternative in the Optimization and Phasing strategies were selected to be carried into the next phase. Of the original 90 alternatives, the 20 alternatives listed in Table C-2 are being carried forward for consideration at this stage. These alternatives are illustrated in the Section 7.0 exhibits.

Table C- 2 Alternatives Carried Forward from the Initial Design Workshop

| ALTERNATIVE | DESCRIPTION |
|---|---|
| Estimated Phasing or Construction Savings Less Than \$100 Million | |
| ALT. 167-1 | Don't build 70th connection - route traffic through city streets |
| ALT. 167-2 | Delay construction of 167 between Valley & SR 161 - Use Valley Ave. in the interim better connection from 167 to Valley East (117) |
| ALT. 167-7 | "DB concept" - D-C using combined ramp in NE quad., lowers I/C by one layer |
| ALT. 167-10 | 1/2-diamond at SR 167/SR 509 I/S. Upgrade connections later |
| ALT. 167-11 | NB167 ultimate with SB167 tie to signalized terminal. |
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| ALT. 509-5 | S 188th Street partial I/C to north only - nothing at 24th/28th. |
| ALT. 5-1 | Squeeze in 2 HOT lanes on I-5 - minimal cost |
| Estimated Phasing or Construction Savings of \$100 Million or more | |
| ALT. 167-3 | Diverging Diamond at I-5/SR 167, with SB167 to NB5, using 70th |
| ALT. 167-4 | 70th to SR 167 (west to SR 509) with 1/2 diamond to north, toll connection, no eastern connection |
| ALT. 167-5 | 1/2 interchange to the north with flyover braided ramp, future link to 70th, no eastern connection |
| ALT. 167-6 | Build Port of Tacoma SR 509 to I-5 connection - [toll this?] (smaller initial investment, meeting 2 immediate needs, development potential, facilitates freight movement) |
| ALT. 167-8 | SR 167/ I-5 SPUI or alternative IC at SYSTEM IC |
| ALT. 167-9 | 3 level diamond I/C (5, Connections/ 167, bottom to top), layering phasable by running 167 through ramp lanes. |
| ALT. 509-3 | 24th/28th to I-5 connection, more perpendicular crossing of I-5. Allows median connection. First phase would connect to outside. "Texas-T" |

4.0 NEXT STEPS AND WORKSHOP OUTCOMES

The 20 alternatives from the Initial Design Workshop will be further evaluated to consider more inputs, including funding and revenue, prior and on-going stakeholder input, and likely procurement alternatives. Then the new inputs will be used to reduce the total alternatives, screening out the least feasible or lower value. Through these steps, new combinations of alternatives may be developed during the next workshop that better integrate with the new input.

5.0 WORKSHOP ATTENDEES

Table C- 3 Initial Design Workshop Attendees and Breakout Groups

| Organization | December 5 Pre-Workshop Field Trip | Workshop Attendance | | Breakout Group |
|--|--|---------------------|---------------------|-------------------|
| | | Day 1 December 6 | Day 2 December 7 | |
| Washington State Department of Transportation | | | | |
| Mark Bandy | | X | | B |
| Ed Barry | | X | X | C |
| John Donahue | | X | X | B |
| Rob Fellows | | X | X | A |
| Steve Fuchs | | X | | A |
| Steve Kim | | X | X | A |
| JoAnn Schueler | | | X | |
| Mazen Wallaia | | | X | |
| John White | | X | X | C |
| Shuming Yan | | X | X | B |
| HNTB Corporation | | | | |
| Alan Black | X | X | X | A |
| John Brestin | X | X | X | C |
| Dan Dixon | X | X | X | C |
| Charlie Dodge | X | X | X | B |
| Conrad Felice | X | X | X | C |
| Randy Hammond | | X | X | A |
| Dan Holmquist | X | X | X | A |
| Bill James | | X | X | B |
| Rick Krebs | X | X | X | A |
| Kiva Lints | | X | X | C |
| Dale McGregor | X | X | X | A |
| Ken Price | X | X | X | C |
| Jason Rhoades | X | X | X | B |
| Steve Rinnert | | X | X | B |
| Pete Smith | | X | X | B |
| James Thomson | | X-p | X-p | |
| Mark Urban | X | X | X | |
| Bill Wiedelman | X | X | X | A |
| Jacobs Engineering | | | | |
| Kevin Dusenberry | | X | X | C |
| Heather Weeks | | X | X | B |

p denotes partial session attendance

6.0 CORRIDOR ALTERNATIVES

lists all the alternatives developed by the three breakout groups and by the entire workshop team. Alternatives are sorted by route, SR 167, SR 509 and I-5, and in descending order by value. The high value (5) phasing and optimization alternatives are carried forward for further evaluation in the next phase of the Strategic Corridor Design Review. Revenue, procurement and stakeholder strategies are not include in the initial design review, but will be considered in a later project stage.

Bold text indicates the 20 alternatives carried forward. Section 7.0 has exhibits for 14 SR 167 alternatives and 5 SR 509 alternatives. The 20th alternative carried forward is on I-5 and is not illustrated.

Table C- 4 Initial Design Workshop Corridor Alternatives

| Value | Strategy | Route | Description | Features |
|-------|----------|----------------------|--|--|
| 5 | Phasing | 167 (Alt 167-1) | Don't build 70th connection - route traffic through city streets | Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from SR 161 to SR 509 Auxiliary lanes both directions on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Directional Interchange at I-5/SR 167 Valley Ave E Interchange New SPUI at Meridian Ave No 70th Ave E connection |
| 5 | Phasing | 167 (Alt 167-2) | Delay construction of 167 between Valley & SR 161 - Use Valley Ave. in the interim better connection from 167 to Valley East (117) | One lane on SR 167 each direction from Valley Ave E to SR 509 Auxiliary lanes both directions on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Directional Interchange at I-5/SR 167 Reconstruct 70th Ave E from 20th St E to SR 99 Half-Diamond to/from north at Valley Ave E Interchange SR 167 Overcrossing at Meridian Ave to new surface street connector Similar to Phase 1-C of Comprehensive Tolling Study |
| 5 | Phasing | 167-0 (Alt 167-3) | Diverging Diamond at I-5/SR 167, with SB167 to NB5, using 70th | Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from new 70th Ave E Interchange to SR 509 No connection to 54th Ave E New Diverging Diamond Interchange at I-5/70th Ave E NB I-5 HOV connection from Valley Ave E SB I-5 HOV connection to 70th Ave E No Valley Ave E Interchange No SPUI at Meridian Ave |
| 5 | Phasing | 167-1 (Alt 167-4) | 70th to SR 167 (west to SR 509) with 1/2 diamond to north, toll connection, no eastern connection | Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from new 70th Ave E Interchange to SR 509 Half-SPUI to/from east at 54th Ave E New Half-Diamond Interchange to/from north at I-5/70th Ave E NB/SB I-5 HOV connection from Valley Ave E No Valley Ave E Interchange for General Purpose Vehicles No SR 167 connection between Valley Ave E and SR 512 |

| Value | Strategy | Route | Description | Features |
|-------|--------------|----------------------|--|---|
| 5 | Phasing | 167-2 (Alt 167-5) | 1/2 interchange to the north with flyover braided ramp, future link to 70th, no eastern connection | <p>One lane on SR 167 each direction from I-5 to SR 509 Half-SPUI to/from east at 54th Ave E New Half-Diamond Interchange to/from north at I-5/SR 167 167-NB5 Ramp crosses over I-5 No SR 167 connection between I-5 and SR 512</p> |
| 5 | Phasing | 167 (Alt 167-6) | Build Port of Tacoma SR 509 to I-5 connection - [toll this?] (smaller initial investment , meeting 2 immediate needs, development potential, facilitates freight movement) | <p>Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from I-5 to SR 509 Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Western half of Directional Interchange at I-5/SR 167 No SR 167 construction east of I-5 Similar to Phase 1-B of Comprehensive Tolling Study</p> |
| 5 | Optimization | 167-5 (Alt 167-7) | "DB concept" - D-C using combined ramp in NE quad., lowers I/C by one layer | <p>Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from SR 161 to SR 509 Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Directional Interchange at I-5/SR 167, with combined flyover in NE quadrant Reconstruct 70th Ave E from 20th St E to SR 99 Valley Ave E Interchange New SPUI at Meridian Ave</p> |
| 5 | Optimization | 167-X (Alt 167-8) | SR 167/ I-5 SPUI or alternative IC at SYSTEM IC | <p>Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from SR 161 to SR 509 Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E SPUI at I-5/SR 167 Interchange (Arterial speed crossing of I-5) Reconstruct 70th Ave E from 20th St E to SR 99 Valley Ave E Interchange New SPUI at Meridian Ave</p> |
| 5 | Optimization | 167-7 (Alt 167-9) | 3 level diverging diamond I/C (5, Connections/ 167, bottom to top), layering phasable by running 167 through ramp lanes. | <p>Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from SR 161 to SR 509 Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Reconstruct 70th Ave E from 20th St E to SR 99 Valley Ave E Interchange New SPUI at Meridian Ave Three level Diverging Diamond Interchange at I-5/SR 167, creates Diamond Interchange on Collector Distributor road system</p> |

| Value | Strategy | Route | Description | Features |
|-------|--------------|------------------------|--|--|
| 5 | Phasing | 167-8 (Alt 167-10) | 1/2-diamond at SR 167/SR 509 I/S. Upgrade connections later | <p>Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from SR 161 to SR 509 SR 167 connects to SR 509 with new signalized intersection(s) Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Directional Interchange at I-5/SR 167 Reconstruct 70th Ave E from 20th St E to SR 99 Valley Ave E Interchange New SPUI at Meridian Ave</p> |
| 5 | Phasing | 167-9 (Alt 167-11) | NB167 ultimate with SB167 tie to signalized terminal. | <p>Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from SR 161 to SR 509 New NB509-NB167 direct connection SB167-SB509 connection through existing intersection Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Directional Interchange at I-5/SR 167 Reconstruct 70th Ave E from 20th St E to SR 99 Valley Ave E Interchange New SPUI at Meridian Ave</p> |
| 5 | Optimization | 167-10 (Alt 167-12) | Giant traffic circle with no signal, at grade | <p>Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from SR 161 to SR 509 Create new large roundabout to improve access to port at SR 509/SR 167 Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Directional Interchange at I-5/SR 167 Reconstruct 70th Ave E from 20th St E to SR 99 Valley Ave E Interchange New SPUI at Meridian Ave</p> |
| 5 | Phasing | 167 (Alt 167-13) | Eliminate (Phase 1) through 167 Roadway over valley/RR/Creek only ramp connections with signal at Valley | <p>Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from SR 161 to SR 509 Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Directional Interchange at I-5/SR 167 Reconstruct 70th Ave E from 20th St E to SR 99 No Valley Ave E Interchange Overcrossing, SR 167 crosses via signalized intersection New SPUI at Meridian Ave</p> |

| Value | Strategy | Route | Description | Features |
|-------|--------------|---------------------|---|--|
| 5 | Phasing | 167 (Alt 167-14) | Change SR 167 grade separation to signalized intersection -> defer to later. (change bridges to signals in eastern end) | Widen I-5 for center piers Replace Porter Way bridge One lane on SR 167 each direction from SR 161 to SR 509 Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange Half-SPUI to/from east at 54th Ave E Directional Interchange at I-5/SR 167 Reconstruct 70th Ave E from 20th St E to SR 99 No Valley Ave E Overcrossing No new connection west of Meridian Ave No new SPUI at Meridian Ave Crossings of Valley Ave E and Meridian Ave are at new signalized intersections |
| 5 | Procurement | 167 | Change law so WSDOT can "act" like a concessionaire to eliminate middle man | |
| 5 | Procurement | 167 | RE-address EIS and Streamline ->Flexibility needs to be written in. | |
| 5 | Revenue | 167 | Expand project to 167 & 410 area to generate Rev - this is a cash cow | |
| 5 | Revenue | 167 | Extend 167 HOT lanes south from SR 18 to SR 161 | |
| 5 | Revenue | 167 | Funding strategies (other than/ in addition to tolls) ->MAP21 tweaks to get you on the list improvements to get on the network ->Earmarks | |
| 5 | Revenue | 167 | If excess ROW due to innovation use for additional Rev or give to DB as part of contract | |
| 5 | Revenue | 167 | If excess ROW due to innovation use for additional Rev producers -> "give" it to the D/B or P3 | |
| 5 | Revenue | 167 | Toll all new access ramp to I-5 | |
| 5 | Revenue | 167 | Value to land over to Port of Tacoma if 167 is realigned | |
| 5 | Stakeholders | 167 | RE-address EIS and Streamline ->Flexibility needs to be written in. | |
| 4 | Optimization | 167 | Evaluate alternates to SPUI at SR 167/Meridian I/C | |
| 4 | Optimization | 167 | Fold the diamond IC @ Valley Ave, on north side of Valley. | |
| 4 | Phasing | 167 | Defer Valley Ave. IC - this is an expensive one - make connection at south I/C | |
| 4 | Phasing | 167 | Eliminate ramps from 161 to 167 west - Use 512 (don't build full I/C) | |
| 4 | Phasing | 167 | Eliminate/limit/stage local access - partnerships/cost sharing to build these service interchanges (eg. Valley) | |
| 4 | Optimization | 167 | 167 redesign to shorten bridge over RR | |
| 4 | Optimization | 167 | at grade sections with signalized intersections | |

| Value | Strategy | Route | Description | Features |
|-------|--------------|-------|--|----------|
| 4 | Optimization | 167 | <i>Revise the geotechnical design criteria -> too conservative right now.</i> | |
| 4 | Optimization | 167 | Straighten out connection from SR 509 to South | |
| 4 | Phasing | 167 | Eliminate 167 to I-5 South connections - use 512 instead | |
| 4 | Phasing | 167 | Eliminate HOT lanes connection from SR 167 to NB I-5 | |
| 4 | Revenue | 167 | At-grade sections w/signals raising property values. | |
| 4 | Revenue | 167 | Develop in-line truck stop within Port to I-5 connection | |
| 4 | Revenue | 167 | Make Rev from weigh stations (parking, retail, P3, etc.) or eliminate | |
| 4 | Revenue | 167 | Value to land owned by Port of Tacoma if SR 167 re-aligned | |
| 3 | Optimization | 167 | Simplify 167 & I-5 IC with loop ramp NB 167 to I-5 NB | |
| 3 | Optimization | 167 | Soil mixing/geofoam/ground improvement to eliminate bridge. | |
| 3 | Phasing | 167-4 | "Milton Connection" - utilizing SR 99 with connection to SR 167 | |
| 3 | Optimization | 167-6 | Left Entrance to single flyover - 4 lane flyover | |
| 3 | Procurement | 167 | Project by project risk register | |
| 3 | Revenue | 167 | Tolled arterial - don't build freeway bridges over signals | |
| 2 | Optimization | 167 | Extend Tacoma SR 509 to NE connection into SR 18 | |
| 2 | Optimization | 167 | Wapato Creek relocation to simplify 167 Valley IC | |
| 0 | Optimization | 167 | <i>Accept other states design standards</i> | |
| 0 | Optimization | 167 | <i>Reduce Footprint/ROW - (Apply Practical Design Concepts) limit ROW takes; shoulders, lane widths, interchange connectivity, wall locations, earthwork, reduce design criteria to reduce cut/fill costs.</i> | |
| 0 | Optimization | 167 | <i>Reduce footprint/ROW acquisition</i> | |
| 0 | Optimization | 167 | <i>Revise object height to optimize vertical design</i> | |
| 0 | Optimization | 167 | Simplify 167 & I-5 IC | |
| 0 | Phasing | 167 | Build arterial (not L/A) facilities to provide connections - I-5 to Port of Tacoma | |
| 0 | Phasing | 167 | Use Valley Ave & 70th corridors as arterials to connect 167 and I-5 and add lesser/service interchange @ I-5 - defer system IC | |
| | Procurement | 167 | Dependent on Regional Plan | |
| | Procurement | 167 | P3 - Project needs to be bigger ->more of I-5 | |

| Value | Strategy | Route | Description | Features |
|-------|--------------|-----------------------|--|---|
| | Procurement | 167 | Use DB/P3 for the rest | |
| | Procurement | 167 | Use DBB for Express Toll | |
| | Procurement | 167 | Write the RFP to accommodate incremental tolling 2 lanes in 2020 4 lanes in 2030 All lanes in 2040 | |
| 5 | Phasing | 509 (Alt 509-1) | Make 509 connections to mainline and CDs later | One lane on SR 509 each direction between S 188th St and 24th/28th Ave S Two lanes on SR 509 each direction from 24th/28th Ave S and I-5 New Diamond Interchange at S 188th St and SR 509 Half-Diamond to/from east at 24th/28th Ave S Widen I-5 to accommodate median access New HOV Direct Connector between I-5 median and SR 509 Reconstruct SR 516 Interchange |
| 5 | Phasing | 509 (Alt 509-2) | Use Texas U-turn as an alternative to building Kent tunnel | One lane on SR 509 each direction between S 188th St and 24th/28th Ave S Two lanes on SR 509 each direction between 24th/28th Ave S and I-5 New Diamond Interchange at S 188th St and SR 509 Half-Diamond to/from east at 24th/28th Ave S South Directional Interchange at I-5/SR 509 Reconstruct SR 516 Interchange New 2-lane Collector Distributor on west side of I-5 Access to S 231st Way via Texas U-turn at SR 516 |
| 5 | Phasing | 509-12 (Alt 509-3) | 24th/28th to I-5 connection, more perpendicular crossing of I-5. Allows median connection. First phase would connect to outside. "Texas-T" | No SR 509 connection west of 24th/28th Ave S One lane on SR 509 each direction between 24th/28th Ave S and I-5 Half-Diamond to/from east at 24th/28th Ave S South Directional Interchange at I-5/SR 509 Lower speed roadway under I-5 for NB5-NB509 ramp No HOV Direct Connect between I-5 median and SR 509 No new Connection to S 231st Way No reconstruction of SR 516 Interchange |
| 5 | Optimization | 509 (Alt 509-4) | Eliminate HOT Express lanes from 509 to I-5 (eliminate D/C from median) | No HOV Direct Connections between I-5 Median and SR 509 One lane on SR 509 each direction between S 188 St and 24th/28th Ave S Two lanes on SR 509 each direction between 24th/28th Ave S and I-5 New Diamond Interchange at S 188 St and SR 509 Half-Diamond to/from east at 24th/28th Ave S South Directional Interchange at I-5/SR 509 New Connection to S 231st Way via new I-5 Collector Distributor system Reconstruct SR 516 Interchange to include new I-5 Collector Distributor system |
| 5 | Phasing | 509 (Alt 509-5) | S 188th Street partial I/C to north only - nothing at 24th/28th. | One lane on SR 509 each direction between S 188 St and 24th/28th Ave S Two lanes on SR 509 each direction between 24th/28th Ave S and I-5 New Half-Diamond Interchange to/from north at S 188th St No Half-Diamond to/from east at 24th/28th Ave S South Directional Interchange at I-5/SR 509 New HOV Direct Connection between I-5 Median and SR 509 New Connection to S 231st Way via new I-5 Collector Distributor system Reconstruct SR 516 Interchange to include new I-5 Collector Distributor system |
| 5 | Procurement | 509 | Change law so WSDOT can "act" like a concessionaire to eliminate middle man | |

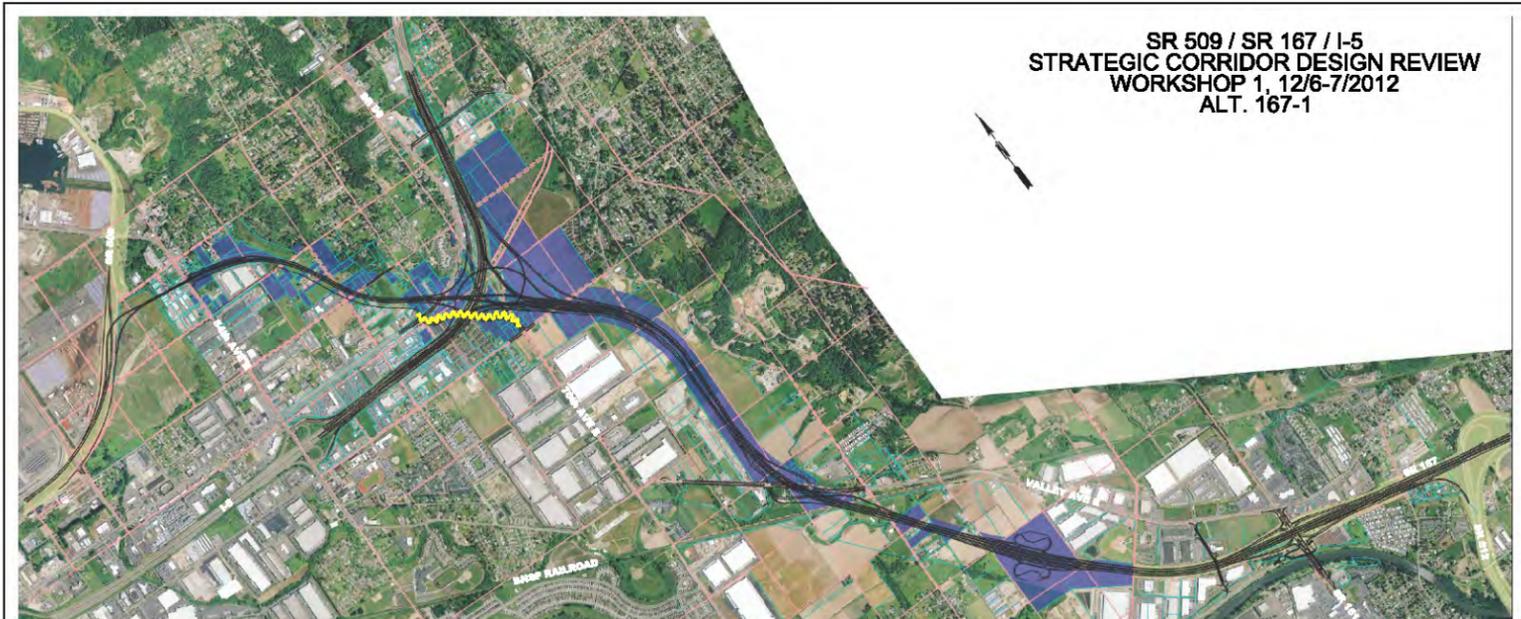
| Value | Strategy | Route | Description | Features |
|-------|--------------|-------|--|----------|
| 5 | Procurement | 509 | RE-address EIS and Streamline ->Flexibility needs to be written in. | |
| 5 | Revenue | 509 | Funding strategies (other than/ in addition to tolls) ->MAP21 tweaks to get you on the list improvements to get on the network ->Earmarks | |
| 5 | Revenue | 509 | If excess ROW due to innovation use for additional Rev producers -> "give" it to the D/B or P3 | |
| 5 | Revenue | 509 | Toll all new access ramp to I-5 | |
| 5 | Stakeholders | 509 | Eliminate/limit/stage local access - partnerships/cost sharing to build these (eg. 24th/28th) | |
| 5 | Stakeholders | 509 | RE-address EIS and Streamline ->Flexibility needs to be written in. | |
| 4 | Optimization | 509 | Less bridge at Park and environmental impact areas | |
| 4 | Optimization | 509 | reduce design speeds on I-5 to SR 509 | |
| 4 | Optimization | 509 | Straighten out 167 at 509 south | |
| 4 | Phasing | 509 | end 509 at SR 99 | |
| 3 | Phasing | 509 | Build 24/28 connection to I-5 - toll this (smaller initial investment , meeting 2 immediate needs, development potential, facilitates freight movement) | |
| 3 | Phasing | 509 | Build arterial (not L/A) facilities to provide connections - SR 509 arterial | |
| 3 | Procurement | 509 | Project by project risk register | |
| 3 | Revenue | 509 | Tolled arterial - don't build freeway bridges over signals | |
| 1 | Optimization | 509 | eliminate tunnels - increase bridge elevation | |
| 1 | Optimization | 509 | Tunnel under the airport " cut the corner, cut&cover tunnel. | |
| 0 | Optimization | 509 | <i>Accept other states design standards</i> | |
| 0 | Optimization | 509 | Connections via CD roads to Kent 231th & SR 516 | |
| 0 | Optimization | 509 | less bridge by environmental impact innovation. | |
| 0 | Optimization | 509 | <i>Reduce Footprint/ROW - limit ROW takes; shoulders, lane widths, interchange connectivity, wall locations, earthwork, reduce design criteria to reduce cut/fill costs.</i> | |
| 0 | Optimization | 509 | <i>Reduce footprint/ROW acquisition</i> | |
| 0 | Optimization | 509 | <i>Revise the geotechnical design criteria -> too conservative right now.</i> | |

| Value | Strategy | Route | Description | Features |
|----------|----------------|------------|---|----------|
| 0 | Optimization | 509 | SR 509 connections to I-5 using a T-ramp | |
| | Procurement | 509 | Dependent on Regional Plan | |
| | Procurement | 509 | P3 - Project needs to be bigger ->more of I-5 | |
| | Procurement | 509 | Use DB/P3 for the rest | |
| | Procurement | 509 | Use DBB for Express Toll | |
| | Procurement | 509 | Write the RFP to accommodate incremental tolling 2 lanes in 2020 4 lanes in 2030 All lanes in 2040 | |
| 3 | Phasing | 509-11 | 2-lane C-D on west side of I-5, through SR 516 I/C, add two lane D-C to median by "Texas-T". | |
| | Revenue | | funding strategies - MAP21 | |
| 5 | Phasing | I-5 | Squeeze in 2 HOT lanes on I-5 - minimal cost | |
| 5 | Revenue | I-5 | Convert GP lanes to toll lanes - congestion price | |
| 5 | Revenue | I-5 | Convert GP lanes to toll lanes during congestion period "congestion Pricing variant. | |
| 5 | Revenue | I-5 | I-5 single lane conversion to HOT from I-405 to SR 16 | |
| 5 | Revenue | I-5 | Take 1 GP land to make the second HOT lane | |
| 4 | Phasing | I-5 | Fix choke points on I-5 first to appease public | |
| 4 | Revenue | I-5 | Add 3+ HOT lanes always | |
| 4 | Revenue | I-5 | Use reversible HOT Lanes | |
| 3 | Optimization | I-5 | Avoid sliver fill (another reason to do widening outside) | |
| 3 | Optimization | I-5 | Existing SR 167 River Road to I-5 | |
| 3 | Optimization | I-5 | Widen to the outside where possible first - must consider cost of MOT/construction access | |
| 3 | Revenue | I-5 | Consider building 509 and/or 167 first to make a future P3 (I-5) opportunity more attractive. | |
| | Stakeholders | I-5 | Express bus is a potential transit option that utilizes the I-5 corridor - no competition between modes | |
| | Stakeholders | I-5 | Utilize joint stakeholder opportunities with light rail P3 - optimize construction | |

7.0 EXHIBITS

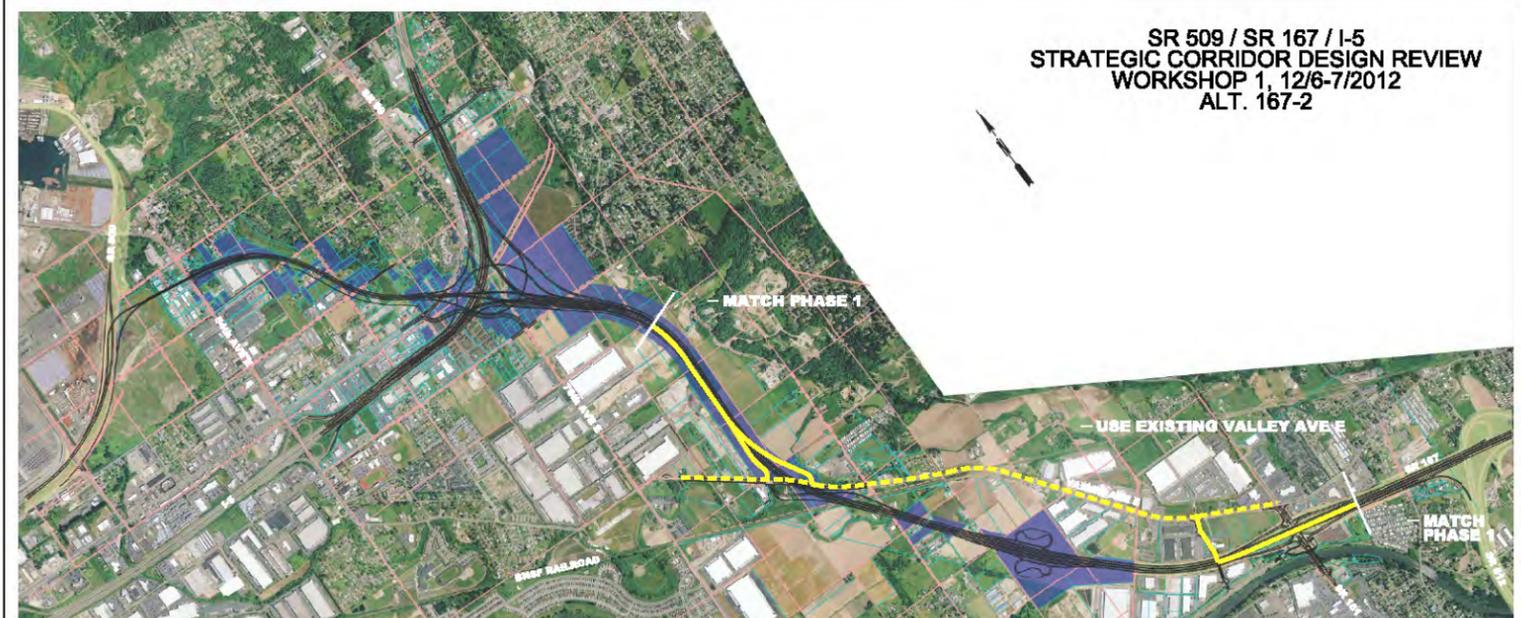
| Exhibit | Alternative | Description |
|---------|-------------|--|
| 1 | ALT. 167-1 | SR 167 Phase 1, delayed construction of new 70th bridge |
| | ALT. 167-2 | SR 167 Phase 1, Route Traffic along Valley Ave E, delay construction of 167 between Valley & SR 161, add Meridian connector |
| | ALT. 167-3 | New Diverging Diamond at I-5/70th Ave E with direct Connections to I-5 HOV from 70th and Valley Ave E |
| 2 | ALT. 167-4 | New Half-Diamond to/from North at I-5/SR 167. Direct Connections to I-5 HOV from Valley Ave E |
| | ALT. 167-5 | New Half-Diamond to/from North at I-5/70th Ave E, with ramp intersections west of I-5. No connection to SR 167 to east. |
| | ALT. 167-6 | Construct SR 167 from SR 509 to I-5, including construction of I-5 directional ramps to/from west. |
| 3 | ALT. 167-7 | Combine SB5-NB167 and SB167-NB5 onto on structure in NE quadrant |
| | ALT. 167-8 | Replaces Directional Interchange with SPUI at SR 167/ I-5 |
| | ALT. 167-9 | Replaces Directional Interchange with three level Diverging Diamond Interchange |
| 4 | ALT. 167-10 | New Half-Diamond Interchange at SR 167/SR 509 Intersection |
| | ALT. 167-11 | Built NB509-NB167 ultimate ramp, and tie SB167 to SR 509 with signalized intersection |
| | ALT. 167-12 | Build traffic circle with no signal, at grade at intersection with SR 509 to promote access to port. |
| 5 | ALT. 167-13 | Delay construction of SR 167 over Valley Ave E/Railroad/ Hylebos Creek. SR 167 connects through signal |
| | ALT. 167-14 | Defer all bridge construction east of I-5. Create signalized intersections |
| 6 | ALT. 509-1 | Defer construction of I-5 collector distributor system to future |
| | ALT. 509-2 | Build two-lane, two-way CD on southbound side of I-5 and construct "Texas U-turn" at SR 516 to provide access to S 231st Way |
| 7 | ALT. 509-3 | Build SR 509 from I-5 to 24th /28th Ave S, defer connection west. Construct more perpendicular crossing of I-5 |
| | ALT. 509-4 | Defer construction of median direct connection from SR 509 to I-5 |
| 8 | ALT. 509-5 | Construct half-diamond interchange to/from north at S188th St. interchange, and defer 24th /28th Ave S to future phase |

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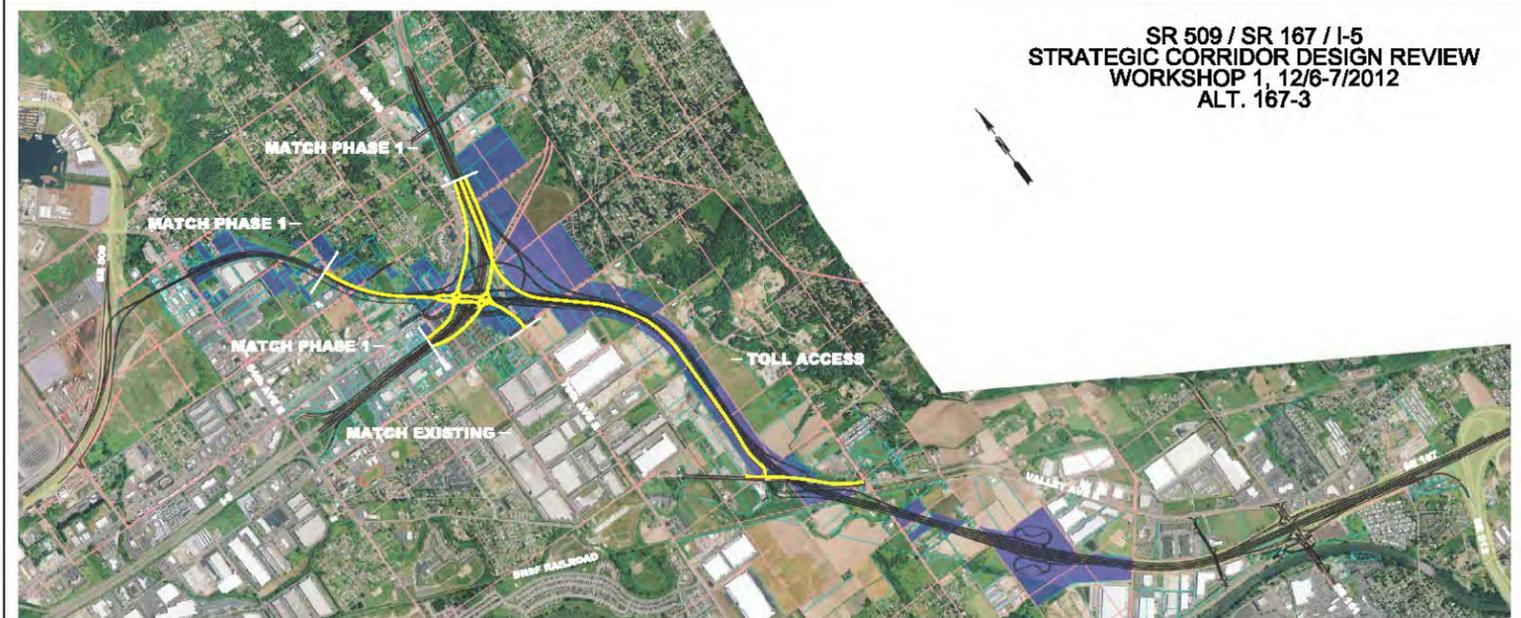
ALT. 167-1: SR 167 Phase 1, delayed construction of new 70th bridge

- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from SR 161 to SR 509
- Auxiliary lanes both directions on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Directional Interchange at I-5/SR 167
- Valley Ave E Interchange
- New SPUI at Meridian Ave
- No 70th Ave E connection



ALT. 167-2: SR 167 Phase 1, Route Traffic along Valley Ave E, delay construction of 167 between Valley & SR 161, add Meridian connector

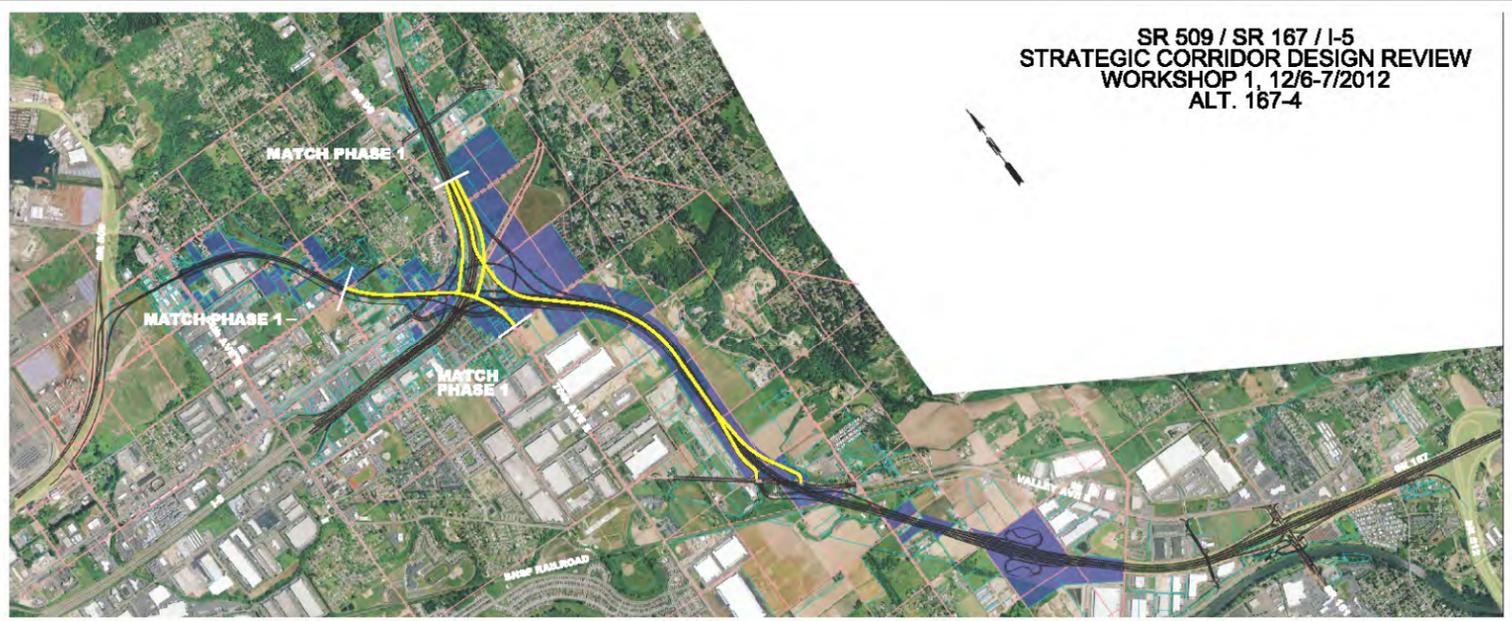
- One lane on SR 167 each direction from Valley Ave E to SR 509
- Auxiliary lanes both directions on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Directional Interchange at I-5/SR 167
- Reconstruct 70th Ave E from 20th St E to SR 99
- Half-Diamond to/from north at Valley Ave E Interchange
- SR 167 Overcrossing at Meridian Ave to new surface street connector
- Similar to Phase 1-C of Comprehensive Tolling Study



ALT. 167-3: New Diverging Diamond at I-5/70th Ave E with direct Connections to I-5 HOV from 70th and Valley Ave E

- Widen I-5 for Center Piers
- Replace Porter Way Bridge
- One lane on SR 167 each direction from new 70th Ave E Interchange to SR 509
- No connection to 54th Ave E
- New Diverging Diamond Interchange at I-5/70th Ave E
- NB I-5 HOV connection from Valley Ave E
- SB I-5 HOV connection to 70th Ave E
- No Valley Ave E Interchange
- No SPUI at Meridian Ave

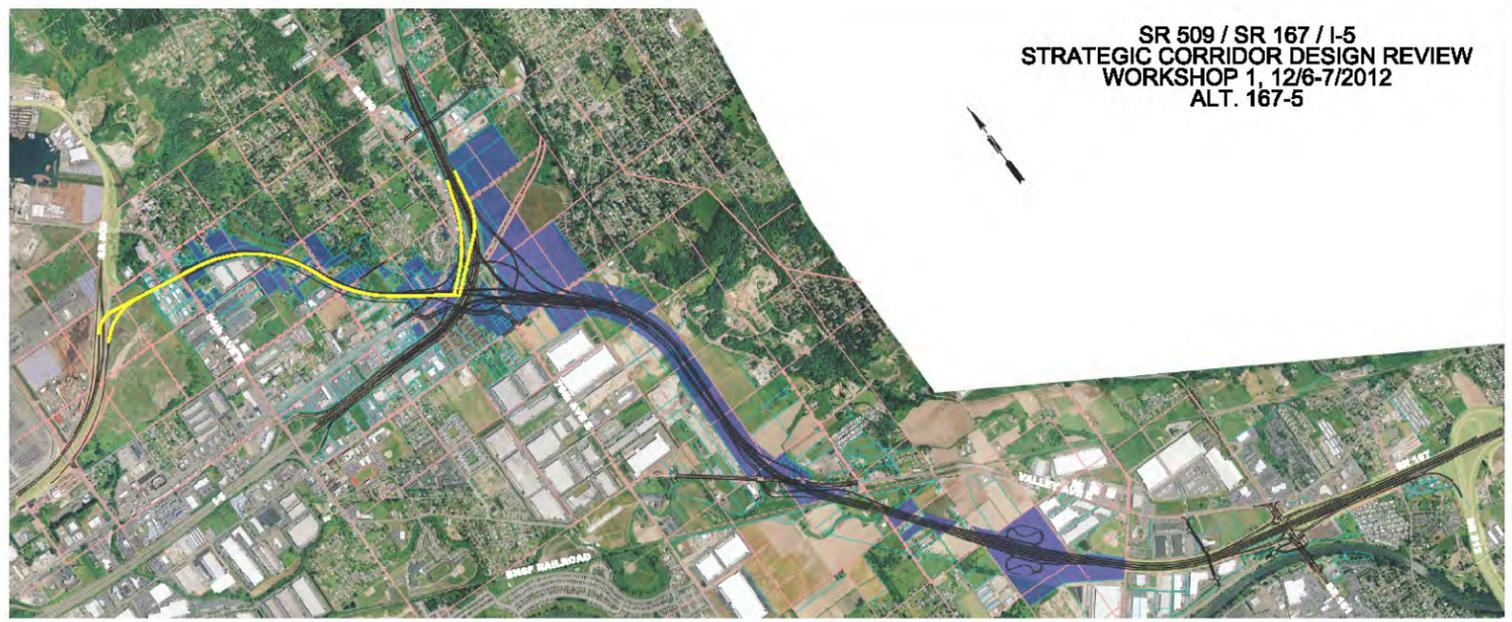
Exhibit C- 1 Alternatives 167-1, 167-2 and 167-3



SR 509 / SR 167 / I-5
 STRATEGIC CORRIDOR DESIGN REVIEW
 WORKSHOP 1, 12/6-7/2012
 ALT. 167-4

ALT. 167-4: New Half-Diamond to/from North at I-5/SR 167. Direct Connections to I-5 HOV from Valley Ave E

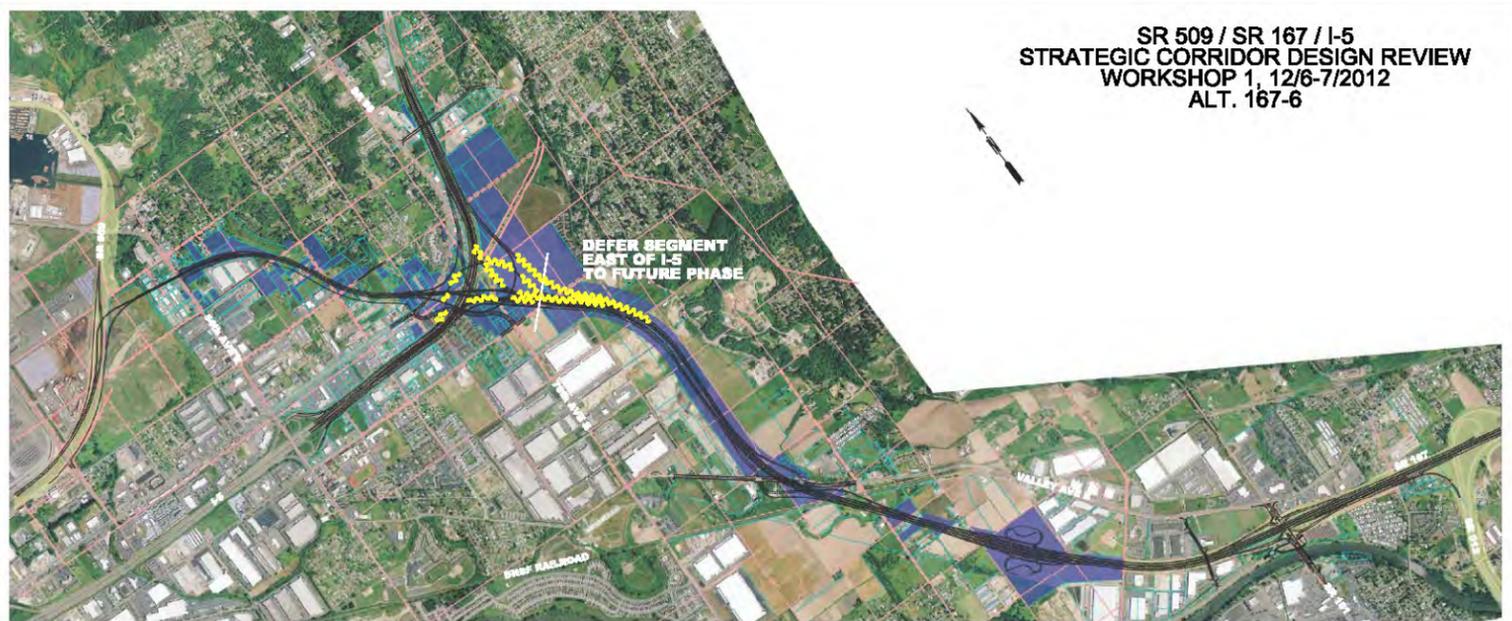
- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from new 70th Ave E Interchange to SR 509
- Half-SPUI to/from east at 54th Ave E
- New Half-Diamond Interchange to/from north at I-5/70th Ave E
- NB/SB I-5 HOV connection from Valley Ave E
- No Valley Ave E Interchange for General Purpose Vehicles
- No SR 167 connection between Valley Ave E and SR 512



SR 509 / SR 167 / I-5
 STRATEGIC CORRIDOR DESIGN REVIEW
 WORKSHOP 1, 12/6-7/2012
 ALT. 167-5

ALT. 167-5: New Half-Diamond to/from North at I-5/70th Ave E, with ramp intersections west of I-5. No connection to SR 167 to east.

- One lane on SR 167 each direction from I-5 to SR 509
- Half-SPUI to/from east at 54th Ave E
- New Half-Diamond Interchange to/from north at I-5/SR 167
- 167-NB5 Ramp crosses over I-5
- No SR 167 connection between I-5 and SR 512

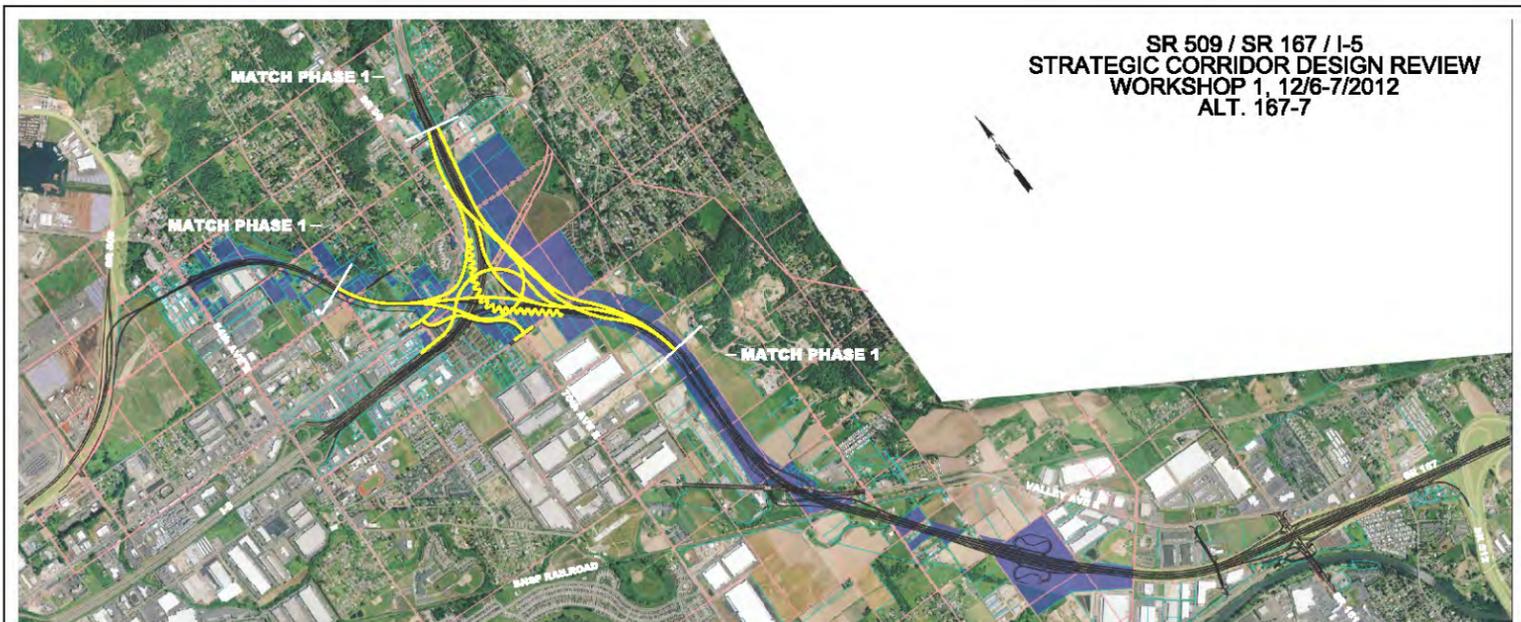


SR 509 / SR 167 / I-5
 STRATEGIC CORRIDOR DESIGN REVIEW
 WORKSHOP 1, 12/6-7/2012
 ALT. 167-6

ALT. 167-6: Construct SR 167 from SR 509 to I-5, including construction of I-5 directional ramps to/from west.

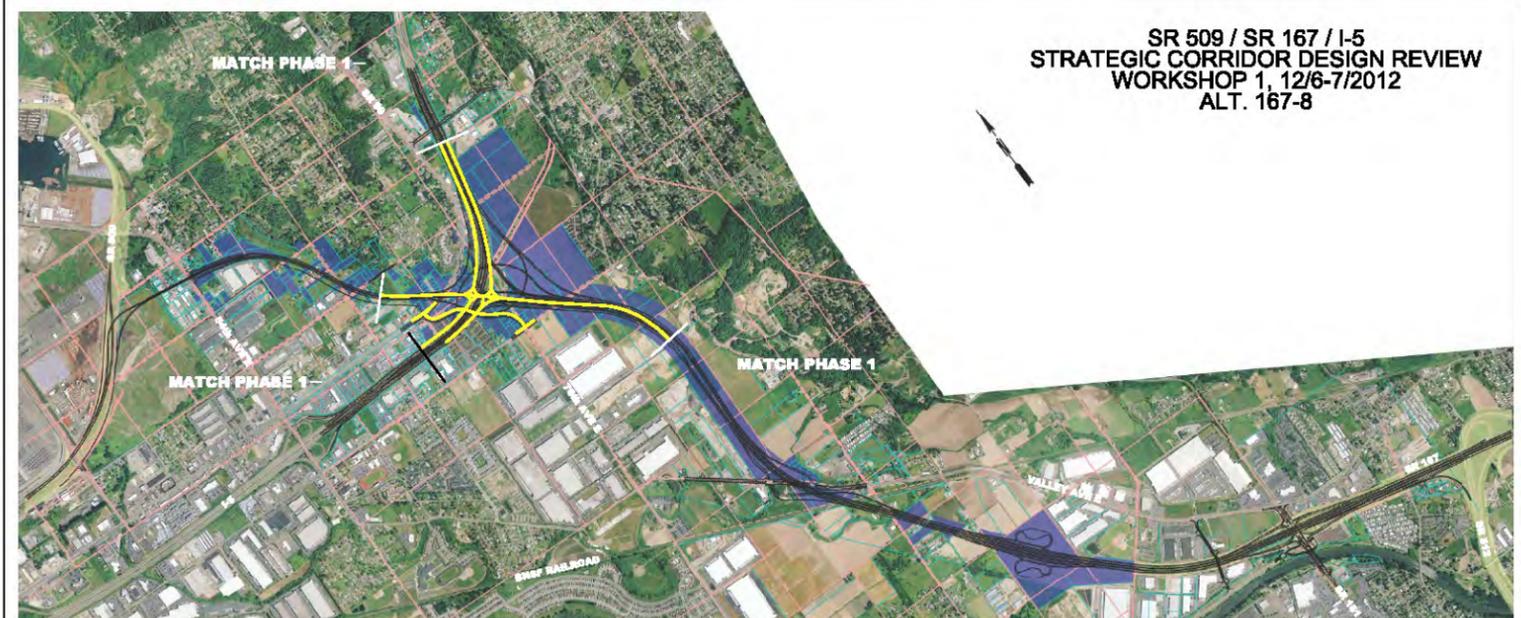
- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from I-5 to SR 509
- Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Western half of Directional Interchange at I-5/SR 167
- No SR 167 construction east of I-5
- Similar to Phase 1-B of Comprehensive Tolling Study

Exhibit C- 2 Alternatives 167-4, 167-5 and 167-6



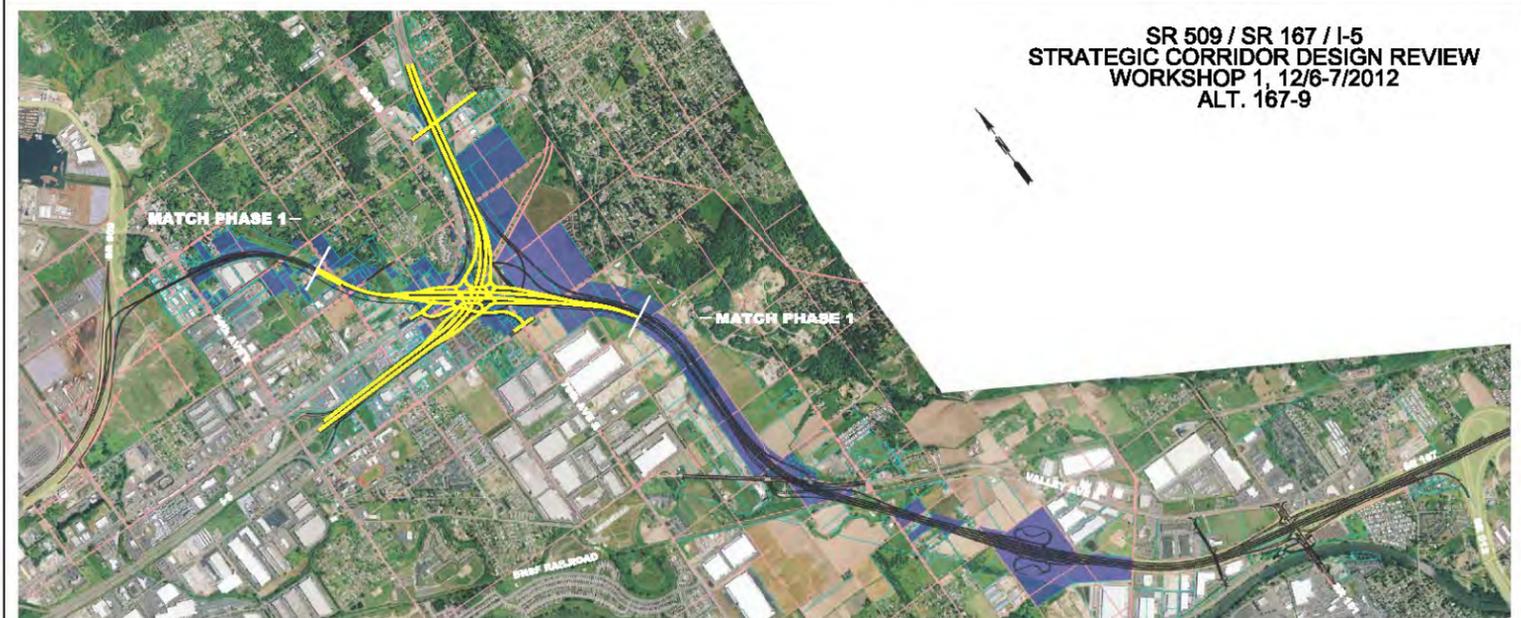
ALT 167-7: Combine SB5-NB167 and SB167-NB5 onto one structure in NE quadrant

- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from SR 161 to SR 509
- Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Directional Interchange at I-5/SR 167, with combined flyover in NE quadrant
- Reconstruct 70th Ave E from 20th St E to SR 99
- Valley Ave E Interchange
- New SPUI at Meridian Ave



ALT 167-8: Replaces Directional Interchange with SPUI at SR 167/I-5

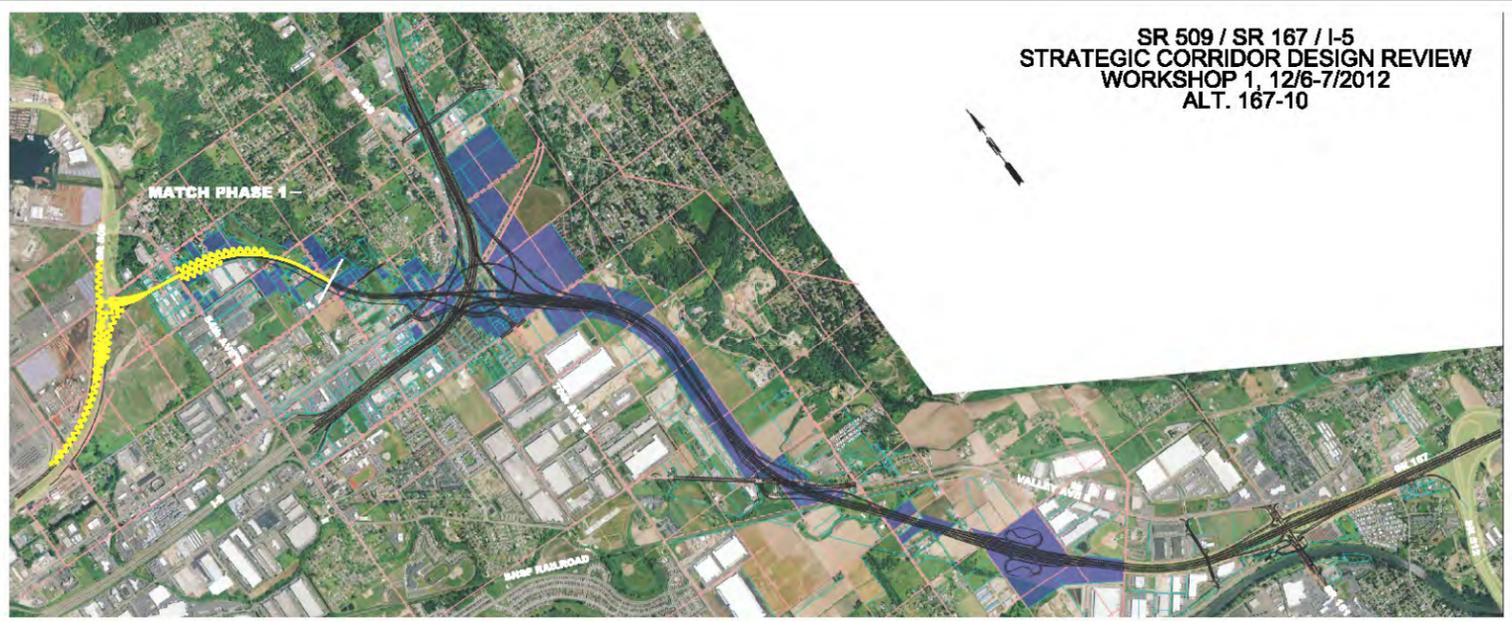
- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from SR 161 to SR 509
- Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- SPUI at I-5/SR 167 Interchange (Arterial crossing of I-5)
- Reconstruct 70th Ave E from 20th St E to SR 99
- Valley Ave E Interchange
- New SPUI at Meridian Ave



ALT 167-9: Replaces Directional Interchange with three level Diverging Diamond Interchange

- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from SR 161 to SR 509
- Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Reconstruct 70th Ave E from 20th St E to SR 99
- Valley Ave E Interchange
- New SPUI at Meridian Ave
- Three level Diverging Diamond Interchange at I-5/SR 167, creates Diamond Interchange on Collector Distributor road system

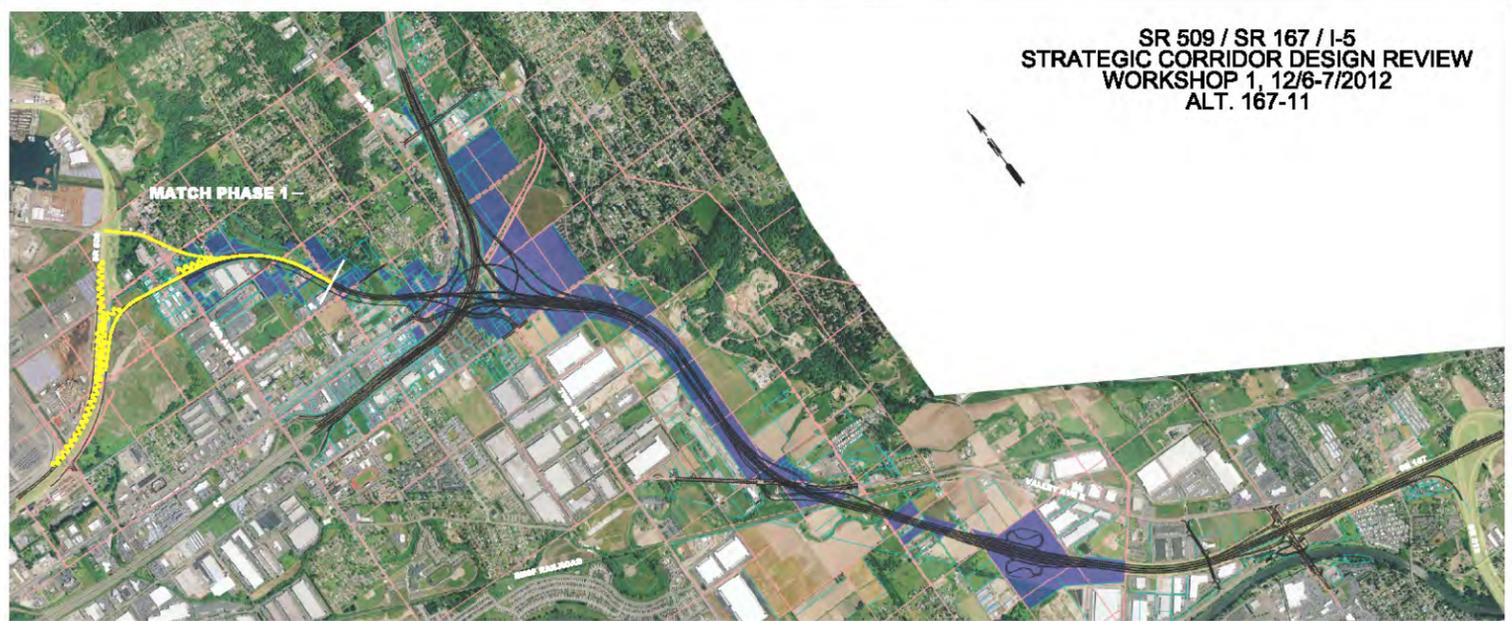
Exhibit C- 3 Alternatives 167-7, 167-8 and 167-9



SR 509 / SR 167 / I-5
 STRATEGIC CORRIDOR DESIGN REVIEW
 WORKSHOP 1, 12/6-7/2012
 ALT. 167-10

ALT. 167-10: New Half-Diamond Interchange at SR 167/SR 509 Intersection

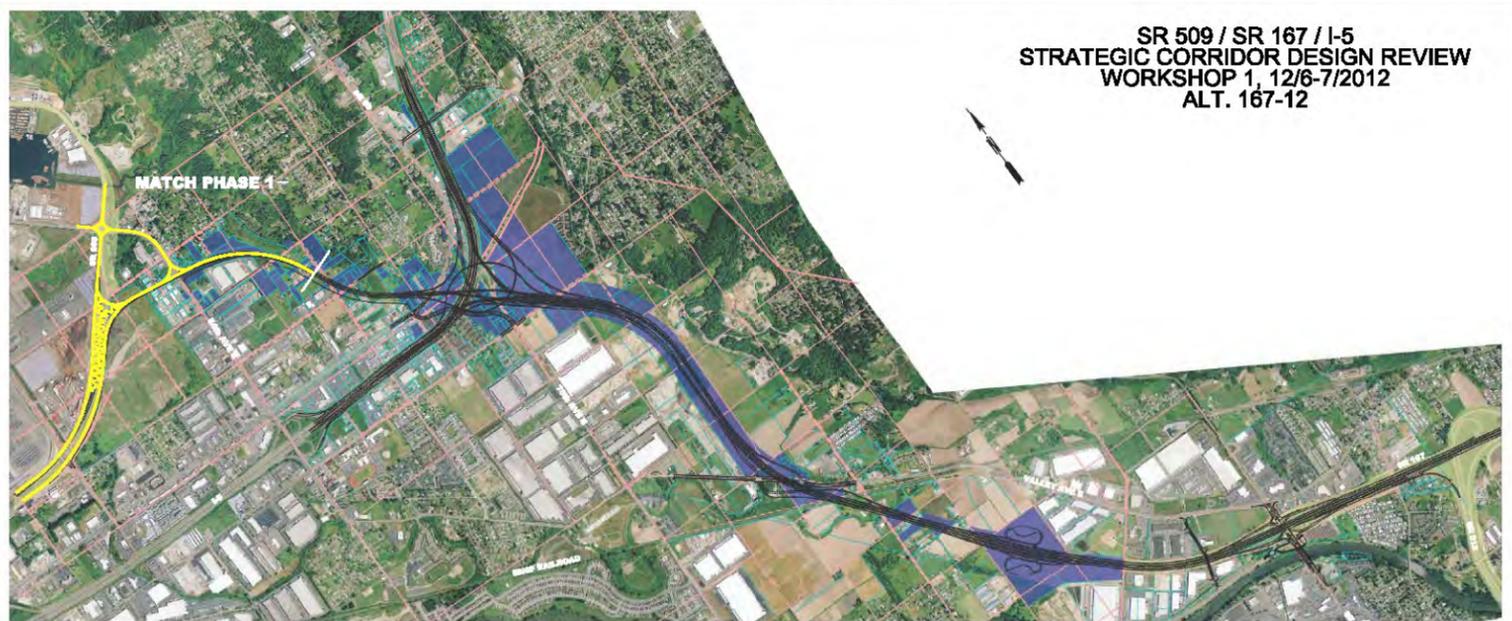
- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from SR 161 to SR 509
- SR 167 connects to SR 509 with new signalized intersection(s)
- Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Directional Interchange at I-5/SR 167
- Reconstruct 70th Ave E from 20th St E to SR 99
- Valley Ave E Interchange
- New SPUI at Meridian Ave



SR 509 / SR 167 / I-5
 STRATEGIC CORRIDOR DESIGN REVIEW
 WORKSHOP 1, 12/6-7/2012
 ALT. 167-11

ALT. 167-11: Build NB509-NB167 ultimate ramp and tie SB167 to SR 509 with signalized intersection

- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from SR 161 to SR 509
- New NB509-NB167 direct connection
- SB167-SB509 connection through existing intersection
- Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Directional Interchange at I-5/SR 167
- Reconstruct 70th Ave E from 20th St E to SR 99
- Valley Ave E Interchange
- New SPUI at Meridian Ave

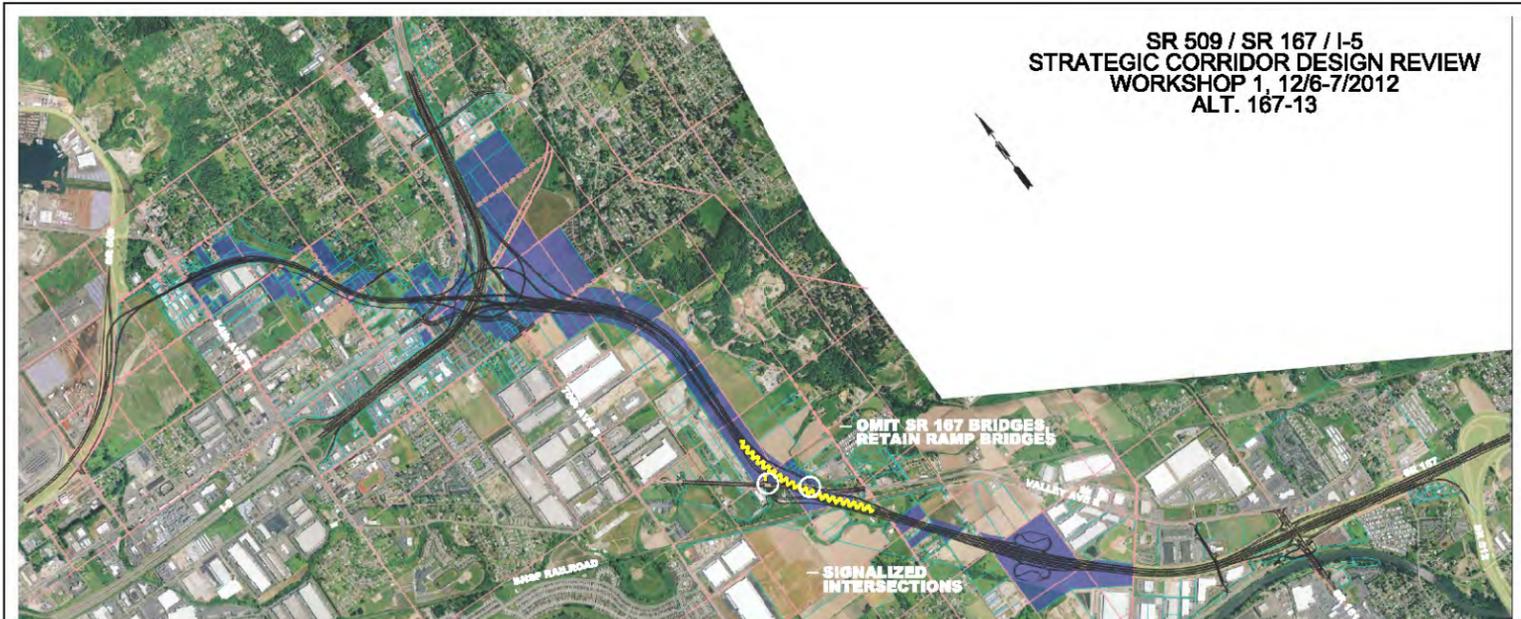


SR 509 / SR 167 / I-5
 STRATEGIC CORRIDOR DESIGN REVIEW
 WORKSHOP 1, 12/6-7/2012
 ALT. 167-12

ALT 167-12: Build traffic circle with no signal, at grade at intersection with SR 509 to promote access to port

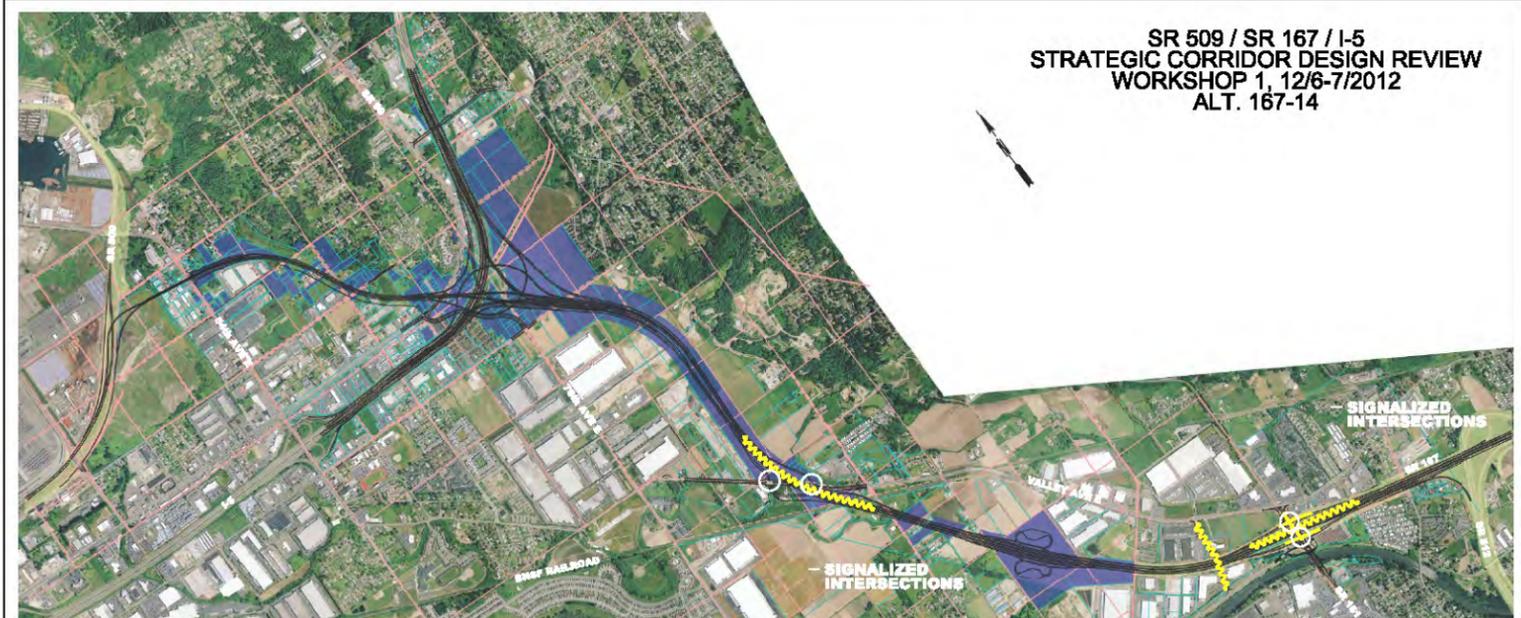
- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from SR 161 to SR 509
- Create new large roundabout to improve access to port at SR 509/SR 167
- Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Directional Interchange at I-5/SR 167
- Reconstruct 70th Ave E from 20th St E to SR 99
- Valley Ave E Interchange
- New SPUI at Meridian Ave

Exhibit C- 4 Alternatives 167-10, 167-11 and 167-12



ALT 167-13: Delay construction of SR 167 over Valley Ave E/Railroad/Hylebos Creek. SR 167 connects through signal.

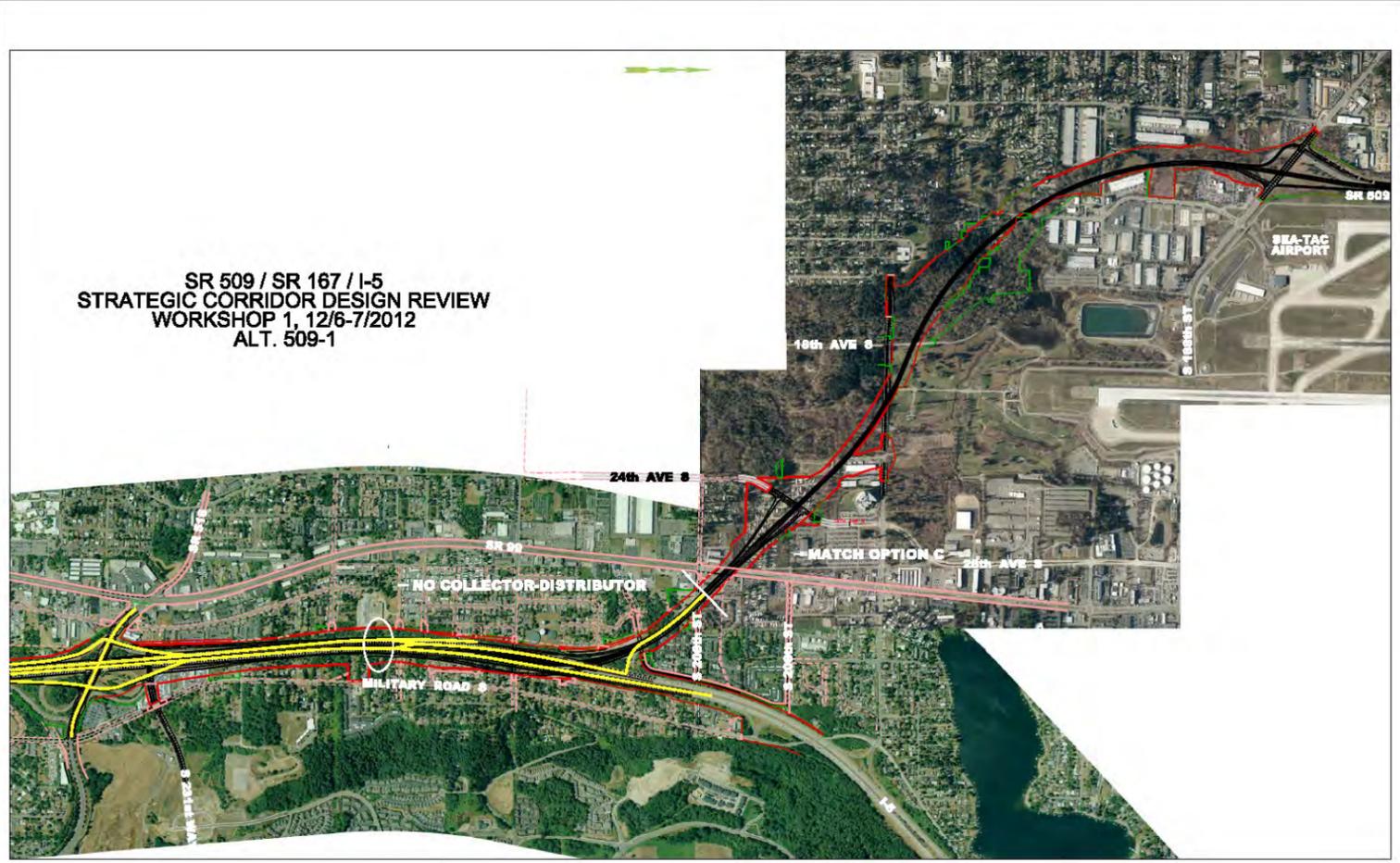
- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from SR 161 to SR 509
- Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Directional Interchange at I-5/SR 167
- Reconstruct 70th Ave E from 20th St E to SR 99
- No Valley Ave E interchange Overcrossing, SR 167 crosses via signalized intersection
- New SPUI at Meridian Ave



ALT 167-14: Defer all bridge construction east of I-5. Create signalized intersections.

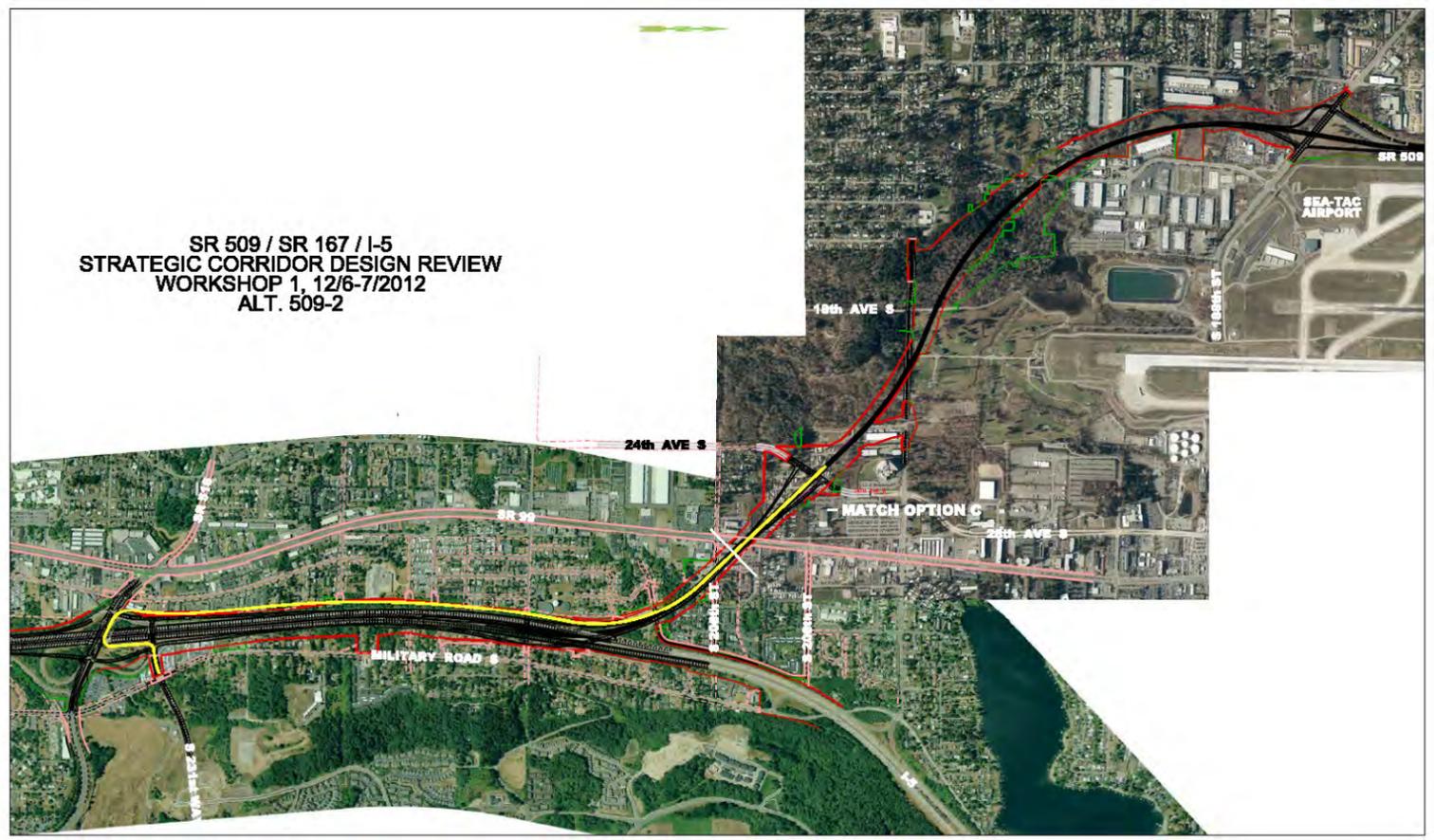
- Widen I-5 for center piers
- Replace Porter Way bridge
- One lane on SR 167 each direction from SR 161 to SR 509
- Auxiliary lane on SR 167 from I-5 to 54th Ave E Interchange
- Half-SPUI to/from east at 54th Ave E
- Directional Interchange at I-5/SR 167
- Reconstruct 70th Ave E from 20th St E to SR 99
- No Valley Ave E Overcrossing
- No new connection west of Meridian Ave
- No new SPUI at Meridian Ave
- Crossings of Valley Ave E and Meridian Ave are at new signalized intersections

Exhibit C- 5 Alternatives 167-13 and 167-14



ALT. 509-1: Defer construction of I-5 collector distributor system to future

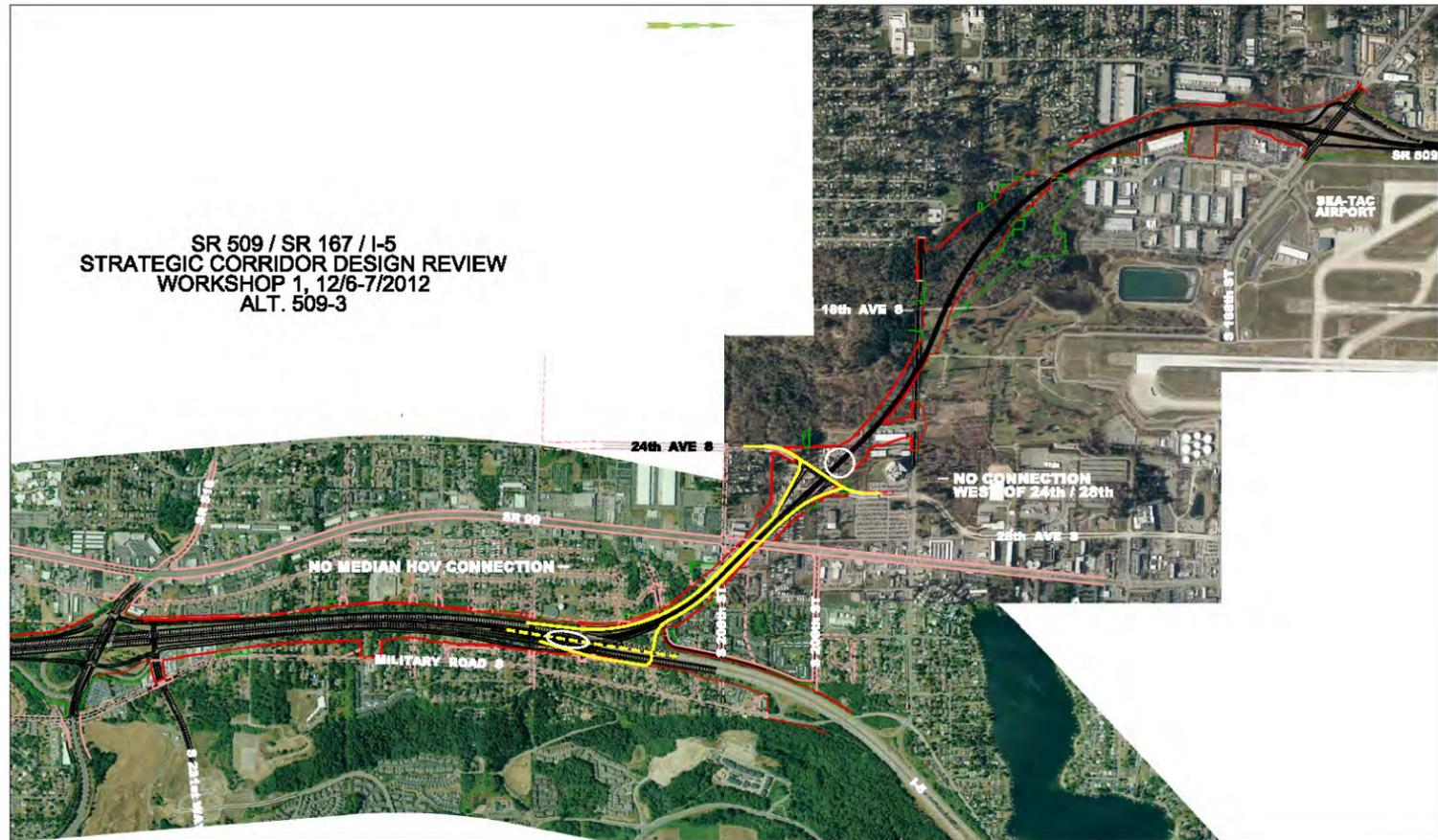
- One lane on SR 509 each direction from S 188th St and 24th/28th Ave S
- Two lanes on SR 509 each direction from 24th/28th Ave S and I-5
- New Diamond Interchange at S 188th St and SR 509
- Half-Diamond to/from east at 24th/28th Ave S
- Widen I-5 to accommodate median access
- New HOV Direct Connect between I-5 Median and SR 509
- Reconstruct SR 516 Interchange



ALT. 509-2: Build two-lane, two-way Collector Distributor on southbound side of I-5 and construct "Texas U-turn" at SR 516 to provide access to S 231st Way

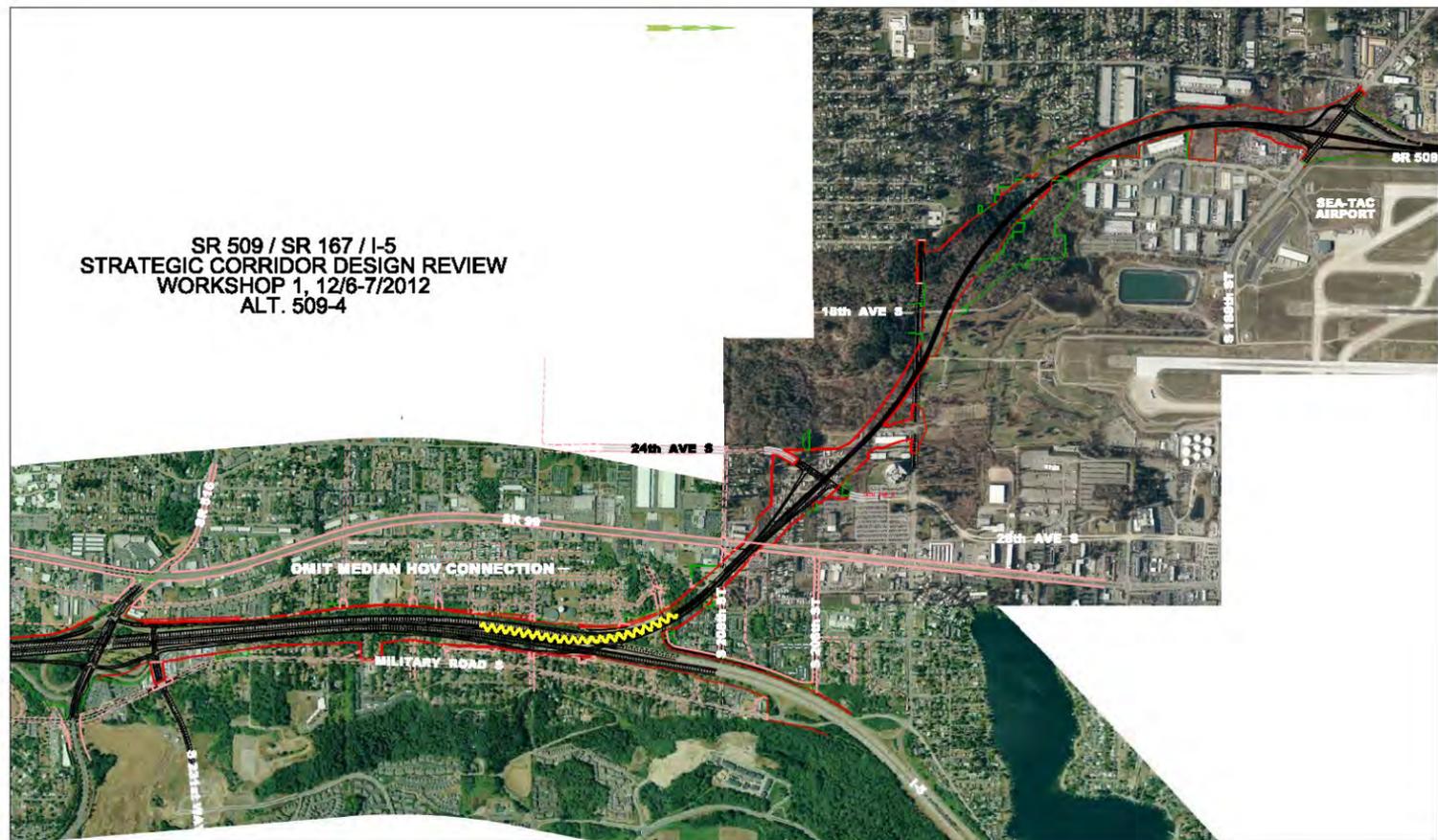
- One lane on SR 509 each direction between S 188th St and 24th/28th Ave S
- Two lanes on SR 509 each direction between 24th/28th Ave S and I-5
- New Diamond Interchange at S 188th St and SR 509
- Half-Diamond to/from east at 24th/28th Ave S
- South Directional Interchange at I-5/SR 509
- Reconstruct SR 516 Interchange
- New 2-lane Collector Distributor on west side of I-5
- Access to S 231st Way via Texas U-turn at SR 516

Exhibit C- 6 Alternatives 509-1 and 509-2



ALT. 509-3: Build SR 509 from I-5 to 24th/28th Ave S, defer connection west. Construct more perpendicular crossing of I-5.

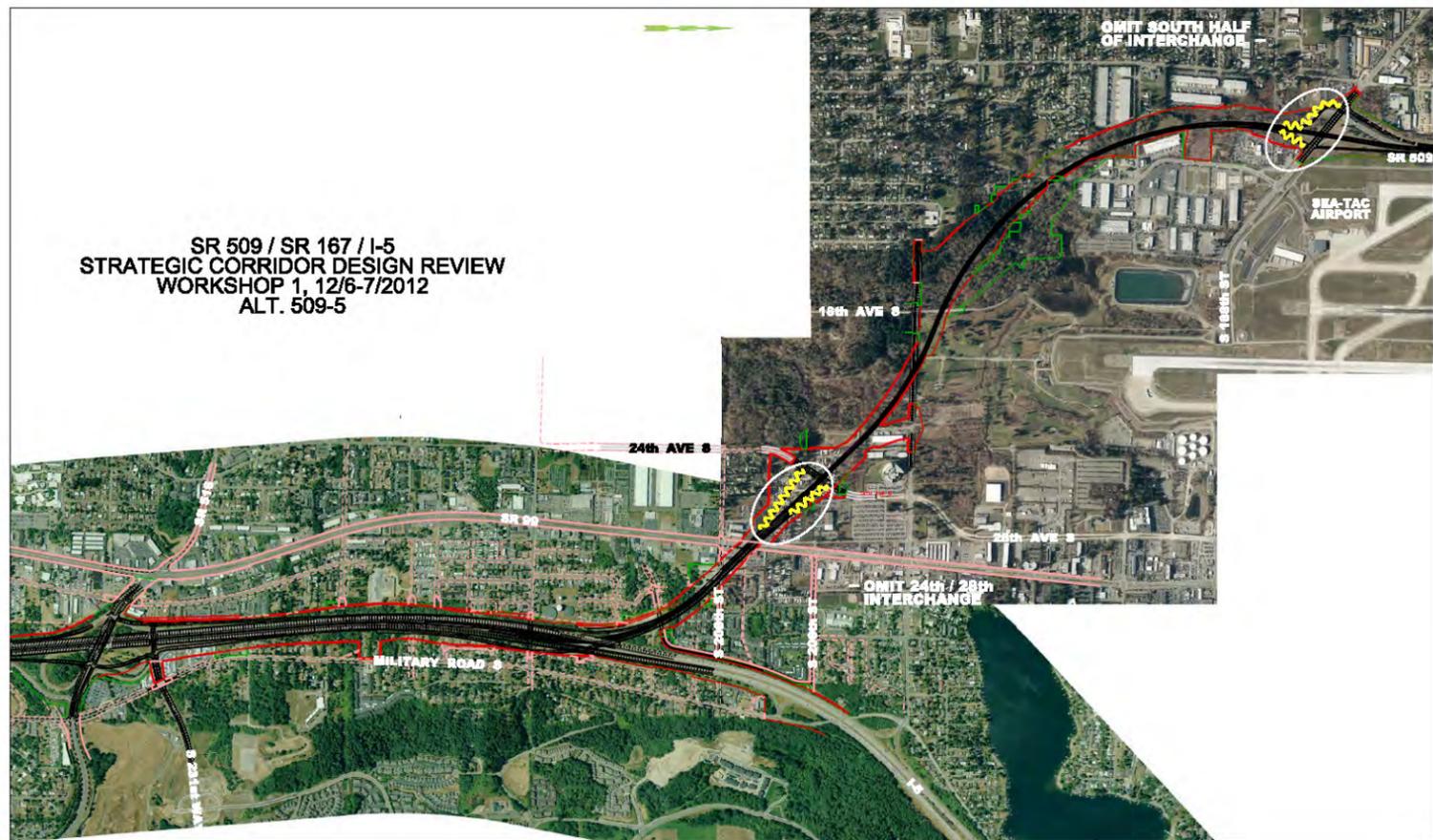
- No SR 509 connection west of 24th/28th Ave
- One lane on SR 509 each direction between 24th/28th Ave and I-5
- Half-Diamond to/from east at 24th/28th Ave
- South Directional Interchange at I-5/SR 509
- Lower speed roadway under I-5 for NB5-NB509 ramp
- No HOV Direct Connect between I-5 Median and SR 509
- No new Connection to S 231st St
- No Reconstruction of SR 516 Interchange



ALT. 509-4: Defer construction of median direct connection from SR 509 to I-5

- No HOV Direct Connections between I-5 Median and SR 509
- One lane on SR 509 each direction between S 188th St and 24th/28th Ave S
- Two lanes on SR 509 each direction between 24th/28th Ave S and I-5
- New Diamond Interchange at S 188th St and SR 509
- Half-Diamond to/from east at 24th/28th Ave S
- South Directional Interchange at I-5/SR 509
- New Connection to S 231st St via new I-5 Collector Distributor system
- Reconstruct SR 516 Interchange to include new I-5 Collector Distributor system

Exhibit C- 7 Alternatives 509-3 and 509-4



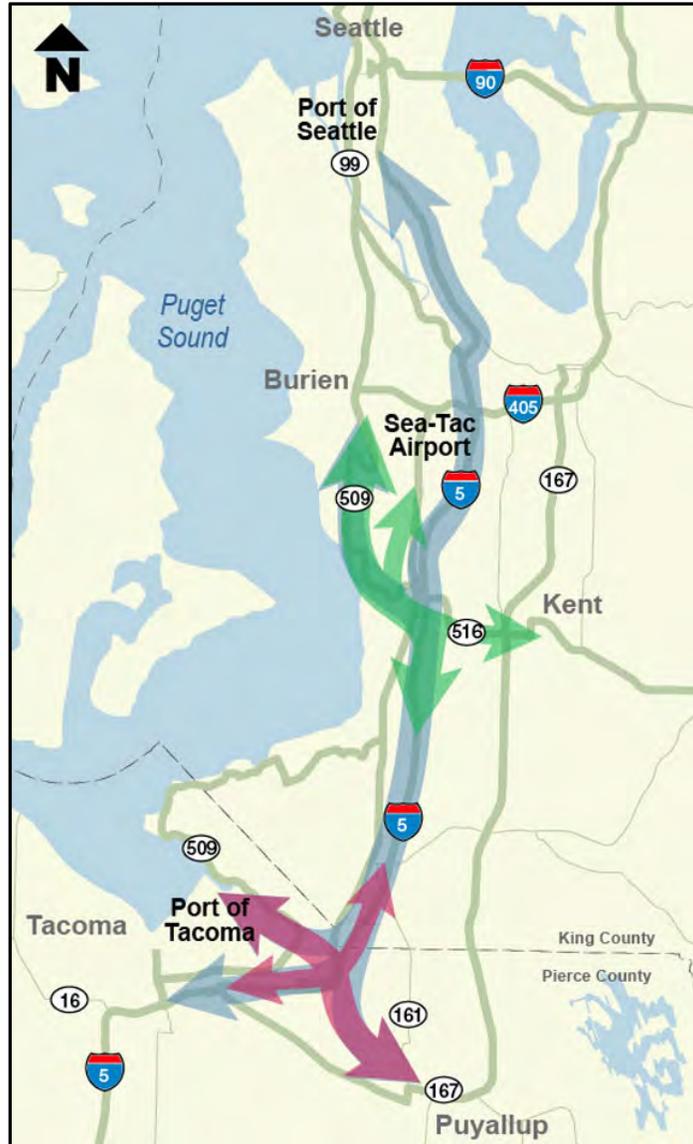
ALT. 509-5: Construct Half-Diamond Interchange to/from north at S 188th St. Interchange and defer 24th/28th Ave S to future phase

- One lane on SR 509 each direction between S 188th St and 24th/28th Ave S
- Two lanes on SR 509 each direction between 24th/28th Ave S and I-5
- New Half-Diamond Interchange to/from north at S 188th St
- No Half-Diamond to/from east at 24th/28th Ave S
- South Directional Interchange at I-5/SR 509
- New HOV Direct Connection between I-5 Median and SR 509
- New Connection to S 231st St via new I-5 Collector Distributor system
- Reconstruct SR 516 Interchange to include new I-5 Collector Distributor system

Exhibit C- 8 Alternative 509-5



APPENDIX C.1: COST ESTIMATE REVIEW



Source: WSDOT, <http://www.wsdot.wa.gov/Projects/Gateway/map.htm>

Puget Sound Gateway Project

*SR 509/ SR 167/ I-5 Funding and Phasing Study:
Strategic Corridor Design Review*

January 18, 2013

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COST ESTIMATE REVIEW

The review of the current base estimates for the three projects focused on the high dollar value items. Generally these were mobilization, structures, walls, roadway earthwork (embankment, compaction, borrow), and paving.

As part of the cost estimate review, the unit bid prices for the items included in the estimate were qualitatively reviewed to determine if they are comparable to current and local market values. Some variation was noted in comparison to current market prices, but only limited revisions were included.

There are two elements of the estimates that should be considered for further evaluation and discussion at a higher level as they involve changes to how the tax rate and missing bid items are addressed. Currently the tax rate is included at 9.5% across all items in the estimate. Based on how the tax is actually applied it might warrant being reduced to 5%. The rationale behind this revision is that about 50% of the cost for most jobs are permanent materials and expendables which are taxed. The labor, equipment and subs typically do not have sales tax applied. The other item that should be investigated further is how the estimates include add-on percentages for missing bid items (TESC, MOT, Mobilization, contingency, etc.). The approach taken in the overall estimate is conservative so there may be opportunity to reduce the percentages.

Based on a review of the available current estimates for the three projects, Table A-1 shows the preliminary cost ranges for the combined projects:

Table C-1 Combined Projects Preliminary Cost Ranges

| Description | Base Cost | Cost Range | | | |
|-----------------------------------|-----------|-----------------|------------------|-----------------|------------------|
| | | Low | Change from Base | High | Change from Base |
| SR 167 - Stage 1 | \$207M | \$201M | -\$6M | \$223M | \$16M |
| SR 167 - Stage 2 One Lane | \$331M | \$321M | -\$10M | \$360M | \$29M |
| SR 167 - Stage 1 Early Mitigation | \$44M | \$42M | -\$2M | \$42M | -\$2M |
| SR 167 - Stage 2 Early Mitigation | \$7M | \$7M | -\$0M | \$7M | -\$0M |
| SR 509 - Full Build | \$473M | \$426M | -\$47M | \$487M | \$14M |
| I-5 Tukwila to Tacoma | \$337M | \$315M | -\$22M | \$323M | -\$14M |
| TOTALS | \$1,399M | \$1,312M | -\$87M | \$1,442M | \$43M |

The upper and lower cost ranges were established by changing unit pricing on some of the items including excavation, borrow, clearing and grubbing, embankment compaction, noise walls,

retaining walls, asphalt, barrier rail, pavement markings and fence. The unit price changes were based on recent values seen on large design-build projects in the Seattle area. As mentioned above, the tax rate was changed to 5% on all estimate reviews and the low and high ranges incorporate that change. Structures are the main cost component of the projects and those numbers were not adjusted since structure costs depend largely on structure type and foundation treatment. The overall average structure costs are reasonable for the available knowledge and information on-hand.