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Juanita Drive NE/68th Avenue NE Pre-design Report

2008 DRAFT

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Continued

Note:
The technical content of this report was prepared in 2007-2008 by Otak, Inc. The Pre-design Report was published in Draft form October 1, 2012.

Section 1—Executive Summary

Study Purpose and Background

Since incorporation in 1998, the City of Kenmore has made great strides toward improving traffic flow, improving pedestrian and bicycle facilities, and refining an image that the City is proud of, through the improvements made to the SR 522 corridor. With the SR 522 projects well underway, the City Council turned its attention to its next most significant arterial, Juanita Drive NE/68th Street NE.

The Juanita Drive NE/68th Street NE Pre-design Report covers the following key issues: 1) the improvement of traffic operations, particularly at the north end of the project, and 2) the provision of safe, continuous facilities for bicycle and pedestrian traffic throughout the corridor.

This study examines the corridor between the south City limits and its intersection with State Route 522 (Bothell Way), a distance of almost two miles. Juanita Drive NE begins in the City of Kirkland, crossing into the City of Kenmore at approximately NE 143rd Street, the roadway changes its name to 68th Avenue NE at the intersection of NE 170th Street. Throughout this report, the road is designated by the name that applies for each section, although Juanita Drive NE is sometimes used to refer to the whole corridor. These sections are also referred to as the south segment and north segment, with NE 170th Street as the dividing point.

Figure 1.1 South End of Study Area

The purpose of the Juanita Drive NE/68th Avenue NE Pre-design Report is to evaluate alternative improvement options for the ultimate development of the road from the south

City limits at NE 143rd Street to the intersection with SR 522. The report will provide the City of Kenmore with a "roadmap" for future improvements on the corridor. Design considerations addressed in the report include traffic safety and congestion, geometrics, utilities, drainage, neighborhood character, pedestrian and bicycle accessibility, environmental concerns, urban design considerations, and how the adjacent Lakepointe development should influence the configuration of improvements to the corridor.

Developing an ultimate roadway section will allow the City to create a prioritized list of capital projects to design and build, and to use when requiring frontage improvements for proposed private developments along the corridor. Development and improvements to the corridor will play a significant role in the future growth and image of the City.

Coordination with Transportation Plan Update

The information gathered in this report was prepared between May 2007 and August 2008. The City began a Transportation Element Comprehensive Plan Update during that time that was later completed and adopted in December 2008. Because both efforts relied on the establishment of future traffic volume predictions for the Juanita Drive NE/68th Avenue NE corridor, portions of the preliminary design work on the corridor were intentionally delayed, to allow for coordinated results. Specifically, the delay affected the work on the north segment, from NE 170th Street to SR 522, and altered how this portion of the project was presented to the community and City Council.

City Council Briefings and Direction

In total, the City Council was briefed on the project five times with discussions that included progress made to date, current issues, and decision points:

- July 16, 2007
- November 5, 2007
- February 19, 2008
- March 14-15, 2008
- July 7, 2008

At the February 19, 2008 Council meeting, preliminary designs and alternatives were presented on the south segment of the project. The presentation covered results from traffic modeling and analysis, community reaction and input to the project, criteria that establish the basis for design, a discussion of three sidewalk alternatives, and specifically requested input from the Council on the following issues:

- *Sidewalk Width* – the current recommendation is to provide 6.5 foot sidewalks. Should a reduced sidewalk width be considered to minimize the footprint of the project, reduce right-of-way/easement needs, and reduce costs?
- *Bicycle Lane Width* – the current recommendation is to provide 5.0 foot bicycle lanes. Should an increased bicycle lane width be considered based on updated King County Road Standards?
- *Overhead Utility Undergrounding* – there has been significant community interest in undergrounding overhead power, telephone, and communications utilities along the corridor. Undergrounding would require cost sharing between the City and the utility providers, with the City's share on the order of $1 million per mile. Should utility undergrounding be considered?
- *Pedestrian Bridge at Arrowhead Elementary (NE 153rd Place)* – the Northshore School District and Arrowhead Elementary have requested that a grade separated crossing of Juanita Drive be considered for safety, to provide a connection between the school and the east side of Juanita Drive. Consideration of a grade separated crossing presents numerous design and cost challenges. The traffic and accident history at this intersection does not appear to warrant a grade separated crossing. Should a grade separated crossing of Juanita Drive be considered?

The Council selected Sidewalk Alternative 2, and directed that the pre-design go forward with a 6.5-foot sidewalk on the east side only, a 6-foot bike lane on the east side and a 5-foot bike lane on the west side, and no pedestrian overpass at NE 153rd Place and Juanita Drive.

The decision of whether to further pursue utility undergrounding will be made during the final design phase of the project(s). For undergrounding to be feasible, it is likely that a local funding solution would have to be found, such as a neighborhood local improvement district.

Issues related to the north segment were presented before Council on July 7, 2008 and concurrence was received on proposed channelization and roadway cross-section.

Community and Stakeholder Involvement

Community and stakeholder involvement has been an important element of the Juanita Drive and 68th Avenue NE study process from beginning to end. Community members and stakeholders were invited to attend two public meetings as well as provide comments through email, comment forms, letters, phone calls and postcards.

Overall, the project has significant support from the community. A design that emphasizes safety for pedestrians and cyclists and improves traffic flow, while balancing these improvements against the impacts on the neighborhood, will be well received.

Figure 1.2 – Public Meeting

As the City of Kenmore moves forward with capital improvement projects to fulfill these goals, further opportunities should be provided to the community for updates and input to ensure that these improvements are an asset to the community.

Existing Conditions

The Juanita Drive Corridor has a history as a transportation corridor dating back several generations. The first milestone in developing the Juanita Drive Corridor occurred in 1917 when the first bridge was built over the Sammamish River in Kenmore at the present-day location of the 68th Avenue NE bridge. In 1938, the original wooden bridge spanning the Sammamish River was replaced with a larger reinforced concrete span, which is in use today as the two southbound lanes of 68th Avenue NE across the river. In 1970, the Sammamish River crossing was expanded with the opening of the East Bridge span, adjacent to the 1938 bridge span. This new crossing allowed expansion of the roadway to four lanes.

The neighborhoods surrounding the Juanita Drive corridor have a diverse mix of uses, including Inglewood Golf Course and St. Edward State Park, commercial areas, industrial

areas, Arrowhead Elementary School and Bastyr University, and residential neighborhoods. The south segment of the corridor is mostly residential and undeveloped. The north segment is urban, with NE 170th Street as a dividing point.

Traffic

The Juanita Drive NE corridor carries a large volume of traffic with approximately 21,500 vehicles per day at the north end, and 12,000 vehicles per day at the south end. The north end experiences severe congestion related to SR 522, specifically caused by queuing at the signal. The entire corridor has a fairly high accident rate involving motor vehicles and bicycles.

Analyzed over a six year period, the majority of bicycle collisions involved vehicles turning into and out of driveways or side streets (10 of 12). The most common vehicle collision type has been rear-end collisions (88) followed by left-turn collisions (32). An additional 22 collisions occurred as vehicles were entering or leaving driveways. Single vehicle collisions leaving the roadway or overturning (29) were the remaining category.

Roadway and Bridge

The existing roadway, with a posted speed limit of 35 mph, contains several geometric deficiencies. Lacking continuous sidewalks and bicycle lanes, horizontal and vertical curves that do not meet design standards, and excessive superelevation on the horizontal curves all contribute to the poor safety record of the roadway.

In the north segment, the corridor crosses the Sammamish River over two separate structures, built at different times. The southbound lanes use the West Kenmore Bridge No. 1071AW, originally built in 1938. The bridge has 12 spans of concrete deck girders for a total length of 590 feet. The northbound lanes use the East Kenmore Bridge No. 1071AE, built in 1970 with five spans of concrete box girder for a total length of 590 feet.

Each bridge carries two lanes of vehicular traffic and a five-foot pedestrian sidewalk, separated from vehicular traffic by a concrete barrier, as shown in the Figure 1.3 below.

The bridges are maintained by the King County Bridges and Structures Unit in the Road Services Division. According to the bridge maintenance records, resurfacing of the bridge decks was completed on both bridges in 1991 and seismic retrofit was completed on both bridges in 1998. However, with the recent changes in bridge seismic design codes, the bridges may need to be re-evaluated for their seismic performance.

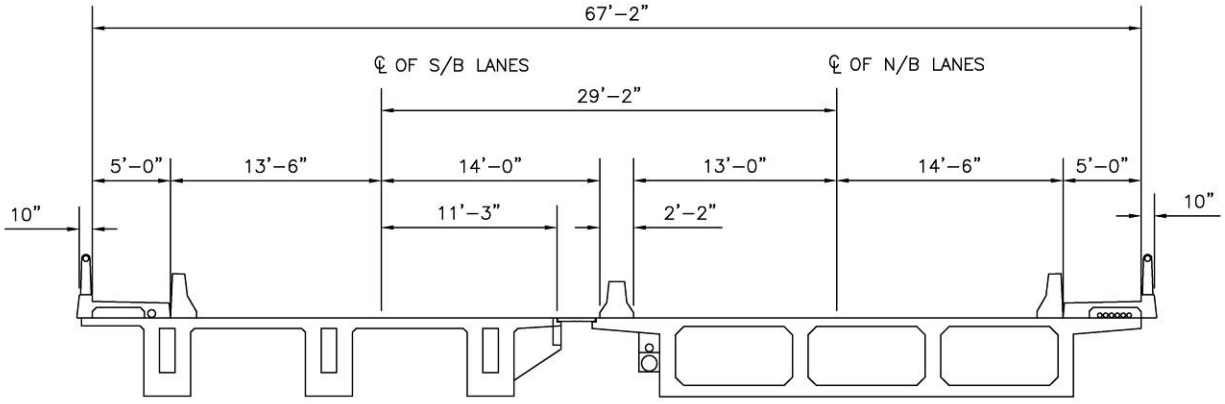

Figure 1.3 – Existing Bridge Section

The latest biennial bridge inspection was performed by the County in 2006 and determined the Bridge Sufficiency Ratings of 56.1 and 71.4 for the West and East Bridge, respectively. Some of the deterioration and defects noted in the inspection include cracks and spalls in concrete members (box girders, pier walls, and columns), some missing bolts at expansion joints, bent and loose railings, and other relatively minor items.

Figure 1.4 – West Bridge

With a typical lifespan of 75 years, the West Bridge could be expected reach the end of its useful life in the next five years. The East Bridge is expected to have a useful life of 35 years if maintained properly. To determine the long-term structural integrity of the bridges against major seismic events, both bridges will need to be re-evaluated under the new codes.

Environmental

The major environmental resources within the corridor include the Sammamish River, streams, wetlands, and steep slopes. A wetland reconnaissance was conducted to evaluate sensitive areas within the corridor, but did not include conducting fish habitat surveys or wetland delineation.

The Sammamish River contains threatened species and provides habitat for resident fish, migration waterfowl, great blue heron, and numerous other wildlife species. Two unnamed streams were also noted within the corridor, as well as wetlands associated with the Sammamish River, one of the unnamed streams, ditches, and stormwater ponds. The corridor also contains an Erosion Hazard Area and Landslide Hazard Area, as well as a Seismic Hazard Area. These sensitive areas will all need to be considered in future work.

Storm Drainage and Utilities

Drainage for the entire corridor is tributary to Lake Washington and the Sammamish River. Drainage patterns within the corridor vary, with conditions ranging from poor, unmaintained, uncontrolled stormwater discharges, to relatively new, well-constructed systems.

Other utilities include Puget Sound Energy overhead power distribution lines and buried gas facilities, Verizon and Comcast overhead and underground telecom lines, Northshore Utility District sewer and water mains, and a 78-inch diameter King County regional sewer main.

Recommended Alternative

Alternatives were evaluated by the design team with City staff input, and then presented to the City Council on three separate occasions and the community at two public meetings. Taking the community reaction into account, the City Council provided direction that shaped the recommend alternative, described in the following section. The recommended alternative is illustrated in detail in Appendix A—Plans, Profiles and Design Calculations, and Appendix B—Typical Roadway Sections. A detailed cost estimate is in Appendix C—Cost Estimates.

Alternatives and Evaluation

To address the goals for this project, a number of alternatives have been considered. These alternatives cover horizontal and alignment issues, the type of use for the median area, and the location and extent of pedestrian facilities.

Horizontal Alignment and Right-of-Way

The primary portion of roadway that does not currently meet minimum horizontal roadway standards is located between NE 154th Court and NE 158th Street, containing curves H3 and H4 as described in the Section 4—Existing Conditions. Two alternatives were developed to improve this section of roadway.

Right-of-way acquisition will be needed for construction of the majority of the Juanita Drive NE/68th Avenue NE corridor. Three approaches to Right-of-Way acquisition were considered.

Based on the impacts to the neighborhood, public input, the ability to resolve safety issues, cost, and City staff and Council confirmation, Alignment Alternative 2 with Right-of-Way Alternative C is recommended. Alignment Alternative 2 is similar to the existing alignment but resolves existing safety problems by adjusting two curves, lowering the speed through this section, and reducing excessive superelevation of the roadway. Right-of-Way Alternative C minimizes impacts to the neighborhood and costs by reducing the amount of right-of-way to be acquired.

Medians

Two sets of alternatives were developed, located where existing driveways and side streets are present. Each examined whether a landscaped median or a two-way center-turn lane was the best use for the median area.

Figure 1.5 Example of Landscaped Median

Between approximate Stations 72+00 and 72+50, Median Alternative 2: Landscaped Median is recommended because of the severity of past accidents, and the proximity to the elementary school. Between approximate Stations 95+35 and 99+00, Median Alternative 4: Two-Way Left-Turn Lane is recommended because the improvement of access to driveways and side streets is expected to be an effective method of addressing safety issues in this section of the corridor.

Sidewalks

Three alternatives have been considered for the design of sidewalks on this corridor.

Sidewalk Alternative 2 is recommended as it provides a continuous facility throughout the corridor, while minimizing impact to mature vegetation. It also minimizes costs by only constructing facilities on the west side of the roadway where it will be useful primarily to connect bus stops to the nearest crosswalk.

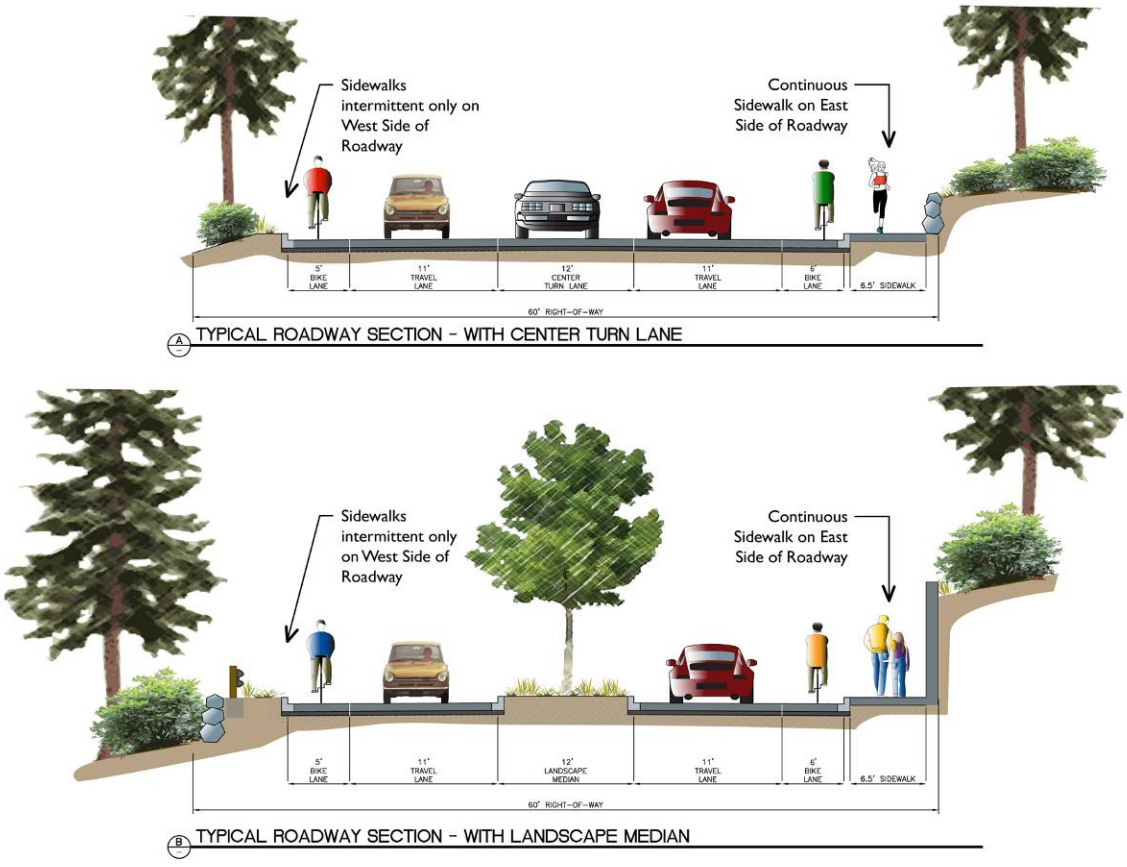

Figure 1.6 – Sidewalk Alternative 2

Other Project Elements

Vertical Alignment

To correct the sight distance deficiency at the south end of the project, the roadway will be adjusted by making a cut of approximately four inches in depth for the first 300 feet.

Channelization – Juanita Drive from NE 143rd Street to NE 170th Street

The recommended channelization is three travel lanes—one lane and a bike lane in each direction, with the center lane being used alternately as a two way left turn lane, a dedicated left turn lane, or a raised planted median.

The use of the center lane and auxiliary lanes are detailed in Table 1.1.

Table 1.1
Center Lane and Auxiliary Lane Improvements

Lane Type	Station From (approx.)	Station To (approx.)
Dedicated southbound left-turn lane to NE 143rd Street	50+00	54+00
Dedicated northbound left-turn lane to Bastyr University	54+00	57+50
Landscaped median	57+50	61+00
Two-way left-turn lane	61+00	72+00
Landscaped median	72+00	72+50
Dedicated northbound and southbound left-turn lanes to NE 153rd Place and NE Arrowhead Drive	72+50	80+00
Dedicated southbound right-turn pocket with raised traffic island	76+50	80+00
Landscaped median	80+00	83+30
Two-way left-turn lane	83+30	86+00
Landscaped median	86+00	88+50
Two-way left-turn lane	88+50	110+80
Landscaped median	110+80	112+20
Dedicated through-right lane northbound at NE 170th Street	121+00	127+50
Dedicated northbound left-turn lane to Inglewood Road NE	123+50	127+50

Channelization – 68th Avenue NE from NE 170th Street to NE Bothell Way/SR 522

The channelization between NE 170th Street and the bridges will consist of two northbound through lanes, one southbound through lane, a southbound left-turn lane, and a southbound right-turn drop lane. Over the bridges, the channelization will consist of two through lanes in each direction. Between the north end of the bridge and SR 522, the channelization will depend on whether or not Lakepointe Boulevard is constructed.

Without Lakepointe Boulevard – The northbound channelization at the north end of the bridge transitions from two through lanes into three lanes at NE 175th Street: a through/left, a through lane, and a through/right. At SR 522, an additional lane is added. The northbound channelization at SR 522 consists of a dual left-turn lane, a through lane, and a right-turn drop lane. The southbound channelization will consist of two through lanes, with left turns permitted but not protected at the intersection with NE 175th Street.

With Lakepointe Boulevard –The northbound channelization at the Lakepointe Boulevard intersection would consist of dual left-turn lanes and two through lanes. The northbound channelization at SR 522 would consist of three lanes: a left-turn lane, a left/through lane, and a through/right-turn lane.

Storm Drainage

This project will utilize dual stormwater conveyance systems in order to bypass offsite flow around the project and keep onsite flow, which must be detained and treated, separate from offsite flow. This strategy also allows conveyance pipes to be sized for the entire corridor so that onsite stormwater may be conveyed to the Sammamish River, eliminating the need for detention throughout much of the project. This consolidation of onsite stormwater, along with improvement to the conveyance system, also allows the City to utilize an existing stormwater tract for water quality purposes.

A detailed synopsis of the stormwater strategies for conveyance, detention and water quality treatment is included in Appendix G—Stormwater. Conceptual plans showing the stormwater system are in Appendix A.

Other Utilities

The proposed improvements will require relocation of above ground and underground utilities. It is anticipated that sections of water main, gas main, and underground telecom facilities will require relocation when in conflict with storm drain improvements, retaining walls and other improvements. It is estimated that 700 feet of water main, 2,100 feet of gas main, and 1,500 feet of telecom will require relocation. The proposed improvements will also conflict with the existing location of 76 utility poles.

Landscaping and Urban Design

Proposed landscape treatments would include plantings in raised medians for those portions of the roadway, and limited landscaping behind the sidewalks due to right-of-way limitations. In general, the aesthetic quality of the roadway landscape will be dependent on the surrounding natural vegetation and residential property landscaping. Some otherwise unused right-of-way may be available for landscaping in the Rhododendron Park area. Plantings

should be selected based on low maintenance requirements using native plants, unless there are particular aesthetic requirements for higher maintenance seasonal plantings such as the area adjacent to Rhododendron Park. The exception to using native plants is the selection of street trees, as most native tree species would not be well-suited for use because of growth habitat and other factors. Aesthetically, the street trees should be selected to blend with the neighborhood's native trees.

Bridges

After reviewing the available information on the age and condition of the bridges, it was decided that adding width to the bridges appeared feasible, but only if the traffic barrier was kept on the existing portion of the bridges. Therefore, it is proposed on the East Bridge, that the bicycles be kept on the sidewalk but given a wider space of ten feet. The existing concrete sidewalk will need to be removed and the new wider concrete sidewalk cantilevered from the existing bridge girders. A narrower base barrier is recommended to gain some width on the bridge. Along the exterior edge, a safety railing will be placed to provide safety for the pedestrians and cyclists.

While the East Bridge can be expected to satisfactorily serve its purpose for another three to four decades, the West Bridge is likely within a few years of the end of its useful life. When replaced, the West Bridge should be replaced with a new concrete structure similar in length (approximately 600 feet long) and with one additional traffic lane. At that time it can be evaluated whether the bicyclist should be kept on the sidewalk or separated into a separate lane on the roadway pavement. With a combined width of ten feet for sidewalk and bicyclists, the new bridge would be approximately 48 feet wide. A planning level cost estimate, including design, construction, and construction administration, is estimated at $14 to $20 million.

The recommend alternative consists of the following:

East Kenmore Bridge (No. 1071AE)

- The existing five-foot sidewalk will be removed and replaced with a ten-foot wide concrete sidewalk cantilevered from the existing bridge girders.
- The existing concrete barrier separating the roadway and sidewalk will be replaced with a similar but narrower base section, if available.
- The exterior edge of the new sidewalk will be protected with a pedestrian safety railing.

West Kenmore Bridge (No. 1071AW)

- It is recommended that the City start planning for the replacement of the West Bridge in the next ten years as it reaches the end of its useful life.

- Rather than improving a structure that is due for replacement, it is recommended that the west sidewalk not be widened, unless it is later determined that the bridge re-construction will not occur in the foreseeable future.

Permitting

If the proposed improvements to Juanita Drive include bridge work at the Sammamish River, or replacement of an existing outfall into the river, a wide variety of permits and environmental documentation would be required at the federal, state, and city levels. These permits are shown in Table 1.2.

Table 1.2
Permits

Agency	Permit
U.S. Army Corps of Engineers	Section 404 and Section 10
U.S. Fish and Wildlife Service	Biological Assessment
Washington Department of Ecology	Section 401 and NPDES
Washington Department of Fish and Wildlife	Hydraulic Project Approval
City of Kenmore	SEPA Checklist Shoreline Substantial Development Critical Areas Ordinance Compliance

For other construction work along the corridor that impacts streams and wetlands, there may also be permit requirements. Any construction activities within the ordinary high water of Tributary 08-0222 and the unnamed stream would require a Hydraulic Project Approval permit from the Washington Department of Fish and Wildlife. Impacts to wetlands may require a Section 404 permit from the U.S. Army Corps of Engineers and a Section 401 permit from the Washington Department of Ecology. In addition, these impacts to streams and wetlands may also require City permits.

Construction Cost

For the purposes of estimating costs, the corridor has been broken into six phases. With the level of work to-date being very preliminary for the West Bridge replacement and the Lakepointe Connector, costs are represented as a range for these phases. Costs are shown in Table 1.3 and detailed in Appendix C—Cost Estimates.

Based on a construction year of 2010, the estimated cost of construction for all six phases total $54.4 to $66.4 million, including design, contingencies, escalation, and right-of-way acquisition. It should be noted that a portion of the cost of Lakepointe Collector will likely be borne by a developer.

Table 1.3
Preliminary Project Cost Estimates (Updated to 2010 Cost Basis)

South Segment: NE 143rd Street to NE 153rd Place	South Segment: NE 153rd Place to NE 170th Street	North Segment: Phase "A", Sammamish River Bridge to NE 175th Street	North Segment: Phase "B", 170th Street to Sammamish River Bridge	North Segment: Phase "C", Lake Pointe Connector	North Segment: Phase "D", West Bridge Span Replacement
$4.6 million	**$11.0 million**	**$3.3 million**	**$6.7 million**	**$15 to $21 million**	**$14 to $20 million**
2,600 feet	5,100 feet	700 feet	2,100 feet	1,300 feet	600 feet
- New three-lane roadway section with landscape islands - Sidewalks (east side only) and bike lanes	- New three-lane roadway section with landscape islands - Sidewalks (east side only) and bike lanes	- Extend northbound right/through lane at NE 175th Street to bridge - Remove Jersey barrier, straighten curves - Sidewalks and bike lanes	- Extend northbound right/through lane at NE 170th Street - Extend southbound right turn lane at NE 170th Street - Add widened sidewalks (cantilevered) on East Bridge span - Remove Jersey barrier, straighten curves - Sidewalks and bike lanes	- Construction of Lake Pointe connector - Burke-Gilman Trail overpass - Dual left-turn lanes onto Lake Pointe (one additional lane on 68th Avenue) - Sidewalks - NE 175th Street becomes right-in/right-out only	- Replace 1938 West Bridge span - Room for one additional travel lane on bridge - Sidewalk and dedicated bike lane

Potential Phasing and Funding Strategy

The six phases shown in Table 1.3 were selected to fit into potential funding source criteria. The Juanita Drive Corridor improvements can be funded by a variety of sources, including private development and a range of City, State and Federal programs. The phases are shown in the Figures 1.7 and 1.8.

Figure 1.7 Proposed South Segment Phasing

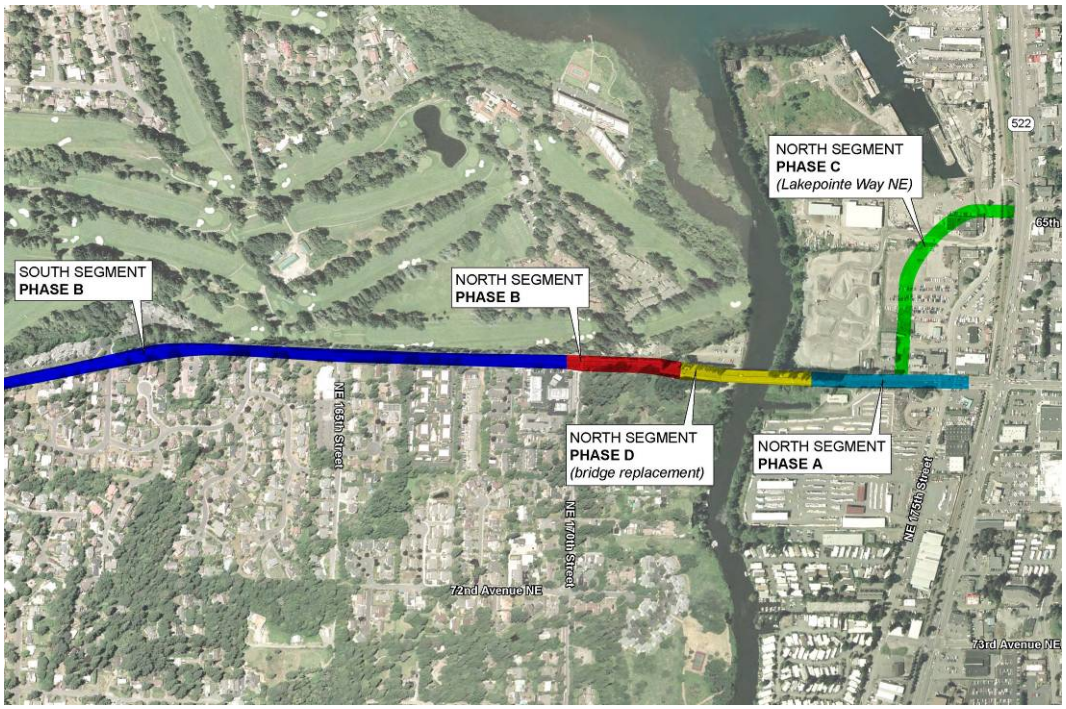

Figure 1.8 Proposed North Segment Phasing

The 68th Avenue NE section of the corridor, north of NE 170th Street, is the most critical in terms of congestion and safety. Improvements to this section would also be expected to compete well for a variety of funding sources, especially relative to improvements in the rest of the corridor.

The focus of improvements south of NE 170th Street is safety rather than traffic congestion. The types of outside funding appropriate for this section include TIB UAP and Sidewalk programs, and the federal STP Enhancement program. The planned improvements near Arrowhead Elementary School would qualify for Safe Routes to Schools and other federal safety funding. Breaking the projects into even smaller sizes may be more appropriate for some of these funding sources.

North Segment Phase A – Sammamish River Bridge to NE 175th Street

This project would extend the northbound through/right-turn lane at NE 175th Street back to the north abutment of the bridge. It would also eliminate the concrete barrier in the median and re-channelize the existing pavement. See Figure 1.9 for details.

Figure 1.9 Phase A Improvements

North Segment Phase B – NE 170th Street to Sammamish River Bridge

This project would improve the channelization at the NE 170th Street intersection (see Figure 1.10). It would also widen the existing sidewalk over the East Bridge to provide adequate width for both pedestrians and bicycles.

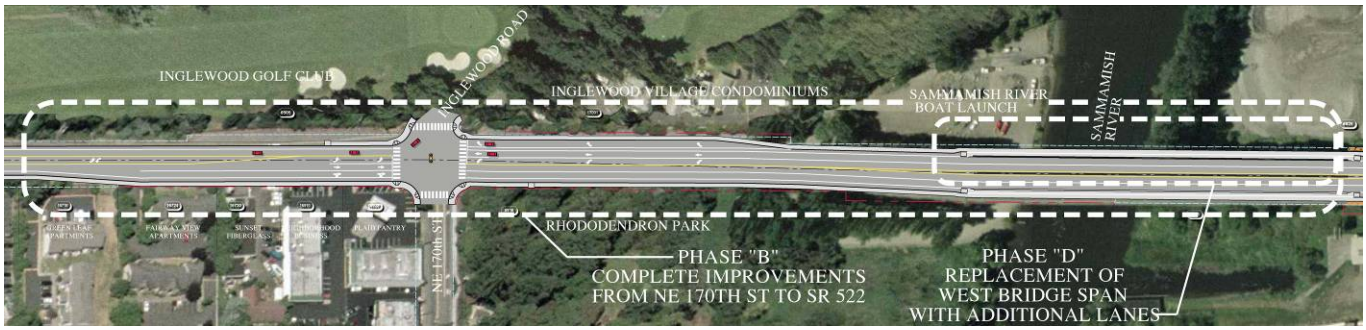

Figure 1.10 Phase B and D Improvements

North Segment Phase C – Lakepointe Boulevard

This project would create a new bypass road beginning at a point approximately 500 feet south of the SR 522 intersection and extending west to a realigned intersection at 65th Avenue NE. The realignment would create a four-legged, signalized intersection at SR 522/65th Avenue NE. See Figure 1.11 for the channelization of the new road.

The existing intersection of 68th Avenue NE and NE 175th Street would be restricted to right in-right out operation.

Figure 1.11 Phase C Improvements

North Segment Phase D – Sammamish River Bridge Replacement

This project would replace the West Bridge over the Sammamish River with a widened and realigned structure, as delineated in Figure 1.10.

Recommendations for Reduced Budgets

As the work on this report was nearly finished, City staff and Council requested a brief review of phasing recommendations based on reductions to the proposed improvements and phasing that fit funding opportunities. This review concentrated on the south segment and was referred to as the "Skinny Juanita".

South Segment

Generally, improvements would be limited to constructing curb, gutter, and sidewalk only on the east side of the roadway with little or no improvements to the west side of the roadway, and the amount of storm drainage improvements would be reduced. The completed roadway should be wide enough to provide five-foot bicycle lanes on both sides of the roadway. The reduced improvements are shown in Figure 1.12, with possible phasing described below.

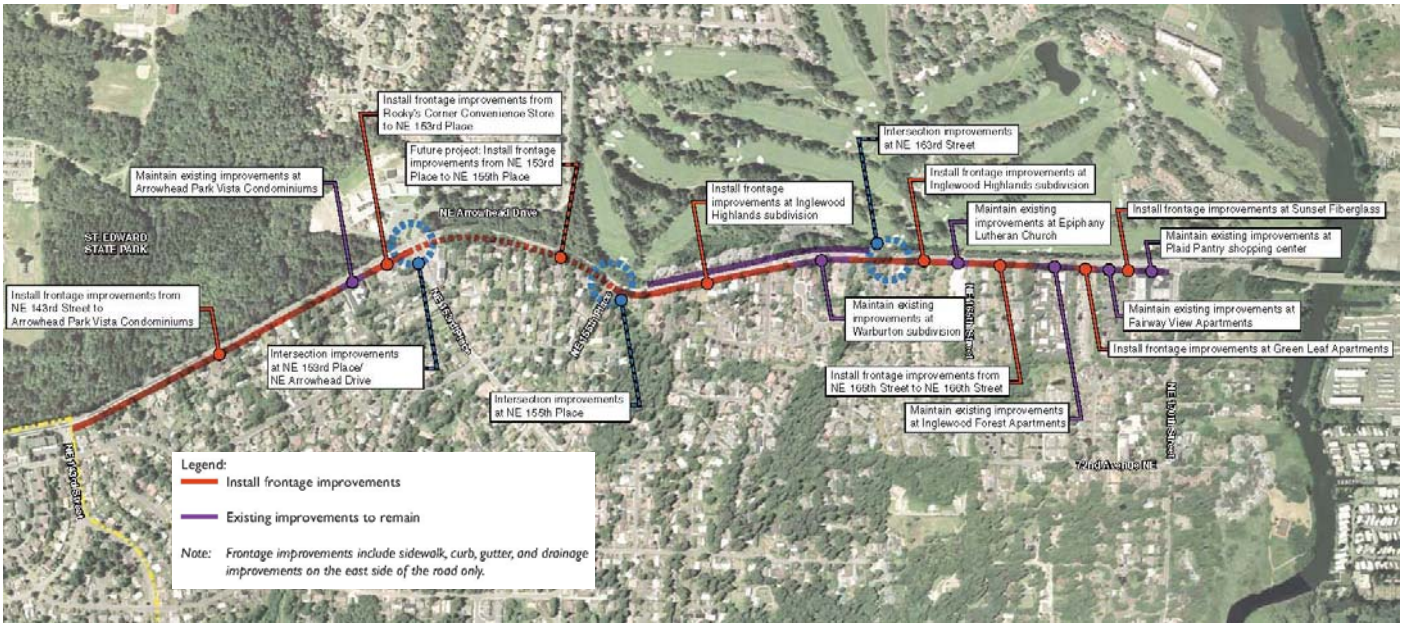

Figure 1.12 Proposed South Segment Phasing – Reduced Improvements

South Segment Phase I, NE 155th Place to NE 170th Street, $5.6 Million

- Re-use existing frontage improvements throughout the corridor, and construct connections between these existing improvements to create a continuous sidewalk.
- Maintain existing channelization at the intersection of Juanita Drive and NE 170th Street. Increase the length of the turn lanes to reduce backups at the intersection.
- Install a southbound left turn lane at NE 163rd Street.
- Drainage improvements, included water quality treatment and possibly a detention system, must be constructed.

South Segment Phase II, NE 143rd Street to NE 153rd Place/NE Arrowhead Drive, $3.2 Million

- Install sidewalk, curb, gutter, and buried drainage system from NE 143rd Place to NE 155th Place. Re-use existing frontage improvements when possible.
- Maintain existing channelization at the intersection of Juanita Drive and NE 153rd Place. Increase the length of the left turn lane.
- Maintain existing channelization at the Bastyr University entrance. Increase the length of the left turn lane.
- Maintain existing channelization at the intersection of Juanita Drive and NE 143rd Street. Increase the length of the left turn lane.
- Drainage improvements, included water quality treatment and either a detention or dispersion system, must be constructed.

South Segment Phase III, NE 153rd Street/NE Arrowhead Drive to NE 155th Place, $1.8 Million

- Install sidewalk, curb, gutter, and buried drainage system from NE 153rd Place to NE 155th Place.
- Install a southbound left turn lane at NE 155th Place.
- Maintain existing channelization at NE 153rd Place. Increase the length of the turn lanes.
- Re-construct and re-align the roadway to correct deficiencies in the horizontal curvature between NE 154th Court and NE 158th Street.
- Detention and water quality treatment may not be necessary.
- This phase includes a significant amount of retaining walls.

The Transportation Element of the 2008 Comprehensive Plan Update included the reduced version of the South Segment projects

Section 2—Study Purpose, Background and Methodology

Since incorporation in 1998, the City of Kenmore has made great strides toward improving traffic flow, improving pedestrian and bicycle facilities, and refining an image that the City is proud of, through the improvements made to the SR 522 corridor. With the SR 522 projects well underway, the City Council turned its attention to its next most significant arterial, Juanita Drive NE/68th Street NE.

The key issues the City wished to address with this study are: 1) the improvement of traffic operations, particularly at the north end of the project, and 2) the provision of safe, continuous facilities for bicycle and pedestrian traffic throughout the corridor.

This study examines the corridor between the south City limits and its intersection with State Route 522 (Bothell Way). Juanita Drive NE begins in the City of Kirkland, crossing into the City of Kenmore at approximately NE 143rd Street, The roadway changes its name to 68th Avenue NE at the intersection of NE 170th Street. Throughout this report, the road is designated by the name that applies for each section, although Juanita Drive NE is sometimes used to refer to the whole corridor. These sections are also referred to as the south segment and north segment, with NE 170th Street as the dividing point.

The Juanita Drive NE and 68th Avenue NE corridor is one of the most attractive roadway segments in the region and is the primary north-south arterial corridor in the City of Kenmore. It provides important connections to residential neighborhoods, schools, parks and recreational facilities. As one of only two arterials crossing the Sammamish River west of I-405, it serves not only local traffic, but also regional traffic accessing destinations on all sides of Kenmore.

The existing roadway is two lanes wide with turn pockets at intersections. The road has limited sidewalk and pedestrian facilities, with traffic signals located at SR-522, NE 175th Street, NE 170th Street and 153rd Place.

The purpose of the Juanita Drive and 68th Avenue NE Preliminary Design Report is to evaluate alternative improvement options for the ultimate development of the road from the south City limits at NE 143rd Street to the intersection with SR 522. The report will provide the City of Kenmore with a "roadmap" for future improvements on the corridor. Design considerations addressed in the report include traffic safety and congestion, geometrics, utilities, drainage, neighborhood character, pedestrian and bicycle accessibility, environmental concerns, and urban design considerations. Developing an ultimate roadway section will allow the City to create a prioritized list of capital projects to design and build, and to use when requiring frontage improvements for proposed private developments along the corridor. Development and improvements to the corridor will play a significant role in the future growth and image of the City.

Methodology

The development of the Pre-Design Report followed five basic steps:

- Analysis of existing conditions, including roadway geometrics, traffic operations, environmental constraints, and stormwater systems
- Engagement of selected stakeholders and the general public to assess key issues and goals
- Development of improvement alternatives that addressed public and stakeholder concerns
- Evaluation of alternatives and selection of a recommended alternative by the City Council
- Development of a phasing plan for corridor improvements

The results of the study are summarized in detail in the following sections of the report.

Section 3—Community and Stakeholder Involvement

Overview of Involvement Process

Community and stakeholder involvement has been an important element of the Juanita Drive and 68th Avenue NE study process from beginning to end. Community members and stakeholders were invited to attend two public meetings as well as provide comments through the following means:

- Email
  An email address was created for community members and stakeholders to contact the project team. All emails were read and responded to by the project team as well as City of Kenmore staff involved in the project. The email address was juanita.drive@otak.com.

- Comment Forms
  At each of the public meetings, a comment form was provided for community members and stakeholders to provide comments on the topics presented by the project team and Kenmore staff. Comment forms were available at the meetings and online at the project website, accessible through the City of Kenmore website (www.cityofkenmore.com).

- Letters, Phone Calls, and Postcards
  The project team and Kenmore staff welcomed all forms of communication from community members and stakeholders.

Figure 3.1 – Public Meeting Display Boards

Each of the two public meetings hosted during the study process were broken into two sessions. The first session was an integrated stakeholder meeting. Stakeholders were invited to meet together with the project team and Kenmore staff involved in the study. Stakeholders who were invited to participate included the following:

Arrowhead Neighborhood Association
Arrowhead Elementary School
Bastyr University
Cascade Bicycle Club
City of Kirkland
Friends of Autumn
Inglewood Golf Course
Inglewood Neighborhood Association
King County Roads
King County Metro Transit
Northshore School District
Washington State Parks
Washington State Department of Transportation

The stakeholder session was followed by a second session to which community members living in the area of the corridor were invited. Both sessions, stakeholder and community, included a presentation by the project team and time for questions to be answered. Below is a summary of each of the public meetings.

Public Meeting No. 1, August 1, 2007

The purpose of the first public meeting was to familiarize community members and stakeholders with the project and the project team, and to gather comments about the corridor and project. Stakeholders and community members were encouraged to highlight and comment on potential problem areas and places where they would like to see changes along the corridor.

Public Meeting No. 2, November 14, 2007

The purpose of the second public meeting was to present three alternatives that addressed the issues raised in the first meeting, and that had the potential for further study. Variations among the alternatives included continuous or intermittent sidewalks along the west side of Juanita Drive, planted center medians or turn lanes, and whether planter strips were desired between the sidewalk and roadway. The meeting facilitated an outlet for public comments on the alternative treatments from both stakeholders and community members.

Community and Stakeholder Comments

A complete summary of the public involvement process and compilation of survey results is included as Appendix E of this report.

Figure 3.2 – Comments Collected at Public Meetings

At the first public meeting, a strong majority of the residents and stakeholders stated that the safety and efficiency of moving vehicles and bicycles along the corridor should be improved, but that traffic volumes on Juanita Drive should not be increased. Pedestrian and bicycle safety was a specific concern for residents. Traffic operations at the north end of the corridor were also a major concern.

During the second public meeting, there was a consensus among the public that continuous sidewalks on the west side of Juanita Drive were not needed, since there are long stretches with no existing or future development potential. Overall, this meeting was well received as stakeholders and community members found elements of all three alternatives that were appealing. While all three alternatives received positive and negative comments, a combination of the alternatives seemed to be the recommended preference of the majority of the attendees who commented.

Community Involvement Conclusion

Overall, the project has significant support from the community. A design that emphasizes safety for pedestrians and cyclists and improves traffic flow, while balancing these improvements against the impacts on the neighborhood and higher costs, will be well received.

As the City of Kenmore moves forward with capital improvement projects to fulfill these goals, further opportunities should be provided to the community for updates and input to ensure that these improvements are an asset to the community.

Corridor History

The Juanita Drive Corridor has a history as a transportation corridor dating back several generations. The first milestone in developing the Juanita Drive Corridor occurred in 1917 when the C. Geske and Company built the first bridge over the Sammamish River in Kenmore at the present-day location of the 68th Avenue NE bridge. The crossing was a wooden truss bridge that measured 20 feet wide by 54 feet long, and was built at a cost of $11,297. The neighborhood surrounding Juanita Drive and 68th Avenue NE developed in the following years with the opening in 1920 of the State Flower Nursery, now known as Rhododendron Park, followed by the opening of the Inglewood Golf and Country Club in 1921. After Bishop Edward O'Dea blessed the cornerstone of St. Edward Seminary in 1930, the seminary opened in 1931 and operated as a seminary and high school for over 40 years.

In 1938, the original wooden bridge spanning the Sammamish River was replaced with a larger reinforced concrete span, which is in use today as the two southbound lanes of 68th Avenue NE across the river. This newer span was a great improvement over the previous crossing, which had a significant hump in the middle of it.

In 1957, Arrowhead Elementary School opened, and continues to serve the community today. In 1958, the Catholic St. Sulpice Society opened St. Thomas the Apostle Seminary on the grounds of St. Edward Seminary, which taught students until 1977.

In 1970, the Sammamish River crossing was expanded with the opening of the East Bridge span, adjacent to the 1938 bridge span. This new crossing allowed expansion of the roadway to four lanes. In the same year, Burlington Northern Railroad abandoned the railroad line that crossed 68th Avenue NE immediately south of Bothell Way.

In 1977 and 1978, both St. Edward and St. Thomas Seminaries were closed by the Archdiocese of Seattle, and the St. Edward grounds were acquired by the State of Washington for use as a state park. The St. Thomas grounds were leased to Bastyr University, as well as other community groups, at this time. Also in 1978, opening of the Burke-Gilman Trail, which is now widely used by walkers, runners, bicyclists, and skaters, gave new life to the former railroad right-of-way at the north end of this corridor.

In 1996, Bastyr University formally completed its acquisition of the former St. Thomas Seminary grounds with purchase of the land and buildings from the Catholic Archdiocese. Bastyr offers naturopathic medicine degree programs at its Kenmore campus, and has recently started to develop a master plan for development of this campus.

Figure 4.1 – St. Edwards Monastery – Image Courtesy of the City of Kenmore

Sources: Wikipedia, the Free Encyclopedia, *http://en.wikipedia.org*
Kenmore by the Lake: A Community History, First Edition, June 2003, © 2003, *Kenmore Heritage Society*
St. Mary's Seminary & University Associated Archives, U.S. Province of the Society of St. Sulpice Archives, http://www.stmarys.edu/archives/arc_coll_sulpice.htm

Land Use

The neighborhoods surrounding the Juanita Drive corridor have a diverse mix of uses, including recreational (Inglewood Golf Course and St. Edward State Park); commercial (Inglewood Village, etc.); industrial (Kenmore Pre-mix, etc.); educational (Arrowhead Elementary School and Bastyr University); and residential. The south end of the corridor is the most residential and undeveloped portion, containing mostly single-family residential on the east side of the roadway and second-growth forests on the west side of the roadway. Entrances to Bastyr University, St. Edward State Park, and Arrowhead Elementary School, all on the west side of the roadway, are not conspicuous in the otherwise continuous stand of trees. A small neighborhood commercial center immediately across the street from Arrowhead Elementary School is the only non-residential use around NE 153rd Place.

North of NE 158th Street, the land use along the corridor becomes more urban, with more visible and dense residential development on the east side of the roadway, and an increased visibility of Inglewood Golf Course on the west side of the roadway. The residential uses change from single-family to multi-family at NE 166th Street. In contrast to the more urban setting, mature trees are a prominent feature in this section of the roadway.

Beginning at the intersection of NE 170th Street and continuing north to Bothell Way, the land use is purely urban. At this location, the name of the roadway changes from Juanita Drive to 68th Avenue NE. Inglewood Village, a neighborhood retail center that includes a highly visible gas station, is located where the roadway transitions to four lanes. Rhododendron Park and the Sammamish River are important natural areas visible from the roadway. Higher traffic volumes between NE 170th Street and Bothell Way and dense commercial development north of the Sammamish River make this northernmost portion of roadway more like SR 522 than the southern portion of the roadway.

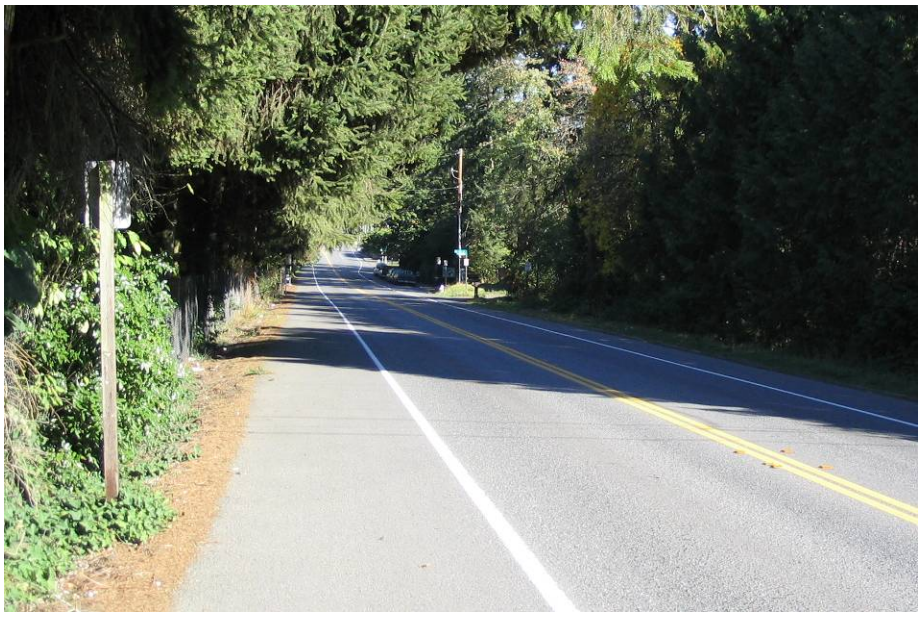

Figure 4.2 – Rural Section of Roadway

Existing Neighborhood Character along Juanita Drive/68th Avenue NE

Rural Character – Juanita Drive

The south end of the corridor has a generally rural appearance because much of the road frontage on the west side includes St. Edward State Park and the Inglewood Golf Course. The golf course and heavily forested state park land means that Juanita Drive has much less

residential development visible from the roadway than other comparable roads in similarly zoned neighborhoods. Also, much of the newer residential development is served by side streets and does not have individual driveways fronting on Juanita Drive. This type of development pattern means that more landscaped back yards are visible from the road.

Also contributing to the rural character of Juanita Drive is the curvilinear nature of the road and the presence of mature trees along the roadway. The rural character of the south end transitions to a more urban appearance at NE 170th Street, as Juanita Drive becomes flatter and straighter and becomes 68th Avenue NE.

Urban Character – 68th Avenue NE

The north end of the corridor is distinctly more urban in character than the south end as Juanita Drive becomes 68th Avenue NE, especially north of the Sammamish River approaching SR 522. Views from the roadway to Rhododendron Park and the Sammamish River are important exceptions to the otherwise commercial/industrial appearance of 68th Avenue approaching SR 522.

Traffic

The Juanita Drive NE corridor carries a large volume of traffic with approximately 38,000 vehicles per day at the north end, and 12,000 vehicles per day at the south end. A Draft Traffic Report prepared by DKS Associates is included as Appendix D, with key points on existing conditions summarized below.

Operations

The City of Kenmore classifies SR 522 and 68th Avenue NE as principal arterial roadways and Juanita Drive NE south of NE 170th Street as a minor arterial. Traffic signals on SR 522 at 68th Avenue NE, 61st Street NE and 73rd Street NE, and on 68th Avenue NE at NE 175th Street are operated by the Washington State Department of Transportation (WSDOT). The other three traffic signals on 68th Avenue NE and Juanita Drive NE, located at NE 170th Street, NE 153rd Street and NE 141st Street, are operated by King County.

PM peak hours on SR 522 have extremely heavy traffic that command long green intervals for eastbound and westbound traffic. The timing at the traffic signal at SR 522/68th Avenue NE only gives about 25% of its green time to northbound traffic. This time is not enough to service the demand for through and left-turn traffic in two lanes. The result is that queues sometimes extend south to NE 170th Street and beyond. These traffic queues will remain or become larger until traffic demand drops below the signal capacity level where the queues will begin to diminish.

The traffic signals on 68th Avenue NE at NE 175th Street and NE 170th Street have green intervals of adequate length to serve the traffic demand. However, when queuing from SR 522 extends through the adjacent intersections, traffic can't proceed and the signals are ineffective.

Figure 4.3 – Signal at NE 170th Street

The intersection at 68th Avenue NE/NE 170th Street has a westbound right-turn restriction on red during PM peak hours. This restriction keeps westbound traffic from monopolizing the limited northbound storage on 68th Avenue NE when traffic queues from SR 522 extend nearly to NE 170th Street. The turn restriction makes westbound right-turn traffic wait until they can proceed when the traffic signal displays a westbound green. Greater volumes of traffic during this signal phase make the interval longer, thereby increasing the length of red for northbound and southbound traffic.

The two other traffic signals at NE 153rd Street and NE 141st Street have adequate capacity to serve vehicle demand.

Collision Analysis

One measure used to evaluate safe traffic operating conditions is the frequency and the severity of vehicle or pedestrian collisions. DKS obtained collision records from WSDOT and the City of Kenmore for a six–year period from 2001 thru 2006. DKS also retrieved collision data from police records for 2007 to identify possible recent changes in collision patterns.

Bicycle Collisions

Bicycle collision stand out in the corridor because of their high concentration in a relatively short distance and the potential severity of these types of collisions. In fact, a fatal bicycle accident occurred in February 2007 just as this study was being initiated.

Figure 4.4 – Cyclist Heading North Along the Corridor

Twelve bicycle collisions occurred in the six years of records examined in the 1.5-mile stretch between Northeast 153rd Place and NE 175th Street. All occurred in daylight hours. Half the bicycle collisions occurred at driveways on the east side of Juanita Drive and one-third occurred at intersections. All but two of the collisions involved vehicles turning into and out of driveways or side streets. Contributing factors for bicycle collision may be as follows:

- Downhill nature of northbound contributing to bicycle speeds
- Variable bicycle travel locations in traffic lane, on paved shoulder, or on sidewalk
- Poor sight distance from driveways with no buffer area to pull out, compounded by on-street parking
- Fast vehicle driver decisions while making turns from heavy traffic

Motor Vehicle Collision Type

The most common collision type in the corridor has been rear-end (vehicles traveling the same direction) collisions (88) followed by left-turn (one vehicle making a left turn colliding with a vehicle traveling the opposite direction) collisions (32). An additional 22 collisions occurred as vehicles were entering or leaving driveways. Single vehicle collisions leaving the roadway or overturning (29) were the remaining category averaging over three collisions a year. The collision patterns support the introduction of left-turn lanes to help motorists

make left turns into side streets or driveways by providing refuge out of moving traffic lanes. Turns from through traffic lanes likely contribute to the high percentage of rear-end and left-turn collisions.

Geometrics

The City of Kenmore has adopted the 1993 King County Road Standards (KCRS) to guide roadway design for city streets. The County updated its Road Standards in 2007, and the City will presumably adopt the new standards in the near future. Therefore this report uses 2007 King County Road Standards to evaluate the existing roadway geometry. Some aspects of roadway alignment are not defined or discussed in the 2007 King County Road Standards; for these elements, Washington State Department of Transportation (WSDOT) and American Association of State Highway and Transportation Officials (AASHTO) design standards were applied.

Juanita Drive is two lanes wide from NE 143rd Street to NE 170th Street, with discontinuous bicycle lanes and sidewalks. From NE 170th Street across the Sammamish River to SR 522, 68th Avenue NE is four lanes wide with turn lanes at intersections and sidewalks on both sides of the roadway.

The entire corridor has a posted speed limit of 35 mph. Based on its classification as a minor arterial, the guidelines recommend a design speed of 35 to 55 mph for Juanita Drive NE. North of NE 170th Street, where 68th Avenue NE is classified as a principal arterial, the guidelines recommend a design speed of 40 to 60 mph. Due to the urban nature, the number of direct accesses, high usage by bicyclists and pedestrians, proximity of an elementary school and parks, and the fact that most of the corridor is a minor arterial, as opposed to a principal arterial, a design speed of 45 mph was selected for analysis and to provide a basis for recognizing the significance and extent of deficiencies.

Existing Alignments

The existing horizontal and vertical curves are described in the following tables, from south to north. Stationing is based on the proposed alignment shown on the plans included in Appendix A.

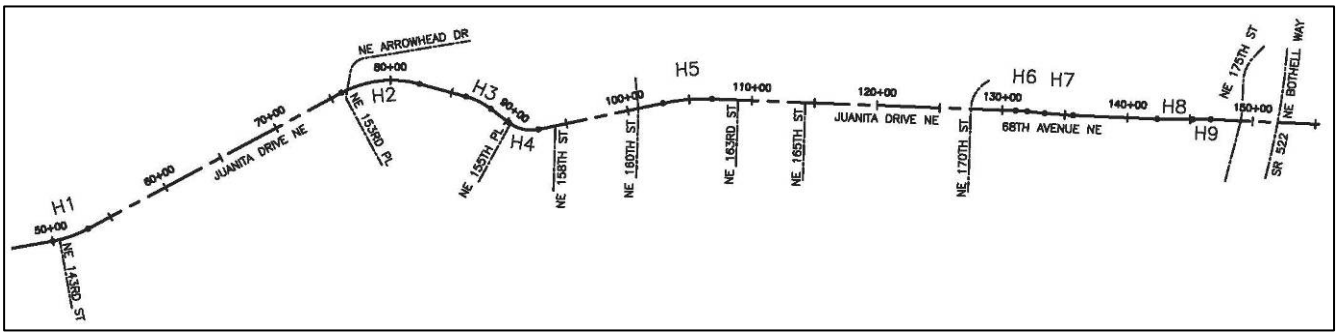

Figure 4.5 Existing Horizontal Alignment

Table 4.1
Horizontal Curves

Curve No.	Station From	Station To	Radius [feet]	Length [feet]	Delta	Super-elevation
H1	50+00	53+00	955	300	18°00'00"	5.5-8.5%±
H2	75+92	82+35	850	642	43°18'23"	4-10%±
H3	86+18	88+42	573	223	22°24'17"	7-9%±
H4	90+26	92+72	286	247	49°26'55"	10-15%±
H5	102+90	106+83	1600	394	14°06'51"	4-6.5%±
H6	131+06	131+99	1500	94	3°36'26"	None
H7	133+39	135+67	4000	228	3°16'23"	None
H8	142+39	145+23	4000	284	4°04'22"	None
H9	145+23	146+66	2000	143	4°06'15"	None

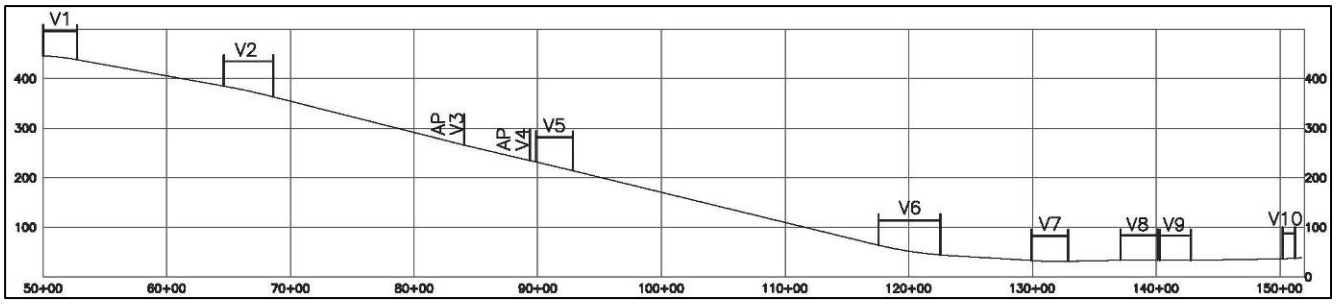

Figure 4.6 Existing Vertical Alignment

Table 4.2
Vertical Curves

Curve No.	Station From (approx.)	Station To (approx.)	Approach Slope	Length [feet]	Exit Slope	Stopping Sight Distance (feet)
V1	50+12	52+87	-1.41%	275	-4.47%	355
V2	64+59	68+59	-4.47%	400	-6.33%	557
V3	84+05	84+05	-6.33%	Angle point	-5.85%	1385
V4	89+35	89+35	-5.85%	Angle point	-5.45%	1661
V5	89+85	92+85	-5.45%	300	-6.06%	1239
V6	117+56	122+56	-6.06%	500	-1.52%	382
V7	129+90	132+90	-1.55%	300	0.49%	476
V8	137+12	140+12	0.49%	300	-0.56%	783
V9	140+32	142+82	-0.56%	250	0.43%	803
V10	150+24	151+24	0.43%	100	-2.00%	323

Alignment Evaluation

As the following evaluation explains in detail, improving the roadway to 2007 King County Road Standards would have significant impacts on portions of the corridor.

Horizontal Alignment Evaluation

The following table lists criteria based on the 2007 King County Road Standards and a 45 mph design speed. WSDOT's standards are used as a supplemental source of information and as specifically cited in King County's standards.

Table 4.3
Horizontal Alignment

Superelevation Rate	Crown	2%	4%	6%**	8%***
Min. Horizontal Radius [feet]	1040*	821*	732*	656	600
Reverse Curve Runoff Length [feet]*	n/a	65*	130*	195*	259*

*Indicates WSDOT Reference, Section 1250.05

**Maximum recommended, per the 2007 King County Road Standards

***Maximum allowed, per the 2007 King County Road Standards

Per the 2007 King County Road Standards, the minimum horizontal curve radius is 656 feet for a 45 mph roadway with the recommended 6 percent superelevation. With the maximum allowable superelevation of 8 percent, the horizontal curve radius can be reduced to 600 feet. Only curve H4 meets these standards; however, all of the curves except H5 have superelevations in excess of the maximum allowable. The distance between curves H2 and H3 is 367 feet, and between curves H3 and H4 is 161 feet, which does not allow sufficient runoff length for these curves.

Figure 4.7 Existing Curves H3 and H4 (photo courtesy of DKS)

The series of horizontal curves north of NE 170th Street, across the Sammamish River, and up to Bothell Way (H6 through H9) do not meet the minimum radius requirement for a road with crown section based on the 2007 KCRS; however, the curves all have deflections of less than 5 degrees. Additionally, they all meet the WSDOT standard for existing curves with crown section.

Vertical Alignment Evaluation

Stopping sight distance is critical in the evaluation of vertical curves. The following table lists criteria based on King County's minimum stopping sight distance requirements, based on a 45 mph design speed.

Table 4.4 Vertical Alignment					
Downslope	0%	1.5%	3%	4.5%	6%
Stopping Sight Distance (feet)	360	369	378	390	401

Curve V1 is the only vertical curve that does not meet this standard.

Bridges

The bridge over the Sammamish River is actually two separate structures, built at different times. The West Kenmore Bridge (Bridge No. 1071AW) was originally built in 1938 with 12 spans of concrete deck girders for a total length of 590 feet. The East Kenmore Bridge (Bridge No. 1071AE) was built in 1970 with five spans of concrete box girder for a total length of 590 feet.

The two bridges are separated by a strip of metal grating, approximately 2-6 inches wide, along the edge of the bridge deck overhang. This grating allows surface water from the West Bridge to drain directly to the river below. A median concrete barrier is seated along the edge of the East Bridge deck overhang, and along that edge are four-inch diameter deck drain holes spaced approximately 20 feet apart to allow the surface water to drain directly to the river below.

Figure 4.8 – West Bridge

Each bridge carries two lanes of vehicular traffic and a five-foot pedestrian sidewalk, separated from vehicular traffic by a concrete barrier, as shown in the Figure 4.9 below.

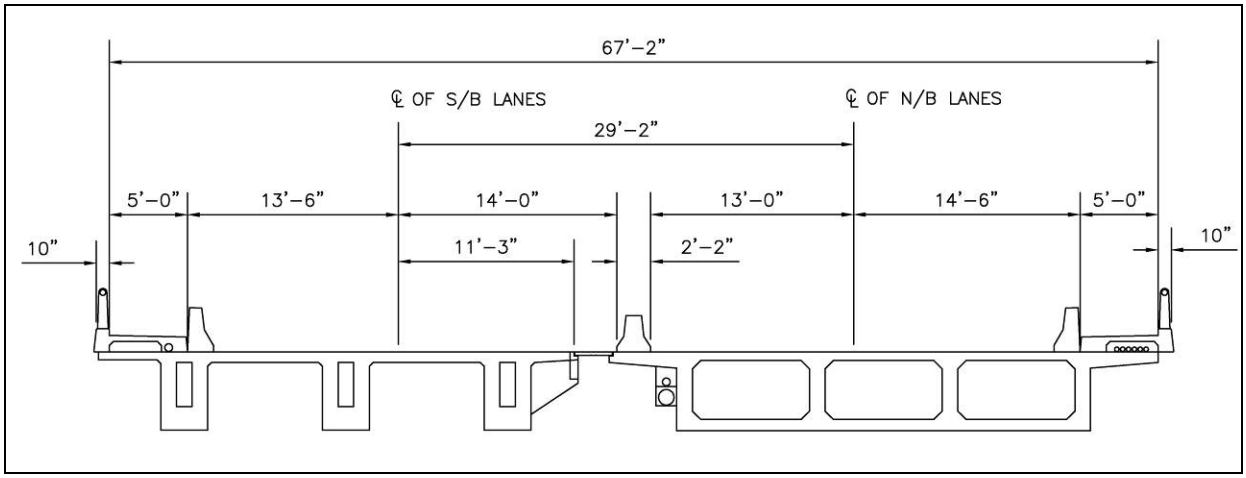

Figure 4.9 – Existing Bridge Section

The Sammamish River channel was dredged by the United States Army Corps of Engineers in 1963, authorized under the Flood Control Act of 1958, to deepen and straighten the river channel to reduce flooding problems.

The bridges are maintained by the King County Bridges and Structures Unit in the Road Services Division. According to the bridge maintenance records, resurfacing of the bridge decks was completed on both bridges in 1991 and seismic retrofit was completed on both bridges in 1998. However, with the recent changes in bridge seismic design codes, the bridges may need to be re-evaluated for their seismic performance.

Figure 4.10 – Sammamish River Under the East Bridge

The latest biennial bridge inspection was performed by the County in 2006 and determined the Bridge Sufficiency Ratings of 56.1 and 71.4 for the West and East Bridge, respectively. Some of the deterioration and defects noted in the inspection include cracks and spalls in concrete members (box girders, pier walls, and columns), some missing bolts at expansion joints, bent and loose railings, and other relatively minor items.

In 2001, the County led an underwater inspection of the bridges, which found no evidence of deterioration or significant scour of the channel bottom around the bridges.

A typical concrete bridge in this region is expected to have a useful life of approximately 75 years. Based on this general guideline and on its age and overall condition, the West Bridge would reach the end of its useful life in the next five to ten years. The East Bridge is expected to have a useful life of 35 years if it is maintained properly, including seismic rehabilitation in accordance with current codes. These conditions are generally reflected in the Sufficiency Ratings, based on the 2006 bridge inspection report.

Without a more thorough investigation of the bridges, it is difficult to estimate the remaining life of the bridge accurately. The bridge Conditional Inspection Reports, which are conducted biennially, provide a good visual assessment of the overall conditions, but this information may not be adequate to predict the remaining life of the bridges. In addition, it is even more difficult to factor in any future changes which might occur on the structures, including traffic demand and seismic events. As noted above, the bridge seismic design and retrofit guidelines have been changed significantly since the last retrofit of the bridge. To determine the long-term structural integrity of the bridges against major seismic events, both bridges will need to be re-evaluated under the new codes.

Environmental

The major environmental resources within the corridor include the Sammamish River, streams, wetlands, and steep slopes. A wetland reconnaissance was conducted on May 18, 2007 to evaluate sensitive areas within the corridor. The reconnaissance did not include conducting fish habitat surveys or wetland delineation.

Sammamish River

The Sammamish River, also known as Sammamish Slough, flows under 68th Avenue NE between NE 170th Street and NE 175th Street and is within the Water Resource Inventory Area (WRIA) #08-0057. The roadway crosses the Sammamish River at river mile 0.5 just upstream of its confluence with Lake Washington. This area is subject to fluctuating water levels during the winter and spring season due to management of the Ballard Locks and

flood events. The Sammamish River is designated as a Class 1 stream by the City of Kenmore.

The Sammamish River provides rearing habitat and is a migration corridor for several salmon and trout species. This includes chinook, coho, and sockeye salmon, as well as steelhead and cutthroat trout. Both chinook salmon and steelhead trout are listed as threatened species according to the National Marine Fisheries Service. In the bridge vicinity, the Sammamish River also provides habitat for resident fish, migration waterfowl, great blue heron, and numerous other wildlife species.

Streams

There are two streams, Tributary 08-0222 and an unnamed stream, within the project corridor that alternate between open channels and culvert pipes. Tributary 08-0222 is located within the South Lake Washington 1 (SLW-1) sub-basin and the unnamed stream is located within the Sammamish River 2 (SR-2) sub-basin. Tributary 08-0222 is shown on Figure G.2 Basin Boundaries and Tributaries Map in Appendix G.

Tributary 08-0222

Tributary 08-0222 is a perennial stream and crosses the project corridor near NE 153rd Place. The City's Streams and Wetlands Map classifies the stream as a Type 4 Stream. The King County map identifies Tributary 08-0222 as an unclassified stream; the Department of Natural Resources water type map identifies it as fish bearing; and the Washington Department of Fish and Wildlife map identifies it as an unknown stream. Coho salmon have been documented in the lower reach of this stream.

Unnamed Stream

The unnamed stream parallels the east shoulder of Juanita Drive NE from approximately NE 162nd Street north to the Sammamish River. Most of the stream runs in stormwater pipes, but there is an open ditch segment between NE 162nd and 165th Street. The City's Streams and Wetlands Map classifies the stream as a Type 4 stream, in the open section. The City appears to regulate this stream, but it is unknown whether any other agencies would. It is likely to be regulated by the Army Corps of Engineers (Corps) as it flows directly to a fish-bearing water (the Sammamish River). The Corps regulates "ditches"; therefore it may regulate a known stream in a pipe if a portion of it is daylighted.

Wetlands

There are riparian wetlands associated with the Sammamish River at all four corners of the bridge over the Sammamish River. There is a large wetland complex at the southeast corner of the bridge within Rhododendron Park that includes palustrine forested, scrub/shrub, and

emergent classes. At the northeast corner of the bridge, there is an emergent and scrub/shrub wetland surrounding a boat slip. There is a band of riparian wetland along the Sammamish River at the northwest corner of the bridge. A Washington Department of Fish and Wildlife boat ramp and parking area is located at the southwest corner of the bridge, limiting the riparian fringe to a narrow area along the bank.

There are also wetlands associated with Stream A, drainage ditches, and stormwater ponds within the project corridor.

Steep Slopes/Geologic Hazards

The City's sensitive area maps show an Erosion Hazard Area and Landslide Hazard Area on the east side of Juanita Drive NE, north of NE 155th Place NE. These areas have special design criteria under Kenmore Municipal Code.

There is a Seismic Hazard Area between NE 170th Street and NE 175th Street. This would particularly affect the design of any bridge modifications or replacement.

Geotechnical

No formal geotechnical investigation was performed as part of this study. However, a review of Soil Conservation Service soils maps shows that the predominant soil types along the corridor can be described as sandy loams. The specific types include Alderwood Gravelly Sandy Loam, Ragnar Indianola Association, Indianola Loamy Fine Sand, and Norma Sandy Loam.

As noted in the Environmental section above, there is an Erosion Hazard Area and Landslide Hazard Area on the east side of Juanita Drive NE, north of NE 155th Place NE. A Seismic Hazard Area is located between NE 170th and NE 175th Street.

Storm Drainage

Drainage for the entire corridor is tributary to Lake Washington and the Sammamish River. Drainage patterns within the corridor vary, with conditions ranging from poor, unmaintained, uncontrolled stormwater discharges, to relatively new, well constructed systems.

The major watershed boundaries and tributaries within the City are shown in Appendix G. Stormwater at the south end of the corridor, from NE 143rd Street to NE 149th Street, is

tributary to South Lake Washington Subbasin 2. The portion south of NE 145th Street drains to tributary 0227, while the portion to the north drains to tributary 0225 located in St. Edward State Park. This piece of roadway features primarily unmaintained ditches and driveway culverts.

Stormwater in the central portion of the corridor, from NE 149th Street to approximately NE 160th Street, is tributary to South Lake Washington Subbasin 1 Tributary 0222, which runs through Inglewood Golf Course. Stormwater facilities in this part of the corridor vary in type and condition, ranging from narrow ditches to relatively new curb and gutter. There are five separate conveyance systems within this corridor. The first, which was recently reconstructed in 2006, crosses Juanita Drive south of NE 153rd Place. The second system outfalls directly to tributary 0222 about 400 feet north of NE 153rd Place. The last three enter detention pipes, installed by King County prior to Kenmore's incorporation, before discharging to the tributary. The ditches within this portion of Juanita Drive are not well defined and undercut both the traveled way and the foot of the adjacent bank. Kenmore maintenance crews remove in excess of 100 tons of material from this system annually. The City has also identified sheet flow flooding of the NE 153rd Place intersection.

Stormwater in the northern segment of the corridor, north of NE 160th Street, is tributary to the Sammamish River Subbasin 2. Although portions of this area drain to ditches, the majority of the area is urbanized and drains to closed stormwater conveyance systems.

Utilities

Street Lighting and Power

Existing street lights, power lines and facilities within the Juanita Drive/68th Avenue NE Corridor are operated and maintained by Puget Sound Energy (PSE). In most areas, power lines are overhead. Utility poles are located on both sides of the right-of-way, with PSE's utility poles located on the west side of the roadway. The location of the poles varies throughout the corridor, but generally speaking the poles are located one to ten feet from the edge of pavement, with some poles located as far as 30 feet from the edge of pavement.

A windstorm in December 2006 downed many of these lines, in most cases as a result of tree limbs that had fallen onto the wires and poles. PSE reported that 75 percent of its customers had lost power during the storm.

Figure 4.11 PSE Crews Repairing Downed Wires

Cable Television

Existing cable television and broadband lines and facilities within the Juanita Drive/68th Avenue NE Corridor are operated and maintained by Comcast. In most areas, Comcast's lines are overhead on utility poles owned by PSE. Isolated buried lines and crossings are located in the vicinity of NE 143rd Street, NE 147th Street, NE 153rd Place, NE 160th Street, NE 163rd Street, NE 166th Court, NE 170th Street, and the Sammamish River crossing.

Telephone

Existing telephone lines and facilities within the Juanita Drive/68th Avenue NE Corridor are operated and maintained by Verizon. Telephone lines are buried underground or located on utility poles throughout the corridor, on both sides of the roadway. Generally, Verizon owns the utility poles located on the east side of the right-of-way. A portion of Verizon's buried lines are copper and fiber optic encased in concrete.

Natural Gas

Natural gas service in the corridor is provided by PSE. Pipes of various materials ranging in size from two to six inches in diameter are intermittently located on both sides of the roadway throughout the corridor, including the bridge crossing the Sammamish River.

Sanitary Sewer

The Juanita Drive/68th Avenue NE Corridor is served by Northshore Utility District. A sewer main, ranging in size from 8 to 12 inches, runs from an easement at NE 145th Street, north to NE 165th Street, where the sewer alignment turns to the east. This sewer alignment

is sited near the east edge of pavement. The Northshore Utility District also owns and maintains an 18-inch sewer crossing immediately south of the Sammamish River.

King County Department of Natural Resources and Parks, Wastewater Treatment Division owns and operates a 78-inch reinforced concrete regional sewer main located along NE 175th Street, and a 60-inch reinforced concrete regional sewer main located along SR 522.

Water

Water service in the corridor is also provided by Northshore Utility District. A series of 8- and 12-inch cast iron and ductile iron water mains run, discontinuously, for nearly the entire length of the corridor, including across the Sammamish River, and is situated, in most areas, within the extents of pavement, near the east edge of pavement.

Transit

Several transit routes serve the Juanita Drive/68th Avenue NE corridor. Bus stops are located on both sides of the roadway throughout the corridor, although many of the stops are not wheelchair accessible and most do not have shelters.

Figure 4.12 Transit Stop on Corridor

King County Metro Route 935

Route 935 provides weekday-only service on Juanita Drive and 68th Avenue NE from NE 141st Street to NE 181st Street. Service on this route extends to the Juanita, Kingsgate, and Totem Lake neighborhoods. This route also features limited dial-a-ride service.

King County Metro Route 644

Route 644 provides weekday-only rush-hour service on Juanita Drive and 68th Avenue NE from NE 153rd Place to NE Bothell Way. Service on this route extends to the Kingsgate neighborhood and Overlake Transit Center.

King County Metro Route 234

Route 234 provides weekday and Saturday service on Juanita Drive and 68th Avenue NE from NE 153rd Place to NE 181st Street. Service on this route extends to the Juanita, Kirkland, Houghton, and Downtown Bellevue neighborhoods, as well as Overlake Hospital.

Connections

King County Metro Routes 306, 312, 331, 342, and 372, as well as Sound Transit Route 522 provide service on Bothell Way/SR 522 at 68th Avenue NE.

Section 5—Alternatives Description and Evaluation

To address the goals for this project, a number of alternatives have been considered. These alternatives cover horizontal and alignment issues, the type of use for the median area, and the location and extent of pedestrian facilities.

Geometrics

Horizontal Alignment Deficiencies

The primary portion of roadway that does not currently meet minimum horizontal roadway standards is located between NE 154th Court and NE 158th Street, containing curves H3 and H4 as described in the Section 4—Existing Conditions. Two alternatives have been developed to improve this section of roadway.

Alignment Alternative 1 – Meet 2007 King County Road Standards

Alignment Alternative 1 applies the 2007 KCRS strictly with respect to the horizontal alignment. To meet this standard between Station 86+00 and Station 93+00, curve H3 would need to be eliminated and curve H4 would require an increased radius of 656 feet (see figure 5.1). This alternative would require complete reconstruction of 900 feet of Juanita Drive and additional construction to extend NE 155th Place and NE 158th Street. This new construction would require approximately one acre of right-of-way acquisition from Inglewood Golf Club and Canterbury at Inglewood Condominium Association. Additionally, demolition or relocation of one structure with multiple dwelling units and relocation of a golf tee and putting green would be necessary to accommodate the location of the new roadway.

Figure 5.1 Alternative Alignment 1 through Inglewood Golf Club

A 25-foot retaining fill wall would be necessary along the west side of the new roadway, adjacent to Inglewood Golf Course. At least 250 feet of pavement, sidewalk, curb, gutter, and stormwater facilities that were recently constructed and in good condition would need to be demolished and replaced.

A benefit associated with this re-alignment is the potential to maintain a portion of the old roadway as a combined driveway onto NE 155th Street for residences at 15554 Juanita Drive NE and 15544 Juanita Drive NE, which currently have separate access points onto Juanita Drive within the existing curve.

Alignment Alternative 2 – Reduced Design Speed

Alignment Alternative 2 generally follows the existing alignment of the road but reduces the design speed to 30 mph, below the posted speed limit of 35 mph, for the portion from approximately Station 86+00 to Station 93+00. This reduced design speed allows for existing Curves H3 and H4 to remain in place, with radius values of 575 feet and 310 feet and superelevation values of 3% to 5%. This section of roadway should be signed with an advisory speed limit.

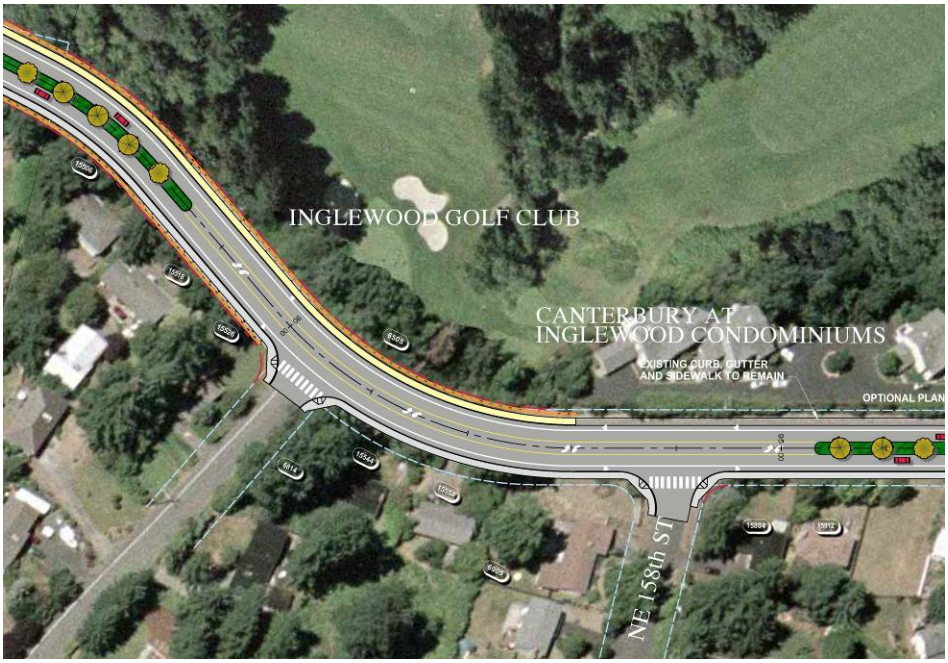

Figure 5.2 Alternative Alignment 2 through Inglewood Golf Club

Contributing factors to safety issues at these curves are the presence of one intersecting roadway (NE 155th Place) and two driveway approaches within Curve H4. Providing turn lanes onto NE 155th Place, NE 154th Court, and the two driveways at Curve H3 would

improve this situation. A two-way left-turn pocket has been provided at all of these locations as part of this alternative.

Right-of-Way

Right-of-way acquisition will be needed for construction of the majority of the Juanita Drive NE/68th Avenue NE corridor. Three approaches to Right-of-Way acquisition were considered.

Right-of-Way Alternative A

Right-of-Way Alternative A follows 2007 King County Road Standards and City of Kenmore Roadway Classifications strictly. This would require a 84-foot-wide right-of-way from the south city limit to NE 170th Street and a 100-foot-wide right-of-way from NE 170th Street to Bothell Way.

Right-of-Way Alternative B

Right-of-Way Alternative B would follow the King County Road Standards minimum right-of-way width for a minor arterial, 84 feet, for the entire study section.

Right-of-Way Alternative C

Right-of-Way Alternative C would determine right-of-way width based on the minimum that would be required to reasonably construct the roadway improvements, estimated to average 70 feet.

The following table summarizes the total amount of right-of-way that would need to be acquired, applying the three right-of-way alternatives to the two alignment alternatives.

Table 5.1
Total Area of Right-of-Way Acquisition

	Alignment Alt. 1 Straighten Curves H3 & H4	Alignment Alt. 2 Reduced Speed Curves H3 & H4
Right-of-Way Alternative A 84' Minor Arterial Width, 100' Major Arterial Width	4.80 acres	4.43 acres
Right-of-Way Alternative B 84' Width Throughout Corridor	4.21 acres	3.85 acres
Right-of-Way Alternative C Right-of-Way Only As-Needed	2.20 acres	1.42 acres

Based on the impacts to the neighborhood, public input, the ability to resolve safety issues, cost, and City staff and Council confirmation, Alignment Alternative 2 with Right-of-Way Alternative C is recommended. Alignment Alternative 2 is similar to the existing alignment but resolves existing safety problems by adjusting two curves, lowering the speed through this section, and reducing excessive superelevation of the roadway. Right-of-Way Alternative C minimizes impacts to the neighborhood and costs by reducing the amount of Right-of-Way to be acquired. This recommendation is further discussed in Section 6—Recommended Alternative.

Channelization

Table 5.2 shows the use of the center lane and auxiliary lanes throughout the study area, with an explanation of why each lane type was selected.

Two sets of alternatives are also contained in Table 5.2, with benefits and disadvantages noted. Each set of alternatives are located where existing driveways and/or side streets are present, and each examines whether a landscaped median or a two-way center-turn lane is the best use for the median area.

Figure 5.2 Example of landscaped median

Table 5.2
Center Lane and Auxiliary Lane Improvements

Lane Type	Station From (approx.)	Station To (approx.)	Comments
Dedicated southbound left-turn lane to NE 143rd Street	50+00	54+00	No other driveways or cross streets in this vicinity.
Dedicated northbound left-turn lane to Bastyr University	54+00	57+50	No other driveways or cross streets in this vicinity; planned intersection improvements by Bastyr University.
Landscaped median	57+50	61+00	No driveways or cross streets in this vicinity; left-turn from Bastyr University to Juanita Drive will not require a refuge area once Bastyr University installs a traffic signal.
Two-way left-turn lane	61+00	72+00	Provide refuge area for NE 148th Place, NE 149th Street, and driveways.
Median Alternative 1: Two-way left-turn lane	72+00	72+50	Benefits: Maintains left-turning access to several parcels. Disadvantages: Vehicles turning from driveways in this area resulted in recent fatal bicycle-auto collision; maintaining access may result in future similar collisions.
Median Alternative 2: Landscaped median	72+00	72+50	Benefits: Encourages compliance with speed limit prior to school crossing. Restricts access to driveways with an accident history. Disadvantages: restricts access to homeowners and small business owners. Maintenance cost.
Dedicated northbound and southbound left-turn lanes to NE 153rd Place and NE Arrowhead Drive	72+50	80+00	NE 153rd Place is classified as a major collector, and NE Arrowhead Drive serves Arrowhead Elementary School. The intersection is signalized, and currently has dedicated left-turn lanes in both directions.
Dedicated southbound right-turn pocket with raised traffic island	76+50	80+00	The angle of intersection is 55 degrees, making right turns to NE Arrowhead Drive very difficult for a school bus. The intersection currently has a dedicated southbound right-turn pocket with raised traffic island.
Landscaped median	80+00	83+30	Encourages compliance with speed limit in approach to Arrowhead Elementary School. No driveways or cross streets in this vicinity.
Two-way left-turn lane	83+30	86+00	Provide refuge area for NE 154th Court and driveway
Landscaped median	86+00	88+50	No driveways or cross streets in this vicinity.
Two-way left-turn lane	88+50	110+80	Provide refuge area for NE 155th Place, NE 158th Street, NE 160th Street, NE 163rd Street,

Table 5.2
Center Lane and Auxiliary Lane Improvements

Lane Type	Station From (approx.)	Station To (approx.)	Comments
			and driveways*. *See alternatives for 95+35 to 99+00*.
Median Alternative 3: Landscaped median	95+35	99+00	Benefits: Passively encourages slower speeds north of Curves H3 and H4 (reduced design speed). Disadvantages: Restricts left-turn access to and from seven parcels.
Median Alternative 4: Two-way left-turn lane	95+35	99+00	Benefits: Maintains current access to and from seven parcels. Disadvantages: 1,000-foot segment of straight roadway with no curves or landscaped median encourages higher speeds approaching Curves H3 and H4 (reduced design speed).
Landscaped median	110+80	112+20	No driveways or cross streets in this vicinity.
Dedicated through-right lane northbound at NE 170th Street	121+00	127+50	Refer to the Traffic Analysis in Appendix D for a discussion of lane configuration at this intersection.
Dedicated northbound left-turn lane to Inglewood Road NE	123+50	127+50	Refer to the Traffic Analysis in Appendix D for a discussion of lane configuration at this intersection.

Between approximate Stations 72+00 and 72+50, Median Alternative 2: Landscaped Median is recommended because of the severity of past accidents, and the proximity to the elementary school. Between approximate Stations 95+35 and 99+00, Median Alternative 4: Two-way left-turn lane is recommended because the improvement of access to driveways and side streets is expected to be an effective method of addressing safety issues in this section of the corridor.

Non-Motorized Alternatives

Sidewalks

Three alternatives have been considered for the design of sidewalks on this corridor.

Sidewalk Alternative 1

Alternative 1 calls for a 6.5-foot sidewalk directly behind the curb on both sides of Juanita Drive for the entire length of the corridor. This alternative provides for full continuity of sidewalks throughout the corridor, on both sides of the corridor.

Sidewalk Alternative 2

Alternative 2 calls for a 6.5-foot sidewalk only along the east side of Juanita Drive. In locations where a sidewalk connection would be needed on the west side of Juanita Drive, such as to a trailhead at Saint Edward State Park or to a bus stop, a sidewalk would be constructed on the west side of the road, connecting the destination to the nearest crosswalk. The benefit to this design would be a reduced construction footprint, reduced wall heights, less right-of-way acquisition, and less sidewalk to construct. The disadvantage is a discontinuous system of sidewalks on one side of the road.

Sidewalk Alternative 3

Alternative 3 calls for a five-foot sidewalk with a five-foot planter strip on both sides of the road. The benefit to adding a planter strip is the ability to separate bicycle and vehicular traffic from pedestrian traffic. It also provides a place for additional landscaping features throughout the corridor and requires less concrete sidewalk. A disadvantage to this alternative is that it requires a larger construction footprint, more wall height, and more right-of-way acquisition.

As further discussed in Section 6—Recommended Alternative, Sidewalk Alternative 2 is recommended as it provides a continuous facility throughout the corridor, while minimizing impact to mature vegetation and costs by only constructing facilities on the west side of the roadway where it will be useful, primarily to connect bus stops to the nearest crosswalk.

Section 6—Recommended Alternative

The alternatives described in Section 5—Alternatives and Evaluation were evaluated by the design team with City staff input, and then presented to the City Council on three separate occasions. The City Council provided direction that shaped the recommend alternative, described in the following section. The recommended alternative is illustrated in detail in Appendix A—Plans, Profiles and Design Calculations, and Appendix B—Typical Roadway Sections. A detailed cost estimate is in Appendix C—Cost Estimates.

Geometrics

The recommended alternative generally follows the existing alignment and roadway geometrics, with corrections made to specific sections of the roadway respecting curvature and cross-slope.

Horizontal Alignment Corrections

The recommended alternative realigns horizontal Curves H3 and H4 with a design that strikes a balance between increased safety and the need to minimize impacts and costs, using a radius of 575 feet with a superelevation of 3% on Curve H3 and a radius of 310 feet with a superelevation of 5 percent on Curve H4. Although this design decreases the design speed to 30 mph, below the posted speed of 35 mph for the section between approximate Stations 86+00 to 93+00, it balances the curvature requirements of both curves and results in superelevation values that are high enough to provide sufficient drainage and benefit to the driver, but low enough to reduce problems with cars sliding under low-speed conditions during winter weather. The tighter radius on Curve H4 and a larger radius on Curve H3 also results in the optimal configuration that requires less right-of-way acquisition and has minimal impact on the surrounding properties.

Superelevation Corrections

Superelevations in existing curves H1, H2, and H5 all exceed six percent. All of these curves have large enough radii that the superelevation can be reduced to the maximum recommended value of six percent without compromising safety. The reduction in the superelevation rate can be made by grinding or adding depth to the pavement to achieve the desired rate.

The recommended alternative reduces superelevation on Curves H1, H2, and H5 to 6 percent. The revised cross-slope for these curves will exceed the requirements for the design speed of 45 miles per hour.

Vertical Alignment Deficiencies

Vertical Curve V1 is the only vertical curve that does not meet stopping sight distance requirements prescribed by the 2007 King County Road Standards. Re-construction of the vertical crest of Curve V1 would result in a maximum cut of four inches to meet 2007 King County and WSDOT standards, however grade adjustments will extend a short distance into the neighboring jurisdiction to the south.

Correction of this vertical curve would add negligible height to proposed retaining walls and slopes, but any utilities within the vertical curve that are shallow may need to be reconstructed to maintain sufficient cover. Additionally, NE 143rd Street intersects Juanita Drive in this vertical curve. The slope on NE 143rd Street has a slope of approximately 5% approaching the intersection. Adjustment of NE 143rd Street to meet the new elevation on Juanita Drive could require some roadway and utility reconstruction.

Channelization

Juanita Drive from NE 143rd Street to NE 170th Street

The recommended channelization is three travel lanes—one lane and a bike lane in each direction, with the center lane being used alternately as a two way left turn lane, a dedicated left turn lane, or a raised planted median. In accordance with 2007 King County Road Standards, each of the through travel lanes will be 11 feet in width, and the center left-turn lane will be 12 feet in width. More information on bicycle lanes and sidewalks is provided in the Non-Motorized Transportation section below.

Right-turn lanes are also provided, as necessary, specifically in the southbound direction at NE Arrowhead Drive, and northbound at NE 170th Street.

The use of the center lane and auxiliary lanes are detailed in Table 6.1.

Table 6.1
Center Lane and Auxiliary Lane Improvements

Lane Type	Station From (approx.)	Station To (approx.)
Dedicated southbound left-turn lane to NE 143rd Street	50+00	54+00
Dedicated northbound left-turn lane to Bastyr University	54+00	57+50
Landscaped median	57+50	61+00
Two-way left-turn lane	61+00	72+00
Landscaped median	72+00	72+50

Table 6.1
Center Lane and Auxiliary Lane Improvements

Lane Type	Station From (approx.)	Station To (approx.)
Dedicated northbound and southbound left-turn lanes to NE 153rd Place and NE Arrowhead Drive	72+50	80+00
Dedicated southbound right-turn pocket with raised traffic island	76+50	80+00
Landscaped median	80+00	83+30
Two-way left-turn lane	83+30	86+00
Landscaped median	86+00	88+50
Two-way left-turn lane	88+50	110+80
Landscaped median	110+80	112+20
Dedicated through-right lane northbound at NE 170th Street	121+00	127+50
Dedicated northbound left-turn lane to Inglewood Road NE	123+50	127+50

68th Avenue NE from NE 170th Street to NE Bothell Way/SR 522

The channelization in this section is constrained by the four-lane bridge over the Sammamish River. Between NE 170th Street and the south end of the bridge, the channelization will consist of two northbound through lanes, one southbound through lane, a southbound left-turn lane, and a southbound right-turn drop lane.

Over the bridge, the channelization will consist of two through lanes in each direction. Between the north end of the bridge and SR 522, the channelization will depend on whether or not Lakepointe Boulevard is constructed.

Without Lakepointe Boulevard – The northbound channelization at the north end of the bridge transitions from two through lanes into three lanes at NE 175th Street: a through/left, a through lane, and a through/right. At SR 522, an additional lane is added. The northbound channelization at SR 522 consists of a dual left-turn lane, a through lane, and a right-turn drop lane.

The southbound channelization will consist of two through lanes, with left turns permitted but not protected at the intersection with NE 175th Street.

With Lakepointe Boulevard – If Lakepointe Boulevard is constructed, the expectation is that a large part of the traffic that currently uses the SR 522/68th Avenue NE intersection will use Lakepointe instead. The northbound channelization at the Lakepointe Boulevard intersection would consist of dual left-turn lanes and two through lanes. The northbound

channelization at SR 522 would consist of three lanes: a left-turn lane, a left/through lane, and a through/right-turn lane.

Traffic Operations

Improvements to SR 522 are currently under construction as part of the City's SR 522 HOV Enhancement Phase 1 Stage 1 project. At the intersection with 68th Avenue NE, these improvements will include the addition of one westbound left-turn lane, and one northbound through lane on the south leg of the intersection. The SR 522 improvements help the operation of the traffic signal at SR 522 and 68th Avenue NE in the following ways:

- Dual westbound left-turn lanes will reduce the amount of time needed for SR 522 traffic to turn left, which will allow more time for northbound traffic movements.
- An additional northbound through lane removes about a third of the traffic from the two left lanes, reducing the demand in these lanes below their capacity with the same amount of green time.
- The removal of a northbound shared left and through lane allows left-turn and through phases to operate independently. This operation is more efficient, and allows SR 522 pedestrian crossings to operate simultaneously, making shorter cycle lengths possible.

However, the additional northbound lane may not be long enough for traffic to utilize its full benefits. Even with widening, traffic queues for northbound traffic could extend 300 feet south of NE 175th Street. Through traffic can only leave the two left lanes if the through lane extends to the end of the traffic queue. Extending the northbound widening 300 feet south of NE 175th Street will enable saturated traffic flow in three northbound lanes during the limited northbound green time. This will allow all northbound traffic to clear the intersection each cycle instead of adding traffic to the queue.

With northbound traffic queues diminished, the turn restriction for westbound right-turn-on-red vehicles at NE 170th Street will not have as much value. If the restriction is removed and westbound right-turn traffic is given signal displays to proceed while southbound left-turn traffic is proceeding, the westbound green interval will be shortened significantly. This will decrease delay for both northbound and southbound traffic.

Non-Motorized Transportation

Bicycle Lanes

As discussed in the Channelization section, bicycle lanes are planned for the length of the corridor on both sides of the roadway, except across the bridges, where wider sidewalks are proposed to accommodate bicycles. The 2007 King County Road Standards specify that bicycle lanes shall be six feet in width from the fog line to the face of curb, an increase of one foot over the 1993 Standards. Given the constricted right-of-way, site topography, utility relocations, and length of the project, widening the roadway and construction footprint by even one foot would have a significant impact on cost. At the same time, because of the consistent grade of six percent, a wider bicycle lane has value. As a compromise between providing wider bicycle lanes and avoiding impacts to private property and increases in construction cost, it is proposed to provide a six-foot bicycle lane on the east side of the roadway (in the downhill direction) and five-foot bicycle lanes on the west side of the roadway. The east side was selected for additional width primarily based on the accident analysis of the corridor, with the majority of the bicycle accidents involving vehicles turning in or out of side streets and driveways on the east side of the corridor. The additional width provides more room for maneuverability for cyclists, but more important, "offers improved sight lines as they descend the hill, enabling them to better spot motorists entering the travelway", as noted by Cascade Bicycle Club's Executive Director Chuck Ayers in a letter dated November 15, 2007.

Sidewalks

Sidewalk Alternative 2, as shown in Figure 6.1 was selected as the recommended alternative. This alternative minimizes construction cost and right-of-way acquisition, while preserving existing trees and constructing a continuous pedestrian pathway through the corridor, accessible to the most residents. Sidewalks will additionally be provided on both sides of the roadway, continuously from NE 170th Street to SR 522, and at locations on the west side where needed for connection to bus stops.

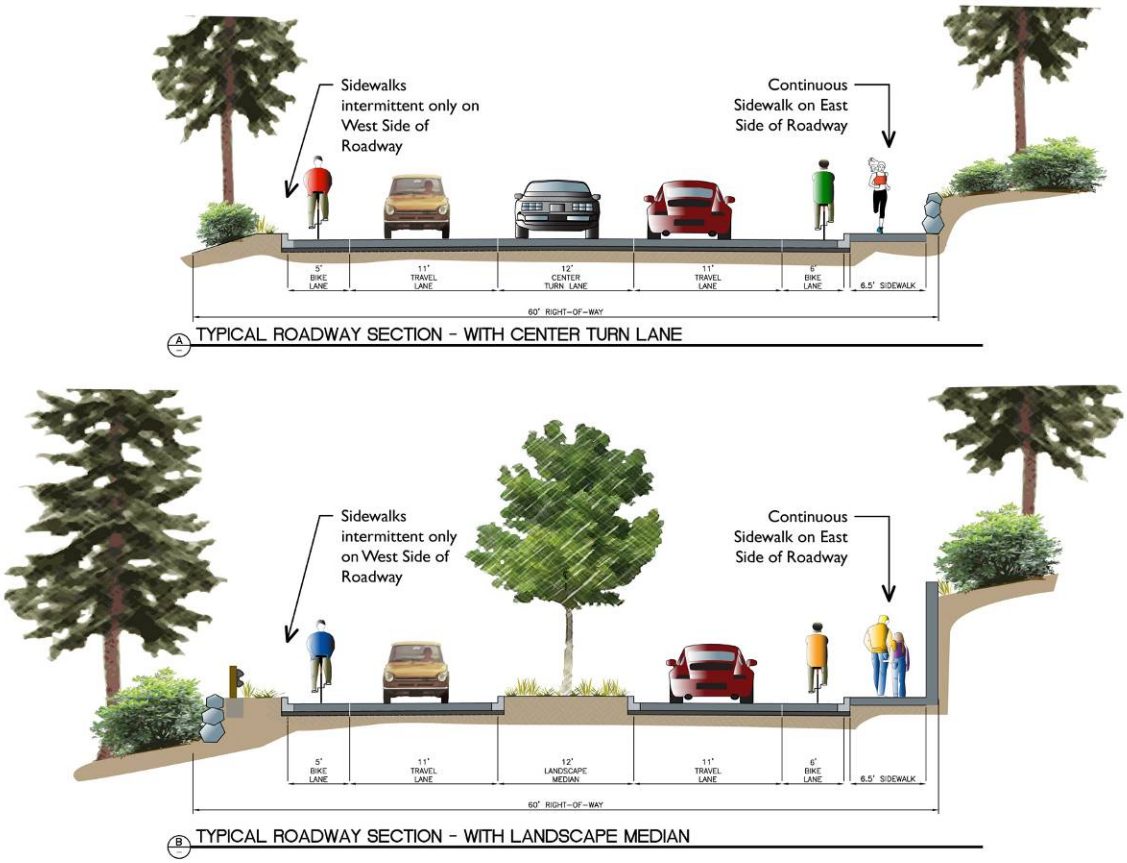

Figure 6.1 – Sidewalk Alternative 2

Storm Drainage

A stormwater management strategy has been adopted for the corridor in compliance with the 2005 King County Surface Water Design Manual (KCSWDM) and City of Kenmore revisions, in anticipation of the City of Kenmore adopting this manual as its stormwater manual prior to construction of this project. The project area has eleven discharge points, including areas where stormwater runoff from the roadway is currently dispersed.

This project will utilize dual stormwater conveyance systems in order to bypass offsite flow around the project and keep onsite flow, which must be detained and treated, separate from offsite flow. This strategy also allows conveyance pipes to be sized for the entire corridor so that onsite stormwater may be conveyed to the Sammamish River, eliminating the need for detention throughout much of the project. This consolidation of onsite stormwater, along with improvement to the conveyance system, also allows the City to utilize an existing stormwater tract for water quality purposes.

A detailed synopsis of the stormwater strategies for conveyance, detention and water quality treatment is included in Appendix G—Stormwater. Conceptual plans showing the stormwater system are in Appendix A.

Utilities

The proposed improvements will require relocation of above ground and underground utilities. It is anticipated that sections of water main, gas main, and underground telecom facilities will require relocation when in conflict with storm drain improvements, retaining walls and other improvements. It is estimated that 700 feet of water main, 2,100 feet of gas main, and 1,500 feet of telecom will require relocation. The proposed improvements will also conflict with the existing location of 76 utility poles.

Two alternatives were investigated for the relocation of facilities currently on utility poles: 1) leave overhead utilities above ground and relocate poles as necessary to resolve conflicts with proposed improvements; and 2) underground overhead utilities.

One reason for investigating the undergrounding of utilities was the severe wind storm in December 2006. During this storm, Puget Sound Energy (PSE) reported that approximately 75% of its circuits had been damaged, and about 1.2 million electric customers in the state of Washington had lost power. Part of this damage occurred along the Juanita Drive Corridor, where power lines had been hit by fallen tree limbs in multiple locations. This generated considerable interest in undergrounding, expressed during the meetings with the public.

Because the lines are privately owned by PSE, interruptions to service are the responsibility of the utility. While the City can require PSE to relocate poles at PSE's expense, they are required by state law to participate in the cost if they require existing facilities to be undergrounded. The City's cost to bury overhead utility lines was estimated at roughly $1 million per mile.

The decision of whether to further pursue utility undergrounding was discussed at a Council meeting in February 2008. The Council directed that the decision will be made during the final design phase of the project(s). For undergrounding to be feasible, it is likely that a local funding solution would have to be found, such as a neighborhood local improvement district.

City staff explored the formation of a local improvement district with the residents along the corridor. When confronted with the high cost of undergrounding improvements, the public reaction was decidedly against undergrounding. Therefore, proposed projects and project

costs assume that existing overhead utility poles will be relocated to new pole locations when they conflict with the proposed improvements, rather than be undergrounded.

Landscape and Urban Design

Community Input on Urban Design Issues

Preserving the Character of the Roadway

Surveys conducted early in the planning process indicate that safety and improved traffic efficiency are more important considerations to a majority of respondents than preservation of the existing character of the roadway. Similarly, the expressed need for a neighborhood "gateway" element was low in comparison to other project objectives for pedestrian, bicycle and vehicle safety. The high visual quality of Juanita Drive means that there is less need for urban design elements such as extensive roadside tree planting, special paving treatments or other elements such as gateway signs or banners. But because of the ample amount of mature vegetation along the corridor, it is recommended to added a gray tint to curb and sidewalk concrete, to avoid the noticeable contrast that white concrete would create. It is also recommended that views across the Inglewood Golf Course be preserved from the roadway as much as possible as this is an asset to the corridor.

Figure 6.2 – Inglewood Golf Club

More Planting versus Narrower Roadway

When presented with a choice between a narrower overall roadway and the addition of a planter strip between the curb and the sidewalk, the consensus of public meeting attendees

was to forego the planter strip. Narrowing the overall roadway footprint means less potential impact to trees and landscaping along the roadway, making the best use of the mature vegetation along the corridor, as opposed to introducing more roadway landscaping.

Proposed Landscaping

The recommended alternative proposes several sections of landscaped median where the two-way left-turn lane has little value, and as a measure for reducing accidents on the corridor by controlling the location of left turns and encouraging speed limit compliance. Proposed landscape treatments would include plantings in raised medians for those portions of the roadway, and limited landscaping behind the sidewalks due to right-of-way limitations. In general, the aesthetic quality of the roadway landscape will be dependent on the surrounding natural vegetation and residential property landscaping.

Widening the roadway cross-section to include a planter strip would impact more mature trees along the road right-of-way and would result in an overall greater aesthetic impact. Some otherwise unused right-of-way may be available for landscaping in the Rhododendron Park area. Several attendees at the second community meeting specifically requested that any "unused" right-of-way be landscaped. The area along Rhododendron Park and south could be planted in rhododendrons as a way of bringing the park out to the street.

Landscaping in raised medians and roadside planter strips can be difficult to maintain because of traffic and worker safety. Plantings in these areas should therefore have low maintenance requirements, unless there are particular aesthetic requirements for higher maintenance seasonal plantings such as the area adjacent to Rhododendron Park.

Generally, native plants should be used for roadway landscaping to both preserve the rural character of the roadway and to reduce maintenance and long term irrigation requirements. The exception to using native plants is the selection of street trees, as most native tree species would not be well-suited for use because of growth habitat and other factors. Aesthetically, the street trees should be selected to blend with the neighborhood's native trees. Examples of street trees that have similar coloring include beech, birch and ash.

Retaining Walls

Because of the challenging topography of the Juanita Drive corridor, retaining walls will be necessary to reduce right-of-way acquisition and neighborhood impacts. Because a geotechnical investigation was not performed as part of this study, only general recommendations can be made regarding retaining walls.

From NE 143rd Street to NE 153rd Place, some fill walls in the range of two to ten feet in height are necessary on the west side of the road, and some cut walls in the range of two to six feet in height are necessary on the east side of the road. From NE 153rd Place to NE 158th Street, continuous fill walls in the range of 4 to 13 feet in height are necessary on the west side of the road, and continuous cut walls in the range of two to ten feet in height are necessary on the east side of the road. From NE 158th Street to the Sammamish River Bridge, retaining walls are generally not needed except in some isolated locations. North of the Sammamish River Bridge, fill walls in the range of two to five feet in height are necessary on both sides of the roadway.

Wall Types

The most feasible retaining wall type at each location will be based on several factors: constructability and construction access, geotechnical conditions, environmental impacts, right-of-way, utilities, aesthetics, and cost.

Some common wall types that can be considered for cut sections include cast-in-place (CIP) cantilevered concrete walls, soldier pile walls, and soil nail walls. These wall types are relatively more expensive than those commonly used in fill areas.

The choice of retaining wall types in fill areas is more varied than those in cut areas. The most common wall types used in fill areas are mechanically stabilized earth (MSE) walls and CIP cantilever concrete walls. Several different types of MSE walls are available in the industry and the most feasible type can be selected during the final design.

Potential Aesthetic Impacts

The Juanita Drive improvements will include fill walls on the west side of the roadway and cut walls on some portions of the east side. Retaining walls on the west side will be primarily visible from the golf course. Retaining walls on the east side will be highly visible from the roadway and from the limited number of residential properties on the west side of the roadway. Without adequate mitigation, retaining walls along Juanita Drive are likely to have a high potential for aesthetic impact, arising from the height and length (scale) of the walls, the material color, texture and public perception of some wall types as appearing more urban.

Figure 6.3 – Possible wall types

Mitigation of the visual impacts of the walls should address scale, color and texture impacts. Where practical, rockeries should be considered for wall construction provided that only rock is used in a continuous wall and not combined with sections of concrete walls. Where concrete walls are used, the brightness of new concrete should be mitigated by integral concrete color or surface concrete stain applications. Similarly, the concrete should be textured so that the surface relief creates shadow lines that reduce the mass of the wall. A sculpted shotcrete finish can also be considered for taller walls to match the look of natural rock used in rockeries.

Additional mitigation of potential visual impacts from retaining walls can be employed in a cost effective manner by the use of vines planted at the base of the walls or trailing plants planted at the tops of the walls, provided that non-invasive species are used. Patterned concrete textures such as board forms and fractured fin, or rustication, may be employed to further reduce the perceived scale of the walls, or to enhance vine growth on the wall fascia. Self-adhering vines such as Parthenocissus and Hydrangea are recommended. Climbing vines may also be used where cables or mesh are attached to the wall surface. Caution should be used in selecting any cable or mesh system that is attractive for people to climb.

Bridges

Proposed Bridge Modifications for Non-motorized Traffic

One of the main objectives of this study was to evaluate the feasibility to improve the non-motorized traffic in the corridor, including bicycle and pedestrian safety on the bridges. The current sidewalk is five feet wide on each side, separated from vehicular traffic by a concrete barrier. Bicycles commonly share the sidewalk over the bridge with pedestrians, but in such a narrow space, conflicts between pedestrians and bicycles are likely.

After reviewing the available information on the age and condition of the bridges, it was decided that adding width to the bridges appeared feasible, but only if the traffic barrier was kept on the existing portion of the bridges. If the barrier is moved onto the new width, it is unlikely that the existing structures can support the moment loads created by the barrier and potential errant vehicles. Therefore, it is proposed that the bicycles be kept on the sidewalk over the bridges but given a wider space of ten feet.

The existing concrete sidewalk will need to be removed and the new wider concrete sidewalk cantilevered from the existing bridge girders. The existing concrete barrier between the roadway and sidewalk will need to be replaced with a similar type barrier. A narrower base barrier is recommended to gain some width on the bridge. Along the exterior edge of sidewalks, a safety railing will be placed to provide safety for the pedestrians and cyclists. The proposed bridge section is shown in Figure 6.4.

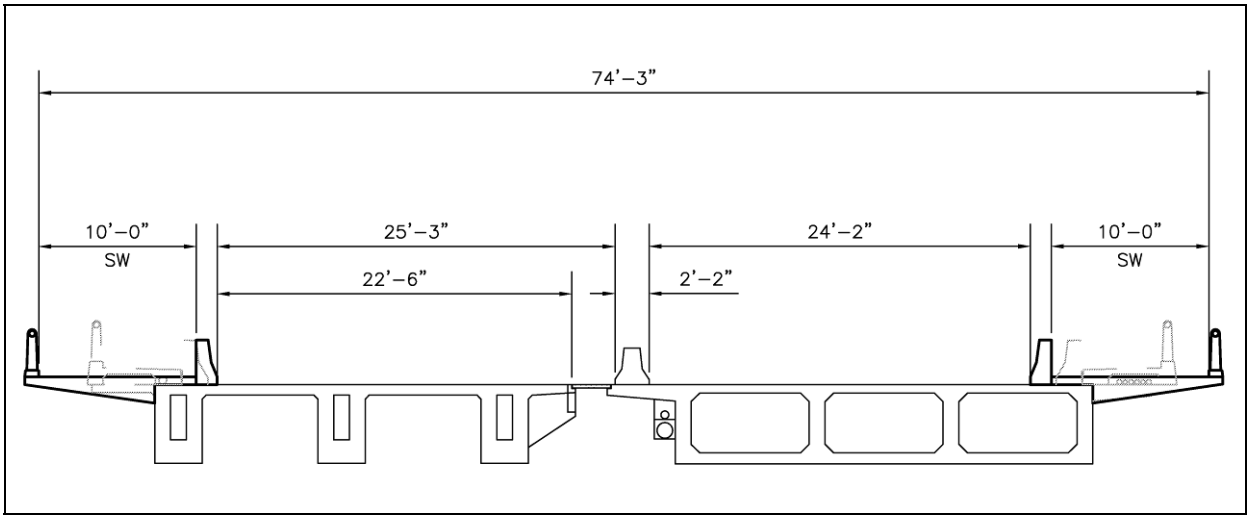

Figure 6.4 – Proposed Bridge Section

For the widening of the proposed sidewalk, the preliminary level construction cost is estimated at approximately $1.5 million per bridge (East and West).

Bridge Replacement

While the East Bridge can be expected to satisfactorily serve its purpose for another three to four decades, the West Bridge is likely within a few years of the end of its useful life. When replaced, the West Bridge should be replaced with a new concrete structure similar in length (approximately 600 feet long) and with one additional traffic lane. At that time it can be evaluated whether the bicyclist should be kept on the sidewalk or separated into a separate lane on the roadway pavement. With a combined width of ten feet for sidewalk and

bicyclists, the new bridge would be approximately 48 feet wide. A planning level cost estimate, including design, construction, and construction administration, is estimated at $14 to $20 million.

The new bridge will provide a great opportunity to improve not only the bridge structural and functional deficiency, but also the hydraulics of Sammamish River by reducing the number of the piers in the water. The new bridge could also help correct the current "kink" in the horizontal alignment. In addition, a new bridge provides an opportunity to provide a gateway-type structure to the City of Kenmore, if desired.

The recommend alternative consists of the following:

East Kenmore Bridge (No. 1071AE)

- The existing five-foot sidewalk will be removed and replaced with a ten-foot wide concrete sidewalk cantilevered from the existing bridge girders.
- The existing concrete barrier separating between the roadway and sidewalk will be replaced with a similar but narrower base section, if available.
- The exterior edge of the new sidewalk will be protected with a pedestrian safety railing.

West Kenmore Bridge (No. 1071AW)

- It is recommended that the City start planning for the replacement of the West Bridge in the next ten years as it reaches the end of its useful life.
- Rather than improving a structure that is due for replacement, it is recommended that the west sidewalk not be widened, unless it is later determined that the bridge re-construction will not occur in the foreseeable future.

Permitting

If the proposed improvements to Juanita Drive include bridge work in the Sammamish River, or replacement of an existing outfall into the river, a wide variety of permits and environmental documentation would be required at the federal, state, and city levels. These permits are shown in Table 6.2.

Table 6.2
Permits

Agency	Permit
U.S. Army Corps of Engineers	Section 404 and Section 10
U.S. Fish and Wildlife Service	Biological Assessment
Washington Department of Ecology	Section 401 and NPDES

Table 6.2 Permits	
Agency	Permit
Washington Department of Fish and Wildlife	Hydraulic Project Approval
City of Kenmore	SEPA Checklist Shoreline Substantial Development Critical Areas Ordinance Compliance

For other construction work along the corridor that impacts streams and wetlands, there may also be permit requirements. Any construction activities within the ordinary high water of Tributary 08-0222 and the unnamed stream would require a Hydraulic Project Approval permit from the Washington Department of Fish and Wildlife. Impacts to wetlands may require a Section 404 permit from the U.S. Army Corps of Engineers and a Section 401 permit from the Washington Department of Ecology. In addition, these impacts to streams and wetlands may also require City permits.

Right-of-Way Acquisition

As discussed in the Alternatives Description and Evaluation section of this report, King County Road Standards require 84 feet of right-of-way for the minor arterial portion of Juanita Drive and 100 feet of right-of-way for the principal arterial portion of 68th Avenue NE. However, because of budgetary constraints and impact to individual property owners, it is recommended that the City only acquire the minimum amount of right-of-way and easements necessary to complete construction and provide for future maintenance needs. The proposed Right-of-Way limits are shown in Appendix A.

Three levels of acquisition will be necessary for this project. The first level is right-of-way acquisition. This occurs when the City purchases land from individual property owners, which is then dedicated to permanent public use.

The second level is permanent easement acquisition. This occurs when the City purchases the right to permanently use land, for a specific purpose, from individual property owners. For example, the City may purchase a permanent drainage easement from a property owner for the purpose of placing underground drainage pipes on the privately-owned property. The benefits to this shared-use arrangement are reduced cost to the city and continued use of the property by the current owner.

The third level of acquisition is temporary construction easement acquisition. This occurs when the City acquires the right to temporarily use land for construction. Upon completion

of construction, the right to occupy the land would expire. The benefit to this sort of arrangement is a minimal cost, and the ability of the current owner to take full control of his land upon completion of construction, with no imposed conditions.

Under the recommended alternative, approximately 62,000 square feet of right-of-way acquisition and 33,000 square feet of temporary construction easement acquisition are expected. The need for permanent easement acquisitions was not identified under this study. For budgetary purposes, the cost of permanent easement acquisitions has been roughly estimated in the cost of right-of-way acquisition shown in Appendix C.

Special Considerations near the Sammamish River

Special requirements for right-of-way acquisition may exist at and near the Sammamish River for several reasons. First, part of the river itself and the Sammamish River boat launch are owned by Washington State Department of Natural Resources. Another part of the river is owned by King County. If bridge widening requires additional right-of-way over the river, the two governmental agencies will need to be involved.

Additionally, the Sammamish River boat launch area and Rhododendron Park are public parks. From the preliminary Right-of-Way research prepared for this study, it appears that part of the road is located within Rhododendron Park, and additional acquisition may be necessary. Further Right-of-Way research will be needed to determine the actual Right-of-Way line at this location, and it may be settled by the legal principle of prescriptive rights. If the City pursues federal funding for the bridge replacement, it's possible a Section 4(f) evaluation would be necessary to comply with NEPA requirements.

Construction Cost

For the purposes of estimating costs, the corridor has been broken into six phases. With the level of work to-date being very preliminary for the West Bridge replacement and the Lakepointe Connector, costs are represented as a range for these phases. Costs are shown in Table 6.3 and detailed in Appendix C—Cost Estimates.

Based on a construction year of 2010, the estimated cost of construction for all six phases total $54.4 to $66.4 million, including design, contingencies, escalation, and right-of-way acquisition. It should be noted that a portion of the cost of Lakepointe Collector will likely be borne by a developer.

Table 6.3
Preliminary Project Cost Estimates (Updated to 2010 Cost Basis)

South Segment: NE 143rd Street to NE 153rd Place	South Segment: NE 153rd Place to NE 170th Street	North Segment: Phase "A", Sammamish River Bridge to NE 175th Street	North Segment: Phase "B", 170th Street to Sammamish River Bridge	North Segment: Phase "C", Lakepointe Connector	North Segment: Phase "D", West Bridge Span Replacement
$4.6 million	**$11.0 million**	**$3.3 million**	**$6.7 million**	**$15 to $21 million**	**$14 to $20 million**
2,600 feet	5,100 feet	700 feet	2,100 feet	1,300 feet	600 feet
- New three-lane roadway section with landscape islands - Sidewalks (east side only) and bike lanes	- New three-lane roadway section with landscape islands - Sidewalks (east side only) and bike lanes	- Extend northbound right/through lane at NE 175th Street to bridge - Remove Jersey barrier, straighten curves - Sidewalks and bike lanes	- Extend northbound right/through lane at NE 170th Street - Extend southbound right turn lane at NE 170th Street - Add widened sidewalks (cantilevered) on East Bridge span - Remove Jersey barrier, straighten curves - Sidewalks and bike lanes	- Construction of Lake Pointe connector - Burke-Gilman Trail overpass - Dual left-turn lanes onto Lake Pointe (one additional lane on 68th Avenue) - Sidewalks - NE 175th Street becomes right-in/right-out only	- Replace 1938 West Bridge span - Room for one additional travel lane on bridge - Sidewalk and dedicated bike lane

The key pieces in the cost estimate are construction cost, design & permitting costs, construction administration costs, and right-of-way acquisition costs. The construction cost is based on items that have been preliminarily designed and quantified. For example, a drainage system has been preliminarily designed, and a length of pipe has been calculated based on this design. Unit costs have been assigned to construction items that have been quantified. Design & permitting costs are for final detailed design of each phase of construction and associated permitting. Construction administration costs include costs for inspections and design support during construction. Right-of-way acquisition costs cover anticipated costs related to acquiring right-of-way and easements, including payments to property owners and an allowance for condemnation process.

Using 2008 dollars as a base, all costs have been escalated to 2010 dollars to account for inflation. A value of 5% per year has been used for the purposes of this cost estimate, although historical averages have ranged from 1% to 6.5% per year since 1983.

A number of assumptions have been made in order to develop this estimate of probable cost.

Some items, such as traffic control, signing, and temporary water pollution & erosion control, have been estimated based on a percentage of the total construction cost. Percentages are based on the percentages of total construction cost typically found in other projects of a similar type and size.

Unit costs for items such as asphalt, concrete, aggregate, and pipe are based on the prices recently bid by contractors on other projects of a similar type and size.

For some items, such as retaining walls, rule-of-thumb costs based on similar projects, have been used in lieu of a detailed design and quantity takeoff.

Many aspects of the design are preliminary and subject to change based on more detailed analyses.

LIDAR (Light Detection And Ranging) data has been used to aid in the design of walls and in several of the other elements measured for use in the cost estimate. Although LIDAR provides a good, low-cost source of information for planning-level design, the data is not precise.

Section 7—Lakepointe Development

The 50-acre site bounded by SR 522, 68th Avenue NE, the Sammamish River and 65th Avenue NE has long been considered for redevelopment. Designated as the Lakepointe Development, a current proposal would convert the existing industrial uses into a mix of residential, retail, commercial, and office space. Excerpts from the Lakepointe Development Masterplan Submittal have been included in Appendix H. A copy of the full submittal can obtained through the City of Kenmore.

A condition of development would include construction of a new road, Lakepointe Boulevard, between the existing intersection of SR 522 and 65th Avenue NE, and a new intersection with 68th Avenue. The new intersection would be located approximately 300 feet south of the intersection with 175th Street NE, which would be closed or converted to right-in and right-out traffic only.

Lakepointe Boulevard would be developed as a five-lane urban minor arterial, following the 2007 King County Road Design and Construction Standards. The road would consist of an 11-foot lane and a 14-foot lane (to accommodate bicycle traffic) in each direction, with a 12-foot two-way left-turn lane. Because it is located within an urban corridor, the required minimum sidewalk width would be eight feet. The minimum curve radius would be 350 feet, the standard for a 35 mph design speed, with a preferred radius of 380 feet or larger.

If Lakepointe Boulevard is constructed, the expectation is that a large part of the traffic that currently uses the SR 522/68th Avenue NE intersection will use Lakepointe instead. The northbound channelization of 68th Avenue NE at the Lakepointe Boulevard intersection would consist of dual left-turn lanes and two through lanes. Channelization at the intersection of Lakepointe Boulevard and SR 522 would provide one through right lane (onto eastbound SR 522 and northbound 65th Avenue NE) and two left-turn lanes (onto westbound SR 522) in the northbound direction. Channelization at the intersection of Lakepointe Boulevard and 68th Avenue NE would provide one left-turn lane (onto northbound 68th Avenue NE) and two right-turn lanes (onto southbound 68th Avenue NE) in the eastbound direction.

Construction of Lakepointe Boulevard would impact four separate properties. The total area needed for construction, assuming a 100-foot right-of-way width, is approximately three acres. The total area of the four affected parcels, however, is approximately 52 acres, because the footprint of the roadway only affects a small portion of the parcels, two of which are very large.

Because NE 175th Street is the primary access point for several properties, property access for owners affected by this project must be maintained. Previous developers that had considered developing Lakepointe had considered a grade-separated intersection between Lakepointe Boulevard and NE 175th Street along the existing NE 175th Street alignment. A

more cost-effective solution, however, may be to provide an at-grade intersection between these roadways along a re-aligned NE 175th Street.

Because of the difference in grade between SR 522 and the existing Burke-Gilman Trail, as well as the desire to avoid at-grade intersections between this heavily-used bike-hike trail and a proposed arterial roadway, a grade-separated intersection between Lakepointe Boulevard and the Burke-Gilman Trail should be seriously considered. Because of the reduced vertical clearance required of a trail, this would be considerably more affordable than a grade-separated intersection between Lakepointe Boulevard and NE 175th Street. Serious considerations that must be made, however, are the condition of the soils and the elevation of groundwater. The proximity to Lake Washington increases the likelihood that both of these factors could create difficult or costly construction conditions.

The total cost to construct Lakepointe Boulevard could range from $14 million to $20 million, assuming a construction date of 2010. This assumes that the cost of right-of-way acquisition is not excessive. Acquisition of any of the affected parcels in entirety would greatly increase the cost. Problematic soil conditions in the location of the Burke-Gilman Trail grade separation could also drastically increase cost.

While Lakepointe Boulevard does provide benefit to regional and local traffic by reducing congestion on 68th Avenue NE, the best solution to ultimately build this roadway is to work with a developer interested in redeveloping the property and sharing the cost of improvements.

Section 8—Recommended Phasing and Funding Strategy

Funding Sources

The Juanita Drive Corridor improvements can be funded by a variety of sources, including private development and a range of City, State and Federal programs. State and Federal funding programs are typically competitive in nature, and it's important to pursue funding from those sources where the project would be most likely to succeed. The major funding sources and programs are summarized in this section.

Federal

The Puget Sound Regional Council (PSRC) is responsible for distributing federal highway funds through two main programs relevant to this project—Surface Transportation Program (STP) and Congestion Mitigation and Air Quality (CMAQ). The Washington State Department of Transportation (WSDOT) has jurisdiction over four other relevant programs—Highway Bridge Replacement and Rehabilitation Program (HBRRP), Transportation Enhancement Program, Safe Routes to Schools Program and the Pedestrian and Bicycle Safety Program.

STP/CMAQ

The competition for these two programs is linked by PSRC. Improvements to Juanita Drive/68th Avenue NE could compete well for these funds, particularly for improvements in the north end of the corridor. A critical factor in competing for federal funding is the regional significance of both the corridor and the planned improvements. In this regard, the City has two factors in its favor. First, the entire corridor is on the PSRC Metropolitan Transportation System. This means that the corridor is recognized as regionally significant.

A second factor is the inclusion of two projects in the PSRC Destination 2030 project list. One project would add a northbound lane between NE 170th Street and NE 175th Street. The second project would construct a three-lane section with bike lanes and sidewalks between NE 145th Street and NE 175th Street. Both of these projects are designated as "Strategic" by PSRC, which means they have been deemed both necessary and financially feasible.

These funds are authorized by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which expires in 2009. It is expected that funding levels in the reauthorization of SAFETEA-LU will be reduced, due to an anticipated deficit in the Highway Trust Fund.

Bridge Replacement

Federal funding for bridge replacement has been non-existent for the past two years, but is expected to become available again shortly. However, competition for these funds is extreme, and they are generally awarded to projects that replace bridges in dire need of replacement because of structural integrity problems. The two Sammamish River bridges may not score well based on the most recent evaluation of the Bridge Sufficiency Ratings, so although this funding source shouldn't be overlooked, it is unlikely that funding would be awarded in the immediate future.

Transportation Enhancement

The Transportation Enhancement program is a subset of STP that focuses on non-motorized transportation, beautification, historic preservation and mitigation. These funds could be used for the pedestrian and bicycle improvement portions of the Juanita Drive corridor improvements, particularly since the corridor has been identified on the King County Regional Bicycle Route system.

Safe Routes to Schools

This program is designed to make walking or biking to school a viable alternative to being driven. This funding source would be ideal for the portion of the corridor improvements that would construct sidewalks and bicycle lanes near Arrowhead Elementary School.

Pedestrian and Bicycle Safety

This program is broader than the Safe Routes to Schools program, but is closely related. The bicycle lanes and sidewalks would qualify well for this source of funding.

State Funding

The major sources of state funding are administered by the Transportation Improvement Board (TIB). There are three TIB programs that might apply to this corridor—the Urban Arterial Program (UAP), the Urban Corridor Program (UCP), and the Sidewalk Program (SP).

Urban Arterial Program

The UAP focuses primarily on safety, mobility and pavement condition in prioritizing projects. The Juanita Drive corridor, with its history of accidents and fatalities, and the need to add lanes north of the Sammamish River, would qualify well for this program.

Urban Corridor Program

The UCP focuses primarily on mobility, the number of funding partners, and the extent to which the improvements will enhance growth and development. The planned improvements

north of the Sammamish River would score well for this program, especially if it can be shown that the Lakepointe Development is contingent on roadway widening.

Sidewalk Program

The Sidewalk Program focuses on pedestrian safety and access. There are several areas along the corridor that would compete well for these funds, such as near Arrowhead Elementary School and where there are gaps in existing sidewalks.

SR 520 Tolling Mitigation

In 2008, the State Legislature passed Engrossed Substitute House Bill 3096, related to the use of tolls to finance improvements to SR 520. The bill directs the State to evaluate the potential diversion of traffic from SR 520 to other parts of the transportation system, including SR 522 and local roadways. The bill further directs the State to confer with mayors and city councils of jurisdictions along the SR 522 corridor regarding the diversion of traffic to local roads and potential mitigation measures. This suggests that a project that improves capacity at the intersection of Juanita Drive and SR 522 would be a prime candidate for funding, using toll revenues from the SR 520 corridor.

Private Development

The City currently requires proposed developments along the corridor to construct frontage improvements that essentially build one-half of the proposed roadway section (sidewalks, bike lanes and part of a travel lane). This requirement will continue in the future, but there is a relatively limited amount of frontage that hasn't been developed, so this will be a minor source of funding. One exception is the Lakepointe Development. Presumably the City will impose conditions on the proposed development that include realigning NE 175th Street to the south, and constructing additional lanes between NE 170th Street and SR 522. In lieu of constructing these improvements, the developer might be required to contribute a proportionate share to a larger City project.

The City also charges developers a Transportation Impact fee that could be used as part of the local match for various funding sources.

Local Funding

The City of Kenmore allocates approximately $3 million per year to transportation projects. The sources of these funds include the general fund, gas tax revenues, and real estate excise taxes. Some of this funding could be used for the Juanita Drive improvements. The optimum use of the funds would be to leverage various state and federal grant funds that require a local match.

Other Local Funding Sources

It might be possible to garner small amounts of funding from other agencies for specific components of the improvements. For instance, King County Metro might contribute to bus pullouts or shelters, and the Northshore School District might contribute to pedestrian improvements near Arrowhead Elementary School. The total amount of funds from these other local sources wouldn't be large; the primary benefit of their contributions would be to show that the proposed improvements have the support of a broad range of stakeholders.

Potential Phasing and Funding Strategy

North Segment

The 68th Avenue NE section of the corridor, north of NE 170th Street, is the most critical in terms of congestion and safety. Improvements to this section would also be expected to compete well for a variety of funding sources, especially relative to improvements in the rest of the corridor. This section is broken up into the following phases as shown in Figures 8.1 and 8.5.

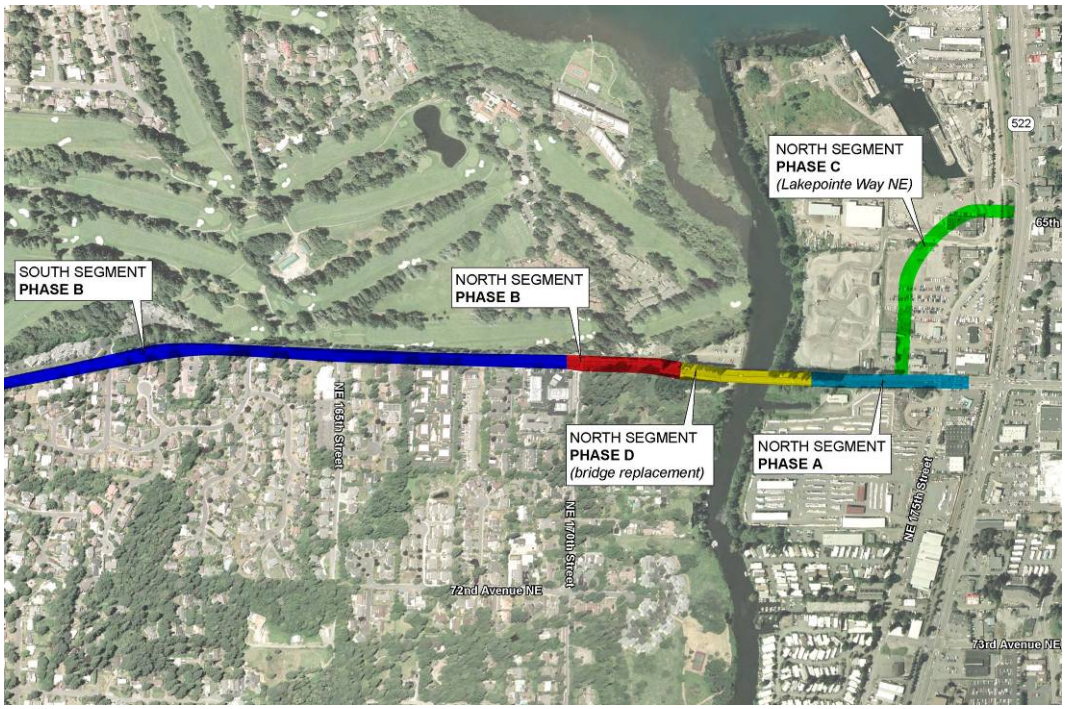

Figure 8.1 Proposed North Segment Phasing

Phase A – Sammamish River Bridge to NE 175th Street

This project would extend the northbound through/right-turn lane at NE 175th Street back to the north abutment of the bridge. It would also eliminate the concrete barrier in the median and re-channelize the existing pavement. See Figure 8.2 for details.

Figure 8.2 Phase A Improvements

Phase B – NE 170th Street to Sammamish River Bridge

This project would improve the channelization at the NE 170th Street intersection (see Figure 8.3). It would also widen the existing sidewalk over the East Bridge to provide adequate width for both pedestrians and bicycles.

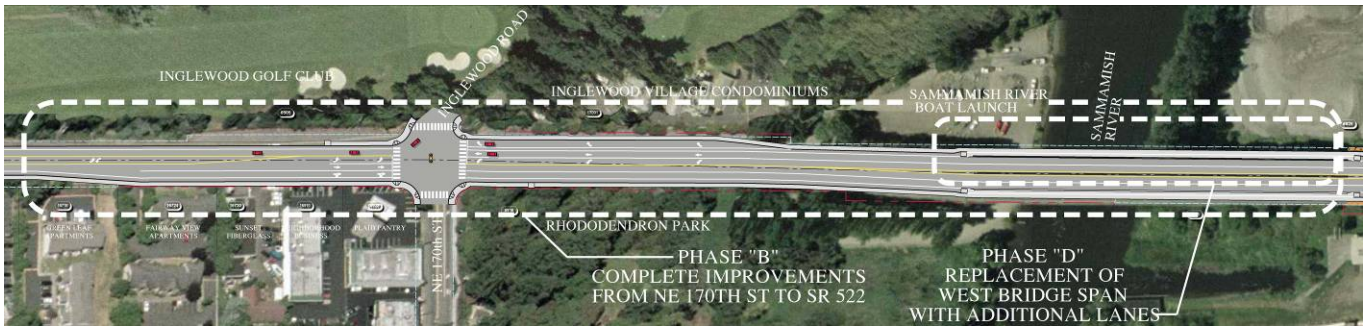

Figure 8.3 Phase B and D Improvements

Phase C – Lakepointe Boulevard

This project would create a new bypass road beginning at a point approximately 500 feet south of the SR 522 intersection and extending west to a realigned intersection at 65th Avenue NE. The realignment would create a four-legged, signalized intersection at SR 522/65th Avenue NE. See Figure 8.4 for the channelization of the new road.

The existing intersection of 68th Avenue NE and NE 175th Street would be restricted to right in-right out operation.

Figure 8.4 Phase C Improvements

Phase D – Sammamish River Bridge Replacement

This project would replace the West Bridge over the Sammamish River with a widened and realigned structure, as delineated in Figure 8.3.

The City should aggressively pursue outside funding for improvements in the North End of the corridor, with applications for TIB funds for Phase A and B submitted in 2008. It is also recommended that the City fully engage with the SR 520 Tolling Implementation Committee and lobby to have improvements to Juanita Drive/68th Avenue NE added to the list of mitigation measures. It is anticipated that the State will allocate funds for mitigation projects in the 2009 legislative session.

The funding cycle for federal STP/CMAQ funds is uncertain at this time, but is a third possibility for this section.

As the condition of the West Bridge worsens over the years, it may become eligible for federal Bridge Replacement funding.

South Segment

The focus of improvements south of NE 170th Street is safety rather than traffic congestion. The types of outside funding appropriate for this section include TIB UAP and Sidewalk

programs, and the federal STP Enhancement program. The planned improvements near Arrowhead Elementary School would qualify for Safe Routes to Schools and other federal safety funding.

Figure 8.5 Proposed South Segment Phasing

The amount of funding available from any of these outside sources is relatively limited. The staging and funding strategy in this section should therefore include these three elements:

- Develop small projects that could be primarily funded by one of the smaller programs.
- Bundle several different funding programs into a package to fund a larger project section.
- Strategically utilize city funds to leverage outside funding.

Examples of projects in this section include the following:

- Construct left-turn channelization at NE 163rd Street Intersection.
- Construct left-turn channelization at NE 155th Place Intersection.
- Fill in sidewalk/bicycle lane gaps – NE 163rd Street to NE 170th Street.
- Fill in sidewalk/bicycle lane gaps – NE 155th Street to NE 158th Street.
- Fill in sidewalk/bicycle lane gaps – NE 160th Street to NE 163rd Street.
- Fill in sidewalk/bicycle lane gaps – NE 158th Street to NE 160th Street.

- Fill in sidewalk/bicycle lane gaps – NE 148th Street to NE 155th Street.
- Fill in sidewalk/bicycle lane gaps – NE 143rd Street to NE 148th Street.

Recommendations for Reduced Budgets

As the work on this report was nearly finished, City staff and Council requested a brief review of phasing recommendations based on reductions to the proposed improvements and phasing that fit funding opportunities. This review concentrated on the south segment and was referred to as the "Skinny Juanita".

South Segment

Generally, improvements would be limited to constructing curb, gutter, and sidewalk only on the east side of the roadway with little or no improvements to the west side of the roadway, and the amount of storm drainage improvements would be reduced. The completed roadway should be wide enough to provide five-foot bicycle lanes on both sides of the roadway. The reduced improvements are shown in Figure 8.6, with possible phasing described below.

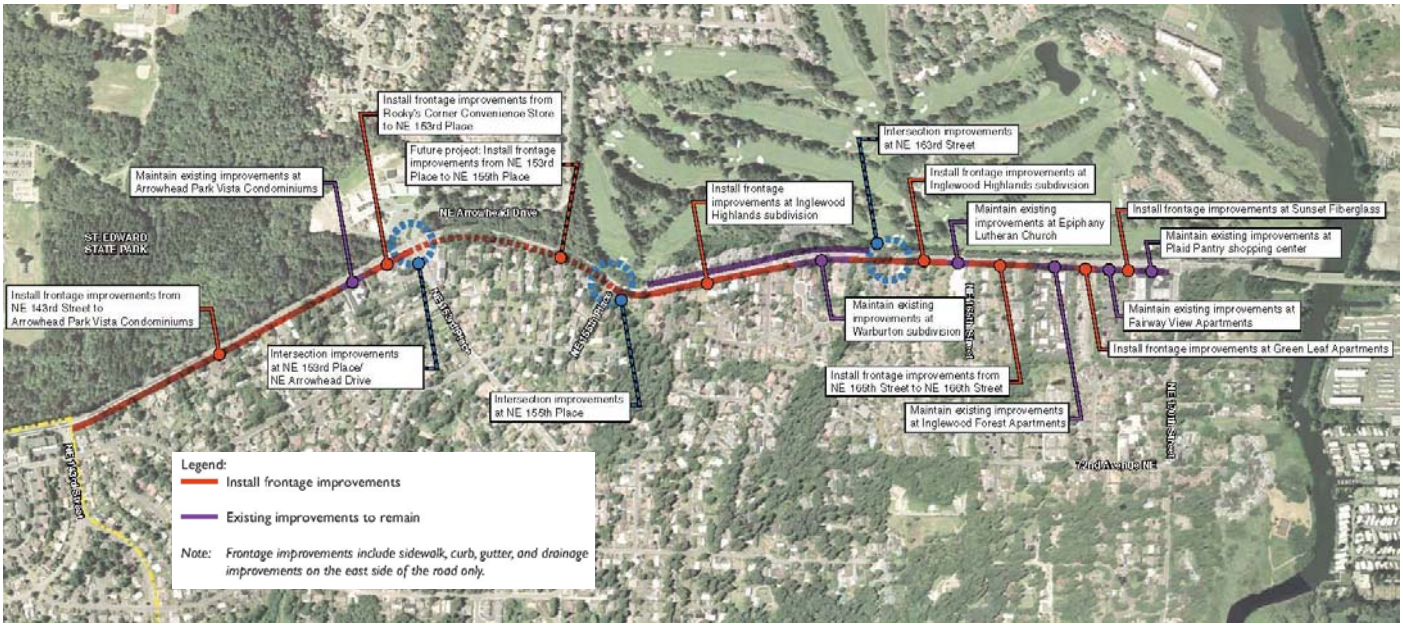

Figure 8.6 Proposed South Segment Phasing – Reduced Improvements

Phase I, NE 155th Place to NE 170th Street, $5.6 Million

- Re-use existing frontage improvements throughout the corridor, and construct connections between these existing improvements to create a continuous sidewalk.

- Maintain existing channelization at the intersection of Juanita Drive and NE 170th Street. Increase the length of the turn lanes to reduce backups at the intersection.
- Install a southbound left turn lane at NE 163rd Street.
- Drainage improvements, included water quality treatment and possibly a detention system, must be constructed.

Phase II, NE 143rd Street to NE 153rd Place/NE Arrowhead Drive, $3.2 Million

- Install sidewalk, curb, gutter, and buried drainage system from NE 143rd Place to NE 155th Place. Re-use existing frontage improvements when possible.
- Maintain existing channelization at the intersection of Juanita Drive and NE 153rd Place. Increase the length of the left turn lane.
- Maintain existing channelization at the Bastyr University entrance. Increase the length of the left turn lane.
- Maintain existing channelization at the intersection of Juanita Drive and NE 143rd Street. Increase the length of the left turn lane.
- Drainage improvements, included water quality treatment and either a detention or dispersion system, must be constructed.

Phase III, NE 153rd Street/NE Arrowhead Drive to NE 155th Place, $1.8 Million

- Install sidewalk, curb, gutter, and buried drainage system from NE 153rd Place to NE 155th Place.
- Install a southbound left turn lane at NE 155th Place.
- Maintain existing channelization at NE 153rd Place. Increase the length of the turn lanes.
- Re-construct and re-align the roadway to correct deficiencies in the horizontal curvature between NE 154th Court and NE 158th Street.
- Detention and water quality treatment may not be necessary.
- This phase includes a significant amount of retaining walls.

The Transportation Element of the 2008 Comprehensive Plan Update included the reduced version of the South Segment projects

Implementation

Once funding has been identified for any of the recommended projects along this corridor, it will be beneficial to begin design early, in particular to pin down right-of-way needs, as the right-of-way acquisition process will have the biggest effect on the project delivery schedule.