

I-5/Bakerview Interchange Value Planning Study Technical Report

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Executive Summary

Improvements are needed to support economic development in the fast growing area of Bellingham surrounding the I-5/Bakerview Road interchange. Our long-term plan calls for a full re-build of the interchange that we cannot afford. We are looking for lower-cost alternatives because new development in the corridor will necessitate improvements and may represent opportunities for implementation.

The Value Planning Study is a technical analysis that builds on the Interstate 5 Master Plan to identify lower-cost options that are consistent with the long-range plan. WSDOT, city of Bellingham, Whatcom County, Whatcom Council of Governments and port of Bellingham staff worked together to assess existing and future conditions and analyze improvement options to support regional development.

The process produced an early design concept –Minor Widening and Restriping—that should be considered and incorporated in future transportation corridor planning. While there are no funds for construction, this early design work is needed to seek funding in the future.

What did we learn?

We were pleased to learn that there is a lower-cost option that will provide congestion relief and multi-modal mobility at the interchange through the year 2030. We can add a dedicated westbound turn lane to the northbound on-ramp,

do minor widening, add a sidewalk on one side and complete other minor improvements to address bottlenecks and improve efficiency to relieve congestion. This option is an efficiency improvement that would increase capacity by 50 percent with minimal change to the roadway footprint.



Recommended improvement:

- Widen Bakerview roadway on the east and west sides of I-5.
- Restripe Bakerview to allow four lanes between Pacific Highway and Bennett Drive.
- Add a right turn pocket (or “slip ramp”) to northbound I-5.
- Add a sidewalk on one side.

These lower-cost improvement can be broken down into more affordable, operationally independent phases. Detailed engineering may reveal additional opportunities to lower construction costs.

Recommended lower-cost option—Minor widening and restriping



Why is the “lower-cost option” so expensive?

The fix isn't cheap – our estimate is \$3.2 million – but it seems very affordable when compared to the long-term plan of re-building the interchange at a cost of \$40 million. The work requires many elements that seem small but add up to relatively big costs:

- Matching the new lane widths on the bridge requires widening on the roadway approaches.
- Retaining walls may be needed to avoid wetland areas.
- Added roadway improvements mean requirements for drainage treatment.
- Wider intersections may require moving signal poles, loops and other infrastructure.

What's next?

WSDOT, the city and the port all have a stake and we must cooperate to successfully implement improvements.

- The project will be incorporated into local, regional and statewide plans.
- The port of Bellingham has committed to make some improvements as part of the second phase of its Airport Master Plan development.
- Traffic studies completed as part of development proposals and annexation requests for areas west of the interchange will build upon value planning study (VPS) findings and address contributions to the cost of recommended improvements.

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What is a Value Planning Study?

We have numerous highway locations and corridors in need of analysis. While budget limitations and increasing responsibilities limit our ability to complete detailed plans for these corridors, it's important to get the work done because:

- Addressing deficiencies is a basic part of our highway system planning responsibilities;
- Private development presents potential opportunities for funding;
- Local agencies are moving ahead with plans for the state highways and it is critical that WSDOT participate and contribute the state's perspective;
- This analysis is an important tool we can use to respond to constituent concerns.

Although there is no funding currently available for improvements, the Value Planning Study provides a blueprint for local jurisdictions and legislators as they determine funding for future projects and it will position participating agencies to take advantage of project construction partnerships. This analysis also provides us with an opportunity to share information about potential improvements with members of the public. In the future, if funding becomes available, there will be opportunities for community members to get involved and provide comment.

Chapter 1: Introduction

Congestion at the I-5/Bakerview Road interchange in Bellingham is a problem today and it will continue in the future. Congestion on Bakerview clogs local streets and business access, and occasionally backs up on the I-5 ramp into mainline traffic. Because the interchange serves the airport and important industrial, retail and commercial centers, congestion affects international travel and trade, and may impede future development.

WSDOT's 2008 *Interstate 5 Master Plan: Fairhaven to Slater* recommends construction of a single-point urban interchange at I-5/Bakerview to address growth in traffic volumes anticipated by 2035. At a cost of \$40 million or more, that project is unaffordable. Additional cooperative effort was needed to identify smaller projects, scaled to more realistic funding levels, that could be completed as short- and mid-term solutions and still provide significant benefits.

Purpose of the VPS

While there is no funding for improvements, the purpose of the VPS is to identify lower-cost building blocks that will keep the interchange moving as growth occurs so we can:

- Respond to new development and increasing traffic volumes
- Evaluate development proposals
- Identify risks that will affect design and construction of projects
- Develop a reliable footprint and cost estimate
- Guide future projects as funding becomes available
- Coordinate interim improvements with long-term plans to avoid tear-out.

How did we do it?

The VPS is a cooperative, staff-level effort of WSDOT, WCOG, city of Bellingham, Whatcom County and the Port of Bellingham. Our work included a planning-level traffic analysis, risk analysis, conceptual design and preliminary cost estimate.



What you'll find in this report:

- Corridor profile
- Transportation needs
- Evaluation of improvement options
- Recommendations
- Implementation strategy

Chapter 2: Corridor Profile

The I-5/Bakerview Road interchange is located within the city of Bellingham incorporated limits. Bakerview Road begins approximately 0.2 mi. west of I-5, and continues east where it intersects with Northwest Avenue, SR 539-Guide Meridian, and Hannegan Road where it transitions into Dewey Road. Bakerview Road is proposed to continue and connect to SR 542 -Mount Baker Highway in the future.



Existing transportation features

- There is a single lane in each direction across the bridge, with a left turn lane for westbound traffic headed to southbound I-5.
- The interchange is part of an important freight route, serving vehicles traveling from I-5 to commercial and industrial areas via Bakerview.
- Whatcom Transit Authority provides service along Bakerview, continuing its regional connections on I-5.
- Sidewalk and bike lanes are provided in some areas, but there are significant gaps. There is no sidewalk on the overpass.

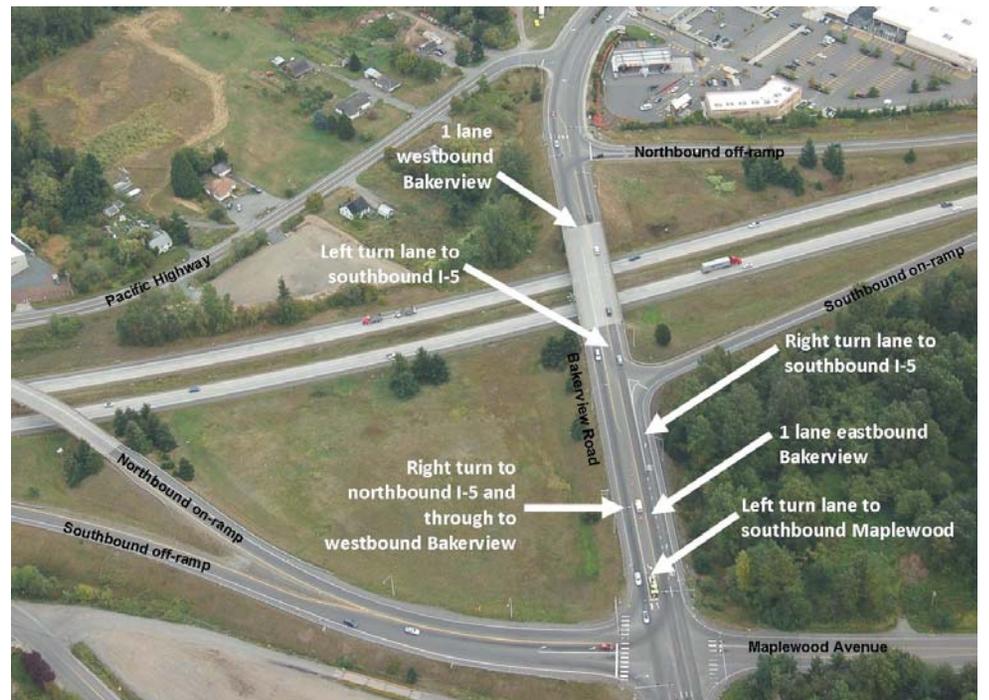
This network provides access to rapidly growing industrial and commercial areas:

Airport: The interchange serves Bellingham International Airport and its industrial and commercial properties to the northwest. This is a local, regional and international destination. The airport estimates that at least half of the passengers flying out of Bellingham are from Canada.

Shopping District: The interchange serves retail and commercial areas to the east and southeast at Cordata and Bellis Fair. Again this traffic is local, regional and international. A local retailer's recent survey revealed



Bakerview Road, looking east. Traffic backups extend across the I-5 bridge as cars wait in a single lane to turn right to the northbound on-ramp or go through the intersection.



There is a single lane in each direction across the bridge, with a left turn lane for westbound traffic headed to southbound I-5.

that 22 percent of customers were from British Columbia.

Recent projects

- 2010: The city and WSDOT adjusted signal timing throughout the corridor to improve travel times.
- 2000: WSDOT widened the I-5/Bakerview northbound off-ramp and made other minor improvements.

Future changes in transportation and land use likely to affect the interchange:

- Whatcom County population will grow from about 180,000 residents today to approximately 270,000 residents by the year 2035. While this is a countywide estimate, the Bellingham urban growth area surrounding the interchange draws in trips due to its regionally significant commercial and employment center activity. This corridor will see impacts from this population increase.
- Bellingham's urban growth area has been designated for dense commercial, industrial and residential growth and will serve as a major regional employment center.
- Without dramatic changes in travel behavior, vehicle miles traveled (VMT) are projected to increase substantially. The Puget Sound Regional Council estimates that VMT will increase up to 30 percent over

Why is the northbound on-ramp on the west side of the interchange?

While not conventional, or desirable given current circumstances, there is a very good reason why the northbound on-ramp to I-5 is on the west (or 'wrong') side of the freeway. When the interchange was designed and constructed in the 1960's and 1970's, it was with the intent of closing the Northwest Avenue interchange and having West Maplewood serve as the conduit to I-5 for northbound traffic leaving Bellingham. A glimpse at an aerial photo of northwest Bellingham (see below) shows how this scheme may have worked if things had gone as planned, but they did not. In the late 1980's the Jerry Chambers site was annexed to the City and a decision was made to keep the Northwest Avenue interchange open despite the fact that it did not meet FHWA interchange spacing requirements. In addition, the city, Birchwood Neighborhood, and residents became resistant to the idea of West Maplewood becoming the major arterial street leading to the freeway for northbound commuter traffic, although it may function that way in addition to Northwest Avenue.

- Chris Comeau, City of Bellingham



When the interchange was designed and constructed in the 1960's and 1970's, it was with the intent of having West Maplewood serve as the conduit to Interstate 5 for northbound traffic leaving Bellingham.

the next 30 years in the Puget Sound area. It is Bellingham's plan that the Bakerview areas will be densely developed so it can support other transportation options such as walking, biking and transit, alleviating the need for so many single-occupancy vehicle trips.

- Airport expansion is underway, implementing the port's 20 year expansion plan. The first phase of construction will roughly double the amount of seating in the pre lobby area from 250 seats to 500 seats. This will lead to the next \$26 million expansion phase that will triple the 30,000 square foot terminal over the next five years.



Several development projects have been proposed in the vicinity of the I-5/Bakerview Interchange. Many more are expected in the future, particularly if areas proposed for annexation are brought into the city.

Afternoon peak trips generated by this development are anticipated to total 630 in 2020, and approximately 860 by 2030. These will require corridor improvements to minimize impacts on several intersections.

Chapter 3: Transportation Needs

The first step in the corridor pre-design analysis process was to identify needs for the I-5/Bakerview interchange. These are problems that WSDOT must address when planning for improvements because of their relationship to the agency's policies and standards. Five goals set by the legislature and outlined in RCW 47.04.280 guide the state's transportation planning and investments:

1. **Preservation** – To maintain, preserve, and extend the life and utility of prior investments in transportation systems and services.
2. **Safety** – To provide for and improve the safety and security of transportation customers and the transportation system.
3. **Mobility** – To improve the predictable movement of goods and people throughout Washington State.
4. **Environment** – To enhance Washington citizens' quality of life through transportation investments that promote energy conservation, enhance healthy communities, and protect the environment.
5. **Stewardship** – To continuously improve the quality, effectiveness, and efficiency of the transportation system.

These goals guide our identification of future transportation needs for the interchange. While environmental protection and

stewardship are goals that ultimately influence which improvements are recommended, and the importance of preserving the existing system influences funding for maintenance activities, safety and mobility are the key factors we consider in future planning.

Safety

The *Strategic Highway Safety Plan: Target Zero* was developed to identify Washington State's traffic safety needs and to guide investment decisions in order to achieve significant reductions in traffic fatalities and disabling injuries. Using data to drive decision-making, WSDOT identifies the worst locations through an analysis of crash frequency and severity and focuses on strategies for reducing traffic fatalities and disabling injuries as funding becomes available. (More information is available at: <http://www.wsdot.wa.gov/safety/>). The I-5/Bakerview Interchange is not among the worst locations based on crash frequency and severity.

We reviewed five years of collision data (January 2005 to December 2009) to assess conditions at the I-5/Bakerview Interchange. Collisions occurring on the I-5 mainline were not incorporated in this analysis. Of the total number of collisions recorded, 63 percent resulted in property damage only (PDO) and 78 percent were rear-end collisions. These patterns are typical in congested corridors.

Mobility

Managing traffic congestion at this interchange is important for economic development in the area. *Level-of-service (LOS)* analysis is a measure of delay that helps us assess congestion and understand how efficiently the highway is serving its users. We performed that analysis for the interchange both under existing conditions and into the future.

Our analysis drew upon several sources, including the city's comprehensive plan, the Whatcom Council of Governments' regional travel demand model, WSDOT's Interstate 5 Master Plan and a traffic impact analysis completed by port of Bellingham for its Airport Master Plan Traffic Impact Analysis.

What did we learn? The traffic analysis reveals level-of-service deficiencies at each of the intersections in the corridor, both under existing conditions and in the future.

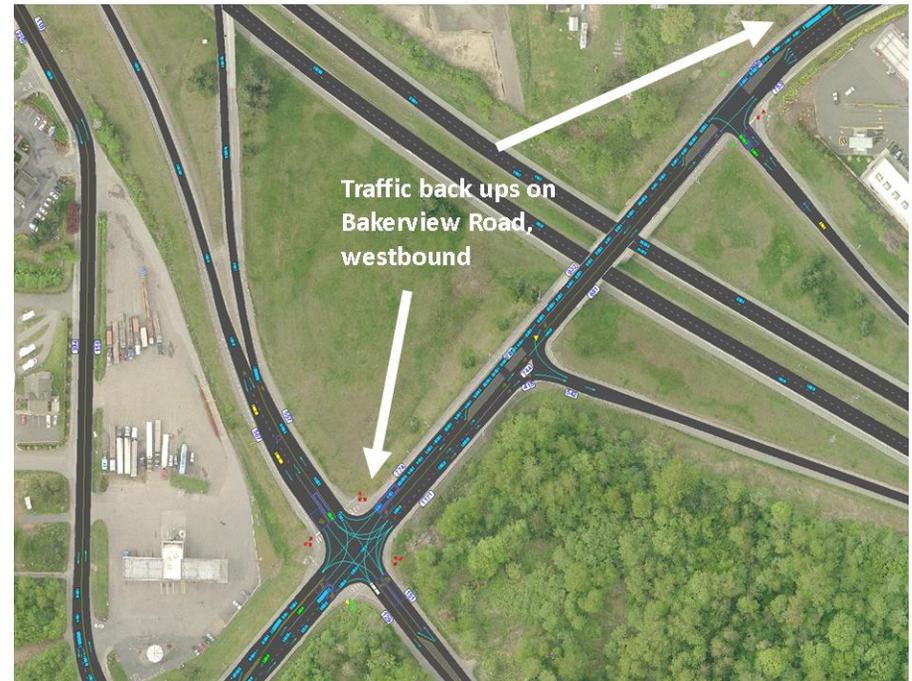
- We are already experiencing congestion at the northbound off-ramp and other intersections in the corridor.



Traffic backups often extend from the northbound on-ramp across I-5 and east of the interchange.



Several intersections at the interchange are already congested, and are expected to worsen without improvements. Locations in red fall below adopted level-of-service.



This image taken from our traffic microsimulation model shows long backups of vehicles headed westbound cross I-5 to the northbound on-ramp. Backups extend into adjacent intersections, creating delays throughout the corridor.

- Congestion at the intersections creates long backups that extend into adjacent intersections during peak periods.
- The corridor will see an increase in traffic as land east and west of the interchange develops for commercial and industrial uses. This will cause level-of-service failures at all three ramp terminals and the Northwest Avenue intersection by 2020.
- By 2035, congestion at the interstate ramp terminals will spill back onto I-5, causing mainline travel speeds to drop and a risk of high speed rear-end collisions.

Public transportation: Local comprehensive plans identify a need to work with Whatcom Transit Authority and other entities to improve access to the regional transit system in this area.

Bicycles and pedestrians: Facilities that provide for safe and efficient movement of bicycles and pedestrians are limited on Bakerview Road near the I-5 interchange. Local comprehensive plans have designated that multi-modal options will be part of the concurrency evaluation, and are needed as part of the congestion solution. The city has designated Bakerview Road and Northwest Avenue as multi-modal corridors.

Large vehicles and freight traffic: A substantial number of large and oversize vehicles regularly use this designated truck

route. Local comprehensive plans call for enhancing this truck route to serve expected freight travel. These must be considered when choosing a design vehicle and determining corresponding geometric features of highway improvements.



Pedestrians crossing I-5 on Bakerview Road use the shoulder because the overpass lacks sidewalks.

Local transportation connections: Bellingham’s comprehensive plan identifies a need for improved local network connections. Improvements to city streets may cost less and provide great benefit to the state highway by increasing surface arterial connectivity and mobility choices. For example, the Interstate Master Plan found that east of the interchange, a realignment of Pacific Highway to meet the signalized intersection at Fred Meyer could provide some benefit.



A substantial number of large and oversize vehicles regularly use this designated truck route.

Chapter 4: Evaluating the options

Chapter 3 describes a number of transportation needs for the I-5/Bakerview Road interchange, particularly congested conditions that impede travel and may stifle future development. We identified several concepts to address these needs, and tested them for their effectiveness for traffic operations. We used that analysis in our comparative evaluation of the improvement concepts and to develop a final recommendation.

Long-range plans

Without the additional analysis completed as part of this value planning study, our choices for addressing congestion were limited to doing nothing or pursuing the long-range plan to replace the existing interchange. These two options represent the extremes. Our mission as part of this effort was to identify lower-cost alternatives that would provide congestion relief.

“No build”: This is the status quo scenario – it assumes the existing transportation features will be in place in the year 2030 with no improvements. The “no build” option serves as our baseline scenario, and provides a basis of comparison for the improvement concepts.

Long-range plan: Single-point urban interchange (SPUI)

The 2008 *Interstate 5 Master Plan: Fairhaven to Slater* recommends construction of SPUIs at several I-5 interchanges in Bellingham, including the I-5/Bakerview

Interchange. A single point urban interchange (SPUI) is a compact interchange designed for maximizing traffic flow with a minimum of right of way. The on-ramps and exit ramps converge at a single location and are controlled by one set of traffic signals in the center of the interchange. A SPUI improves safety and reduces vehicle conflicts. It also increases the efficiency and capacity of the interchange to handle high volumes of traffic, and reduces dangerous backups onto the interstate.

Construction of a SPUI at this location is not affordable—our preliminary estimates suggest that the project could cost \$40 million.

Lower-cost, interim improvement options

We identified several lower-cost, interim improvement options and conducted a preliminary evaluation that included a comparison to the no-build scenario, a preliminary assessment



Long-range plans call for a new interchange at I-5/Bakerview.

of challenges and opportunities for design and construction, and an estimated cost range. We evaluated how they would operate in the year 2030.

Our initial review considered six improvement options:

- ☑ Option 1: Minor widening and striping
- ☑ Option 2: New northbound on-ramp
- ☒ Option 3: Roundabouts at ramp intersections
- ☑ Option 4: Additional lane over I-5
- ☒ Option 5: Re-align Pacific Highway to tie into Bakerview Road/I-5 northbound off-ramp
- ☒ Option 6: Diverging Diamond Interchange

Key findings:

- The two improvement options that increase capacity on the bridge over I-5 provide the greatest reduction in queues and delay on Bakerview.
- The effectiveness of roundabouts (Option 3) are limited by two key factors:
 - The high number of left turns at the Bakerview/I-5 southbound off-ramp/I-5 northbound on-ramp/Maplewood intersection
 - The close proximity of intersections in the corridor.

- The intersection of Bakerview and Pacific Highway shows a poor level of service in the no-build scenario as well as with each of the improvement options. However, it is important to note that the poor level-of-service is driven entirely by the few vehicles making the left turn from Pacific Highway onto Bakerview. Through traffic on Bakerview operates very well.
- Restriping of the bridge to four lanes (Option 1) appears to provide a great deal of benefit, addressing bottlenecks causing delays for westbound traffic. The addition of a new northbound on-ramp (Option 2) further reduces delays and queues, while the addition of a new structure on the bridge (Option 4) resolves the remaining bottlenecks causing delays for eastbound traffic. The question is whether the incremental benefit provided by options 2 and 4 are justified by the additional expense of constructing those improvements.
- Physical space on the overpass is a limitation in every scenario. There is room for a sidewalk on one side, but not enough room for a separated bike lane.

This preliminary evaluation helped narrow our focus to three concepts for more detailed analysis.

- Option 1: Minor widening and restriping
- Option 2: New northbound on-ramp
- Option 4: Additional lane over I-5

Option 1: Minor widening and restriping, \$3.2 million

This option involves minor widening to restripe Bakerview Road to four lanes between the Bakerview/Northwest Avenue intersection and the Bakerview/Bennett Drive intersection (to include the I-5/Bakerview Bridge). This improvement option will include a 6-foot wide sidewalk on the north side of Bakerview Road, although there is not enough physical space on the overpass for a separated bike lane. The analysis also adds a westbound right-turn pocket (or “slip ramp”) located at the I-5 ramps/Bakerview Road/Maplewood Avenue intersection. The improvement will require minor widening on each of the bridge approaches with associated drainage treatment and possible retaining walls.

Comparison to the 2030 no-build scenario:

- There are significant reductions in queues and delay for westbound traffic.
- The addition of a sidewalk on one side improves safety for pedestrians.
- I-5 ramps operate about the same. However, this option provides

greater flexibility for signal timing adjustments that could help reduce the queue on the southbound off-ramp and for westbound traffic.

- Long queues and delays for eastbound traffic remain.

Challenges and Opportunities

- This option would reduce the travel lanes from 12 feet to 11 feet wide. This change may reduce driver comfort and could reduce travel speeds during non-congested periods.
- Design standards require a shoulder width of 4 feet. A justification of the reduced 2 foot shoulder over the bridge will be required.
- It is possible to match the new striping to the existing Bakerview Road alignment on either side of the bridge.
- This is a relatively low-cost installation requiring little to no structural work and relatively minor widening and striping changes.



Option 2: New northbound on-ramp, \$7 million

This option would construct a new northbound on-ramp on the east side of I-5 between Bakerview Road and the existing northbound on-ramp. The proposed on-ramp configuration would be routed beneath the existing northbound on-ramp structure while maintaining standards and minimum clearances. The analysis assumes that Option 1 improvements are in place.

Comparison to the 2030 no-build scenario:

- There are significant reductions in queues and delay for westbound traffic.
- The I-5 northbound off-ramp operates about the same.
- Delay and queues on the southbound off-ramp are reduced.
- Long queues and delays for eastbound traffic remain.
- The addition of a sidewalk on one side improves safety for pedestrians, but limited physical space does not allow for a separated bike lane.

Challenges and Opportunities

- An existing stream is in the vicinity of the potential new ramp. There is potential that impacts to this stream or the drainage facilities located within the proposed work area may result in environmental impacts, requiring additional permits and possible mitigation measures.

- Changes would likely increase impervious surface, thereby requiring improvements to stormwater treatment.
- Neighboring parcels may be affected by the improvement. This would require right of way acquisition. Additionally, future development in this area could greatly increase cost and complicate design and construction.
- A large amount of fill material will be necessary to construct the on-ramp.
- A deviation would be needed for a 6-foot shoulder width (8 feet is standard) along the new ramp. Reduced shoulder width is needed to avoid an existing pier.
- Owners of the parcels located on the northeast quadrant of the existing structure are currently seeking permits for a new motel/office/convention complex. The right



of way necessary for this element may not be available or the value elevated due to development.

Option 4: Additional lane over I-5, \$7.7 million

This improvement would extend a westbound right-turn pocket across I-5 via a cantilevered structure (or new structure) alongside the existing I-5/Bakerview Bridge, providing an additional lane for the full width of the interchange. This option assumes that Option 1 improvements are in place.

Comparison to the 2030 no-build scenario:

- There are significant reductions in queues for westbound traffic.
- There are significant reductions in queues and delay for eastbound traffic.
- The I-5 northbound off-ramp operates about the same.
- Delay and queues on the southbound off-ramp are reduced.
- The addition of a sidewalk on one side improves safety for pedestrians, but limited physical space does not allow for a separated bike lane.

Challenges and Opportunities

- Retrofit or construction of a new structure is costly, and construction of a structure over the interstate increases the complexity of design and construction.

- To support a cantilevered structure, the existing structure would require a large amount of reinforcement and significant reconstruction.



- Incorporation of a pedestrian/bicycle facility may be required at additional cost (expanded structure width, right of way, materials etc.).

Comparative evaluation

Our initial evaluation compared each improvement option to our “no build” scenario. The next step was to compare the options to one another.

Option 1 provides:

- Adds a westbound through lane, reducing westbound backups and adds storage.
- Adds a right turn pocket for northbound on-ramp, which adds westbound storage, reducing westbound backups.
- Adds a sidewalk on one side to improve safety for pedestrians.
- No change to eastbound operations, so the eastbound bottleneck at I-5 southbound off-ramp remains.

Option 2 provides:

- All option 1 benefits.
- Relocation of right-turns from the existing northbound on-ramp to the east side of I-5 reduces westbound demand on the bridge.
- Flexibility for added lane across existing bridge, added lane can be either a westbound or an eastbound through lane.

- Complicates existing northbound off-ramp intersection by adding a fourth leg and additional traffic to already-congested intersection.

Option 4 provides:

- All option 1 benefits.
- Adds an eastbound through lane which reduces eastbound delay and backups.

Benefits, by location	Option 1	Option 1 + Option 2	Option 1 + Option 4
	Widen / Re-Chan	New NB On-Ramp	New WB Bridge
	(\$3.2 M.)	(\$7.0 M.)	(\$7.7 M.)
	Benefits	Added Benefits	Added Benefits
CORRIDOR	Adds WB thru-lane Increase WB capacity Reduce WB delays Adds sidewalk	Flexibility to substitute Option 1 WB lane for an EB lane over the existing bridge resulting in removal of the EB bottleneck.	Adds EB lane Adds EB capacity Reduces EB delay
BENNETT DR.	Increase WB capacity Increase WB storage		
MAPLEWOOD AVE.	Increase WB capacity Increase WB storage	Relocates WB RT-turn demand to new ramp. This reduces overall demand on this intersection.	
I-5 SB ON-RAMP			Adds EB capacity
EXIST. STRUCTURE	Increase WB capacity	Flexibility for EB <u>or</u> WB lane over existing structure. If WB demand is reduced enough, the EB lane may be favored which in turn would remove the existing EB bottleneck.	Adds EB capacity
I-5 NB OFF-RAMP	Increase WB capacity	Allows free right turn for WB vehicles getting onto the freeway.	Adds EB capacity
PACIFIC HWY	Reduce Pacific Hwy. right turn delay by allowing more storage on the mainline.		

WB = westbound, EB = eastbound

Disadvantages by location	Option 1	Option 1 + Option 2	Option 1 + Option 4
	Widen / Re-Chan (\$3.2 M.)	New NB On-Ramp (\$7.0 M.)	New WB Bridge (\$7.7 M.)
	Operational Disadvantages	Operational Disadvantages	Operational Disadvantages
CORRIDOR	No change to EB operations. Physical space does not allow for a separated bike lane on the overpass.		
BENNETT DR.		No benefit	
MAPLEWOOD AVE.			May produce lane change conflicts near approach and departure from structure. Resulting in a risk of increased sideswipe collisions in this area.
I-5 SB ON-RAMP	EB bottleneck remains.	No benefit	
EXIST. STRUCTURE	No change to EB operations.		
I-5 NB OFF-RAMP		Creates a four-leg intersection/signal.	
PACIFIC HWY	Adds additional crossing lane for the left turn movement from Pacific Hwy.	Close proximity to Pac. Hwy intersection may result in longer delays associated with Pacific Hwy approach.	

Chapter 5: Recommendations

Completion of Option 1 improvements helps address existing bottlenecks to improve efficiency and relieve congestion at the interchange. Such changes are needed to support economic development in the area. Adding a northbound on-ramp on the east side of the interchange (Option 2), and widening the bridge to add additional capacity (Option 4), represent an additional cost of \$4 million and \$5 million respectively. These improvements would provide some additional benefit over the lowest-cost option, but not enough to justify the substantial additional expense.

Recommendation: Proceed with Option 1

Option 1 provides significant benefit for low cost, especially as compared to long-term improvements recommended in the Interstate 5 Master Plan. It has three operationally independent phases that allow for incremental improvement as funding becomes available.

Why are the Option 1 “minor improvements” so expensive?

The work requires many elements that seem small but add up to relatively big costs:

- ✓ Matching the new lane widths on the bridge requires widening on the approaches.
- ✓ Fill and retaining walls may be required to avoid sensitive areas.
- ✓ New improvements mean requirements for drainage treatment.
- ✓ Wider intersections require moving signal poles, loops and other infrastructure.

While these costs are substantial, they are definitely “low-cost” when compared to the \$40 million long-term improvements recommended in the Interstate 5 Master Plan.

Recommended lower-cost improvements:

Phase 1: \$1.0 Million

Construction of the right turn pocket (or “slip ramp”) located at the Maplewood/Bakerview intersection. Construction would include full build out of the road prism to the north side, necessary to facilitate the additional through lane. One third of the drainage treatment facilities cost, likely to be necessary for the Option 1 build-out, have been included.

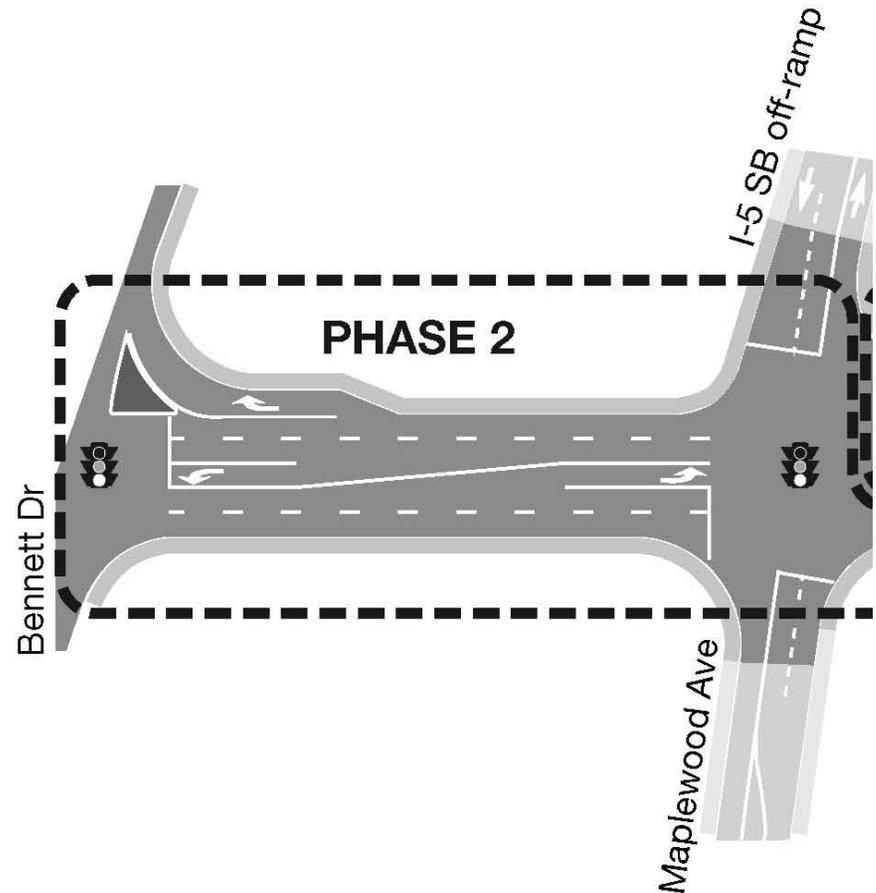
Phase 2: \$1.3 Million

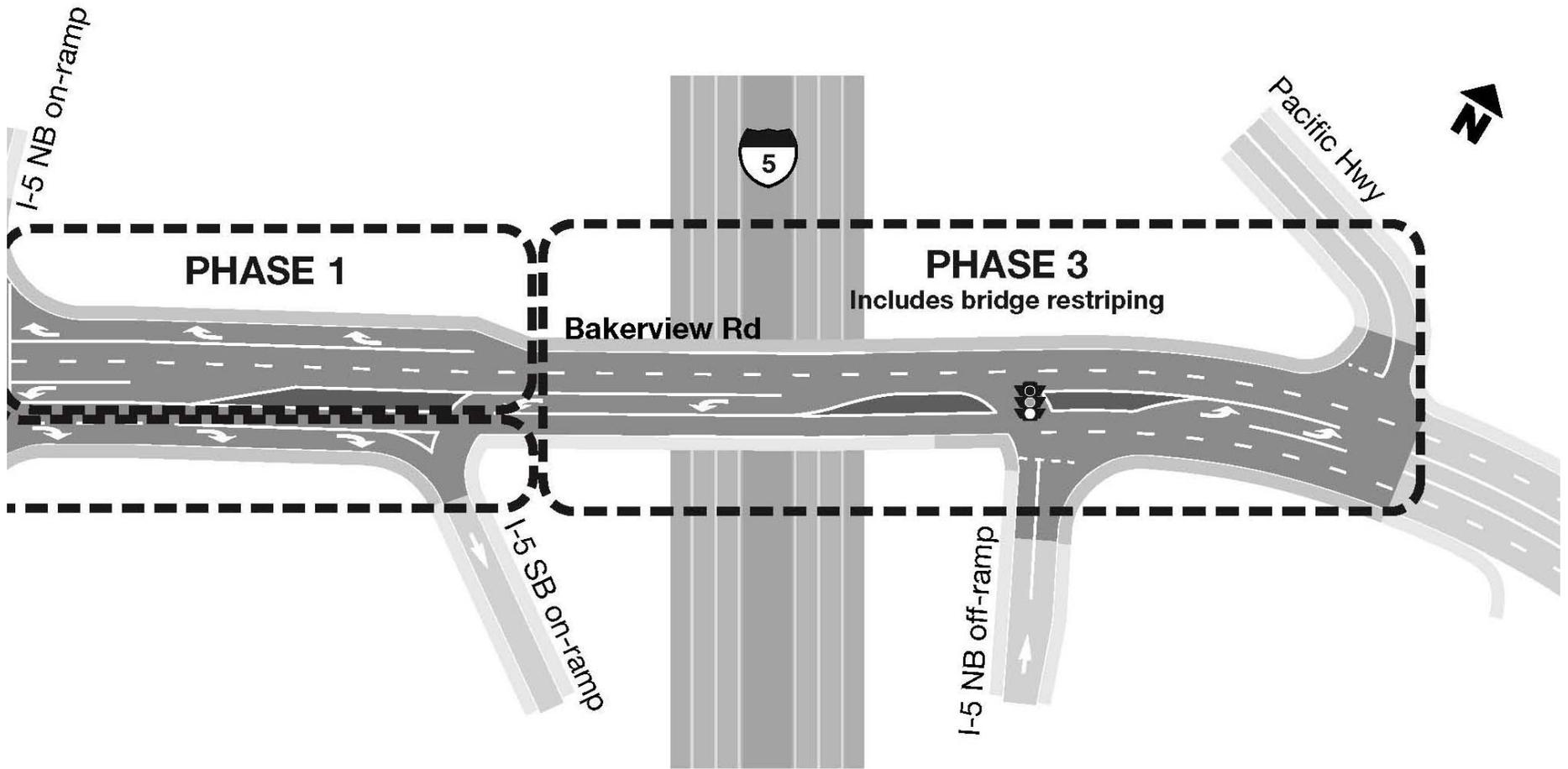
Widening of the existing roadway prism and construction of the remaining through lanes (limited to the west side of I-5 only) between the Bakerview bridge and the Bennett Drive intersection. One third of the drainage treatment facilities cost, likely to be necessary for the Option 1 build-out, has been included.

Phase 3: \$0.9 Million

Widening of the existing roadway prism and completion of the proposed through lanes (limited to the east side of I-5 only) between the Bakerview bridge and the Fred Meyer intersection. One third of the drainage treatment facilities cost, likely to be necessary for the Option 1 build-out, have been included.

Note: These are preliminary estimates of project costs based on initial planning analysis. Detailed engineering may reveal opportunities to reduce construction costs.





Challenges for design and construction

- Proposed widening is likely to impact sensitive areas. Wetlands were documented in this area during a 2006 investigation performed by WSDOT.
- The anticipated impervious surface addition is expected to exceed 5,000 square feet. Additional treatment, such as construction of a pond or vault, will likely be required, with associated right of way needs.
- Future development is proposed within the proposed project vicinity. Some new construction may ultimately occupy property needed for the proposed project.
- Earthwork/fill is necessary to expand the roadway prism to fit new lanes. Fill quantities may vary from planning level estimate as the planning phase is typically a cursory look at existing conditions and grades.
- East side widening to the north may require purchasing approx. 3,000 square feet of right of way. WSDOT may be allowed to purchase a slope easement instead of the right of way.
- Construction of option 1 in phases may require full drainage design and construction of drainage facilities in phase 1, adding those costs up front.

Opportunities for design and construction

- Port of Bellingham has committed to construction of the westbound slip lane located at the I-5 ramps/ Bakerview Road/Maplewood Avenue intersection.
- The project can be divided into three individual phases. The estimate of total project cost is slightly higher with the phasing strategy. The difference is due to reduced efficiency associated with dividing the project and timing.

Chapter 6: Implementation Strategy

Roles and responsibilities

WSDOT, city of Bellingham, Whatcom Council of Governments, Whatcom County and port of Bellingham partnered in this analysis and development of the recommended improvements. These agencies will have a role in any future improvement of the corridor.

Developer-funded improvements:

The city of Bellingham and Whatcom County are responsible for permitting future development and implementing review under the State Environmental Protection Act (SEPA). WSDOT participates in the process by reviewing and commenting on traffic impact analysis reports provided by developers. Together, the city, county and WSDOT work with developers to identify improvements that will mitigate their impacts on the highway.

What are WSDOT's requirements? At the time of the notice of application being published, WSDOT will request that a traffic study be prepared for the project to discuss potential impacts from the proposed development on the state highway system. In addition, the study will also need to discuss and calculate pro-rata share contribution to mitigate impacts to the recommended I-5/Bakerview Road Interchange project as described in the value planning study. The formula

that will be used to calculate this contribution will be the project cost times the percent of new traffic the development will be adding to the location of the project¹.

State and federally-funded improvements:

The Washington State Legislature ultimately determines how state highway funds are distributed for projects across the state. Federal funds are divided: some are dispersed to the state for distribution to projects; some are dispersed to regional planning organizations for distribution as grants for local agencies; and some are reserved for dispersal to specific projects. These funds are focused on safety and mobility needs, rather than on any enhancements that may be desired.

As a cabinet agency that reports to the governor, WSDOT identifies projects through the Highway System Plan process and relies on direction from the governor and legislature to allocate state and federal funds. The state prioritizes projects based on the legislature's policy goals of preservation, safety, mobility, environment and stewardship. In managing congestion, the aim is to first maintain, preserve and improve the operating efficiency of the existing highway system before adding capacity.

1. The basic formula to calculate the pro-rata share contribution is as follows: $TMP = (A/B) \times C$ where:
TMP = Traffic Mitigation Payment; A= Total proposal generated PM peak-hour trips both directions on project.; B= applicable maximum service flow rate for all through lanes both directions for ideal conditions; C= WSDOT project cost (including design, right-of-way, and construction).

Action plan

1. Identify the project, at an estimated cost of \$3.2 million, as part of state, regional and local transportation plans:
 - WSDOT Highway System Plan
 - Bellingham Six-Year Transportation Improvement Program
 - County Transportation Improvement Program
 - Whatcom Regional Transportation Plan
2. Port of Bellingham committed to mitigation as part of its airport master plan. The Port will implement this mitigation to accommodate planned expansion.
3. Value Planning Study findings will be incorporated into future development proposals and annexation requests.
4. Pursue funding opportunities
5. Address long-term needs in long-range planning: incorporate Interstate 5 Master Plan recommendations into the city's transportation element.

We drew upon several prior studies to complete the VPS, including the city comprehensive plan, WCOG's regional travel demand model, the Interstate 5 Master Plan and traffic impact analysis completed by Port of Bellingham for its airport master plan. Future analyses should reference this VPS.

Chapter 7: Conclusion

The VPS resulted in a positive outcome – there is a lower-cost option that would help relieve congestion and improve multi-modal mobility in order to support economic development. The project cost, while significantly lower than what would be required for a full re-build of the interchange, is still considerable. None of the public agency partners involved in the project has funding available for design engineering and construction. However, the collaboration for the VPS is a good model for what we'll need to do to secure funding in the future.

Although there is no funding currently available for improvements, the Value Planning Study provides a blueprint for local jurisdictions and legislators as they determine funding for future projects and it will position participating agencies to take advantage of project construction partnerships. This analysis also provides us with an opportunity to share information about potential improvements with members of the public. As this work is reviewed and incorporated into local, regional and state plans, there will be opportunities for community members to be involved and provide comment.

Appendix A: Technical Reports

- Background Data Collection
- Expectations, Requirements and Constraints
- Improvement Concepts Analysis
- Micro-simulation Analysis
- Pre-Design Technical Report
- Implementation Policy Strategies
- Implementation Plan Summary Report

Appendix B: Presentation Materials

- Workshop 1 – August 12, 2010
- Workshop 2 – September 23, 2010
- Workshop 3 – February 15, 2011

Appendix C: References

- WSDOT Design Manual, M22-01. July 2010.
- WSDOT Plans Preparation Manual, M22-31.01 Nov. 2008
- WSDOT Standard Plans, M21-01. April 6 2010.
- WSDOT Risk Management Plan (RMP) - Modeling Spreadsheet.
- WSDOT Mobility Project Prioritization Process Benefit/Cost Software
- WSDOT Collision data, Jan. 2005 – Dec. 2009, I-5, MP 257.33 to 258.40
- WSDOT GIS GeoCatalog (GIS Workbench)