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Washington State Department of Transportation

I-5 JBLM Vicinity Interchange Report and Environmental Documentation: Phase 1 – Corridor Plan Feasibility Study

Photo credit: The Olympian

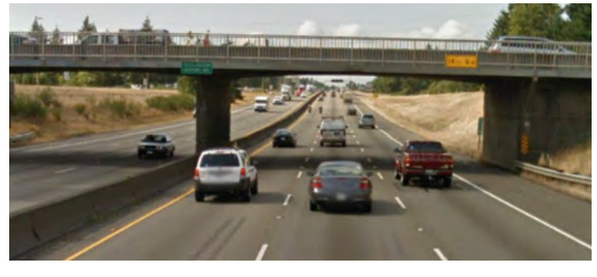


Photo credit: PSRC

Study Origins

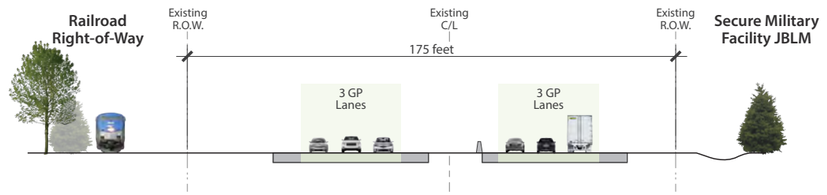
In 2012 WSDOT began to prepare the studies and analysis necessary to identify the causes and potential solutions to chronic congestion on I-5 in the vicinity of Joint Base Lewis-McChord (JBLM) from the Steilacoom-DuPont interchange (Exit 119) to the Thorne Lane interchange (Exit 123). These studies are known as Interchange Justification Reports (IJRs) and are necessary for any access revisions to the interstate system.

Phase 1 developed a framework plan to define a vision for the I-5 corridor through JBLM. This is a critical first step because there is not currently a plan that addresses the future capacity needs on this section of I-5. The framework plan identifies options for the number and type of lanes on the mainline through the study area so that new interchange configurations can be designed to allow for freeway capacity improvements. Phase 1 focused on creating a plan to provide transitional flexibility for the mainline because interchange bridges typically have a lifespan of 75 years – so constructing spans to accommodate the long term freeway widening avoids the need for costly reconstruction of the bridges.

Six mainline lane configuration options were developed and tested to determine which performed best in 2040 across a variety of criteria including speed, hours of congestion, person throughput, friction relief, environmental impacts and cost. In addition, concepts for improvements at four interchanges were identified and pared down to the two or three concepts with the best potential to handle future traffic volumes.

Physical Constraints

I-5 is partially located on roadway easement from the Department of Defense in the study area. The existing easement/right-of-way is generally about 175 feet wide. There are a number of physical constraints within and adjacent to the right-of-way that limit the operational effectiveness of I-5. Overpass bridges at Thorne Lane, Berkeley Street and Steilacoom-DuPont Road were constructed in the 1950s with narrow spans that prevent freeway widening and constrain local cross-freeway traffic mobility. Additionally, a railroad corridor paralleling the southbound lanes prohibits widening toward the rail line.



Causes of Congestion

A number of characteristics unique to the study area contribute to chronic congestion:

Population Growth. Population in the region has increased dramatically. Interstate 5 was last widened in 1975. Since then, population has increased 93 percent in Pierce County and 228 percent in Thurston County. The City of DuPont has also grown dramatically, and so have Lakewood and Steilacoom. Additionally, JBLM has become a strategic military base with over 56,000 employees. The steady increase in traffic from growth is shown on the figure below.

Limited Alternate Routes. The presence of secure military bases on both sides of I-5 (JBLM and Camp Murray) severely restricts possible parallel routes to the freeway. Alternate routes require circuitious detours with drive times equal or greater to waiting in congestion on I-5.

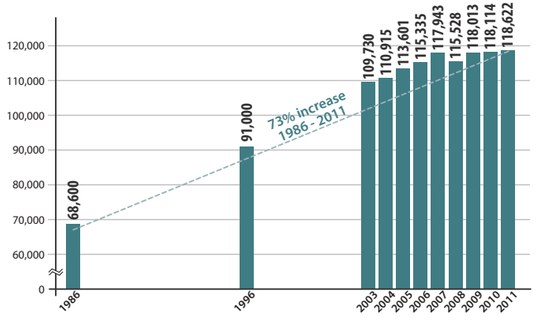
Thorne Lane Choke Point. At Thorne Lane, the number of lanes on I-5 transitions from four to three in each direction. This creates a choke point where southbound traffic merges into three lanes. Northbound, the slowest speeds are experienced south of Thorne Lane. Speeds increase where I -5 widens to four lanes north of Thorne Lane.

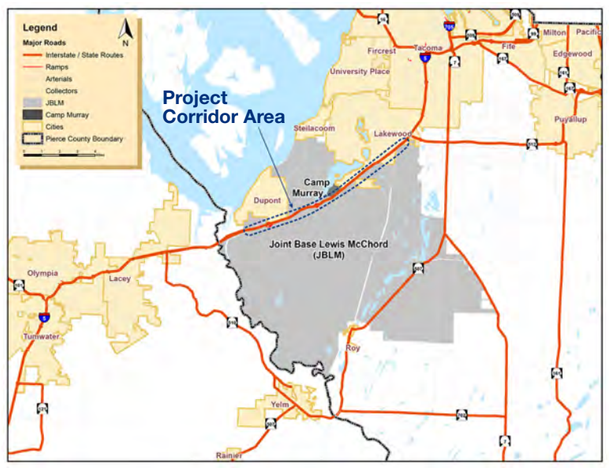
Heavy Merge and Weave Activity Northbound. Between Steilacoom-DuPont Road and Thorne Lane, over 3,650 cars enter the freeway during the PM peak hour. This number of cars represents over 50% of the through lane capacity in the area. The large number of vehicles entering the outside lane causes traffic to slow, increases congestion, and increases the likelihood of collisions.

Mix of Local and Through Trips. Approximately 50% of the peak period traffic is starting outside the study area and travelling through. The other 50% starts from or is going to destinations within the study area. This percentage of trips starting/ending in the study area is much higher than average. The resulting heavy volume of ramp traffic leads to frequent lane change, slows speeds, and increases congestion.

Heavy Volumes of Short Trips. The limited number of local roads passing in and through the secure JBLM installation encourages drivers to use I-5 for local trips. These short trips add to the overall congestion and safety problems experienced in the corridor.

Average Daily Traffic Volume 1986-2011, I-5 at DuPont.





The project team worked with a diverse stakeholder group to identify and screen the options. Stakeholder participants included:

WSDOT

FHWA

JBLM

Camp Murray

City of Lakewood

Town of Steilacoom

City of Lacey

City of DuPont

Pierce County

Pierce Transit

Intercity Transit

TRPC

PSRC

Nisqually Tribe

Sound Transit

South Sound Military and Communities Partnership

Study recommendations and next steps

The purpose of Phase 1 is to address chronic congestion on I-5 at JBLM by developing scenarios to define the type and number of lanes in the future, and by identifying concepts for rebuilding four interchanges in the study area. These I-5 scenarios and interchange concepts will be analyzed in Phase 2 to select preferred improvements. The following are recommendations resulting from the Phase 1 work and next steps to be completed during Phase 2.

Recommendations

Advance I-5 Mainline Scenarios 3 and 4

These two scenarios perform best when considering congestion relief, environmental impacts, and cost. The best combination of managed lanes/HOV lanes, general purpose lanes, collector/distributor lanes, and auxiliary lanes will be identified in Phase 2. The following key issues will guide the development of solutions

- **Invest in Multimodal Improvements.** Multimodal improvements will yield substantial benefits for congestion relief, travel time reliability, and transportation choices. Managed lanes, improved transit service, and demand management strategies all play a critical role in achieving cost effective solutions.
- **Reduce Side Friction.** Select mainline and interchange improvements to address heavy entering and exiting traffic at closely spaced interchanges, and their impact to vehicle speeds, congestion, and safety. Use lower cost tools to increase efficiencies (i.e., ramp metering), while strategically adding capacity to accommodate the heavy volume of entering and exiting traffic.
- **Maintain Flexibility.** Maintaining the flexibility for future capacity in the I-5 corridor, even beyond the next 20 years, is part of being efficient and making sound fiscal decisions. Bridges are designed to last 75 years or more. Building new interchanges and bridge structures to accommodate future mobility in the corridor will avoid the need for costly reconstruction in the future.

Advance Concepts for Four Interchanges in the Study Area

The interchange concepts identified in Phase 1 will be further analyzed during Phase 2 to determine which configurations function best at each location. Each configuration will be designed in coordination with the scenario selected for mainline I-5. Final configurations will be selected as part of the Interchange Justification Report and environmental review processes. The final configurations will consider the following key issues:

- **Coordinate with JBLM Gate Operations.** Work in cooperation with officials at Joint Base Lewis-McChord to select interchange configurations that integrate with possible gate modifications and/or relocations. The impacts of gate queuing to the interchange areas and to mainline I-5 will be significantly improved through cooperative and coordinated design of interchanges by WSDOT and gates by JBLM.
- **Look for Local Street Improvements to Reduce I-5 Demand.** Improving local connectivity within the surrounding communities will provide more alternative routes, reduce the amount of short trips on I-5, and reduce demand pressures on I-5. Ideas will be fully considered in Phase 2 for (1) new local roadway connections (i.e., Gravelly – Thorne connector) and (2) better connectivity within JBLM to keep inter-base trips off I-5.

Next steps

Prepare Corridor Level Interchange Justification Report (IJR)

Results of the analysis and findings will be documented in an IJR. These studies are required to justify new or revised ramp configurations on limited access freeways, such as I-5.

Conduct NEPA/SEPA

A more in-depth evaluation of the benefits and consequences to the built and natural environment will be conducted during Phase 2 and used to guide the selection of final mainline and interchange improvements.

Develop an Implementation Strategy

All of the mainline and interchange improvements in the study area cannot be built at the same time. A phasing strategy must be developed to deliver timely beneficial improvements through the corridor. The strategy will include both a list of recommended improvements for inclusion in local, regional, and state plans, as well as a prioritized array of projects to define funding needs in the coming years.

Stakeholder Engagement

Coordination with the Executive Committee and Technical Team will continue through Phase 2. A broader public outreach process will also be conducted to solicit ideas, concerns and comments from the general public.

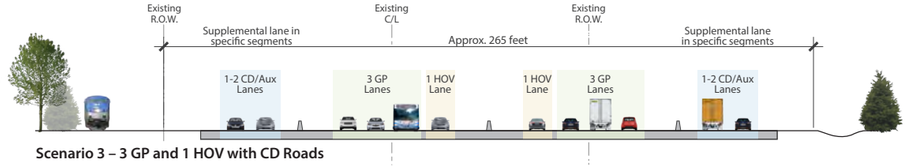
Options for I-5 Mainline

The study team worked with the project stakeholders to develop a series of improvement scenarios for the I-5 mainline through the study area. Six potential lane scenarios were identified and tested to determine their ability to improve traffic operations in the corridor through the year 2040.

The six scenarios used varying combinations of lane types including managed lanes/HOV lanes, general purpose lanes, collector/distributor lanes, and auxiliary lanes.

Of the six scenarios considered, the two that provided the highest performance for vehicle speed, hours of congestion, person throughput, friction/conflict reduction, environmental impact, and cost were selected for further analysis in Phase 2. The cross sections for these two scenarios are shown below:

Scenario 3 includes the addition of one HOV lane each direction with collector/distributor lanes or auxiliary lanes. The table below summarizes the performance of Scenario 3.



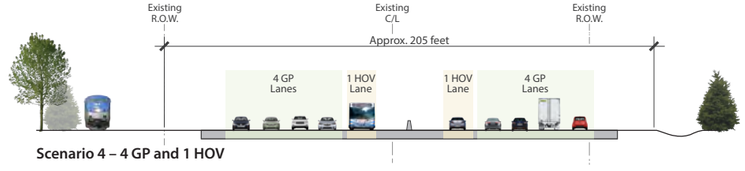
Scenario 3 – 3 GP and 1 HOV with CD Roads

Scenario 3 (2040)

	AM Peak Northbound	AM Peak Southbound	PM Peak Northbound	PM Peak Southbound	Hours of Congestion North-bound*	Hours of Congestion South-bound*
General Purpose Lanes	55 mph	56 mph	39 mph	31 mph	AM: 3 PM: 3	AM: 1 PM: 2
HOV Lane	56 mph	59 mph	53 mph	50 mph	AM: 0 PM: 0	AM: 0 PM: 0

**Hours of congestion noted are for worst performing segment of the scenario.*

Scenario 4 includes the addition of one general purpose lane and one HOV lane in each direction. It does not include collector/distributor lanes or auxilary lanes. The table below summarizes the performance of Scenario 4.



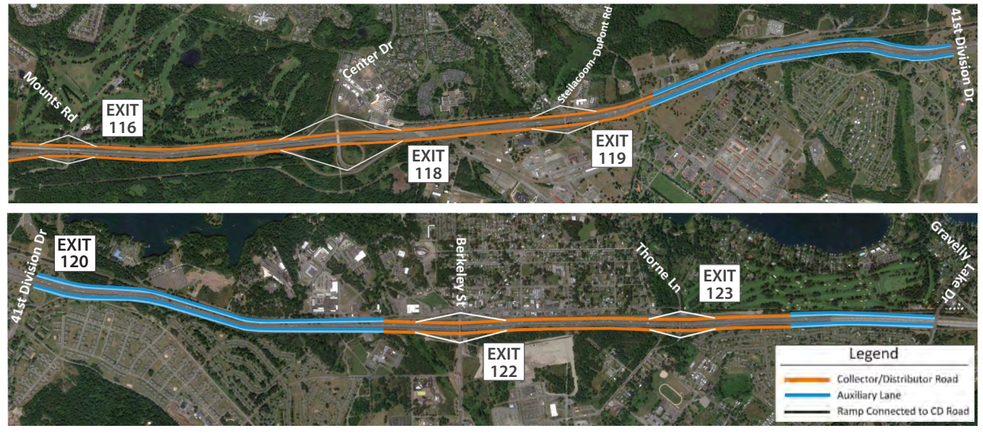
Scenario 4 – 4 GP and 1 HOV

Scenario 4 (2040)

	AM Peak Northbound	AM Peak Southbound	PM Peak Northbound	PM Peak Southbound	Hours of Congestion North-bound*	Hours of Congestion South-bound*
General Purpose Lanes	45 mph	57 mph	53 mph	29 mph	AM: 2 PM: 2	AM: 0 PM: 4
HOV Lane	56 mph	58 mph	52 mph	52 mph	AM: 0 PM: 0	AM: 0 PM: 0

**Hours of congestion noted are for worst performing segment of the scenario.*

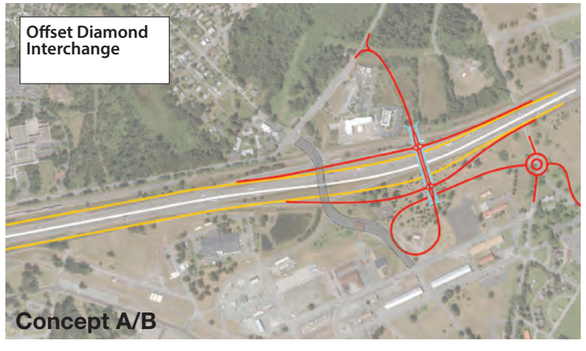
The collector/distributor lanes or auxiliary lanes are being considered where they provide the most operational benefit to mainline I-5. The likely limits of collector/distributor lanes are shown in orange and auxiliary lanes are shown in blue on the figure at right:

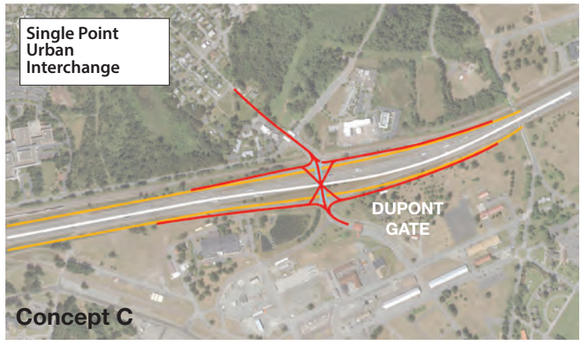


Interchange Concepts

A number of interchange concepts were considered for the four interchanges at the center of the study area. All of the concepts were evaluated to identify their performance with regard to; mobility and operations, environmental factors, and enhanced access and circulation for JBLM. The evaluation identified the two to four concepts at each interchange that offer the best performance. These concepts will be further analyzed in Phase 2 to determine which configuration provides the best performance at each location. The concepts that will be further evaluated in Phase 2 for each interchange location are presented below:

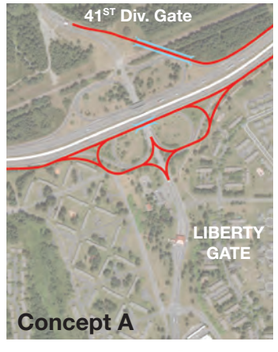
Steilacoom-DuPont Road Interchange Exit 119

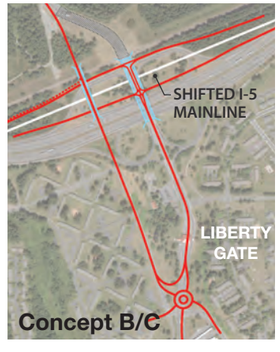


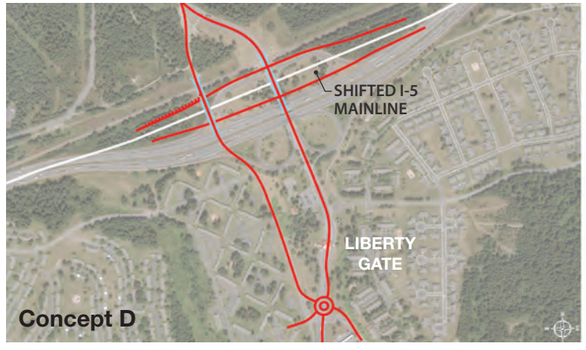


Interchange options include relocating the overpass slightly north with diverging or tight diamond configurations (Concepts A and B), or reconstructing in place in a single point urban interchange configuration (Concept C). Concepts A & B allow for grade separation with the rail line and enhanced operations at Wilmington & Barksdale intersection. Option C has the least right of way impacts, but will be challenging to construct. Concept C does not offer the opportunity to grade separate the rail and maintains close spacing between JBLM gate and the interchange.

41st Division/Main Gate Interchange Exit 120

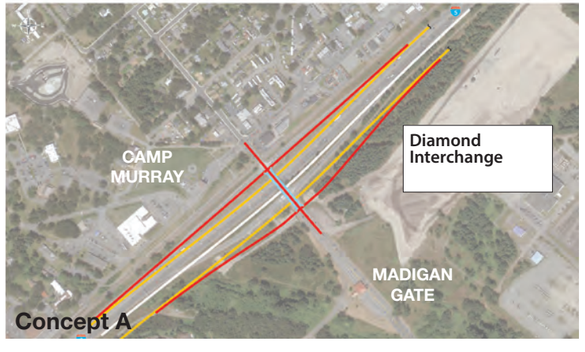


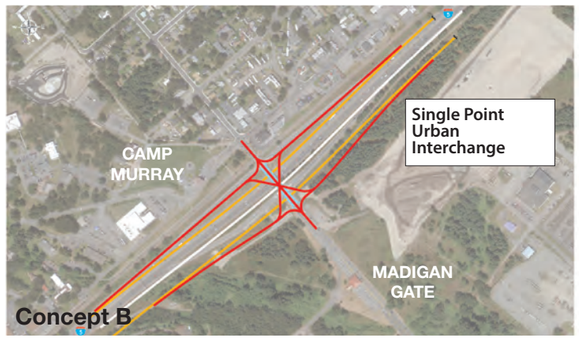




Concept A would adjust the cloverleaf ramps to accommodate the widened mainline, and provide grade separation from the rail line for southbound traffic destined for the North Fort Gate. Concepts B and C would shift the mainline and lower it to grade. The interchange would be a diverging or tight diamond configuration and would cross over the mainline (I-5 currently crosses over 41st Division Drive). A new interbase connector/overpass would provide a secure internal route for JBLM traffic traveling between Lewis Main and Lewis North. Concept D is identical to B &C, except it maintains and grade separates the ramp to the North Fort Gate.

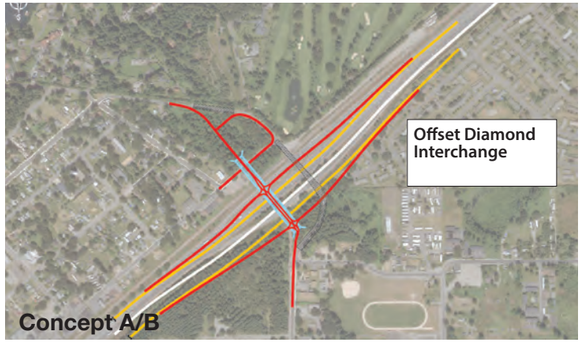
Berkeley Street Interchange Exit 122

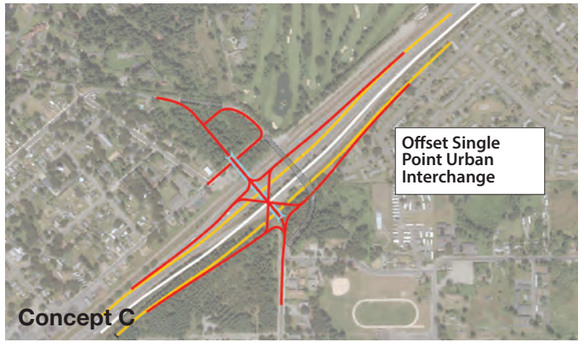




At Berkeley Street the proximity of the Union Street intersection to the interchange precludes grade separating the overpass traffic from the rail line. The existing diamond interchange configuration is maintained in Concept A and Concept B is a single point urban interchange configuration.

Thorne Lane Interchange Exit 123





Concepts A and B would be diverging or tight diamond configurations and Concept C would be a single point urban interchange. Each of the concepts would be constructed just south of the existing interchange at Thorne Lane. All three concepts provide grade separation from the rail line. Due to the height of the overpass structure, a new loop road would provide access to Union Avenue.