MEMORANDUM

Date:	September 3, 2009	**TG:**	08301.00
To:	TRC Members		
From:	Project Team		
Subject:	Level 1 Screening – Draft Results		

This memorandum summarizes the findings of the Level 1 screening results prepared by the project team. The project team is seeking feedback from the Technical Review Committee (TRC) on these screening results to move to the next step of the project. Once comments and feedback from the committee have been addressed, subsequent efforts will then focus on developing improvement concepts for the **four** remaining interchange locations which will be carried forward to the Level 2 screening process to be conducted during September, October, and November.

Background

At the June 25th TRC meeting, the screening methodology and criteria were presented and discussed. The TRC acknowledged the three levels of screening, with the first screening level having the purpose of refining the overall scope of the study area and focusing the analysis on the four most critical interchanges. The second level screening is a fatal flaw analysis of specific improvement concepts, and the third level screening is a more detailed evaluation of the remaining improvement concepts. The end result will be a preferred concept and/or a group of concepts that will be recommended by the project team and the TRC to be carried forward to the next phase of the project. The final phase of the project will largely be determined by the type(s) of improvement concepts that are recommended for further consideration. The screening process previously presented to the TRC is shown in the illustration attached to this memorandum.

The level of detail of the improvement concepts and the criteria used to evaluate each concept increase as part of each subsequent screening level. In other words, the screening levels build upon the previous outcomes and become more refined and detailed to further evaluate the remaining improvement concepts. The improvement concepts that will be considered could include low-cost system efficiency improvements, local arterial improvements, interchange modifications, additional strategic freeway capacity, and concepts or strategies to reduce single occupant vehicle (SOV) demand and better promote the use of alternative modes.

Level 1 Screening Overview ("Identify Area of Focus")

The study area includes a total of nine interchanges, over ten miles of interstate freeway, numerous local arterials, and many military installation gates and access roads. The budget and scope of the study does not allow the project team to develop improvement concepts to address every issue at each interchange in the study area. Therefore, to develop specific improvement concepts that can be carried forward to subsequent phases, it is necessary to identify the locations in the study area with the greatest need of improvements and which are directly related to military operations and/or growth. This allows the project team and the TRC to begin developing specific improvement concepts to address issues for only the areas most impacted by military operations and which have the greatest overall need.

This screening level is not intended to eliminate strategies or higher level concepts that could be applied throughout the study area, such as improved transit service or Intelligent Transportation Systems (ITS) technologies, but rather to reduce the number of geometric improvement concepts that would need to be evaluated at each interchange.

Therefore the first screening level looks exclusively at each of the nine interchanges to identify the **four** interchanges that more closely align with the criteria identified in Table 1.

Table 1. Level 1 Screening Criteria and Quantitative Measurements

Criteria[1]	Measurement Description[2]
Military Impact	- The percentage of future (2030) PM peak hour traffic that is attributed to the military installations. - The total number of future (2030) daily gate volumes that are directly served by the interchange.
Safety Issues	- The number of severe collisions per million vehicle miles travelled from 2002 to 2008. - The number of total collisions per million vehicle miles travelled from 2002 to 2008.
Operational Issues	- The number of existing (2009) interchange ramps, intersections, or adjacent freeway mainlines operating at LOS E or F during the PM peak hour. - The number of interchange ramps or approach legs operating above a volume-to-capacity threshold of 1.0 during the PM peak hour for year 2030.

1. General criteria used in refining the study area.
2. Describes how the criteria were measured.

Level 1 Screening Methodology and Results

Results from the existing conditions analysis were used as a starting point to measure each of the screening criteria. A refined version of Pierce County's travel demand model, specifically focused on the installations and the Cities of Lakewood and DuPont, was prepared to develop estimates of future travel demand. The model forecast year is 2030 and is consistent with all local and regional plans. The forecasts from the model were also used in measuring the screening criteria, specifically the military impact components and the future operational issues. Each interchange was then evaluated against the quantitative measurements described in Table 1. The general process included the following steps:

1. Evaluate each interchange against the quantitative measurements for each criteria;
2. Score each interchange with respect to the measurements;
3. Adjust the weighting of each criteria based on the purpose and need of the study;
4. Compare weighted and non-weighted results, and identify the "area of focus."

Description of the Quantitative Measures

The ranking of the interchanges is based on quantitative measures for each of the screening criteria. **The measures are meant solely to rank each interchange relative to one another and are not intended to identify specific deficiencies or highlight every operational or safety issue at each interchange.** They are measures by which the project team can easily determine and use to identify the interchanges that most closely align with the evaluation criteria highlighted in Table 1. The specific measures are summarized below.

Military Impact – (1) the total number of daily vehicles directly accessing each interchange from an adjacent military access point during the PM peak hour for the year 2030, and (2) the percentage of military traffic at the interchange as a percent of the total volume served during the PM peak hour for the year 2030.

Safety Issues – (1) the number of severe mainline or ramp related collisions per million vehicle miles travelled between the years of 2002 and 2008, and (2) the total number of mainline or ramp related collisions per million vehicle miles travelled between the years of 2002 and 2008. Severe collisions were defined as any involving an injury or fatality.

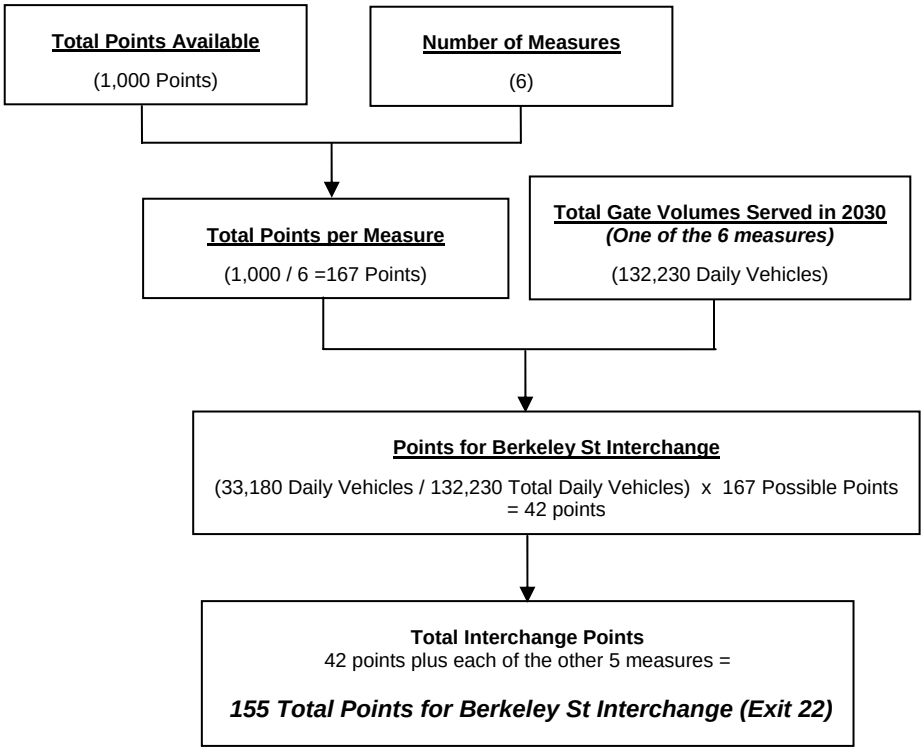
Operational Issues – (1) the number of existing (2009) interchange ramps, intersections, or adjacent freeway mainlines operating at LOS E or F during the

PM peak hour, (2) the number of interchange ramps or approach legs operating above a volume-to-capacity (v/c ratio) threshold of 1.0 during the PM peak hour for year 2030. The v/c ratio is based on raw model volumes and link capacities, and LOS was determined using Highway Capacity Manual methodologies.

How the Interchanges were Scored (Non-Weighted Scenario)

The quantitative measures were summarized for each interchange and used to score the interchange relative to each other. A total of 1,000 points were distributed amongst the measures and individual interchanges. Since there were six measures, a total of 167 points were distributed per measure (1,000 total pts / 6 measures = 167 points). This assumes each measure is weighted equally. Each measure then had a total of 167 points to distribute amongst the nine interchanges. These points were proportionally distributed amongst the interchanges for each individual measure as shown in the example below. *A higher score represents a negative result, indicating the interchange may have existing safety issues, a high military impact, or existing or future operational issues.*

EXAMPLE SCORING FOR ONE MEASURE
(Military Impact: The total number of future daily gate volumes directly served by the interchange)



Once the points were distributed for each measure, the points for each interchange were summed together to calculate a total score. While there are many ways to score the measures, this methodology distributes points to each interchange based on how the interchange ranks relative to one another. This avoids having to identify specific point ranges and values for each measure and keeps the process relatively simple.

Table 2 presents the scoring of each measure for the nine interchanges assuming each measure is weighted the same. A higher score indicates an interchange more directly impacted by the military and in greatest need of improvement.

Table 2. Level 1 Screening Results – Non-Weighted

	Points Assigned[1]							
	Military Impact[2]		Safety Issues[2]		Operational Issues[2]			
Interchange	Total Daily Gate Volumes Served	% of Total Traffic	# of Severe Collisions per MVM	# of Collisions per MVM	# of Approaches LOS E/F	# of Segments with V/C > 1.00	Score[2]	Rank
Exit 116 Mounts Road	0	12	11	12	15	25	**75**	**8th**
Exit 118 Center Drive	1	11	8	9	23	17	**69**	**9th**
Exit 119 DuPont-Steilacoom Rd	19	17	11	13	30	25	**115**	**5th**
Exit 120 41st Division Dr	68	26	13	15	0	42	**164**	**1st**
Exit 122 Berkeley Street	42	25	28	28	15	17	**155**	**2nd**
Exit 123 Thorne Lane	8	23	18	16	30	25	**120**	**3rd**
Exit 124 Gravelly Lake Drive	7	22	15	13	30	8	**95**	**6th**
Exit 125 Bridgeport Way	22	21	34	33	0	8	**118**	**4th**
Exit 127 SR 512	0	10	28	28	23	0	**89**	**7th**
						Total Points	**1,000**	

SHADED: The top four interchanges
1. A higher score indicates an interchange more directly impacted by the military and in greatest need of improvement.
2. See Table 1 for descriptions of criteria and measures.
3. A total of 1,000 points have been distributed to the nine interchanges assuming all criteria are weighted equally.

Applying a Weighting Factor

Although the results presented in Table 2 assume each measure is weighted equally, it is possible to weight each measure based on how closely it aligns with the purpose and need of the study. Typically, the application of a weighting factor will further assist in differentiating the final scores. The project team recommends the TRC review both weighted and non-weighted scoring to understand the differences in the results.

Since the study purpose and need of this project is tied to military growth and impacts, additional weighting was applied to the military impact criteria. In addition, the existing conditions analysis identified that a majority of the collisions in the study area were due to congestion and frequent stop-and-go traffic. Therefore, operational issues were provided more weight because addressing those issues would likely address the safety issues as well. Safety received lower weighting, not because it was less important, but because the operational measures would largely influence safety.

Table 3 summarizes the results of applying weighting factors to the measures and compares the weighted results with the non-weighted rankings. The weighting adjusted the total number of points available to each measure. For example, under the non-weighted scenario, the military impact criteria had 334 total points it could distribute, under the weighted scenario it can distribute 400 total points (or 40% of the 1,000 points available).

Summary of the Rankings

In the end, the weighted and non-weighted rankings are very similar. The top three interchanges are ranked the same under both scenarios and include 41st Division Drive, Berkeley Street, and Thorne Lane. Under the non-weighted scenario, Bridgeport Way is ranked 4th and DuPont-Steilacoom Road is ranked 5th. The rankings for these two interchanges then reverse under the weighted scenario. Below is a general summary of each interchange and its ranking.

<u>Mounts Road – Exit 116</u>
The primary reason this interchange ranks 8th is that it serves a low proportion of military demand. While there are operational issues at the interchange, they are primarily confined to one ramp during the peak periods. Much of the traffic using the interchange is regional in nature because the interchange provides a back-door route to Yelm. A majority of the military personnel living in Yelm use the East gate rather than Mounts Road to travel to and from Fort Lewis.

<u>Center Drive – Exit 118</u>
The screening analysis assumed the Center Drive gate was closed to better reflect the issues and needs at the DuPont-Steilacoom Road interchange. The major reason Fort Lewis opens the Center Drive gate during the PM peak period is due to the fact the DuPont-Steilacoom Road interchange is unable to accommodate the demand. This is one of several reasons why the Center Drive interchange receives the lowest ranking of the nine. The ranking in no way endorses the continuation of utilizing the Center Drive emergency access as a relief valve, but rather acknowledges that it should be a temporary situation, with the permanent solution likely being further improvements at the DuPont-Steilacoom Road interchange.

<u>DuPont-Steilacoom Road – Exit 119</u>
This interchange ranks 4th under the weighted scenario and 5th under the non-weighted scenario. The analysis assumed vehicles using the Center Drive gate would instead exit the DuPont Gate. Therefore the interchange receives a high number of points under the operational issues and military impact criteria. Fort Lewis has plans to improve and reconfigure the DuPont Gate which could also provide an opportunity to consider improvements to the interchange.

Table 3. Level 1 Screening Results – Weighted

	Points Assigned[1]									
	Military Impact[2]		Safety Issues[2]		Operational Issues[2]					
Interchange	Total Daily Gate Volumes Served	% of Total Traffic	# of Severe Collisions per MVM	# of Collisions per MVM	# of Approaches LOS E/F	# of Segments with V/C > 1.00	Weighted		Non-Weighted	
WEIGHTING	**20%**	**20%**	**15%**	**10%**	**15%**	**20%**	**Score[2]**	**Rank**	**Score[2]**	**Rank**
Exit 116 Mounts Road	0	14	10	7	14	30	**75**	**7th**	**75**	**8th**
Exit 118 Center Drive	1	14	7	5	21	20	**68**	**9th**	**69**	**9th**
Exit 119 DuPont-Steilacoom Rd	23	20	10	8	27	30	**118**	**4th**	**115**	**5th**
Exit 120 41st Division Dr	82	32	12	9	0	50	**185**	**1st**	**164**	**1st**
Exit 122 Berkeley Street	50	30	25	17	14	20	**156**	**2nd**	**155**	**2nd**
Exit 123 Thorne Lane	9	27	16	10	27	30	**119**	**3rd**	**120**	**3rd**
Exit 124 Gravelly Lake Drive	9	26	14	8	27	10	**94**	**6th**	**95**	**6th**
Exit 125 Bridgeport Way	26	25	31	20	0	10	**112**	**5th**	**118**	**4th**
Exit 127 SR 512	0	12	25	16	20	0	**73**	**8th**	**89**	**7th**
						Total Points	**1,000**		**1,000**	

SHADED: The top four interchanges
1. A higher score indicates an interchange more directly impacted by the military and in greatest need of improvement.
2. See Table 1 for descriptions of criteria and measures.
3. A total of 1,000 points have been distributed to the nine interchanges assuming based on the weighting factors.

41st Division Drive – Exit 120

This interchange provides access to the main Fort Lewis gate and the North Fort gate. It serves approximately one-third of all military demand. It receives the highest ranking mainly due to the military impact criteria. Since it is forecast to have operational issues in the future, it receives high scores under the operational issues criteria because of its cloverleaf design, which includes eight separate ramps.

Berkeley Street – Exit 122

The Berkeley Street interchange provides primary access to the Madigan Army Medical Center and Camp Murray. It experiences significant congestion throughout the day, with vehicle queuing often observed onto the freeway mainline during the morning commute. It receives high scores for almost every category. There have been a number of collisions involving injuries at or near the interchange, and it has one of the highest collision rates along the corridor. It ranks 2nd under both the weighted and non-weighted scenarios.

Thorne Lane – Exit 123

This interchange will be reconfigured as part of the future Cross-Base Highway. It provides access to both McChord AFB and Fort Lewis, while also serving regional east-west traffic that use the 150th Street corridor. Currently I-5 adds and drops a freeway lane at Thorne Lane often resulting in congestion and back-ups. It scores high in almost every category and ranks 3rd under each scenario. The future model and forecasts assume completion of the Cross-Base Highway in the future. While existing Cross-Base Highway designs would reconfigure this interchange into a proposed single-point urban interchange, this study should consider alternative concepts and possible interim improvements.

Gravelly Lake Drive – Exit 124

The Gravelly Lake Drive interchange ranks 6th under both the weighted and non-weighted scenarios. It scores low in safety and future operational issues. While it provides access to McChord AFB, the adjacent gate is only open for a limited number of hours. Military personnel living in Lakewood often use this interchange to exit or access I-5, therefore is scores high under the percent of total traffic that is from the installations. Future improvements will likely be considered at this interchange because the Thorne Lane interchange design for the Cross-Base Highway currently includes a frontage road connecting both interchanges. Therefore the study will likely devote a limited amount of time accounting for improvements at this interchange as well.

Bridgeport Way – Exit 125

The Bridgeport Way interchange provides primary access to McChord AFB and the City of Lakewood. It ranks 4th under the non-weighted scenario and 5th under the weighted scenario. It receives a high overall score due to a history of high collision rates at and around the interchange. The collisions are mainly due to mainline congestion from the add/drop lane at Thorn Lane to the south and the merging and weaving issues from/to SR 512 to the north.

SR 512 – Exit 127

The SR 512 interchange is a major freeway to freeway interchange with vehicle queuing often observed on the ramps and at the adjoining intersections. The close proximity of the southbound ramp intersection with the intersection with Pacific Highway South results in sometimes significant delays for vehicles entering and exiting the City of Lakewood. While the needs are great at the interchange, they are primarily regional in nature and do not directly relate to the purpose and need of the study. Overall, the interchange ranks 7th under the non-weighted scenario and 8th under the weighted scenario.

Recommendation / Next Steps

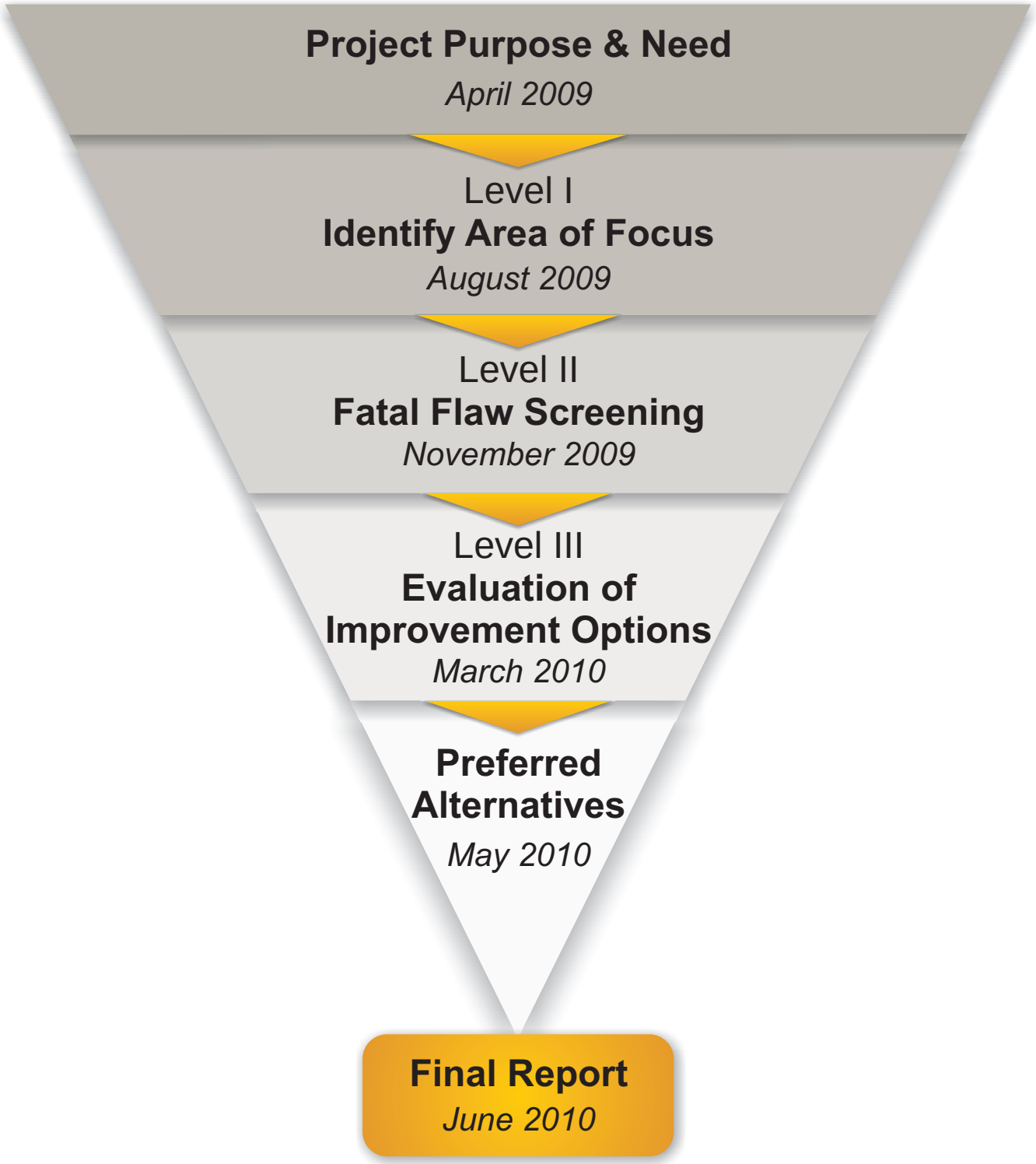
Based on the results of the weighted and non-weighted rankings for the Level 1 screening process, the project team recommends the study focus on the following four interchanges:

1. Exit 119 – DuPont-Steilacoom Road
2. Exit 120 – 41st Division Drive
3. Exit 122 – Berkeley Street
4. Exit 123 – Thorne Lane

While the non-weighted rankings result in the Bridgeport Way interchange having a higher ranking than the DuPont-Steilacoom Road interchange, the Bridgeport Way interchange is farther north than the other three interchanges and would result in a fragmented study area. In addition, the project team believes there are significant issues at the DuPont-Steilacoom Road interchange that need to be addressed, along with possible joint opportunities with Fort Lewis as part of their plans to improve the DuPont Gate. Therefore the recommendation includes the DuPont-Steilacoom Road interchange as the fourth interchange location to be included in the primary study area.

While improvement concepts for the other interchanges will not be evaluated in detail, the study will still address the future deficiencies and needs at each interchange, while also considering system level strategies that could benefit the other interchange locations.

The next steps will be to begin developing improvement concepts for the interchanges, freeway mainline, local arterials, and gate access locations that will have a direct benefit on the four remaining interchange locations. Level 2 screening is anticipated to occur in September and October with final completion in November.

Screening & Evaluation Process

I-5 Transportation Alternatives and Operational Traffic Model