APPENDIX D
STEP ONE RANKINGS MEMO

Transportation Study
Capitol Boulevard/Trosper Road Intersection

Step One Ranking of Alternatives

Prepared for

City of Tumwater
555 Israel Road SW
Tumwater, WA 98501

Prepared by

SCJ Alliance
8730 Tallon Lane NE, Suite 200
Lacey, WA 98516
T. 360.352.1465
www.scjalliance.com

September 2015| 0625.12

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PURPOSE

The purpose of this report is to present an overview of findings and recommendations for the Capitol Boulevard and Trosper Road Transportation Study – Step One Ranking of alternatives. The Step One Ranking is a best-value based alternatives analysis that follows Practical Design principles. Practical Design is a Washington Department of Transportation (WSDOT) approach to making project decisions that focuses on the need for a project and looks for cost-effective solutions. It engages local stakeholders at the earliest stages of defining scope to ensure their input is included at the correct stage of project design.

The Step One Ranking of alternatives consisted of the following elements:

- *Alternative Analysis* – score 11 alternatives against 8 weighted criteria.
- *Operations Analysis* – perform operational analysis at the following locations:
    - Capitol Boulevard/Trosper Road
    - Capitol Boulevard/Linda Street
    - Capitol Boulevard/Ruby Street
    - Capitol Boulevard/Lee Street
    - Capitol Boulevard/T Street
    - Littlerock Road/2nd Ave/Trosper Road
    - I-5/Trosper Road ramps
    - I-5/Trosper Road merge/diverge points
- *Safety Analysis* – score safety qualitatively.
- *Project Cost Analysis* – estimate the project costs including design, right-of-way acquisition, and construction cost estimates.
- *Screening* – screen the 11 alternatives down to 2-4 alternatives (Step Two Alternatives) based on their value ranking and carry forward to the Step Two Ranking.
- *Alternative Combinations* – identify combinations of Step Two Alternatives to include in the Step Two Ranking.

BACKGROUND

Existing Conditions

In 2013, the City of Tumwater and Thurston Regional Planning Council (TRPC) partnered on the Capitol Boulevard Corridor Plan (CBCP) from M Street SE to Tumwater Boulevard SE (approximately 1.4 miles). The CBCP was initiated with the purpose of improving (1) economic conditions, (2) transportation options and safety for walkers, cyclists, and motorists, and (3) aesthetic appeal of Capitol Boulevard.

The CBCP identified congestion along Capitol Boulevard between W Lee Street and Trosper Road SW (about 750 feet) as one of the biggest challenges in the area surrounding the Capitol Boulevard/Trosper Road intersection; however, the CBCP did not present any solutions to address the heavy congestion.

There are large regional traffic movements for (1) southbound I-5 to eastbound Trosper Road to southbound Capitol Boulevard and (2) northbound Capitol Boulevard to westbound Trosper Road to northbound I-5. There are currently double left turn lanes for the southbound I-5 off ramp and for Capitol Boulevard northbound at Trosper Road to help accommodate these heavy moves; however, lane balance at both double left turn lanes locations is poor (approximately 75% of vehicles in the shared through/left turn lane). Southbound vehicles crowd the outside left turn lane because there is only one

right turn lane from eastbound Trosper Road to southbound Capitol Boulevard, and northbound vehicles crowd the outside lane because there is only one lane for the northbound I-5 on ramp from Trosper Road.

Previous Work

In January 2014, the City of Tumwater contracted with SCJ Alliance (SCJ) to (1) evaluate alternatives to address the heavy congestion at the Capitol Boulevard/Trosper Road intersection and (2) develop an overall preliminary design and project footprint for Capitol Boulevard based on recommendations from the CBCP and the results of Item (1). This Transportation Study is focused on Item (1), alternatives evaluation.

In May 2014, SCJ hosted a half-day workshop to brainstorm possible ways to address congestion at the intersection. The workshop included representatives from the City of Tumwater, City of Olympia, City of Lacey, Thurston County, Thurston Regional Planning Council, Intercity Transit, and Washington Department of Transportation (WSDOT) Headquarters Traffic.

The workshop resulted in 42 alternatives to address traffic congestion at the Capitol Boulevard/Trosper Road intersection. SCJ then performed a simple scoring and ranking analysis to screen the alternatives down to 6-10 alternatives. The results of the workshop and the subsequent screening were carried forward and used as a starting point by the Support Team for the Transportation Study.

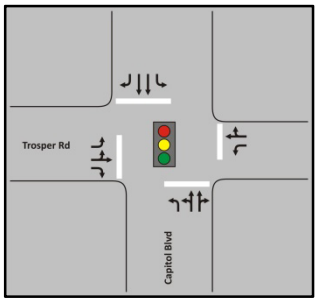
The Support Team modified the screened alternatives to develop a list of 11 alternative improvements to be analyzed for effectiveness in accommodating Design Year (2040) traffic demand for the Capitol Boulevard/Trosper Road intersection. We grouped the 11 alternatives into four categories:

- **Base Condition/No Build** – this is the existing traffic signal at the Capitol Boulevard/Trosper Road intersection.
- **Intersection 2040 Capacity Alternatives** – these are alternatives that are sized to accommodate 2040 traffic regardless of footprint size.
- **Context Sensitive Intersection Capacity Alternatives** – these are alternatives that best accommodate 2040 traffic volumes but are limited in footprint size to fit the scale and context of the intersection site.
- **Traffic Diversion Alternatives** – these are alternatives that encourage traffic to use other routes, thereby improving operations at the Capitol Boulevard/Trosper Road intersection by reducing the amount of traffic using the intersection.

The following are descriptions of the 11 alternatives:

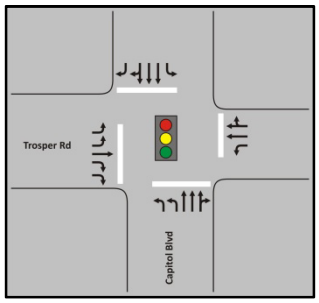
Base Condition/No Build (1)

- Existing channelization at the Capitol Boulevard/Trosper Road traffic signal (total of 12 entering lanes).

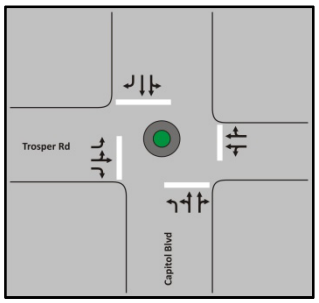


Intersection 2040 Capacity Alternatives (2)

- Traffic Signal – with additional through and/or turn lanes to meet Design Year demand (approximately 18 total entering lanes).

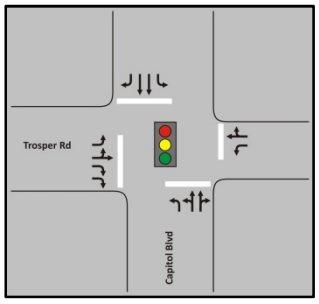


- Roundabout – sized with circulating lanes and/or bypass lanes to meet Design Year demand (3 lanes northbound – 1 left turn lane, 1 left-thru lane, and 1 thru-right lane; bypass lanes southbound and eastbound).

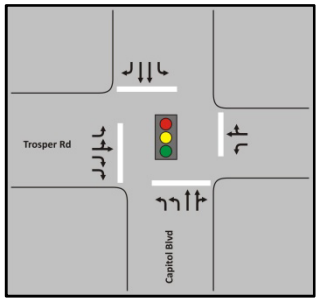


Context Sensitive Intersection Capacity Alternatives (3)

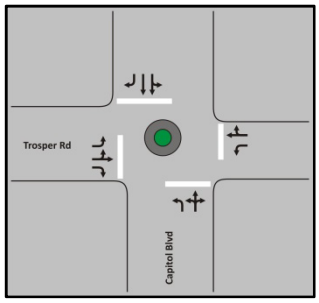
- Double Right Turns – existing channelization plus one added right turn lane for eastbound Trosper Road (creates dual right turn lanes – 13 total entering lanes).



- Traffic signal – with additional through lanes and/or turn lanes limited to 14 total entering lanes.

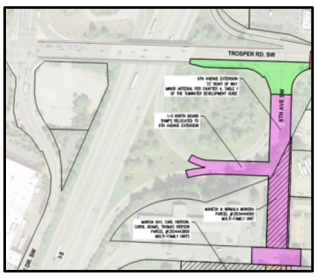


- Roundabout – limited to 2 circulating lanes with bypass lanes southbound to westbound and eastbound to southbound.



Traffic Diversion Alternatives (5)

- Relocation of the Trosper Road northbound off ramp and northbound loop on ramp to Ruby Street. Includes construction of 6th Avenue between Trosper Road and Lee Street.



- Construction of an I-5 crossing south of Trosper Road.

- Closure of the east leg of the Capitol Boulevard/Trosper Road intersection.
- Construction of a north-south couplet for Capitol Boulevard traffic between Lee Street and M Street.
- Provide a transit center/park and ride lot close to Tumwater's City Hall and Tumwater Boulevard SW and expand transit and express service between Tumwater and downtown Olympia.

ALTERNATIVES ANALYSIS

The scoring and ranking of alternatives was prepared in accordance with the "Proposed Alternatives Methodology – REVISION 3" memorandum, dated May 20, 2015 (see Appendix A). This methodology calls for the following steps:

- Assign relative weights to eight criteria.
- Score the performance of the 11 alternatives for each of the eight criteria.
- Develop project cost estimates for the 11 alternatives.
- Calculate the value of each alternative (performance divided by cost) and identify the highest value alternatives.

Criteria and Weighting

There are four main objectives for the project: (1) Advancing corridor and regional planning goals identified in the CBCP, (2) Improving local network performance, (3) Promoting efficient operation of I-5 mainline and the Trosper Road ramps, and (4) Promoting safety for vehicles, bikes and pedestrians. The eight criteria were grouped under these four objectives.

The Support Team developed weights (relative importance) for the criteria by using pair-wise comparisons. The highest weighted criteria were Operations at Capitol/Trosper and Capitol Corridor Operations. See Appendix B for additional detail.

Scoring of Alternatives by Criteria

The following summarizes the scoring of the eight criteria grouped into the four objectives.

Advance Corridor and Regional Planning Goals

Advancing the corridor and regional planning goals includes three criteria consistent with the goals identified in the CBCP. The criteria are measured qualitatively based on how they advance the CBCP goals and whether or not they provide the opportunity to further advance the goals. Table 1 shows the scoring for the following three criteria:

- *Economic Conditions* – increase attractiveness for property owners and developers to redevelop along the Corridor.
- *Network Connectivity* – create a road network and local access consistent with the Corridor Plan.
- *Neighborhoods/Environment* – create neighborhoods and environmental changes and aesthetics consistent with the Corridor Plan.

Table 1
Advance Corridor and Regional Planning Goals Scoring

Alternative	Economic Conditions	Network Connectivity	Neighborhoods/ Environment
Base Condition	2	2	2
Traffic Signal – 2040 Capacity	0	0	0
Roundabout – 2040 Capacity	8	2	4
Double Right Turns	2	3	2
Traffic Signal – Context Sensitive	2	4	2
Roundabout – Context Sensitive	5	6	7
Ruby Ramps	8	8	8
I-5 Crossing	4	2	0
East Leg Closure	0	0	2
North-South Couplet	2	1	1
Transit Center	2	4	2

Improve Local Network Performance

The purpose of the improvements is to better the operations at the Capitol Boulevard/Trosper Road intersection along with the surrounding intersections and increase mobility and access for bicycles and pedestrians. The surrounding intersections are listed in the Methods and Assumptions Report (see Appendix E). Table 2 shows the scoring for the following three criteria:

- *Capitol Boulevard/Trosper Road Operations* – minimize peak hour queue length (linear feet) and peak hour intersection delay (seconds).
- *Local Intersection Operations* – minimize peak hour queue length (linear feet) and peak hour intersection delay (seconds).
- *Bicycles and Pedestrian Access* – provide mobility and access to transit for bicycles and pedestrians through/near the intersection and the corridor (measured qualitatively).

Table 2
Improve Local Network Performance Scoring

Alternative	Operations Capitol/Trosper	Corridor Operations Other Local I/S's	Bicycles/Pedestrians
Base Condition	0	1	2
Traffic Signal – 2040 Capacity	5	3	0
Roundabout – 2040 Capacity	10	4	5
Double Right Turns	1	2	1
Traffic Signal – Context Sensitive	2	3	1
Roundabout – Context Sensitive	1	2	6
Ruby Ramps	8	6	8
I-5 Crossing	3	6	8
East Leg Closure	3	2	2
North-South Couplet	4	1	5
Transit Center	3	4	5

Promote Efficient Operation of I-5 (mainline and ramps)
One of the alternatives includes modifying the northbound I-5 ramps at Trosper Road. This objective addresses impacts to the operations of I-5 at the Trosper Road ramp terminals and the merge/diverge points. The scoring considers the levels of service (LOS) of the merge/diverge points and the delay/queue at the ramp terminals. Table 3 shows the scoring for the I-5 Operations:

Table 3
Promote Efficient Operations of I-5 (mainline and ramps) Scoring

Alternative	Operations I-5
Base Condition	3
Traffic Signal – 2040 Capacity	2
Roundabout – 2040 Capacity	3
Double Right Turns	3
Traffic Signal – Context Sensitive	3
Roundabout – Context Sensitive	3
Ruby Ramps	6
I-5 Crossing	4
East Leg Closure	5
North-South Couplet	3

Table 3 – cont.
Promote Efficient Operations of I-5 (mainline and ramps) Scoring

Alternative	Operations I-5
Transit Center	4

Safety (Qualitative)
Safety scoring for the Step One Ranking is qualitative with the goal of vetting alternatives with significant safety challenges (e.g., requiring pedestrians to cross 8-lane road sections). Quantitative measures will be used for the Step Two Ranking process. Table 4 shows the scoring for the qualitative safety scoring.

Table 4
Safety Scoring (qualitative)

Alternative	Safety
Base Condition	2
Traffic Signal – 2040 Capacity	0
Roundabout – 2040 Capacity	5
Double Right Turns	1
Traffic Signal – Context Sensitive	3
Roundabout – Context Sensitive	7
Ruby Ramps	8
I-5 Crossing	6
East Leg Closure	3
North-South Couplet	4
Transit Center	6

See Appendix C for a Performance Profile (a bar chart graphic showing the total performance of each alternative considering the criteria weights and scores). Appendix C also includes the reasoning for the scores assigned and details on the scales used to score the alternatives.

Project Costs

Conceptual-level project costs were developed for seven of the alternatives to provide a value ranking of the alternatives. Project costs are broken up into right-of-way and design/construction costs.

There is no cost associated with the Base Condition/No Build. Costs for the transit center are also not included in the Step One analysis. Conceptual costs for Step One include capital costs only. Operations and maintenance costs make up a significant portion of the transit alternative. We recommend that the transit alternative is carried forward to the Step Two Ranking. Transit costs, including operations and

maintenance, will be developed during Step Two. Lastly, we did not estimate project costs for the following alternatives:

- Intersection 2040 Capacity – Traffic Signal
- Traffic Diversion – Closure of the East Leg of the Capitol/Trosper intersection

These alternatives do not meet the corridor and regional planning goals set forth in the Capitol Boulevard Corridor Plan. Both alternatives would add to the access management problems at the intersection and immediately south of the intersection.

The traffic signal would require a total of 18 lanes entering the intersection with 8 lanes on the south leg alone. An intersection of that size is not consistent with the Corridor Plan goals in scale and network connectivity for bicycles and pedestrians. While the intersection would solve traffic congestion at the intersection, it is counterproductive to the Corridor Plan. Subsequently, we determined further screening of the alternative is not warranted.

Considering the low cost associated with closing the east leg, its value is likely high. However, this alternative does not advance access management and economic goals in the Corridor Plan. The parcels east of the intersection would see a significant reduction in business due to access issues associated with closing the east leg. In addition, the access issues would likely deter future developers from redeveloping the parcels. As such, we do not feel further screening of the alternative is warranted.

Right-of-Way Acquisition
Each one of the alternatives will require purchasing right-of-way. Right-of-way limits required are based on conceptual level layouts using City provided right-of-way lines along Capitol Boulevard and Thurston County Geodata to estimate existing right-of-way boundaries not included in the City-provided data. The parcel values were determined using the 2014 Thurston County assessed values. A detailed breakdown of the right-of-way acquisition costs is included in Appendix D.

Design and Construction Costs
Design and construction cost estimates were developed using the City's standard plans and a review of the 2014 WSDOT Unit Bid Item Analysis for the Olympic region. Appendix D includes a detailed breakdown of the design and construction costs for each of the alternatives listed in Table 5.

Table 5 includes a summary of the project costs seven alternatives.

Table 5
Conceptual Level Estimate Summary

Alternative	Right-of-Way Costs	Design and Construction Cost	Total Project Cost
Roundabout – 2040 Capacity	$4,050,000	$3,000,000	$7,050,000
Double Right Turns	$1,070,000	$1,530,000	$2,600,000
Traffic Signal – Context Sensitive	$4,990,000	$4,100,000	$9,090,000
Roundabout – Context Sensitive	$2,550,000	$2,380,000	$4,930,000
Ruby Ramps	$1,460,000	$3,120,000	$4,580,000
I-5 Crossing	$6,210,000	$15,830,000	$22,040,000
North-South Couplet	$7,310,000	$6,410,000	$13,720,000

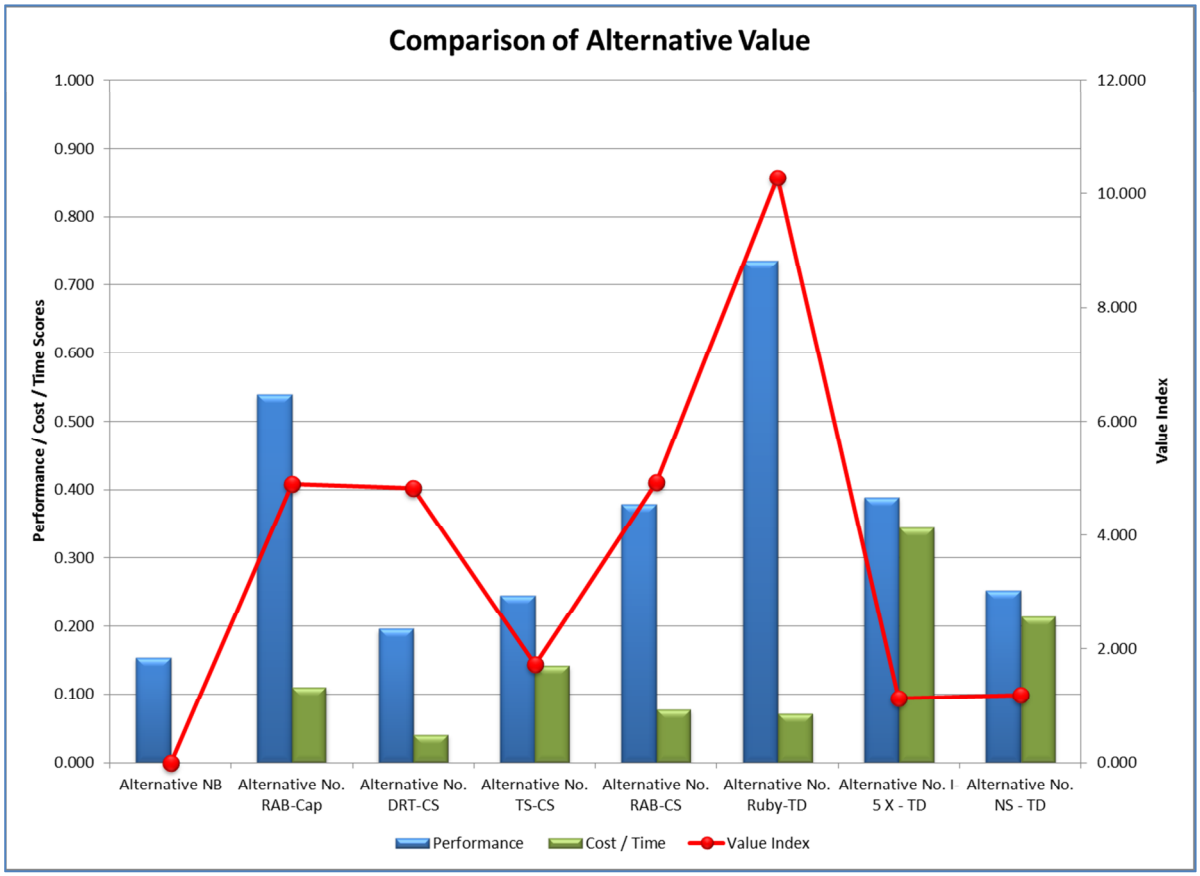
Value Rankings

Dividing the performance scores of the seven alternatives by a cost index derived from the project costs shown in Table 5 calculates the value index for each of the alternatives. The value index is a benefit/cost ratio. The alternatives with the higher value indices provide a greater benefit per unit of cost. Table 6 includes a summary of the calculated value indices and Figure 1 displays the value results graphically.

Table 6
Alternative Value

Alternative	Value Index
Roundabout – 2040 Capacity	4.89
Double Right Turns	4.82
Traffic Signal – Context Sensitive	1.73
Roundabout – Context Sensitive	4.92
Ruby Ramps	10.29
I-5 Crossing	1.29
North-South Couplet	1.18

Figure 1 – Comparison of Alternative Value



RECOMMENDATIONS

Building the Ruby Street Ramps is the highest value alternative. We estimate the Ruby Street Ramps combined with the existing traffic signal will reach a failing level of service (delay or queue length) by year 2032. Therefore, we also recommend combining some alternatives to develop improvement packages that will provide functional operations at the Capitol/Trosper intersection in year 2040. Accordingly, we recommend the following alternatives and alternative combinations for advancement to the Step Two Ranking.

Alternatives

- Ruby Street Ramps

Alternative Combinations

- Ruby Street Ramps + Context Sensitive Roundabout at Capitol/Trosper
- Ruby Street Ramps + Double Rights (EB Trosper to SB Capitol)
- Transit Improvements + Context Sensitive Roundabout at Capitol/Trosper

As previously mentioned, we did not develop project costs for the transit center alternative. The operational results warrant a closer look into this alternative. Therefore, we have included it in the recommended Alternative Combinations. Capitol facility and operations/maintenance costs will be developed in the Step Two Ranking to establish a value index for comparison to other alternative combinations.

Appendix A
Proposed Alternatives Methodology – REVISION 3

TECHNICAL MEMORANDUM

TO:	Jay Eaton, PE
FROM:	Scott Sawyer, PE
DATE:	May 20, 2015
PROJECT #:	0625.12
SUBJECT:	Capital Boulevard/Trosper Road Proposed Alternative Analysis Methodology – REVISION 3

BACKGROUND

In January 2014 the City of Tumwater (City) contracted with SCJ Alliance (SCJ) to develop intersection improvement alternatives for the Capitol Boulevard and Trosper Road intersection. The purpose of this technical memorandum is to summarize the proposed methodology for weighting and scoring the criteria for evaluating the intersection improvement alternatives identified.

PURPOSE AND NEED

Purpose

The purpose of the project is to improve the intersection to have a design year (2040) LOS D (35-55 seconds of delay), or a queue less than 500 feet (roughly 20 vehicles) as much as practical.

Need

The Capitol Blvd / Trosper Rd intersection is currently operating at a Level of Service (LOS) D, with a 55 second delay and 1,000 foot queue for the northbound lanes. In 2013 the City of Tumwater received a grant from the Transportation Improvement Board (TIB) to build a second right turn lane from eastbound Trosper Rd to southbound Capitol Blvd. While this improvement will help with existing traffic volumes the intersection fails in 2040 with a LOS F, 124 second delay, and a 4,500 foot queue for the northbound lanes.

ALTERNATIVES

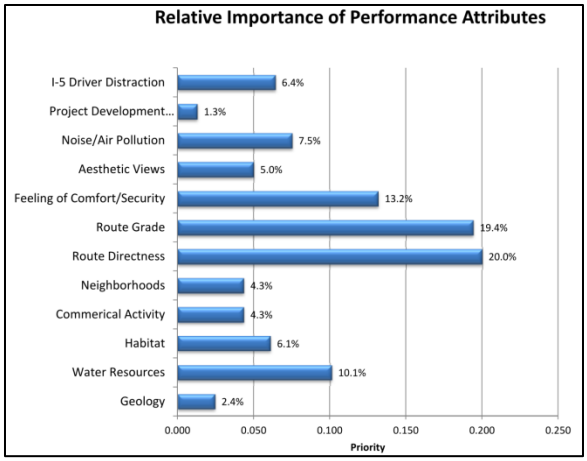
A design workshop was held on May 2, 2014 to brainstorm potential improvements. Subsequent to the design workshop, SCJ performed a preliminary analysis to develop a list of alternatives that addressed the goals set forth in the Corridor Plan. A list of final alternatives to be analyzed is included as Attachment A.

PERFORMANCE RANKING

SCJ proposes to use a Performance Value Measurement spreadsheet to weigh and score performance attributes used for this alternatives analysis. The spreadsheet uses the following variables and methods to evaluate the alternatives.

Criteria

SCJ drafted criteria and the Support Team refined the criteria at the workshop meetings from January to April. An outline of the final criteria is included as Attachment B.



Example Criteria Weight distribution - Graph

Weighting

SCJ meet with the Support Team to weigh the relative importance of the criteria at workshop meetings in March and April. Relative weightings were established by using pair-wise comparisons.

The pair-wise comparisons developed at the April 30th workshop and the resultant weightings are shown as Attachment C.

Scoring

Each of the alternatives identified in the List of Final Alternatives will be scored against the criteria. A rating of 0 to 10 will be applied to each of the criteria. The rating is then multiplied by the criteria weight to determine the criteria score. The alternative score is determined by the sum of the criteria scores.

$$Criteria\ Score = weight * rating$$

$$Alternative\ Score = \sum criteria\ scores$$

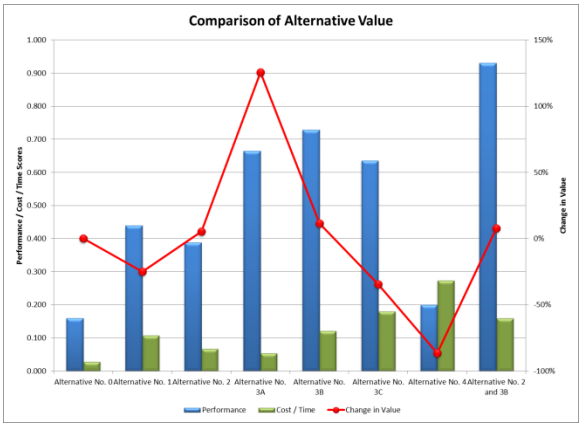
$$Cost\ Index = \frac{Alternative\ Cost}{\sum Alternative\ Cost}$$

$$Alternative\ Value = \frac{Alternative\ Score}{Cost\ Index}$$

Formulae for developing Value Index

Value Ranking

The alternatives are valued by best value. The alternative value is a function of the cost index and alternative score, where the cost index is the ratio of the individual alternative cost and the sum of all alternative costs. The alternative value is determined by dividing the alternative score by the cost index. The best value alternative will be the recommended alternative.



Example Value Index for alternatives - graphic

Two Step Ranking

Since there are eleven alternatives, a two-step screening will be used to rank alternatives.

Step One

- Score all 11 alternatives against all eight criteria.
- Score operations criteria (Capital/Trosper, local intersections and I-5) by PM peak hour only.
- Score safety qualitatively.
- Screen down the 11 alternatives down to about two to four alternatives.

- Identify appropriate combination(s) of alternatives.

Step Two

- Score the remaining two to four alternatives and any combinations identified in Step One.
- Score operations criteria by AM and PM peak hours.
- Score safety quantitatively.
- Identify the highest value alternative and/or combination of alternatives.

Attachment A

February 23, 2014

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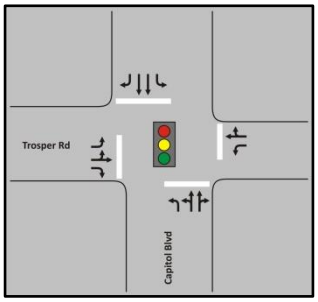
Transportation Study – Capitol Boulevard/Trosper Road Intersection

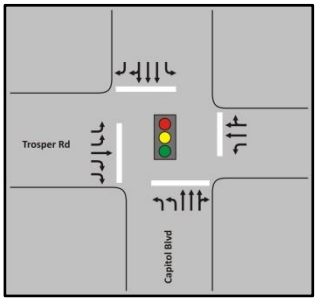
List of Final Alternatives

There are a total of 10 alternative improvements to be analyzed for effectiveness in accommodating Design Year (2040) traffic demand for the Capitol Boulevard/Trosper Road intersection.



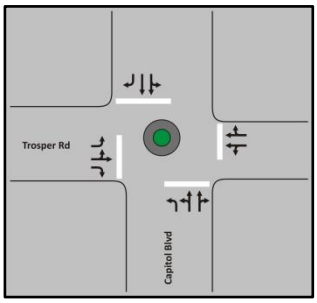
Base Condition/No Build

- Existing channelization at the Capitol Boulevard/Trosper Road traffic signal (total of 12 entering lanes).

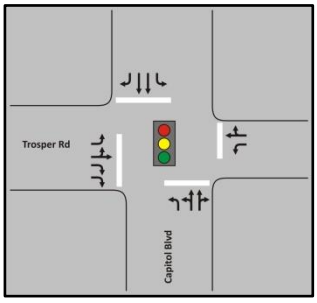


Intersection Capacity Alternatives

- Traffic Signal – with additional through and/or turn lanes to meet Design Year demand (approximately 18 total entering lanes).



- Roundabout – sized with circulating lanes and/or bypass lanes to meet Design Year demand (3 lanes northbound – 1 left turn lane, 1 left-thru lane, and 1 thru-right lane; bypass lanes southbound and eastbound).



Context Sensitive Intersection Capacity Alternatives

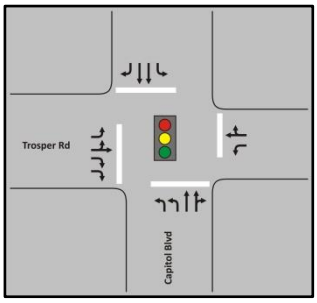
- Existing channelization plus one added right turn lane for eastbound Trosper Road (creates dual right turn lanes – 13 total entering lanes).

Attachment A

February 23, 2014

SCJ ALLIANCE
CONSULTING SERVICES

- Traffic signal – with additional through lanes and/or turn lanes limited to 14 total entering lanes.



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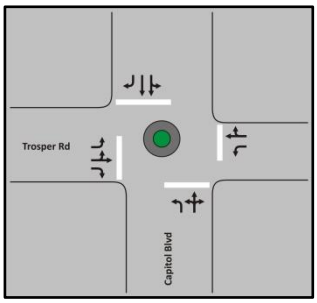
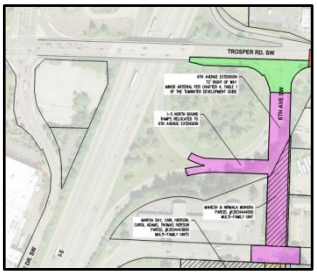
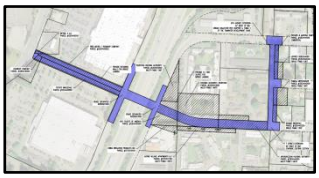


Traffic Diversion Alternatives

- Relocation of the Trosper Road northbound off ramp and northbound loop on ramp to Ruby Street. Includes construction of 6th Street between Trosper Road and Lee Street.
  - Extension of 6th Street from Lee Street to T Street.
  - Extension of T Street from 6th Street to Linderson Way.



- Construction of an I-5 crossing south of Trosper Road.



- Closure of the east leg of the Capitol Boulevard/Trosper Road intersection.
- Construction of a north-south couplet for Capitol Boulevard traffic between Lee Street and M Street.
- Provide a transit center / park and ride lot close to Tumwater's City Hall and Tumwater Boulevard SW and expand transit and express service between Tumwater and downtown Olympia.

Combinations

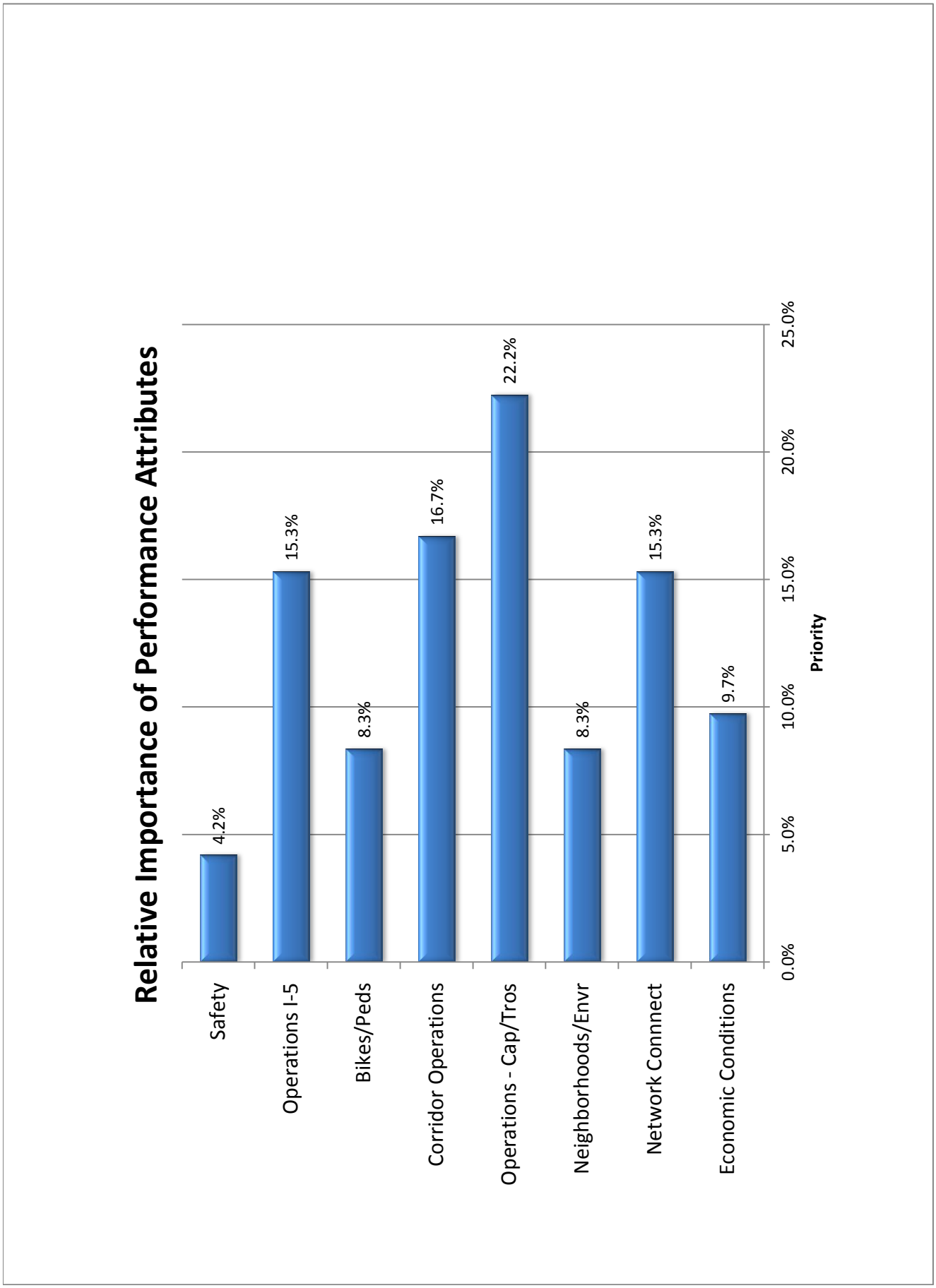
- Possibly combine the top 1-2 Context Sensitive solutions with the top 1-2 Traffic Diversion alternatives to optimize the final recommended solution.

Criteria Table

Objectives (4)	Criteria (8)	Measures (8)
Advance Corridor and Regional Planning Goals	**Economic Conditions**	*Increase attractiveness for property owners and developers to redevelop along the Corridor – qualitative*
	Network Connectivity	*Create a road network and local access consistent with the Corridor Plan - qualitative*
	Neighborhoods/ Environment	*Create neighborhoods and environmental changes and aesthetics consistent with the Corridor Plan - qualitative*
Improve Local Network Performance	**Operations – Capital/Trosper**	*Minimize peak hour queue length (linear feet) and minimize peak hour intersection delay (seconds)*
	Corridor Operations – other local I/S's	*Minimize peak hour queue length (linear feet) and minimize peak hour intersection delay (seconds)*
	Bicycles / Pedestrians	*Provide mobility and access to transit for bicycles and pedestrians through/near the intersection and the corridor – qualitative or HCM 2010.*
Promote Efficient Operation of I-5 (mainline and ramps)	**Operations**	*I-5 operations – freeway merge/diverge (LOS); ramp terminal (delay/queue);*
Safety	**Vehicle, bike and ped safety**	*Projected collisions for vehicles, bikes and peds*

Attachment B

Attachment C



Appendix B
Weighting and Scoring

Appendix B.1 – Pair-wise Comparisons

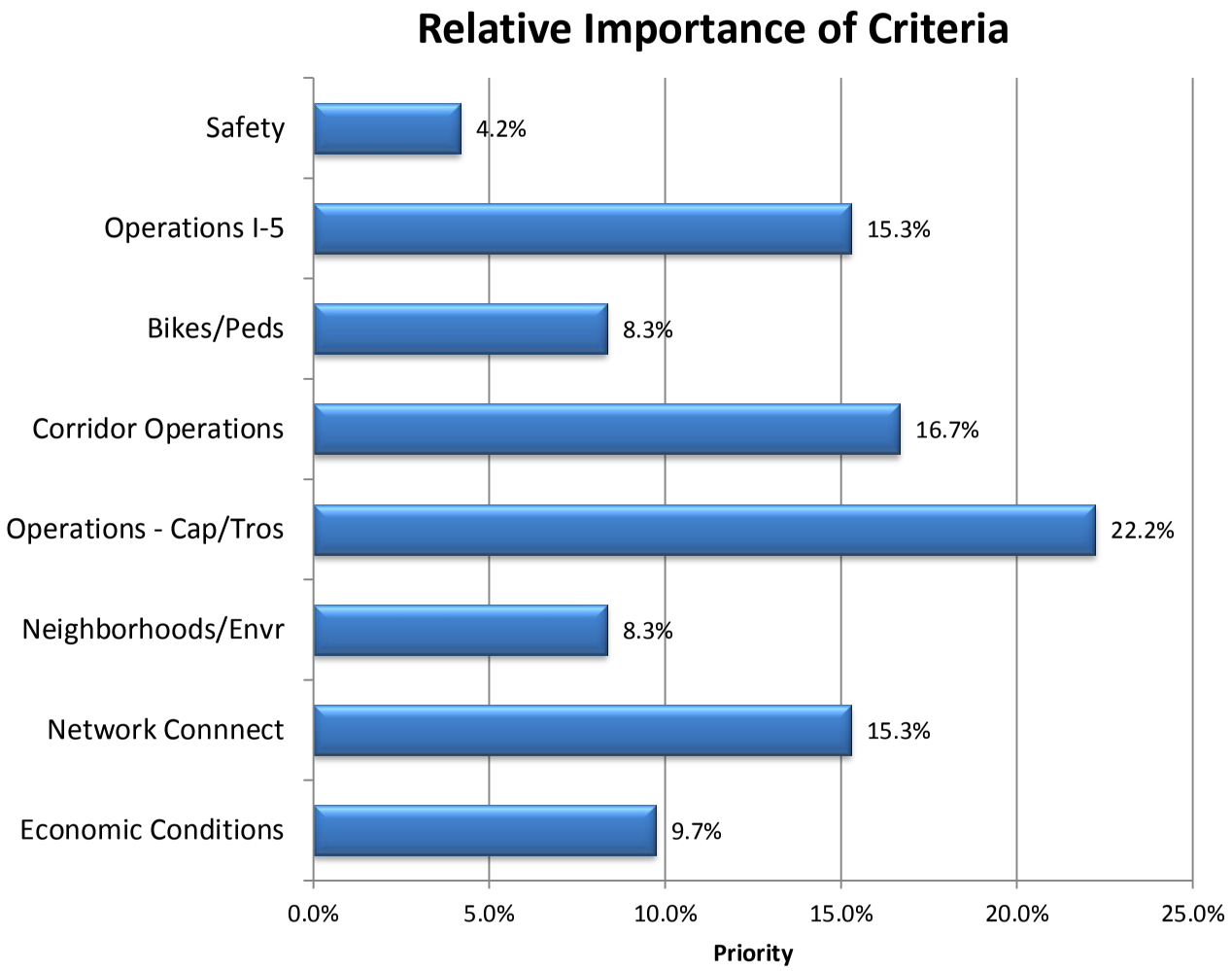
Appendix B.2 – Relative Importance of Criteria

Weighting of Criteria

Capital Blvd/Trosper Rd I/S Transportation Study

Rate the relative importance of the attributes relative to the project's Need and Purpose.

	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Performance Attributes	**Economic Conditions**	**Network Connnect**	**Neighborhoods/Envr**	**Operations - Cap/Tros**	**Corridor Operations**	**Bikes/Peds**	**Operations I-5**	**Safety**	**TOTAL COUNT**	**PRIORITIES**
Economic Conditions	A	B	A	D	E	A/F	G	A	3.5	**9.7%**
Network Connnect		B	B	D	B/E	B	G	B	5.5	**15.3%**
Neighborhoods/Envr			C	D	E	C/F	C/G	C	3.0	**8.3%**
Operations - Cap/Tros				D	D	D	D	D	8.0	**22.2%**
Corridor Operations					E	E	E/G	E	6.0	**16.7%**
Bikes/Peds						F	F/G	F/H	3.0	**8.3%**
Operations I-5							G	G	5.5	**15.3%**
Safety								H	1.5	**4.2%**
SUB-TOTALS									36.0	**100.0%**

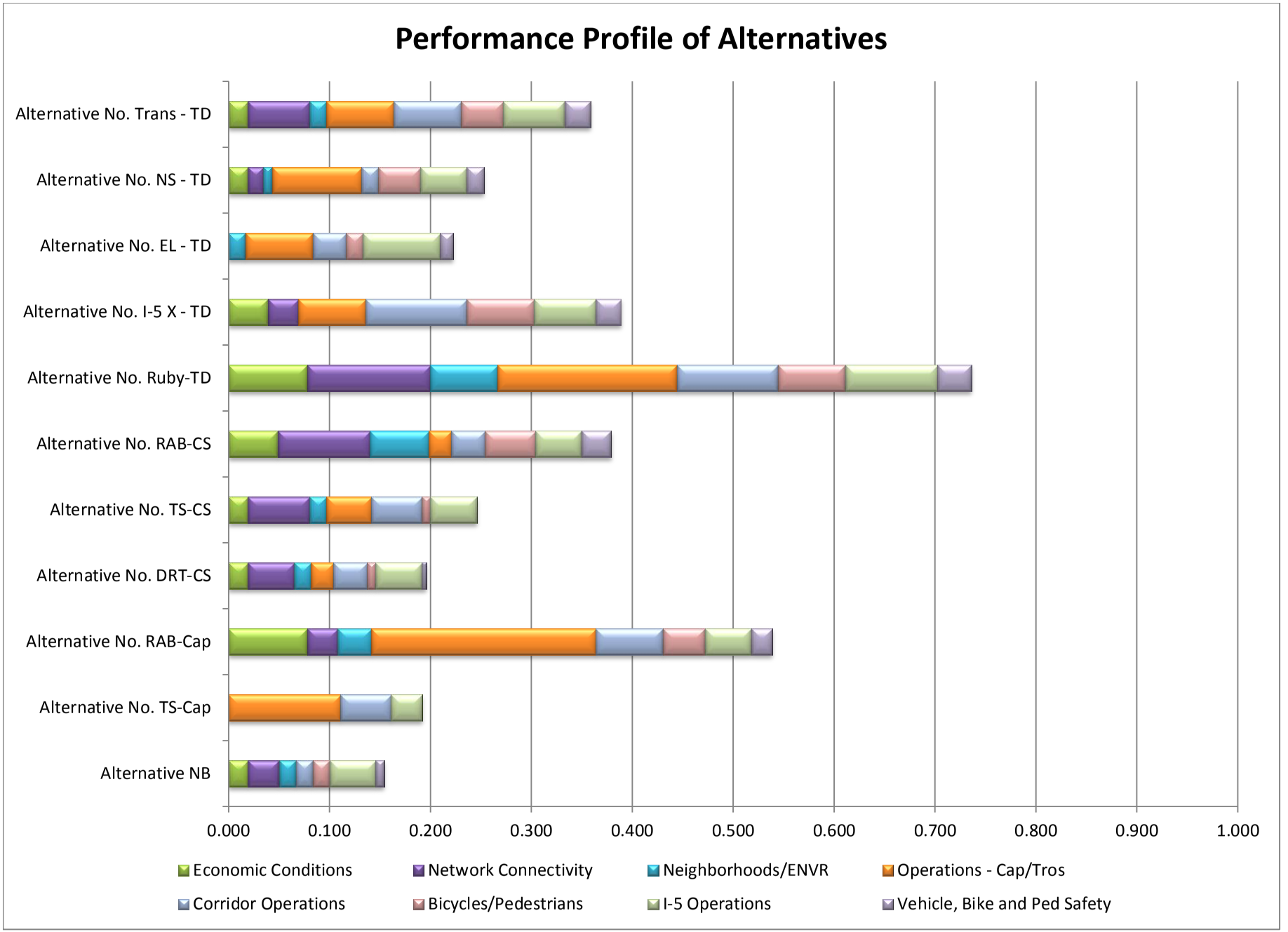

Relative Importance of Criteria
Safety
4.2%
Operations I-5
15.3%
Bikes/Peds
8.3%
Corridor Operations
16.7%
Operations - Cap/Tros
22.2%
Neighborhoods/Envr
8.3%
Network Connnect
15.3%
Economic Conditions
9.7%
0.0%
5.0%
10.0%
15.0%
20.0%
25.0%
Priority

Appendix C
Performance Profile of Alternative, Performance Scoring, and Performance Scales

Appendix C.1 – Performance Profile of Alternatives

Appendix C.2 – Performance Scoring

Appendix C.3 – Performance Scales


Performance Profile of Alternatives
Alternative No. Trans - TD
Alternative No. NS - TD
Alternative No. EL - TD
Alternative No. I-5 X - TD
Alternative No. Ruby-TD
Alternative No. RAB-CS
Alternative No. TS-CS
Alternative No. DRT-CS
Alternative No. RAB-Cap
Alternative No. TS-Cap
Alternative NB
0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
0.900
1.000
Economic Conditions
Network Connectivity
Neighborhoods/ENVR
Operations - Cap/Tros
Corridor Operations
Bicycles/Pedestrians
I-5 Operations
Vehicle, Bike and Ped Safety

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative NB Base Condition/No Build

Performance Attributes	Rationale	Rating
Economic Conditions	No changes to economic opportunities.	2
Network Connnect	No changes at Capitol/Trosper and doesn't prevent other changes in the Plan from being implemented.	2
Neighborhoods/Envr	No changes. Does not prevent built environment from redeveloping or neighborhoods being improved.	2
Operations - Cap/Tros	LOS F, with multiple v/c ratios worse than 1.1. Each approach has queues in excess of 1/2 mile.	**0**
Corridor Operations	Littlerock/Trosper with queue issues on all approaches. Trosper Rd Congestion EB, Capitol Blvd congestion North and south of Trosper. Tyee/Trosper and T St with LOS F	**1**
Bikes/Peds	No changes.	2
Operations I-5	SB Diverge LOS E, SB off-ramp queues extend to mainline, SB Ramp intersection LOS F (NB and SB approaches fail) with over 1.0 v/c for SB left-turns. NB Ramps operate well.	**3**
Safety	No changes	2

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. TS-Cap Traffic Signal - 2040 capacity

Performance Attributes	Rationale	Rating
Economic Conditions	This option would increase difficulty in access management along Capitol Blvd encouraging users to find alternate places to do business. Parcel redevelopment would likely be discouraged as well. Assumes - center median or curb would prevent left turns onto properties and no u-turns allowed at Cap/Trosper due to signal timing needs (green right for EB Trosper to SB Capitol during NB Cap to WB Trosper left greens).	0
Network Connnect	In conflict with Corridor Plan in both scale and vision. An intersection this large would make it difficult to manage the accesses in the vicinity of the intersection.	0
Neighborhoods/Envr	Intersection is beyond the scale of the built environment envisioned in the corridor plan.	0
Operations - Cap/Tros	LOS E with a NB left-turn v/c of 1.05. NB queue still extends beyond Lee Street and WB approach still has queues in excess of 3,000' EB queue does not extend into upstream intersections. SB queue greatly improved from baseline	**5**
Corridor Operations	Littlerock/Trosper with queue issues on all approaches. Trosper Rd Congestion EB, Capitol Blvd congestion North and south of Trosper, with NB queue improved. Tyee/Trosper and T St with LOS F	**3**
Bikes/Peds	Pedestrian crossings at Capitol/Trosper will lengthen making the intersection unattractive for pedestrians to use. NB bike traffic will also struggle turning left onto Trosper as they would have to merge multiple lanes to make the turn. Bike lanes could be added to Capitol provided sufficient ROW is acquired; however, an intersection of this scale will have a net negative impact.	0
Operations I-5	SB Diverge LOS E, SB off-ramp queues extend to mainline, SB Ramp intersection LOS F (All approaches fail) with over 1.15 v/c for SB left-turns. NB Ramps operate well.	**2**
Safety	6+ lanes pedestrian crossings, no access control encouraging impatient drivers	0

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. RAB-Cap Roundabout - 2040 capacity

Performance Attributes	Rationale	Rating
Economic Conditions	Provides some increase in economic conditions by providing manageable RIRO access opportunities with roundabouts at Trosper/Cap and T/Cap (T/Cap RAB is part of Corridor Plan). Parcels would be more attractive for users and potential redevelopment. Does limit economic opportunities at the parcels in the southwest quadrant of the Cap/Trosper intersection as the footprint would eliminate access to a few parcels and there are no other accesses to those properties.	8
Network Connnect	In conflict with Corridor Plan in both scale and vision. Does provide some benefit in access management for properties between Trosper and Lee. Without further improvements there are a few parcels in the southwest quadrant of the intersection that would be inaccessible.	2
Neighborhoods/Envr	Creates great opportunity for increased aesthetics through landscape medians and roundabout island. Roundabout island can also be used for gateway sculpture. However, the overall footprint is beyond the scale of the built environment envisioned in the corridor plan and without further improvements some parcels at the southwest quadrant of the intersection would be inaccessible. Rates highly for aesthetic opportunities but 0 for consistency with Corridor Plan vision.	4
Operations - Cap/Tros	LOS C with all v/c ratios below 1.0. All approaches have queues less than 400'	**10**
Corridor Operations	Littlerock/Trosper with queue issues on all approaches. Trosper Rd Congestion EB, NB congestion on Capitol Blvd improved. Tyee/Trosper and T St with LOS F	**4**
Bikes/Peds	Improves bike connectivity by adding bike lanes on Capitol Blvd and improves pedestrian connectivity by reducing the length of crossings at the intersections. Roundabouts are also more friendly towards bicycle traffic. Would score higher if not for the large volume moving through the intersection. Also, does not provide additional connectivity.	5
Operations I-5	SB Diverge LOS E, SB off-ramp queues extend to mainline, SB Ramp intersection LOS F (NB and SB approaches fail) with over 1.0 v/c for SB left-turns. NB Ramps operate well.	**3**
Safety	Improves bike and ped safety through the intersection. Bike lanes would be added to Capitol Blvd. Peds crossing up to 3 lanes. Large volumes through intersection increase opportunity for collisions.	5

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. DRT-CS Double Right-turn Lanes - Context Sensitive

Performance Attributes	Rationale	Rating
Economic Conditions	Does not change the economic condition. Access management on Capitol near Trosper would still be a concern.	2
Network Connnect	Does not exceed the scale of the Plan, however, access management would still be an issue between Trosper and Lee.	3
Neighborhoods/Envr	No significant changes one way or the other	2
Operations - Cap/Tros	LOS F with NB queue extending into upstream intersections, but improved from baseline. SB queue exceeds 1/2 mile. Additional NB left-turn lane helps SB v/c. EB queue not impacting downstream intersections	**1**
Corridor Operations	Littlerock/Trosper with queue issues on all approaches. Trosper Rd Congestion EB, Capitol Blvd congestion North and south of Trosper. Tyee/Trosper and T St with LOS F	**2**
Bikes/Peds	Increased pedestrian crossing length on west leg of Capitol/Trosper. No improvements to bike routes/connectivity. Net negative thought not as bad as the full build intersection.	1
Operations I-5	SB Diverge LOS E, SB off-ramp queues extend to mainline, SB Ramp intersection LOS F (NB, WB and SB approaches fail) with over 1.0 v/c for SB left-turns. NB Ramps operate well.	**3**
Safety	Increased pedestrian crossing length for WB leg of intersection. Not quite a no change scenario but minimal impacts.	1

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. TS-CS Traffic Signal - Context Sensitive

Performance Attributes	Rationale	Rating
Economic Conditions	Does not change the economic condition. Access management on Capitol near Trosper would still be a concern. Assumes no median or curb would be added to Capitol between Trosper and Lee and left turns into parcels would still be allowed.	2
Network Connnect	Intersection improvements are at a scale consistent with the Plan. Local access remains difficult due to not having an easy option to accommodate RIRO accesses. Left turns may still be allowed however they would not be an easy movement and would contribute to congestion.	4
Neighborhoods/Envr	No significant changes to built environment. Aesthetically not as strong as other options as landscaped medians will not fit within the cross section between Trosper and Lee.	2
Operations - Cap/Tros	LOS F with NB queue extending into upstream intersections, but additional improvement from baseline al just adding EB right-turn lane. SB queue exceeds 1/2 mile. Additional NB left-turn lane helps SB v/c. EB queue not impacting downstream intersections	**2**
Corridor Operations	Trosper Rd Congestion EB, Capitol Blvd congestion North and south of Trosper. Tyee/Trosper and T St with LOS F	**3**
Bikes/Peds	Bike paths would be added to Capitol, pedestrians would be required to cross up to 6 lanes, bikes still required to merge multiple lanes for NB to WB left turns. Does not improve connectivity elsewhere. Net negative and not much better than full build intersection.	1
Operations I-5	SB Diverge LOS E, SB off-ramp queues extend to mainline, SB Ramp intersection LOS F (NB and SB approaches fail) with over 1.0 v/c for SB left-turns. NB Ramps operate well.	**3**
Safety	Adds lanes and additional length for pedestrian crossings. Bikes have to merge an additional lane to make left turns onto Trosper. Net negative impact at the intersection.	0

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. RAB-CS Roundabout - Context Sensitive

Performance Attributes	Rationale	Rating
Economic Conditions	Provides some increase in economic conditions by providing manageable RIRO access opportunities with roundabouts at Trosper/Cap and T/Cap (T/Cap RAB is part of Corridor Plan). Parcels would be more attractive for users and potential redevelopment. Does limit economic opportunities at the parcels in the southwest quadrant of the Cap/Trosper intersection as the footprint would eliminate access to a few parcels and there are no other accesses to those properties. In addition, this improvement alone would cause significant congestion through the corridor making it difficult for consumers to access business. To take full advantage of the opportunities this alternative provides it would need to be combined with a traffic diversion improvement.	5
Network Connnect	Provides an intersection footprint consistent with the Plan. Provides gateway to the corridor and maintains existing connections. Due to traffic delays local property access on northbound Capitol will be difficult which may encourage users to use other businesses. The positive is that it does provide a roundabout corridor making RIROs attractive. Potential for local property access improvements with future projects. Consistent with corridor plan but must be combined with a traffic diversion alternative.	6
Neighborhoods/Envr	Within the scale of the Corridor Plan and provides a complete roundabout corridor through the study area. Provides great opportunities for landscaping via medians and roundabout island. Does limit if not remove access options for a few parcels at the southwest quadrant of the intersection.	7
Operations - Cap/Tros	LOS F with NB v/c of 1.8+. Queues for NB approach exceed 1 mile. Other approaches operate reasonably well	**1**
Corridor Operations	Littlerock Road with queueing on all approaches, Trosper Rd Congestion EB, Capitol Blvd congestion North and south of Trosper. Tyee/Trosper and T St with LOS F	**2**
Bikes/Peds	Improves bike connectivity by adding bike lanes on Capitol Blvd and improves pedestrian connectivity by reducing the length of crossings at the intersections. Would score higher but it does not provide additional connectivity through the corridor.	6
Operations I-5	SB Diverge LOS E, SB off-ramp queues extend to mainline, SB Ramp intersection LOS F (NB and SB approaches fail) with over 1.0 v/c for SB left-turns. NB Ramps operate well.	**3**
Safety	Improves bike and ped safety through the intersection though intersection is failing increasing risk of collisions. Bike lanes would be added to Capitol Blvd as part of project. Peds crossing up to 2 lanes.	7

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. Ruby-TD Ruby Street Ramps - Traffic Diversion

Performance Attributes	Rationale	Rating
Economic Conditions	Increased economic opportunities with the parcels between I-5 and Capitol south of Trosper and north of Lee. Does not prevent vehicles wanting to access I-5 from still accessing Capitol/Trosper intersection and the businesses adjacent to the intersection. The left turn accesses on Capitol are less of a concern, though still exist, with traffic being diverted at Lee St.	8
Network Connnect	Provides network connection between Trosper and T Street consistent with the Plan. Improvements are at a scale consistent with the plan. Local access to I-5 greatly improved (Linderson traffic can now bypass Capitol).	8
Neighborhoods/Envr	Connector street between Trosper and Lee is within the Corridor Plan though as more of a local access street. Diverting traffic allows the Capitol Blvd improvements to be scaled down to match the rest of the Corridor Plan visions. Great opportunity for aesthetic improvements via median and roundabout landscaping. Greater opportunity for improved access to properties in the southwest quadrant of Cap/Trosper. Overall built environment within Corridor Plan scale.	8
Operations - Cap/Tros	LOS E with NB v/c of 1.05 being worst v/c for all critical lanes. NB and EB queuing are not causing downstream congestion. SB queue improved from baseline. WB approach still experiences congestion	**8**
Corridor Operations	Littlerock Road with queuing on all approaches, Trosper Rd Congestion EB, Capitol Blvd NB queuing not an issue, SB queuing north of Trosper still occurs. Lee St as RIRO operates at LOS C and RAB at T St operates at LOS D with all queues under 400' and all v/c under 0.88	**6**
Bikes/Peds	Reduces traffic at Capitol/Trosper making it more attractive for bikes/peds, adds an additional route for bikes/peds to reach Trosper Rd or areas south of Trosper for bikes/peds coming from Trosper.	8
Operations I-5	SB Diverge LOS E, SB off-ramp queue exceeds 1,000' but does not extend to mainline, SB Ramp intersection LOS F (NB, EB and SB approaches fail) with over 1.15 v/c for SB left-turns. **NB Ramps operate well.**	**6**
Safety	No changes to the Capitol/Trosper geometry however traffic is reduced. The intersection with the new road not only provides additional routes but would have shorter pedestrian crossings. The ramp terminal would be a roundabout. Roundabout will help prevent entering I-5 headed the wrong way. Current configuration has no buffer preventing wrong way entrance. Overall positive impact to safety.	8

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. I-5 X - TD I-5 Crossing - Traffic Diversion

Performance Attributes	Rationale	Rating
Economic Conditions	Potential for increased economic conditions on Capitol Blvd south of Lee St by providing an alternate route for vehicles to access Capitol Blvd from Littlerock Rd. Due to latent demand the models still show significant traffic using the Capitol/Trosper intersection which would still cause access management issues with businesses between Trosper and Lee. Additional improvements to the Capitol corridor would be required to improve conditions between those two streets.	4
Network Connnect	Network is beyond the scope envisioned in the Plan. Access between the Fred Meyer and Costco parking lots would be significantly reduced if not eliminated. Unknown impacts to Littlerock Rd. Local access on Capitol would remain unchanged. Business accesses would still experience difficulty as the traffic model shows a significant number of vehicles accessing the crossing are latent demand trips and it does not significantly reduce trips at Capitol/Trosper. Gets some points for providing another connection to Littlerock Rd.	2
Neighborhoods/Envr	Neighborhoods along T Street would be negatively impacted with the additional traffic. Does not provide additional benefits to neighborhoods to counter that impact. Aesthetically an underpass adjacent to residential multi-family properties is not pleasing	0
Operations - Cap/Tros	LOS E/F with SB queue exceeding 1/2 mile. EB queue extends into upstream intersections. NB approach is improved, both v/c and queue.	**3**
Corridor Operations	Littlerock intersection experiences less queue problems. Trosper EB queue does not occur through interchange area. Tyee operates at LOS E	**6**
Bikes/Peds	Provides additional access to Littlerock for bikes and peds allowing them to access Littlerock Rd/Capitol Blvd without using Capitol/Trosper.	8
Operations I-5	SB Diverge LOS E, SB off-ramp queues extend to mainline, SB Ramp intersection LOS E (NB and EB approaches fail) with over 1.0 v/c for SB through. NB Ramps operate well.	**4**
Safety	No changes to safety. Pedestrians crossing 5-6 lanes on Capitol/Trosper. Does provide an alternate route for bike/peds accessing Littlerock Rd and that route would likely be safer than traveling through Cap/Trosper and the Tyee off-ramps.	6

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. EL - TD Closure of East Leg at Capital/Trosper - Traffic Diversion

Performance Attributes	Rationale	Rating
Economic Conditions	Closing the east leg of the intersection would have a negative impact on business on the east side of the intersection without constructing the north-south local access road identified in the Corridor Plan. Sites such as the Burger King site would become unattractive for users and potential developers.	0
Network Connnect	Has a negative impact on businesses east of the intersection. For instance Burger King's drive thru circulation would be significantly impacted and would require vehicles to use the unsignalized intersection at Linda St which would make it virtually impossible to access I-5 without u-turning north of the Capitol/Trosper Rd intersection. Left turns would be out of the question during peak hours. Users could work their way through parking lots to Ruby St which would make it somewhat easier to get into the left turn lanes but that is unattractive option for those business owners.	0
Neighborhoods/Envr	No change to built environment. Does not create aesthetic improvement opportunities. Not a significant impact one way or the other.	2
Operations - Cap/Tros	LOS E with all approaches have a v/c greater than 1.0. SB queue exceeds 3/4 mile and EB queue extends into upstream intersections. NB queue and LOS improved.	**3**
Corridor Operations	Littlerock/Trosper LOS E, Lee St with multiple v/c ratios over 1.0, Trosper EB queue improved, T St LOS F. Capitol Blvd NB queue still causing congestion	**2**
Bikes/Peds	Does not create additional connectivity for bikes/pedestrians. Does not remove connectivity. Net no change. Bike lanes could be added to Capitol.	2
Operations I-5	SB Diverge LOS E, SB off-ramp queues barely extend to mainline, SB Ramp intersection LOS F (NB and SB approaches fail) with over 1.0 v/c for SB left-turns. NB Ramps operate well, with EB queue improving from baseline	**5**
Safety	Pedestrian and bicycle safety improve through a 3 leg intersection vs a 4-leg intersection along with vehicle safety. No improvements elsewhere along the corridor. Overall impact is not that large as the east leg is only 3 lanes and does not see a significant amount of the traffic at Capitol/Trosper.	3

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. NS - TD North-South Couplet - Traffic Diversion

Performance Attributes	Rationale	Rating
Economic Conditions	Mixed potential for negative and positive impacts. The south end of the couplet could provide greater opportunity for increased economic conditions providing multiple access opportunities. The north end of the road would reduce the parcels sizes to where they would hardly be usable.	2
Network Connnect	Beyond scale of the north south connector street identified in the corridor plan (arterial vs local collector/access). Local access improves for northbound traffic on the east side of Capitol but not for the west side. Capitol/Trosper queue shifts from Capitol to the north-south connector and is greater than the length of the connector if it started at T Street (likely location). This would put added pressure on the neighborhood connectors east of the road.	1
Neighborhoods/Envr	Built environment for the couplet is significantly beyond the scale envisioned in the Corridor Plan (arterial vs local access). Could improve access to the east side neighborhoods. Potential for aesthetically pleasing landscaping.	1
Operations - Cap/Tros	LOS C with v/c all under 1.0. SB queue exceeds 1/2 mile and new WB approach queue exceeds 1/2 mile, which would lock up the NB portion of the couplet. EB queue extends into upstream intersections	**4**
Corridor Operations	Queue congestion EB and WB on Trosper Rd through interchange area. Littlerock/Trosper with queuing on all approaches. NB Capitol queue improved, but WB Trosper Rd at Trosper/Capitol worse.	**1**
Bikes/Peds	Additional connectivity on east side of Capitol for bikes/peds. However, parking lot connections and local access roads provide connectivity on that side of the corridor so the benefit is not as great as it would be if connections were added on the west side of the road.	5
Operations I-5	SB Diverge LOS E, SB off-ramp queues extend to mainline, SB Ramp intersection LOS F (NB, WB and SB approaches fail) with over 1.0 v/c for SB through. NB Ramps operate well.	**3**
Safety	Reduces lanes at Capitol/Trosper making it safer for peds/bikes. Overall positive impact but not much different than the current conditions.	4

PERFORMANCE SCORING

Capital Blvd/Trosper Rd I/S Transportation Study

Alternative No. Trans - TD Transit Center and Park & Ride - Traffic Diversion

Performance Attributes	Rationale	Rating
Economic Conditions	Increased transit stops along Capitol Blvd would help increase economics with non-motorized users. However, this option would not make any changes with access management or additional connections. The rating assumes any benefit we get with traffic being reduced and foot traffic increasing would be negated by increased vehicle traffic and no further improvements.	2
Network Connnect	Does not provide any added benefit to network connectivity consistent with the corridor plan although increased transit opportunities are part of the plan it does not specifically address other needs. Can be coordinated with IT to provide additional stops off the main corridor to encourage ridership. Scores 0 for additional road network and 8 for transit consistency with the Plan for avg of 4.	4
Neighborhoods/Envr	No changes.	2
Operations - Cap/Tros	LOS E with multiple approaches having a v/c greater than 1.0. NB queue extends into upstream intersections but improved from baseline, SB queue approximately 1/2 mile, and WB approach experiences congestion. EB approach does not queue back into upstream intersections	**3**
Corridor Operations	Littlerock/Trosper with only EB queue congestion. Tyee/Trosper at LOS E and improved v/c ratios. Trosper EB queue through corridor, T St LOS F	**4**
Bikes/Peds	Bike and ped connectivity increases through additional transit stop locations and more frequent bus routes. Scores negatively as it does not provide walking/cycling routes and positively as the bike/ped traffic has an alternate method to reach their destination.	5
Operations I-5	SB Diverge LOS E, SB off-ramp queues extend to mainline, SB Ramp intersection LOS E (NB, WB and SB approaches fail) with over 1.0 v/c for SB through. NB Ramps operate well.	**4**
Safety	Decreased vehicle volume and providing pedestrians and bikes with an alternate method of transportation to and from the corridor would help increase safety. However, the vehicle trip reduction is not significant enough to provide additional safety beyond what is there today.	6

PERFORMANCE SCALES

Capital Blvd/Trosper Rd I/S Transportation Study

Performance Attribute	**Definition**	
Economic Conditions	Increase attractiveness for property owners and developers to redevelop along the Corridor – qualitative	
Scales		
Rating	**Rating Rationale**	**Rating**
Unacceptable	Negatively impacts economic conditions through the Corridor Plan study area	0
	No changes	2
		4
	Provides some opportunity improvement to economic conditions in form of redevelopment and attractiveness of properties. Factors impacting economic conditions include ease of access, traffic conditions, lot size, etc.	6
	Provides improvements to economic conditions, but requires additional improvements to take full advantage.	8
Ideal	Provides much opportunity for economic improvements.	10

Performance Attribute	**Definition**	
Network Connectivity	Create a road network and local access consistent with the Corridor Plan - qualitative	
Scales		
Rating	**Rating Rationale**	**Rating**
Unacceptable	In conflict with Corridor Plan in both scale and vision.	0
		2
		4
		6
	Mostly consistent with the Corridor Plan	8
Ideal	Matches and improves on Corridor Plan	10

Performance Attribute	**Definition**	
Neighborhoods/ENVR	Create neighborhoods and environmental changes and aesthetics consistent with the Corridor Plan - qualitative	
Scales		
Rating	**Rating Rationale**	**Rating**
Unacceptable	Not consistent with corridor goals for built environment, aesthetics, and neighborhoods	0
	No significant changes one way or the other.	2
	Creates some improvement	4
		6
		8
Ideal	Creates much improvement	10

PERFORMANCE SCALES

Capital Blvd/Trosper Rd I/S Transportation Study

Performance Attribute	**Definition**	
Operations - Cap/Tros	Minimize peak hour queue length (linear feet) and minimize peak hour intersection delay (seconds)	
Scales		
Rating	**Rating Rationale**	**Rating**
Unacceptable	A LOS of F, with one or more approaches at V/C greater than 1.1, and multiple queues extending upstream for over 2,000 feet	0
		2
	A LOS of E or better, with only one critical movement at v/c 1.1 or greater and only one approach with a queue failure (over 1/2 mile)	4
	A LOS of E or better, with only one critical movement at v/c 1.1 or greater and limited queue impacts upstream	6
		8
Ideal	A LOS of D or better, with no v/c greater than 1.1 and no queues impacting upstream intersections	10

Performance Attribute	**Definition**	
Corridor Operations	Minimize peak hour queue length (linear feet) and minimize peak hour intersection delay (seconds)	
Scales		
Rating	**Rating Rationale**	**Rating**
Unacceptable	Queues back up both directions on Trosper Road, Queues back up along Capitol Blvd south of Trosper, multiple failing intersections	0
		2
	One of either Trosper Rd or Capitol Blvd experiences corridor congestion, most intersections operating at LOS E or better	4
		6
		8
Ideal	No queuing issues along Trosper through the interchange, no queue issues along Capitol Blvd, Intersection LOS D or better	10

PERFORMANCE SCALES

Capital Blvd/Trosper Rd I/S Transportation Study

Performance Attribute	**Definition**	
Bicycles/Pedestrians	Provide mobility and access to transit for bicycles and pedestrians through/near the intersection and the corridor – qualitative or HCM 2010.	
Scales		
Rating	**Rating Rationale**	**Rating**
Unacceptable	Negatively impacts bike and pedestrian connectivity through the corridor. (large or congested intersections with no bike lanes on Capitol Blvd)	0
	No changes to connectivity other than potential use of bike lanes on Capitol.	2
		4
		6
		8
Ideal	Reduced intersection size at Cap/Trosper, alternate connections to major roads (Trosper, Cap, Littlerock, etc.) with bike lanes, additional transit opportunities (transit center, bus stops, etc.)	10

Performance Attribute	**Definition**	
I-5 Operations	I-5 operations – freeway merge/diverge (LOS); and ramp terminal (delay/queue)	
Scales		
Rating	**Rating Rationale**	**Rating**
Unacceptable	A failing Merge/Diverge LOS, queues that extend back to the mainline, ramp approach v/c ratios of 1.15 or greater and LOS F at the ramp intersections	0
		2
	Merge/Diverge LOS E or better, SB Ramp terminal with LOS E or better and v/c ratios of less than 1.15 for ramp approaches. SB ramp queues extend to mainline	4
	Merge/Diverge LOS E or better, no ramp approach v/c ratios exceeding 1.15, Intersection LOS E or better and no queues back to mainline	6
		8
Ideal	Merge/Diverge LOS of D or better, no queuing back to mainline, no approach v/c ratios over 1.0 and ramp intersection LOS D or better	10

PERFORMANCE SCALES

Capital Blvd/Trosper Rd I/S Transportation Study

Performance Attribute	**Definition**	
Vehicle, Bike and Ped Safety	Projected collisions for vehicles, bikes and pedestrians - qualitative	
Scales		
Rating	**Rating Rationale**	**Rating**
Unacceptable	Pedestrian crossings 6+ lanes at Capitol/Trosper, large intersections and cross sections requiring bikes to merge through multiple lanes to make left turns,	0
	No changes	2
		4
		6
		8
Ideal	Traffic reduction in intersections, designated bike paths, pedestrian crossings 1-2 lanes max	10

Appendix D
Project Costs

Appendix D.1 – Right-of-way Acquisition Costs

Appendix D.2 – Design and Construction Costs

Right-of-Way Acquisition Estimate

Roundabout - 2040 Capacity

Parcel	Address	2014 Assessed Parcel Value	Parcel Area	Parcel Value per SF	ROW Acquisition	ROW Cost	Acquisition Costs	Commercial, Rental, Apartment Relocation	Single Family Unit	Cost
09080061000	5210 Capitol Blvd SE	$ 517,900	27,300	$ 19	27,300	$ 517,900	$ 112,850	1		$ 630,750
09080065000	5204 Capitol Way N	$ 163,400	8,400	$ 19	500	$ 9,726	$ 7,450			$ 17,176
12834440300	5252 Capitol Blvd S	$ 904,250	18,700	$ 48	18,700	$ 904,250	$ 112,850	1		$ 1,017,100
12834440400	5301 Capitol Blvd SW	$ 907,950	22,600	$ 40	22,600	$ 907,950	$ 112,850	1		$ 1,020,800
12834440600	Access	$ 31,150	16,200	$ 2	9,200	$ 17,690	$ 7,450			$ 25,140
12834440602	211 Trosper Rd SW	$ 706,550	20,500	$ 34	20,500	$ 706,550	$ 112,850	1		$ 819,400
12834440701	5403 Capitol Blvd S	$ 953,350	48,300	$ 20	1,200	$ 23,686	$ 7,450			$ 31,136
44100201400	5300 Capitol Blvd S	$ 758,150	16,300	$ 47	200	$ 9,302	$ 7,450			$ 16,752
44100201600	5310 Capitol Blvd SE	$ 770,150	17,000	$ 45	10,000	$ 453,029	$ 17,850			$ 470,879
						Total				**$ 4,050,000**

Right-of-Way Acquisition Estimate

Double Right Turns

Parcel	Address	2014 Assessed Parcel Value	Parcel Area	Parcel Value per SF	ROW Acquisition	ROW Cost	Acquisition Costs	Commercial, Rental, Apartment Relocation	Single Family Unit	Cost
12834440400	5301 Capitol Blvd SW	$ 907,950	22,600	$ 40	22,600	$ 907,950	$ 97,850	1		$ 1,005,800
12834440602	211 Trosper Rd SW	$ 706,550	20,500	$ 34	1,000	$ 34,466	$ 17,850			$ 52,316
12834440701	5403 Capitol Blvd S	$ 953,350	48,300	$ 20	200	$ 3,948	$ 7,450			$ 11,398
						Total				**$ 1,070,000**

Right-of-Way Acquisition Estimate

Signal - Context Sensitive

Parcel	Address	2014 Assessed Parcel Value	Parcel Area	Parcel Value per SF	ROW Acquisition	ROW Cost	Acquisition Costs	Commercial, Rental, Apartment Relocation	Single Family Unit	Cost
12834440400	5301 Capitol Blvd SW	$ 907,950	22,600	$ 40	22,600	$ 907,950	$ 112,850	1		$ 1,020,800
12834440602	211 Trosper Rd SW	$ 706,550	20,500	$ 34	1,000	$ 34,466	$ 17,850			$ 52,316
12834440701	5403 Capitol Blvd S	$ 953,350	48,300	$ 20	200	$ 3,948	$ 7,450			$ 11,398
12834440901	5407 Capitol Blvd S	$ 278,000	53,000	$ 5	1,400	$ 7,343	$ 7,450			$ 14,793
12834441001	5409 Capitol Blvd S	$ 1,239,800	48,100	$ 26	48,100	$ 1,239,800	$ 112,850	1		$ 1,352,650
12834441300	5421 Capitol Blvd S	$ 358,150	16,300	$ 22	1,900	$ 41,748	$ 17,850			$ 59,598
12834443700	5595 Capitol Blvd SW	$ 483,550	10,000	$ 48	10,000	$ 483,550	$ 112,850	1		$ 596,400
44100201400	5300 Capitol Blvd S	$ 758,150	16,300	$ 47	16,300	$ 758,150	$ 112,850	1		$ 871,000
44100201600	5310 Capitol Blvd SE	$ 770,150	17,000	$ 45	17,000	$ 770,150	$ 112,850	1		$ 883,000
44100301200	5400 Capitol Blvd S	$ 1,152,400	35,600	$ 32	3,100	$ 100,349	$ 17,850			$ 118,199
						Total				**$ 4,990,000**

Right-of-Way Acquisition Estimate

Roundabout - Context Sensitive

Parcel	Address	2014 Assessed Parcel Value	Parcel Area	Parcel Value per SF	ROW Acquisition	ROW Cost	Acquisition Costs	Commercial, Rental, Apartment Relocation	Single Family Unit	Cost
09080061000	5210 Capitol Blvd SE	$ 517,900	27,300	$ 19	3,900	$ 73,986	$ 17,850			$ 91,836
09080065000	5204 Capitol Way N	$ 163,400	8,400	$ 19	500	$ 9,726	$ 7,450			$ 17,176
12834440300	5252 Capitol Blvd S	$ 904,250	18,700	$ 48	800	$ 38,684	$ 17,850			$ 56,534
12834440400	5301 Capitol Blvd SW	$ 907,950	22,600	$ 40	22,600	$ 907,950	$ 112,850	1		$ 1,020,800
12834440600	Access	$ 31,150	16,200	$ 2	9,200	$ 17,690	$ 7,450			$ 25,140
12834440602	211 Trosper Rd SW	$ 706,550	20,500	$ 34	20,500	$ 706,550	$ 112,850	1		$ 819,400
12834440701	5403 Capitol Blvd S	$ 953,350	48,300	$ 20	1,200	$ 23,686	$ 7,450			$ 31,136
44100201400	5300 Capitol Blvd S	$ 758,150	16,300	$ 47	200	$ 9,302	$ 7,450			$ 16,752
44100201600	5310 Capitol Blvd SE	$ 770,150	17,000	$ 45	10,000	$ 453,029	$ 17,850			$ 470,879
						Total				**$ 2,550,000**

Right-of-Way Acquisition Estimate

Ruby Ramps (Trosper Rd to Lee St)

Parcel	Address	2014 Assessed Parcel Value	Parcel Area	Parcel Value per SF	ROW Acquisition	ROW Cost	Acquisition Costs	Commercial, Rental, Apartment Relocation	Single Family Unit	Cost
12834444000	348 Lee St SW	$ 680,900	24,000	$ 28	24,000	$ 680,900	$ 777,850	8		$ 1,458,750
						Total				**$ 1,460,000**

Right-of-Way Acquisition Estimate

I-5 Crossing at T Street

Parcel	Address	2014 Assessed Parcel Value	Parcel Area	Parcel Value per SF	ROW Acquisition	ROW Cost	Acquisition Costs	Commercial, Rental, Apartment Relocation	Single Family Unit Relocation	Cost
12703111700	301 T St SW	$ 8,993,700	406,000	$ 22	12,500	$ 276,900	$ 17,850			$ 294,750
12703120101	5880 Linderson Way SW	$ 692,800	41,500	$ 17	5,200	$ 86,900	$ 17,850			$ 104,750
12834430101	5330 Littlerock Rd SW	$ 714,900	23,000	$ 31	1,300	$ 40,500	$ 17,850			$ 58,350
12834430501	5735 Linderson Way SW	$ 647,700	17,500	$ 37	17,500	$ 647,700	$ 112,850	1		$ 760,550
12834430502	555 Trosper Rd SW	$ 12,891,950	512,000	$ 25	22,200	$ 559,000	$ 17,850			$ 576,850
12834430504	5402 Littlerock Rd SW	$ -	14,000	$ 10	1,600	$ 16,000	$ 7,450			$ 23,450
12834430800	550 Littlerock Rd SW	$ 11,204,850	583,000	$ 19	22,500	$ 432,500	$ 17,850			$ 450,350
12834441500	207 Lee St SW	$ 278,000	12,200	$ 23	3,500	$ 79,800	$ 17,850			$ 97,650
12834442200	228 W T St SW	$ 184,150	16,200	$ 11	3,500	$ 39,800	$ 17,850			$ 57,650
12834443400	227 Gerth St SW	$ 148,650	12,300	$ 12	12,300	$ 148,700	$ 112,850	1		$ 261,550
12834443900	411 Lee St SW	$ 5,363,050	168,000	$ 32	68,000	$ 2,170,800	$ 17,850			$ 2,188,650
12834444200	5701 6th Ave SW	$ 2,757,600	148,000	$ 19	28,500	$ 531,100	$ 17,850			$ 548,950
12834444400	348 Lee St SW	$ 120,350	7,600	$ 16	7,600	$ 120,400	$ 112,850	1		$ 233,250
12844430500	5737 Linderson Way SW	$ 430,800	26,200	$ 16	26,200	$ 430,800	$ 112,850	1		$ 543,650
				Total						**$6,210,000**

Right-of-Way Acquisition Estimate

North - South Couplet

Parcel	Address	2014 Assessed Parcel Value	Parcel Area	Parcel Value per SF	ROW Acquisition	ROW Cost	Acquisition Costs	Commercial, Rental, Apartment Relocation	Single Family Unit	Cost
09080053000	5188 Capitol Blvd S	$ 3,950,450	85,400	$ 46	85,400	$ 3,950,450	$ 112,850	1		$ 4,063,300
09080054000	5178 Capitol Blvd SE	$ 908,350	46,200	$ 20	23,100	$ 454,175	$ 17,850			$ 472,025
09080058000	5212 Capitol Blvd SE	$ 484,850	13,500	$ 36	27,300	$ 980,474	$ 112,850	1		$ 1,093,324
09080061000	5210 Capitol Blvd SE	$ 517,900	27,300	$ 19	27,300	$ 517,900	$ 112,850	1		$ 630,750
09080060000	5220 Capitol Blvd S	$ 1,025,650	15,700	$ 65	15,700	$ 1,025,650	$ 112,850	1		$ 1,138,500
09080065000	5204 Capitol Blvd N	$ 163,400	8,400	$ 19	8,400	$ 163,400	$ 17,850			$ 181,250
12834440300	5252 Capitol Blvd S	$ 904,250	18,700	$ 48	18,700	$ 904,250	$ 112,850	1		$ 1,017,100
12834440600	Access	$ 31,150	14,375	$ 2	14,375	$ 31,150	$ 17,850			$ 49,000
44100400900	113 Lee St SE	$ 307,700	15,250	$ 20	15,250	$ 307,700	$ 112,850	1		$ 420,550
44100201200	100 Ruby St SE	$ 733,600	22,300	$ 33	22,300	$ 733,600	$ 112,850	1		$ 846,450
44100201400	5300 Capitol Blvd S	$ 758,150	16,300	$ 47	16,300	$ 758,150	$ 112,850	1		$ 871,000
44100201600	5310 Capitol Blvd SE	$ 770,150	17,000	$ 45	17,000	$ 770,150	$ 112,850	1		$ 883,000
44100301200	5400 Capitol Blvd S	$ 1,152,400	35,600	$ 32	35,600	$ 1,152,400	$ 112,850	1		$ 1,265,250
80400000100	5000 Capitol Blvd S	$ 7,755,150	267,500	$ 29	43,560	$ 1,262,857	$ 17,850			$ 1,280,707
80400000700	5110 Capitol Blvd S	$ 738,600	22,250	$ 33	22,250	$ 738,600	$ 112,850	1		$ 851,450
				Total						**$ 7,310,000**

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

Roundabout - 2040 Capacity

Element	Estimated Quantities	Unit	Quantity		Subtotal
Preparation				**$**	**351,285**
	Mobilization	8%	1	$	168,194
	Clearing and Grubbing	SF	20,000	$	4,591
	Roadway Excavation Incl Haul	CY	3,570	$	178,500
Roadwork				**$**	**1,195,131**
	Roadway Section	SF	77,775	$	411,977
	Conveyance	LF	1,020	$	62,118
	Water Quality/Flow Control	SF	77,775	$	290,101
	Sidewalk	LF	985	$	107,562
	Curb and Gutter	LF	1,930	$	103,602
	Erosion Control	LF	1,020	$	33,456
	Illumination	LF	1,020	$	86,700
	Undergrounding Power	LF	600	$	31,814
	Permanent Signing	LF	1,020	$	4,080
	Landscaping	LF	1,770	$	63,720
Construction Staging	**20%**			**$**	**239,026**
	Typical Construction	5%		$	-
	Staging	20%	1	$	239,026
	Difficult/Inefficient	35%		$	-
Environmental	**2%**			**$**	**23,903**
	Low	2%	1	$	23,903
	Medium	10%		$	-
	High	20%		$	-
Utilities	**10%**			**$**	**119,513**
	Low	1%		$	-
	Medium	10%	1	$	119,513
	High	20%		$	-
Engineering	**25%**			**$**	**446,360**
	Design	15%	1	$	267,816
	Construction	10%	1	$	178,544
Permitting	**13%**			**$**	**155,367**
	WSDOT	10%	1	$	119,513
	City	3%	1	$	35,854
	Subtotal			$	2,530,585
	Conceptual Contingency (30%)			$	463,925
	Total			**$**	**3,000,000**

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

Double Right Turns

Element	Estimated Quantities	Unit	Quantity		Subtotal
Preparation				**$**	**145,910**
	Mobilization	8%	1	$	86,492
	Clearing and Grubbing	SF	4,000	$	918
	Roadway Excavation Incl Haul	CY	1,170	$	58,500
Roadwork				**$**	**735,458**
	Roadway Section	SF	19,400	$	102,763
	Conveyance	LF	700	$	42,630
	Water Quality/Flow Control	SF	19,400	$	72,362
	Sidewalk	LF	650	$	70,980
	Curb and Gutter	LF	1,145	$	61,464
	Erosion Control	LF	700	$	22,960
	Signal	EACH	1	$	300,000
	Illumination	LF	700	$	59,500
	Undergrounding Power	LF		$	-
	Permanent Signing	LF	700	$	2,800
	Landscaping	LF		$	-
Construction Staging	**5%**			**$**	**36,773**
	Typical Construction	5%	1	$	36,773
	Staging	20%		$	-
	Difficult/Inefficient	35%		$	-
Environmental	**2%**			**$**	**14,709**
	Low	2%	1	$	14,709
	Medium	10%		$	-
	High	20%		$	-
Utilities	**1%**			**$**	**7,355**
	Low	1%	1	$	7,355
	Medium	10%		$	-
	High	20%		$	-
Engineering	**25%**			**$**	**229,535**
	Design	15%	1	$	137,721
	Construction	10%	1	$	91,814
Permitting	**13%**			**$**	**95,610**
	WSDOT	10%	1	$	73,546
	City	3%	1	$	22,064
	Subtotal			$	1,265,349
	Conceptual Contingency (30%)			$	264,410
	Total			**$**	**1,530,000**

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

Signal - Context Sensitive

Element	Estimated Quantities	Unit	Quantity		Subtotal
Preparation				**$**	**448,454**
	Mobilization	8%	1	$	229,535
	Clearing and Grubbing	SF	4,000	$	918
	Roadway Excavation Incl Haul	CY	4,360	$	218,000
Roadwork				**$**	**1,656,793**
	Roadway Section	SF	83,600	$	442,832
	Conveyance	LF	1,400	$	85,260
	Water Quality/Flow Control	SF	83,600	$	311,828
	Sidewalk	LF	1,350	$	147,420
	Curb and Gutter	LF	2,545	$	136,616
	Erosion Control	LF	1,400	$	45,920
	Signal	EACH	1	$	300,000
	Illumination	LF	1,400	$	119,000
	Undergrounding Power	LF	700	$	37,117
	Permanent Signing	LF	1,400	$	5,600
	Landscaping	LF	700	$	25,200
Construction Staging	**20%**			**$**	**331,359**
	Typical Construction	5%		$	-
	Staging	20%	1	$	331,359
	Difficult/Inefficient	35%		$	-
Environmental	**2%**			**$**	**33,136**
	Low	2%	1	$	33,136
	Medium	10%		$	-
	High	20%		$	-
Utilities	**10%**			**$**	**165,679**
	Low	1%		$	-
	Medium	10%	1	$	165,679
	High	20%		$	-
Engineering	**25%**			**$**	**609,151**
	Design	15%	1	$	365,491
	Construction	10%	1	$	243,660
Permitting	**13%**			**$**	**215,383**
	WSDOT	10%	1	$	165,679
	City	3%	1	$	49,704
	Subtotal			$	3,459,954
	Conceptual Contingency (30%)			$	631,574
	Total			**$**	**4,100,000**

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

Roundabout - Context Sensitive

Element	Estimated Quantities	Unit	Quantity		Subtotal
Preparation				**$**	**322,079**
	Mobilization	8%	1	$	138,987
	Clearing and Grubbing	SF	20,000	$	4,591
	Roadway Excavation Incl Haul	CY	3,570	$	178,500
Roadwork				**$**	**961,105**
	Roadway Section	SF	51,850	$	274,651
	Conveyance	LF	1,020	$	62,118
	Water Quality/Flow Control	SF	51,850	$	193,401
	Sidewalk	LF	985	$	107,562
	Curb and Gutter	LF	1,930	$	103,602
	Erosion Control	LF	1,020	$	33,456
	Illumination	LF	1,020	$	86,700
	Undergrounding Power	LF	600	$	31,814
	Permanent Signing	LF	1,020	$	4,080
	Landscaping	LF	1,770	$	63,720
Construction Staging	**20%**			**$**	**192,221**
	Typical Construction	5%		$	-
	Staging	20%	1	$	192,221
	Difficult/Inefficient	35%		$	-
Environmental	**2%**			**$**	**19,222**
	Low	2%	1	$	19,222
	Medium	10%		$	-
	High	20%		$	-
Utilities	**10%**			**$**	**96,110**
	Low	1%		$	-
	Medium	10%	1	$	96,110
	High	20%		$	-
Engineering	**25%**			**$**	**368,851**
	Design	15%	1	$	221,311
	Construction	10%	1	$	147,540
Permitting	**3%**			**$**	**28,833**
	WSDOT	10%		$	-
	City	3%	1	$	28,833
	Subtotal			$	1,988,421
	Conceptual Contingency (30%)			$	384,955
	Total			**$**	**2,380,000**

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

Ruby Ramps

Element	Estimated Quantities	Unit	Quantity		Subtotal
Preparation				**$**	**310,948**
	Mobilization	8%	1	$	182,596
	Clearing and Grubbing	SF	14,600	$	3,352
	Roadway Excavation Incl Haul	CY	2,500	$	125,000
Roadwork				**$**	**1,479,439**
	Roadway Section	SF	48,000	$	254,258
	Conveyance	LF	1,025	$	62,423
	Water Quality/Flow Control	SF	48,000	$	179,040
	Sidewalk	LF	1,025	$	111,930
	Curb and Gutter	LF	2,050	$	110,044
	Erosion Control/Landscaping	LF	1,025	$	33,620
	Signal	EACH	2	$	600,000
	Illumination	LF	1,025	$	87,125
	Undergrounding Power	LF		$	-
	Permanent Signing	LF	1,025	$	4,100
	Landscaping	LF	1,025	$	36,900
Construction Staging	**10%**			**$**	**147,944**
	Typical Construction	5%		$	-
	Staging	10%	1	$	147,944
	Difficult/Inefficient	35%		$	-
Environmental	**2%**			**$**	**29,589**
	Low	2%	1	$	29,589
	Medium	10%		$	-
	High	20%		$	-
Utilities	**1%**			**$**	**14,794**
	Low	1%	1	$	14,794
	Medium	10%		$	-
	High	20%		$	-
Engineering	**25%**			**$**	**406,846**
	Design	15%	1	$	244,107
	Construction	10%	1	$	162,738
Permitting	**13%**			**$**	**192,327**
	WSDOT	10%	1	$	147,944
	City	3%	1	$	44,383
	Subtotal			$	2,581,887
	Conceptual Contingency (30%)			$	537,116
	Total			**$**	**3,120,000**

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

I-5 Crossing at T Street

Element	Estimated Quantities	Unit	Quantity		Subtotal
Preparation				**$**	**947,980**
	Mobilization	8%	1	$	711,896
	Clearing and Grubbing	SF	26,500	$	6,084
	Roadway Excavation Incl Haul	CY	4,600	$	230,000
Roadwork				**$**	**2,286,772**
	Roadway Section	SF	108,100	$	572,610
	Conveyance	LF	3,000	$	182,700
	Water Quality/Flow Control	SF	108,100	$	403,213
	Sidewalk	LF	3,000	$	327,600
	Curb and Gutter	LF	6,000	$	322,080
	Erosion Control/Landscaping	LF	3,360	$	110,208
	Illumination	LF	3,360	$	285,600
	Undergrounding Power	LF	900	$	47,722
	Permanent Signing	LF	3,360	$	13,440
	Landscaping	LF	600	$	21,600
Bridgework				**$**	**5,352,100**
	Bridge	SF	18,720	$	3,369,600
	Wall	SF	14,540	$	727,000
	Abutments	SF	3,550	$	177,500
	Gravel Borrow	TON	77,000	$	1,078,000
	Staging	20%	1	$	1,527,774
	Difficult/Inefficient	35%		$	-
Construction Staging	**20%**			**$**	**1,527,774**
	Typical Construction	5%		$	-
	Staging	20%	1	$	1,527,774
	Difficult/Inefficient	35%		$	-
Environmental	**2%**			**$**	**152,777**
	Low	2%	1	$	152,777
	Medium	10%		$	-
	High	20%		$	-
Utilities	**1%**			**$**	**76,389**
	Low	1%	1	$	76,389
	Medium	10%		$	-
	High	20%		$	-
Engineering	**25%**			**$**	**1,909,718**
	Design	15%	1	$	1,145,831
	Construction	10%	1	$	763,887
Permitting	**13%**			**$**	**993,053**
	WSDOT	10%	1	$	763,887
	City	3%	1	$	229,166
	Subtotal			$	13,246,564
	Conceptual Contingency (30%)			$	2,576,056
	Total			**$**	**15,830,000**

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

North - South Couplet

Element	Estimated Quantities	Unit	Quantity		Subtotal
Preparation				**$**	**803,032**
	Mobilization	8%	1	$	378,032
	Clearing and Grubbing	SF	0	$	-
	Roadway Excavation Incl Haul	CY	8,500	$	425,000
Roadwork				**$**	**2,674,935**
	Roadway Section	SF	115,000	$	609,159
	Conveyance	LF	2,600	$	158,340
	Water Quality/Flow Control	SF	170,000	$	634,100
	Sidewalk	LF	2,600	$	283,920
	Curb and Gutter	LF	5,200	$	279,136
	Erosion Control	LF	2,600	$	85,280
	Signal	EACH	1	$	300,000
	Illumination	LF	2,600	$	221,000
	Undergrounding Power	LF	0	$	-
	Permanent Signing	LF	2,600	$	10,400
	Landscaping	LF	2600	$	93,600
Construction Staging	**20%**			**$**	**534,987**
	Typical Construction	5%		$	-
	Staging	20%	1	$	534,987
	Difficult/Inefficient	35%		$	-
Environmental	**5%**			**$**	**133,747**
	Low	5%	1	$	133,747
	Medium	10%		$	-
	High	20%		$	-
Utilities	**5%**			**$**	**133,747**
	Low	5%	1	$	133,747
	Medium	10%		$	-
	High	20%		$	-
Engineering	**25%**			**$**	**1,003,239**
	Design	15%	1	$	601,943
	Construction	10%	1	$	401,295
Permitting	**3%**			**$**	**80,248**
	WSDOT	10%	0	$	-
	City	3%	1	$	80,248
	Subtotal			$	5,363,934
	Conceptual Contingency (30%)			$	1,043,390
	Total			**$**	**6,410,000**

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

Backup Data for Roadway Element Unit Cost

Roadway			**Cost per Square Foot of Road**		**$5.30**		
	Cost		**Quantity for SF of roadway**				
HMA	$	80.00	0.051	ton	$	4.07	0.67 depth @ 2.05 T/CY
CSBC	$	20.00	0.057	ton	$	1.14	0.83 depth @ 1.85 T/CY
Striping	$	0.15	0.6	lf	$	0.09	
Storm Water							
Conveyance			**Cost per Linear Foot of Road**		**$60.90**		
			Quantity for each LF of Road				
Pipe	$	36.00	1.4	LF	$	50.40	Add 60' for every 150' of road for laterals
Structure Ex				cy	$	-	included in drainage structure cost
Drainage Structure	$	1,500.00	0.007	ea	$	10.50	1 structure / 150' = .007
Quality/Quantity			**Cost per Square Foot of Road**		**$3.73**		
			Quantity for SF of roadway				
Detention/Retention	$	6.50	0.5	cf	$	3.25	0.5 cf storage/sf of road (based on conceptual WWHM model)
Treatment	$	3,000.00	0.00016	ea	$	0.48	7 cartridges/acre of treatment (based on conceptual WWHM model)
Sidewalk			**Cost per Linear Foot of Road**		**$109.20**		
			Quantity for each LF of Road				
Sidewalk	$	80.00	1.33	sy	$	106.40	4"x 6' wide both sides of road
CSBC	$	20.00	0.14	ton	$	2.80	0.17' depth @ 1.85 T/CY
Bridge			**Cost per Square Foot of Bridge**		**$180.00**		
			Quantity for each SF of Bridge				
Bridge	$	180.00	1	SF	$	180.00	Dry crossing w/ piling per Appendix 12.3-A1 WSDOT Bridge DM
Curb and Gutter			**Cost per Linear Foot of Road**		**$53.68**		
			Quantity for each LF of Road				
Curb and Gutter	$	26.50	2	LF	$	53.00	both sides of road
CSBC	$	20.00	0.034	ton	$	0.68	0.17' depth @ 1.85 T/CY
Erosion Control			**Cost per Linear Foot of Road**		**$32.80**		
			Quantity for each LF of Road				
Silt Fence	$	6.00	2	LF	$	12.00	Each side of the roadway
Seeding and Mulching	$	1.00	20	sf	$	20.00	10' wide section each side of the roadway
Inlet Protection	$	100.00	0.007	ea	$	0.70	1 structure / 150' = .007
FA Erosion Control	$	0.10	1	LF	$	0.10	

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

Backup Data for Roadway Element Unit Cost

Illumination			**Cost per Linear Foot of Road**		**$85.00**	
			Quantity for each LF of Road			
Conduit/Service Connection/Wiring	$	5.00	1 LF	$	5.00	
Luminaire/Light Standard	$	8,500.00	0.008 ea	$	68.00	1 pole per 130' = .008, Non-LED
Foundation	$	1,000.00	0.008 ea	$	8.00	1 pole per 130' = .008
Jbox	$	500.00	0.008 ea	$	4.00	1 pole per 130' = .008
Wall			**Cost per Square Foot of Wall**		**$50.00**	
			Quantity for each SF of Wall			
Wall	$	50.00	1 sf	$	50.00	
Traffic Control			**Cost per Linear Foot of Road**		**$16.00**	
			Quantity for each LF of Road			
Flagger	$	40.00	0.3 hr	$	12.00	.3 Hr per linear foot of roadway
Signs	$	4.00	0.5 sf	$	2.00	.5 sf per ft of road improvements
Trucks/equipment	$	2.00	1 hr	$	2.00	1 Hr per linear foot of roadway
Signal			**Cost per Each**		**$300,000.00**	
			Quantity per Intersection			
4 poles/cabinet/sensors	$	300,000.00	1 ea	$	300,000.00	
Permanent Signing			**Cost per Linear Foot of Road**		**$4.00**	
			Quantity for each LF of Road			
Sign	$	1,000.00	0.004 ea		4	4 signs for every 1000' of roadway
Utility Relocation			**Cost per Linear Foot**		**$53.02**	
			Quantity for each LF			
Utility Trench	$	11.83	1 LF	$	11.83	
2" conduit	$	3.35	4 LF	$	13.41	4 for tele/tv
3" conduit	$	4.59	1 LF	$	4.59	1 for secondary
4" conduit	$	4.73	1 LF	$	4.73	1 for gas
6" conduit	$	8.30	1 LF	$	8.30	1 for primary
transformer vault	$	930.33	0.002 LF	$	1.86	1 every 500 ft
junction box	$	2,073.33	0.004 LF	$	8.29	1 every 250 ft
Landscaping			**Cost per Linear Foot of Road**		**$36.00**	
			Quantity for each LF of Road			
Landscaping	$	2.00	12 sf		24	6' landscape buffer both sides of road
Irrigation	$	1.00	12 sf		12	6' landscape buffer both sides of road

Conceptual Level Estimate
Capitol Blvd Trosper Rd Transportation Study

Backup Data for Roadway Element Unit Cost

Roadway Excavation Incl Haul			**Cost per Cubic Yard**	**$50.00**		
Roadway Excavation Incl Haul	$	50.00	1	C.Y.	50	1.5' depth average includes curb, gutter, and sidewalk removal
Clearing and Grubbing			**Cost per Square Foot**	**$0.23**		
Clearing and Grubbing	$	10,000.00	1	sf	0.23	$10k per acre
Gravel Borrow			**Cost per Square Foot**	**$14.00**		
Gravel Borrow	$	14.00	1	ton	14	

Appendix E
Methods and Assumptions Report

Attachment 4

Transportation Study
Capitol Boulevard/Trosper Road Intersection

Methods and Assumptions Report

Prepared for

City of Tumwater
555 Israel Road SW
Tumwater, WA 98501

Prepared by

SCJ Alliance
8730 Tallon Lane NE, Suite 200
Lacey, WA 98516
T. 360.352.1465
www.scjalliance.com

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LIST OF FIGURES

ACRONYMS

CBCP	Capitol Boulevard Corridor Plan
FHWA	Federal Highway Administration
HSP	Highway System Plan
IJR	Interchange Justification Report
MTP	Metropolitan Transportation Plan
NEPA	National Environmental Policy Act
RTP	Regional Transportation Plan
SEPA	State Environmental Policy Act
SCJ	SCJ Alliance
TRPC	Thurston Regional Planning Council
WSDOT	Washington State Department of Transportation

1. METHODS AND ASSUMPTIONS – STAKEHOLDER ACCEPTANCE

"The undersigned parties, including all members of the team from WSDOT, FHWA TRPC, and the City of Tumwater, concur with the Transportation Study Methods and Assumptions for the Capitol Boulevard/Trosper Road Intersection as presented in this document."

Stakeholder Acceptance

City of Tumwater

_____
Jay Eaton
Public Works Director

_____
Date

WSDOT – Olympic Region

_____
Steve Kim
Olympic Region Traffic Engineer

_____
Date

WSDOT – Olympic Region

_____
Dennis Engel
Olympic Region Planning Manager

_____
Date

WSDOT – Headquarters

_____
Barb De Ste. Croix
Headquarters Access and Hearings

_____
Date

WSDOT – Headquarters

_____
Scott Zeller
Assistant State Design Engineer

_____
Date

Federal Highway Administration

_____
Dean Moberg
FHWA Area Engineer

_____
Date

Thurston Regional Planning Council

_____
Thera Black
TRPC Senior Planner

_____
Date

Thurston County

_____
Scott Davis
Public Works Transportation Manager

_____
Date

2. INTRODUCTION AND PROJECT DESCRIPTION

In 2013, the City of Tumwater and Thurston Regional Planning Council (TRPC) partnered on the Capitol Boulevard Corridor Plan from M Street SE to Tumwater Boulevard SE (approximately 1.4 miles). The Capitol Boulevard Corridor Plan (CBCP) was initiated with the purpose of improving (1) economic conditions, (2) transportation options and safety for walkers, cyclists, and motorists, and (3) aesthetic appeal of Capitol Boulevard.

The CBCP identified congestion along Capitol Boulevard between W Lee Street and Trosper Road SW (about 750 feet) as one of the biggest problems in the area surrounding the Capitol Boulevard / Trosper Road intersection. However, the CBCP did not present any solutions to address the heavy congestion.

There are large regional traffic movements for (1) southbound I-5 to eastbound Trosper Road to southbound Capitol Boulevard and (2) northbound Capitol Boulevard to westbound Trosper Road to northbound I-5. There are currently double left turn lanes for the southbound I-5 off ramp and for Capitol Boulevard northbound at Trosper Road to help accommodate these heavy moves. However, lane balance at both double left turn lanes locations is poor (approximately 75% of vehicles in the shared through/left turn lane). Southbound vehicles crowd the outside left turn lane because there is only one right turn lane from eastbound Trosper Road to southbound Capitol Boulevard, and northbound vehicles crowd the outside lane because there is only one lane for the northbound I-5 on ramp from Trosper Road.

In January 2014, the City of Tumwater contracted with SCJ Alliance (SCJ) to (1) evaluate alternatives to address the heavy congestion at the Capitol Boulevard/Trosper Road intersection, and (2) develop an overall preliminary design and project footprint for Capitol Boulevard based on recommendations from the CBCP and the results of item (1). This Transportation Study is focused on item (1).

In May 2014, SCJ hosted a half-day workshop to brainstorm possible ways to address congestion at the intersection. The workshop included representatives from the City of Tumwater, City of Olympia, City of Lacey, Thurston County, Thurston Regional Planning Council, Intercity Transit, and Washington Department of Transportation (WSDOT) Headquarters Traffic.

The results of the May 2014 workshop and the subsequent alternatives screening will be carried forward and verified by the Support Team during this Transportation Study.

2.1 PURPOSE OF THE PROJECT

The purpose of the Interstate 5/Trosper Road Interchange project is to evaluate alternatives and select a preferred alternative for improving congestion at the Capitol Boulevard/Trosper Road intersection.

The current WSDOT Highway System Plan, *2007-2026 Highway System Plan* (HSP), does not include any planned projects at the Trosper Road interchange.

There is growing concern within the community about congestion and the difficulty of accessing businesses along Capitol Boulevard between Trosper Road and Lee Street. Additionally, the intersection environment for bicycling and walking does not encourage

these travel modes. Increasing growth and future redevelopment in the Capitol Boulevard corridor raises questions about the best ways to accommodate growth, while maintaining safe and acceptable levels of mobility for all travel modes.

The existing transportation network in the Capitol Boulevard/Trosper Road Intersection study area includes the interchange and the following nearby street intersections:

Interchange Intersections

- Northbound ramp terminal at Trosper Road
- Southbound ramp terminal at Trosper Road

Local Intersections

- Littlerock Road/2nd Avenue/Trosper Road
- Capitol Boulevard/Trosper Road
- Capitol Boulevard/Linda Street
- Capitol Boulevard/Ruby Street
- Capitol Boulevard/Lee Street

The limits of the study area will be verified during this Transportation Study. If appropriate, the study area will be expanded to encompass impacted areas upstream and/or downstream on I-5.

The adjacent interchanges along I-5 include Tumwater Boulevard to the south (1.5 miles), Deschutes Parkway to the north (northbound off ramp only, 0.9 miles), and US 101 to the north (1.5 miles).

This project will address the current conditions, future needs, and environmental impacts associated with improving traffic operations and safety for the congestion in the interchange area, especially at the Capitol Boulevard/Trosper Road intersection.

2.2 PROJECT LEADS AND PROPONENTS

As sponsors of the project, the following individual groups will set the goals and requirements for the project and its deliverables:

- Federal Highway Administration
- Washington State Department of Transportation
- City of Tumwater
- Thurston Regional Planning Council
- Thurston County
- Intercity Transit

2.3 ENVIRONMENTAL DOCUMENT TYPE

It is envisioned that project environmental documentation will be an Environmental Classification Summary (ECS) leading to a Documented Categorical Exclusion (DCE).

2.4 LEVEL OF DOCUMENTATION

As required by WSDOT and FHWA, eight specific policy points are to be addressed in an IJR. If this Transportation Study identifies improvements requiring the preparation of an IJR, the

anticipated level of documentation and technical content of the eight points discussion are presented below.

The eight policy points included in an IJR as identified in Chapter 550 of the WSDOT *Design Manual* are:

(1) Policy Point 1: Need for the Access Point Revision – This point responds to questions related to current and projected travel needs, and indicates why existing access points and the existing or improved local street system is unable to meet expected needs. This policy point also addresses whether anticipated demand is for short or long trips.

Traffic forecasts will be updated to reflect a 2020 Opening Year condition and to extend the prior analysis horizon year of 2035 to 2040. Refer to Sections 3 through 7 for a more detailed description of the traffic forecasting and operations analysis work.

- Using the Base Conditions operation analyses for 2014, 2020 and 2040, document the operational deficiencies at the will be discussed.
- Using the horizon year travel demand forecast, document select-link analyses for the Trosper Road ramps and discuss the demand for short trips and long trips. Evaluate the ability for local road improvements to address the operational deficiencies at the Capitol Boulevard/Trosper Road intersection.
- Using the collision analysis, document the existing safety issues at the intersection and future safety issues if changes do not occur.

(2) Policy Point 2: Reasonable Alternatives – Describe the reasonable alternatives that have been evaluated.

- Alternatives developed to support this IJR and how these alternatives met or did not meet the purpose of the improvement will be discussed.
- The process used to evaluate benefits and select the recommended alternative(s) will be developed.

This Transportation Study work will include alternatives analysis focused on addressing Policy Point 2. As the performance assessment of the recommended improvement concept(s) continues through operations analysis, consideration will be given to design enhancements or modifications.

(3) Policy Point 3: Operational and Collision Analyses - How will the proposal affect safety and traffic operations at year of opening and design year?

- The results of the local intersection and freeway operational analysis for the opening year (2020) and design year (2040) for the recommended improvements (Build Condition) will be compared to the Base Condition

results for the Trosper Road ramp merge/diverge connections and the local road intersections listed Section 2.1/4.3.

- Safety effects of the Build Condition will be identified and collision histories, rates, and types for the ramp termini and the affected local street system will be updated and documented.

(4) Policy Point 4: Access Connections and Design – Will the proposal provide fully directional interchanges connected to public streets or roads, spaced appropriately, and designed to full design level geometric control criteria?

- Conceptual horizontal design of the proposed improvements will be prepared and described.
- Design criteria, including right-of-way and access impacts will be discussed.

(5) Policy Point 5: Land Use and Transportation Plans – Is the proposed access point revision compatible with all land use and transportation plans for the area?

- Consistency with the Capitol Boulevard Corridor Plan will be summarized.
- Consistency with local, regional and state multi-modal policies and plans will be summarized.
- Current land use assumptions included in the travel demand model will be summarized.
- Consistency with local, regional, and statewide transportation plans will be discussed.

(6) Policy Point 6: Future Interchanges – Is the proposed access point revision compatible with a comprehensive network plan? Is the proposal compatible with other known new access points and known revisions to existing points?

- This policy point is not applicable since the proposal is not expected to create new access points.

(7) Policy Point 7: Coordination – Are all coordinating projects and actions programmed and funded?

- Document City of Tumwater plans to program the local improvements included in the Build Condition, and how they will work with WSDOT to program and pursue funds for the ramp modifications.

(8) Policy Point 8: Environmental Processes – What is the status of the proposal's environmental processes? This section should be something more than just a status report of the environmental process; it should be a brief summary of the environmental process.

- Environmental screening findings, the anticipated type of NEPA document and environmental permits needed to implement the improvements will be discussed.

- WSDOT approval of the environmental process prior to the final IJR approval will be discussed.

3. ANALYSIS YEARS / PERIODS

Operational analysis will include AM and PM peak hours for the following years:

- Existing Base Year – 2014
- Assumed Opening Year – 2020
- Horizon/Design Year – 2040

This analysis will include evaluation of phased implementation in 2020 (i.e., consideration of phasing ramp improvements, roundabout improvements, and local street connections).

4. PROJECT STUDY AREA

The project study area will encompass the Capitol Boulevard/Trosper Road Intersection, the I-5/Trosper Road Interchange, and the surrounding local street intersections listed in Section 2.1/4.3. See Figure 1.

The limits of the study area will be verified during this Transportation Study. If appropriate, the study area will be expanded to encompass impacted areas upstream and/or downstream on I-5.

4.1 INTERSTATE 5 FREEWAY ANALYSIS LOCATIONS

Analysis locations include the ramp merge/diverge connections for the northbound ramps and the southbound ramps.

4.2 INTERCHANGE VICINITY ANALYSIS LOCATIONS

None.

4.3 OTHER SURFACE STREET INTERSECTIONS

The following intersections will be analyzed. See Figure 2.

- Littlerock Road/2nd Avenue/Trosper Road
- Capitol Boulevard/Trosper Road
- Capitol Boulevard/Linda Street
- Capitol Boulevard/Ruby Street
- Capitol Boulevard/Lee Street
- Capitol Boulevard/T Street

5. TRAFFIC OPERATIONS ANALYSIS

For freeway operations, the *2010 Highway Capacity Manual* (HCM) using the associated *Highway Capacity* software (HCS) (version 6.5) will be used to analyze merge/diverge connections and weaving segments. Average vehicle speed and density will be used as performance measures for the HCS analysis. For the three analysis years (2014, 2020 and 2040), AM and PM peak hour analyses will be performed.

For ramp terminal/surface street operations, intersections will be analyzed as follows:

- SIDRA 6.0 software package will be used to analyze roundabout controlled intersections. HCM 2000 level of service delay thresholds will be used, matching the thresholds used for signalized intersections.
- Synchro 8.0 software will be used to analyze the operations of signalized intersections
- Synchro 8.0 software or HCS 6.5 will be used to analyze unsignalized intersections
- SimTraffic software will be used to check Synchro results for ramp queuing

6. TRAVEL FORECASTS

The existing TRPC Emme/3 travel demand model will be utilized to develop forecasts for 2020 (year of opening) and 2040 (design year). Travel forecasts for the AM and PM peak hours will be prepared.

TRPC has recently started an update of their model. If TRPC updates the model prior to completion of this study, the model update will be reviewed to verify the final study recommendations are not affected.

6.1 MODEL OVERVIEW

The existing TRPC model was selected as the preferred model to support evaluation of I-5 mainline and interchange concepts in the study area. The model study area includes all of Thurston County, including major highways and a finely detailed network of local streets. The base year of this model is 2009 and the planning horizon year is 2035. An update to 2040 is currently under development but will not be available until 2015. No interim year (i.e., 2020) model is available.

Traffic forecasts for 2040 will be developed by calculating the traffic growth between 2009 and 2035 and extending the annualized growth rate by five more years. Traffic forecasts for 2020 will be developed by interpolating output between the 2009 and 2035 models.

6.2 INTERCHANGE & INTERSECTION TRAFFIC FORECASTS

Future interchange and intersection traffic volumes will be developed using travel forecasts from the model. The model travel forecasts for each time period will be post-processed and translated into vehicle volumes for use in the operations analysis. The interchange and intersection volumes will be balanced using the freeway ramp volumes as control totals.

7. BASE YEAR HIGHWAY NETWORK ASSUMPTIONS

The following baseline conditions are assumed:

- 2014 Base Conditions
  - Existing highway network
- 2020 and 2040 Base Conditions
  - Funded TIP improvements from local jurisdictions
  - Funded STIP improvements
  - RTP transportation improvements from local and state jurisdictions

Improvements from the *Regional Transportation Plan* will be reviewed by the Support Team and selected improvements will be included.

8. BUILD HIGHWAY NETWORK ASSUMPTIONS

- Build Alternatives 2020
  - Use same local highway network as developed for the 2020 Base Conditions
  - Modify I-5 mainline and ramps, and local streets as approved by Support Team
- Build Alternatives 2040
  - Use same local highway network as developed for the 2040 Base Conditions
  - Modify I-5 mainlines and ramps, and local streets as approved by Support Team

9. SAFETY ISSUES

This Transportation Study will use the current Highway Safety Manual (HSM) Interchange Safety Analysis Tool enhanced (ISATe) spreadsheet for the Trosper Road Interchange area, and the HSM Prediction Urban and Suburban Arterials spreadsheet for the local streets segments and intersections. The most recent five years of available collision data will be used for this analysis (January 1, 2009, through December 31, 2013).

The interchange analysis will include the following:

- I-5 freeway segments in the study area.
- Ramp segments for the Trosper Road ramps
- Ramp merge/diverge points for the Trosper Road ramps
- Ramp terminals for the Trosper Road ramps

The following arterial segment and intersections will be analyzed:

- Capitol Boulevard – Segment from T Street to M Street
- Trosper Road – Segment from Littlerock Road to Capitol Boulevard

- Capitol Boulevard/Trosper Road - Intersection

10. DESIGN DEVIATIONS/JUSTIFICATIONS

Design deviations may be identified through the conceptual design work and will be documented in the Transportation Study.

11. SELECTION OF MEASURES OF EFFECTIVENESS (MOES)

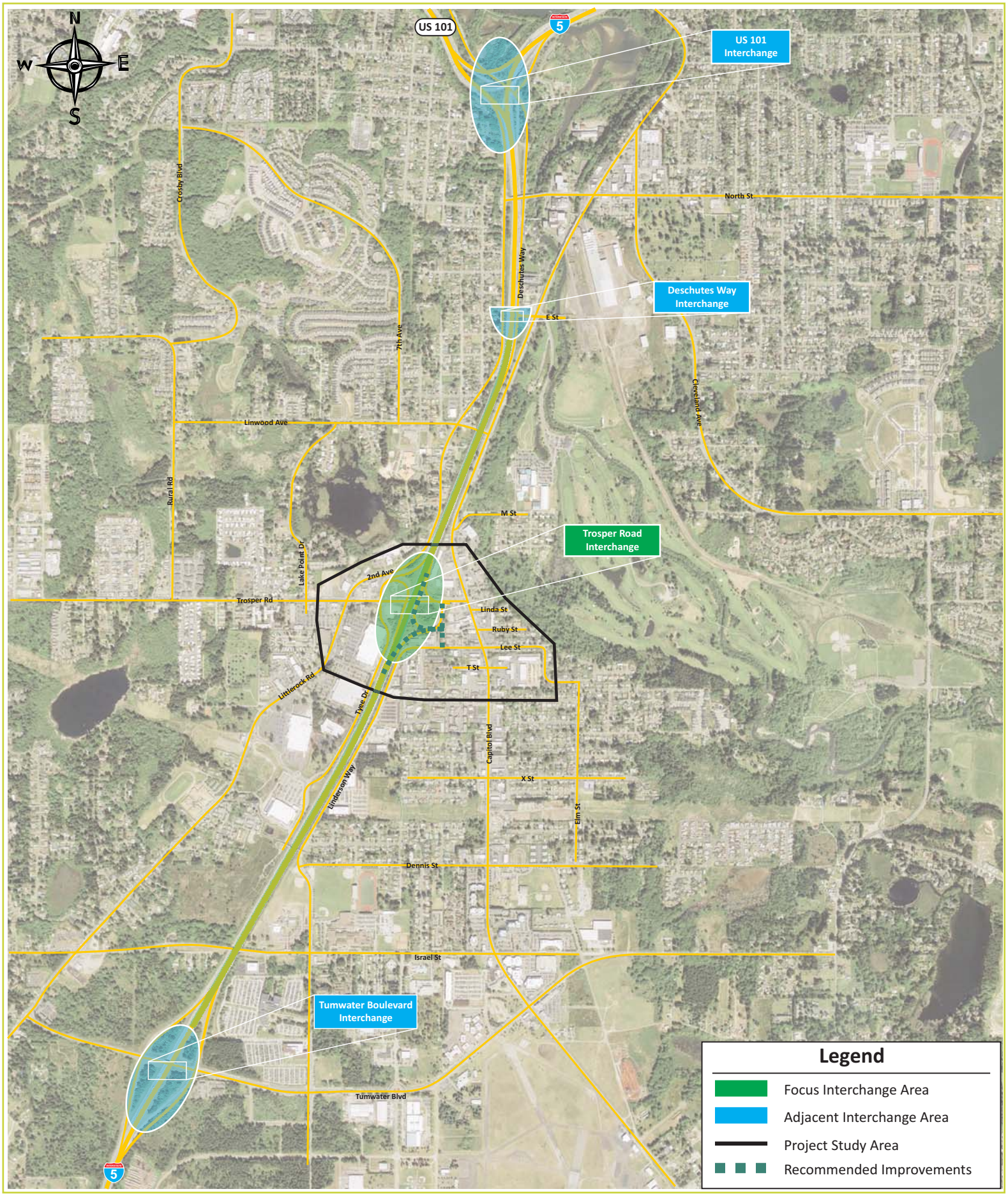
Potential metrics to be used to demonstrate how the proposal will accomplish the stated objectives include, but are not limited to:

1. Traffic operations at ramp terminals and intersections. (Average intersection delay and queuing)
2. Predicted safety performance
3. Built environment impacts (physical features)
4. Design standards/deviations
5. Right-of-way and access impacts

This list will be finalized as the evaluation methodology is developed with approval of the Support Team.

12. CONCLUSION

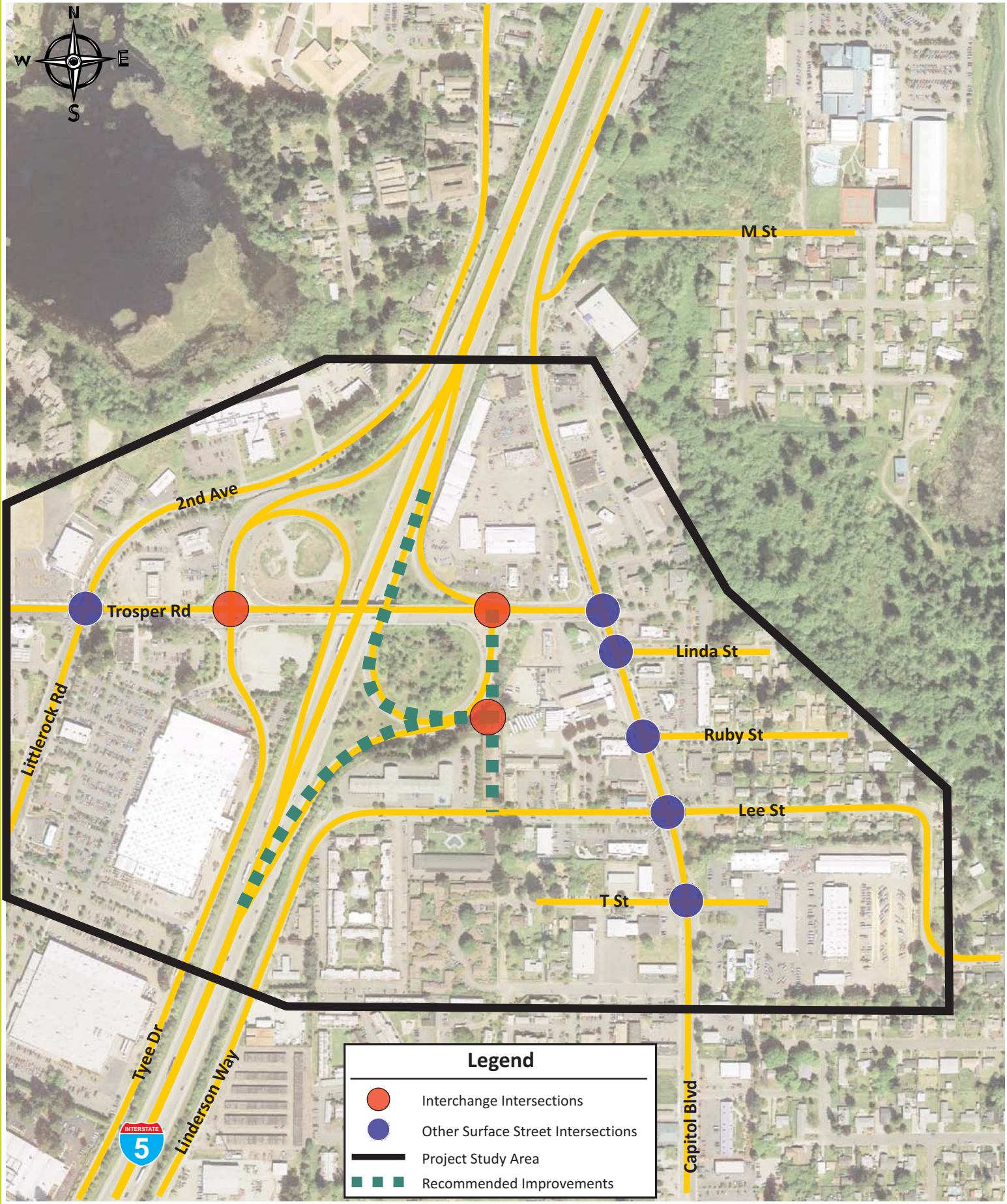
Options for improving operations at the Capitol Boulevard/Trosper Road intersection without degrading the mainline freeway or on/off-ramp operations and safety at the Trosper Road interchange will be analyzed and reviewed for this Transportation Study effort. While degradation of the state highway system is not an acceptable outcome, there may be localized areas where degradation may occur due to system tradeoffs. Engineering judgment will be applied to arrive at the best overall set of practical improvements within the study area. The Support Team will be asked to approve all key assumptions and decisions for the project



SCJ ALLIANCE
CONSULTING SERVICES

Trosper Road Interchange
Interchange Justification Report
Tumwater, Washington

Figure 1
Study Area and Interchanges



SCJ ALLIANCE
CONSULTING SERVICES

Trosper Road Interchange
Interchange Justification Report
Tumwater, Washington

Figure 2
Study Area Intersections