J-U-B ENGINEERS, INC.

J-U-B COMPANIES | THE LANGDON GROUP | GATEWAY MAPPING INC.

MEMORANDUM

DATE: May 23, 2014

TO: Jeff Peters, P.E., Transportation And Development Manager, City of Richland, WA

CC: Spencer Montgomery; Lori Labrum, P.E., P.T.O.E.; Vijay Kornala, P.E., P.T.O.E.

FROM: Imanuel Aswandi, P.E., P.T.O.E.

SUBJECT: George Washington Way/Columbia Point Drive Intersection Study Supplement

J-U-B Engineers, Inc. (J-U-B) has performed traffic analysis in support of the previously prepared Alternative Concepts for the George Washington Way/Columbia Point Drive Intersection. Two Alternative Concepts were selected in the previous analysis: The Traditional Alternative (ALT# 2) and the Split-T Alternative (ALT# 3). The City of Richland staff requested that J-U-B perform additional analysis and provide supplemental information that will help in further evaluation and assist in determining whether additional modeling should be performed. This memo includes discussion on the following:

1. The origin-destination of the traffic from I-182, to determine the percent of traffic that is completing the weave, to merge into the northbound left-turn lane at the George Washington Way/Columbia Point Drive intersection.
2. The origin-destination of the southbound George Washington Way traffic to determine the percentage of traffic going eastbound-westbound on I-182 and the percentage of traffic continuing southbound on George Washington Way (SR240).
3. The Impact of pedestrians crossing at the intersection of George Washington Way/Columbia Point on the Alternative Concepts.

In the previous analysis, the northbound traffic movements were determined from the proportion of total traffic by movement at the George Washington Way/Columbia Point Drive intersection, as collected in the turning movement counts. The southbound movements were assumed to be split, with 50% of the total traffic going to I-182 (eastbound and westbound) and 50% going south on George Washington Way (SR 240). Pedestrians were not represented in the original VISSIM traffic models.

J-U-B reviewed the data collection videos of the May 2012 traffic counts and estimated the origin and destination of the southbound traffic on George Washington Way for the PM peak hour. April 2014 field counts were used to estimate the origin and destination of the northbound traffic, including traffic from George Washington Way (SR 240) and I-182, to determine the trips completing the weave from westbound I-182 to the northbound left movement at Columbia Point Drive to Aaron Drive. The field observed origin-destination percentages were then compared to the inputs assumed in the VISSIM traffic models used to develop the Alternative

a 2875 South Decker Lake Dr., Ste. 575, Salt Lake City, Utah 84119 *p* 801 886 9052 *f* 801 886 9123 *w* www.jub.com

Concepts. J-U-B also observed the number and direction of the pedestrians crossing at the intersection, to be included in the analysis.

1. ORIGIN-DESTINATION FOR NORTHBOUND I-182 TRAFFIC.

There is an existing merge/weave condition for the westbound I-182 to northbound George Washington Way traffic turning left at Columbia Point Drive to Aaron Drive. In the original VISSIM model, it was assumed that 13.6% of westbound I-182 traffic would turn left at the Columbia Point intersection and 13.6% of the northbound George Washington Way (SR 240) traffic would turn left at the Columbia Point intersection.

After completing an origin-destination review of the field data collection, it was found that the traffic from westbound I-182 to the northbound left at George Washington Way/Columbia Point was actually 10%, not 13.6%, a net reduction in approximately 30 vehicles. **TABLE 1** shows the comparison of the original VISSIM percentages used and the field collected percentages. Since the model percentages used were higher than the actual field condition, the models represent a more conservative condition.

TABLE 1. Comparison of VISSIM and Field Observed Origin-Destination Percentages for the Northbound George Washington Way

	From			
	Northbound SR 240		Westbound I-182	
To	VISSIM	Field	VISSIM	Field
Northbound GWW Left turn	13.6%	15.0%	13.6%	10.0%
Northbound GWW Thru/RT	86.4%	85.0%	86.4%	90.0%

2. ORIGIN-DESTINATION OF THE SOUTHBOUND GEORGE WASHINGTON WAY THROUGH MOVEMENT.

The Split-T Alternative indicates that the queue length for the southbound George Washington Way movement at the Columbia Point intersection ranges from 1300 ft to 1400 ft in the PM Peak Hour. This queue length in the model is associated with poor lane utilization of southbound traffic. As it was mentioned earlier, a 50%-50% split was assumed in the VISSIM traffic model representing both westbound-eastbound I-182 and southbound George Washington Way traffic. According to the field observation, the I-182 destined traffic is approximately 8.4% less than was originally assumed, corresponding to approximately 240 less vehicles using the I-182 ramps in the PM Peak Hour. It is our opinion that this percentage change will potentially reflect a decrease in queue length for the southbound movement. While this percentage change will reflect a change to the vehicle queuing it will likely have little impact on the delay and level of service results at the intersection since the total traffic using the intersection will remain the same. **TABLE 2** shows the comparison of the VISSIM percentages and the percentages observed in the field.

a 2875 South Decker Lake Dr., Ste. 575, Salt Lake City, Utah 84119 *p* 801 886 9052 *f* 801 886 9123 *w* www.jub.com

TABLE 2. Comparison of the VISSIM and Field Observed Origin-Destination Percentages for the Southbound Direction

	From					
	Southbound GW Way		Westbound Columbia Pt Dr.		Eastbound Aaron Drive	
To	VISSIM	Field	VISSIM	Field	VISSIM	Field
Southbound SR 240	50.0%	58.4%	50.0%	42.0%	50.0%	60.6%
I-182	50.0%	41.6%	50.0%	58.0%	50.0%	39.4%

3. IMPACT OF PEDESTRIANS ON THE ALTERNATIVE CONCEPTS

Pedestrians were not originally included in the VISSIM models during the evaluation of the Alternative Concepts. The pedestrian count data indicates that there were a total of 4 pedestrians during the PM peak hour with 7 lanes on George Washington Way for pedestrian to cross on the north side of the intersection. The Traditional Alternative VISSIM model includes 10 lanes on George Washington Way and the Split-T Alternative includes 8 lanes on George Washington Way for pedestrians to cross on the north side of the intersection. The Manual on Uniform Traffic Control Devices (MUTCD) requires the pedestrian walk interval to be 4 seconds to 7 seconds, depending on the pedestrian volumes. Also, MUTCD requires the pedestrian clearance times at crosswalks to be designed based on the walking rate of 3.5 ft/sec to 4.0 ft/sec and the crossing distance. Therefore, a minimum of 35 seconds are required for pedestrians to cross the Traditional Alternative roadway section and a minimum of 29 seconds are required for pedestrians to cross the Split-T Alternative roadway section. The Split-T alternative requires lesser crossing time due to the shorter crossing distance.

For the evaluation of the Alternative Concepts, the VISSIM models included 19 seconds green time interval for the Traditional Alternative and 35 seconds for the Split-T Alternative for the George Washington Way/Columbia Point Drive intersection. The 19 seconds green time in the Traditional Alternative includes the eastbound-westbound through/right phase of the signal cycle that is available for crossing George Washington Way. Thus, the Traditional Alternative analysis results will be affected since the intersection signal cycle length will be disrupted for providing adequate time to clear the pedestrians.

In the Split-T Alternative, the westbound left/right phase is longer, approximately 35 seconds, and this time can be used to provide a pedestrian phase for crossing George Washington Way. Therefore, the Split-T Alternative analysis results will not be affected since the green time for the westbound left/right movements is sufficient for clearing the pedestrian. **TABLE 3** indicates the comparison of the VISSIM model green time intervals and the minimum pedestrian crossing time required for the George Washington Way/Columbia Point Drive intersection Alternatives.

a 2875 South Decker Lake Dr., Ste. 575, Salt Lake City, Utah 84119 *p* 801 886 9052 *f* 801 886 9123 *w* www.jub.com

TABLE 3. East-West Green Time Comparison at The George Washington Way/Columbia Point Drive Intersection

Green Time			
Traditional Alternative		Split T Alternative	
VISSIM (seconds)	Minimum for Pedestrian Crossing (seconds)	VISSIM (seconds)	Minimum for Pedestrian Crossing (seconds)
19	35	35	29

The City of Richland is considering the inclusion of pedestrians in analysis of the Alternative Concepts. If pedestrians are to be input into the traffic model, the Traditional Alternative VISSIM model would need to be re-evaluated to accommodate the pedestrian crossing requirements. However, the intersection cycle length for the Traditional Alternative is 145 seconds and it will be disrupted 4 out of 25 cycles with 4 pedestrians in one hour, which means the results of the previous analysis will not be impacted significantly, unless it is desirable to estimate a higher number of pedestrians for the 20 years forecast. As for the Split-T Alternative, it was mentioned earlier the analysis results will not be affected.

The location of the crosswalks for both, Split-T and Traditional Alternatives remain the same. The advantages of the Split-T Alternative over the Traditional Alternative are as follows:

- Shorter distance for the pedestrian crossing and therefore shorter time required to clear the pedestrians.
- Less points of conflict between the vehicles and the pedestrians (11 points vs 6 points).
- The entire signal phase of the minor street is available for pedestrian crossings with the relocation of the eastbound movements.
- The cycle length is shorter which may reduce the overall pedestrian waiting time as well as the waiting time of the vehicles.

Some disadvantages of the Split-T Alternative over the Traditional Alternative are:

- An east-west crossing on the north leg at the southern intersection is operationally undesirable and not recommended because there would be no phase of the signal cycle that allows pedestrian to cross the road.
- An east-west crossing on the south leg at the southern intersection is operationally undesirable and not recommended because the location of the crossing would be too close to the ramps. Pedestrians would continue to cross east-west at Columbia Point Drive.
- Intersection configuration could potentially lead to jaywalking on George Washington Way.

a 2875 South Decker Lake Dr., Ste. 575, Salt Lake City, Utah 84119 *p* 801 886 9052 *f* 801 886 9123 *w* www.jub.com