

Project Concept Synchro Results and Benefit/Cost Ratios

Table 1. Project Concept A1 Synchro Results and Benefit/Cost Ratios			PM Peak Hour Results						Travel Operations Benefit: Vehicle Hours of Delay Reduced	Cost (\$1 million)	Benefit / Cost Ratio
Intersection	Project Concept ID	Project Description	2035 PM Total Entering Volume	2035 Baseline PM Delay (Sec)	2035 Concept PM Delay (Sec)	2035 Baseline - Tot. Veh. Delay (Veh x Avg. Delay in minutes)	2035 Concept- Tot. Veh. Delay (Veh x Avg. Delay in minutes)	Delta (in minutes)			
Synchro Results											
148th - 150th Avenue SE / SE Eastgate Way	C101	Add a second NB left, Extend SB Left turn lane and add NB right turn pocket	5540	90	84	8310	7756	554	9.23	\$ 2.38	3.880
150th Avenue SE / SE 37th Street	C201	Add a second eastbound right (EBR), Extend SB left turn pocket, Extend SB through lane from loop ramp to SE 38 <sup>th</sup> Street	4485	73	54	5457	4037	1420	23.67	\$ 1.62	14.612
150th/SE 37th Street	C202	Restrict eastbound left (EBL) on the west approach	4485	73	49	5457	3663	1794	29.90	\$ 0.03	1196.000
150thAvenue SE / SE 37th Street	C203	Add a second westbound left (WBL) and westbound right (WBR) turn pocket	4485	73	35	5457	2616	2841	47.34	\$ 0.92	51.458
I-90 On-Ramp / SE 37th Street	C302	Modify channelization between 150th Avenue SE and I-90 EB on-ramp & and traffic signal at EB on-ramp	1780	16	6.3	475	187	288	4.80	\$ 0.46	10.541
150th Avenue SE / SE 38th Street	C401	Extend NB receiving lane / right turn pocket between SE 38th Street and SE 37th Street	4360	67	67	4869	4869	0	0.00	\$ 0.52	0.000 *
150th/SE 38th Street	C402	Adjust signal timings to remove split phasing and optimize green time	4360	67	53	4869	3851	1017	16.96	\$ 0.03	678.222
VISSIM Results			2035 PM Segment Volume	2035 Corridor Travel Time (Mins)	2035 Corridor Concept Travel Time (Mins)	2035 Corridor Concept Travel Time Baseline - Concept (Mins)			Travel Operations Benefit: Vehicle Hours of Delay Reduced	Cost (\$1 million)	Benefit / Cost Ratio
Project Concept Package A1	A1	C101, C201, C202, C203, C302, C402	3015	15.8	9.9	5.9			296.475**	\$ 5.43	54.650

Sources:  
Synchro analysis, forecasted volumes, delta: Concord Engineering, 2019.  
Planning level cost estimates: KPFF, 2019.  
B/C ratio calculations: Fehr & Peers, 2019.  
Note:

\* Synchro does not calculate a benefit for this improvement, but it is accounted for in the overall corridor delay reduction as calculated by VISSIM. This lane allows for better traffic progression in the northbound direction between SE 38th and SE 37th Streets.

\*\* VISSIM results are not a summation of the Synchro delay reductions for each intersection. The VISSIM results are only presented for vehicles traveling along 148th-150th Avenue SE and consider the interaction of vehicles between intersections in addition to the intersection delay. This is a more complete picture of traffic conditions along the corridor.

Table 2. Project Concept A2 Synchro Results and Benefit/Cost Ratios			PM Peak Hour Results						Travel Operations Benefit: Vehicle Hours of Delay Reduced	Cost (\$1 million)	Benefit / Cost Ratio
Intersection	Project Concept ID	Project Description	2035 PM Total Entering Volume	2035 Baseline PM Delay (Sec)	2035 Concept PM Delay (Sec)	2035 Baseline - Tot. Veh. Delay (Veh x Avg. Delay in minutes)	2035 Concept- Tot. Veh. Delay (Veh x Avg. Delay in minutes)	Delta (in minutes)			
Synchro Results											
148th - 150th Avenue SE / SE Eastgate Way	C102	C101 + SB through lane from north of SE Eastgate Way to EB I-90 loop ramp	5540	90	61	8310	5632	2678	44.63	\$ 5.04	8.855
150th Avenue SE / SE 37th Street	C201	Add a second eastbound right (EBR), Extend SB left turn pocket, Extend SB through lane from loop ramp to SE 38th Street	4485	73	54	5457	4037	1420	23.67	\$ 1.62	14.612
150th/SE 37th Street	C202	Restrict eastbound left (EBL) on the west approach	4485	73	49	5457	3663	1794	29.90	\$ 0.03	1196.000
150thAvenue SE / SE 37th Street	C203	Add a second westbound left (WBL) and westbound right (WBR) turn pocket	4485	73	35	5457	2616	2841	47.34	\$ 0.92	51.458
I-90 On-Ramp / SE 37th Street	C302	Modify channelization between 150th Avenue SE and I-90 EB on-ramp & and traffic signal at EB on-ramp	1780	16	6.3	475	187	288	4.80	\$ 0.46	10.541
150th Avenue SE / SE 38th Street	C401	Extend NB receiving lane / right turn pocket between SE 38th Street and SE 37th Street	4360	67	67	4869	4869	0	0.00	\$ 0.52	0.000 *
150th/SE 38th Street	C402	Adjust signal timings to remove split phasing and optimize green time	4360	67	53	4869	3851	1017	16.96	\$ 0.03	678.222
VISSIM Results			2035 PM Segment Volume	2035 Corridor Travel Time (Mins)	2035 Corridor Concept Travel Time (Mins)	2035 Corridor Concept Travel Time Baseline - Concept (Mins)			Travel Operations Benefit: Vehicle Hours of Delay Reduced	Cost (\$1 million)	Benefit / Cost Ratio
Project Concept Package A1	A2	C102, C201, C202, C203, C302, C401, C402	3015	15.8	8.2	7.6			381.9**	\$ 8.61	44.381

Sources:  
Synchro analysis, forecasted volumes, delta: Concord Engineering, 2019.  
Planning level cost estimates: KPFF, 2019.  
B/C ratio calculations: Fehr & Peers, 2019.  
Note:

\* Synchro does not calculate a benefit for this improvement, but it is accounted for in the overall corridor delay reduction as calculated by VISSIM. This lane allows for better traffic progression in the northbound direction between SE 38th and SE 37th Streets.

\*\* VISSIM results are not a summation of the Synchro delay reductions for each intersection. The VISSIM results are only presented for vehicles traveling along 148th-150th Avenue SE and consider the interaction of vehicles between intersections in addition to the intersection delay. This is a more complete picture of traffic conditions along the corridor.

Table 3. Project Concept B1 Synchro Results and Benefit/Cost Ratios			PM Peak Hour Results						Travel Operations Benefit: Vehicle Hours of Delay Reduced	Cost (\$1 million)	Benefit / Cost Ratio
Intersection	Project Concept ID	Project Description	2035 PM Total Entering Volume	2035 Baseline PM Delay (Sec)	2035 Concept PM Delay (Sec)	2035 Baseline - Tot. Veh. Delay (Veh x Avg. Delay in minutes)	2035 Concept- Tot. Veh. Delay (Veh x Avg. Delay in minutes)	Delta (in minutes)			
Synchro Results											
Factoria Boulevard SE / SE 38th Street	C801	Add second WB left (maintain right turn pocket)	4225	110	94	7746	6619	1127	18.78	\$ 0.18	107.302
Factoria Boulevard SE / SE 38th Street	C802	C801 + additional channelization modifications (Add two exclusive EB left turn lanes) and WB widening	4225	110	78	7746	5493	2253	37.56	\$ 0.95	39.532
VISSIM Results			2035 PM Segment Volume	2035 Corridor Travel Time (Mins)	2035 Corridor Concept Travel Time (Mins)	2035 Corridor Concept Travel Time Baseline - Concept (Mins)			Travel Operations Benefit: Vehicle Hours of Delay Reduced	Cost (\$1 million)	Benefit / Cost Ratio
Project Concept Package B1	B1	C801, C802	2115	13.3	11.9	1.4			49.35**	\$ 1.13	43.867

Sources:  
 Synchro analysis, forecasted volumes, delta: Concord Engineering, 2019.  
 Planning level cost estimates: KPFF, 2019.  
 B/C ratio calculations: Fehr & Peers, 2019.

\*\* VISSIM results are not a summation of the Synchro delay reductions for each intersection. The VISSIM results are only presented for vehicles traveling along Factoria Boulevard SE and consider the interaction of vehicles between intersections in addition to the intersection delay. This is a more complete picture of traffic conditions along the corridor.

Table 4. Project Concepts for Other Intersections Not Included in Concept Packages Synchro Results and Benefit/Cost Ratios			PM Peak Hour Results						Travel Operations Benefit: Vehicle Hours of Delay Reduced	Cost (\$1 million)	Benefit / Cost Ratio
Intersection	Project Concept ID	Project Description	2035 PM Total Entering Volume	2035 Baseline PM Delay (Sec)	2035 Concept PM Delay (Sec)	2035 Baseline - Tot. Veh. Delay (Veh x Avg. Delay in minutes)	2035 Concept- Tot. Veh. Delay (Veh x Avg. Delay in minutes)	Delta (in minutes)			
Synchro Results											
150th/Newport Way	C501	Add 2x Left at southbound approach to alleviate queuing spillback	3545	51	22	3013	1300	1713	28.56	\$ 20.60	1.386
142nd Place SE / SE 36th Street	C1001	Add SBR and remove west crosswalk	2105	35	19	1228	667	561	9.36	\$ 0.81	11.550
139th Avenue SE / SE 32nd Street	C1201	Add traffic signal at this location	1485	250	9	6188	223	5965	99.41	\$ 0.93	106.895
VISSIM Results					Average Intersection Delay Delta (Mins)	Average Intersection Delay Delta * Tot. Veh. (Mins)			Travel Operations Benefit: Vehicle Hours of Delay Reduced	Cost (\$1 million)	Benefit / Cost Ratio
SE Eastgate Way / SE 37th Street	C901	Add traffic signal and modify channelization	1845		160	4920			82.00	\$ 1.15	71.304

Sources:  
 Synchro analysis, forecasted volumes, delta: Concord Engineering, 2019.  
 Planning level cost estimates: KPFF, 2019.  
 B/C ratio calculations: Fehr & Peers, 2019.