MEMORANDUM

Date:	November 22, 2006	**TG:**	05122.01
To:	Mike Scarey, City of SeaTac Planning Tom Gut, City of SeaTac Public Works		
From:	Larry Toedtli Jesse Birchman		
Subject:	SeaTac LRT Station Area Plans—Intersection Operations Analyses		

As requested, The Transpo Group has prepared this evaluation of forecast traffic operations related to the potential redevelopment of the areas in the vicinity of the two Sound Transit Light Rail Transit (LRT) stations serving the City. This analysis supplements Transpo's November 13, 2006 memorandum summarizing the overall transportation impacts of the potential redevelopments.

The assessment of intersection traffic operations is based on the forecast traffic volumes and the conceptual access/circulation roadway system identified for each station area as documented in Transpo's November 13, 2006 memorandum. The traffic operations analysis is intended to guide the City in identifying potential transportation improvements to support the redevelopment of the station area. Additional analyses will likely be needed to support design and construction of individual improvement projects. The additional analyses would be able to consider traffic generation and traffic volumes based on actual development projects within the station areas instead of the more conceptual land use plans used in these analyses.

The next section summarizes key findings of the analyses, including potential improvement needs. This is followed by a more detailed discussion of traffic operations analysis and traffic queue issues with the redevelopment of the SeaTac LRT Station Areas. This includes an identification of potential intersection or roadway improvements needed to help mitigate the traffic operations and queuing issues.

The final section reviews potential changes in traffic operations and improvement needs if the existing westbound off-ramp from SR 518 to S 154th Street is relocated. One option is to move the existing SR 518 westbound off-ramp to the west to align with 32nd Avenue S. Another option identified in the station area planning study calls for the SR 518 westbound off-ramp to be directly connected to northbound International Boulevard south of S 154th Street.

Summary of Findings

The following summarizes key findings of the operations analyses. Key findings and improvement needs for the S 154th Street Station Area are presented first. The improvement needs for the SeaTac/Airport Station Area are then summarized.

S 154th Street Station Area

- A traffic signal will likely be needed (and warranted) at the intersection of Military Road/S 152nd Street to resolve future level of service deficiencies (due to the short distance between Military Road and International Boulevard, the new signal should be interconnected with and coordinated with the signal at International Boulevard). Additional turn lanes will also be needed on the eastbound and southbound approaches to reduce impacts of traffic queues.
- Additional travel lanes should be considered in the eastbound direction on S 152nd Street between Military Road and International Boulevard. The additional eastbound lanes would allow modifications of the signal to eliminate the existing split phasing for the eastbound and westbound approaches. The additional travel lanes and modifications to the signal phasing would improve the overall level of service at the S 152nd Street/International Boulevard intersection. Combined, they also would help reduce the potential for eastbound traffic to queue back to the Military Road/S 152nd Street intersection.
- Closure of Military Road south of S 152nd Street would increase the eastbound right-turn movement from S 152nd Street to International Boulevard. A 35-foot curb radius would be needed to more effectively accommodate the higher volumes of right turns. The larger radius is especially needed to accommodate trucks that may make this turn. The larger radius curb would increase pedestrian crossing distances of S 152nd Street and International Boulevard.
- A traffic signal will likely be warranted in the future at the S 154th Street/32nd Avenue S intersection. A signal would be needed to resolve the forecast LOS F with an unsignalized intersection. A signal would provide LOS B operations.
- The planned improvement to widen S 154th Street to provide dual left-turn lanes on the eastbound and westbound approaches at International Boulevard will accommodate redevelopment of the station area. Some southbound queuing impacts may develop in the long term. These could be minimized by monitoring and adjusting signal timing.
- Two options were evaluated for relocating the existing SR 518 westbound off-ramp at S 154th Street. Realigning the ramp to align with 32nd Avenue S has several advantages. By moving the ramp to the west, more storage distance is provided between the ramp and International Boulevard. The relocated ramp and 32nd Avenue S alignment would both benefit from the addition of a single traffic signal. This would reduce delays for traffic from SR 518 and from the redevelopment area. The realigned off-ramp also would provide direct access from the regional highway to the redevelopment area.
- Although a high proportion of traffic using the SR 518 off-ramp has destinations north or east of the station area, a direct ramp to International

Boulevard would be difficult. Traffic queues on northbound International Boulevard will make it difficult for traffic exiting westbound SR 518 directly to safely and efficiently merge onto northbound International Boulevard. It would be very difficult for traffic from the off-ramp to "weave" across northbound traffic lanes to access the left-turn lane to S 154th Street. This would likely result in safety and operations issues or traffic shifting to S 152nd Street.

SeaTac/Airport Station Area

- Improvements will be needed at the intersection of S 170th Street/International Boulevard to address the forecast LOS F operations. Widening the westbound approach of S 170th Street to provide separate left, through, and right-turn lanes and eliminating the split phasing for the signal would provide a forecast LOS E. Southbound traffic queues could extend north for approximately 1,000 feet during the 2020 PM peak hour.
- The forecast traffic volumes would warrant a new signalized intersection at approximately S 173rd Street/International Boulevard. This would be the primary access to the north section of the SeaTac/Airport Station Area. The westbound approach should have two lanes – a left-turn lane and a shared left/right-turn lane to help minimize the impacts of traffic queues. Addition of a northbound right-turn lane would help reduce the potential for traffic queues to extend south to the S 176th Street intersection. The southbound left-turn movement will require a storage lane of approximately 600 feet to reduce the impacts on southbound through traffic.
- No improvements are needed at the S 176th Street/International Boulevard intersection to provide LOS D or better. The increase in traffic volumes will result in traffic queues in the northbound direction extending south of the S 180th Street intersection. Forecast traffic volumes result in traffic queues in the southbound left-turn lane extending to just south of the planned intersection at S 173rd Street.
- The intersections of S 180th Street/International Boulevard and S 182nd Street/International Boulevard are forecast to operate at LOS D or better with the redevelopment of the station area. Westbound traffic queues on S 180th Street could block access drives to development parcels; therefore, the location of internal access drives should be located as far east as practical to reduce conflicts. Southbound traffic on International Boulevard approaching S 182nd Street will likely queue north of S 180th Street.
- No improvements are needed at the intersections of S 170th Street/31st Avenue S or S 170th Street/32nd Avenue S to provide acceptable levels of service.
- A traffic signal will be needed (and warranted) to provide an acceptable level of service at the S 176th Street/30th Avenue S intersection which will serve as a

major access location for the station area. The future signal should be interconnected and coordinated with the existing signal at S 176th Street/International Boulevard. The City will want to consider adjustments to the signal timing and/or phasing to reduce the potential for traffic queues developing between 30th Avenue S and International Boulevard.

- No improvements are forecast to be needed at the existing signalized intersection of S 176th Street/32nd Avenue S.

Intersection Traffic Operations Analyses

The operations of an intersection can be described by its level of service (LOS). In addition, traffic queues at an intersection can affect the operations of an intersection or roadway. The level of service and queue analyses are based on the methods reported in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2000. The Synchro 6 software package was used for the evaluation.

Levels of service for an intersection range from LOS A to LOS F. LOS A indicates free-flowing traffic with little or no delays. LOS F indicates significant delays and severe congestion. At signalized intersections, level of service is measured in terms of the average control delay per vehicle and is typically reported for the intersection as a whole. At two-way, stop-controlled intersections, LOS is typically reported for the intersection movement with the highest average control delay per vehicle. The LOS at all-way stop intersections is typically reported for the overall intersection, similar to a signalized intersection. Attachment 1 provides a more detailed description of intersection levels of service.

Intersection operations analyses were conducted for the 2020 PM peak hour with the redevelopment of the two LRT station areas. The process for developing the 2020 traffic forecasts is described in Transpo's November 13, 2006 memorandum. The prior memorandum summarizes the assumed land uses, resulting trip generation, and traffic distribution/assignments for the station areas.

Attachment 2 shows the resulting 2020 PM peak hour traffic operations results with redevelopment of the station areas. The analysis assumes completion of the internal access/circulation roadways and basic improvements at key site access intersections, consistent with the results of the station area planning process. Currently funded improvements at the intersection of S 154th Street/International Boulevard are also assumed in the analyses. The second set of level of service results shown in Attachment 2 reflects additional improvement concepts identified as part of these analyses. The LOS worksheets are included in Attachment 5.

S 154th Street Station Area

Traffic operations and potential queue impacts were evaluated for five study intersections serving the major travel patterns and access to the S 154th Street station area. The part of the analysis does not assume relocation of the existing off-ramp from westbound SR 518 to S 154th Street. Additional analyses with the relocation of

the ramp are presented in the last section of this memorandum. The analysis assumes completion of the widening and reconfiguration of the S 154th Street/International Boulevard intersection based on the City and Sound Transit improvement project. The S 154th Street/International Boulevard intersection improvement has been designed and will be constructed in the near future.

The analysis assumes closure of Military Road as a through street between S 152nd Street and International Boulevard. This closure was identified during development of the station area plan. The closure will increase the volume of east-to-south right turns at the S 152nd Street/International Boulevard intersection. This right-turn movement at the S 152nd Street/International Boulevard intersection is less than a 90-degree turn. Therefore, the analysis also reviews the needed turning radius to effectively accommodate the higher volume of right turns.

S 152nd Street/32nd Avenue S. This unsignalized intersection is forecast to operate at LOS C under the 2020 PM peak hour with the station area redevelopment. The LOS C is for the low volume southbound approach and would affect approximately 25 vehicles per hour (vph). The northbound approach from the station redevelopment area is forecast to operate at LOS B during the 2020 PM peak hour. The primary movement from the station area is the north-to-east right turn.

S 152nd Street/Military Road S. This intersection is currently controlled with an all-way stop. Based on the 2020 PM peak hour forecasts, the intersection would operate at LOS F with an all-way stop. Converting the intersection to a two-way stop control configuration without stop signs on S 152nd Street also results in LOS F. Addition of turn lanes under the two-way stop control configuration also does not resolve the LOS F condition.

Installation of a traffic signal would result in LOS D if no changes are made to the channelization. However, extensive traffic queues would develop on both the southbound and eastbound approaches. Westbound queues would not likely extend to the adjacent intersection at International Boulevard. Eastbound queues on S 152nd Street from International Boulevard could, however, block the Military Road intersection unless additional eastbound lanes are added at the approach to International Boulevard. These needs are discussed below.

In order to reduce the queues on the southbound and eastbound approach, the City could add an east-to-north left-turn lane and a separate southbound left-turn lane. With this configuration and a signal, the intersection would operate at LOS C with the 2020 PM peak hour volumes. The preliminary analysis indicates that the 2020 forecast PM peak hour volumes would likely meet signal warrants.

S 152nd Street/International Boulevard. The changes in traffic volumes due to the possible closure of Military Road south of S 152nd Street, in conjunction with the redevelopment traffic and overall growth in the area, would result in a 2020 PM peak hour LOS E at this intersection. While this level of service would meet the City of SeaTac's LOS standard, extensive traffic queues would likely develop in the eastbound and southbound directions. The eastbound queues would extend west of

the Military Road intersection and the southbound queues would block the intersection of S 150th Street/International Boulevard.

In order to resolve the forecast queuing impacts, the eastbound approach could be widened to three lanes to accommodate separate left, through, and right-turn lanes. The existing two-lane westbound approach should be reconfigured as a separate left-turn lane and a shared through/right-lane. This change is needed to eliminate the split signal phasing for the east/west approaches. The northbound and southbound approaches on International Boulevard would not need to be modified. The signal timing also would need to be modified to eliminate the likelihood of the eastbound traffic queues blocking the Military Road intersection. Combined, these improvements would result in a forecast LOS C during the 2020 PM peak hour.

The east-to-south right-turn movement would see a significant increase in traffic with the closure of Military Road south of S 152nd Street. This turn movement is at less than a 90-degree intersection which would impact the ability of traffic to make this turn efficiently. The existing curb has a 25-foot radius.

An analysis of turn radius needs was conducted to identify the need for changes to the curve radius to accommodate cars, buses, and trucks. Attachment 3 shows the turn radius for a WB-40 truck making this right turn. A 35-foot curb radius would be needed to accommodate this size of truck. This would extend the pedestrian crossing distances of both International Boulevard and S 152nd Street. A 35-foot radius is also needed to accommodate a 40-foot bus. Single-unit trucks (WB-30) would have some difficulty with the 25-foot radius. Drivers of passenger cars should be able to make the turn with the existing 25-foot radius, although they would likely need to reduce their speeds which could affect traffic queues on S 152nd Street.

S 154th Street/32nd Avenue S. This currently unsignalized intersection is forecast to operate at LOS F in the future. Installation of a traffic signal would provide LOS B during the 2020 PM peak hour with redevelopment of the station area. The forecast traffic volumes would likely meet the *Manual on Uniform Traffic Control Devices* (MUTCD) warrants for installation of a traffic signal in the future, even without realignment of the SR 518 westbound off-ramp.

S 154th Street/International Boulevard. The City of SeaTac and Sound Transit have recently completed design plans for this intersection. The plans call for constructing dual eastbound and westbound left-turn lanes. With these improvements, the intersection is forecast to operate at LOS D under the 2020 PM peak hour with the station area redevelopment. The forecast traffic queues in the eastbound approach would just extend to the existing SR 518 westbound off-ramp. Southbound queues could extend to S 152nd Street approximately 5 percent of the signal cycles based on the 2020 forecasts. Slight changes to signal timing parameters could be applied to reduce or mitigate any impacts of traffic queues in the southbound direction.

SeaTac/Airport Station Area

Nine intersections serving the SeaTac/Airport Station Area were evaluated to identify potential traffic operations issues and improvement strategies. Five of the nine study

intersections are along International Boulevard which will serve the highest volume of station area traffic. In addition, intersections along S 170th and S 176th Streets are also analyzed since these corridors will also serve as key access points for the station area.

S 170th Street/International Boulevard. This intersection is impacted by station area traffic oriented to/from the north. It also will experience change in traffic patterns due to the recent closure of the northbound on-ramp to the North Airport Expressway (NAE). With redevelopment of the station area, this intersection is forecast to operate at LOS F during the 2020 PM peak hour without any changes to the existing channelization. Much of the delay is due to the existing signal's split phasing on the eastbound and westbound approaches. In addition, lengthy traffic queues could develop of approximately 1,000 feet in the southbound direction.

LOS E could be provided by adding a third westbound lane and reconfiguring the signal operations and lane configuration to eliminate the split phasing for the eastbound and westbound approaches. The revision to the east/west approaches would not eliminate the lengthy traffic queues in the southbound direction. The City also could consider adding a northbound right-turn lane to further reduce overall delays at the intersection. The intersection would operate at LOS E with or without the northbound right-turn lane.

S 173rd Street/International Boulevard. This intersection would be the main access location to the station area north of S 176th Street. The plan identifies a new signal at this intersection. The signal would be interconnected and coordinated with the adjacent signals along International Boulevard.

Assuming separate left- and right-turn lanes on the westbound approach, the new signalized intersection would operate at LOS F. The average delays would be slightly above the LOS E/F threshold of 80 seconds per vehicle. Lengthy traffic queues also would likely develop for the northbound approach, the southbound left-turns, and the westbound left-turns. The forecast volumes would warrant a traffic signal at the new intersection.

In order to help resolve the level of service and some of the queuing issues, the westbound approach could be modified to have a left-turn lane and a shared left/right-turn lane. While this configuration will result in LOS E, significant queuing impacts will still occur in the northbound through lanes and for the southbound left-turn movement. Construction of a northbound right-turn lane would help reduce the northbound queue impacts, although they could still extend into the S 176th Street intersection during some cycles. Likely traffic queues in the southbound left-turn lane will require a storage length of approximately 650 feet.

S 176th Street/International Boulevard. This intersection is forecast to operate at LOS D during the 2020 pm peak hour with the redevelopment of the station area. Extensive traffic queues are forecast for the northbound through lanes and the southbound left-turn lane. The northbound queues could extend south to the S 180th Street intersection. The southbound left-turn queues would likely extend to just south of the new S 173rd Street/International Boulevard intersection.

S 180th Street/International Boulevard. This existing signalized intersection would serve as a primary access route for the station area redevelopment south of S 176th Street. With the redevelopment, it is forecast to operate at LOS C during the 2020 PM peak hour. Traffic queues will develop on the westbound approach. Therefore, the City will want to have the major access drives to parking areas located at least 400 feet east of International Boulevard, if practical.

S 182nd Street/International Boulevard. This intersection is located just south of the station area redevelopment area. It is forecast to operate at LOS D with buildout of the redevelopment area. Southbound traffic will queue well north of the S 180th Street intersection during the 2020 PM peak hour.

S 170th Street/31st Avenue S. This intersection would provide access to/from the SeaTac/Airport Station area. LOS C is forecast for the intersection with stop signs controlling traffic on the northbound and southbound approaches. Additional turn lanes would not be required for traffic operations. However, a westbound left-turn lane may be desirable to help delineate the entrance location for the station area.

S 170th Street/32nd Avenue S. This unsignalized intersection is forecast to operate at LOS B during the 2020 PM peak hour with the station area redevelopment. No improvements were identified to improve traffic operations.

S 176th Street/30th Avenue S. This intersection provides the south access to the planned internal circulation road serving the SeaTac/Airport Station Area north of S 176th Street. It also provides access for existing and potential future redevelopment south of S 176th Street. The relatively high east/west volumes on S 176th Street will result in LOS F for the northbound and southbound approaches unless the intersection is signalized.

The 2020 forecast traffic volumes at 30th Avenue S/International Boulevard would likely meet traffic signal warrants per the MUTCD. Installation of a signal at this intersection should be interconnected and coordinated with the adjacent signals to minimize traffic operations issues. Installing a signal would result in LOS C with the redevelopment of the station area.

Traffic queues could develop in the eastbound direction that may extend west to International Boulevard. If the queues develop and impact operations at S 176th Street/International Boulevard, additional signal time can be allocated for eastbound traffic. Westbound traffic from the International Boulevard signal is not forecast to extend to the 30th Avenue S intersection.

S 176th Street/32nd Avenue S. This signalized intersection, located east of the station area, serves residential development north of S 176th Street and a hotel and residential uses south of S 176th Street. It is forecast to operate at LOS C during the 2020 PM peak hour with redevelopment of the station area. Based on the resulting traffic operations, no improvements were identified.

SR 518 Westbound Off-ramp Relocation

The existing westbound off-ramp from SR 518 intersects with S 154th Street approximately 375 feet west of International Boulevard. As part of the S 154th Street Station Area planning process, two options for relocating the off-ramp were identified. One option would move the off-ramp to the west to align with 32nd Avenue S. This would provide more distance between the off-ramp and International Boulevard. It also would allow traffic oriented to/from the station area to directly use 32nd Avenue S without making a series of turns to/from S 154th Street. As discussed above, the intersection of S 154th Street/32nd Avenue S would need to be signalized to resolve the forecast LOS F condition even without the relocation of the off-ramp.

The other relocation option would have the westbound off-ramp directly connect to northbound International Boulevard south of S 154th Street. This alignment would allow drivers desiring to go north on International Boulevard to avoid using S 154th Street. However, traffic oriented to S 154th Street west of International Boulevard would need to "weave" across several lanes to access the north-to-west left-turn lane.

Attachment 4 summarizes the 2020 PM peak hour levels of service for the three alternatives for the ramp. The level of service worksheets are included in Attachment 6. Levels of service are shown for all five study intersections. The base condition assumes the improvements identified to address operations and queuing issues at the various intersections, as shown on Attachment 2.

Relocate Ramp to Align with 32nd Avenue S

Moving the SR 518 off-ramp to align with 32nd Avenue S results in several positive conditions. First, northbound traffic would be able to tie into a possible future signal at S 154th Street/32nd Avenue S, which was identified as needed with the increased volumes. This signalized intersection would reduce delays for the north-to-west left turns onto S 154th Street. It also would provide a direct access to the station area via 32nd Avenue S.

Moving the intersection west also provides more distance between the off-ramp and International Boulevard. The spacing will enhance the ability of vehicles making the north-to-east right turn from the off-ramp to merge into the east-to-north left-turn lane at International Boulevard.

With the relocated ramp, a signalized intersection at S 154th Street/32nd Avenue S would operate at LOS C during the 2020 PM peak hour. The relocation would not affect the levels of service at the other four study intersections in the S 154th Street Station Area.

Relocate Ramp to International Boulevard

Approximately 75 percent of the 2020 forecast traffic using the SR 518 westbound off-ramp makes the right turn to S 154th Street to connect with International Boulevard. A majority of the off-ramp trips that head east on S 154th Street are forecast to make the east-to-north left turn onto International Boulevard. Relocating

the off-ramp to directly tie into International Boulevard can greatly reduce the traffic volumes on S 154th Street west of International Boulevard. This would allow traffic to more directly access northbound International Boulevard.

The remaining 2020 forecast traffic using this SR 518 westbound off-ramp would turn west onto S 154th Street. Some of this traffic would connect to the land uses within the station area, while other trips would continue west toward 24th Avenue S. With the ramp relocated to International Boulevard, these trips would need to "weave" across International Boulevard to make a left turn onto S 154th Street. This would be a difficult weaving maneuver given the short distance and the high volume of traffic on International Boulevard. Northbound traffic queues on International Boulevard would block this weave resulting in added delay and potential safety problems.

With the off-ramp relocated to northbound International Boulevard, the intersection of S 154th Street/International Boulevard would operate at LOS D during the 2020 PM peak hour with slightly longer average vehicle delays. Relocation of the ramp also would result in longer traffic queues for the north-to-west left turns and northbound through movements on International Boulevard approaching S 154th Street.

The levels of service would not change at the other study intersections in the vicinity of the station area.

Attachment 1
Level of Service Definitions

Highway Capacity Manual, 2000

Signalized intersection level of service (LOS) is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Specifically, LOS criteria are stated in terms of average delay per vehicle during a specified time period (for example, the PM peak hour). Vehicle delay is a complex measure based on many variables, including signal phasing (i.e., progression of movements through the intersection), signal cycle length, and traffic volumes with respect to intersection capacity. Table 1 shows LOS criteria for signalized intersections, as described in the *Highway Capacity Manual* (Transportation Research Board, Special Report 209, 2000).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (sec/veh)	General Description (Signalized Intersections)
A	≤10	Free Flow
B	>10 - 20	Stable Flow (slight delays)
C	>20 - 35	Stable flow (acceptable delays)
D	>35 - 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 - 80	Unstable flow (intolerable delay)
F	>80	Forced flow (jammed)

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop-controlled and two-way stop-controlled. All-way, stop-controlled intersection LOS is expressed in terms of the average vehicle delay of all of the movements, much like that of a signalized intersection. Two-way, stop-controlled intersection LOS is defined in terms of the average vehicle delay of an individual movement(s). This is because the performance of a two-way, stop-controlled intersection is more closely reflected in terms of its individual movements, rather than its performance overall. For this reason, LOS for a two-way, stop-controlled intersection is defined in terms of its individual movements. With this in mind, total average vehicle delay (i.e., average delay of all movements) for a two-way, stop-controlled intersection should be viewed with discretion. Table 2 shows LOS criteria for unsignalized intersections (both all-way and two-way, stop-controlled).

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

Attachment 2
2020 PM Peak Hour Levels of Service with Station Area Redevelopment

Attachment 2

2020 PM Peak Hour Levels of Service With Station Area Redevelopment

Intersection	2020 With Planned Improvements			2020 With Additional Improvements		
	LOS[1]	Delay[2]	V/C or WM[3]	LOS	Delay	V/C or WM
154th Street Station Area						
S 152nd St/32nd Ave S	C	20.8	SB	C[6]	21.3	SB
S 152nd St/Military Rd S	F[4]	55.9	NA	C[7]	28.2	0.44
S 152nd St/International Blvd	E	71.2	0.94	C[8]	25.7	0.61
S 154th St/32nd Ave S	F	>180	SB	B[9]	12.1	0.78
S 154th St/International Blvd	D[5]	44.2	0.82	D[6]	45.5	0.84
SeaTac/Airport Station Area						
S 170th St/International Blvd	F	85.1	1.05	E[11]	70.0	1.04
S 173rd St/International Blvd	F[10]	81.1	1.21	E[12]	56.2	1.09
S 176th St/International Blvd	D	42.3	1.00	D[6]	50.2	1.02
S 180th St/International Blvd	C	30.8	0.87	C[6]	30.8	0.87
S 182nd St/International Blvd	D	36.3	0.78	D[6]	36.5	0.78
S 170th St/31st Ave S	C	17.2	NB	C[6]	17.1	NB
S 170th St/32nd Ave S	B	14.6	NB	-[13]	-	-
S 176th St/30th Ave S	F	>180	NB & SB	C[14]	28.8	0.83
S 176th St/32nd Ave S	C	30.8	0.63	-[13]	-	-

1. Level of service based on Highway Capacity Manual (2000) methodology.

2. Average control delay per vehicle

3. Volume-to-capacity (v/c) ratio reported for signalized intersections or worst movement (WM) for two-way stop-controlled intersections (NB = northbound, SB = southbound, etc.).

4. Assumes all-way stop-controlled and closure of Military Road as a through street south of S 152nd Street.

5. With planned widening resulting in eastbound dual left-turn, through, and right-turn lanes, and westbound dual left-turn and shared thru-right turn lane.

6. No additional improvements identified for this intersection. The changes in delay values are due to reoptimizing the signal timing at the intersections associated with the additional improvements along International Boulevard.

7. With installation of traffic signal and addition of southbound and eastbound left-turn lanes.

8. With addition of left- and right-turn lanes on the eastbound approach, and change in signal phasing to concurrent EB and WB protected left turns and through phases.

9. With installation of a traffic signal.

10. With traffic signal and separate westbound left and right-turn lanes.

11. With eastbound and westbound channelization changed to exclusive left- and right-turn lanes and a single through lane in each direction.

12. With westbound channelization changed to a single left-turn lane and one shared left- and right-turn lane, and an additional northbound right-turn lane.

13. No additional improvements identified at this intersection. The level of service does not change with reoptimizing signal timing along the International Boulevard corridor.

14. With installation of a traffic signal.

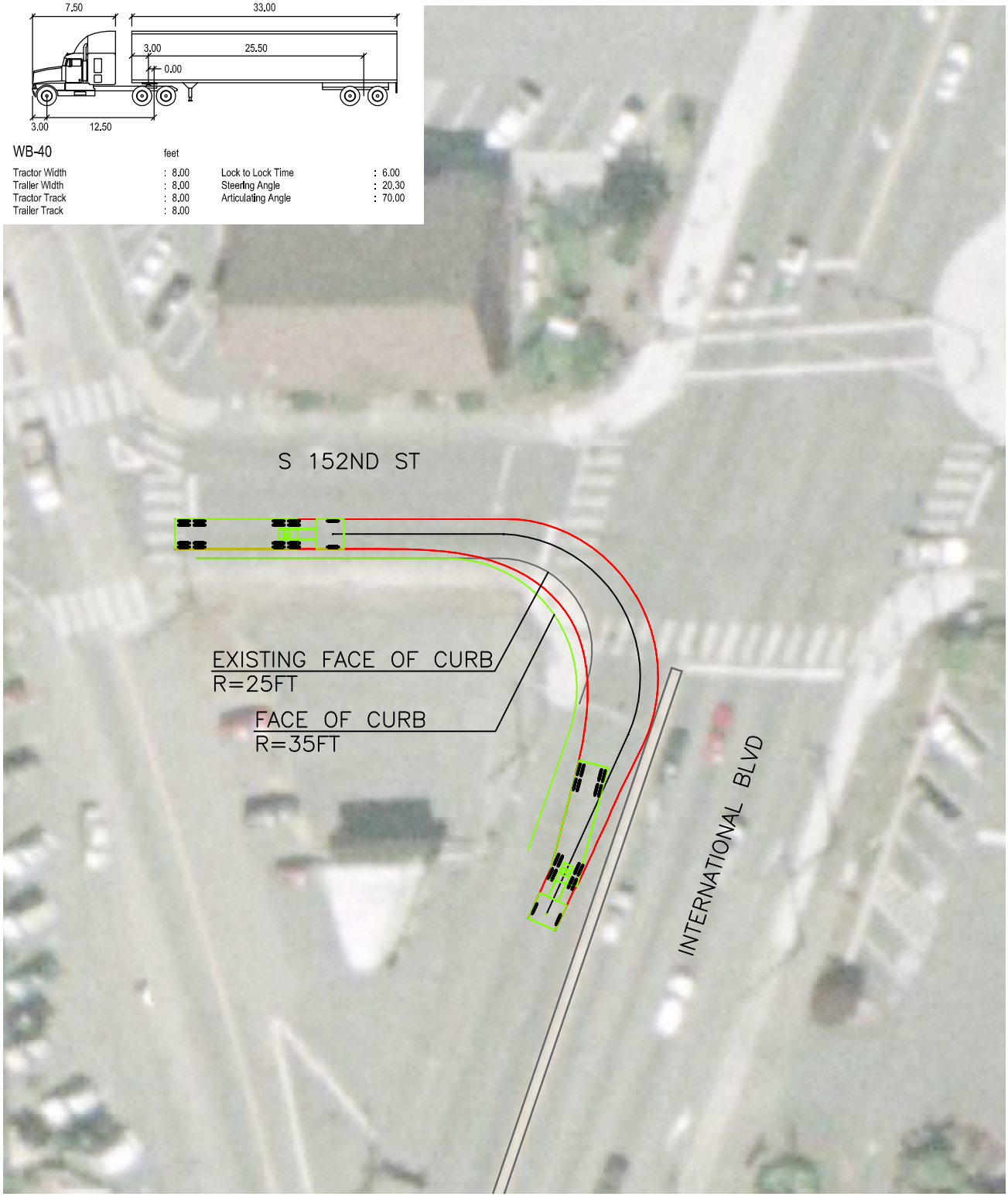
Attachment 3
S 152nd Street/International Boulevard
East-to-South Right-Turn Movement Radius

N

SCALE: 1"=40'

WB-40 feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.00	Steering Angle	: 20.30
Tractor Track	: 8.00	Articulating Angle	: 70.00
Trailer Track	: 8.00		



Attachment 3

S 152nd Street/International Blvd East-to-South Right-Turn Movement Radius

SeaTac LRT Station Area Plan - Traffic Analyses

The Transpo Group

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Attachment 4
2020 PM Peak Hour Levels of Service with Relocation of SR 518 Westbound Off-Ramp

Attachment 4

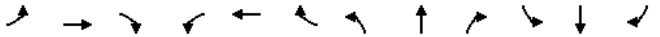
SR 518 Off-Ramp Relocation Alternatives LOS Summary - 2020 PM Peak Hour

Intersection	Ramp at Existing Mid-Block Location			Relocate Ramp to 32nd Ave S			Relocate Ramp to International Blvd.		
	LOS[1]	Delay[2]	V/C or WM[3]	LOS	Delay	V/C or WM	LOS	Delay	V/C or WM
154th Street Station Area									
S 152nd St/32nd Ave S[4]	C	21.3	SB	C	21.3	SB	C	23.8	SB
S 152nd St/Military Rd S[5]	C	28.2	0.44	C	28.2	0.44	C	28.3	0.47
S 152nd St/International Blvd[6]	C	25.7	0.61	C	25.7	0.61	D	46.7	0.67
S 154th St/32nd Ave S[7]	B	12.1	0.78	C[8]	21.0	0.92	B	10.3	0.73
S 154th St/International Blvd[9]	D	45.5	0.84	D	45.5	0.84	D	47.9	0.89

1. Level of service based on Highway Capacity Manual (2000) methodology.
2. Average control delay per vehicle
3. Volume-to-capacity (v/c) ratio reported for signalized intersections or worst movement (WM) for two-way stop-controlled intersections (NB = northbound, SB = southbound, etc.).
4. Assumes two-way stop-controlled intersection.
5. With installation of traffic signal and addition of southbound and eastbound left-turn lanes.
6. With addition of left- and right-turn lanes on the eastbound approach, and change in signal phasing to concurrent EB and WB protected left turns and through phases.
7. With installation of a traffic signal.
8. With addition of northbound right-turn lane.
9. With planned widening resulting in eastbound dual left-turn, through, and right-turn lanes, and westbound dual left-turn and shared thru-right turn lane.

Attachment 5
Level of Service Synchro Worksheets

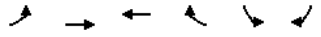
S 154th Street Station Area 2020 PM Peak Hour
Level of Service Worksheets
With Planned Improvements



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	85	25	180	80	20	40	20	265	10	10	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	92	27	196	87	22	43	22	288	11	11	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	109			120			617	617	106	905	620	98
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	109			120			617	617	106	905	620	98
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			87			88	94	70	93	97	99
cM capacity (veh/h)	1482			1481			351	352	951	155	352	964

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	125	304	353	27
Volume Left	5	196	43	11
Volume Right	27	22	288	5
cSH	1482	1481	723	254
Volume to Capacity	0.00	0.13	0.49	0.11
Queue Length 95th (ft)	0	11	68	9
Control Delay (s)	0.4	5.4	14.6	20.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.4	5.4	14.6	20.8
Approach LOS			B	C

Intersection Summary				
Average Delay	9.2			
Intersection Capacity Utilization	49.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	225	205	160	185	395	235
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	232	211	165	191	407	242

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total (vph)	443	165	191	649
Volume Left (vph)	232	0	0	407
Volume Right (vph)	0	0	191	242
Hadj (s)	0.10	0.02	-0.68	-0.08
Departure Headway (s)	6.7	7.4	6.7	6.2
Degree Utilization, x	0.82	0.34	0.35	1.11
Capacity (veh/h)	534	477	527	588
Control Delay (s)	33.1	12.9	12.1	95.3
Approach Delay (s)	33.1	12.5		95.3
Approach LOS	D	B		F

Intersection Summary				
Delay	55.9			
HCM Level of Service	F			
Intersection Capacity Utilization	77.9%	ICU Level of Service	D	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		235			723			704			2826	
Travel Time (s)		5.3			16.4			16.0			64.2	
Lane Group Flow (vph)	0	623	0	0	109	10	196	979	41	62	1129	0
v/c Ratio		1.12			0.57	0.06	0.66	0.63	0.06	0.66	1.03	
Control Delay		114.2			69.9	24.4	64.8	23.6	6.4	95.8	83.1	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		114.2			69.9	24.4	64.8	23.6	6.4	95.8	83.1	
Queue Length 50th (ft)		~605			97	0	175	306	8	56	~585	
Queue Length 95th (ft)		#844			148	17 m	#358	408	m24	#127	#725	
Internal Link Dist (ft)		155			643			624			2746	
Turn Bay Length (ft)												
Base Capacity (vph)		558			325	291	297	1552	714	96	1091	
Starvation Cap Reductn		0			0	0	0	0	0	0	0	
Spillback Cap Reductn		0			0	0	0	0	0	0	0	
Storage Cap Reductn		0			0	0	0	0	0	0	0	
Reduced v/c Ratio		1.12			0.34	0.03	0.66	0.63	0.06	0.65	1.03	

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.91			1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1700			1819	1583	1752	3505	1568	1770	3493	
Flt Permitted		0.99			0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1700			1819	1583	1752	3505	1568	1770	3493	
Volume (vph)	110	100	395	50	55	10	190	950	40	60	1000	95
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	113	103	407	52	57	10	196	979	41	62	1031	98
RTOR Reduction (vph)	0	48	0	0	0	9	0	0	20	0	5	0
Lane Group Flow (vph)	0	575	0	0	109	1	196	979	21	62	1124	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	Split			Split		Perm	Prot		Perm	Prot		
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)		41.0			13.7	13.7	22.3	59.4	59.4	4.9	42.0	
Effective Green, g (s)		42.0			14.7	14.7	23.8	60.9	60.9	6.4	43.5	
Actuated g/C Ratio		0.30			0.10	0.10	0.17	0.44	0.44	0.05	0.31	
Clearance Time (s)		5.0			5.0	5.0	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)		510			191	166	298	1525	682	81	1085	
v/s Ratio Prot		c0.34			c0.06		0.11	c0.28		0.04	c0.32	
v/s Ratio Perm						0.00			0.01			
v/c Ratio		1.13			0.57	0.01	0.66	0.64	0.03	0.77	1.04	
Uniform Delay, d1		49.0			59.6	56.1	54.3	31.0	22.7	66.1	48.2	
Progression Factor		1.00			1.00	1.00	1.01	0.68	0.60	1.00	1.00	
Incremental Delay, d2		79.6			2.5	0.0	3.4	1.8	0.1	31.3	37.1	
Delay (s)		128.6			62.2	56.1	58.0	22.9	13.8	97.4	85.3	
Level of Service		F			E	E	E	C	B	F	F	
Approach Delay (s)		128.6			61.7			28.2			86.0	
Approach LOS		F			E			C			F	

Intersection Summary

HCM Average Control Delay	71.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis — SeaTac LRT Station Area Redevelopment
24: S 154th St & 32nd Ave S — 2020 With-Redevelopment (opt.)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	135	360	5	15	810	240	5	5	20	75	5	110
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	147	391	5	16	880	261	5	5	22	82	5	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					691							
pX, platoon unblocked	0.90						0.90	0.90		0.90	0.90	0.90
vC, conflicting volume	1141			397			1723	1861	394	1625	1603	880
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1157			397			1803	1957	394	1694	1670	867
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	73			99			79	87	97	0	91	62
cM capacity (veh/h)	544			1156			26	42	659	45	62	317

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	543	897	261	33	207
Volume Left	147	16	0	5	82
Volume Right	5	0	261	22	120
cSH	544	1156	1700	87	91
Volume to Capacity	0.27	0.01	0.15	0.38	2.26
Queue Length 95th (ft)	27	1	0	37	464
Control Delay (s)	7.4	0.4	0.0	69.4	676.5
Lane LOS	A	A		F	F
Approach Delay (s)	7.4	0.3		69.4	676.5
Approach LOS				F	F

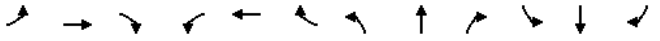
Intersection Summary					
Average Delay			75.4		
Intersection Capacity Utilization			98.0%	ICU Level of Service	F
Analysis Period (min)			15		

Queues — SeaTac LRT Station Area Redevelopment
25: S 154th St & International Blvd — 2020 With-Redevelopment (opt.)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		691			758			5562			704	
Travel Time (s)		15.7			17.2			126.4			16.0	
Lane Group Flow (vph)	366	211	392	165	361	0	340	773	134	108	1216	206
v/c Ratio	0.75	0.77	0.69	0.38	0.75		1.05	0.42	0.15	0.65	0.81	0.27
Control Delay	67.5	75.9	11.6	57.8	62.9		116.6	23.6	4.2	46.4	26.2	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.5	75.9	11.6	57.8	62.9		116.6	23.6	4.2	46.4	26.2	7.7
Queue Length 50th (ft)	167	187	0	72	153		~335	221	0	85	529	60
Queue Length 95th (ft)	213	267	96	105	201		#533	345	42	m91	m547	m88
Internal Link Dist (ft)		611			678			5482			624	
Turn Bay Length (ft)												
Base Capacity (vph)	644	349	616	638	658		325	1820	878	210	1510	753
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.60	0.64	0.26	0.55		1.05	0.42	0.15	0.51	0.81	0.27

Intersection Summary	
Area Type:	Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

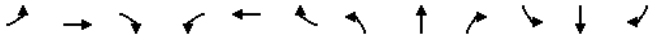


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	1881	1599	3433	3395		1752	3505	1568	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	1881	1599	3433	3395		1752	3505	1568	1770	3539	1583
Volume (vph)	355	205	380	160	255	95	330	750	130	105	1180	200
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	366	211	392	165	263	98	340	773	134	108	1216	206
RTOR Reduction (vph)	0	0	335	0	30	0	0	0	64	0	0	78
Lane Group Flow (vph)	366	211	57	165	331	0	340	773	70	108	1216	128
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	18.7	19.3	19.3	16.9	17.5		25.6	70.7	70.7	12.6	57.7	57.7
Effective Green, g (s)	19.7	20.3	20.3	17.9	18.5		26.1	72.7	72.7	13.1	59.7	59.7
Actuated g/C Ratio	0.14	0.15	0.15	0.13	0.13		0.19	0.52	0.52	0.09	0.43	0.43
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	488	273	232	439	449		327	1820	814	166	1509	675
v/s Ratio Prot	0.11	c0.11		0.05	c0.10		c0.19	0.22		0.06	c0.34	
v/s Ratio Perm			0.04						0.04			0.08
v/c Ratio	0.75	0.77	0.24	0.38	0.74		1.04	0.42	0.09	0.65	0.81	0.19
Uniform Delay, d1	57.8	57.6	53.1	55.9	58.4		57.0	20.8	16.9	61.2	35.1	25.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	0.74	0.69	0.74
Incremental Delay, d2	5.7	11.7	0.2	0.2	5.4		60.5	0.7	0.2	0.6	0.4	0.1
Delay (s)	63.5	69.3	53.3	56.1	63.8		117.4	21.5	17.1	45.8	24.7	18.5
Level of Service	E	E	D	E	E		F	C	B	D	C	B
Approach Delay (s)		60.6			61.4			47.2			25.3	
Approach LOS		E			E			D			C	

Intersection Summary			
HCM Average Control Delay	44.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

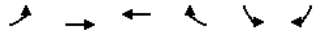
S 154th Street Station Area 2020 PM Peak Hour
Level of Service Worksheets
With Planned and Additional Improvements



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	85	25	180	80	20	40	20	265	10	10	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	92	27	196	87	22	43	22	288	11	11	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					680							
pX, platoon unblocked	0.97						0.97	0.97		0.97	0.97	0.97
vC, conflicting volume	109			120			617	617	106	905	620	98
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78			120			604	604	106	902	606	67
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			87			87	94	70	93	97	99
cM capacity (veh/h)	1470			1481			347	346	951	150	346	969

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	125	304	353	27
Volume Left	5	196	43	11
Volume Right	27	22	288	5
cSH	1470	1481	719	248
Volume to Capacity	0.00	0.13	0.49	0.11
Queue Length 95th (ft)	0	11	68	9
Control Delay (s)	0.4	5.4	14.7	21.3
Lane LOS	A	A	B	C
Approach Delay (s)	0.4	5.4	14.7	21.3
Approach LOS			B	C

Intersection Summary			
Average Delay	9.2		
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Right Turn on Red				Yes		Yes
Link Speed (mph)		30	30		30	
Link Distance (ft)		680	235		1987	
Travel Time (s)		15.5	5.3		45.2	
Lane Group Flow (vph)	232	211	165	191	407	242
v/c Ratio	0.51	0.33	0.60	0.48	0.38	0.23
Control Delay	34.6	31.2	47.2	9.7	17.2	2.5
Queue Delay	0.0	0.0	1.0	0.6	0.0	0.0
Total Delay	34.6	31.2	48.2	10.3	17.2	2.5
Queue Length 50th (ft)	132	118	63	0	199	0
Queue Length 95th (ft)	184	166	m149	m37	308	43
Internal Link Dist (ft)		600	155		1907	
Turn Bay Length (ft)						
Base Capacity (vph)	531	994	477	548	1068	1053
Starvation Cap Reductn	0	0	146	136	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.21	0.50	0.46	0.38	0.23

Intersection Summary	
Area Type:	Other

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1900	1881	1599	1787	1599
Flt Permitted	0.34	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	639	1900	1881	1599	1787	1599
Volume (vph)	225	205	160	185	395	235
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	232	211	165	191	407	242
RTOR Reduction (vph)	0	0	0	163	0	97
Lane Group Flow (vph)	232	211	165	28	407	145
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Turn Type	pm+pt			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	44.3	44.3	19.1	19.1	77.7	77.7
Effective Green, g (s)	44.3	44.3	19.1	19.1	77.7	77.7
Actuated g/C Ratio	0.34	0.34	0.15	0.15	0.60	0.60
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	408	647	276	235	1068	956
v/s Ratio Prot	c0.09	0.11	0.09		c0.23	
v/s Ratio Perm	c0.10			0.02		0.09
v/c Ratio	0.57	0.33	0.60	0.12	0.38	0.15
Uniform Delay, d1	33.0	31.8	51.9	48.1	13.6	11.6
Progression Factor	1.00	1.00	0.80	1.07	1.00	1.00
Incremental Delay, d2	1.8	0.3	2.5	0.2	1.0	0.3
Delay (s)	34.8	32.1	44.0	51.5	14.7	11.9
Level of Service	C	C	D	D	B	B
Approach Delay (s)		33.5	48.0		13.6	
Approach LOS		C	D		B	

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		235			723			704			2826	
Travel Time (s)		5.3			16.4			16.0			64.2	
Lane Group Flow (vph)	113	103	407	52	67	0	196	979	41	62	1129	0
v/c Ratio	0.54	0.46	0.74	0.33	0.39		0.84	0.45	0.04	0.47	0.58	
Control Delay	52.2	48.5	13.1	58.3	54.6		61.8	5.1	0.4	69.5	24.2	
Queue Delay	0.4	0.4	0.4	0.0	0.0		3.4	0.0	0.0	0.0	0.0	
Total Delay	52.7	48.9	13.5	58.3	54.6		65.2	5.1	0.4	69.5	24.2	
Queue Length 50th (ft)	71	62	45	43	50		168	34	0	51	307	
Queue Length 95th (ft)	104	93	67	75	87		m#278	240	m3	99	#603	
Internal Link Dist (ft)		155			643			624			2746	
Turn Bay Length (ft)												
Base Capacity (vph)	344	362	636	340	355		243	2197	998	144	1930	
Starvation Cap Reductn	55	72	40	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		14	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.39	0.36	0.68	0.15	0.19		0.86	0.45	0.04	0.43	0.58	

Intersection Summary	
Area Type:	Other

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	1881	1599	1770	1821		1752	3505	1568	1770	3493	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1787	1881	1599	1770	1821		1752	3505	1568	1770	3493	
Volume (vph)	110	100	395	50	55	10	190	950	40	60	1000	95
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	113	103	407	52	57	10	196	979	41	62	1031	98
RTOR Reduction (vph)	0	0	359	0	5	0	0	0	16	0	4	0
Lane Group Flow (vph)	113	103	48	52	62	0	196	979	25	62	1125	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases			8						2			
Actuated Green, G (s)	14.1	14.4	14.4	9.6	9.9		16.9	77.9	77.9	7.1	68.1	
Effective Green, g (s)	15.1	15.4	15.4	10.6	10.9		18.4	79.4	79.4	8.6	69.6	
Actuated g/C Ratio	0.12	0.12	0.12	0.08	0.08		0.14	0.61	0.61	0.07	0.54	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	208	223	189	144	153		248	2141	958	117	1870	
v/s Ratio Prot	c0.06	0.05		0.03	c0.03		c0.11	0.28		0.04	c0.32	
v/s Ratio Perm			0.03						0.02			
v/c Ratio	0.54	0.46	0.26	0.36	0.40		0.79	0.46	0.03	0.53	0.60	
Uniform Delay, d1	54.2	53.4	52.1	56.5	56.5		53.9	13.7	10.0	58.7	20.7	
Progression Factor	0.82	0.82	1.03	1.00	1.00		0.66	0.27	0.07	1.00	1.00	
Incremental Delay, d2	1.5	0.5	0.2	0.6	0.6		11.9	0.6	0.0	2.0	1.4	
Delay (s)	45.7	44.1	54.0	57.1	57.1		47.7	4.3	0.7	60.7	22.1	
Level of Service	D	D	D	E	E		D	A	A	E	C	
Approach Delay (s)		50.8			57.1			11.2			24.2	
Approach LOS		D			E			B			C	

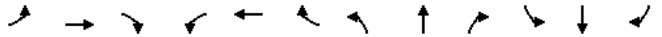
Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1415			691			357			665	
Travel Time (s)		32.2			15.7			8.1			15.1	
Lane Group Flow (vph)	0	543	0	0	896	261	0	32	0	0	207	0
v/c Ratio		0.91			0.74	0.23		0.10			0.62	
Control Delay		31.1			11.0	1.1		15.8			26.3	
Queue Delay		0.0			0.1	0.0		0.0			0.0	
Total Delay		31.1			11.0	1.1		15.8			26.3	
Queue Length 50th (ft)		126			163	0		3			48	
Queue Length 95th (ft)		#429			350	18		26			126	
Internal Link Dist (ft)		1335			611			277			585	
Turn Bay Length (ft)												
Base Capacity (vph)		676			1366	1239		456			452	
Starvation Cap Reductn		0			24	0		0			0	
Spillback Cap Reductn		0			0	0		0			0	
Storage Cap Reductn		0			0	0		0			0	
Reduced v/c Ratio		0.80			0.67	0.21		0.07			0.46	

Intersection Summary	
Area Type:	Other

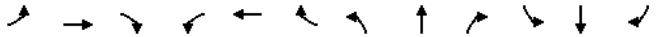
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		1.00			1.00	0.85		0.91			0.92	
Flt Protected		0.99			1.00	1.00		0.99			0.98	
Satd. Flow (prot)		1836			1843	1568		1710			1684	
Flt Permitted		0.51			0.99	1.00		0.96			0.86	
Satd. Flow (perm)		941			1826	1568		1658			1470	
Volume (vph)	135	360	5	15	810	240	5	5	20	75	5	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	391	5	16	880	261	5	5	22	82	5	120
RTOR Reduction (vph)	0	0	0	0	0	85	0	18	0	0	63	0
Lane Group Flow (vph)	0	543	0	0	896	176	0	14	0	0	144	0
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	0%	0%	0%	2%	2%	2%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		39.4			39.4	39.4		10.9			10.9	
Effective Green, g (s)		39.4			39.4	39.4		10.9			10.9	
Actuated g/C Ratio		0.68			0.68	0.68		0.19			0.19	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		636			1234	1060		310			275	
v/s Ratio Prot												
v/s Ratio Perm		c0.58			0.49	0.11		0.01			c0.10	
v/c Ratio		0.85			0.73	0.17		0.05			0.52	
Uniform Delay, d1		7.2			6.0	3.5		19.4			21.4	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		10.8			2.2	0.1		0.1			1.8	
Delay (s)		18.0			8.2	3.5		19.5			23.1	
Level of Service		B			A	A		B			C	
Approach Delay (s)		18.0			7.1			19.5			23.1	
Approach LOS		B			A			B			C	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	98.0%	ICU Level of Service	F
Analysis Period (min)	15		

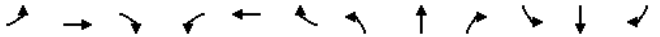
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		691			758			5562			704	
Travel Time (s)		15.7			17.2			126.4			16.0	
Lane Group Flow (vph)	366	211	392	165	361	0	340	773	134	108	1216	206
v/c Ratio	0.74	0.59	0.68	0.55	0.74		1.15	0.53	0.18	0.33	0.80	0.27
Control Delay	62.4	54.3	14.3	63.8	57.8		146.3	30.4	4.5	53.9	25.5	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.4	54.3	14.3	63.8	57.8		146.3	30.4	4.5	53.9	25.5	2.7
Queue Length 50th (ft)	154	164	39	70	140		~336	254	0	94	474	34
Queue Length 95th (ft)	200	233	140	105	187		#528	321	40	m151	#656	m6
Internal Link Dist (ft)		611			678			5482			624	
Turn Bay Length (ft)												
Base Capacity (vph)	693	396	602	687	708		296	1450	727	330	1524	763
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.53	0.65	0.24	0.51		1.15	0.53	0.18	0.33	0.80	0.27

Intersection Summary	
Area Type:	Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	1881	1599	3433	3395		1752	3505	1568	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	1881	1599	3433	3395		1752	3505	1568	1770	3539	1583
Volume (vph)	355	205	380	160	255	95	330	750	130	105	1180	200
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	366	211	392	165	263	98	340	773	134	108	1216	206
RTOR Reduction (vph)	0	0	273	0	32	0	0	0	79	0	0	81
Lane Group Flow (vph)	366	211	119	165	329	0	340	773	55	108	1216	125
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	17.6	23.7	23.7	10.3	16.4		21.5	51.8	51.8	23.7	54.0	54.0
Effective Green, g (s)	18.6	24.7	24.7	11.3	17.4		22.0	53.8	53.8	24.2	56.0	56.0
Actuated g/C Ratio	0.14	0.19	0.19	0.09	0.13		0.17	0.41	0.41	0.19	0.43	0.43
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	496	357	304	298	454		296	1451	649	329	1524	682
v/s Ratio Prot	c0.11	0.11		0.05	c0.10		c0.19	0.22		0.06	c0.34	
v/s Ratio Perm			0.07						0.04			0.08
v/c Ratio	0.74	0.59	0.39	0.55	0.72		1.15	0.53	0.09	0.33	0.80	0.18
Uniform Delay, d1	53.4	48.0	46.1	56.9	54.0		54.0	28.6	23.2	45.9	32.1	22.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.06	0.63	0.22
Incremental Delay, d2	4.9	1.7	0.3	1.3	4.8		98.7	1.4	0.3	0.2	3.6	0.5
Delay (s)	58.3	49.8	46.4	58.2	58.8		152.7	30.1	23.4	48.6	23.8	5.6
Level of Service	E	D	D	E	E		F	C	C	D	C	A
Approach Delay (s)		51.6			58.6			62.8			23.1	
Approach LOS		D			E			E			C	

Intersection Summary			
HCM Average Control Delay	45.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

SeaTac/Airport Station Area
2020 PM Peak Hour Levels of Service
Worksheets With Planned Improvements

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		455			547			1014			5562	
Travel Time (s)		10.3			12.4			23.0			126.4	
Lane Group Flow (vph)	222	232	562	0	490	0	459	1788	0	170	1953	0
v/c Ratio	0.81	0.80	0.98		0.90		1.14	1.08		0.90	1.06	
Control Delay	94.5	92.9	56.8		90.2		100.8	55.4		90.0	92.4	
Queue Delay	0.0	0.0	0.0		0.0		0.0	9.1		0.0	0.0	
Total Delay	94.5	92.9	56.8		90.2		100.8	64.4		90.0	92.4	
Queue Length 50th (ft)	266	277	261		285		~574	~1231		~169	~972	
Queue Length 95th (ft)	#390	#391	#515		#373		m#414	m475		#340	#1060	
Internal Link Dist (ft)		375			467			934			5482	
Turn Bay Length (ft)												
Base Capacity (vph)	294	310	587		574		402	1651		188	1836	
Starvation Cap Reductn	0	0	0		0		0	32		0	0	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	0.76	0.75	0.96		0.85		1.14	1.10		0.90	1.06	

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	0.95	0.95	1.00		0.95		1.00	0.95		1.00	0.91	
Frt	1.00	1.00	0.85		0.96		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1681	1770	1583		3159		1671	3285		1770	4979	
Flt Permitted	0.95	1.00	1.00		0.98		0.08	1.00		0.08	1.00	
Satd. Flow (perm)	1681	1770	1583		3159		138	3285		146	4979	
Volume (vph)	215	225	545	230	115	130	445	1535	200	165	1630	265
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	222	232	562	237	119	134	459	1582	206	170	1680	273
RTOR Reduction (vph)	0	0	315	0	22	0	0	5	0	0	12	0
Lane Group Flow (vph)	222	232	247	0	468	0	459	1783	0	170	1941	0
Heavy Vehicles (%)	2%	2%	2%	7%	7%	7%	8%	8%	8%	2%	2%	2%
Turn Type	Split		Perm	Split			pm+pt			pm+pt		
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4				2			6		
Actuated Green, G (s)	28.9	28.9	28.9		29.2		89.6	88.8		64.6	64.6	
Effective Green, g (s)	29.4	29.4	29.4		29.7		90.1	90.1		65.9	65.9	
Actuated g/C Ratio	0.16	0.16	0.16		0.16		0.50	0.50		0.37	0.37	
Clearance Time (s)	4.5	4.5	4.5		4.5		4.5	5.3		4.7	5.3	
Vehicle Extension (s)	2.0	2.0	2.0		2.5		3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	275	289	259		521		401	1644		187	1823	
v/s Ratio Prot	0.13	0.13			c0.15		0.25	c0.54		0.07	c0.39	
v/s Ratio Perm			c0.16				c0.33			0.26		
v/c Ratio	0.81	0.80	0.96		0.90		1.14	1.08		0.91	1.06	
Uniform Delay, d1	72.6	72.5	74.6		73.7		67.0	45.0		52.4	57.0	
Progression Factor	1.00	1.00	1.00		1.00		0.53	0.31		1.00	1.00	
Incremental Delay, d2	15.0	14.0	43.0		18.1		68.1	39.1		39.9	40.7	
Delay (s)	87.5	86.5	117.7		91.7		103.9	53.2		92.3	97.8	
Level of Service	F	F	F		F		F	D		F	F	
Approach Delay (s)		104.0			91.7			63.6			97.3	
Approach LOS		F			F			E			F	

Intersection Summary

HCM Average Control Delay	85.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15	9		9	15	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	475		980			1014
Travel Time (s)	10.8		22.3			23.0
Lane Group Flow (vph)	418	309	2103	0	500	1781
v/c Ratio	1.12	0.62	1.22		1.27	0.68
Control Delay	144.0	26.7	113.2		171.7	6.7
Queue Delay	0.0	0.1	25.7		0.0	5.7
Total Delay	144.0	26.8	139.0		171.7	12.4
Queue Length 50th (ft)	~565	110	~1571		~703	217
Queue Length 95th (ft)	#793	225	m#1486		m#672	m200
Internal Link Dist (ft)	395		900			934
Turn Bay Length (ft)						
Base Capacity (vph)	374	497	1726		395	2635
Starvation Cap Reductn	0	0	0		0	794
Spillback Cap Reductn	0	4	78		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.12	0.63	1.28		1.27	0.97

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3297		1770	3539
Flt Permitted	0.95	1.00	1.00		0.04	1.00
Satd. Flow (perm)	1770	1583	3297		76	3539
Volume (vph)	405	300	1855	185	485	1728
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	418	309	1912	191	500	1781
RTOR Reduction (vph)	0	163	4	0	0	0
Lane Group Flow (vph)	418	146	2099	0	500	1781
Heavy Vehicles (%)	2%	2%	8%	8%	2%	2%
Turn Type		Perm			pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	37.4	37.4	92.7		133.5	132.7
Effective Green, g (s)	38.0	38.0	94.0		134.0	134.0
Actuated g/C Ratio	0.21	0.21	0.52		0.74	0.74
Clearance Time (s)	4.6	4.6	5.3		4.5	5.3
Vehicle Extension (s)	3.0	3.0	3.0		2.0	3.0
Lane Grp Cap (vph)	374	334	1722		395	2635
v/s Ratio Prot	c0.24		0.64		c0.25	0.50
v/s Ratio Perm		0.09			c0.69	
v/c Ratio	1.12	0.44	1.22		1.27	0.68
Uniform Delay, d1	71.0	61.7	43.0		68.5	11.8
Progression Factor	1.00	1.00	0.16		1.00	0.55
Incremental Delay, d2	82.3	0.9	100.0		121.5	0.1
Delay (s)	153.3	62.6	106.8		189.9	6.6
Level of Service	F	E	F		F	A
Approach Delay (s)	114.8		106.8			46.8
Approach LOS	F		F			D

Intersection Summary

HCM Average Control Delay	81.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	116.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	408		1141			980
Travel Time (s)	9.3		25.9			22.3
Lane Group Flow (vph)	464	438	1655	479	588	1628
v/c Ratio	0.74	0.69	1.05	0.46	1.08	0.59
Control Delay	77.4	12.8	59.5	3.3	94.4	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2
Total Delay	77.4	12.8	59.5	3.3	94.4	1.9
Queue Length 50th (ft)	270	19	~1131	30	~541	57
Queue Length 95th (ft)	333	139	#1267	m61	m#889	m74
Internal Link Dist (ft)	328		1061			900
Turn Bay Length (ft)						
Base Capacity (vph)	666	646	1569	1025	544	2743
Starvation Cap Reductn	0	0	0	0	0	334
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.68	1.05	0.47	1.08	0.68

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3467	1599	3343	1495	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	3467	1599	3343	1495	84	3539
Volume (vph)	450	425	1605	465	570	1579
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	464	438	1655	479	588	1628
RTOR Reduction (vph)	0	343	0	30	0	0
Lane Group Flow (vph)	464	95	1655	449	588	1628
Heavy Vehicles (%)	1%	1%	8%	8%	2%	2%
Turn Type		Perm		pm+ov	pm+pt	
Protected Phases	8		2	8	1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	31.9	31.9	83.2	115.1	139.0	138.2
Effective Green, g (s)	32.5	32.5	84.5	117.0	139.5	139.5
Actuated g/C Ratio	0.18	0.18	0.47	0.65	0.78	0.78
Clearance Time (s)	4.6	4.6	5.3	4.6	4.5	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	626	289	1569	1005	543	2743
v/s Ratio Prot	c0.13		0.50	0.08	c0.31	0.46
v/s Ratio Perm		0.06		0.22	c0.53	
v/c Ratio	0.74	0.33	1.05	0.45	1.08	0.59
Uniform Delay, d1	69.8	64.2	47.8	15.5	61.1	8.4
Progression Factor	1.00	1.00	0.53	0.22	0.69	0.12
Incremental Delay, d2	4.7	0.7	33.6	0.2	55.7	0.6
Delay (s)	74.5	64.9	58.7	3.6	98.1	1.6
Level of Service	E	E	E	A	F	A
Approach Delay (s)	69.8		46.3			27.2
Approach LOS	E		D			C

Intersection Summary

HCM Average Control Delay	42.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	112.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	483		580			1141
Travel Time (s)	11.0		13.2			25.9
Lane Group Flow (vph)	309	381	1691	227	294	1819
v/c Ratio	0.90	0.72	0.87	0.25	0.90	0.67
Control Delay	99.6	25.9	25.5	4.7	78.1	14.5
Queue Delay	0.0	0.0	1.6	0.0	0.0	0.2
Total Delay	99.6	25.9	27.1	4.7	78.1	14.7
Queue Length 50th (ft)	355	113	984	39	276	720
Queue Length 95th (ft)	#510	246	497	m28	#436	658
Internal Link Dist (ft)	403		500			1061
Turn Bay Length (ft)						
Base Capacity (vph)	371	553	1949	924	357	2710
Starvation Cap Reductn	0	0	122	0	0	210
Spillback Cap Reductn	0	0	0	0	0	186
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.69	0.93	0.25	0.82	0.73

Intersection Summary

Area Type: Other

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	3343	1495	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1805	1615	3343	1495	87	3539
Volume (vph)	300	370	1640	220	285	1764
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	309	381	1691	227	294	1819
RTOR Reduction (vph)	0	225	0	52	0	0
Lane Group Flow (vph)	309	156	1691	175	294	1819
Heavy Vehicles (%)	0%	0%	8%	8%	2%	2%
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	33.7	33.7	103.6	103.6	136.5	136.5
Effective Green, g (s)	34.2	34.2	104.9	104.9	137.8	137.8
Actuated g/C Ratio	0.19	0.19	0.58	0.58	0.77	0.77
Clearance Time (s)	4.5	4.5	5.3	5.3	4.5	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	343	307	1948	871	337	2709
v/s Ratio Prot	c0.17		0.51		c0.14	0.51
v/s Ratio Perm		0.10		0.12	c0.53	
v/c Ratio	0.90	0.51	0.87	0.20	0.87	0.67
Uniform Delay, d1	71.2	65.4	31.7	17.7	60.6	10.2
Progression Factor	1.00	1.00	0.64	0.49	0.95	1.25
Incremental Delay, d2	25.5	1.3	3.9	0.4	17.4	1.1
Delay (s)	96.7	66.7	24.2	9.0	75.0	13.8
Level of Service	F	E	C	A	E	B
Approach Delay (s)	80.1		22.4			22.3
Approach LOS	F		C			C

Intersection Summary

HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	94.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		460			311			2695			580	
Travel Time (s)		10.5			7.1			61.3			13.2	
Lane Group Flow (vph)	145	149	149	10	25	0	376	1613	5	15	2314	0
v/c Ratio	0.77	0.82	0.42	0.43	0.14		1.04	0.71	0.00	0.27	0.79	
Control Delay	99.3	107.0	12.0	122.1	36.8		133.5	26.3	14.6	105.6	24.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.6	0.0	0.0	1.5	
Total Delay	99.3	107.0	12.0	122.1	36.8		133.5	26.8	14.6	105.6	25.5	
Queue Length 50th (ft)	176	183	0	12	11		~246	622	1	17	372	
Queue Length 95th (ft)	260	268	68	34	41		#361	1038	9	m25	#1157	
Internal Link Dist (ft)		380			231			2615			500	
Turn Bay Length (ft)												
Base Capacity (vph)	237	228	408	41	318		360	2275	1018	56	2915	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	391	
Spillback Cap Reductn	0	0	0	0	1		0	285	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.61	0.65	0.37	0.24	0.08		1.04	0.81	0.00	0.27	0.92	

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

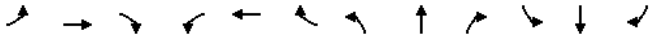
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00		0.97	0.95	1.00	1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	0.95	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1688	1583	1770	1695		3242	3343	1495	1770	5019	
Flt Permitted	0.74	0.71	1.00	0.25	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1311	1265	1583	475	1695		3242	3343	1495	1770	5019	
Volume (vph)	280	5	145	10	10	15	365	1565	5	15	2050	195
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	289	5	149	10	10	15	376	1613	5	15	2113	201
RTOR Reduction (vph)	0	0	128	0	14	0	0	0	1	0	5	0
Lane Group Flow (vph)	145	149	21	10	11	0	376	1613	4	15	2309	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	8%	8%	8%	2%	2%	2%
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		
Protected Phases		4			3		5	2		1	6	
Permitted Phases	4		4	3					2			
Actuated Green, G (s)	25.3	25.3	25.3	15.2	15.2		21.3	117.5	117.5	3.2	99.4	
Effective Green, g (s)	25.8	25.8	25.8	15.7	15.7		21.8	118.8	118.8	3.7	100.7	
Actuated g/C Ratio	0.14	0.14	0.14	0.09	0.09		0.12	0.66	0.66	0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.3	5.3	4.5	5.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.0	2.0		2.5	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	188	181	227	41	148		393	2206	987	36	2808	
v/s Ratio Prot					0.01		c0.12	0.48		0.01	c0.46	
v/s Ratio Perm	0.11	c0.12	0.01	c0.02					0.00			
v/c Ratio	0.77	0.82	0.09	0.24	0.08		0.96	0.73	0.00	0.42	0.82	
Uniform Delay, d1	74.3	74.9	67.0	76.6	75.5		78.6	20.1	10.4	87.1	32.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.13	0.65	
Incremental Delay, d2	17.0	24.6	0.1	1.1	0.1		34.0	2.2	0.0	2.2	2.2	
Delay (s)	91.2	99.5	67.1	77.7	75.6		112.6	22.3	10.4	100.6	23.2	
Level of Service	F	F	E	E	E		F	C	B	F	C	
Approach Delay (s)		85.9			76.2			39.3			23.7	
Approach LOS		F			E			D			C	

Intersection Summary

HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis — SeaTac LRT Station Area Redevelopment
10: S 170th St & 31st Ave S — 2020 With-Redevelopment (opt.)

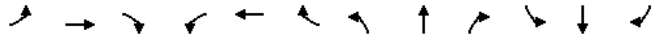


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	35	300	50	15	260	5	25	0	15	10	0	60
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	316	53	16	274	5	26	0	16	11	0	63
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		547										
pX, platoon unblocked				0.90			0.90	0.90	0.90	0.90	0.90	
vC, conflicting volume	279			368			787	726	342	739	750	276
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	279			299			763	696	269	711	722	276
tC, single (s)	4.2			4.2			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			90	100	98	96	100	92
cM capacity (veh/h)	1255			1112			258	317	697	298	306	767

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	405	295	42	74
Volume Left	37	16	26	11
Volume Right	53	5	16	63
cSH	1255	1112	338	627
Volume to Capacity	0.03	0.01	0.12	0.12
Queue Length 95th (ft)	2	1	11	10
Control Delay (s)	1.0	0.6	17.2	11.5
Lane LOS	A	A	C	B
Approach Delay (s)	1.0	0.6	17.2	11.5
Approach LOS			C	B

Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	44.8%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis — SeaTac LRT Station Area Redevelopment
15: S 176th St & 30th Ave S — 2020 With-Redevelopment (opt.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	135	580	325	90	565	95	150	5	85	90	5	150
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	147	630	353	98	614	103	163	5	92	98	5	163
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		408			573							
pX, platoon unblocked	0.74						0.74	0.74		0.74	0.74	0.74
vC, conflicting volume	717			984			2076	2014	807	1880	2139	666
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	616			984			2461	2376	807	2195	2546	546
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	79			86			0	69	76	0	60	59
cM capacity (veh/h)	713			706			5	17	381	11	14	396

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	147	984	98	717	261	266
Volume Left	147	0	98	0	163	98
Volume Right	0	353	0	103	92	163
cSH	713	1700	706	1700	8	26
Volume to Capacity	0.21	0.58	0.14	0.42	34.67	10.12
Queue Length 95th (ft)	19	0	12	0	Err	Err
Control Delay (s)	11.3	0.0	10.9	0.0	Err	Err
Lane LOS	B		B		F	F
Approach Delay (s)	1.5		1.3		Err	Err
Approach LOS					F	F

Intersection Summary				
Average Delay	2132.8			
Intersection Capacity Utilization	88.5%	ICU Level of Service	E	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	285	55	30	245	65	25
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	303	59	32	261	69	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	1040					
pX, platoon unblocked						
vC, conflicting volume			362		657	332
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			362		657	332
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			97		83	96
cM capacity (veh/h)			1170		416	707

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	362	293	96
Volume Left	0	32	69
Volume Right	59	0	27
cSH	1700	1170	470
Volume to Capacity	0.21	0.03	0.20
Queue Length 95th (ft)	0	2	19
Control Delay (s)	0.0	1.1	14.6
Lane LOS		A	B
Approach Delay (s)	0.0	1.1	14.6
Approach LOS			B

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		573			822			442			1979	
Travel Time (s)		13.0			18.7			10.0			45.0	
Lane Group Flow (vph)	82	522	190	98	593	0	163	157	0	71	147	0
v/c Ratio	0.58	0.78	0.20	0.61	0.87		0.74	0.36		0.40	0.31	
Control Delay	53.9	31.1	2.1	52.5	36.7		54.7	10.0		40.5	13.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	53.9	31.1	2.1	52.5	36.7		54.7	10.0		40.5	13.0	
Queue Length 50th (ft)	41	221	0	48	256		80	11		34	20	
Queue Length 95th (ft)	#102	339	27	#113	#435		#174	58		73	68	
Internal Link Dist (ft)		493			742			362			1899	
Turn Bay Length (ft)												
Base Capacity (vph)	144	737	957	170	754		242	489		205	477	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.57	0.71	0.20	0.58	0.79		0.67	0.32		0.35	0.31	

Intersection Summary	
Area Type:	Other

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.88		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1881	1599	1787	1853		1752	1616		1787	1693	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1787	1881	1599	1787	1853		1752	1616		1787	1693	
Volume (vph)	75	480	175	90	490	55	150	25	120	65	45	90
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	522	190	98	533	60	163	27	130	71	49	98
RTOR Reduction (vph)	0	0	99	0	5	0	0	94	0	0	75	0
Lane Group Flow (vph)	82	522	91	98	588	0	163	63	0	71	72	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	3%	3%	3%	1%	1%	1%
Turn Type	Prot		pm+ov	Prot			Prot			Prot		
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases			2									
Actuated Green, G (s)	4.1	24.2	33.0	4.9	25.0		8.8	20.1		5.6	16.5	
Effective Green, g (s)	4.6	26.0	35.3	5.4	26.8		9.3	20.6		6.1	17.4	
Actuated g/C Ratio	0.06	0.35	0.48	0.07	0.36		0.13	0.28		0.08	0.23	
Clearance Time (s)	4.5	5.8	4.5	4.5	5.8		4.5	4.5		4.5	4.9	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	111	660	848	130	670		220	449		147	398	
v/s Ratio Prot	0.05	0.28	0.01	c0.05	c0.32		c0.09	c0.04		0.04	c0.04	
v/s Ratio Perm			0.04									
v/c Ratio	0.74	0.79	0.11	0.75	0.88		0.74	0.14		0.48	0.18	
Uniform Delay, d1	34.2	21.6	10.7	33.7	22.1		31.2	20.1		32.5	22.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.6	6.0	0.0	19.5	12.1		11.1	0.1		0.9	1.0	
Delay (s)	53.8	27.6	10.7	53.2	34.2		42.3	20.2		33.4	23.7	
Level of Service	D	C	B	D	C		D	C		C	C	
Approach Delay (s)		26.3			36.9			31.5			26.8	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	74.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

SeaTac/Airport Station Area
2020 PM Peak Hour Levels of Service Worksheets
With Planned and Additional Improvements

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		455			547			1014			5562	
Travel Time (s)		10.3			12.4			23.0			126.4	
Lane Group Flow (vph)	222	232	562	237	119	134	459	1788	0	170	1953	0
v/c Ratio	0.56	0.79	0.96	0.71	0.38	0.36	1.14	1.06		0.84	1.01	
Control Delay	50.6	91.3	48.8	57.8	69.0	11.5	97.6	43.2		75.2	75.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5		0.0	0.0	
Total Delay	50.6	91.3	48.8	57.8	69.0	11.5	97.6	49.7		75.2	75.5	
Queue Length 50th (ft)	189	256	219	205	117	0	~575	~1233		~169	~972	
Queue Length 95th (ft)	267	368	#468	288	197	65	m#477	m691		#340	#1060	
Internal Link Dist (ft)		375			467			934			5482	
Turn Bay Length (ft)												
Base Capacity (vph)	457	333	611	364	331	391	404	1688		203	1931	
Starvation Cap Reductn	0	0	0	0	0	0	0	25		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.49	0.70	0.92	0.65	0.36	0.34	1.14	1.08		0.84	1.01	

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1687	1776	1509	1671	3285		1770	4979	
Flt Permitted	0.60	1.00	1.00	0.20	1.00	1.00	0.08	1.00		0.08	1.00	
Satd. Flow (perm)	1111	1863	1583	349	1776	1509	132	3285		140	4979	
Volume (vph)	215	225	545	230	115	130	445	1535	200	165	1630	265
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	222	232	562	237	119	134	459	1582	206	170	1680	273
RTOR Reduction (vph)	0	0	336	0	0	111	0	5	0	0	12	0
Lane Group Flow (vph)	222	232	226	237	119	23	459	1783	0	170	1941	0
Heavy Vehicles (%)	2%	2%	2%	7%	7%	7%	8%	8%	8%	2%	2%	2%
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		
Protected Phases	4	8		7	3		5	2		1	6	
Permitted Phases	8		8	3		3	2			6		
Actuated Green, G (s)	51.6	28.0	28.0	57.6	31.0	31.0	91.7	90.9		68.1	68.1	
Effective Green, g (s)	52.6	28.5	28.5	58.6	31.5	31.5	92.2	92.2		69.4	69.4	
Actuated g/C Ratio	0.29	0.16	0.16	0.33	0.18	0.18	0.51	0.51		0.39	0.39	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5.3		4.7	5.3	
Vehicle Extension (s)	2.0	2.0	2.0	2.5	2.5	2.5	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	413	295	251	315	311	264	401	1683		201	1920	
v/s Ratio Prot	0.07	0.12		c0.11	0.07		c0.25	0.54		0.08	c0.39	
v/s Ratio Perm	0.09		c0.14	0.13		0.02	c0.34			0.25		
v/c Ratio	0.54	0.79	0.90	0.75	0.38	0.09	1.14	1.06		0.85	1.01	
Uniform Delay, d1	51.6	72.8	74.4	49.3	65.7	62.2	66.9	43.9		82.4	55.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.51	0.27		1.00	1.00	
Incremental Delay, d2	0.7	12.0	31.4	9.3	0.6	0.1	68.1	28.3		25.6	23.3	
Delay (s)	52.3	84.8	105.8	58.6	66.2	62.3	102.2	40.2		108.0	78.6	
Level of Service	D	F	F	E	E	E	F	D		F	E	
Approach Delay (s)		89.3			61.4			52.8			81.0	
Approach LOS		F			E			D			F	

Intersection Summary

HCM Average Control Delay	70.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	100.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50		50	50	50	50
Trailing Detector (ft)	0		0	0	0	0
Turning Speed (mph)	15	9		9	15	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	475		980			1014
Travel Time (s)	10.8		22.3			23.0
Lane Group Flow (vph)	727	0	1912	191	500	1781
v/c Ratio	1.03		1.11	0.24	1.13	0.66
Control Delay	101.8		66.8	0.4	124.3	8.0
Queue Delay	0.9		25.1	0.0	0.0	5.0
Total Delay	102.7		91.9	0.4	124.3	13.0
Queue Length 50th (ft)	~423		~1336	1	~641	229
Queue Length 95th (ft)	#558		m#1308	m4	m#667	m203
Internal Link Dist (ft)	395		900			934
Turn Bay Length (ft)						
Base Capacity (vph)	706		1716	809	444	2701
Starvation Cap Reductn	0		0	0	0	846
Spillback Cap Reductn	2		84	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	1.03		1.17	0.24	1.13	0.96

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.97		0.95	1.00	1.00	0.95
Frt	0.94		1.00	0.85	1.00	1.00
Flt Protected	0.97		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3289		3343	1495	1770	3539
Flt Permitted	0.97		1.00	1.00	0.04	1.00
Satd. Flow (perm)	3289		3343	1495	77	3539
Volume (vph)	405	300	1855	185	485	1728
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	418	309	1912	191	500	1781
RTOR Reduction (vph)	74	0	0	42	0	0
Lane Group Flow (vph)	653	0	1912	149	500	1781
Heavy Vehicles (%)	2%	2%	8%	8%	2%	2%
Turn Type				Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases				2	6	
Actuated Green, G (s)	34.0		91.1	91.1	136.9	136.1
Effective Green, g (s)	34.6		92.4	92.4	137.4	137.4
Actuated g/C Ratio	0.19		0.51	0.51	0.76	0.76
Clearance Time (s)	4.6		5.3	5.3	4.5	5.3
Vehicle Extension (s)	3.0		3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	632		1716	767	444	2701
v/s Ratio Prot	c0.20		0.57		c0.26	0.50
v/s Ratio Perm				0.10	c0.60	
v/c Ratio	1.03		1.11	0.19	1.13	0.66
Uniform Delay, d1	72.7		43.8	23.7	66.0	10.1
Progression Factor	1.00		0.19	0.02	1.07	0.74
Incremental Delay, d2	44.5		54.4	0.2	65.6	0.4
Delay (s)	117.2		62.6	0.6	136.5	7.8
Level of Service	F		E	A	F	A
Approach Delay (s)	117.2		57.0			36.1
Approach LOS	F		E			D

Intersection Summary			
HCM Average Control Delay	56.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	109.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	408		1141			980
Travel Time (s)	9.3		25.9			22.3
Lane Group Flow (vph)	464	438	1655	479	588	1628
v/c Ratio	0.80	0.71	1.03	0.46	1.08	0.58
Control Delay	94.2	23.2	49.8	5.8	93.4	1.6
Queue Delay	1.5	0.3	0.0	0.0	0.8	0.2
Total Delay	95.7	23.4	49.8	5.9	94.1	1.8
Queue Length 50th (ft)	285	113	~1094	50	~732	34
Queue Length 95th (ft)	m331	m187	#1267	m113	m#910	m72
Internal Link Dist (ft)	328		1061			900
Turn Bay Length (ft)						
Base Capacity (vph)	666	646	1610	1030	545	2786
Starvation Cap Reductn	80	21	0	0	0	328
Spillback Cap Reductn	0	0	0	31	1	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.70	1.03	0.48	1.08	0.66

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3467	1599	3343	1495	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.04	1.00
Satd. Flow (perm)	3467	1599	3343	1495	82	3539
Volume (vph)	450	425	1605	465	570	1579
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	464	438	1655	479	588	1628
RTOR Reduction (vph)	0	348	0	30	0	0
Lane Group Flow (vph)	464	90	1655	449	588	1628
Heavy Vehicles (%)	1%	1%	8%	8%	2%	2%
Turn Type		Perm		pm+ov	pm+pt	
Protected Phases	8		2	8	1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	29.7	29.7	85.4	115.1	141.2	140.4
Effective Green, g (s)	30.3	30.3	86.7	117.0	141.7	141.7
Actuated g/C Ratio	0.17	0.17	0.48	0.65	0.79	0.79
Clearance Time (s)	4.6	4.6	5.3	4.6	4.5	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	584	269	1610	1005	543	2786
v/s Ratio Prot	c0.13		0.50	0.08	c0.31	0.46
v/s Ratio Perm		0.06		0.23	c0.54	
v/c Ratio	0.79	0.33	1.03	0.45	1.08	0.58
Uniform Delay, d1	71.9	65.9	46.6	15.5	60.0	7.5
Progression Factor	1.20	2.67	0.53	0.44	0.67	0.13
Incremental Delay, d2	5.6	0.6	24.3	0.2	56.5	0.6
Delay (s)	91.7	176.3	48.9	7.0	96.9	1.6
Level of Service	F	F	D	A	F	A
Approach Delay (s)	132.8		39.5			26.9
Approach LOS	F		D			C

Intersection Summary

HCM Average Control Delay	50.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	112.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	483		580			1141
Travel Time (s)	11.0		13.2			25.9
Lane Group Flow (vph)	309	381	1691	227	294	1819
v/c Ratio	0.90	0.72	0.87	0.25	0.90	0.67
Control Delay	99.6	25.9	25.5	4.8	75.8	14.9
Queue Delay	0.0	0.0	1.6	0.0	0.0	0.2
Total Delay	99.6	25.9	27.1	4.8	75.8	15.0
Queue Length 50th (ft)	355	113	984	41	275	676
Queue Length 95th (ft)	#510	246	497	m28	m#431	680
Internal Link Dist (ft)	403		500			1061
Turn Bay Length (ft)						
Base Capacity (vph)	371	553	1949	924	357	2710
Starvation Cap Reductn	0	0	122	0	0	201
Spillback Cap Reductn	0	0	0	0	0	190
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.69	0.93	0.25	0.82	0.72

Intersection Summary

Area Type: Other

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	3343	1495	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1805	1615	3343	1495	87	3539
Volume (vph)	300	370	1640	220	285	1764
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	309	381	1691	227	294	1819
RTOR Reduction (vph)	0	225	0	52	0	0
Lane Group Flow (vph)	309	156	1691	175	294	1819
Heavy Vehicles (%)	0%	0%	8%	8%	2%	2%
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	33.7	33.7	103.6	103.6	136.5	136.5
Effective Green, g (s)	34.2	34.2	104.9	104.9	137.8	137.8
Actuated g/C Ratio	0.19	0.19	0.58	0.58	0.77	0.77
Clearance Time (s)	4.5	4.5	5.3	5.3	4.5	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	343	307	1948	871	337	2709
v/s Ratio Prot	c0.17		0.51		c0.14	0.51
v/s Ratio Perm		0.10		0.12	c0.53	
v/c Ratio	0.90	0.51	0.87	0.20	0.87	0.67
Uniform Delay, d1	71.2	65.4	31.7	17.7	60.6	10.2
Progression Factor	1.00	1.00	0.64	0.50	0.91	1.29
Incremental Delay, d2	25.5	1.3	3.9	0.4	17.3	1.1
Delay (s)	96.7	66.7	24.2	9.2	72.4	14.2
Level of Service	F	E	C	A	E	B
Approach Delay (s)	80.1		22.4			22.3
Approach LOS	F		C			C

Intersection Summary

HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	94.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Queues
9: S 182nd St & International Blvd

SeaTac LRT Station Area Redevelopment
Mitigation - Airport Station Area (combined)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		460			311			2695			580	
Travel Time (s)		10.5			7.1			61.3			13.2	
Lane Group Flow (vph)	145	149	149	10	25	0	376	1613	5	15	2314	0
v/c Ratio	0.77	0.82	0.42	0.43	0.14		1.04	0.71	0.00	0.27	0.79	
Control Delay	99.3	107.0	12.0	122.1	36.8		133.5	26.3	14.6	107.1	24.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.6	0.0	0.0	1.5	
Total Delay	99.3	107.0	12.0	122.1	36.8		133.5	26.8	14.6	107.1	25.8	
Queue Length 50th (ft)	176	183	0	12	11		~246	622	1	17	413	
Queue Length 95th (ft)	260	268	68	34	41		#361	1038	9	m25	#1160	
Internal Link Dist (ft)		380			231			2615			500	
Turn Bay Length (ft)												
Base Capacity (vph)	237	228	408	41	318		360	2275	1018	56	2915	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	391	
Spillback Cap Reductn	0	0	0	0	1		0	289	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.61	0.65	0.37	0.24	0.08		1.04	0.81	0.00	0.27	0.92	

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: S 182nd St & International Blvd

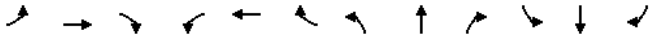
SeaTac LRT Station Area Redevelopment
Mitigation - Airport Station Area (combined)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00		0.97	0.95	1.00	1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	0.95	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1688	1583	1770	1695		3242	3343	1495	1770	5019	
Flt Permitted	0.74	0.71	1.00	0.25	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1311	1265	1583	475	1695		3242	3343	1495	1770	5019	
Volume (vph)	280	5	145	10	10	15	365	1565	5	15	2050	195
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	289	5	149	10	10	15	376	1613	5	15	2113	201
RTOR Reduction (vph)	0	0	128	0	14	0	0	0	1	0	5	0
Lane Group Flow (vph)	145	149	21	10	11	0	376	1613	4	15	2309	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	8%	8%	8%	2%	2%	2%
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		
Protected Phases		4			3		5	2		1	6	
Permitted Phases	4		4	3					2			
Actuated Green, G (s)	25.3	25.3	25.3	15.2	15.2		21.3	117.5	117.5	3.2	99.4	
Effective Green, g (s)	25.8	25.8	25.8	15.7	15.7		21.8	118.8	118.8	3.7	100.7	
Actuated g/C Ratio	0.14	0.14	0.14	0.09	0.09		0.12	0.66	0.66	0.02	0.56	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	5.3	5.3	4.5	5.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.0	2.0		2.5	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	188	181	227	41	148		393	2206	987	36	2808	
v/s Ratio Prot					0.01		c0.12	0.48		0.01	c0.46	
v/s Ratio Perm	0.11	c0.12	0.01	c0.02					0.00			
v/c Ratio	0.77	0.82	0.09	0.24	0.08		0.96	0.73	0.00	0.42	0.82	
Uniform Delay, d1	74.3	74.9	67.0	76.6	75.5		78.6	20.1	10.4	87.1	32.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.15	0.66	
Incremental Delay, d2	17.0	24.6	0.1	1.1	0.1		34.0	2.2	0.0	2.2	2.2	
Delay (s)	91.2	99.5	67.1	77.7	75.6		112.6	22.3	10.4	102.2	23.6	
Level of Service	F	F	E	E	E		F	C	B	F	C	
Approach Delay (s)		85.9			76.2			39.3			24.1	
Approach LOS		F			E			D			C	

Intersection Summary

HCM Average Control Delay	36.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

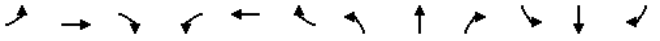
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	35	300	50	15	260	5	25	0	15	10	0	60
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	316	53	16	274	5	26	0	16	11	0	63
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		547										
pX, platoon unblocked				0.90			0.90	0.90	0.90	0.90	0.90	
vC, conflicting volume	279			368			787	726	342	739	750	276
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	279			299			763	696	270	711	723	276
tC, single (s)	4.2			4.2			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			90	100	98	96	100	92
cM capacity (veh/h)	1255			1112			259	317	697	299	306	767

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	405	295	42	74
Volume Left	37	16	26	11
Volume Right	53	5	16	63
cSH	1255	1112	338	627
Volume to Capacity	0.03	0.01	0.12	0.12
Queue Length 95th (ft)	2	1	11	10
Control Delay (s)	1.0	0.6	17.1	11.5
Lane LOS	A	A	C	B
Approach Delay (s)	1.0	0.6	17.1	11.5
Approach LOS			C	B

Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	44.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		408			573			223			421	
Travel Time (s)		9.3			13.0			5.1			9.6	
Lane Group Flow (vph)	147	983	0	98	717	0	0	260	0	0	266	0
v/c Ratio	0.38	0.78		0.48	0.55			0.97			0.71	
Control Delay	6.6	10.8		22.0	14.9			108.0			62.4	
Queue Delay	0.0	4.8		0.0	6.5			0.0			0.0	
Total Delay	6.6	15.6		22.0	21.4			108.0			62.4	
Queue Length 50th (ft)	30	271		50	393			289			242	
Queue Length 95th (ft)	m43	m310		112	500			#480			358	
Internal Link Dist (ft)		328			493			143			341	
Turn Bay Length (ft)												
Base Capacity (vph)	385	1264		204	1299			279			386	
Starvation Cap Reductn	0	215		0	523			0			0	
Spillback Cap Reductn	0	0		0	43			0			1	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.38	0.94		0.48	0.92			0.93			0.69	

Intersection Summary	
Area Type:	Other

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis — SeaTac LRT Station Area Redevelopment
15: S 176th St & 30th Ave S — Mitigation - Airport Station Area (combined)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.95		1.00	0.98			0.95			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.98	
Satd. Flow (prot)	1787	1780		1787	1841			1720			1678	
Flt Permitted	0.30	1.00		0.16	1.00			0.57			0.80	
Satd. Flow (perm)	557	1780		303	1841			1019			1360	
Volume (vph)	135	580	325	90	565	95	150	5	85	90	5	150
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	630	353	98	614	103	163	5	92	98	5	163
RTOR Reduction (vph)	0	11	0	0	3	0	0	11	0	0	32	0
Lane Group Flow (vph)	147	972	0	98	714	0	0	249	0	0	234	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	126.8	126.8		126.8	126.8			45.2			45.2	
Effective Green, g (s)	126.8	126.8		126.8	126.8			45.2			45.2	
Actuated g/C Ratio	0.70	0.70		0.70	0.70			0.25			0.25	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	392	1254		213	1297			256			342	
v/s Ratio Prot		c0.55			0.39							
v/s Ratio Perm	0.26			0.32				c0.24			0.17	
v/c Ratio	0.38	0.78		0.46	0.55			0.97			0.68	
Uniform Delay, d1	10.7	17.3		11.6	12.8			66.8			60.9	
Progression Factor	0.40	0.44		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.7	3.0		7.0	1.7			48.1			5.6	
Delay (s)	6.0	10.6		18.6	14.5			114.9			66.5	
Level of Service	A	B		B	B			F			E	
Approach Delay (s)		10.0			15.0			114.9			66.5	
Approach LOS		A			B			F			E	

Intersection Summary				
HCM Average Control Delay	28.8	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	88.5%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis — SeaTac LRT Station Area Redevelopment
17: S 170th St & 32nd Ave S — Mitigation - Airport Station Area (combined)

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	285	55	30	245	65	25
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	303	59	32	261	69	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	1040					
pX, platoon unblocked						
vC, conflicting volume			362		657	332
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			362		657	332
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			97		83	96
cM capacity (veh/h)			1170		416	707

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	362	293	96
Volume Left	0	32	69
Volume Right	59	0	27
cSH	1700	1170	470
Volume to Capacity	0.21	0.03	0.20
Queue Length 95th (ft)	0	2	19
Control Delay (s)	0.0	1.1	14.6
Lane LOS		A	B
Approach Delay (s)	0.0	1.1	14.6
Approach LOS			B

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	48.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues
18: S 176th St & 32nd Ave S

SeaTac LRT Station Area Redevelopment
Mitigation - Airport Station Area (combined)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		573			822			442			1979	
Travel Time (s)		13.0			18.7			10.0			45.0	
Lane Group Flow (vph)	82	522	190	98	593	0	163	157	0	71	147	0
v/c Ratio	0.58	0.78	0.20	0.61	0.87		0.74	0.36		0.40	0.31	
Control Delay	53.9	31.1	2.1	52.5	36.7		54.7	10.0		40.5	13.0	
Queue Delay	0.0	0.0	0.0	0.0	0.3		0.2	0.0		0.0	0.0	
Total Delay	53.9	31.1	2.1	52.5	37.0		55.0	10.0		40.5	13.0	
Queue Length 50th (ft)	41	221	0	48	256		80	11		34	20	
Queue Length 95th (ft)	#102	339	27	#113	#435		#174	58		73	68	
Internal Link Dist (ft)		493			742			362			1899	
Turn Bay Length (ft)												
Base Capacity (vph)	144	737	957	170	754		242	489		205	477	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	14		3	0		0	13	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.57	0.71	0.20	0.58	0.80		0.68	0.32		0.35	0.32	

Intersection Summary

Area Type: Other

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
18: S 176th St & 32nd Ave S

SeaTac LRT Station Area Redevelopment
Mitigation - Airport Station Area (combined)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.88		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1881	1599	1787	1853		1752	1616		1787	1693	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1787	1881	1599	1787	1853		1752	1616		1787	1693	
Volume (vph)	75	480	175	90	490	55	150	25	120	65	45	90
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	522	190	98	533	60	163	27	130	71	49	98
RTOR Reduction (vph)	0	0	99	0	5	0	0	94	0	0	75	0
Lane Group Flow (vph)	82	522	91	98	588	0	163	63	0	71	72	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	3%	3%	3%	1%	1%	1%
Turn Type	Prot		pm+ov	Prot			Prot			Prot		
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases			2									
Actuated Green, G (s)	4.1	24.2	33.0	4.9	25.0		8.8	20.1		5.6	16.5	
Effective Green, g (s)	4.6	26.0	35.3	5.4	26.8		9.3	20.6		6.1	17.4	
Actuated g/C Ratio	0.06	0.35	0.48	0.07	0.36		0.13	0.28		0.08	0.23	
Clearance Time (s)	4.5	5.8	4.5	4.5	5.8		4.5	4.5		4.5	4.9	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	111	660	848	130	670		220	449		147	398	
v/s Ratio Prot	0.05	0.28	0.01	c0.05	c0.32		c0.09	c0.04		0.04	c0.04	
v/s Ratio Perm			0.04									
v/c Ratio	0.74	0.79	0.11	0.75	0.88		0.74	0.14		0.48	0.18	
Uniform Delay, d1	34.2	21.6	10.7	33.7	22.1		31.2	20.1		32.5	22.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.6	6.0	0.0	19.5	12.1		11.1	0.1		0.9	1.0	
Delay (s)	53.8	27.6	10.7	53.2	34.2		42.3	20.2		33.4	23.7	
Level of Service	D	C	B	D	C		D	C		C	C	
Approach Delay (s)		26.3			36.9			31.5			26.8	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	74.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Attachment 6
Level of Service Worksheets
With Relocation of SR 518 Westbound Off-Ramp

HCM Unsignalized Intersection Capacity Analysis — SeaTac LRT Station Area Redevelopment
21: S 152nd St & 32nd Ave S — 2020 With-Redevelopment (opt., 32nd Ramp)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	85	25	180	80	20	40	20	265	10	10	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	92	27	196	87	22	43	22	288	11	11	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					680							
pX, platoon unblocked	0.97						0.97	0.97		0.97	0.97	0.97
vC, conflicting volume	109			120			617	617	106	905	620	98
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78			120			604	604	106	902	606	67
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			87			87	94	70	93	97	99
cM capacity (veh/h)	1470			1481			347	346	951	150	346	969

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	125	304	353	27
Volume Left	5	196	43	11
Volume Right	27	22	288	5
cSH	1470	1481	719	248
Volume to Capacity	0.00	0.13	0.49	0.11
Queue Length 95th (ft)	0	11	68	9
Control Delay (s)	0.4	5.4	14.7	21.3
Lane LOS	A	A	B	C
Approach Delay (s)	0.4	5.4	14.7	21.3
Approach LOS			B	C

Intersection Summary				
Average Delay	9.2			
Intersection Capacity Utilization	49.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues — SeaTac LRT Station Area Redevelopment
22: S 152nd St & Military Rd S — 2020 With-Redevelopment (opt., 32nd Ramp)

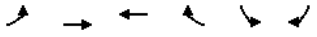
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Right Turn on Red				Yes		Yes
Link Speed (mph)		30	30		30	
Link Distance (ft)		680	235		1987	
Travel Time (s)		15.5	5.3		45.2	
Lane Group Flow (vph)	232	211	165	191	407	242
v/c Ratio	0.51	0.33	0.60	0.48	0.38	0.23
Control Delay	34.6	31.2	47.2	9.7	17.2	2.5
Queue Delay	0.0	0.0	1.0	0.6	0.0	0.0
Total Delay	34.6	31.2	48.2	10.3	17.2	2.5
Queue Length 50th (ft)	132	118	63	0	199	0
Queue Length 95th (ft)	184	166	m149	m37	308	43
Internal Link Dist (ft)		600	155		1907	
Turn Bay Length (ft)						
Base Capacity (vph)	531	994	477	548	1068	1053
Starvation Cap Reductn	0	0	146	136	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.21	0.50	0.46	0.38	0.23

Intersection Summary	
Area Type:	Other

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
22: S 152nd St & Military Rd S

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., 32nd Ramp)



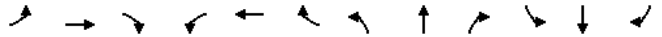
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1900	1881	1599	1787	1599
Flt Permitted	0.34	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	639	1900	1881	1599	1787	1599
Volume (vph)	225	205	160	185	395	235
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	232	211	165	191	407	242
RTOR Reduction (vph)	0	0	0	163	0	97
Lane Group Flow (vph)	232	211	165	28	407	145
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Turn Type	pm+pt			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	44.3	44.3	19.1	19.1	77.7	77.7
Effective Green, g (s)	44.3	44.3	19.1	19.1	77.7	77.7
Actuated g/C Ratio	0.34	0.34	0.15	0.15	0.60	0.60
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	408	647	276	235	1068	956
v/s Ratio Prot	c0.09	0.11	0.09		c0.23	
v/s Ratio Perm	c0.10			0.02		0.09
v/c Ratio	0.57	0.33	0.60	0.12	0.38	0.15
Uniform Delay, d1	33.0	31.8	51.9	48.1	13.6	11.6
Progression Factor	1.00	1.00	0.80	1.07	1.00	1.00
Incremental Delay, d2	1.8	0.3	2.5	0.2	1.0	0.3
Delay (s)	34.8	32.1	44.0	51.5	14.7	11.9
Level of Service	C	C	D	D	B	B
Approach Delay (s)		33.5	48.0		13.6	
Approach LOS		C	D		B	

Intersection Summary				
HCM Average Control Delay	28.2	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.44			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	52.8%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Queues
23: S 152nd St & International Blvd

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., 32nd Ramp)



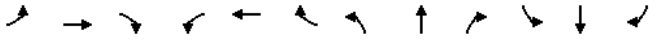
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		235			723			704			2826	
Travel Time (s)		5.3			16.4			16.0			64.2	
Lane Group Flow (vph)	113	103	407	52	67	0	196	979	41	62	1129	0
v/c Ratio	0.54	0.46	0.74	0.33	0.39		0.84	0.45	0.04	0.47	0.58	
Control Delay	52.2	48.5	13.1	58.3	54.6		61.8	5.1	0.4	69.5	24.2	
Queue Delay	0.4	0.4	0.4	0.0	0.0		3.4	0.0	0.0	0.0	0.0	
Total Delay	52.7	48.9	13.5	58.3	54.6		65.2	5.1	0.4	69.5	24.2	
Queue Length 50th (ft)	71	62	45	43	50		168	34	0	51	307	
Queue Length 95th (ft)	104	93	67	75	87		m#278	240	m3	99	#603	
Internal Link Dist (ft)		155			643			624			2746	
Turn Bay Length (ft)												
Base Capacity (vph)	344	362	636	340	355		243	2197	998	144	1930	
Starvation Cap Reductn	55	72	40	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		14	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.39	0.36	0.68	0.15	0.19		0.86	0.45	0.04	0.43	0.58	

Intersection Summary	
Area Type:	Other

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
23: S 152nd St & International Blvd

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., 32nd Ramp)



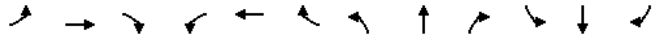
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	1881	1599	1770	1821		1752	3505	1568	1770	3493	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1787	1881	1599	1770	1821		1752	3505	1568	1770	3493	
Volume (vph)	110	100	395	50	55	10	190	950	40	60	1000	95
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	113	103	407	52	57	10	196	979	41	62	1031	98
RTOR Reduction (vph)	0	0	359	0	5	0	0	0	16	0	4	0
Lane Group Flow (vph)	113	103	48	52	62	0	196	979	25	62	1125	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases			8						2			
Actuated Green, G (s)	14.1	14.4	14.4	9.6	9.9		16.9	77.9	77.9	7.1	68.1	
Effective Green, g (s)	15.1	15.4	15.4	10.6	10.9		18.4	79.4	79.4	8.6	69.6	
Actuated g/C Ratio	0.12	0.12	0.12	0.08	0.08		0.14	0.61	0.61	0.07	0.54	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	208	223	189	144	153		248	2141	958	117	1870	
v/s Ratio Prot	c0.06	0.05		0.03	c0.03		c0.11	0.28		0.04	c0.32	
v/s Ratio Perm			0.03						0.02			
v/c Ratio	0.54	0.46	0.26	0.36	0.40		0.79	0.46	0.03	0.53	0.60	
Uniform Delay, d1	54.2	53.4	52.1	56.5	56.5		53.9	13.7	10.0	58.7	20.7	
Progression Factor	0.82	0.82	1.03	1.00	1.00		0.66	0.27	0.07	1.00	1.00	
Incremental Delay, d2	1.5	0.5	0.2	0.6	0.6		11.9	0.6	0.0	2.0	1.4	
Delay (s)	45.7	44.1	54.0	57.1	57.1		47.7	4.3	0.7	60.7	22.1	
Level of Service	D	D	D	E	E		D	A	A	E	C	
Approach Delay (s)		50.8			57.1			11.2			24.2	
Approach LOS		D			E			B			C	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues
24: S 154th St & 32nd Ave S

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., 32nd Ramp)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1415			691			357			665	
Travel Time (s)		32.2			15.7			8.1			15.1	
Lane Group Flow (vph)	0	543	0	0	684	141	0	337	543	0	207	0
v/c Ratio		0.95			0.68	0.15		0.88	0.69		0.53	
Control Delay		42.2			12.6	1.8		46.9	9.2		13.3	
Queue Delay		0.0			0.0	0.0		0.0	0.0		0.0	
Total Delay		42.2			12.6	1.8		46.9	9.2		13.3	
Queue Length 50th (ft)		143			137	0		104	24		22	
Queue Length 95th (ft)		#343			238	18		#235	106		75	
Internal Link Dist (ft)		1335			611			277			585	
Turn Bay Length (ft)												
Base Capacity (vph)		592			1043	959		401	801		407	
Starvation Cap Reductn		0			0	0		0	0		0	
Spillback Cap Reductn		0			0	0		0	0		0	
Storage Cap Reductn		0			0	0		0	0		0	
Reduced v/c Ratio		0.92			0.66	0.15		0.84	0.68		0.51	

Intersection Summary	
Area Type:	Other

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
24: S 154th St & 32nd Ave S

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., 32nd Ramp)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0	4.0		4.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		1.00			1.00	0.85		1.00	0.85		0.92	
Flt Protected		0.99			1.00	1.00		0.97	1.00		0.98	
Satd. Flow (prot)		1836			1843	1568		1842	1615		1684	
Flt Permitted		0.55			0.99	1.00		0.70	1.00		0.63	
Satd. Flow (perm)		1028			1820	1568		1333	1615		1080	
Volume (vph)	135	360	5	15	615	130	195	115	500	75	5	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	391	5	16	668	141	212	125	543	82	5	120
RTOR Reduction (vph)	0	0	0	0	0	63	0	0	316	0	85	0
Lane Group Flow (vph)	0	543	0	0	684	78	0	337	227	0	122	0
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	0%	0%	0%	2%	2%	2%
Turn Type	Perm			Perm		Perm	Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		28.9			28.9	28.9		15.1	15.1		15.1	
Effective Green, g (s)		28.9			28.9	28.9		15.1	15.1		15.1	
Actuated g/C Ratio		0.56			0.56	0.56		0.29	0.29		0.29	
Clearance Time (s)		4.0			4.0	4.0		4.0	4.0		4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		571			1012	871		387	469		314	
v/s Ratio Prot												
v/s Ratio Perm		c0.53			0.38	0.05		c0.25	0.14		0.11	
v/c Ratio		0.95			0.68	0.09		0.87	0.48		0.39	
Uniform Delay, d1		10.9			8.2	5.4		17.5	15.2		14.8	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		25.7			1.8	0.0		18.8	0.8		0.8	
Delay (s)		36.6			10.0	5.4		36.3	16.0		15.6	
Level of Service		D			B	A		D	B		B	
Approach Delay (s)		36.6			9.2			23.8			15.6	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	52.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Queues
25: S 154th St & International Blvd

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., 32nd Ramp)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		691			758			5562			704	
Travel Time (s)		15.7			17.2			126.4			16.0	
Lane Group Flow (vph)	366	211	392	165	361	0	340	773	134	108	1216	206
v/c Ratio	0.74	0.59	0.68	0.55	0.74		1.15	0.53	0.18	0.33	0.80	0.27
Control Delay	62.4	54.3	14.3	63.8	57.8		146.3	30.4	4.5	53.9	25.5	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.4	54.3	14.3	63.8	57.8		146.3	30.4	4.5	53.9	25.5	2.7
Queue Length 50th (ft)	154	164	39	70	140		~336	254	0	94	474	34
Queue Length 95th (ft)	200	233	140	105	187		#528	321	40	m151	#656	m6
Internal Link Dist (ft)		611			678			5482			624	
Turn Bay Length (ft)												
Base Capacity (vph)	693	396	602	687	708		296	1450	727	330	1524	763
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.53	0.65	0.24	0.51		1.15	0.53	0.18	0.33	0.80	0.27

Intersection Summary	
Area Type:	Other

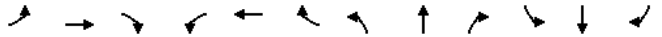
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	1881	1599	3433	3395		1752	3505	1568	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	1881	1599	3433	3395		1752	3505	1568	1770	3539	1583
Volume (vph)	355	205	380	160	255	95	330	750	130	105	1180	200
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	366	211	392	165	263	98	340	773	134	108	1216	206
RTOR Reduction (vph)	0	0	273	0	32	0	0	0	79	0	0	81
Lane Group Flow (vph)	366	211	119	165	329	0	340	773	55	108	1216	125
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	17.6	23.7	23.7	10.3	16.4		21.5	51.8	51.8	23.7	54.0	54.0
Effective Green, g (s)	18.6	24.7	24.7	11.3	17.4		22.0	53.8	53.8	24.2	56.0	56.0
Actuated g/C Ratio	0.14	0.19	0.19	0.09	0.13		0.17	0.41	0.41	0.19	0.43	0.43
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	496	357	304	298	454		296	1451	649	329	1524	682
v/s Ratio Prot	c0.11	0.11		0.05	c0.10		c0.19	0.22		0.06	c0.34	
v/s Ratio Perm			0.07						0.04			0.08
v/c Ratio	0.74	0.59	0.39	0.55	0.72		1.15	0.53	0.09	0.33	0.80	0.18
Uniform Delay, d1	53.4	48.0	46.1	56.9	54.0		54.0	28.6	23.2	45.9	32.1	22.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.06	0.63	0.22
Incremental Delay, d2	4.9	1.7	0.3	1.3	4.8		98.7	1.4	0.3	0.2	3.6	0.5
Delay (s)	58.3	49.8	46.4	58.2	58.8		152.7	30.1	23.4	48.6	23.8	5.6
Level of Service	E	D	D	E	E		F	C	C	D	C	A
Approach Delay (s)		51.6			58.6			62.8			23.1	
Approach LOS		D			E			E			C	

Intersection Summary			
HCM Average Control Delay	45.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis — SeaTac LRT Station Area Redevelopment
21: S 152nd St & 32nd Ave S — 2020 With-Redevelopment (opt., International Ramp)

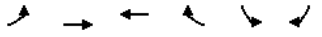


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	85	25	210	95	30	40	10	250	10	10	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	92	27	228	103	33	43	11	272	11	11	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					680							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	136			120			704	709	106	970	707	120
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	70			120			681	687	106	968	684	52
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			85			85	96	71	92	96	99
cM capacity (veh/h)	1422			1481			289	290	951	133	292	949

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	125	364	326	27
Volume Left	5	228	43	11
Volume Right	27	33	272	5
cSH	1422	1481	688	219
Volume to Capacity	0.00	0.15	0.47	0.12
Queue Length 95th (ft)	0	14	64	10
Control Delay (s)	0.4	5.4	14.8	23.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.4	5.4	14.8	23.8
Approach LOS			B	C

Intersection Summary				
Average Delay	8.9			
Intersection Capacity Utilization	50.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues — SeaTac LRT Station Area Redevelopment
22: S 152nd St & Military Rd S — 2020 With-Redevelopment (opt., International Ramp)



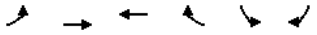
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Right Turn on Red				Yes		Yes
Link Speed (mph)		30	30		30	
Link Distance (ft)		680	235		1987	
Travel Time (s)		15.5	5.3		45.2	
Lane Group Flow (vph)	222	211	242	201	407	242
v/c Ratio	0.58	0.32	0.59	0.40	0.38	0.23
Control Delay	40.9	30.0	38.0	6.7	16.9	2.5
Queue Delay	0.0	0.0	2.0	0.8	0.0	0.0
Total Delay	40.9	30.0	40.0	7.5	16.9	2.5
Queue Length 50th (ft)	126	118	90	0	181	0
Queue Length 95th (ft)	182	170	m70	m0	278	39
Internal Link Dist (ft)		600	155		1907	
Turn Bay Length (ft)						
Base Capacity (vph)	607	1018	550	610	1061	1048
Starvation Cap Reductn	0	0	183	201	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.21	0.66	0.49	0.38	0.23

Intersection Summary	
Area Type:	Other

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
22: S 152nd St & Military Rd S

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., International Ramp)



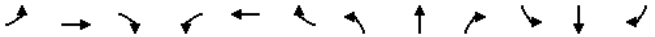
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1900	1881	1599	1787	1599
Flt Permitted	0.39	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	739	1900	1881	1599	1787	1599
Volume (vph)	215	205	235	195	395	235
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	222	211	242	201	407	242
RTOR Reduction (vph)	0	0	0	157	0	98
Lane Group Flow (vph)	222	211	242	44	407	144
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Turn Type	pm+pt			Perm		Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	42.8	42.8	27.1	27.1	74.2	74.2
Effective Green, g (s)	42.8	42.8	27.1	27.1	74.2	74.2
Actuated g/C Ratio	0.34	0.34	0.22	0.22	0.59	0.59
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	353	651	408	347	1061	949
v/s Ratio Prot	c0.06	0.11	0.13		c0.23	
v/s Ratio Perm	c0.16			0.03		0.09
v/c Ratio	0.63	0.32	0.59	0.13	0.38	0.15
Uniform Delay, d1	42.5	30.4	44.0	39.4	13.4	11.3
Progression Factor	1.00	1.00	0.81	1.12	1.00	1.00
Incremental Delay, d2	3.5	0.3	1.2	0.1	1.1	0.3
Delay (s)	46.0	30.7	36.9	44.3	14.4	11.7
Level of Service	D	C	D	D	B	B
Approach Delay (s)		38.5	40.2		13.4	
Approach LOS		D	D		B	

Intersection Summary			
HCM Average Control Delay	28.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues
23: S 152nd St & International Blvd

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., International Ramp)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		235			723			704			2826	
Travel Time (s)		5.3			16.4			16.0			64.2	
Lane Group Flow (vph)	113	103	407	52	67	0	284	979	41	62	1129	0
v/c Ratio	0.53	0.45	0.74	0.32	0.38		1.01	0.45	0.04	0.46	0.63	
Control Delay	63.8	60.2	21.2	55.4	52.0		109.4	17.8	6.2	66.2	26.6	
Queue Delay	0.4	0.4	0.3	0.0	0.0		3.2	0.0	0.0	0.0	0.0	
Total Delay	64.2	60.6	21.5	55.4	52.0		112.6	17.8	6.2	66.2	26.6	
Queue Length 50th (ft)	89	81	68	41	48		~237	214	0	49	319	
Queue Length 95th (ft)	116	108	96	72	83		#420	426	24	97	#651	
Internal Link Dist (ft)		155			643			624			2746	
Turn Bay Length (ft)												
Base Capacity (vph)	357	376	645	354	369		280	2160	982	148	1804	
Starvation Cap Reductn	60	78	33	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		3	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.38	0.35	0.67	0.15	0.18		1.03	0.45	0.04	0.42	0.63	

Intersection Summary	
Area Type:	Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
23: S 152nd St & International Blvd

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., International Ramp)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	1881	1599	1770	1821		1752	3505	1568	1770	3493	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1787	1881	1599	1770	1821		1752	3505	1568	1770	3493	
Volume (vph)	110	100	395	50	55	10	275	950	40	60	1000	95
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	113	103	407	52	57	10	284	979	41	62	1031	98
RTOR Reduction (vph)	0	0	358	0	5	0	0	0	16	0	4	0
Lane Group Flow (vph)	113	103	49	52	62	0	284	979	25	62	1125	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases			8						2			
Actuated Green, G (s)	13.8	14.1	14.1	9.5	9.8		19.6	73.4	73.4	7.0	60.8	
Effective Green, g (s)	14.8	15.1	15.1	10.5	10.8		21.1	74.9	74.9	8.5	62.3	
Actuated g/C Ratio	0.12	0.12	0.12	0.08	0.09		0.17	0.60	0.60	0.07	0.50	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	
Lane Grp Cap (vph)	212	227	193	149	157		296	2100	940	120	1741	
v/s Ratio Prot	c0.06	0.05		0.03	c0.03		c0.16	0.28		0.04	c0.32	
v/s Ratio Perm			0.03						0.02			
v/c Ratio	0.53	0.45	0.25	0.35	0.39		0.96	0.47	0.03	0.52	0.65	
Uniform Delay, d1	51.8	51.1	49.8	54.0	54.0		51.5	13.9	10.2	56.3	23.2	
Progression Factor	1.09	1.10	2.93	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	0.5	0.2	0.5	0.6		40.6	0.7	0.1	1.6	1.9	
Delay (s)	58.0	56.7	146.2	54.5	54.6		92.1	14.7	10.3	57.8	25.1	
Level of Service	E	E	F	D	D		F	B	B	E	C	
Approach Delay (s)		115.4			54.6			31.4			26.8	
Approach LOS		F			D			C			C	

Intersection Summary			
HCM Average Control Delay	46.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues
24: S 154th St & 32nd Ave S

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., International Ramp)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1415			691			357			665	
Travel Time (s)		32.2			15.7			8.1			15.1	
Lane Group Flow (vph)	0	543	0	0	853	163	0	32	0	0	207	0
v/c Ratio		0.90			0.70	0.15		0.10			0.60	
Control Delay		30.5			10.1	1.2		13.6			22.1	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		30.5			10.1	1.2		13.6			22.1	
Queue Length 50th (ft)		118			140	0		3			42	
Queue Length 95th (ft)		#406			331	16		23			102	
Internal Link Dist (ft)		1335			611			277			585	
Turn Bay Length (ft)												
Base Capacity (vph)		647			1306	1169		455			463	
Starvation Cap Reductn		0			0	0		0			0	
Spillback Cap Reductn		0			0	0		0			0	
Storage Cap Reductn		0			0	0		0			0	
Reduced v/c Ratio		0.84			0.65	0.14		0.07			0.45	

Intersection Summary	
Area Type:	Other

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
24: S 154th St & 32nd Ave S

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., International Ramp)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00			1.00	1.00		1.00			1.00	
Frt		1.00			1.00	0.85		0.91			0.92	
Flt Protected		0.99			1.00	1.00		0.99			0.98	
Satd. Flow (prot)		1836			1843	1568		1710			1684	
Flt Permitted		0.55			0.99	1.00		0.96			0.86	
Satd. Flow (perm)		1020			1825	1568		1660			1470	
Volume (vph)	135	360	5	15	770	150	5	5	20	75	5	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	391	5	16	837	163	5	5	22	82	5	120
RTOR Reduction (vph)	0	0	0	0	0	53	0	18	0	0	75	0
Lane Group Flow (vph)	0	543	0	0	853	110	0	14	0	0	132	0
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	0%	0%	0%	2%	2%	2%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		37.9			37.9	37.9		10.2			10.2	
Effective Green, g (s)		37.9			37.9	37.9		10.2			10.2	
Actuated g/C Ratio		0.68			0.68	0.68		0.18			0.18	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		689			1233	1059		302			267	
v/s Ratio Prot												
v/s Ratio Perm		c0.53			0.47	0.07		0.01			c0.09	
v/c Ratio		0.79			0.69	0.10		0.05			0.49	
Uniform Delay, d1		6.3			5.5	3.2		18.9			20.6	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		5.9			1.7	0.0		0.1			1.4	
Delay (s)		12.3			7.2	3.2		19.0			22.1	
Level of Service		B			A	A		B			C	
Approach Delay (s)		12.3			6.6			19.0			22.1	
Approach LOS		B			A			B			C	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	56.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Queues
25: S 154th St & International Blvd

SeaTac LRT Station Area Redevelopment
2020 With-Redevelopment (opt., International Ramp)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		691			758			5562			704	
Travel Time (s)		15.7			17.2			126.4			16.0	
Lane Group Flow (vph)	82	57	392	165	361	0	541	1268	242	108	1216	206
v/c Ratio	0.35	0.27	0.75	0.53	0.67		1.00	0.76	0.29	0.31	0.96	0.32
Control Delay	60.2	53.6	14.4	60.3	52.2		81.6	29.8	5.9	51.9	56.6	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.2	53.6	14.4	60.3	52.2		81.6	29.8	5.9	51.9	56.6	14.4
Queue Length 50th (ft)	32	42	0	65	134		~437	411	26	77	499	47
Queue Length 95th (ft)	61	87	100	107	193		#743	501	72	#163	#732	118
Internal Link Dist (ft)		611			678			5482			624	
Turn Bay Length (ft)												
Base Capacity (vph)	632	361	624	649	702		542	1814	897	344	1268	644
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.16	0.63	0.25	0.51		1.00	0.70	0.27	0.31	0.96	0.32

Intersection Summary	
Area Type:	Other

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis — SeaTac LRT Station Area Redevelopment
25: S 154th St & International Blvd — 2020 With-Redevelopment (opt., International Ramp)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	1881	1599	3433	3395		1752	3505	1568	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	1881	1599	3433	3395		1752	3505	1568	1770	3539	1583
Volume (vph)	80	55	380	160	255	95	525	1230	235	105	1180	200
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	82	57	392	165	263	98	541	1268	242	108	1216	206
RTOR Reduction (vph)	0	0	346	0	26	0	0	0	94	0	0	77
Lane Group Flow (vph)	82	57	46	165	335	0	541	1268	148	108	1216	129
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	6.3	13.6	13.6	10.3	17.6		37.6	56.3	56.3	23.4	42.1	42.1
Effective Green, g (s)	7.3	14.6	14.6	11.3	18.6		38.1	58.3	58.3	23.9	44.1	44.1
Actuated g/C Ratio	0.06	0.12	0.12	0.09	0.15		0.31	0.47	0.47	0.19	0.36	0.36
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	204	221	188	313	509		538	1647	737	341	1258	563
v/s Ratio Prot	c0.02	0.03		0.05	c0.10		c0.31	0.36		0.06	c0.34	
v/s Ratio Perm			0.03						0.09			0.08
v/c Ratio	0.40	0.26	0.25	0.53	0.66		1.01	0.77	0.20	0.32	0.97	0.23
Uniform Delay, d1	56.3	49.8	49.7	53.8	49.7		43.0	27.3	19.3	43.1	39.3	28.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	0.2	0.7	2.3		40.2	2.4	0.2	0.2	17.9	0.3
Delay (s)	56.8	50.0	50.0	54.6	52.1		83.2	29.7	19.4	43.3	57.1	28.3
Level of Service	E	D	D	D	D		F	C	B	D	E	C
Approach Delay (s)		51.0			52.9			42.6			52.3	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	47.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	124.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group