BURKE GILMAN TRAIL EXTENSION

Transportation Technical Memorandum

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EXECUTIVE SUMMARY

As part of the overall design effort for extending the Burke-Gilman trail between 11th Avenue and the Hiram Chittenden Locks, a planning-level analysis of peak hour traffic movements was conducted to assess the operational implications of specific proposed traffic improvements. This technical memorandum presents results of that analysis, with particular emphasis on proposed improvements at the intersection of Shilshole Avenue and 17th Avenue, including introduction of a new eastbound left-turn pocket and a new traffic signal. An additional intersection evaluation of Shilshole and Vernon Place was also performed to gauge the potential level of impact of installing a signal at this crossing for the trail extension.

Previous studies conducted in the study area have provided recommendations regarding traffic and pedestrian/bicycle improvements along the Shilshole Avenue corridor, including a new eastbound left-turn lane at the Shilshole Avenue / 17th Avenue intersection and improved pedestrian crossings across Shilshole Avenue. Also, in accordance with Seattle City Council resolution #30408 (October 2001), a technical design study of various route alignment alternatives was conducted, with a preferred route following 45th Street and Shilshole Avenue west to 17th Avenue, where an interim route would then continue along Ballard Avenue to Vernon Street. The alignment would then continue along Shilshole Avenue to Market Street and then on to the Locks.

Traffic capacity assessments of the proposed improvements at the intersection of Shilshole Avenue and 17th Avenue and the proposed signal at Shilshole Avenue and Vernon Place were performed using Synchro traffic analysis software. Analysis was conducted for existing conditions (2007) and the 2030 design year with and without the proposed trail and intersection improvements. The Shilshole/Vernon analysis was performed for the 2030 design year only. Current operations at this stop-controlled intersection reflect modest delays for Vernon traffic (Shilshole is free flowing) and minimal queues for all approaches.

The findings of the Shilshole/17th Avenue evaluation indicate that the overall delay, level of service, and queuing at the intersection would be significantly improved with the proposed improvements, with the exception of the westbound approach. In addition to the anticipated operational improvements, the proposed intersection modifications are expected to provide enhanced safety for motorized vehicles as well as pedestrians and bicyclists. Results for the Shilshole/Vernon analysis show modest signal-related delays for vehicular and non-motorized traffic movements and demonstrate that installation of a new signal at this location would not add significant traffic congestion to mainline or side street movements during the critical peak traffic periods.

INTRODUCTION

This technical memorandum presents results of the traffic analysis conducted as part of the Burke-Gilman Trail extension effort between its current endpoint at 11th Avenue and the Hiram Chittenden Locks. Particular emphasis was placed in this analysis on proposed improvements at the intersection of Shilshole Avenue and 17th Avenue, including introduction of a new eastbound left-turn pocket and a new traffic signal to address and accommodate potential traffic conflicts associated with trail alignment improvements. A follow-up peak hour assessment for the intersection of Shilshole Avenue and Vernon Place was also performed to investigate potential traffic congestion impacts of adding a new signal at this location.

BACKGROUND

Several traffic studies related to projects in or near the study area have been conducted in recent years. These studies are summarized below. In general, traffic generated by these new projects is not anticipated to significantly impact operations on the Burke Gilman Trail within the study area.

South Ballard Transportation Corridor Study, 2002

The South Ballard Transportation Corridor Study sought to improve access and mobility, reduce conflicts among various modes of transportation, and improve safety for all modes for multiple transportation corridors in the South Ballard area. The recommendations from the report include a new eastbound left-turn lane at the intersection of Shilshole Avenue and 17th Avenue and improved pedestrian crossings across Shilshole Avenue north of Vernon Street.

Ballard Corridor Design Study (11th Ave NW to Locks), 2003

This study was conducted in accordance with Seattle City Council resolution #30408 (October, 2001), which directed the Seattle Department of Transportation to initiate and complete a technical design study of options for a bicycle and pedestrian route for the area in the South Ballard transportation corridor between 11th Ave NW and the Ballard Locks. After studying various route alignment alternatives in the context of such issues as traffic, parking, and business operations, the design team identified a preferred route that features a new trail along NW 45th Street west of 11th Avenue to 17th Avenue, an interim signed bike route along Ballard Avenue between 17th and Vernon Avenues, a new trail along Shilshole Avenue between Vernon and 24th Avenues, an interim trail along Market Street between 24th and 28th Avenues, and a new trail to the Locks.

Transportation Impact Analysis for 4609-14th Ave NW and 1416 NW 46th Street, 2005

This report provided a transportation impact analysis for development projects proposed for two adjacent properties located on the block bounded by 14th Avenue NW, 15th Avenue NW, NW 46th Street, and NW Ballard Way. The two proposed projects would include over 130,000 square feet of commercial space (retail, grocery, health club, and office) and 468 stalls of structured parking, accessed by two driveways located on Ballard Way and 46th Street.

Transportation Impact Analysis for 1451 NW 46th Street and 1401 NW 46th Street, 2007

This report provided a transportation impact analysis for development projects proposed for two adjacent properties located on the block bounded by 14th Avenue NW, 15th Avenue NW, NW 45th Street, and NW 46th Street. The two proposed projects would include over 260,000 square feet of commercial space (retail and office) and 562 stalls of structured parking, accessed by a new driveway located on 45th Street.

TRAFFIC OPERATIONS ANALYSIS

Traffic operations analysis was performed to assess the effects of proposed improvements at the intersection of Shilshole Avenue and 17th Avenue. The proposed improvements include a new eastbound left-turn pocket, a new traffic signal with a protected/permissive phase for eastbound vehicles making left turns, and a crosswalk connecting a new pedestrian/bicycle trail

on the south side of Shilshole Avenue with the north side of the street. In addition, a follow-up evaluation for Shilshole Avenue and Vernon Place was conducted to show the effects of adding a new signal for the route through this intersection across Shilshole Avenue.

Methodology

Synchro traffic analysis software was used to analyze traffic operations for existing conditions, as well as anticipated conditions in the 2030 design year with and without the proposed intersection improvements at Shilshole Avenue and 17th Avenue. This software was also used for the Shilshole/Vernon analysis for the 2030 design year (only). Year 2030 volumes for both intersections and time periods (AM & PM peak hours) reflect an annual growth rate of 0.6% based on a review of recent traffic studies in the project area and input from City of Seattle traffic operations staff. This growth rate captures, at the sub-area level, additional traffic that will be generated by planned land use development projects in the area.

The 2030 Build scenario for Shilshole/17th Avenue assumes the addition of a new two-phase traffic signal at the intersection with actuation by vehicular traffic as well as pedestrians and/or bicyclists. A new eastbound left-turn pocket and crosswalk across Shilshole Avenue for pedestrians and bicyclists on the west side of 17th Avenue are also included. The 2030 Build scenario for Shilshole/Vernon reflects a new signal to control all traffic movements (vehicular and non-motorized). As it is difficult to predict the volume of pedestrians and bicyclists that will use the proposed crosswalk, the analysis reflected the conservative assumption that a trigger or "call" at the button-activated crosswalk would occur for each signal cycle. A range of pedestrian and bicycle crossings (50-100 per hour in each crosswalk) was used for both intersections to establish reasonable expectations in terms of non-motorized impacts to general purpose traffic.

Figure 1 shows the assumed configuration at Shilshole Avenue and 17th Avenue for the Existing and Year 2030 No Build scenarios. Figure 2 shows the assumed configuration at Shilshole Avenue and 17th Avenue for the Year 2030 Build scenario. The lane configuration is assumed to remain the same at Shilshole Avenue and Vernon Place whether a new signal is installed or not.

Figure 3 shows the assumed configuration at Shilshole Avenue and Vernon Place for the 2030 Build scenario. New crosswalks are assumed across Shilshole Avenue on both sides of Vernon Place.

Figure 1. Shilshole/17th Ave Intersection – Existing and 2030 No Build Scenarios

Figure 2. Shilshole/17th Avenue Intersection – 2030 Build Scenario

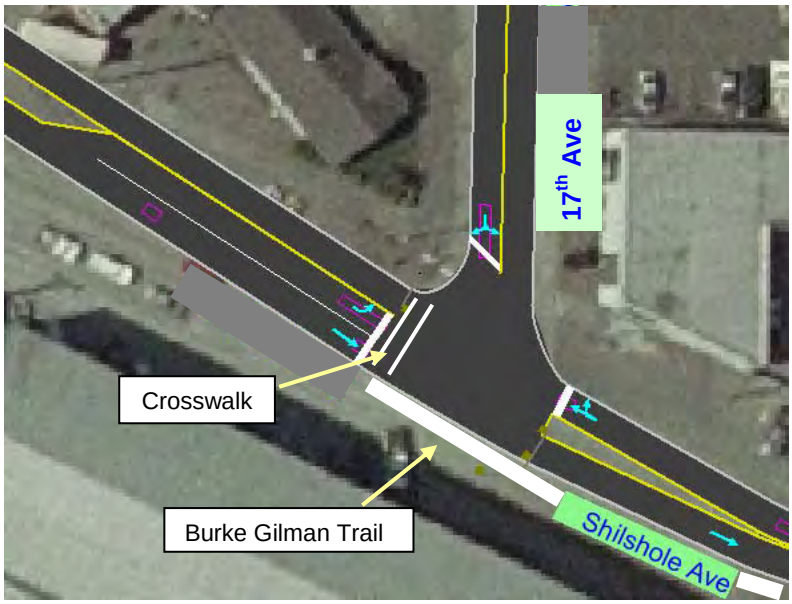
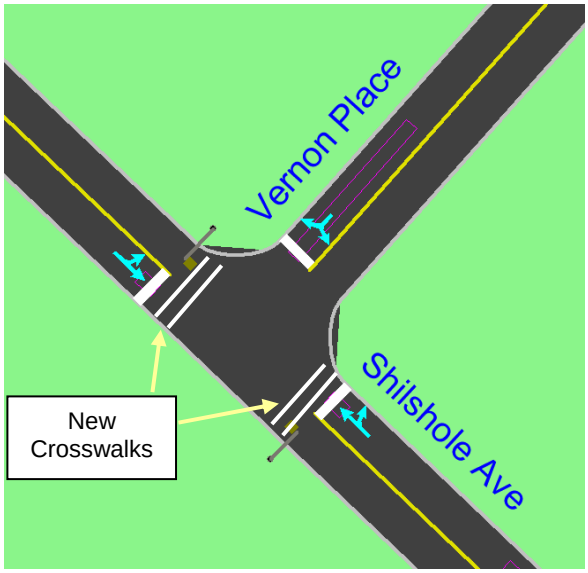


Figure 3. Shilshole/Vernon Place Intersection – 2030 Build Scenario



Analysis Results

Table 1 presents the expected delay and level of service at the intersections of Shilshole Avenue and 17th Avenue and Shilshole Avenue and Vernon Place for each of the scenarios studied during both the AM and PM peak hours. Results are shown for each movement as well as for the overall intersection. While delay is expected to increase for the westbound through and right-turn movements at Shilshole Avenue and 17th Avenue, the overall delay and level of service at the intersection would be significantly improved with the proposed improvements.

Planning-level results for the Shilshole/Vernon 2030 intersection analysis indicate modest delays for all traffic movements for either the AM or PM peak hour period. The proposed signal at this location is not expected to result in significant congestion for the mainline (Shilshole Avenue) through movements or turns from the side street (Vernon Place). Estimated delays from the Synchro analysis indicate all movements operating at LOS C or better. In addition, non-motorized delays would be minimized through the use of call buttons or specialized bicycle detection systems.

Table 1. Delay (sec) and Level of Service

Scenario	AM PEAK						
	EBL	EBT	WBT	WBR	SBL	SBR	All
Shilshole / 17th							
Existing Conditions	16.0 (C)	14.3 (B)	1.1 (A)	0.5 (A)	99.9 (F)	30.1(D)	11.5 (B)
2030 No-Action	47.8 (E)	45.3 (E)	1.6 (A)	0.9 (A)	> 180.0 (F)	> 180.0 (F)	40.1 (E)
2030 Build	47.9 (D)	26.8 (C)	27.2 (C)	17.9 (B)	22.9 (C)	9.8 (A)	30.5 (C)
Shilshole / Vernon							
2030 Build	11.5 (B)	9.9 (A)	3.5 (A)	3 (A)	30.6 (C)	3.6 (A)	8.4 (A)
Scenario	**PM PEAK**						
	EBL	**EBT**	**WBT**	**WBR**	**SBL**	**SBR**	**All**
Shilshole / 17th							
Existing Conditions	32.9 (D)	25.9 (D)	1.7 (A)	0.6 (A)	148.1 (F)	58.3 (F)	13.5 (B)
2030 No-Action	127.6 (F)	114.6 (F)	2.2 (A)	0.7 (A)	> 180.0 (F)	> 180.0 (F)	54.4 (F)
2030 Build	118.8 (F)	44.2 (D)	13.9 (B)	13.4 (B)	38.0 (D)	17.5 (B)	33.7 (C)
Shilshole / Vernon							
2030 Build	23.3 (C)	11.1 (B)	8.7 (A)	6.6 (A)	23 (C)	11.1 (B)	9.9 (A)

Note: Results are based on average of five (5) SimTraffic runs.

Table 2 presents the anticipated queues at the intersections of Shilshole Avenue and 17th Avenue and Shilshole Avenue and Vernon Place for each of the scenarios studied during both the AM and PM peak hours. Results are shown for each movement as well as for the overall intersection. Similar to delay and level of service results, queue lengths at Shilshole Avenue and 17th Avenue are expected to increase for the westbound approach with the proposed intersections improvements, while queues are expected to decrease for the eastbound and southbound approaches. Peak period queues at Shilshole Avenue and Vernon Place are anticipated to be reasonably low relative to other signalized intersections in the project area.

Table 2. Queues (ft)

Scenario	AM PEAK			
	EBL	EBT	WB (All)	SB (All)
Shilshole / 17th				
Existing Conditions	---	453	39	101
2030 No-Action	---	1020	77	179
2030 Build	177	651	190	51
Shilshole / Vernon				
2030 Build	---	318	106	44
Scenario	**PM PEAK**			
	EBL	**EBT**	**WB (All)**	**SB (All)**
Shilshole / 17th				
Existing Conditions	---	464	32	91
2030 No-Action	---	1050	43	179
2030 Build	182	832	163	47
Shilshole / Vernon				
2030 Build	---	327	289	53

Note: Results are based on average of five (5) SimTraffic runs.

FINDINGS & CONCLUSIONS

The proposed improvements at the intersections of Shilshole Avenue and 17th Avenue and Shilshole Avenue and Vernon Place are anticipated to provide a number of benefits to both motorized and non-motorized traffic.

Improved Traffic Operations and Safety for Motorized Vehicles

The combination of the new eastbound left-turn pocket and a new traffic signal will provide improved traffic operations for the intersection as a whole, particularly, for vehicles travelling eastbound on Shilshole Avenue. Currently, eastbound vehicles turning left at the intersection often must wait a significant length of time for a gap in the traffic that is sufficient to allow a turning maneuver. This causes significant delay not only for the left-turning vehicles, but vehicles that are travelling through the intersection as well. Some eastbound drivers who desire to travel through the intersection choose to circumvent vehicles waiting to turn left by illegally utilizing the off-street gravel area adjacent to the south side of the roadway. The proposed left-turn pocket is intended to help reduce this bypass activity and decrease delays for the through movement. In addition, the protected eastbound left-turn phase will provide a safer environment and sufficient green time for left-turning vehicles.

Beyond the improvements to general traffic operations, the proposed intersection improvements at Shilshole Avenue and 17th Avenue will provide a significantly safer environment for motorists. As indicated above, left-turning vehicles are faced with minimal gaps in on-coming traffic that is often traveling above the speed limit. For vehicles traveling westbound on 46th Street and turning onto westbound Shilshole Avenue, a new flashing advance warning signal will warn drivers when the new signal is red, enabling them to begin braking in advance of the intersection.

As described previously, the effects of installing a new signal at the intersection of Shilshole Avenue and Vernon Place would be minimal in terms of added peak hour congestion along Shilshole Avenue or delays to turning movements to/from Vernon Place. For either the AM or PM peak hour periods, delays based on the planning-level Synchro assessment indicate delays for all movements between LOS A and LOS C.

Improved Safety for Pedestrians and Bicycles

A formalized trail alongside Shilshole Avenue will provide a safe environment for pedestrians and bicyclists to travel through this already heavily used corridor. In addition, the new trail will provide a safer crossing of the existing railroad tracks by channelizing users into a right-angle crossing of the tracks.

At the intersections of Shilshole Avenue and 17th Avenue and Shilshole Avenue and Vernon Place, new crosswalks across Shilshole Avenue, along with new traffic signals, will provide safe crossings for users of the Burke-Gilman Trail, as well as for general neighborhood workers and residents. In addition, new striping and/or refined curb return sections would provide an enhanced pedestrian environment and better define traffic movement zones for motorized and non-motorized modes.