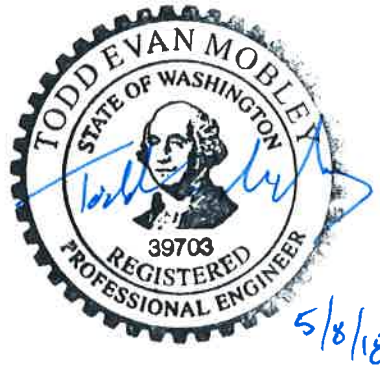


# Technical Memorandum



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**To:** Ed Greer  
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**From:** Daniel Stumpf, EI  
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**Date:** May 8, 2018

**Subject:** Stephens Hillside Farm Subdivision – Queuing Analysis

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## **Introduction**

This memorandum reports and evaluates the potential transportation impacts related to the proposed Stephens Hillside Farm Subdivision located at 34700 NE North Fork Avenue in La Center, Washington. Specifically, a queuing analysis was conducted at the proposed “Street A” intersection at NE North Fork Avenue/Aspen Avenue with findings reported within this memorandum.

The purpose of this memorandum is to examine projected queuing at the intersection of the proposed “Street A” at NE North Fork Avenue/Aspen Avenue under the 2058 planning horizon year, or 40 years beyond year 2018. In addition to the queuing analysis, any recommendations for improvement, if necessary, will be included within this supplementary study to the *Stephens Hillside Farm Subdivision Traffic Impact Study (TIS)* dated February 1, 2018.

## **Project Description**

The proposed development will construct an 85-lot subdivision with access located at the corner of Aspen Avenue and NE North Fork Avenue. Based on the project site plan, the existing NE 348<sup>th</sup> Street private road will be reconstructed as “Street A” and will provide approximately 200 feet of intersection spacing between Aspen Avenue/NE North Fork Avenue and the proposed “Court B”.

Per the *La Center Urban Area Capital Facilities Plan* and at the direction of city staff, NW Bolen Street to the west is planned for an extension to Aspen Avenue/NE North Fork Avenue and will connect via “Street A” within approximately 40 years. Upon connecting the two roadways, “Street A” will be reclassified as a Collector roadway which requires an access spacing of 275 feet. Provided that sufficient queue storage space is provided between Aspen Avenue/NE North Fork Avenue and the proposed “Court B” an access modification letter may be prepared requesting this exception to design standards.



## **2058 Planning Horizon Volumes**

Based on correspondence with city staff, it is assumed that the planned extension of NW Bolen Street will occur within the next 40 years. Upon extending the roadway, it is expected that some traffic that currently utilizes NW Pacific Highway (between NW Bolen Street and W 10<sup>th</sup> Street) will reroute to the proposed “Street A” and NW Bolen Street connection. In addition, an elementary school is planned for development along NW Bolen Street west of the site.

To estimate year 2058 planning horizon volumes, a linear growth rate of 5 percent was calculated and applied over a 41-year period to the measured traffic volumes collected in December 2017 (raw data is provided within TIS). This growth rate was calculated based on information provided within the *La Center Comprehensive Plan 2016-2035*, where it is assumed that the city’s population will double in the span of 20 years. It is assumed that this aggressive growth will remain constant through year 2058.

To determine the potential rerouting of traffic, traffic volumes at the intersection of W 10<sup>th</sup> Street/E Southview Heights Drive at Aspen Avenue were assessed to determine the directional travel of volumes to and from the east and south (north/west traveling volume relative to north/south travel). Based on the existing travel patterns at the intersection as well as an assessment of the surrounding vicinity, the following were assumed:

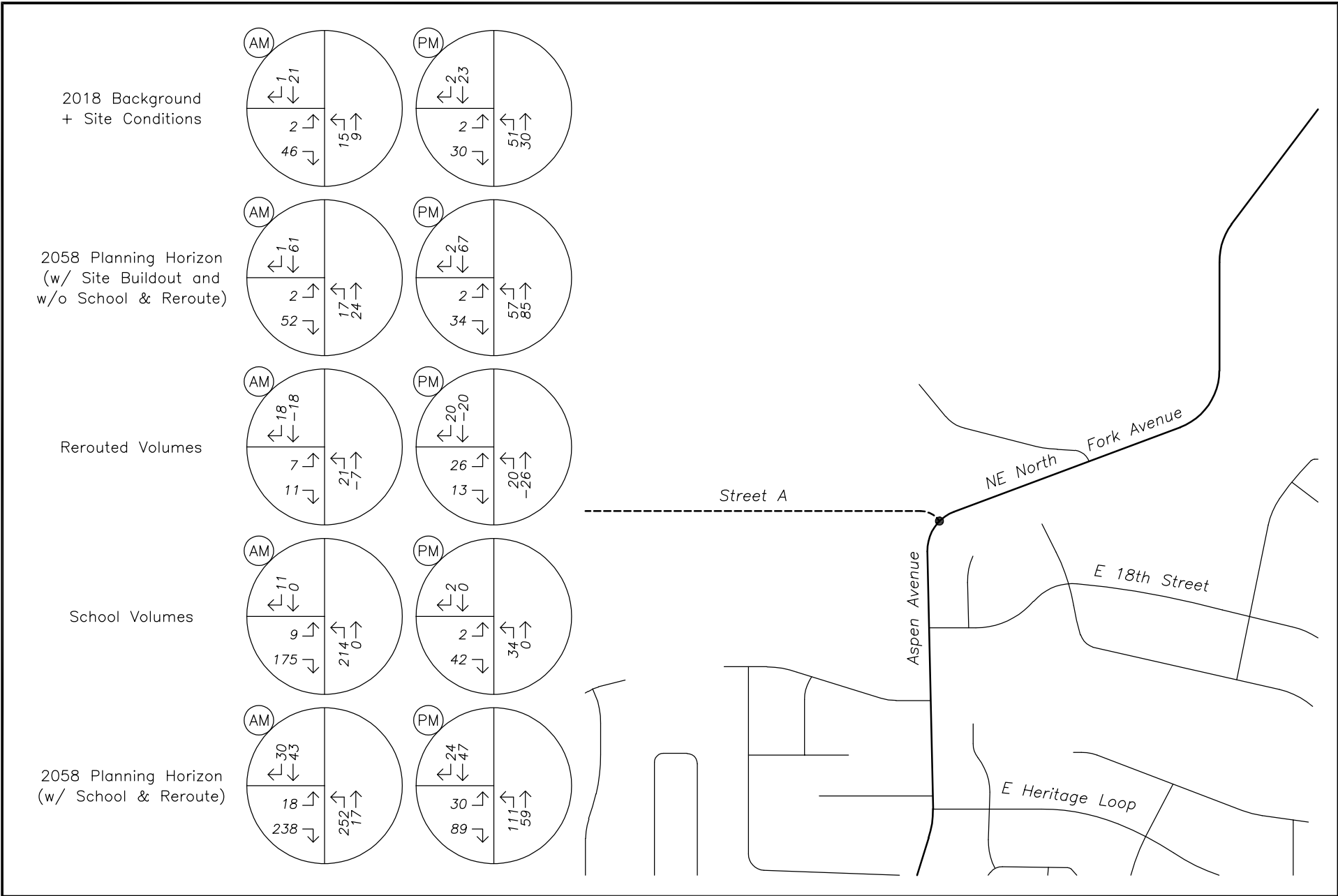
- Approximately 30 percent of the southbound right-turning and eastbound left-turning traffic at the intersection of W 10<sup>th</sup> Street/E Southview Heights Drive at Aspen Avenue (assuming 2058 traffic conditions) would reroute and utilize the NW Bolen Street/“Street A” connection.
- Approximately 30 percent of traffic traveling to and from the north along NE North Fork Avenue (north of “Street A”) would reroute and utilize the NW Bolen Street/“Street A” connection.

In addition to the assumed growth and rerouting of traffic, city staff have indicated that an elementary school is planned for construction along NW Bolen Street west of the site. To estimate the number of trips that will be generated by the planned school, trip rates from the *Trip Generation Manual*<sup>1</sup> were used. Data from land-use code 520, *Elementary School*, was used to estimate the school’s trip generation based on an average elementary school building size of 84,000 square feet of gross floor area. Based on the locations of likely trip destinations and locations of major transportation facilities, it is assumed that approximately 70 percent of trips to and from the school would utilize the NW Bolen Street/“Street A” connection. The directional distribution of school trips at the “Street A” intersection at Aspen Avenue/NE North Fork Avenue are based on those assumed within the TIS.

Figure A on the following page presents a breakdown of existing and projected traffic volumes at the intersection of “Street A” at Aspen Avenue/NE North Fork Avenue.

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<sup>1</sup> Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 10<sup>th</sup> Edition, 2017.



**TRAFFIC VOLUMES**  
 Year 2020 Site Buildout and 2058 Planning Horizon  
 AM & PM Peak Hours



**FIGURE A**



## Queuing Analysis

To determine the adequacy of vehicle storage between Aspen Avenue/NE North Fork Avenue and the proposed “Court B”, an analysis of projected queuing was conducted at the study intersection. The queue lengths for the intersection were projected based on the results of a Synchro/SimTraffic simulation, with the reported values based on the 95<sup>th</sup> percentile queue length. This means that 95 percent of the time the queue length will be less than or equal to the reported values.

The projected eastbound 95<sup>th</sup> percentile queue lengths reported by the Synchro/SimTraffic simulation are presented in Table 1 for the morning and evening peak hours. Available lane storage was assumed to be 200 feet, the approximate distance between Aspen Avenue/NE North Fork Avenue and the proposed “Court B”. Detailed queuing analysis worksheets are included in the technical appendix to this report.

Table 1: Intersection Queuing Analysis

Study Intersection Eastbound Approach	Available Storage (Feet)	95th Percentile Queue Length	
		Morning Peak Hour (Feet)	Evening Peak Hour (Feet)
2020 Background plus Site Conditions*	200	47	47
2058 Planning Horizon	200	83	55

\* Volumes utilized from *Stephens Hillside Farm Subdivision TIS*.

## Conclusions

Based on the results of the queuing analysis, it’s projected that sufficient vehicle queue storage space will be available between Aspen Avenue/NE North Fork Avenue and the proposed “Court B” to allow safe operation of the intersection without obstructing any vehicle turning movements to and from the proposed “Court B”. Accordingly, no queuing-related mitigation is necessary or recommended.

If you have any questions regarding this technical memorandum, please don’t hesitate to contact us.



## TRIP GENERATION CALCULATIONS

*Land Use:* Elementary School  
*Land Use Code:* 520  
*Setting/Location:* General Urban/Suburban  
*Variable:* 1000 Sq Ft Gross Floor Area  
*Variable Value:* 84

### AM PEAK HOUR

*Trip Rate:* 6.97

	Enter	Exit	Total
Directional Distribution	55%	45%	
Trip Ends	<b>322</b>	<b>263</b>	<b>585</b>

### PM PEAK HOUR

*Trip Rate:* 1.37

	Enter	Exit	Total
Directional Distribution	45%	55%	
Trip Ends	<b>52</b>	<b>63</b>	<b>115</b>

### WEEKDAY

*Trip Rate:* 19.52

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	<b>820</b>	<b>820</b>	<b>1,640</b>

### PM PEAK HOUR OF GENERATOR

*Trip Rate:* 3.16

	Enter	Exit	Total
Directional Distribution	44%	56%	
Trip Ends	<b>117</b>	<b>148</b>	<b>265</b>

Intersection: 3:

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Movement	EB
Directions Served	LR
Maximum Queue (ft)	47
Average Queue (ft)	26
95th Queue (ft)	47
Link Distance (ft)	907
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

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Network wide Queuing Penalty: 0

Intersection: 3:

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Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	54	18
Average Queue (ft)	21	2
95th Queue (ft)	47	13
Link Distance (ft)	907	229
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

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Network wide Queuing Penalty: 0

Intersection: 3:

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Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	101	62
Average Queue (ft)	51	18
95th Queue (ft)	83	51
Link Distance (ft)	907	229
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

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Network wide Queuing Penalty: 0



Intersection: 3:

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Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	60	43	9
Average Queue (ft)	36	7	0
95th Queue (ft)	55	29	5
Link Distance (ft)	907	229	271
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

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Network wide Queuing Penalty: 0