Appendix H3

Updated Traffic Analysis for Site Access Driveway

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August 18, 2021

TECHNICAL MEMORANDUM

Project: **Issaquah School District – HS #4 / ES #17**

Subject: Updated Traffic Analysis for Site Access Driveway

Date: August 18, 2021

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The memorandum presents updated traffic analysis for Issaquah School District's proposed new High School #4 / Elementary School #17 site access driveway. The analysis has been updated to reflect changes in the 228th Avenue SE frontage design as coordinated with the City of Sammamish and City of Issaquah. The analysis utilizes information from two prior efforts listed below.

- *Transportation Technical Report (TTR, REVISED) for High School #4 / Elementary School #17* (Heffron Transportation, Inc., February 16, 2021). This report presented the transportation impacts of the project to a broad study area and to all modes of transportation. Trip generation and future traffic volumes for the site access were detailed in this report.

- *Technical Memorandum: Issaquah School District – HS #4 / ES #17 Issaquah School District – HS #4 / ES #17* (Heffron Transportation, Inc., May 18, 2021). This memorandum presented analysis of the prior design for the site frontage, and included the results of traffic operations simulations for the segment of 228th Avenue SE from Providence Point Drive SE through 40th Street SE. It is this analysis that has been updated to reflect the new design.

1. Revised Site Access Design

The proposed configuration of 228th Avenue SE along the school's site frontage was updated in coordination with the Cities of Sammamish and Issaquah. The new design (see Figure 1, attached) reflects the following changes compared to the prior design (from May 2021).

- Northbound left turn lane on 228th Avenue SE at the site driveway would be a dual-lane pocket with each lane having 250-feet of storage area. The prior design had unequal pocket lengths.
- South of the site, the dual left turn lane would taper to a four-lane section using a taper design that matches the entrance to Eastlake High School located further north on 228th Avenue SE. The prior design had tapered the staggered-lanes back to the through lanes at a 40:1 ratio.
- The four-lane section south of the site would continue beyond the site frontage, connecting to the newly-widened intersection at Providence Point Drive. This would provide two through lanes in each direction on 228th Avenue SE all the way from East Lake Sammamish Parkway to north of the site driveway. The prior design transitioned the two southbound lanes along the school's frontage to one southbound lane at the edge of the property.

- North of the site, the 228th Avenue SE / SE 40th Street intersection would be a Flying "T" configuration with a stop-sign control for SE 40th Street. One of the northbound lanes would be a right-turn-only lane at this intersection until the section north of SE 40th Street can be widened to its full 5-lane configuration. This is the same configuration as the prior design.

2. Analysis Assumptions

Future Traffic Volumes

This analysis evaluates the same two traffic volume growth scenarios for year 2024 that were evaluated in the *TTR, REVISED* to test the resiliency of the proposed improvements along 228th Avenue SE:

- **Low Growth** – Assumes a 1.5% per year background growth rate plus traffic from pipeline development projects (see Section 3.3.2 of the *TTR, REVISED*); and
- **High Growth** – Assumes a 4.0% per year background growth rate plus traffic from pipeline development projects.

The Low-Growth Scenario reflects the growth paradigm now expected by City of Sammamish staff. The High-Growth Scenario reflects a worst-case condition and shows how resilient the various configurations would be to further increases in traffic. Trips generated by the proposed schools would be the same for each of these conditions (see Section 4.1 of the *TTR, REVISED*).

Analysis Methodology and Input Assumptions

The near site traffic operations were evaluated using the *SimTraffic* microsimulation software. The physical attributes of the intersection (e.g., lane configuration, lane widths, lane lengths, and grade) were set per the design. Additional adjustments were made to reflect local and school-related operating conditions, The model calibration adjustments included:

- **Reduced saturation flow rates** – The saturation flow rates in all models were reduced from the default of 1,900 vehicles per hour per lane (vphpl) to 1,750 vphpl, based on research conducted by Transportation Solutions, Inc. (TSI), the City of Sammamish's traffic engineering consultant, and presented in the *Issaquah School District High School #4/Elementary School #17, Traffic Analysis Supplement.*[1]

- **Peak 15-minute conditions –** The school's peak morning arrival and afternoon departure occur during compressed time periods, which are modelled using peak hour factors (PHF). The PHFs used were derived from observed patterns at comparable existing Issaquah schools and shown on charts in the *TTR, REVISED*. They range from 0.63 to 0.77 depending on the movement and time of day.

- **Bus operations –** The high school is expected to generate 28 bus trips during the morning and afternoon peak hour (14 buses in and 14 buses out); however, for the purpose of analysis, the high school's bus loading zone capacity of 23 buses was assumed for analysis with a total of 46 buses (23 buses in and 23 buses out). These are expected to distribute to the surrounding roadway network in a similar pattern to the other school traffic, which has about 60% of the traffic arriving from and departing to the south. The buses have been accounted for in the operations analysis as an increase in the heavy vehicle percentages from the Without-Project

[1] Transportation Solutions, Inc., April 26, 2021.

conditions. For the purposes of this analysis, all heavy vehicles were modeled as buses with the SimTraffic default acceleration profile for a bus.

- **Lane change parameters** – The Mandatory Distance and Positioning Distance parameters are used to dictate where a lane change must commence and where a vehicle first attempts to change lanes, respectively. These values were modified from the default values for the northbound approach at SE 40th Street to more accurately model the transition from a northbound through lane to a northbound right-turn only lane. The Mandatory Distance was set to align with the beginning of the lane transition taper while the Positioning Distance was set roughly 130 feet from the stop bar for traffic leaving the site. Both the Mandatory Distance and Positioning Distance are adjusted by a driver parameter, meaning the actual distance could be 50% to 200% of the distance depending on the simulated driver type.

- **Driver parameters** – Driver parameters in all simulations were set according to Washington State Department of Transportation's *WSDOT Synchro and SimTraffic Protocol.*[2]

- **Turning speed for right turns** – Turning speed for right turns was changed from 9 mph to 12 mph in accordance with *WSDOT Synchro and SimTraffic Protocol*.

Results for the key intersections reflect the average of six 60-minute *SimTraffic* model runs.

3. Simulation Results – Site Access Driveway

The main site access driveway on 228th Avenue SE with the proposed lane and signal configuration would operate at an overall level of service (LOS) B with the project under either background growth scenario. For all conditions, the worst movement at the intersection would operate at LOS D or better. The level of service results are presented in Table 1.

[2] Washington State Department of Transportation, August 2018

Table 1. Level of Service at 228th Ave SE / Site Access Driveway – 2024 With Project and Proposed Lane Configuration[a]

	Morning Peak Hour (7:15 – 8:15 A.M.)		Afternoon Peak Hour (3:00 – 4:00 P.M.)		Commuter PM Peak Hour (4:45 – 5:45 P.M.)	
	LOS [b]	Delay [c]	LOS	Delay	LOS	Delay
LOW-GROWTH SCENARIO – Dual 250-foot NBL pockets						
Overall Intersection	B	19.1	B	16.4	B	13.9
Eastbound Left-Turn	D	41.5	C	26.8	D	39.0
Northbound Left-Turn	C	31.1	D	39.5	D	52.0
Southbound Through	B	18.4	B	14.0	A	8.1
Northbound Through	A	3.1	A	8.3	A	7.2
HIGH-GROWTH SCENARIO – Dual 250-foot NBL pockets						
Overall Intersection	B	18.9	B	16.1	B	13.9
Eastbound Left-Turn	D	39.1	C	29.2	D	39.1
Northbound Left-Turn	C	31.2	D	38.9	D	46.7
Southbound Through	B	18.9	B	13.0	A	8.7
Northbound Through	A	2.8	A	7.8	A	8.7

Source: Heffron Transportation, Inc., July 2021. All analyses assumed a saturation flow rate of 1,750 vph per lane. Delays determined using average of six 60-minute SimTraffic simulation runs.

a. Proposed configuration assumes two northbound through lanes on 228th Avenue SE and dual left-turn lanes exiting site.

b. LOS = Level of service.

c. Delay = Average seconds of delay per vehicle.

Queuing analysis determined the storage lengths needed to accommodate the 95th-percentile queues (meaning that the queues would be at that length, or shorter, for 95% of the peak hour). The results, presented in Table 2, reflect the longest 95th-percentile queues of all three time periods evaluated. This shows that the proposed dual 250-foot northbound left turn pockets would accommodate 95th-percentile queue lengths during the peak arrival period. As previously noted, the queue lengths do account for the surge in arrival traffic, which is expected to occur for about 20 minutes during the peak hour period.

Table 2. Peak Queuing Conditions at Site Access Driveway – 2024 With Project and Proposed Lane Configuration[a]

Storage Lane	Average Queue	95th Percentile Queue
LOW-GROWTH SCENARIO – Dual 250-foot NBL pockets		
Northbound Left-Turn [b]	141 feet	240 feet
Southbound Right-Turn [b]	101 feet	223 feet
Eastbound Right-Turn [c]	173 feet	266 feet
Eastbound Left-Turn [c]	87 feet	236 feet
HIGH-GROWTH SCENARIO – Dual 250-foot NBL pockets		
Northbound Left-Turn [b]	140 feet	223 feet
Southbound Right-Turn [b]	95 feet	209 feet
Eastbound Right-Turn [c]	168 feet	276 feet
Eastbound Left-Turn [c]	103 feet	282 feet

Source: Heffron Transportation, Inc., July 2021. All analyses assumed a saturation flow rate of 1,750 vph per lane. Queues determined using average of six 60-minute SimTraffic simulation runs.

a. Proposed configuration assumes two northbound through lanes on 228th Avenue SE and dual left-turn lanes exiting site

*b. Based on peak queuing condition, which occurs during the **morning peak hour**.*

*c. Based on peak queuing condition, which occurs during the **afternoon peak hour**.*

4. Summary of Findings

The operations and queuing analyses confirm that the proposed intersection design along with the site frontage lane channelization would provide acceptable levels of operation. No other changes to the site access driveway design are needed.

MCH/tsm/zdg

Attachment – Concept Design for 228th Avenue SE along site frontage

FOR CITY APPROVAL

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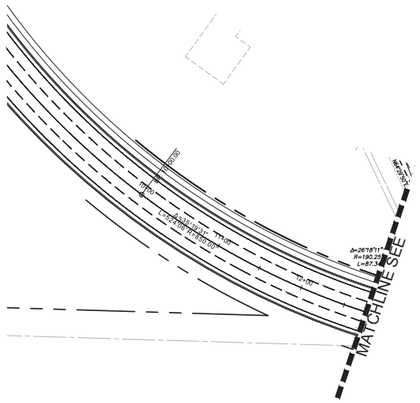

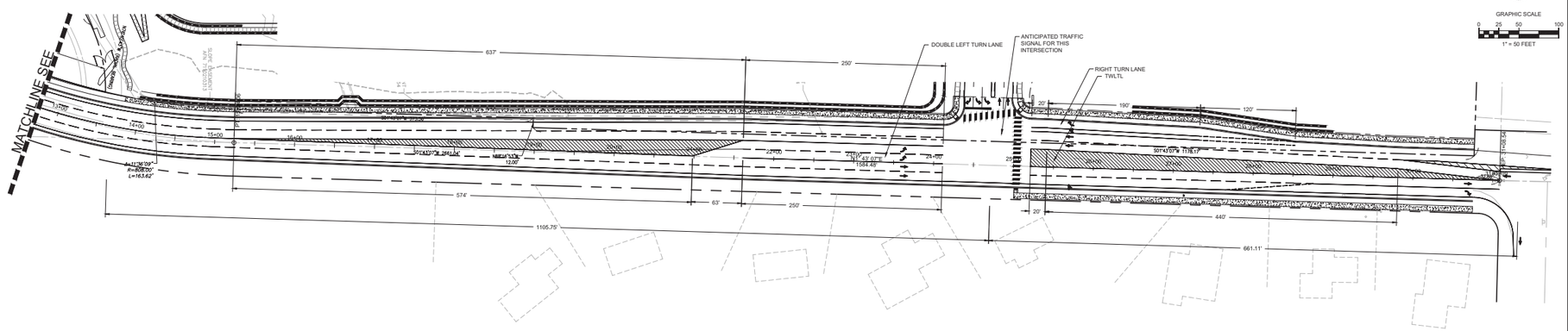

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ISSAQUAH HS #4 AND ES #17

4221 228TH AVE SE, ISSAQUAH, WA 98029

JOB NO: 1802
ISSUE DATE: 4/2/2021

Jurisdiction Stamp Area

FRONTAGE CHANNELIZATION PLAN

FI.06