Appendix H1

Revised Transportation Technical Report Final

Prepared by Heffron Transportation, Inc.

February 16, 2021

REVISED

TRANSPORTATION TECHNICAL REPORT

for

High School #4 / Elementary School #17

APPLICANT:

Issaquah School District

PREPARED BY:

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February 16, 2021

REVISED
Transportation Technical Report
for
Issaquah School District
High School #4 / Elementary School #17

PARCEL ID 1624069001
ISSAQUAH, WA 98029

APPLICATION # COM20-00001

APPLICANT:
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February 16, 2021

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EXECUTIVE SUMMARY

This report has been revised and augmented to incorporate comments made by the Cities of Sammamish and Issaquah on the original report dated September 1, 2020. This report supersedes the prior version. This report also updates and supersedes analysis previously presented in the Technical Memorandum: Site Access Analysis dated June 10, 2020.

Proposal

The Issaquah School District (ISD) proposes to co-locate a new elementary school (serving grades pre-kindergarten through 5) and a new high school (serving grades 9 through 12) on property located west of 228th Avenue SE and north of SE 43rd Way. The site is located within Issaquah, but is at the boundary with Sammamish. The Site Access driveway on 228th Avenue SE would be within City of Sammamish jurisdiction. The elementary school is planned for an enrollment capacity of 744 students (552 in permanent buildings plus potentially 192 in portable classrooms) with about 75 faculty and staff. The high school is planned for an enrollment capacity of 1,823 students (1,631 in permanent buildings plus potentially 192 in portable classrooms) with about 150 faculty and staff. The project would have 644 striped parking stalls and 33 bus stalls. An additional 91 parking stalls could be provided in family vehicle and bus loading areas during off-peak periods, allowing up to 735 vehicles to be parked on site during special events. This exceeds the 667 parking stalls required by code. The proposed school facilities include athletic fields, tennis courts, an auditorium, and a gymnasium.

Traffic Generation

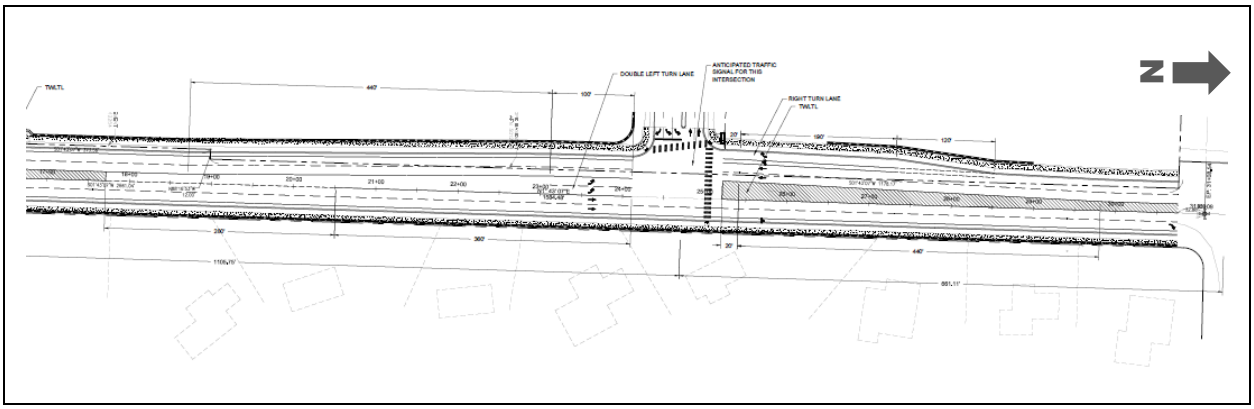
With both schools at capacity, they are forecast to cumulatively generate 1,304 vehicle trips the morning peak hour, 862 vehicle trips in the afternoon peak hour, and 476 vehicle trips in the commuter PM peak hour. These estimates assume that the schools would have similar characteristics to other ISD schools. The high school and elementary school bell schedules separate the peak arrival and departure times for these schools. Implementation of a Transportation Management Plan (TMP) to encourage travel by modes other than single-occupant-vehicles is recommended for each school, which would seek to reduce project-generated trips compared to what is reflected in the analysis. It is important to note that if the proposed schools are not constructed, the students living in the enrollment areas would still need to attend a different school, and therefore, would still generate trips to and from the schools they would otherwise attend. These shifts are reflected in the traffic forecasts developed for the project.

The intersection at the site driveway/228th Avenue SE would be signalized to facilitate site access and egress as well as pedestrian crossings of the intersection. In addition to installing a signal, the project would construct extensive improvements of 228th Avenue SE along the site frontage. Improvements would include widening the street's current two-lane section (one travel lane in each direction) to a five-lane section (two travel lanes in each direction plus a center left-turn lane), consistent with the City of Sammamish's ultimate plans for the street. New 6-foot-wide sidewalk and landscaping would be constructed along the site frontage, with a length of approximately 1,700 feet.

Analysis was performed to determine the optimal configuration of the Site Access intersection on 228th Avenue SE. Several options, including a roundabout, were considered and the various designs were tested with different growth parameters for through traffic on 228th Avenue SE to ensure the design is resilient to change. The recommended configuration is shown on **Figure A**. It includes two through lanes in each direction on 228th Avenue SE, a dual-left turn lane in the northbound direction (to enter the site), an auxiliary southbound right turn lane, and three lanes exiting the Site Access driveway. This signalized intersection is projected to operate at LOS C during the morning peak hour, LOS B during the afternoon peak

hour, and LOS A during the Commuter PM Peak hour even if through traffic on 228th Avenue SE were to increase at a high rate of growth (4% per year plus pipeline development traffic plus school traffic). The worst movement at the intersection would be eastbound left turn exiting the site, which would operate at LOS D or better during all peak hours. These are acceptable levels of service and show that the proposed driveway configuration would have adequate capacity to accommodate the project and future growth beyond what is currently expected.

Figure A. Proposed Configuration of 228th Avenue SE/Site Access Driveway intersection



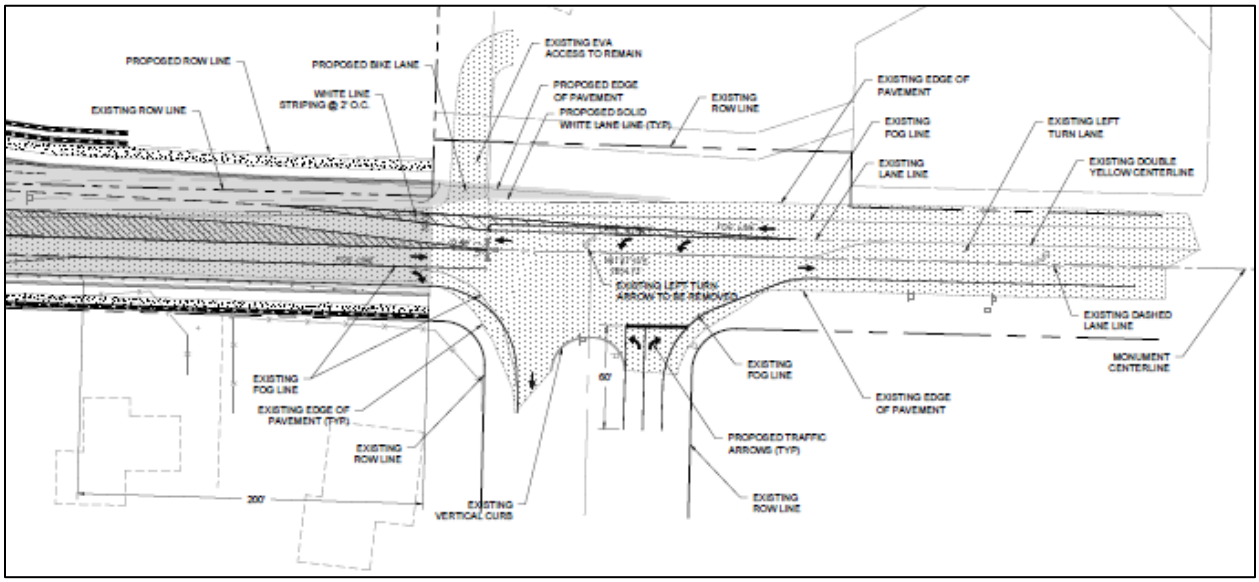
Source: AHBL, February 2020.

Off-Site Intersection Operations

Traffic operations analysis was performed for 23 intersections throughout Sammamish and Issaquah. The original analysis for Sammamish intersections assumed a high-growth scenario with 4% annual growth plus traffic generated by development projects that are already in the permit process (known as pipeline projects). After reviewing those original results, the City of Sammamish requested use of a lower growth rate, set at 1.5% per year plus pipeline projects. Analysis of the lower-growth condition was performed for intersections where improvements or mitigation had been previously identified along the 228th Avenue SE / SE 43rd Way corridor between SE 40th Street and Providence Point Drive SE. For this segment, sensitivity analysis was performed to show the effect of differing growth and configuration assumptions.

The intersection at SE 40th Street/228th Avenue SE, just north of the site, is a stop-sign controlled T-intersection. Westbound left turns from SE 40th Street are expected to operate at LOS F in the year 2024 without the proposed school project. This poor operation is expected with either of the growth conditions described above. The original analysis has suggested that this intersection be signalized. However, a signal could attract cut-through traffic to SE 40th Street and is not desired by the City of Sammamish. An alternative configuration, known as a "Flying T," was evaluated. This configuration, shown on **Figure B**, would utilize a raised center median and striping to physically separate the southbound through traffic from the other movements at the intersection. With this change, motorists turning left from SE 40th Street would not conflict with southbound through traffic. The proposed signal at the project's Site Access driveway to the south of SE 40th Street would increase gaps in the northbound traffic stream. Together, these measures would improve the westbound left turn movement to LOS B during the AM peak hour, LOS E during the afternoon peak hour, and LOS D during the PM peak hour at the expected future growth rate (1.5% per year). These operations are substantially improved compared to conditions without the project. The Flying T configuration and site driveway improvements would mitigate impacts to the 228th Avenue SE /SE 40th Street intersection.

Figure B. Proposed Configuration of SE 40th Street/228th Avenue SE intersection



Source: AHBL, February 2021

Project-generated traffic is also expected to add delay to the NW Sammamish Road / 17th Avenue W and SE 56th Street / East Lake Sammamish Parkway intersections in Issaquah, which are projected to operate at LOS E or F in 2024 without the project. The City of Issaquah has identified future capacity improvements that would improve traffic operation at these locations. In its payment of traffic impact fees to the City of Issaquah, the project would mitigate its share of traffic impacts at these intersections.

During the morning peak hour, the SE 43rd Way / East Lake Sammamish Parkway roundabout is projected to operate at LOS E with the project. However, no mitigation is recommended because (1) the projected average delay is less than a half second above the LOS D threshold, (2) the cumulative conditions reflect a 4% annual background traffic growth that is substantially higher than the 1.1% average rate reflected in the City of Issaquah's models, and (3) the City has chosen to implement a capacity reduction at this location. Additionally, ISD would develop a TMP to encourage travel by modes other than single-occupant-vehicles, which would seek to reduce project-generated trips compared to what is reflected in the analysis.

On-Site Circulation

The proposed internal lane configuration, combined with separation of loading and major parking activity, would minimize the potential for internal vehicle conflicts on site. The primary location where conflicts could occur is the intersection of the main access road with the high school parking garage/ passenger loading area access road. However, when westbound left-turns (toward the high school and parking garage) would be highest, there would be a low volume of opposing traffic (from the elementary school, bus loop, and parking west of the athletic facilities). The proposed site design would separate circulation of buses and vehicles generated by each school, so that maximum queuing conditions at one school would not impede vehicles or buses traveling to or from the other school. Analysis indicates that the proposed site configuration would be adequate to accommodate expected queues generated by both schools without affecting other on-site circulation functions.

Traffic Safety

Historical collision data indicated no unusual safety patterns in the transportation study area. Transportation improvements constructed by the project would be built to meet design standards established by the City of Sammamish and would not result in adverse safety impacts.

A traffic signal at the 228th Avenue SE/Site Access driveway intersection has been incorporated into the proposal to address traffic operational and queuing needs. Signals typically reduce the likelihood of angle collisions, which can be more severe in terms of injury and property damage, but can result in increased numbers of less-severe rear-end collections.

It is recommended that with the school project, ISD work with the City of Sammamish to implement a school zone speed limit on 228th Avenue SE adjacent to and approaching the site, as provided along 228th Avenue SE near other elementary schools. This would improve safety conditions for both vehicles and pedestrians in the vicinity of the school site.

Transit and Non-Motorized Facilities and Service

Elementary School #17 is estimated to be served by 10 school buses, and High School #4 is estimated to be served by 14 buses. The school bus arrival and departure times would not overlap due to the different bell schedules. During the morning and afternoon peak hours evaluated, it was assumed that the high school buses would be part of the site traffic. To provide a conservative analysis, the high school's bus loading zone capacity of 23 buses was assumed, reflecting 23 inbound and 23 outbound buses during those periods. Each school would have its own bus loading area that is separated from passenger vehicle loading areas. No adverse impacts associated with school buses are expected.

The project would provide substantial improvements that would enhance the pedestrian environment along the site frontage. Improvements would include construction of a new 6-foot-wide sidewalk and landscaping, and provision of signalized pedestrian crosswalks in the north-south and east-west directions at the Site Access driveway. The project would also provide bike racks to accommodate 68 bicycles on the site. The project is not expected to result in adverse impacts to transit, bicycle or pedestrian facilities.

Typical School-Day and Event Parking

A peak school-day parking demand of 644 vehicles is projected for both schools combined. This would be accommodated by the planned permanent on-site supply.

Events would include scholastic events, performances, athletics, and business meetings. An additional 91 vehicles could park in family vehicle and bus loading areas during off-peak periods, allowing up to 735 vehicles to be parked on site during special events. Parking demand would vary based on the type of event and attendance; most types of events could be accommodated by the proposed parking supply. The proposed parking supply would be adequate to accommodate all single evening/weekend events held by either school except the high school's Curriculum Night. Additionally, without management, some higher attendance elementary school events during the day have the potential to generate a higher level of parking demand cumulatively with typical school day demand than available supply. Recommended measures include development and implementation of an Event Management Plan by each school to ensure that on-site parking is adequate for all combinations of events.

Construction

Project construction would generate truck trips, as well as construction employee commute trips. Construction truck traffic is expected to average between 2 to 3 trips per hour during a typical eight-hour construction work day, over a 6-month period.

It is expected that most construction activity would occur before the Site Access driveway is signalized and improved to its recommended configuration. Therefore, flagger control and temporary access coning may be required during most construction phases. It is recommended that the contractor be required to prepare a Construction Management Plan to show how trucks and construction workers would access the site, including the plan for flagging and signage on 228th Avenue SE.

Mitigation and Recommendations

Based on the extensive analysis prepared for the proposed High School #4 / Elementary School #17 project, the following physical measures have been incorporated into the proposal. More detail about these measures is provided in Section 5.

A. Widen and improve SE 228th Avenue SE.

B. Construct pedestrian improvements along 228th Avenue SE.

C. Signalize and widen the site driveway intersection at 228th Avenue SE.

D. Provide on-site wayfinding signage for motorists and pedestrians. In addition, the egress road on the east side of the high school garage should be signed for "No Pedestrians."

The following additional mitigation has been identified for the project:

E. Construct Flying T configuration at the SE 40th Street / 228th Avenue SE intersection. Retain stop-sign control for SE 40th Street.

F. Establish School-Zone Speed Limit on 228th Avenue SE.

G. Develop and implement Construction Management Transportation Plan (CMTP).

H. Develop and implement Transportation Management Plans (TMPs).

I. Develop and implement School-Event Management Plans for evening events with more than 1,000 expected attendees (for a single event or more than one event combined).

J. Pay City of Issaquah Transportation Impact Fees.

1. INTRODUCTION

This report presents the transportation impact analyses for a new elementary school and a new high school proposed by the Issaquah School District (ISD) at a site located in Issaquah at its boundary with Sammamish. It documents the existing transportation conditions in the site vicinity, presents estimates of project-related traffic, and evaluates the anticipated impacts to the surrounding transportation system, including traffic operations, site circulation and safety, parking, transit, and non-motorized facilities. The scope of this analysis was coordinated extensively between ISD and the Cities of Sammamish and Issaquah. This report was prepared in accordance with the City of Sammamish's *Traffic Impact Analysis Report Guidelines*[1] because the Site Access driveway and a large portion of the transportation study area are in Sammamish. It is also consistent with the City of Issaquah's *Traffic Impact Analysis Guidelines.*[2,3]

This report was originally issued on September 1, 2020. This version has been updated to address comments from the City of Sammamish and City of Issaquah. It supersedes the prior version.

2. PROJECT DESCRIPTION

2.1. Project Location

ISD proposes to co-locate a new elementary school (serving grades pre-kindergarten through 5) and a new high school (serving grades 9 through 12) on property located west of 228th Avenue SE and north of SE 43rd Way. The site location is shown on **Figure 1**. The site is located within Issaquah, but is at the boundary with Sammamish. The Site Access driveway on 228th Avenue SE would be within City of Sammamish jurisdiction.

2.2. Proposed School Project

A conceptual site plan for the proposed project is shown on **Figure 2**; a detailed site plan is provided in **Appendix A**. On the site, the elementary school building and parking/loading facilities would be located to the west of the athletic field and tennis courts, and the high school building and parking/loading facilities would be located to the east. The elementary school is planned for an enrollment capacity of 744 students (552 in permanent buildings plus potentially 192 in portable classrooms) with about 75 faculty and staff. The high school is planned for an enrollment capacity of 1,823 students (1,631 in permanent buildings plus potentially 192 in portable classrooms) with about 150 faculty and staff. The project would have 640 striped parking stalls and 33 bus stalls. An additional 91 vehicles could park in family vehicle and bus loading areas during off-peak periods, allowing up to 731 vehicles to be parked on site during special events. This exceeds the 667 parking stalls required by code. The proposed school facilities include athletic fields, tennis courts, an auditorium, and a gymnasium.

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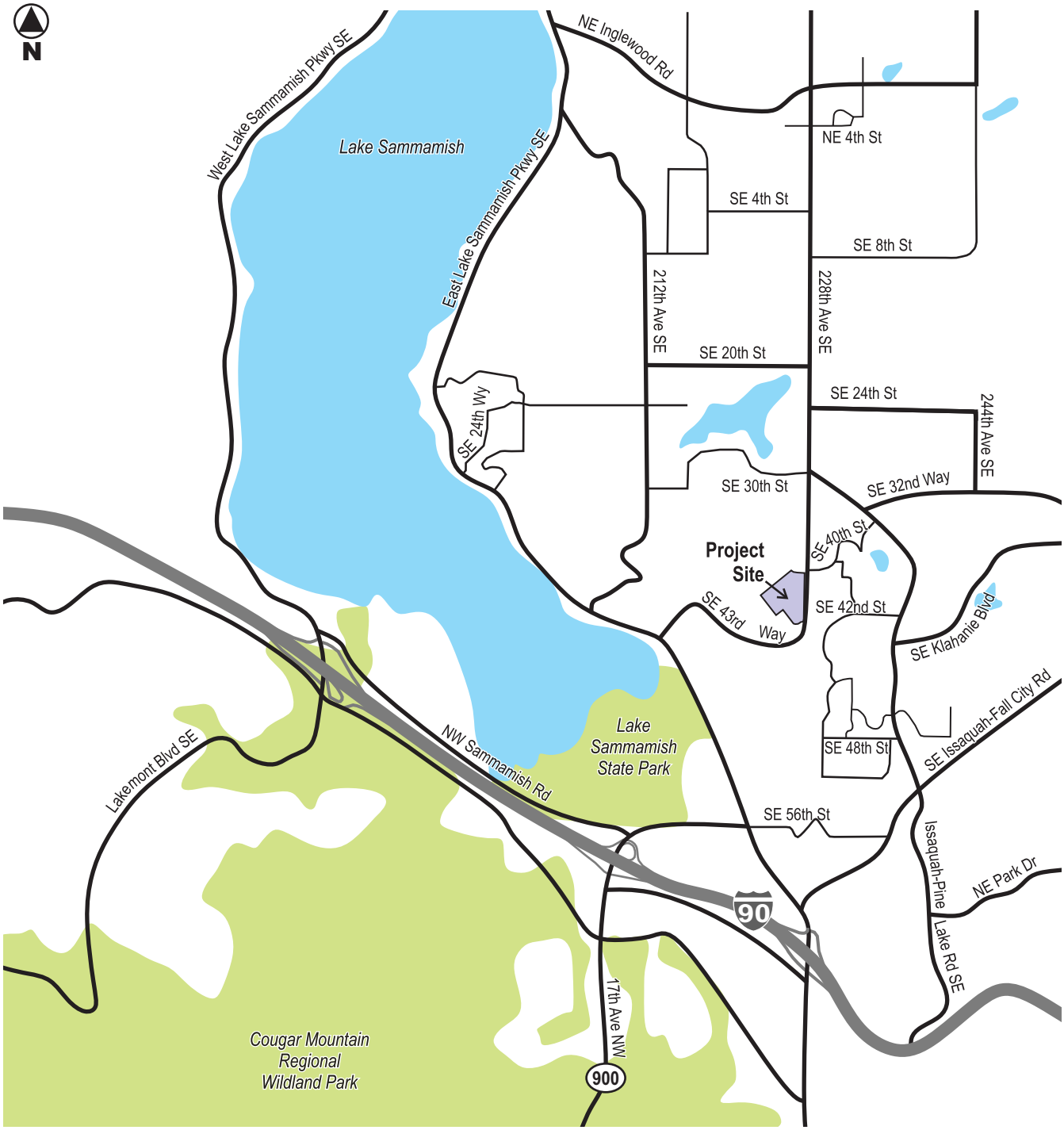
1 City of Sammamish, 2016 Public Works Standards, Appendix E – Traffic Impact Analysis Report Guidelines, December 31, 2016.
2 City of Issaquah, Traffic Impact Analysis Guidelines, April 8, 2015.
3 The overall approach to the transportation analysis was confirmed in a meeting between ISD staff, Steven Chen and Andrew Zagars, City of Sammamish, and Kurt Seemann and Doug Schlepp, City of Issaquah, on October 24, 2019.



High School #4
Elementary #17

Figure 1

Site Location

heffron transportation inc

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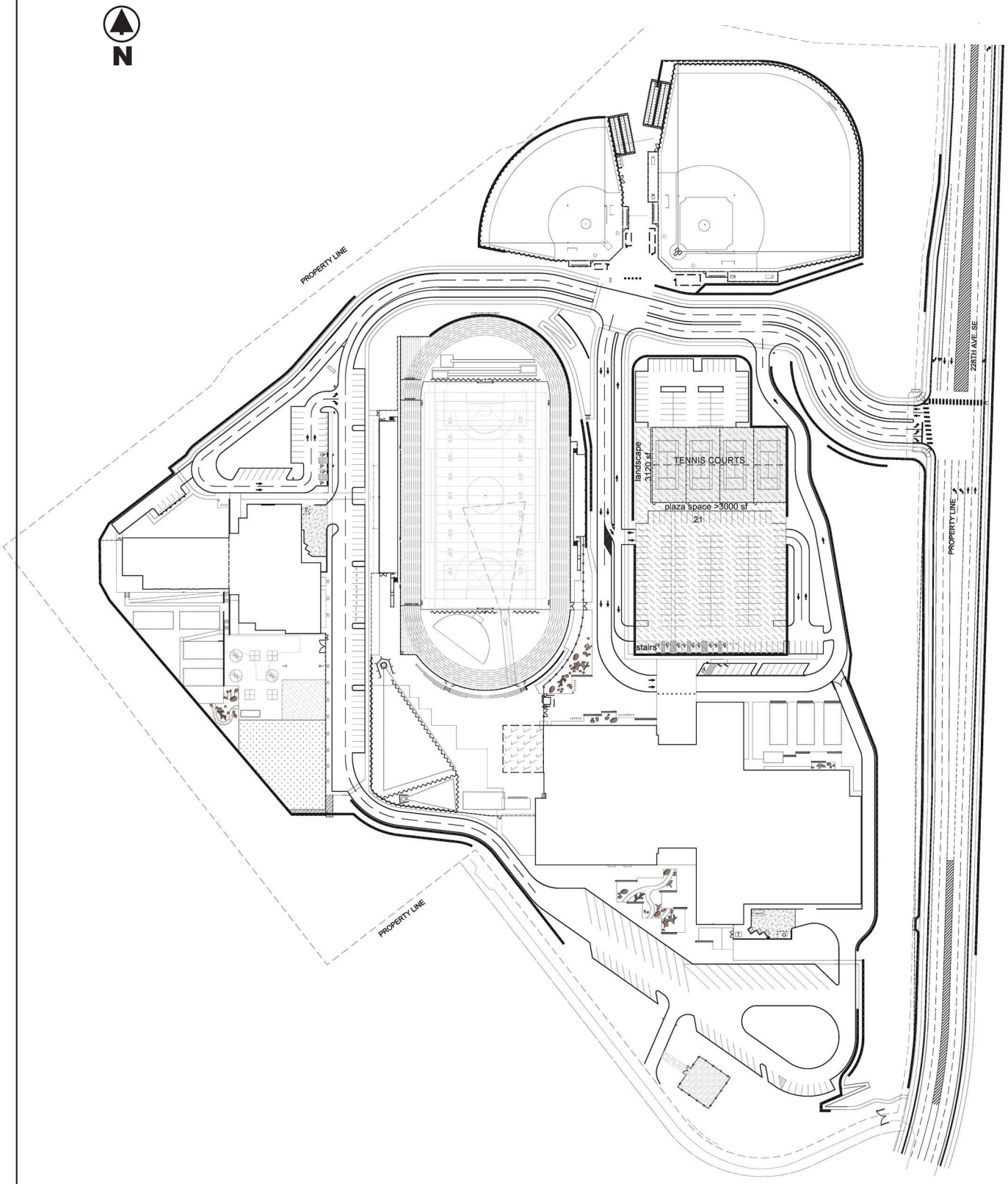

Source: AHBL, February 2021.

High School #4
Elementary #17

Figure 2

Conceptual Site Plan

heffron transportation inc

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The intersection at the site driveway/228th Avenue SE would be signalized to facilitate site access and egress as well as pedestrian crossings of the intersection. In addition to installing a signal, the project would construct extensive improvements of 228th Avenue SE along the site frontage. These are described in Section 4.4. Improvements would include widening the current two-lane section (one travel lane in each direction) to a five-lane section (two travel lanes in each direction plus a center left-turn lane), consistent with the City of Sammamish's ultimate plans for the street. Additional turn lanes would be constructed at the site driveway intersection as needed to ensure that it would meet the City's traffic operational standards during all times of day. New 6-foot-wide sidewalk and landscaping would be constructed along the site frontage, with a length of approximately 1,700 feet.

A separate emergency-access/service driveway connection to the fire lane east of the school building is also proposed on the south side of the site. Each school would have separate passenger vehicle and bus loading zones. For the elementary school, the passenger vehicle loading area would be located along the north side of the school building, and the bus loading area would be located along the east side. For the high school, the passenger vehicle loading area would be located on the north side of the school building and the bus loading area would be located along the south side.

2.3. Study Area

The scope and study area for this analysis were coordinated with City of Sammamish and City of Issaquah staff. Study area intersections were identified in coordination with both Cities after review of preliminary trip generation and distribution estimates prepared for the project,[4] and then reconfirmed after review of the updated trip generation analysis[5] that incorporated City comments on the initial estimates (note, the updated trip generation analysis is presented in *Section 4.1* of this report). The 23 study-area intersections confirmed by the Cities are shown on **Figure 3** and summarized in **Table 1**.

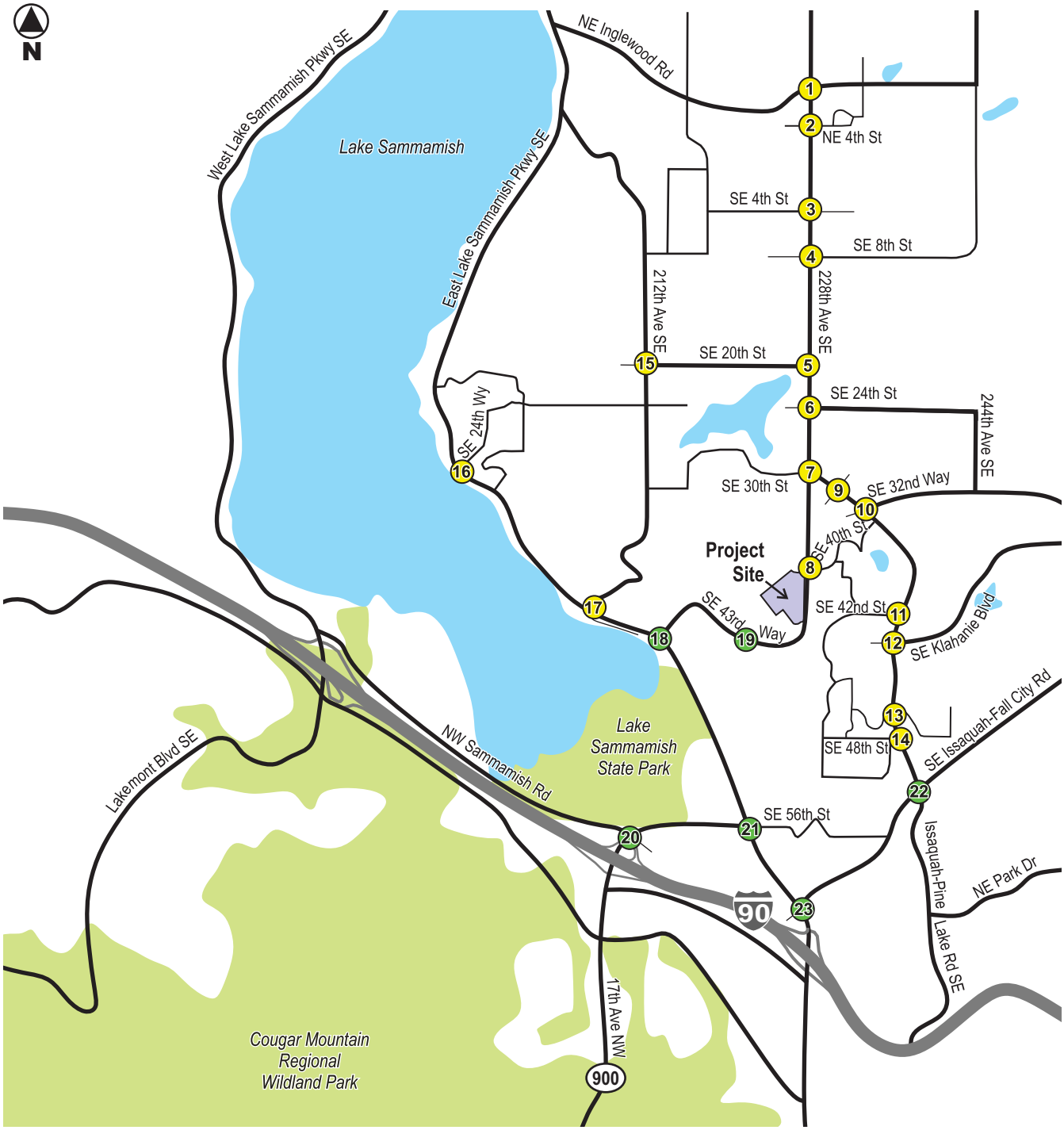
[4] Heffron Transportation, Inc., ISD High School #4 / Elementary School #17, Trip Generation and Distribution, December 12, 2019.
[5] Heffron Transportation, Inc., ISD High School #4 / Elementary School #17, Trip Generation and Distribution - Updated, June 9, 2020.

Table 1. Off-Site Intersections for Transportation Analysis

City of Sammamish	
Signalized	
(1) NE Inglewood Drive / 228th Avenue NE	(9) SE 230th Lane / Issaquah-Pine Lake Road SE
(2) NE 4th Street / 228th Avenue NE	(11) SE 42nd Street / Issaquah-Pine Lake Road SE
(3) SE 4th Street / 228th Avenue SE	(12) SE Klahanie Boulevard / Issaquah-Pine Lake Road SE
(4) SE 8th Street / 228th Avenue SE	(13) 238th Way SE / Issaquah-Pine Lake Road SE
(5) SE 20th Street / 228th Avenue SE	(14) SE 48th Street / Issaquah-Pine Lake Road SE
(6) SE 24th Street / 228th Avenue SE	(17) 212th Way SE / East Lake Sammamish Parkway SE
(7) 228th Avenue SE / Issaquah-Pine Lake Road SE	
Stop Sign-Controlled	
(8) SE 40th Street / 228th Avenue SE	(16) SE 24th Way / East Lake Sammamish Parkway SE
(15) SE 20th Street / 212th Avenue SE	
Roundabout-Controlled	
(10) SE 32nd Way / Issaquah-Pine Lake Road SE	
City of Issaquah	
Signalized	
(19) SE 43rd Way / Providence Point Drive SE [a]	(22) SE Issaquah-Fall City Road / Issaquah-Pine Lake Road SE
(20) N Sammamish Road / 17th Avenue NW	(23) SE Issaquah-Fall City Road / East Lake Sammamish Pkwy SE
(21) SE 56th Street / East Lake Sammamish Parkway SE	
Roundabout-Controlled	
(18) SE 43rd Way / East Lake Sammamish Parkway SE	

Note: (X) indicates the intersection ID number presented in the figures and tables in this report.

a. SE 43rd Way / Providence Point Drive SE is currently stop-sign controlled, but will be signalized by 2024.



Sammamish Analysis Intersection

Issaquah Analysis Intersection

High School #4
Elementary #17

Figure 3

Transportation Study Area

heffron transportation inc

09.01.20

2.4. Analysis Periods

The schools are planned to be completed and partially occupied by Fall 2022, and fully occupied by Fall 2023. Analysis presented in this report was completed for future 2024 conditions with the schools operating at full capacity and taking into account traffic from development growth unrelated to the project (described in *Section 3.3.2* of this report).

Analysis was completed for the peak morning (arrival) and afternoon (dismissal) periods, when school-generated trips are typically highest, and for commuter PM peak hour when traffic on the adjacent streets is typically highest. Sammamish Municipal Code (SMC) §14A.05.010 defines the period from 7:00 to 8:00 A.M. as the model morning peak hour, and the period from 4:45 to 5:45 P.M. as the model PM peak hour. The following peak hours were defined for the analysis presented in this report, and are described in more detail *Section 4.1 Trip Generation.*

- **Morning peak hour** – The analysis found that the schools' combined morning peak hour would be offset from the City-defined peak hour by 15 minutes—starting at 7:15 A.M. instead of 7:00 A.M. For the analysis completed in this report, the morning peak hour was defined as 7:15 to 8:15 A.M., to reflect analysis of the potential worst-case condition with the highest school-generated traffic.

- **Afternoon peak hour** – The afternoon peak hour period was determined to be from 3:00 to 4:00 P.M., because that is the hour in which the trips generated by the combined schools' dismissal periods would be highest.

- **Commuter PM peak hour** – The commuter PM peak hour was identified as the hour from 4:45 to 5:45 P.M., consistent with SMC §14A.05.010.

3. BACKGROUND CONDITIONS

This section presents the existing and future conditions without the proposed project. The impacts of the proposed project were evaluated against these base conditions. The following sections describe the existing street network, traffic volumes, traffic operations, traffic safety, transit facilities, parking, non-motorized facilities, and planned future projects in the study area.

3.1. Study Area Street System

The school site is bounded by 228th Avenue SE on its east side. Development to the north, south, and west consists primarily of the Providence Point senior residential community; there would be no direct roadway connections between the project site and the surrounding residential development.

228th Avenue is a north-south Principal Arterial. To the north of NE 25th Way it turns into Sahalee Way NE, which connects to Redmond-Fall City Road (State Route [SR] 202). To the south of the project site, it turns into SE 43rd Way, which connects to East Lake Sammamish Parkway. North of Issaquah-Pine Lake Road SE, it has two travel lanes in each direction, with left-turn lanes at major intersections and median where turn lanes are not present. Between Issaquah-Pine Lake Road and Providence Point Drive SE (where it has become SE 43rd Way) it has one travel lane in each direction with left-turn lanes at some intersections—this includes the segment adjacent to the project site. Between Providence Point Drive SE and East Lake Sammamish Parkway, SE 43rd Way has two travel lanes in the northbound/eastbound (uphill) direction, and one travel lane in the southbound/westbound (downhill) direction. 228th Avenue has a speed limit of 35 miles per hour (mph) to the north of about NE 2nd Avenue, and a speed limit of 40 mph to the south, which includes the segment adjacent to the project site. Between SE 24th Street and 33rd Court SE there are sidewalks and painted bike lanes on both sides of the street. To the south, there are shoulders on both sides of the street, with the exception of intermittent segments where sidewalk has been constructed adjacent to a development project. There is no on-street parking allowed on either side. The segment of 228th Avenue SE adjacent to the project site has one travel lane with shoulder in each direction.

Characteristics of the key study area arterial streets are summarized in **Table 2**.

Table 2. Study Area Arterial Street Characteristics

Street	Classification [a]	Number of Lanes	Speed Limit (mph) [b]	Non-Motorized Facilities
Sammamish Jurisdiction				
228th Avenue	Principal Arterial	2 – 5	35 – 40	Sidewalks and painted bike lanes between SE 24th Street and SE 33rd Court. Shoulder with intermittent sidewalk elsewhere.
East Lake Sammamish Parkway (west of Peregrine Point Way SE)	Minor Arterial	2 – 3	35	Shoulders, both sides
212th Avenue SE	Collector Arterial	2	25	Combination of sidewalks and shoulders, both sides
Issaquah-Pine Lake Road SE	Principal Arterial	2 – 4	35	Sidewalks, painted bike lanes both sides
NE Inglewood Road / NE 8th Street	Minor Arterial	3	35	Sidewalks both sides. Painted bike lanes both sides on NE Inglewood Road
SE 4th Street	Collector Arterial	2 – 3	25	Sidewalk, north side
SE 8th Street – west of SE 228th Ave	Collector Arterial	2	25	Sidewalk, north side
SE 8th Street – east of SE 228th Ave	Minor Arterial	3	30	Sidewalks and painted bike lanes, both sides
SE 20th Street – west of SE 228th Ave	Collector Arterial	2	30	Sidewalk, north side
SE 24th Street	Collector Arterial	2	35	Sidewalk, north side
SE 32nd Street	Minor Arterial	2	35	Sidewalks and painted bike lanes, both sides
SE Klahanie Boulevard	Collector Arterial	2	25	Sidewalks, both sides
SE Issaquah-Fall City Road	Principal Arterial	4 – 5	40	Sidewalks, both sides
Issaquah Jurisdiction				
SE 43rd Way	Principal Arterial	2 eastbound 1 westbound	40	Narrow shoulders, both sides
East Lake Sammamish Parkway (east of Peregrine Point Way SE)	Principal Arterial	3 – 7	35 – 40	Sidewalks, one or both sides
NW Sammamish Road	Minor Arterial	3	35	Sidewalks and painted bike lanes, both sides
SE 56th Street	Principal Arterial (west of ELSP)	5	35	Sidewalks, both sides
17th Avenue NW (SR 900)	Principal Arterial	5 – 8	40	Sidewalk or trail, one or both sides

a. Sources: City of Sammamish, Comprehensive Plan, Amended September 18, 2018; City of Issaquah, Comprehensive Plan, Amended 2019.

3.2. Programmed Roadway Improvements

The current *Capital Improvement Plans* (CIPs)[6,7] for each city were reviewed to determine if any transportation projects are planned that would affect the operation or capacity of the study area intersections. The following projects would affect capacity of study area intersections and are either under construction or planned to be complete by 2024. They were assumed to be complete in the future analysis presented in this report.

- SE 4th Street / 228th Avenue SE – addition of an eastbound right-turn lane (TR-01)
- East Lake Sammamish Parkway / SE 24th Way – addition of left-turn pocket and acceleration lane on East Lake Sammamish Parkway, separate turn lanes on SE 24th Way (TR-04)
- East Lake Sammamish Parkway / SE 43rd Way – removal of southeast-bound slip lane at the roundabout (TR-046)
- SE 43rd Way / Providence Point Drive SE / Providence Point Place SE – installation of a new traffic signal and associated channelization (TR-031)

3.3. Traffic Volumes

3.3.1. Existing Traffic Volumes

Due to the COVID-19 pandemic and associated state-wide school closures initiated by Governor Inslee in March 2020, it was not possible to collect representative new traffic data for this analysis. Therefore, all analyses were based on 2019 traffic data provided by the Cities of Sammamish and Issaquah.

For the morning and commuter PM peak hours, existing traffic volumes were obtained directly from the Cities. The City of Sammamish provided peak hour turning movement counts for the study intersections that were conducted in May 2019, and are provided in **Appendix B**. The City of Issaquah provided traffic operational models with 2019 traffic volumes for the morning and commuter PM peak hours; the traffic operational reports for existing conditions, provided in **Appendix D,** reflect the volumes provided. The one exception was the intersection of SE 43rd Way / Providence Point Drive. Existing volumes at this intersection were based on a 2017 traffic count (also provided in Appendix B), with volumes increased to balance the 2019 volumes reflected in the counts at the nearest adjacent intersections. Traffic volumes for the specific analysis hours defined previously—AM peak hour between 7:15 and 8:15 A.M. and commuter PM peak hour between 4:45 and 5:45 P.M.—were compiled from the count data.

The afternoon peak hour is an analysis period unique to school projects, and is not generally counted as part of regular City data collection efforts. Typically for school projects, new traffic counts would be conducted during the afternoon peak hour at all analysis intersections. However, due to conditions caused by the COVID-19 pandemic and noted above, it was not possible to conduct new representative traffic counts. Instead, existing afternoon peak hour volumes were estimated by applying adjustment factors derived from 24-hour count volumes collected by the City of Sammamish in May 2019, which are also provided in **Appendix B**.

The afternoon volumes were derived by reviewing and comparing hourly machine counts that the Cities conducted along the study area arterials. Traffic volumes were compiled and averaged for Tuesday and Thursday, which are typical weekdays when schools in the study area are on regular schedules. A graphic

[6] City of Sammamish, 2020-2025 Six-Year Transportation Capital Improvement Plan, Adopted June 18, 2019.
[7] City of Issaquah, 2020-2025 Capital Improvement Plan (CIP), Adopted through Resolution No. 2019-07, July 15, 2019.

that shows the ratio of afternoon to commuter PM peak hour volumes, reflected in the traffic counts within the study area, is provided in Appendix B. In general, the counts found that traffic volumes during the afternoon peak hour are lower than volumes during the commuter PM peak hour. However, on some corridors, the counts indicated that the southbound volumes are somewhat higher. This primarily occurred along corridors where a number of other schools are located, and is likely due to traffic generated during the school dismissal periods. For corridors where the counts indicated that one direction was higher and one direction was lower than the commuter PM peak hour, the different factors were applied to the respective directions. For corridors where counts indicated afternoon volumes in both directions were generally lower than the commuter PM peak hour, an average value was applied to both directions. The adjustment factors applied are summarized in **Table 3**. The 228th Avenue SE / SE 43rd Way corridor had the highest afternoon adjustment factor (1.34 for the southbound direction), which was derived from machine counts near SE 32nd Street. This factor likely reflects traffic egressing the many high schools along that corridor. On 228th Avenue SE north of SE 4th Street, the count data indicated that afternoon volumes are lower than commuter PM peak hour volumes in the southbound direction. However, due to the presence of several high schools in this area and to be consistent with adjustment factors applied at the south end of the corridor, the higher adjustment factor was applied.

Table 3. Adjustment Factors Applied to Estimate Afternoon Peak Hour Volumes

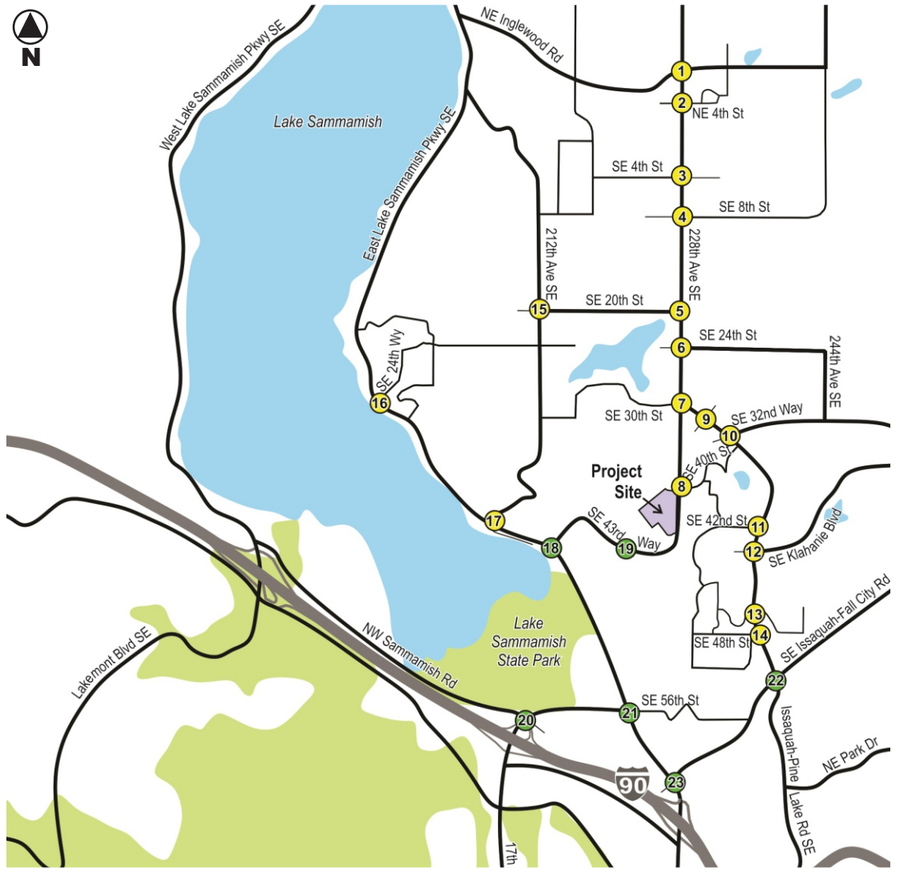
Street Corridor	Adjustment Factor Applied to Commuter PM Peak Hour Volumes	
	Northbound/Eastbound	Southbound/Westbound
228th Avenue / SE 43rd Way	0.76	1.34 [a]
Issaquah Pine Lake Road	0.77	1.02
East Lake Sammamish Parkway	0.72	1.04
212th Avenue SE	0.85	0.85
NW Sammamish Road / SE 56th Street	0.88 [b]	0.88 [b]

Source: Heffron Transportation, July 2020.

a. North of SE 4th Street, the count data indicated that afternoon volumes are lower than commuter PM peak hour volumes in the southbound direction. However, due to the presence of several high schools in this area and to be consistent with factors applied at the south end of the corridor, the higher factor was applied.

b. 24-hour count data were not available for corridors at the south end of the study area in Issaquah. This factor was estimated based upon counts in south Sammamish nearest to Issaquah.

The existing vehicle volumes in the project study area for the morning, afternoon, and commuter PM peak hours are shown on **Figure 4**.



Legend:

- Sammamish Analysis Intersection
- Issaquah Analysis Intersection

XX Morning Peak Hour Volume
(XX) Afternoon Peak Hour Volume
[XX] Commuter PM Peak Hour Volume

1 228th Ave NE/ NE Inglewood Hill Rd

[43] (58) 56	[481] (645) 493	[229] (307) 113
[243] (185) 64		
[232] (244) 133		
[280] (375) 231		

182 (102) [134]		
196 (179) [170]		
147 (249) [186]		
260 (213) [280]	468 (394) [519]	71 (103) [135]

2 228th Ave NE/NE 4th St

[3] (4) 6	[745] (998) 595	[73] (98) 224
[17] (13) 24		
[3] (3) 5		
[11] (15) 17		

160 (258) [129]		
3 (18) [9]		
133 (564) [282]		
5 (8) [11]	737 (701) [922]	123 (54) [71]

3 228th Ave SE/SE 4th St

[79] (106) 39	[903] (1210) 594	[19] (25) 128
[106] (81) 72		
[2] (2) 39		
[105] (141) 63		

71 (17) [23]		
11 (7) [7]		
80 (39) [29]		
45 (105) [138]	726 (657) [864]	243 (10) [13]

4 228th Ave SE/SE 8th St

[77] (103) 41	[810] (1085) 605	[115] (154) 110
[82] (62) 28		
[38] (40) 18		
[18] (24) 5		

325 (174) [87]		
29 (64) [32]		
250 (326) [163]		
45 (74) [97]	675 (655) [862]	217 (188) [247]

5 228th Ave SE/SE 20th St

[84] (113) 78	[954] (1278) 1021	[16] (21) 7
[81] (62) 150		
[6] (6) 1		
[180] (241) 89		

19 (12) [16]		
1 (1) [1]		
31 (25) [19]		
153 (92) [121]	851 (948) [1247]	15 (24) [32]

6 228th Ave SE/SE 24th St

[16] (21) 7	[821] (1100) 871	[273] (366) 103
[13] (10) 3		
[4] (4) 2		
[7] (9) 0		

176 (198) [261]		
1 (5) [5]		
91 (95) [71]		
4 (14) [18]	585 (942) [1240]	87 (112) [147]

7 228th Ave SE/ Issaquah-Pine Lake Rd SE

[31] (42) 37	[358] (480) 616	[410] (549) 322
[132] (100) 90		
[83] (87) 90		
[12] (16) 14		

361 (285) [375]		
82 (102) [97]		
170 (158) [118]		
6 (11) [14]	338 (603) [793]	54 (147) [194]

8 228th Ave SE/SE 40th St

[449] (602) 843	[27] (36) 17	

66 (16) [21]		
32 (15) [11]		
386 (733) [964]	7 (18) [24]	

9 Issaquah-Pine Lake Rd SE/ 230th Ln SE

[6] (6) 102	[725] (740) 347	[44] (45) 8
[10] (8) 113		
[0] (1) 0		
[11] (11) 58		

36 (21) [27]		
1 (1) [0]		
22 (17) [17]		
89 (8) [11]	515 (491) [638]	10 (22) [28]

10 Issaquah-Pine Lake Rd SE/ SE 32nd Way

[5] (5) 2	[521] (531) 353	[228] (233) 77
[4] (3) 7		
[1] (1) 1		
[0] (1) 1		

223 (108) [156]		
1 (2) [2]		
189 (126) [124]		
3 (2) [3]	565 (483) [627]	64 (132) [172]

11 Issaquah-Pine Lake Rd SE/ SE 42nd St

[15] (15) 14	[580] (592) 535	
[29] (20) 23		
[28] (29) 22		

18 (22) [29]	471 (507) [659]	

12 Issaquah-Pine Lake Rd SE/ SE Klahanie Blvd

[4] (4) 3	[538] (549) 536	[65] (66) 18
[2] (1) 12		
[0] (1) 0		
[1] (1) 19		

81 (26) [37]		
3 (1) [0]		
268 (89) [87]		
1 (11) [14]	396 (500) [649]	45 (186) [242]

13 Issaquah-Pine Lake Rd SE/ 238th Way SE

[4] (4) 1	[596] (608) 870	[18] (18) 11
[2] (1) 4		
[0] (1) 0		
[7] (7) 12		

17 (18) [26]		
0 (1) [0]		
103 (45) [44]		
3 (8) [11]	407 (711) [924]	21 (84) [109]

14 Issaquah-Pine Lake Rd SE/ SE 48th St

[40] (41) 12	[639] (652) 991	
[34] (23) 39		
[91] (93) 162		

44 (127) [165]	359 (782) [1015]	

15 212th Ave SE/SE 20th St

[7] (6) 1	[138] (117) 123	[182] (155) 42
[2] (2) 10		
[30] (26) 20		
[30] (26) 37		

134 (60) [70]		
25 (28) [33]		
113 (88) [104]		
38 (26) [30]	139 (122) [144]	127 (79) [93]

16 E Lake Sammamish Pkwy SE/ SE 24th Way

[472] (491) 427	[8] (8) 13	

11 (5) [7]		
33 (35) [34]		
	292 (382) [530]	12 (32) [45]

17 E Lake Sammamish Pkwy SE/ 212th Way SE

[9] (6) 7	[2] (2) 0	[119] (124) 288
[11] (11) 7		
[537] (558) 520		
[0] (0) 0		

85 (197) [273]		
305 (449) [623]		
0 (2) [3]		
0 (1) [1]	0 (1) [1]	0 (1) [1]

18 E Lake Sammamish Pkwy SE/ SE 43rd Way

[36] (48) 42	[609] (816) 958	
[38] (40) 40		
[629] (654) 783		

389 (723) [1004]		
389 (616) [856]		

19 Providence Point Dr SE/ SE 43rd Way

[31] (42) 24	[0] (0) 0	[0] (0) 0
[34] (26) 12		
[976] (742) 382		
[1] (1) 5		

1 (3) [2]		
859 (598) [446]		
15 (16) [12]		
9 (13) [10]	0 (0) [0]	11 (9) [12]

20 NW Sammamish Rd/ 17th Ave NW

[270] (238) 480	[1570] (1382) 1225	[15] (13) 10
[380] (334) 115		
[155] (136) 30		
[365] (321) 135		

15 (22) [25]		
55 (88) [100]		
100 (238) [270]		
315 (202) [230]	1145 (1078) [1225]	175 (202) [230]

21 E Lake Sammamish Pkwy SE/ SE 56th St

[665] (585) 840	[490] (431) 415	[40] (35) 15
[1070] (942) 415		
[145] (128) 60		
[455] (400) 185		

15 (40) [45]		
175 (145) [165]		
30 (75) [85]		
490 (277) [315]	435 (695) [790]	15 (35) [40]

22 Issaquah-Pine Lake Rd SE/ SE Issaquah-Fall City Rd

[460] (469) 593	[316] (322) 525	[40] (41) 76
[547] (421) 169		
[508] (457) 114		
[9] (9) 5		

33 (51) [66]		
739 (365) [406]		
402 (285) [279]		
2 (13) [17]	197 (420) [545]	242 (497) [646]

23 E Lake Sammamish Pkwy SE/ SE Issaquah-Fall City Rd

[20] (18) 45	[790] (695) 370	[250] (220) 55
[40] (35) 25		
[35] (31) 15		
[80] (70) 40		

145 (119) [135]		
35 (9) [10]		
875 (528) [600]		
75 (13) [15]	820 (854) [970]	405 (858) [975]

High School #4
Elementary #17

Figure 4
Existing Traffic Volumes
AM, Afternoon and Commuter PM Peak Periods

heffron transportation inc

08.15.20

3.3.2. Future/Background Volumes Without Development

To estimate year 2024 background traffic for the study area intersections, traffic expected to be generated by pipeline development projects (permitted or under construction, but expected to be complete by the future analysis year) in the vicinity of the site, as well as traffic resulting from regional development growth, was added to the existing volumes.

The analysis presented in this report evaluates cumulative conditions with traffic generated by other future planned development in the vicinity. Traffic generated by the following pipeline projects (permitted or under construction, but expected to be complete by the future analysis year) identified by the City of Sammamish[8] is also reflected in the analysis.

- ISD's Elementary School #16, analyzed for a capacity of 756 students, located at Issaquah-Pine Lake Road / Klahanie Boulevard [9]
- Sammamish Town Center Project, Phase 1 (413 multi-family residential units, 10 single-family houses, and 82,000 square feet of commercial space), located at SE 4th Street / 228th Avenue SE [10]

In addition to the pipeline traffic described above, an annual background traffic growth rate was applied to the existing traffic volumes, to account for traffic increases from regional development growth. At the direction of the City of Sammamish in March 2020,[11] an annual growth rate of 4% was assumed for analysis of intersections within Sammamish. The traffic volumes and level of service results presented herein for Sammamish intersections reflect that higher growth rate. The City later reassessed that growth rate and recommended lowering it to 1.5% per year.[12] This lower growth rate was applied as part of new sensitivity analysis performed for the 228th Avenue SE /SE 43rd Way corridor near the proposed school site (from north of SE 40th Street to south of Providence Point Drive SE). The sensitivity analysis is presented in Section 4.4.

For intersections in Issaquah, traffic volumes in the City of Issaquah's 2019 and 2040 traffic operational models for the commuter PM peak hour were compared—these reflect 1.1% annual growth at the study area intersections located in Issaquah, and therefore a rate of 1.2% was applied. (Note, even though the intersections of SE 43rd Way with Providence Point Drive SE and East Lake Sammamish Parkway are within Issaquah's jurisdiction, the higher Sammamish growth assumptions were applied at these intersections since they are located nearer the Sammamish city limits and the project site). The projected 2024 background volumes without pipeline trips at the study intersections, as well as the projected pipeline trips, are provided in **Appendix C**. These volumes were added together to estimate the 2024 volumes without the proposed project.

Figure 5 shows the forecast 2024 traffic volumes for conditions without the project, for the morning, afternoon, and commuter PM peak hours.

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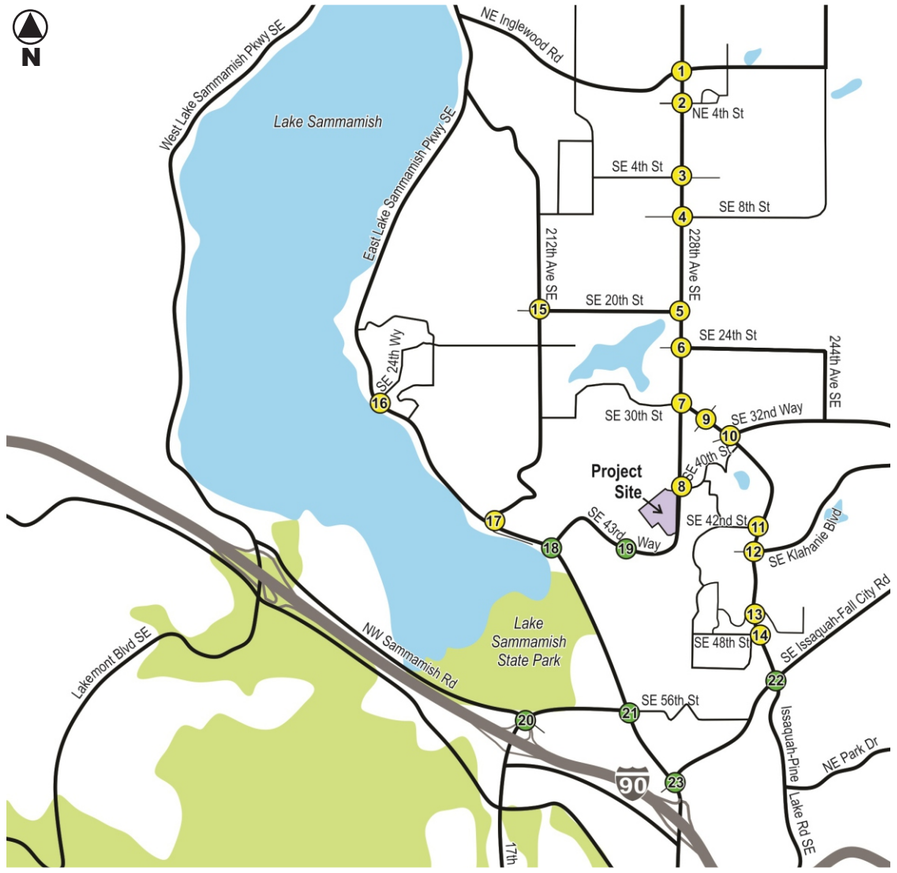
8 Pipeline projects were identified in an email from Steven Chen, City of Sammamish, March 10, 2020.
9 Jake Traffic Engineering, Sammamish Elementary School #16, Traffic Impact Analysis Revised, September 18, 2019.
10 Transpo Group, Sammamish Town Center Traffic Impact Analysis, October 2019.
11 E-mail from Steven Chen, City of Sammamish, March 10, 2020, and confirmed with a follow-up telephone conversation between Jennifer Barnes of Heffron Transportation, Inc. and Steven Chen.
1212 City of Sammamish comment letter, October 29, 2020.



Legend:

- Sammamish Analysis Intersection
- Issaquah Analysis Intersection

XX Morning Peak Hour Volume
(XX) Afternoon Peak Hour Volume
[XX] Commuter PM Peak Hour Volume

1 228th Ave NE/ NE Inglewood Hill Rd

[52] [593] [279]
(71) (791) (374)
68 613 137

221 (124) [163]
238 (218) [207]
182 (311) [235]

[296] (225) 78
[282] (297) 162
[342] (457) 283

317 591 92
(260) (489) (130)
[342] [642] [170]

2 228th Ave NE/NE 4th St

[4] [929] [89]
(5) (1234) (119)
7 742 273

195 (314) [157]
4 (22) [11]
164 (693) [351]

[21] (16) 29
[4] (4) 6
[13] (18) 21

7 928 154
(11) (878) (66)
[14] [1150] [86]

3 228th Ave SE/SE 4th St

[176] [1091] [23]
(199) (1465) (30)
66 733 156

86 (21) [28]
23 (10) [10]
97 (47) [35]

[185] (148) 127
[2] (2) 63
[171] (210) 110

86 891 296
(162) (793) (12)
[206] [1044] [16]

4 228th Ave SE/SE 8th St

[100] [1004] [149]
(130) (1336) (195)
59 763 141

401 (218) [113]
35 (78) [39]
304 (397) [198]

[104] (79) 36
[46] (49) 22
[22] (29) 6

55 852 264
(90) (815) (229)
[118] [1069] [301]

5 228th Ave SE/SE 20th St

[102] [1178] [19]
(137) (1570) (26)
95 1266 9

23 (15) [19]
1 (1) [1]
38 (30) [23]

[99] (75) 182
[7] (7) 1
[219] (293) 108

186 1064 18
(112) (1170) (29)
[147] [1535] [39]

6 228th Ave SE/SE 24th St

[19] [1013] [334]
(26) (1350) (447)
9 1081 127

218 (244) [321]
1 (6) [6]
111 (116) [86]

[16] (12) 4
[5] (5) 2
[9] (11) 1

5 737 106
(17) (1160) (136)
[22] [1524] [179]

7 228th Ave SE/ Issaquah-Pine Lake Rd SE

[38] [439] [507]
(56) (587) (675)
45 750 411

454 (359) [469]
103 (126) [120]
212 (195) [146]

[161] (122) 109
[103] (108) 113
[15] (19) 17

7 420 70
(13) (734) (183)
[17] [965] [238]

8 228th Ave SE/SE 40th St

[551] [33]
(738) (44)
1032 21

80 (19) [26]
39 (18) [13]

483 9
(896) (22)
[1175] [29]

9 Issaquah-Pine Lake Rd SE/ 230th Ln SE

[7] [894] [54]
(7) (911) (55)
124 449 10

44 (26) [33]
1 (1) [1]
27 (21) [21]

[12] (10) 137
[1] (1) 1
[13] (13) 71

108 650 12
(10) (614) (27)
[13] [793] [34]

10 Issaquah-Pine Lake Rd SE/ SE 32nd Way

[6] [646] [277]
(6) (657) (283)
2 456 94

271 (131) [190]
1 (2) [2]
235 (156) [154]

[5] (4) 9
[1] (1) 1
[1] (1) 1

4 710 82
(2) (605) (164)
[4] [780] [212]

11 Issaquah-Pine Lake Rd SE/ SE 42nd St

[18] [721]
(23) (734)
17 683

[35] (24) 28
[40] (58) 82

69 600
(55) (637)
[42] [822]

12 Issaquah-Pine Lake Rd SE/ SE Klahanie Blvd

[5] [676] [79]
(5) (705) (80)
4 739 22

99 (32) [45]
4 (1) [1]
340 (114) [110]

[2] (1) 15
[1] (1) 1
[1] (1) 23

1 556 67
(13) (656) (233)
[17] [818] [299]

13 Issaquah-Pine Lake Rd SE/ 238th Way SE

[10] [761] [24]
(25) (810) (25)
36 1177 17

26 (24) [34]
1 (1) [1]
125 (55) [54]

[7] (19) 45
[1] (1) 1
[9] (9) 15

4 630 26
(10) (923) (102)
[13] [1159] [133]

14 Issaquah-Pine Lake Rd SE/ SE 48th St

[57] [805]
(92) (821)
57 1283

[48] (48) 97
[111] (113) 197

54 522
(155) (989)
[201] [1263]

15 212th Ave SE/SE 20th St

[9] [169] [221]
(7) (143) (189)
1 177 51

163 (73) [85]
30 (34) [40]
137 (107) [127]

[2] (2) 12
[36] (32) 24
[36] (32) 45

46 170 155
(32) (165) (96)
[36] [194] [113]

16 E Lake Sammamish Pkwy SE/ SE 24th Way

[574] [10]
(597) (10)
520 16

13 (6) [9]
40 (43) [41]

355 15
(465) (39)
[645] [55]

17 E Lake Sammamish Pkwy SE/ 212th Way SE

[11] [2] [145]
(7) (2) (151)
9 0 375

103 (256) [350]
371 (546) [758]
0 (2) [4]

[13] (13) 9
[654] (681) 640
[0] (0) 0

0 0 0
(1) (1) (1)
[1] [1] [1]

18 E Lake Sammamish Pkwy SE/ SE 43rd Way

[44] [743]
(58) (996)
51 1172

479 (882) [1223]
473 (765) [1059]

[47] (51) 56
[765] (796) 978

19 Providence Point Dr SE/ SE 43rd Way

[38] [1] [15]
(51) (1) (20)
29 1 30

1 (4) [2]
1051 (734) [548]
18 (19) [15]

[41] (32) 15
[1189] (907) 478
[1] (1) 6

11 1 13
(16) (1) (11)
[12] [1] [15]

20 NW Sammamish Rd/ 17th Ave NW

[287] [1669] [16]
(253) (1469) (14)
509 1314 11

16 (23) [27]
58 (93) [106]
106 (253) [287]

[403] (355) 122
[165] (144) 32
[387] (341) 143

334 1217 186
(214) (1153) (214)
[244] [1309] [244]

21 E Lake Sammamish Pkwy SE/ SE 56th St

[708] [520] [42]
(623) (458) (37)
905 454 16

16 (42) [48]
186 (154) [175]
32 (80) [90]

[1145] (1009) 443
[154] (136) 64
[483] (425) 196

520 464 16
(294) (747) (37)
[334] [848] [42]

22 Issaquah-Pine Lake Rd SE/ SE Issaquah-Fall City Rd

[488] [349] [55]
(498) (356) (57)
629 597 116

75 (71) [82]
784 (387) [431]
427 (303) [296]

[590] (455) 179
[539] (485) 121
[10] (10) 5

2 252 257
(14) (472) (528)
[18] [600] [686]

23 E Lake Sammamish Pkwy SE/ SE Issaquah-Fall City Rd

[21] [839] [265]
(19) (739) (234)
48 406 58

154 (126) [143]
37 (10) [11]
929 (560) [637]

[42] (37) 27
[37] (33) 16
[85] (74) 42

80 870 430
(14) (915) (911)
[16] [1039] [1035]

High School #4
Elementary #17

Figure 5
Forecast 2024 Without-Project Traffic Volumes
Morning, Afternoon, and Commuter PM Peak Hours

heffron transportation inc

08.15.20

3.4. Traffic Operations

Level of service (LOS) analysis was conducted for the study area intersections for the morning, afternoon, and commuter PM peak hour conditions. Level of service is a qualitative measure used to characterize traffic operating conditions. The quality of traffic conditions is graded into one of six LOS designations, "A" through "F". LOS A is the best and represents good traffic operations with little or no delay to motorists. LOS F is the worst and indicates poor traffic operations with long delays. The Cities have adopted the following level of service standards for intersections within their respective jurisdictions.

- The City of Sammamish has adopted a standard of LOS C for intersections that include a Collector or Minor Arterial, and LOS D for most intersections that include a Principal Arterial. However, for intersections where LOS D cannot be met with three approach lanes in any direction, a standard of LOS E is assigned.[13]

- The City of Issaquah has adopted a standard of LOS D for city street intersections. As a designated Highway of Regional Significance, SR 900 has a standard of LOS "E Mitigated."[14]

Levels of service for the study area intersections were analyzed using methodologies presented in the *Highway Capacity Manual (HCM) Sixth Edition.*[15] **Appendix D** includes level of service thresholds and definitions for signalized and unsignalized intersections. Delay calculations rely on complex equations that consider a number of variables. For example, delay at signalized intersections is determined based on a combination of variables including: the quality of progression, cycle length, green ratio, and a volume-to-capacity ratio for the lane group or approach in question. Delay at unsignalized intersections is determined for vehicles that must stop or yield for oncoming traffic. That delay is related to the availability of gaps in the main street's traffic flow and the ability of a driver to enter or pass through those gaps. Level-of-service calculations for the signalized and stop-sign controlled intersections were performed using the *Synchro 10.3 (Build 151)* traffic operations analysis software. Synchro models that included the channelization and signal timings at the study area intersections were provided by the Cities of Sammamish and Issaquah.

The two roundabouts in the study area were evaluated using the *Sidra 9* analysis software. Existing lane geometry and model parameters established in the *WSDOT Sidra Policy Settings*[16] were used to evaluate the roundabout operations. Level of service criteria for roundabouts is also provided in **Appendix D**.

Signal timing information was provided by the Cities of Sammamish and Issaquah for the analysis intersections within their respective jurisdictions. Input data for the analysis, including the signal timing and roadway geometric characteristics, were confirmed during field observations. The analyses consider pedestrian, bicycle, and heavy vehicle (trucks and buses) volumes based on counts.

Table 4 summarizes levels of service at the analysis intersections for existing and future conditions without the project; the level-of-service reports are provided in **Appendix D**. The table shows that most study area intersections currently meet the LOS standards; the exceptions are (8) SE 40th Street / 228th Avenue SE which is operating at LOS E during the afternoon peak hour, and (21) SE 56th Street / East Lake Sammamish Parkway, which is operating at LOS E during all peak hours.

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13 City of Sammamish, Comprehensive Plan, Background Transportation Information, Amended September 18, 2018.
14 City of Issaquah Comprehensive Plan, adopted in 1995 and most recently amended March 27, 2019.
15 Transportation Research Board, 2016.
16 WSDOT, October 2019. https://www.wsdot.wa.gov/Design/Traffic/Analysis/default.htm, accessed June 30, 2020.

Forecast growth would add delay to all study area intersections. As previously described, growth in the City of Sammamish assumed a very conservative growth rate of 4% per year plus traffic generated by pipeline projects. With the additional growth, the westbound stop-controlled movement at Intersection (8) SE 40th Street / 228th Avenue SE is projected to degrade to LOS F during all three peak hours. The projected background traffic growth would degrade operation along 228th Avenue NE, to the north of SE 20th Street, to LOS F during the afternoon peak hour. Background growth would also degrade operation to LOS E at SE 48th Street / Issaquah-Pine Lake Road SE during the morning peak hour, and at SE 8th Street / 228th Avenue SE during the commuter PM peak hour. Within the City of Issaquah, Intersection (20)—NW Sammamish Road / 17th Avenue NW—is also projected to degrade to LOS F operation during all three peak hours in 2024.

After the original Transportation Technical Report was completed, the City of Sammamish determined that the 4% growth rate produced future traffic volumes that were higher than now expected based on its six-year model.[17] It was determined that the background growth rate should be reduced to 1.5% per year. However, as will be described later in Section 4.3, the proposed project would not result in the need for mitigation at most intersections in the study area. A sensitivity analysis was performed for the 228th Avenue SE/SE 43rd Way corridor close to the proposed site to determine how the lower growth rate would affect mitigation needs. The sensitivity analysis is presented in Section 4.4.

[17] City of Sammamish comment letter, October 29, 2020.

Table 4. Level of Service Summary – Existing and 2024-Without-Project Conditions

Intersection / Control Type	LOS Std [a]	Morning Peak Hour				Afternoon Peak Hour				Commuter PM Peak Hour			
		Existing		2024 w/o Project		Existing		2024 w/o Project		Existing		2024 w/o Project	
		LOS [b]	Delay [c]	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Signalized													
(1) NE Inglewood Dr / 228th Ave NE	D	C	31.0	D	39.8	D	52.5	**F**	**90.2**	D	43.3	**E**	**63.1**
(2) NE 4th St / 228th Ave NE	E	C	24.3	D	35.8	D	38.9	**F**	**90.5**	B	19.0	C	27.5
(3) SE 4th St / 228th Ave SE	E	C	20.4	C	22.6	B	19.2	D	49.4	B	17.4	C	22.3
(4) SE 8th St / 228th Ave SE	D	C	33.5	D	42.8	**E**	**70.0**	**F**	**129.4**	D	38.3	**E**	**65.4**
(5) SE 20th St / 228th Ave SE	D	B	18.7	C	29.6	C	30.4	**F**	**100.3**	B	17.4	C	25.5
(6) SE 24th St / 228th Ave SE	E	B	13.8	B	16.0	C	26.4	D	42.3	C	24.8	C	28.7
(7) 228th Ave SE / Issaquah-Pine Lake Rd SE	E	C	29.1	D	36.1	C	34.5	D	47.3	C	32.0	D	40.4
(9) SE 230th Ln / Issaquah-Pine Lake Rd SE	D	B	16.4	B	18.2	A	8.3	A	9.5	A	7.6	A	9.7
(11) SE 42nd St / Issaquah-Pine Lake Rd SE	D	A	4.5	A	8.5	A	8.2	B	11.2	A	8.2	B	11.0
(12) SE Klahanie Blvd / Issaquah-Pine Lake Rd SE	D	B	17.8	C	28.9	B	12.0	B	15.1	B	11.2	B	14.8
(13) 238th Way SE / Issaquah-Pine Lake Rd SE	D	B	15.5	D	36.6	B	10.3	B	14.6	B	10.2	B	17.9
(14) SE 48th St / Issaquah-Pine Lake Rd SE	D	B	16.7	**E**	**74.0**	A	9.7	B	16.4	B	10.4	B	15.6
(17) 212th Way SE / East Lake Sammamish Pkwy	C	B	11.0	B	15.5	A	8.6	B	10.6	A	8.2	B	10.1
(19) SE 43rd Way / Providence Point Dr SE / Providence Point Pl SE [d]	D	Unsignalized		A	5.8	Unsignalized		B	12.0	Unsignalized		B	11.3
(20) NW Sammamish Rd / 17th Ave NW (SR 900)	E	E	69.5	**F**	**84.9**	E	77.5	**F**	**94.0**	E	79.1	**F**	**95.9**
(21) SE 56th St / East Lake Sammamish Pkwy	D	**E**	**56.2**	**E**	**72.2**	**E**	**57.3**	**E**	**67.5**	**E**	**58.2**	**E**	**68.6**
(22) SE Issaquah-Fall City Rd / Issaquah-Pine Lake Rd SE	D	C	33.3	D	39.6	D	35.5	D	40.4	D	38.2	D	43.9
(23) SE Issaquah-Fall City Rd / East Lake Sammamish Pkwy	D	D	35.6	D	38.6	C	34.1	D	37.2	C	34.5	D	37.6

Table 4. Level of Service Summary – Existing and 2024-Without-Project Conditions (continued)

	LOS Std [a]	Morning Peak Hour				Afternoon Peak Hour				Commuter PM Peak Hour			
		Existing		2024 w/o Project		Existing		2024 w/o Project		Existing		2024 w/o Project	
		LOS [b]	Delay [c]	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
One-or Two-Way Stop Controlled [e]													
(8) SE 40th St / 228th Avenue SE *(overall)*	D	*A*	*3.3*	**E**	**37.5**	*A*	*0.9*	B	12.3	*A*	*0.8*	*A*	*4.9*
Westbound Movement		D	30.3	**F**	**360.7**	**E**	**46.0**	**F**	**467.8**	D	32.7	**F**	**179.5**
Southbound left-turn		A	8.3	A	8.6	B	10.2	B	11.4	B	10.8	B	12.4
(16) SE 24th Wy / E Lake Sammamish Pkwy *(overall)*	C	*A*	*0.9*	*A*	*1.0*	*A*	*1.3*	*A*	*1.7*	*A*	*1.2*	*A*	*1.4*
Westbound movement		B	13.9	C	15.4	C	18.9	C	24.0	C	18.8	C	22.8
Southbound left-turn		A	8.1	A	8.4	A	8.6	A	9.0	A	9.0	A	9.6
(19) SE 43rd Way / Providence Point Dr SE / Providence Point Pl SE *(overall)* [d]	D	A	0.4	Signalized		A	0.6	Signalized		A	0.5	Signalized	
Eastbound left-turn		B	10.3	--	--	A	9.5	--	--	A	8.7	--	--
Westbound left-turn		A	8.2	--	--	B	10.1	--	--	B	10.9	--	--
Northbound movements		C	15.2	--	--	C	21.6	--	--	C	19.8	--	--
Southbound movements		C	15.8	--	--	B	13.9	--	--	B	11.9	--	--
All-Way Stop Controlled													
(15) SE 20th St / 212th Ave SE	C	B	13.0	C	18.9	B	11.6	B	14.7	B	12.1	C	16.0
Roundabout-Controlled													
(10) SE 32nd Way / Issaquah-Pine Lake Rd SE	D	A	7.9	C	26.4	A	9.0	D	42.7	A	9.8	D	49.9
(18) SE 43rd Way / East Lake Sammamish Pkwy	D	A	9.0	B	17.0	A	7.8	B	10.9	A	7.6	B	15.4

Source: Heffron Transportation, July 2020.

a. Sources: Sammamish Comprehensive Plan (2018) for Intersections 1 through 17; Issaquah Comprehensive Plan (2019) for Intersections 18 through 23.

b. LOS = Level of Service

c. Delay = average delay in seconds per vehicle

d. SE 43rd Way / Providence Point Dr SE is currently stop-controlled but will be signalized by 2024.

e. For the one- or two-way way stop-controlled intersections, minor leg LOS reported for the worst stop-controlled approach.

Grey-shaded cells indicate LOS standard is exceeded.

3.5. Collision History

Collision data for the study area intersections were obtained from WSDOT and are summarized in **Table 5**. The data reflect the period between January 1, 2015, and June 4, 2020 (about 5.4 years), and are provided in **Appendix E**.

Table 5. Collision History in Study Area

Intersection	Reported Collisions Per Year						Total	Annual Average	Rate per MEV [b]
	2015	2016	2017	2018	2019	2020 [a]			
(1) NE Inglewood Hill Rd / 228th Ave NE	1	7	6	7	6	4	31	5.7	0.54
(2) NE 4th St / 228th Ave NE	1	3	4	1	1	0	10	1.8	0.22
(3) SE 4th St / 228th Ave NE	3	5	5	3	7	0	23	4.2	0.51
(4) SE 8th St / 228th Ave NE	1	5	4	8	2	3	23	4.2	0.44
(5) SE 20th St / 228th Ave NE	2	1	2	2	6	0	13	2.4	0.24
(6) SE 24th St / 228th Ave NE	3	3	5	3	6	0	20	3.7	0.35
(7) Issaquah-Pine Lake Rd SE / 228th Ave NE	4	4	4	4	6	0	22	4.1	0.43
(8) SE 40th St / 228th Ave NE	2	0	0	1	0	0	3	0.6	0.10
(9) 230th Ln SE / Issaquah-Pine Lake Rd SE	0	0	0	0	0	0	0	0.0	0.00
(10) SE 32nd Way / Issaquah-Pine Lake Rd SE	1	4	1	3	0	1	10	1.8	0.28
(11) SE 42nd St / Issaquah-Pine Lake Rd SE	0	0	0	0	0	0	0	0.0	0.00
(12) SE Klahanie Blvd / Issaquah-Pine Lake Rd SE	3	4	2	5	4	0	18	3.3	0.56
(13) 238th Way SE / Issaquah-Pine Lake Rd SE	3	1	1	2	0	0	7	1.3	0.20
(14) SE 48th St / Issaquah-Pine Lake Rd SE	0	3	0	0	1	0	4	0.7	0.10
(15) SE 20th St / 212th Ave SE	1	1	0	1	0	0	3	0.6	0.18
(16) SE 24th Way / E Lake Sammamish Pkwy	1	0	3	3	0	0	7	1.3	0.32
(17) 212th Way SE / E Lake Sammamish Pkwy	4	3	2	1	0	1	11	2.0	0.35
(18) SE 43rd Way / E Lake Sammamish Pkwy	11	11	6	11	13	2	54	9.9	0.86
(19) SE 43rd Way / Providence Point Dr SE	0	0	2	1	1	0	4	0.7	0.13
(20) NW Sammamish Rd / 17th Ave NW	4	10	6	9	6	2	37	6.8	0.39
(21) SE 56th St / E Lake Sammamish Pkwy	3	9	11	8	5	0	36	6.6	0.42
(22) SE Issaquah-Fall City Rd / Issaquah-Pine Lake Rd SE	15	10	5	11	6	0	47	8.7	0.62
(23) SE Issaquah-Fall City Rd / E Lake Sammamish Pkwy SE	7	14	8	9	12	5	55	10.1	0.71

Source: WSDOT, for period starting January 1, 2015 through June 4, 2020; compiled by Heffron Transportation.

a. 2020 data reported for the period from January 1 through June 4.

*b. MEV = million entering vehicles. Calculated by applying a K-factor of 10 to the commuter PM peak hour entering volumes to estimate average daily traffic (ADT). MEV = ADT * 365 days/year * 5.4 years / 1,000,000.*

The data indicate that collisions occurred at a rate lower than 1 per million entering vehicles (MEV) and do not indicate unusual safety conditions in the study area.

Table 6 summarizes the details of collisions reported in the near-site vicinity. Along the segment of 228th Avenue SE and SE 43rd Way between SE 40th Street and Providence Point Drive SE, most were rear-end collisions or collisions with fixed objects. One collision at SE 40th Street / 228th Avenue SE involved a bicyclist. None of the collisions resulted in fatality. The reported collisions occurred at rates lower than 1 per MEV at the intersections and 1 per million vehicle miles traveled (MVMT) along the segment, and do not reflect unusual safety patterns for a major arterial street.

Table 6. Collision Detail in Vicinity of Project Site

Intersection	Number of Collisions by Type						Total (5.4 Yrs)	Avg / Year
	Rear-End	Side Swipe	Left Turn	Right Angle	Ped / Cycle	Other [a]		
SE 40th St / 228th Ave SE	0	0	0	0	1	2	3	0.6
SE 43rd Way / Providence Point Dr SE	1	0	3	0	0	0	4	0.7
Segment								
228th Avenue SE / SE 43rd Way, between SE 40th St and Providence Point Drive SE	10	4	0	0	1	6	21	3.9 [a]

Source: City of Seattle Department of Transportation, Data from January 1, 2016 through February 19, 2020. https://data-seattlecitygis.opendata.arcgis.com/datasets/collisions, Accessed February 19, 2020.

a. "Other" collisions reported primarily consist of a vehicle hitting a fixed object, with one vehicle that hit a deer, and one vehicle that hit another vehicle while making an illegal U-turn.

*b. Reflects a rate of 0.29 collisions/million vehicle miles traveled (MVMT). ADT estimated by applying a K-factor of 10 to the two-way commuter PM peak hour volumes traveling along the 2,800-ft long segment. MVMT = segment length (miles) * ADT * 365 days/year * 5.4 years / 1,000,000.*

3.6. Transit Facilities and Service

The site is not directly served by public transit. The nearest bus stop is located on Issaquah-Pine Lake Road SE at 228th Avenue SE, located approximately ¾-mile to the north. The stops are served by King County Metro Routes 216, 219, and 269, which serve destinations between Sammamish, Issaquah, Bellevue, and downtown Seattle.

3.7. Non-Motorized Transportation Facilities

As described previously, 228th Avenue S does not have sidewalks in the vicinity of the project site. The nearest signalized crossings are located more than a half a mile to the north and south.

4. PROJECT IMPACTS

This section describes the conditions that would exist with the proposed elementary school and high school at the project site, with each operating at its enrollment capacity. Level of service analysis was performed to determine the proposed project's impact on traffic operations in the study area. Site access, circulation, parking, transit, and non-motorized impacts are also evaluated.

4.1. Trip Generation

4.1.1. Overview of Approach

Trip generation estimates for new school projects are typically developed using one of two methods. The most common method applies rates published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual,*[18] and is used when little may be known about expected operational characteristics. In some cases, however, it is appropriate to derive trip generation rates and travel characteristics based on observed conditions at an existing school with similar or representative characteristics. Since the published ITE rates are based on data collected from sites across the country, rates and travel patterns derived from local schools can offer representative travel characteristics for a particular school within the subject school district. The methodology applied herein combines these methods. Local trip generation data were obtained for four local schools in the Issaquah School District, which were compared to the ITE trip generation rates. The highest rates of those sets were then applied to reflect a conservative worst-case condition. Since the two schools sharing the site would have different bell schedules, the local data were also used to assess how the trips would overlap during the course of the day and to select the cumulative peak hour conditions used for the analysis.

After examining all elementary and high schools within the district, two elementary schools and two high schools were selected for data collection and observation. The representative schools were confirmed with City of Issaquah and City of Sammamish staff.[19] Idax Data Solutions conducted three days of detailed traffic counts at each school on Tuesday, October 1, Wednesday, October 2, and Thursday, October 3, 2019. The morning counts were performed for a two-hour period in which morning arrivals predominantly occur, and afternoon counts were conducted for a six-hour period that included the afternoon dismissal period and the evening peak hour on the adjacent streets (commuter PM peak period). Counts were conducted at 15-minute intervals, and compiled to determine the trips generated by each school during the morning, afternoon, and commuter PM peak hour, as well as the time that each peak hour occurred.

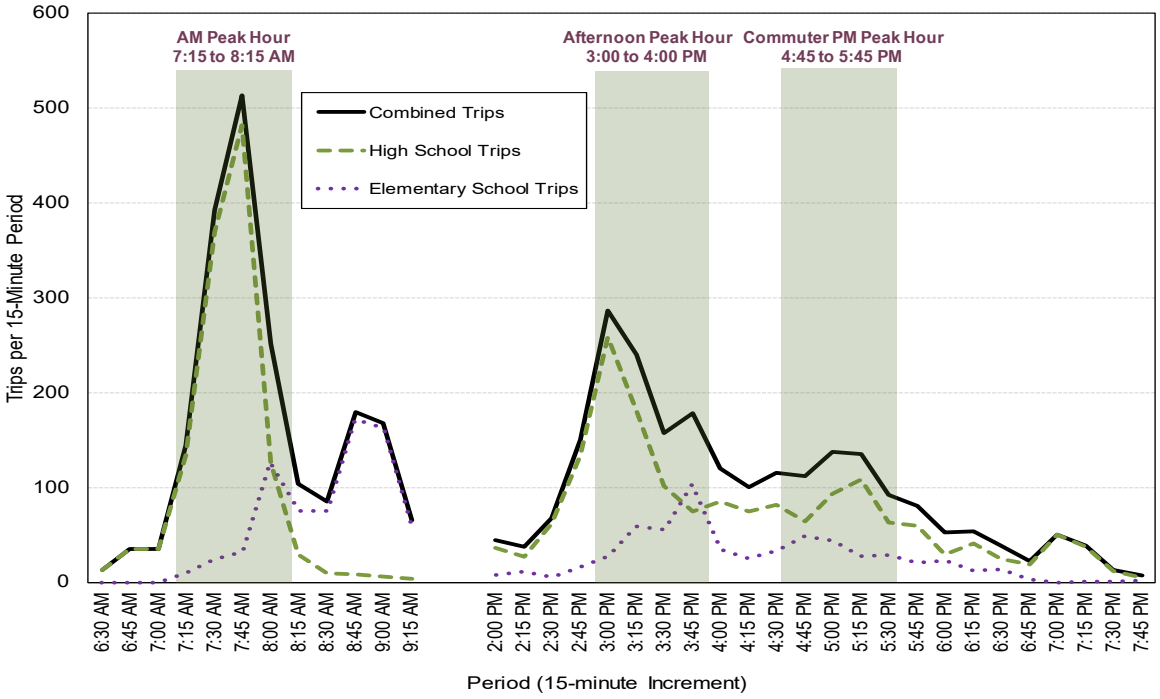
Trip generation rates were then derived from the compiled count data based on each school's student enrollment at the time of the counts. The rates were compared to average ITE rates, and the higher rate (local or ITE) was then applied to each of the proposed new schools. Applying this approach, ITE rates were applied for the elementary school morning and afternoon peak hours, and local trip rates were applied for the high school for all peak hours, as well as the commuter PM peak hour for the elementary school. Since the peak arrival and departure times for each school would differ, the local count data were used to determine when the peak for each school would occur and to assess the cumulative trips for each 15-minute period. These were then used to select the peak analysis hours and derive peak-hour factors that were applied in the traffic operations analysis. The trip generation calculations for the proposed schools and site are described in detail in a technical memorandum provided in **Appendix F** of this report.

[18] ITE, 10th Edition, 2017.
[19] Confirmed at a meeting between ISD, City of Issaquah staff, and City of Sammamish staff, on September 26, 2019.

4.1.2. Cumulative Trips for Both Schools

The high school and the elementary school would have different peak hours due to offset bell schedules. **Figure 6** shows the cumulative trips with these schools combined on one site. Because the high school would have a much larger student population than the elementary school, the peak hours for the cumulative trips would be primarily influenced by the high school. However, some elementary trips would also occur during those peak hours.

Figure 6. Cumulative Trips for High School and Elementary School



Source: Heffron Transportation, Inc., April 2020.

Table 7 summarizes the vehicle trip estimates for the morning, afternoon, and commuter PM peak hours.

Table 7. Cumulative Trips Generation for Analysis Peak Hours

Analysis Period	High School #4 Trip Generation			Elementary #17 Trip Generation			Total Trip Generation for Both Schools		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
AM Peak Hour (7:15 to 8:15 AM)									
Trips	767	345	1,112	133	59	192	900	404	1,304
Peak Hour Factor [a]	0.58	0.56	0.58	0.42	0.31	0.38	0.63	0.63	0.63
Afternoon Peak Hour (3:00 to 4:00 PM)									
Trips	127	489	616	131	115	246	258	604	862
Peak Hour Factor	0.76	0.56	0.59	0.62	0.35	0.60	0.77	0.69	0.75
Commuter PM Peak Hour (4:45 to 5:45 PM)									
Trips	147	181	328	68	80	148	215	261	476
Peak Hour Factor	0.78	0.74	0.76	0.77	0.77	0.77	0.87	0.87	0.87

Source: Heffron Transportation, April 2020.

a. PHF = Peak Hour Factor = Peak Hour Volume / (4 X Peak 15-minute Volume)

4.1.3. Traffic Peaking Characteristics

Table 7 summarizes the calculated peak hour factor (PHF) for each school individually and cumulatively. Standard practice and methodologies for traffic operations analyses, established in the *Highway Capacity Manual,*[20] are conducted using hourly traffic flow rates. However, the methodology recognizes that traffic volumes may vary within the analysis peak hour. To account for variable flow rates within the hour, a PHF is applied to the hourly flow rates. This factor adjusts the total hourly flow rate to reflect the rate of the highest 15-minute period across the hour. The PHF is calculated as follows:

PHF = (total hourly volume) / [(peak 15-minute volume within the hour x 4)]

A PHF close to 1.0 indicates that traffic volumes are steady over the course of the hour and flows during each 15-minute period are about the same. A lower PHF indicates that volumes during one or two 15-minute periods are higher than those during the remaining 15-minute periods. For operational analyses, the hourly traffic volumes are divided by the PHF before levels of service are calculated. This results in an analysis that conservatively assumes the highest 15-minute vehicle flow rate occurs over the entire peak hour.

Traffic generation at schools tends to be more compressed within the peak hours than background traffic on surrounding roadways. This occurs because trips to and from the school occur relatively close to the school start and dismissal times as family drivers tend to arrive during the 20 to 30 minutes before each. Some school-generated trips, such as those by employees and/or visitors, also occur within the peak hour, but not within the highest 15-minute periods. For example, some staff may arrive about 45-minutes before school starts or may leave 45 minutes after dismissal. While they would be part of the overall peak hour traffic, they would not be part of the flows during the highest 15 to 30 minutes. Additionally, after the peak trips associated with school dismissal have subsided, later afternoon and evening trips may be more spread out, as after school activities begin and end at varying times.

[20] Transportation Research Board (TRB), Highway Capacity Manual, 6th Edition, 2016.

The calculated cumulative PHFs of the school-generated traffic were applied to the traffic operational analysis at intersections near the site. Farther from the site, the school-generated traffic becomes more spread out and has less influence on the overall peaking characteristics. The exceptions would be at intersections near other schools in the study area. Based upon comparison of available afternoon and commuter PM peak hour counts conducted in fall 2019 adjacent to Skyline High School, Discovery Elementary School, and Sunny Hills Elementary School, the commuter PM peak hour factors at each study intersection were reduced by 11% to estimate the peak hour factors for the afternoon peak hour volumes

4.1.4. School Bus Trips

The trip generation estimates presented above reflect all vehicles that enter and exit the site, including school buses. The number of buses that each school could generate was estimated using information provided by the Issaquah School District.[21] It is noted that these are preliminary estimates, and actual bus trips and routes would be determined for each school year based on the demographics for that year. The preliminary estimates are based on the following:

- An estimated 50% of the elementary school students and 40% of the high school students would use yellow school bus service; and

- Average load per school bus is estimated at 40 students for the elementary school and 52 students for the high school (the school district's buses have a capacity of 60 students).

Elementary School #17 is estimated to be served by 10 school buses, and High School #4 is estimated to be served by 14 buses. The school bus arrival and departure times would not overlap due to the different bell schedules. During the morning and afternoon peak hours evaluated, it was assumed that the high school buses would be part of the site traffic. To provide a conservative analysis, the high school's bus loading zone capacity of 23 buses was assumed, reflecting 23 inbound and 23 outbound buses during those periods.

[21] E-mail from Royce Norigat, Issaquah School District Capital Projects and Coleen Xaudaro, Issaquah School District Transportation, November 19, 2020.

4.2. Trip Distribution and Assignment

4.2.1. School-Generated Trips

The trip distribution patterns of school-generated trips were developed based on a combination of the overall residential density within ISD's estimated enrollment areas, and traffic patterns observed within the study area.[22] Geographic Information System (GIS) data were used to determine the proportion of residences within neighborhoods in the respective school enrollment boundaries; Google Maps predictive travel times[23] were utilized to estimate routes to and from the site based on the respective travel times. Separate project trip distribution patterns and assignments were developed for each analysis hour and also account for typical patterns of some family drivers linking school drop-off and pick-up trips with work trips.[24]

During the combined morning peak hour, which would begin more than an hour ahead of the elementary school start time, the data indicate that about half of the inbound elementary school trips would be arriving staff, and half would be early student drop-offs. Therefore, the distribution of elementary school trips assumes about 40% of inbound trips would originate from outside the enrollment area. The high school would have a larger enrollment area, and inbound trips would be generated predominantly by students being dropped off or driving and parking; 10% of inbound trips generated by the high school during the combined morning peak hour were assumed to be generated by staff from outside the enrollment area.

For the combined afternoon peak hour, which would begin about 40 minutes before the elementary school dismissal, it is expected that all elementary school trips would be generated by student pick-up activity. The high school generated trips are expected to be generally similar to the morning pattern but in reverse direction—with about 10% of outbound trips assumed to be staff departures to destinations outside the enrollment area.

For the commuter PM peak hour, most trips are associated with student pick-up activity or student drivers involved in afterschool activities or sports. A small number of trips departing the parking lots for each school are assumed to be staff departures to destinations outside the respective enrollment areas. Detailed estimates of the trip distribution for each school separately and both schools combined are provided in the technical memorandum in **Appendix F**.

4.2.2. Shifts in Trips from Other Schools

It is important to note that if the proposed schools are not constructed, the students living in the enrollment areas would still need to attend a different school, and therefore, would still generate trips to and from the schools they would otherwise attend. Additionally, morning drop-off trips and afternoon pick-up trips linked to work trips would still occur. Therefore, while the school-generated trips would be new trips at and near the site access location, and would affect traffic volumes in the vicinity of the site, farther away from the site most would not be new trips on the street system.

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22 Peak hour traffic counts on 228th Avenue SE were conducted by Idax Data Solutions on Tuesday, October 1, through Thursday October 3, 2019.

23 Google Maps, https://www.google.com/maps, Accessed November 2019.

24 The estimated portion of total trips expected to be new trips, and not trips linked to existing trips on the street system, was based upon a pass-by trip study conducted for the Northshore School District (Gibson Traffic Consultants, *ITE School Pass-By Report*, January 2012). The study was based upon surveys conducted of parents at four Northshore elementary and middle schools. It found that in the morning, an average of 58% of trips generated at the school were primary (new) trips, and 42% were linked to existing trips that would occur with or without the school activity. In the afternoon, an average of 62% of trips generated at the school were primary (new) trips, and 38% were linked to existing trips that would occur with or without the school activity.

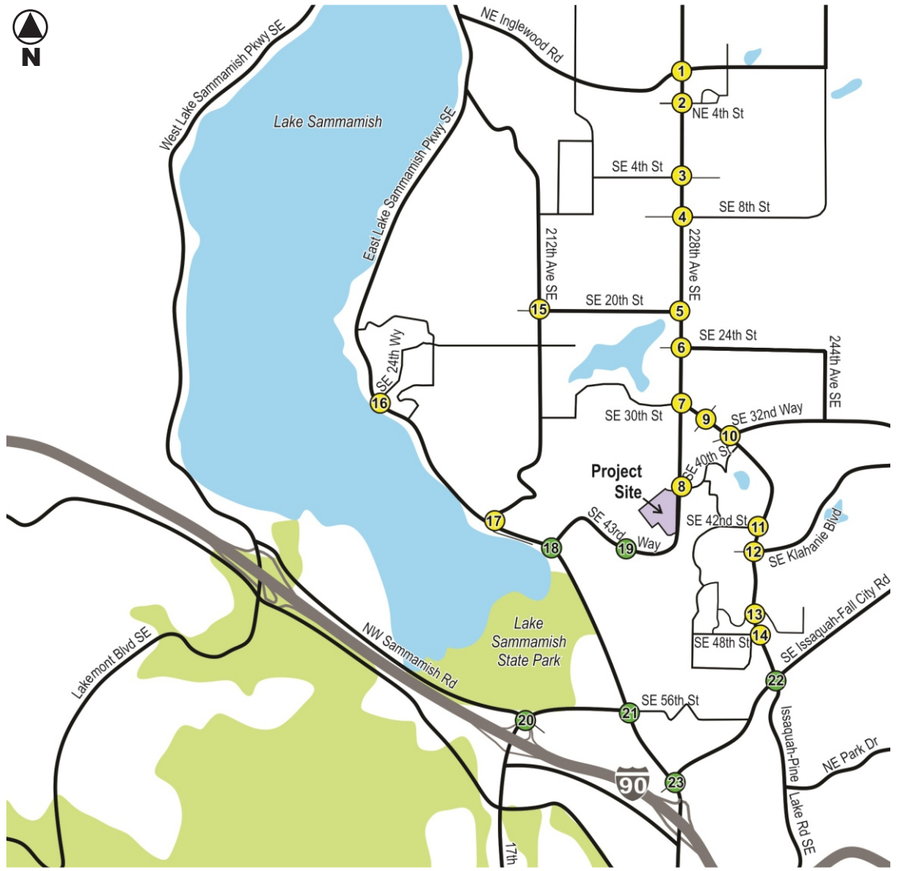
Based upon the relative residential densities in the overlap areas, it is expected that the enrollment for Elementary School #17 would be comprised of about 57% that would otherwise attend Sunny Hills Elementary, 28% that would otherwise attend Clark Elementary, and 15% that would otherwise attend Creekside Elementary. The enrollment for High School #4 would be comprised of about 50% from Skyline High School and 50% from Issaquah High School.

With the new schools in place, the trips generated by these students would be shifted from the existing schools that they would otherwise attend. Future traffic forecasts and operational analysis completed for the project reflect the shifts that would occur with the project. The total project trips generated by the new schools, as well as the estimated trips that would be shifted from each of these schools, are detailed in **Appendix G**. The net new peak hour trips generated by the High School #4 / Elementary School #17 project consist of the total project trips minus the trips that would be shifted from other schools, shown on **Figure 7**.

4.3. Off-Site Traffic Operations

4.3.1. Future Traffic Volumes with School Project

The net new peak hour school trips were added to the forecast 2024-without-project traffic volumes to project future conditions with the proposed school. **Figure 8** shows the forecast 2024-with-project traffic volumes for the morning, afternoon, and commuter PM peak hours. These volumes reflect the 4% background growth rate, which is referred to as the "high growth scenario" for sensitivity analysis presented later in this report for key intersections near the site.



Legend:

- Sammamish Analysis Intersection
- Issaquah Analysis Intersection

XX Morning Peak Hour Volume
(XX) Afternoon Peak Hour Volume
[XX] Commuter PM Peak Hour Volume

1 228th Ave NE/ NE Inglewood Hill Rd

[0] (0) 0	[0] (0) 0	[0] (0) 0
[0] (0) 0		0 (0) [0]
[0] (0) 0		0 (0) [0]
		0 (0) [0]

[0] (0) 0	0	0
[0] (0) 0	(0)	(0)
[0] (0) 0	[0]	[0]

2 228th Ave NE/NE 4th St

[0] (0) 0	[0] (0) 0	[0] (0) 0
[0] (0) 0		0 (0) [0]
[0] (0) 0		0 (0) [0]
		0 (0) [0]

[0] (0) 0	0	0
[0] (0) 0	(0)	(0)
[0] (0) 0	[0]	[0]

3 228th Ave SE/SE 4th St

[0] (-2) -2	[0] (2) 2	[0] (0) 0
[0] (0) 0		0 (0) [0]
[0] (0) -1		0 (0) [0]
[-12] (-10) -57		0 (0) [0]

-30	1	0
(-65)	(0)	(0)
[-22]	[0]	[0]

4 228th Ave SE/SE 8th St

[0] (0) 0	[4] (5) -6	[-16] (-13) -45
[0] (0) 0		-25 (-48) [-18]
[0] (0) 0		0 (0) [0]
[0] (0) 0		-73 (-109) [0]

0	-4	0
(0)	(-17)	(0)
[0]	[-4]	[0]

5 228th Ave SE/SE 20th St

[-14] (-32) -14	[-38] (-113) -68	[0] (0) 0
[0] (0) 0		0 (0) [0]
[-8] (-7) -95		0 (0) [0]
[7] (6) 52		0 (0) [0]

17	-173	0
(34)	(-15)	(0)
[13]	[-34]	[0]

6 228th Ave SE/SE 24th St

[0] (0) 0	[-31] (-107) -16	[0] (0) 0
		0 (0) [0]
		0 (0) [0]
		0 (0) [0]

0	-156	0
(0)	(19)	(0)
[0]	[-22]	[0]

7 228th Ave SE/ Issaquah-Pine Lake Rd SE

[-20] (-52) -24	[-7] (-49) 31	[-4] (-6) -23
		-13 (-5) [-6]
		0 (0) [0]
		55 (38) [27]

24	-60	37
(52)	(33)	(38)
[20]	[-5]	[20]

8 228th Ave SE/SE 40th St

[46] (32) 183	[-12] (-31) -14	
		-48 (-6) [-6]
		98 (39) [24]

49	34	
(131)	(85)	
[42]	[43]	

9 Issaquah-Pine Lake Rd SE/ 230th Ln SE

[0] (0) 0	[16] (33) 19	[0] (0) 0
		0 (0) [0]
		0 (0) [0]
		0 (0) [0]

0	43	0
(0)	(31)	(0)
[0]	[21]	[0]

10 Issaquah-Pine Lake Rd SE/ SE 32nd Way

[0] (0) 0	[-23] (-22) 2	[0] (0) 0
		0 (0) [0]
		0 (0) [0]
		0 (0) [0]

0	-12	0
(0)	(-29)	(0)
[0]	[-9]	[0]

11 Issaquah-Pine Lake Rd SE/ SE 42nd St

[-14] (-22) -7	[5] (22) 15	
[-8] (-16) -15		
[0] (0) 0		

0	18	
(0)	(2)	
[0]	[7]	

12 Issaquah-Pine Lake Rd SE/ SE Klahanie Blvd

[0] (0) 0	[5] (22) 15	[0] (0) 0
		0 (0) [0]
		0 (0) [0]
		0 (0) [0]

0	18	0
(0)	(2)	(0)
[0]	[7]	[0]

13 Issaquah-Pine Lake Rd SE/ 238th Way SE

[1] (5) 1	[2] (7) 12	[0] (0) 0
		0 (0) [0]
		0 (0) [0]
		0 (0) [0]

-3	14	0
(-6)	(4)	(0)
[-3]	[6]	[0]

14 Issaquah-Pine Lake Rd SE/ SE 48th St

[4] (7) 4	[-4] (-1) 2	
[4] (6) 26		
[-5] (-5) -44		

-11	-15	
(-26)	(-8)	
[-9]	[-1]	

15 212th Ave SE/SE 20th St

[0] (0) 0	[-12] (-17) -7	[5] (4) 35
		12 (21) [8]
		0 (0) [0]
		-9 (-19) [-9]

0	-18	-25
(0)	(-17)	(-5)
[0]	[-10]	[-6]

16 E Lake Sammamish Pkwy SE/ SE 24th Way

[12] (10) 90	[0] (0) 0	
		0 (0) [0]
		0 (0) [0]

26	0	
(57)	(0)	
[22]	[0]	

17 E Lake Sammamish Pkwy SE/ 212th Way SE

[0] (0) 0	[0] (0) 0	[-11] (-16) 3
		-16 (-11) [-8]
		26 (57) [22]
		0 (0) [0]

0	0	0
(0)	(0)	(0)
[0]	[0]	[0]

18 E Lake Sammamish Pkwy SE/ SE 43rd Way

[24] (63) 28	[105] (252) 169	
		376 (96) [83]
		-6 (-5) [-4]
[2] (-6) 95		
[-1] (0) -2		

19 Providence Point Dr SE/ SE 43rd Way

[0] (0) 0	[0] (0) 0	[0] (0) 0
		0 (0) [0]
		190 (320) [136]
		0 (0) [0]

0	0	0
(0)	(0)	(0)
[0]	[0]	[0]

20 NW Sammamish Rd/ 17th Ave NW

[13] (38) 17	[35] (97) 72	[0] (0) 0
		0 (0) [0]
		0 (0) [0]
[8] (6) 58		
[0] (0) 0		

0	159	0
(0)	(32)	(0)
[0]	[32]	[0]

21 E Lake Sammamish Pkwy SE/ SE 56th St

[62] (172) 106	[6] (10) 27	[30] (58) 22
		62 (27) [16]
		0 (0) [0]
		-31 (-14) [-9]
[48] (45) 276		
[0] (0) 0		
[-8] (-7) -59		

-17	32	-11
(-37)	(19)	(-29)
[-14]	[15]	[-15]

22 Issaquah-Pine Lake Rd SE/ SE Issaquah-Fall City Rd

[-11] (-9) -58	[0] (0) 0	[2] (3) 16
		8 (7) [7]
		-8 (-7) [-7]
		0 (0) [0]
[-17] (-41) -34		
[-2] (-3) -16		
[0] (0) 0		

0	0	0
(0)	(0)	(0)
[0]	[0]	[0]

23 E Lake Sammamish Pkwy SE/ SE Issaquah-Fall City Rd

[0] (0) 0	[-11] (-11) -63	[0] (0) 0
		0 (0) [0]
		-96 (-28) [-25]
[0] (0) 0		
[0] (0) 0		

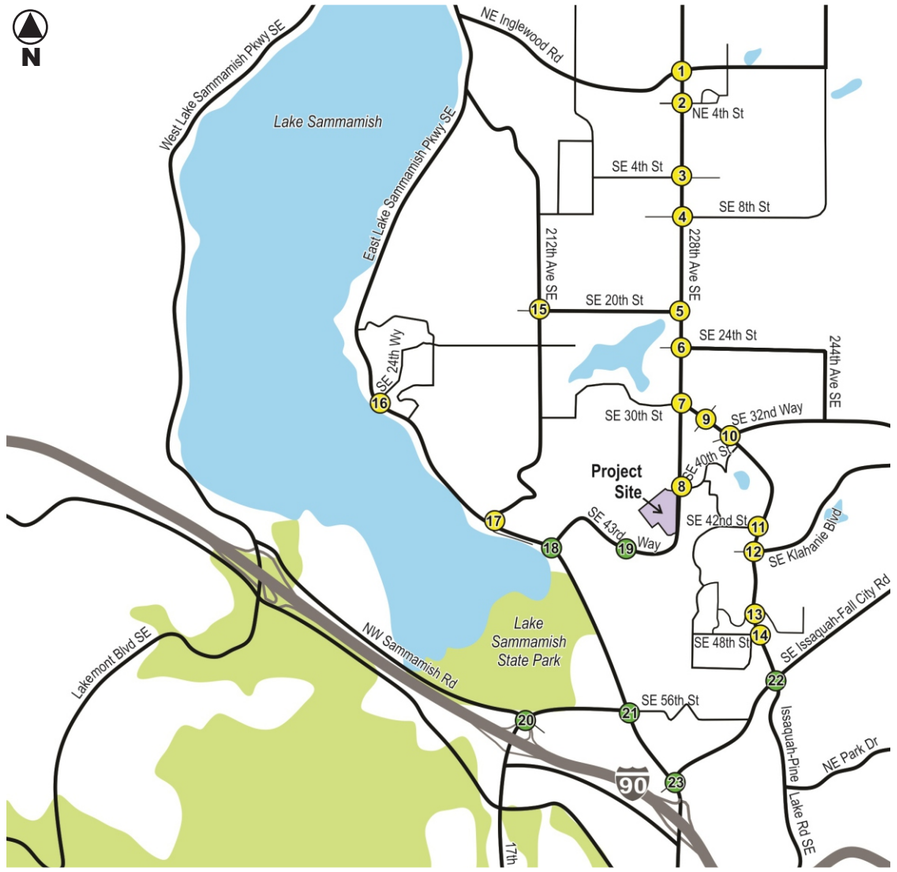
0	5	-61
(0)	(-46)	(-73)
[0]	[-12]	[-33]

High School #4
Elementary #17

Figure 7
Net New Trips With Project
Morning, Afternoon, and Commuter PM Peak Hours

heffron transportation inc

08.15.20



Legend:

- Sammamish Analysis Intersection
- Issaquah Analysis Intersection

XX Morning Peak Hour Volume
(XX) Afternoon Peak Hour Volume
[XX] Commuter PM Peak Hour Volume

1 228th Ave NE/ NE Inglewood Hill Rd

[52] [593] [279]
(71) (791) (374)
68 613 137

221 (124) [163]
238 (218) [207]
182 (311) [235]

[296] (225) 78
[282] (297) 162
[342] (457) 283

317 591 92
(260) (489) (130)
[342] [642] [170]

2 228th Ave NE/NE 4th St

[4] [929] [89]
(5) (1234) (119)
7 742 273

195 (314) [157]
4 (22) [11]
164 (693) [351]

[21] (16) 29
[4] (4) 6
[13] (18) 21

7 928 154
(11) (878) (66)
[14] [1150] [86]

3 228th Ave SE/SE 4th St

[176] [1091] [23]
(197) (1467) (30)
64 735 156

86 (21) [28]
23 (10) [10]
97 (47) [35]

[185] (148) 126
[2] (2) 63
[159] (200) 53

56 892 296
(97) (793) (12)
[184] [1044] [16]

4 228th Ave SE/SE 8th St

[100] [1008] [133]
(130) (1341) (182)
59 757 96

376 (170) [95]
35 (78) [39]
231 (288) [198]

[104] (79) 36
[46] (49) 22
[22] (29) 6

55 848 264
(90) (798) (229)
[118] [1065] [301]

5 228th Ave SE/SE 20th St

[88] [1140] [19]
(105) (1457) (26)
81 1198 9

23 (15) [19]
1 (1) [1]
38 (30) [23]

[91] (68) 87
[7] (7) 1
[226] (299) 160

203 891 18
(146) (1155) (29)
[160] [1501] [39]

6 228th Ave SE/SE 24th St

[19] [982] [334]
(26) (1243) (447)
9 1065 127

218 (244) [321]
1 (6) [6]
111 (116) [86]

[16] (12) 4
[5] (5) 2
[9] (11) 1

5 581 106
(17) (1179) (136)
[22] [1502] [179]

7 228th Ave SE/ Issaquah-Pine Lake Rd SE

[18] [432] [503]
(4) (538) (669)
21 781 388

441 (354) [463]
103 (126) [120]
267 (233) [173]

[150] (113) 26
[103] (108) 113
[26] (28) 100

31 360 107
(65) (767) (221)
[37] [960] [258]

8 228th Ave SE/SE 40th St

[597] [21]
(770) (13)
1215 7

32 (13) [20]
137 (57) [37]

532 43
(1027) (107)
[1217] [72]

9 Issaquah-Pine Lake Rd SE/ 230th Ln SE

[7] [910] [54]
(7) (944) (55)
124 468 10

44 (26) [33]
1 (1) [1]
27 (21) [21]

[12] (10) 137
[1] (1) 1
[13] (13) 71

108 693 12
(10) (645) (27)
[13] [814] [34]

10 Issaquah-Pine Lake Rd SE/ SE 32nd Way

[6] [623] [277]
(6) (635) (283)
2 458 94

271 (131) [190]
1 (2) [2]
235 (156) [154]

[5] (4) 9
[1] (1) 1
[1] (1) 1

4 698 82
(2) (576) (164)
[4] [771] [212]

11 Issaquah-Pine Lake Rd SE/ SE 42nd St

[4] [726]
(1) (756)
10 698

[27] (8) 13
[40] (58) 82

69 618
(55) (639)
[42] [829]

12 Issaquah-Pine Lake Rd SE/ SE Klahanie Blvd

[5] [681] [79]
(5) (727) (80)
4 754 22

99 (32) [45]
4 (1) [1]
340 (114) [110]

[2] (1) 15
[1] (1) 1
[1] (1) 23

1 574 67
(13) (658) (233)
[17] [825] [299]

13 Issaquah-Pine Lake Rd SE/ 238th Way SE

[11] [763] [24]
(30) (817) (25)
37 1189 17

26 (24) [34]
1 (1) [1]
125 (55) [54]

[6] (15) 44
[1] (1) 1
[7] (8) 9

1 644 26
(4) (927) (102)
[10] [1165] [133]

14 Issaquah-Pine Lake Rd SE/ SE 48th St

[61] [801]
(99) (820)
61 1285

[52] (54) 123
[106] (108) 153

43 507
(129) (981)
[192] [1262]

15 212th Ave SE/SE 20th St

[9] [157] [226]
(7) (126) (193)
1 170 86

175 (94) [93]
30 (34) [40]
128 (88) [118]

[2] (2) 12
[36] (32) 24
[36] (32) 45

46 152 130
(32) (148) (91)
[36] [184] [107]

16 E Lake Sammamish Pkwy SE/ SE 24th Way

[586] [10]
(607) (10)
610 16

13 (6) [9]
40 (43) [41]

381 15
(522) (39)
[667] [55]

17 E Lake Sammamish Pkwy SE/ 212th Way SE

[11] [2] [134]
(7) (2) (135)
9 0 378

87 (245) [342]
397 (603) [780]
0 (2) [4]

[13] (13) 9
[666] (691) 730
[0] (0) 0

0 0 0
(1) (1) (1)
[1] [1] [1]

18 E Lake Sammamish Pkwy SE/ SE 43rd Way

[68] [848]
(121) (1248)
79 1341

855 (978) [1306]
467 (760) [1055]

[49] (45) 151
[764] (796) 976

19 Providence Point Dr SE/ SE 43rd Way

[38] [1] [15]
(51) (1) (20)
29 1 30

1 (4) [2]
1241 (1054) [684]
18 (19) [15]

[41] (32) 15
[1291] (1026) 966
[1] (1) 6

11 1 13
(16) (1) (11)
[12] [1] [15]

20 NW Sammamish Rd/ 17th Ave NW

[300] [1704] [16]
(291) (1566) (14)
526 1386 11

16 (23) [27]
58 (93) [106]
106 (253) [287]

[411] (361) 180
[165] (144) 32
[387] (341) 143

334 1376 186
(214) (1185) (214)
[244] [1341] [244]

21 E Lake Sammamish Pkwy SE/ SE 56th St

[770] [526] [72]
(795) (468) (95)
1011 481 38

78 (69) [64]
186 (154) [175]
1 (66) [81]

[1193] (1054) 719
[154] (136) 64
[475] (418) 137

503 496 5
(257) (766) (8)
[320] [863] [27]

22 Issaquah-Pine Lake Rd SE/ SE Issaquah-Fall City Rd

[477] [349] [57]
(489) (356) (60)
571 597 132

83 (78) [89]
776 (380) [424]
427 (303) [296]

[573] (414) 145
[537] (482) 105
[10] (10) 5

2 252 257
(14) (472) (528)
[18] [600] [686]

23 E Lake Sammamish Pkwy SE/ SE Issaquah-Fall City Rd

[21] [828] [265]
(19) (728) (234)
48 343 58

154 (126) [143]
37 (10) [11]
833 (532) [612]

[42] (37) 27
[37] (33) 16
[85] (74) 42

80 875 369
(14) (869) (838)
[16] [1027] [1002]

High School #4
Elementary #17

Figure 8
Forecast 2024 With-Project Traffic Volumes
Morning, Afternoon, and Commuter PM Peak Hours

heffron transportation inc

08.15.20

4.3.2. Intersection Level of Service

Table 8 summarizes 2024 "with-project" levels of service for the study area intersections. The without-project results are shown for comparison; the level-of-service reports are provided in **Appendix D.**

As shown, the project would improve operation on 228th Avenue SE north of Issaquah-Pine Lake Road, and on Issaquah-Pine Lake Road, due to changes in travel patterns associated with shifted trips from Sky-line High School, Creekside Elementary School, and Sunny Hills Elementary School. Project-generated traffic would increase delay at (8) SE 40th Street / 228th Avenue SE, which is projected to operate at LOS F under 2024 conditions without the project, requiring mitigation at this location. The City of Sammamish has identified this intersection for future capacity improvement.[25] Further analysis of potential improvements under different growth scenarios is presented in the next section.

Project-generated traffic is also expected to add delay to the (20) NW Sammamish Road / 17th Avenue W and (21) SE 56th Street / East Lake Sammamish Parkway intersections in Issaquah, which are projected to operate at LOS E or F in 2024 without the project. This is due to additional traffic that would be shifted from Issaquah High School and Clark Elementary School to the new schools (it is noted that this shift would reduce traffic on Newport Way and other streets to the south in Issaquah, but these streets are outside of the study area). In its *Comprehensive Plan*,[26] the City of Issaquah has identified the following future capacity improvements that would improve traffic operation at both of these locations.

- (Project #4) NW Sammamish Road / 17th Avenue NW (SR 900) / 12th Avenue NW – Widen 12th Avenue NW at SR 900 / NW Sammamish Road to provide for an additional westbound approach lane to provide exclusive dual left-turn lanes. In addition, widen the northbound 17th Avenue NW approach to provide for an exclusive right turn lane for traffic turning from 17th Avenue NW to 12th Avenue NW.

- (Project #6) SR 900 / NW Sammamish Road – Construct an additional westbound general-purpose lane approaching the I-90 Ramps from 11th Ave NW to the metered location on the westbound I-90 on-ramp.

- (Project #19) NW Sammamish Road / SE 56th Street – Widen NW Sammamish Road / SE 56th Street to three lanes in each direction between the I-90 westbound ramps and East Lake Sammamish Parkway. Provide additional turn lane capacity at various intersections along the corridor.

In its payment of traffic impact fees to the City of Issaquah, in accordance with Issaquah Municipal Code (IMC) §3.71, the project would mitigate its share of traffic impacts at these intersections.

During the morning peak hour, the (18) SE 43rd Way / East Lake Sammamish Parkway roundabout is projected to operate at LOS E with the project. However, because (1) the projected average delay is less than a half second above the LOS D threshold, (2) the cumulative conditions reflect a 4% annual background traffic growth that is substantially higher than the 1.1% average rate reflected in the City of Issaquah's models (as described in *Section 3.3.2*), and (3) the City has chosen to implement a capacity reduction at this location (as described in *Section 3.2*), no mitigation is recommended.

Additionally, ISD would develop a Transportation Management Plan (TMP) to encourage travel by modes other than single-occupant-vehicles, which would seek to reduce project-generated trips compared to what is reflected in the analysis. This is described in more detail in *Section 5. Mitigation and Recommendations.*

[25] City of Sammamish, Comprehensive Plan, 2018.
[26] City of Issaquah, Comprehensive Plan, 2019.

Table 8. Level of Service Summary – 2024 Conditions Without- and With-Project

Intersection / Control Type	LOS Std [a]	Morning Peak Hour				Afternoon Peak Hour				Commuter PM Peak Hour			
		2024 w/o Project		2024 w/ Project		2024 w/o Project		2024 w/ Project		2024 w/o Project		2024 w/ Project	
		LOS [b]	Delay [c]	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Signalized													
(1) NE Inglewood Dr / 228th Ave NE	D	D	39.8	D	39.8	**F**	**90.2**	**F**	**90.2**	**E**	**63.1**	**E**	**63.1**
(2) NE 4th St / 228th Ave NE	E	D	35.8	D	35.8	**F**	**90.5**	**F**	**90.5**	C	27.5	C	27.5
(3) SE 4th St / 228th Ave SE	E	C	22.6	C	22.5	D	49.4	D	35.3	C	22.3	C	21.4
(4) SE 8th St / 228th Ave SE	D	D	42.8	C	34.4	**F**	**129.4**	**F**	**120.0**	**E**	**65.4**	**E**	**62.6**
(5) SE 20th St / 228th Ave SE	D	C	29.6	C	29.2	**F**	**100.3**	**F**	**87.1**	C	25.5	C	25.6
(6) SE 24th St / 228th Ave SE	E	B	16.0	B	15.7	D	42.3	D	44.7	C	28.7	C	28.5
(7) 228th Ave SE / Issaquah-Pine Lake Rd SE	E	D	36.1	E	58.6	D	47.3	E	55.3	D	40.4	D	41.0
(9) SE 230th Ln / Issaquah-Pine Lake Rd SE	D	B	18.2	B	18.3	A	9.5	A	9.6	A	9.7	A	9.7
(11) SE 42nd St / Issaquah-Pine Lake Rd SE	D	A	8.5	A	8.2	B	11.2	B	10.8	B	11.0	A	9.7
(12) SE Klahanie Blvd / Issaquah-Pine Lake Rd SE	D	C	28.9	C	29.6	B	15.1	B	15.3	B	14.8	B	14.9
(13) 238th Way SE / Issaquah-Pine Lake Rd SE	D	D	36.6	C	34.4	B	14.6	B	14.6	B	17.9	B	17.9
(14) SE 48th St / Issaquah-Pine Lake Rd SE	D	**E**	**74.0**	**E**	**70.9**	B	16.4	B	15.9	B	15.6	B	15.8
(17) 212th Way SE / East Lake Sammamish Pkwy	C	B	15.5	B	18.0	B	10.6	B	10.5	B	10.1	A	9.9
(19) SE 43rd Way / Providence Point Dr SE	D	A	5.8	A	7.8	B	12.0	B	13.6	B	11.3	B	12.6
(20) NW Sammamish Rd / 17th Ave NW (SR 900)	E	**F**	**84.9**	**F**	**91.2**	**F**	**94.0**	**F**	**106.7**	**F**	**95.9**	**F**	**100.7**
(21) SE 56th St / East Lake Sammamish Pkwy	D	**E**	**72.2**	**F**	**113.4**	**E**	**67.5**	**F**	**88.8**	**E**	**68.6**	**F**	**80.2**
(22) SE Issaquah-Fall City Rd / Issaquah-Pine Lake Rd SE	D	D	39.6	D	37.5	D	40.4	D	39.2	D	43.9	D	43.4
(23) SE Issaquah-Fall City Rd / East Lake Sammamish Pkwy	D	D	38.6	D	37.6	D	37.2	C	34.5	D	37.6	D	36.7

Table 8 (continued). Level of Service Summary – 2024 Conditions With- and Without-Project

	LOS Std [a]	Morning Peak Hour				Afternoon Peak Hour				Commuter PM Peak Hour			
		2024 w/o Project		2024 w/ Project		2024 w/o Project		2024 w/ Project		2024 w/o Project		2024 w/ Project	
		LOS [b]	Delay [c]	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
One-Way Stop Controlled [d]													
(8) SE 40th St / 228th Avenue SE *(overall)*	D	**E**	**37.5**	***F***	***>500***	B	12.3	**F**	**>500**	A	4.9	**F**	**>500**
Westbound movement		**F**	**360.7**	**F**	**>500**	**F**	**467.8**	**F**	**>500**	**F**	**179.5**	**F**	**>500**
Southbound left-turn		A	8.7	A	9.1	B	11.5	C	20.2	B	12.4	**F**	**92.0**
(16) SE 24th Wy / E Lake Sammamish Pkwy *(overall)*	C	*A*	*1.0*	*A*	*1.0*	*A*	*1.7*	*A*	*1.7*	*A*	*1.4*	*A*	*1.4*
Westbound movement		C	15.4	C	16.7	C	24.0	D	25.9	C	22.8	C	23.6
Southbound left-turn		A	8.4	A	8.5	A	9.0	A	9.3	A	9.6	A	9.7
All-Way Stop Controlled													
(15) SE 20th St / 212th Ave SE	C	C	18.9	C	16.4	B	14.7	B	13.8	C	16.0	B	14.9
Roundabout-Controlled													
(10) SE 32nd Way / Issaquah-Pine Lake Rd SE	D	C	26.4	C	24.2	D	42.7	D	36.9	D	49.9	D	44.8
(18) SE 43rd Way / East Lake Sammamish Pkwy	D	B	17.0	**E**	**55.2**	B	10.9	B	18.0	B	15.4	C	23.2

Source: Heffron Transportation, July 2020

a. Sources: Sammamish Comprehensive Plan (2018) for Intersections 1 through 17; Issaquah Comprehensive Plan (2019) for Intersections 18 through 23.

b. LOS = Level of Service

c. Delay = average delay in seconds per vehicle

d. For the one-way stop-controlled intersections, minor leg LOS reported for the worst stop-controlled approach.

Grey-shaded cells indicate LOS standard is exceeded under future conditions without the project.

Green-shaded cells indicate LOS standard is exceeded under future conditions with the project, but unchanged or improved compared to without-project conditions.

Red-shaded cells indicate project would cause LOS to exceed standard, or add delay where LOS standard is exceeded without the project.

4.4. Traffic Operations Near Site

Detailed traffic operations and sensitivity analysis was performed for the 228th Avenue SE/SE 43rd Way corridor from north of SE 40th Street to south of Providence Point Drive SE. This analysis was performed to determine the optimal lane configuration and intersection traffic control for the Site Access driveway and SE 40th Street intersections. For all of these analyses, the intersection at SE 43rd Way / Providence Point Drive SE was assumed to be signalized. Two growth scenarios were evaluated:

- **Low Growth** – Which assumes a 1.5% per year background growth rate plus pipeline projects described previously in Section 3.3.2; and
- **High Growth** – Which assumes a 4.0% per year background growth rate plus pipeline 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 configuration would be to further increases in traffic. Trips generated by the schools would be the same for each of these conditions, are previously described in Section 4.1. Traffic volumes for the two growth conditions are shown on **Figure 9.**

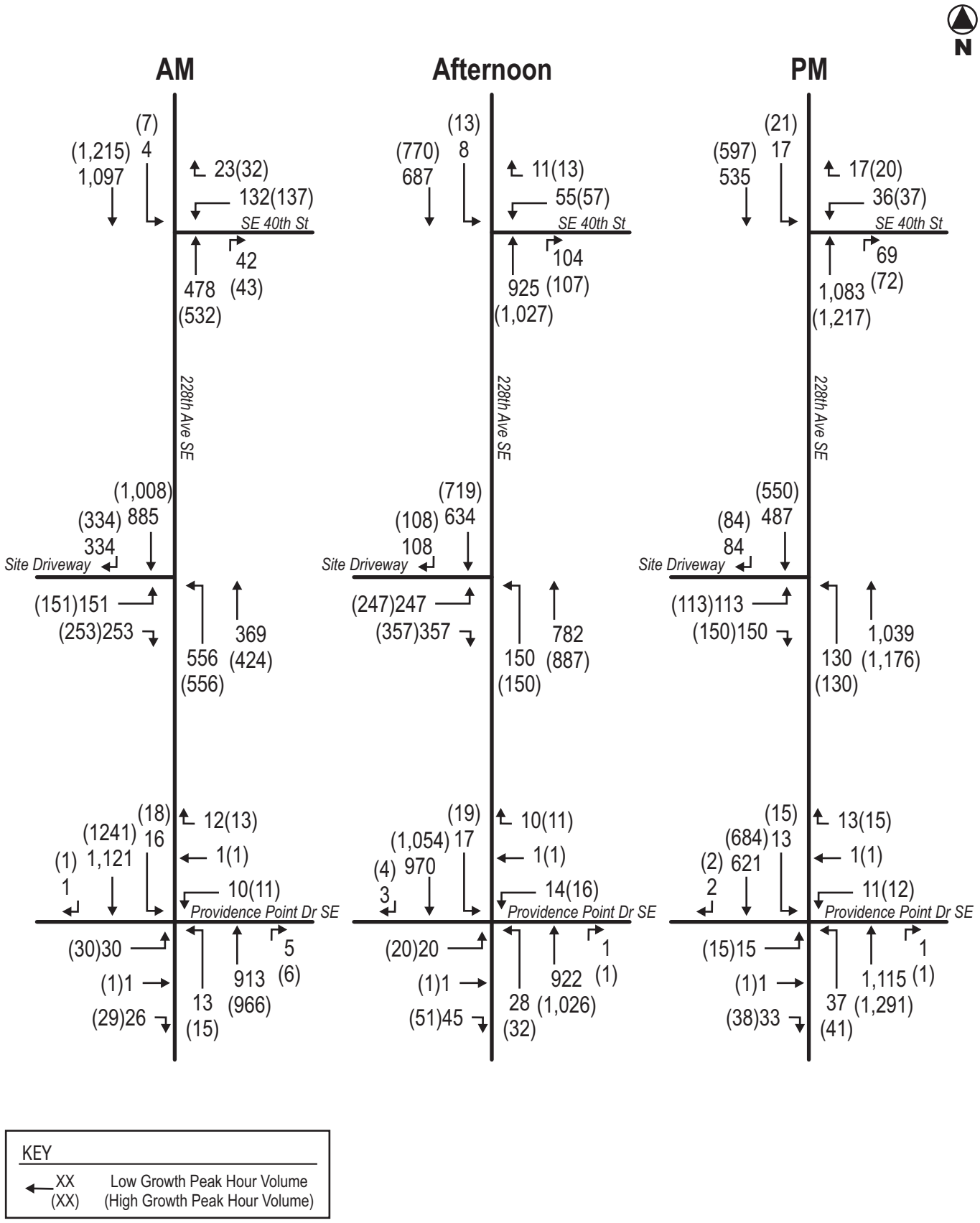
The high school is expected to generate 28 bus trips during the morning and afternoon peak hour (14 buses in and 14 buses out); however, for the purpose of analysis, the high school's bus loading zone capacity of 23 buses was assumed for analysis with a total of 46 buses (23 buses in and 23 buses out). These are expected to distribute to the roadway 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 a heavy vehicle percentage with acceleration characteristics for a bus.

4.4.1. Main Site Access Driveway

Detailed traffic operations analysis was performed to support design of the site driveway on 228th Avenue SE. First, analysis was conducted to determine whether a signal would be warranted at the driveway, and then to determine the optimal lane configuration and operation.

A roundabout at this intersection was considered but found to be infeasible due to the grade of the roadway. The WSDOT *Design Manual*[27] section on Roundabouts states that, "*The circulatory roadway grade value should not exceed 4%. Terrain may require benching the roundabout to fit conditions."* The grade of 228th Avenue SE along the site frontage is 11%, which would greatly exceed WSDOT's guidance. Therefore, a very large bench would need to be created to accommodate the inscribed roundabout about 150-feet in diameter plus additional width for the circulating lanes and bike lanes. In addition to the physical constraints, a roundabout at the Site Access intersection would also operate at a worse level of service than a traffic signal, particularly for through traffic movements on 228th Avenue SE. The roundabout would give priority to movements entering and exiting the school because they would enter the roundabout before opposing through traffic. For example, during the AM peak hour, northbound traffic on 228th Avenue SE wanting to turn "left" into the school site would need to make a three-quarter turn around the roundabout. Southbound through and right turn traffic on 228th Avenue SE would need to yield to those vehicles. Likewise, in the afternoon, traffic exiting the site and making a left turn onto northbound 228th Avenue SE would enter the roundabout in advance of the higher-volume northbound through movement. Detailed analysis of a potential roundabout was presented in a separate memorandum: *Feasibility of Roundabout for 228th Intersection.*[28]

[27] Washington State Department of Transportation, September 2020.
[28] AHBL, January 5, 2021.



Issaquah School District
High School #4 / Elementary School #17

Figure 9
Forecast 2024 With Project Traffic Volumes on 228th Ave SE / SE 43rd Way Near Site

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Signal Warrant Analysis

Traffic signal warrant analysis was performed according to guidelines published in the *Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways.*[29] Hourly traffic volumes for a full day, needed to complete the signal warrant analysis, were estimated as follows.

1. Background volumes on 228th Avenue SE were assumed to reflect an hourly profile similar to the City's 24-hour traffic count conducted to the south of SE 32nd Street in May 2019, but factored up to reflect the 2024-without-project volumes as described above.
2. Volumes generated by Elementary School #17 were assumed to reflect an hourly profile similar to that of Sunny Hills Elementary, based upon 24-hour counts conducted at the Sunny Hills Elementary driveways on Tuesday, October 1, and Thursday, October 3, 2019.
3. Volumes generated by High School #4 were assumed to reflect an hourly profile similar to that of Skyline High School, based upon 24-hour counts conducted at the Skyline High School driveways on Tuesday, October 1, and Thursday, October 3, 2019.
4. The combined school-generated trips were added to the 2024-without-project background traffic volumes to estimate total future volumes with the project.

The MUTCD states, "*A traffic control signal should not be installed unless one or more of the factors described in this section are met.*" The nine warrants for traffic signal installation are listed as follows:

- Warrant 1 – Eight-Hour Vehicular Volume (minimum volumes over eight hours)
- Warrant 2 – Four-Hour Vehicular Volume (minimum volumes over four hours)
- Warrant 3 – Peak Hour (minimum volume over a one-hour period)
- Warrant 4 – Pedestrian Volume
- Warrant 5 – School Crossing (adequacy of gaps near school crossing location)
- Warrant 6 – Coordinated Signal System (platooning for one-way or two-way streets)
- Warrant 7 – Crash Experience (number and type of accidents)
- Warrant 8 – Roadway Network (for organized traffic flow networks)
- Warrant 9 – Intersection Near a Grade Crossing

If the posted speed limit or the 85th-percentile speed on the major street exceeds 40 mph, the MUTCD allows a "70% factor" to be applied to Warrants 1 through 3, which reduces the warrant thresholds to 70% of the volumes that are otherwise applied to an intersection. The posted speed limit on 228th Avenue SE is 40 mph, which is at but does not exceed this threshold. Determination of the 85th-percentile speed can be made through speed measurements; but were not provided by the City. To provide a conservative analysis of the above warrants, the unadjusted thresholds were applied.

The volumes used to assess the three warrants for 2024-with-project conditions are summarized in **Table 9**. As shown, Warrants 1B, 2, and 3 are expected to be met for conditions with the project. These warrant triggers would be met for either the low-growth or high-growth conditions for through traffic on 228th Avenue SE. Additionally, it is likely that with the high peak hour volumes through the intersection, the requirements for Warrant 5 (school crossing) could also be met. These results indicate that expected traffic conditions with the project would meet the MUTCD warrants for installation of a traffic signal. If a speed study

[29] US Department of Transportation, Federal Highway Administration, 2009.

determined that application of the 70% threshold were appropriate, a greater number of hours would meet the warrant conditions, but would not change the overall conclusion since warrants are expected to be met at the unadjusted thresholds.

Based upon the results of the signal warrant analysis, installation of a traffic signal at the 228th Avenue SE / Site Access driveway is recommended and has been incorporated into the proposal. The operational effects of the project with this recommended access configuration are described in the following section.

Table 9. Signal Warrant Analysis Summary – 2024 Conditions With Project

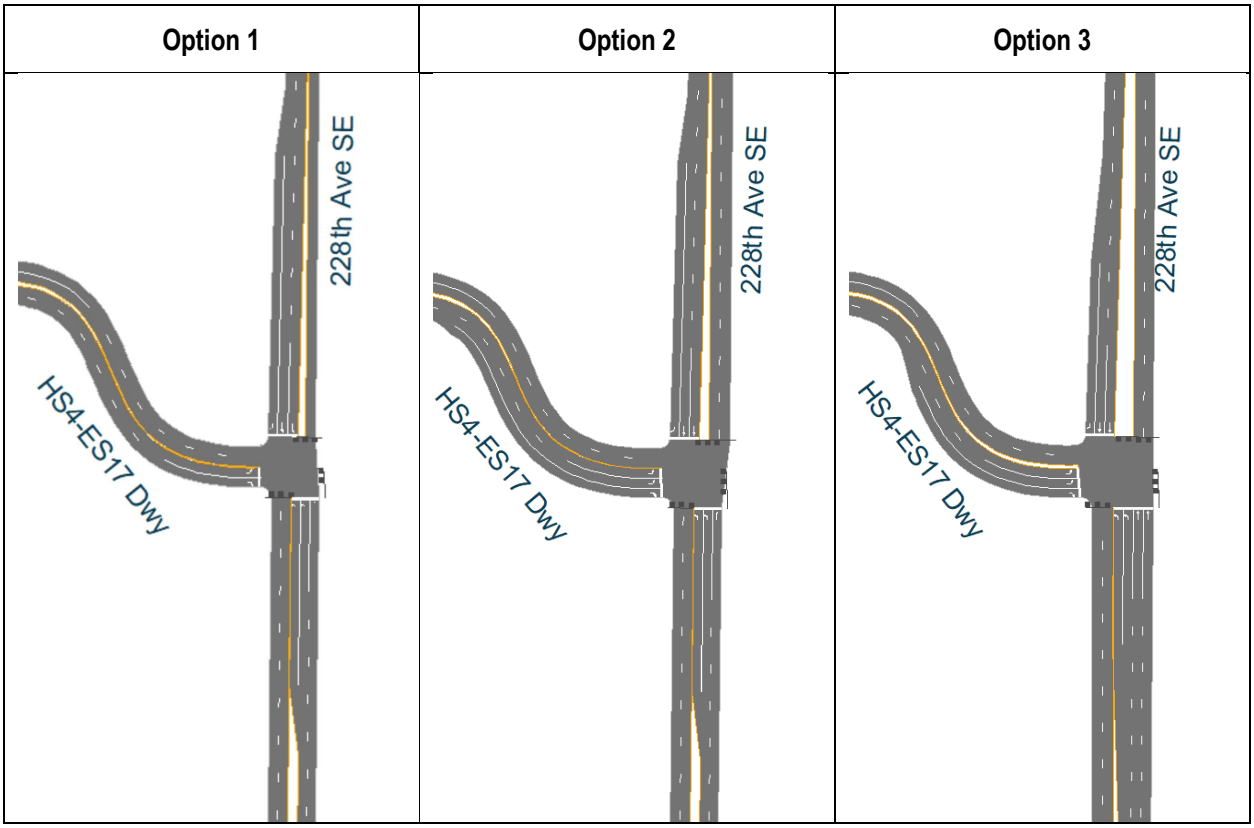
Hour Beginning	Major Street Volume (both directions) [a]	Minor Street Volume [a]	Vehicle Volume Warrant Requirements Met?			
	228th Avenue SE	HS 4 / ES 17 Driveway	1A	1B	2	3
12:00 A.M.	58	1	N	N	N	N
1:00 A.M.	29	0	N	N	N	N
2:00 A.M.	16	0	N	N	N	N
3:00 A.M.	39	1	N	N	N	N
4:00 A.M.	119	1	N	N	N	N
5:00 A.M.	323	2	N	N	N	N
6:00 A.M.	982	12	N	N	N	N
7:00 A.M.	2,381	268	**Y**	**Y**	**Y**	**Y**
8:00 A.M.	1,963	292	**Y**	**Y**	**Y**	**Y**
9:00 A.M.	1,686	156	N	**Y**	**Y**	N
10:00 A.M.	1,136	78	N	N	N	N
11:00 A.M.	1,180	92	N	N	N	N
12:00 P.M.	1,237	70	N	N	N	N
1:00 P.M.	1,274	74	N	N	N	N
2:00 P.M.	1,430	139	N	**Y**	**Y**	N
3:00 P.M.	1,921	604	**Y**	**Y**	**Y**	**Y**
4:00 P.M.	1,924	272	**Y**	**Y**	**Y**	**Y**
5:00 P.M.	1,965	247	**Y**	**Y**	**Y**	**Y**
6:00 P.M.	1,753	111	N	**Y**	N	N
7:00 P.M.	1,152	65	N	N	N	N
8:00 P.M.	816	128	N	N	N	N
9:00 P.M.	600	147	N	N	N	N
10:00 P.M.	284	10	N	N	N	N
11:00 P.M.	164	5	N	N	N	N
		Hours Met?	5	8	7	5
		Hours Required	8	8	4	1
		Warrant Met?	**No**	**Yes**	**Yes**	**Yes**

Source: Heffron Transportation, Inc., June 2020, using warrants and thresholds from the MUTCD, US Department of Transportation, Federal Highway Administration, 2009. Through traffic volumes on 228th Avenue SE assume a high-growth scenario with 4% per year background growth.

Intersection Configuration and Operating Parameters

Three alternative configuration options of the Site Access driveway were evaluated and are shown on **Figure 10**. For all three conditions, the intersection was assumed to be signalized, with signalized pedestrian crosswalks across the north leg of 228th Avenue SE and the site driveway (west leg). All options would have a double northbound left turn lane to enter the site, as well as two southbound through lanes on 228th Avenue SE and a right-turn lane to enter the site. The options would differ with the number of lanes on northbound 228th Avenue SE and the site driveway. Option 1 would have two eastbound (egress) lanes on the site driveway (one left turn lane and one right turn lane), and would only have one northbound thru lane on 228th Avenue SE. Option 2 would have a second left turn lane on the site driveway and would need two northbound departure lanes, but would only have one northbound thru lane approaching the intersection. Option 3 would be similar to Option 2 but with two northbound thru lanes.

Figure 10. Site Access Driveway Configuration Options



Source: Heffron Transportation, Inc., February 2020.

Site Access Intersection Operations

Levels of service for the Site Access intersection were first evaluated using the Synchro methodologies described in Section 3.4. With the proposed configuration that would provide three or more lanes on each approach, the City of Sammamish operational standard is LOS E.

Table 10 summarizes forecast 2024 levels of service for the three peak hour conditions with the proposed project, with each configuration option and the two growth scenarios. The level-of-service reports are provided in **Appendix H**.

Table 10. Level of Service at 228th Ave SE / Site Access Driveway – 2024 With Project

	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 [a]	Delay [b]	LOS	Delay	LOS	Delay
LOW-GROWTH SCENARIO (1.5% background growth per year)						
Lane Configuration Option 1 (1 NB Thru Lane on 228th Ave SE and Single Left Turn Lane Exiting Site)						
Overall Intersection	C	28.4	C	22.8	B	16.1
Worst Movement [c]	E	57.7	D	45.4	E	60.1
Lane Configuration Option 2 (1 NB Thru Lane on 228th Ave SE and Double Left Turn Lanes Exiting Site)						
Overall Intersection	C	25.0	B	17.9	B	14.5
Worst Movement [c]	D	48.2	C	32.8	D	44.5
Lane Configuration Option 3 (2 NB Thru Lane on 228th Ave SE and Double Left Turn Lanes Exiting Site)						
Overall Intersection	C	24.5	B	16.0	A	9.5
Worst Movement [c]	D	48.0	C	32.7	D	42.0
HIGH-GROWTH SCENARIO (4% background growth per year)						
Lane Configuration Option 1 (1 NB Thru Lane on 228th Ave SE and Single Left Turn Lane Exiting Site)						
Overall Intersection	C	30.1	C	24.8	C	20.5
Worst Movement [c]	E	63.9	D	48.0	E	74.1
Lane Configuration Option 2 (1 NB Thru Lane on 228th Ave SE and Double Left Turn Lanes Exiting Site)						
Overall Intersection	C	26.1	B	19.4	B	17.3
Worst Movement [c]	D	48.3	C	35.0	D	52.3
Lane Configuration Option 3 (2 NB Thru Lane on 228th Ave SE and Double Left Turn Lanes Exiting Site)						
Overall Intersection	C	25.5	B	18.2	A	9.8
Worst Movement [c]	D	48.2	C	34.8	D	53.8

Source: Heffron Transportation, Inc., February 2020.

a. LOS = Level of service.

b. Delay = Average seconds of delay per vehicle.

c. Worst movement for all conditions is the eastbound left turn exiting the site driveway.

The analysis shows that the site driveway intersection would operate at an acceptable level of service with all three of the lane-configuration options under either growth scenario. The configuration with the fewest lanes—Option 1—would operate at LOS C during all three time periods, even if through traffic on 228th Avenue SE were to grow at 4% per year. The additional lanes on the site driveway provided with Option 2 would reduce overall delay by 3 to 5 seconds per vehicle during each of the time period. The additional northbound thru lane with Option 3 would further reduce delay, particularly during the PM peak hour when northbound flow is the highest. The Option 3 configuration would operate at LOS B during the afternoon peak hour and at LOS A during the commuter PM peak hour.

For all design options and all time periods and condition, the worst-operating movement would be the eastbound left turn exiting the site. Even with the higher growth scenario, this movement would operate at LOS E with the limited egress lanes provided by Option 1 during both the AM peak hour and commuter

PM peak hour. With additional lanes provided by Option 2 and Option 3, the eastbound left turn movement would operate at LOS D or better during all time periods.

It is important to note that the operations summarized in **Table 10** reflect conditions for the most congested portion of the peak hour. For the morning and afternoon peak hours, since they coincide primarily with the high school arrival and dismissal periods, the most congested conditions typically occur over a 20- to 30-minute period within the peak hour. During the remainder of the morning and afternoon peak hours, and during the other non-peak hours of the day and on weekends, traffic operation would be better than the worst-case conditions summarized in the table.

Peak Queuing Conditions with Configuration Options

Vehicle queuing at the approaches of the 228th Avenue SE / Site Access driveway intersection was evaluated using the *SimTraffic* microsimulation software. Conditions were modeled applying the forecast with-project traffic volumes for the three peak hour conditions. **Table 11** summarizes the forecast peak queuing conditions with each configuration option. Peak hour queuing summary reports, based upon the average of six model runs for each analysis period, are provided in **Appendix H**.

The queuing analysis determined that storage lengths needed to accommodate the 95th-percentile queue (meaning that the queue would be at that length, or shorter, 95% of the time) would be about 210 feet for the southbound right-turn movement, and 300 feet for the eastbound right-turn movement. The reported queue lengths for the northbound left-turn represent the queues in the outside of the two left turn lanes.

Table 11. Peak Queuing Conditions Site Access Driveway – 2024 With Project

Storage Lane	Lane Configuration Option 1 (1 NB Thru Lane on 228th Ave + Single Left from Site Driveway)		Lane Configuration Option 2 (1 NB Thru Lane on 228th Ave Double Left from Site Driveway)		Lane Configuration Option 3 (2 NB Thru Lane on 228th Ave Double Left from Site Driveway)	
	Average Queue	95th Percentile Queue	Average Queue	95th Percentile Queue	Average Queue	95th Percentile Queue
LOW-GROWTH SCENARIO (1.5% background growth per year)						
Northbound Left-turn [a]	144 feet	255 feet	147 feet	261 feet	142 feet	236 feet
Southbound Right-Turn [a]	95 feet	204 feet	92 feet	194 feet	97 feet	216 feet
Eastbound Right-Turn [b]	163 feet	269 feet	133 feet	239 feet	127 feet	228 feet
Eastbound Left-Turn [b]	125 feet	220 feet	63 feet	154 feet	64 feet	180 feet
HIGH-GROWTH SCENARIO (4.0% background growth per year)						
Northbound Left-turn [a]	151 feet	275 feet	139 feet	245 feet	145 feet	255 feet
Southbound Right-Turn [a]	97 feet	209 feet	97 feet	212 feet	96 feet	217 feet
Eastbound Right-Turn [b]	162 feet	272 feet	152 feet	283 feet	161 feet	260 feet
Eastbound Left-Turn [b]	147 feet	247 feet	69 feet	190 feet	99 feet	249 feet

Source: Heffron Transportation, Inc., February 2020. Queues determined using average of six SimTraffic simulation runs.

a. Based on peak queuing condition, which occurs during the morning peak hour. The queue in the northbound left turn lane reflects the queue in the outside lane.

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

Recommended Site Driveway Configuration

The site driveway is proposed to be constructed with the Option 3 Lane Configuration. The analysis shows that this configuration would operate at acceptable levels of service during the three peak hour periods even if growth on 228th Avenue SE increases at 4% per year. This configuration provides resilience to accommodate potential fluctuations in growth. The length of auxiliary turn lanes will be designed to accommodate the 95th-percentile queue lengths. The recommended configuration should include the following elements:

- **228th Avenue SE: South Leg** – Provide four northbound approach lanes (two left turn lanes and two through lanes) and two southbound (departure) lanes. The lanes in the northbound direction should have a 100-foot inside left turn pocket and a 255-foot minimum outside left turn lane. The outside left turn lane would transition to become the center two-way-left-turn-lane further south.
- **228th Avenue SE: North Leg** – Provide three southbound (approach) lanes (two through lanes plus a right-turn lane with at least 235 feet of storage) and two northbound (departure) lanes.

- **Site Access Driveway:** West Leg – Provide three eastbound (approach) lanes (two left turn lanes and one right turn lane) plus two westbound (departure) lanes.
- **Pedestrian Crosswalks and Phases** – Crosswalks with pedestrian signals would be provided across the east and north intersection legs. North-south pedestrian crossing of the east leg would occur with the southbound through phase (right-turning motorists would need to yield to crossing pedestrians). East-west pedestrian crossings of the north leg would occur with the eastbound phase, and could also overlap with the northbound left turn movement.

The SimTraffic analysis performed for the recommended configuration determined that the overall intersection would operate at LOS B during all three time periods even under the High-Growth Scenario.

4.4.2. Secondary Access Driveway

A secondary access point is proposed to be located near the west edge of the site, and would be limited to emergency vehicle access only. Given its location on an 11% grade, and proximity to on-site functions, it may be feasible to allow high school buses to use this driveway with right-in/right-out only movements. Elementary school buses could not be directed to this driveway because it would result in buses arriving with access doors on the wrong side of the elementary school bus loading zone, and there is nowhere beyond the bus zone where a bus could turn around on site.

Allowing high school buses to access the site at this location would not improve operations at the main Site Access. Southbound buses arriving from the Plateau would become through movements at the main Site Access driveway instead of right turn movements. While exiting buses destined down the hill could avoid the main site driveway, those right turn movements are not a critical movement at main Site Access intersection so removing the buses from the main driveway would not benefit traffic operations. For these reasons, it is recommended that the secondary access remain gated for emergency use only and to prevent its use by unauthorized vehicles.

4.4.3. SE 40th Street/228th Avenue SE Intersection

This intersection is currently controlled with a stop-sign on SE 40th Street. There is a center turn lane on 228th Avenue SE to accommodate southbound left turn movements; however, the wide center median on SE 40th Street may affect operations since motorists making a southbound left turn may enter this lane later than at a typical T-intersection.

The off-site intersection analysis determined that westbound left turns from SE 40th Street currently operate at LOS E during the afternoon peak hour. These left turns are expected to operate at LOS F in the year 2024 during all peak hours without the proposed school project. This poor operation is expected with either of the growth conditions described above. The proposed schools would add substantial delay to the intersection, particularly during the AM peak hour when southbound volumes on 228th Avenue SE are highest.

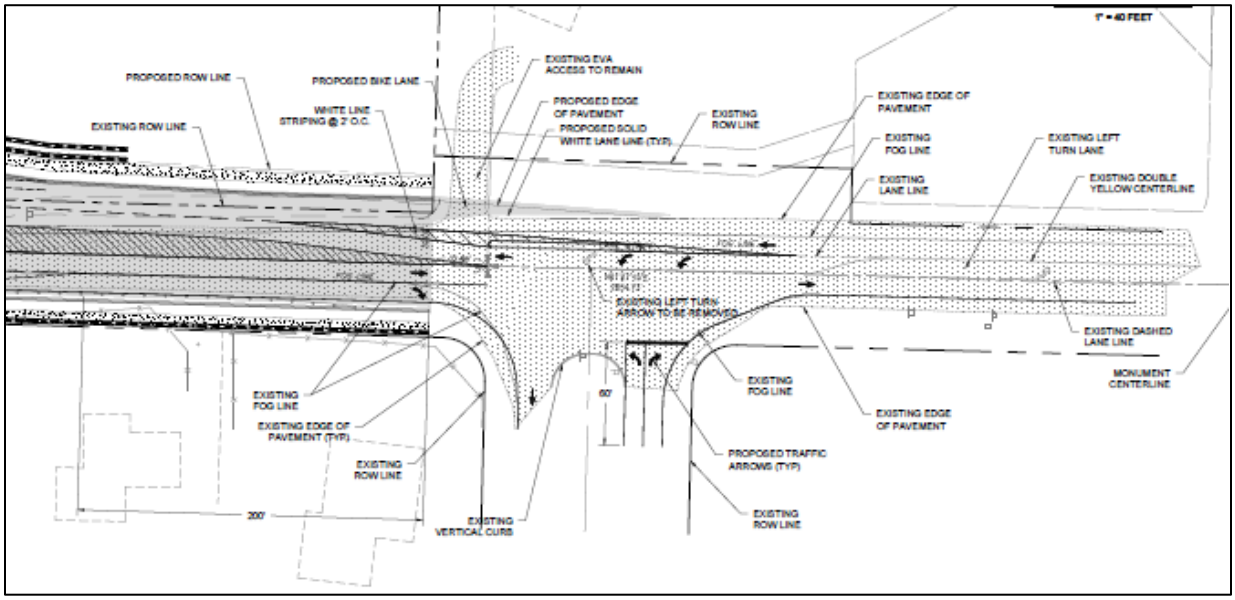
The original Transportation Impact Analysis suggested that this intersection be signalized. With the current geometry, a signalized intersection could operate at LOS C or better during the peak hours. However, a signal could also attract cut-through traffic to SE 40th Street, and is not desired by the City of Sammamish. Sensitivity analysis was therefore performed for an alternative configuration, referred as a "Flying T" intersection, which is described below.

Figure 11 shows a conceptual diagram of a Flying T configuration at the SE 40th Street/228th Avenue SE intersection. This configuration would utilize a raised center median and striping to physically separate the southbound through traffic from the other movements at the intersection. With this change, motorists

turning left from SE 40th Street would not conflict with southbound through traffic. The proposed signal at the Site Access driveway would increase gaps in the northbound traffic stream at SE 40th Street. Together, these measures would improve the westbound left turn movement to better than the level of service without the project. Under the Low-Growth Scenario anticipated by City of Sammamish staff, the westbound left turn movement would operate at LOS B during the AM peak hour, at LOS E during the afternoon peak hour, and at LOS D during the commuter PM peak hour. Additional traffic under the High-Growth Scenario would return the westbound left turn movement to LOS F during the commuter PM peak hour but it would it would still operate better than it would under the without-project conditions. Analysis results are presented in **Table 12** and **Appendix H.**

The above analysis does show that the Flying T configuration and site driveway improvements would mitigate the project's impacts to the SE 40th Street/228th Avenue SE intersection. If growth were to occur at the higher rate, the City of Sammamish could choose to signalize the intersection in the future to improve operations.

Figure 11. Improvement Option for 228th Avenue SE/SE 40 Street Intersection – Flying T



Source: AHBL, February 2021.

Table 12. Level of Service at 228th Avenue SE / SE 40th Street Intersection – Year 2024

	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 [a]	Delay [b]	LOS	Delay	LOS	Delay
LOW-GROWTH SCENARIO (1.5% background growth per year)						
Without Project, With Existing Configuration						
Overall Intersection	B	13.8	A	5.2	A	2.4
Worst Approach [c]	F	132.1	F	191.5	F	83.5
With Project, With Existing Configuration [e]						
Overall Intersection	F	>500	F	>500	F	>500
Worst Approach [c]	F	>500	F	>500	F	>500
With Project, With Flying T Configuration						
Overall Intersection	A	4.1	A	3.5	A	1.5
Worst Movement [d]	B	13.8	E	35.9	D	33.6
HIGH-GROWTH SCENARIO (4.0% background growth per year)						
Without Project, With Existing Configuration						
Overall Intersection	E	37.5	B	12.3	A	4.9
Worst Approach [c]	F	360.7	F	467.8	F	179.5
With Project, With Existing Configuration [e]						
Overall Intersection	F	>500	F	>500	F	>500
Worst Approach [c]	F	>500	F	>500	F	>500
With Project, With Flying T Configuration						
Overall Intersection	A	4.5	A	3.8	A	5.4
Worst Movement [d]	C	15.3	E	40.5	F	135.8

Source: Heffron Transportation, Inc., November 2020. Intersection operations determined using the Synchro analysis software.

a. LOS = Level of service.

b. Delay = Average seconds of delay per vehicle.

c. Worst movement for all conditions is the westbound left turn exiting SE 40th Street.

d. Some of the movements would improve with the project and without any improvements because of the upstream signal that the project would construct at the 228th Avenue SE/Site Driveway intersection. This signal would platoon northbound traffic and create longer gaps to accommodate side-street turn movements.

4.5. On-Site Circulation

4.5.1. Vehicles and Buses

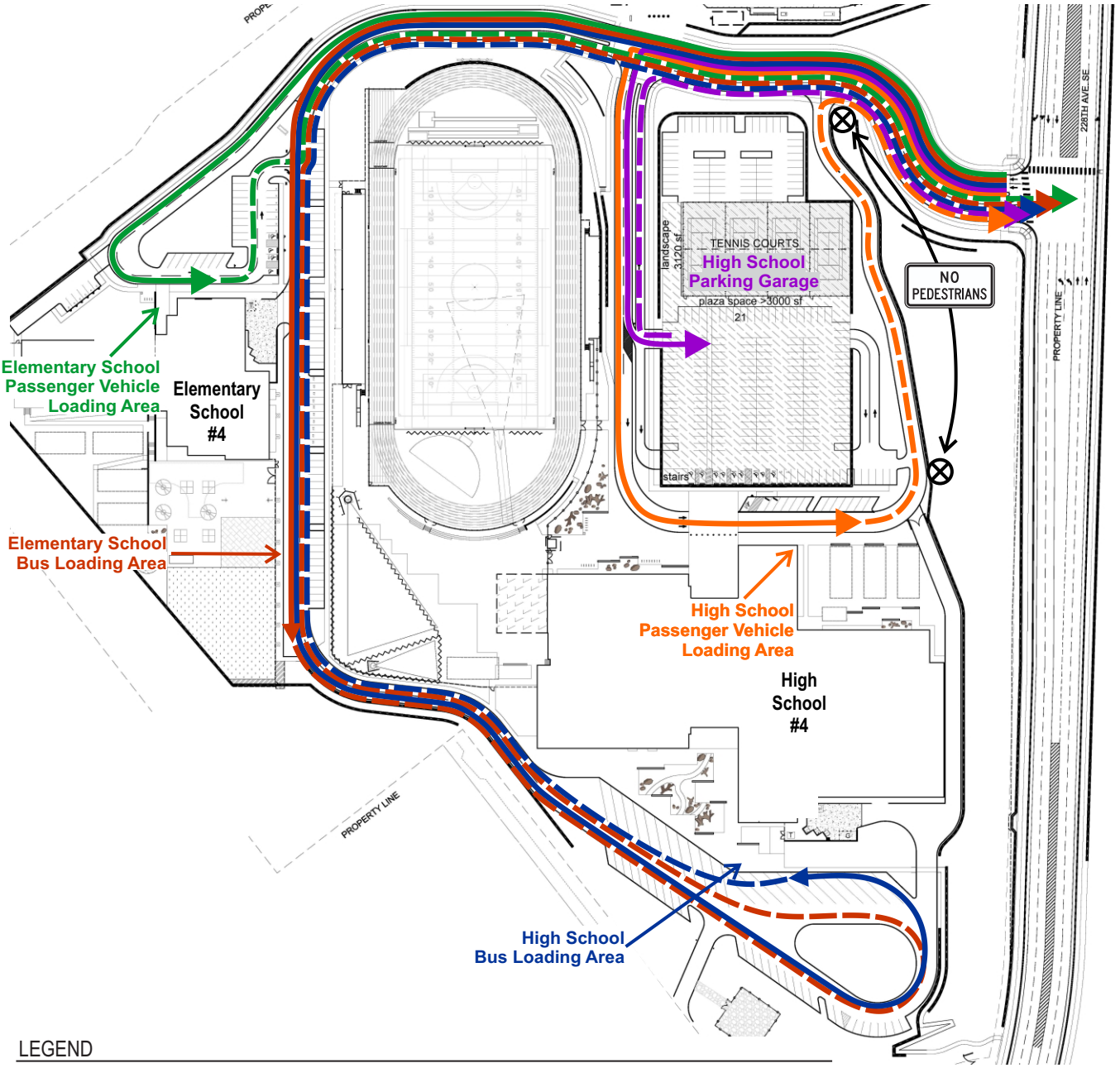
The proposed site layout was evaluated to determine each school's capacity to accommodate student loading and queuing. School hours for the elementary and high school would be offset. Based upon typical schedules for ISD elementary and high schools, the morning start time for Elementary School #17 (9:15 A.M.) would occur 75 minutes after the start time for High School #4 (8:00 A.M.). The afternoon dismissal for Elementary School #17 (3:40 P.M.) would occur 45 minutes after the dismissal time for High School #4 (2:55 P.M.). On Wednesdays when both schools would have reduced schedules, comparable separation would occur with the school day occurring from 9:15 A.M. to 1:30 P.M. for Elementary School #17, and 10:10 A.M. to 3:45 P.M. for High School #4.

Figure 12 shows the proposed parking and loading areas at the project site, as well as vehicle routes to and from those areas. The internal circulation road would have two through lanes in each direction between 228th Avenue SE and the high school parking garage/ passenger loading area access road. To the west of that intersection, the main access road would have two westbound lanes inbound to the elementary school, and one lane outbound. There would also be a two-lane access road to and from the bus loading area and some on-site parking along the east side of the elementary school and south side of the high school. Although the bus staging would occur in separate areas for each school, all school buses would use the loop located to the south of the high school to turn around prior to exiting the site.

The proposed internal lane configuration, combined with separation of loading and major parking activity, would minimize the potential for internal vehicle conflicts on site. The primary location where conflicts could occur is the intersection of the main access road with the high school parking garage/ passenger loading area access road. However, when westbound left-turns (toward the high school and parking garage) would be highest, there would be a low volume of opposing traffic (from the elementary school, bus loop, and parking west of the athletic facilities). The proposed site design would separate circulation of buses and vehicles generated by each school, so that maximum queuing conditions at one school would not impede vehicles or buses traveling to or from the other school.

4.5.2. Pedestrian Circulation

Pedestrian access to the site would be provided at the main access driveway as well as at the southeast corner of the site where an ADA-accessible path would be created on the slope between 228th Avenue SE and the edge of the bus turnaround loop. Pedestrians walkways and crosswalks would be provided along both sides of the main access drive with crossings of the drive provided at 228th Avenue SE (signalized crosswalk) and west of the high school access drive. There would be no pedestrian facility along the high school drop-off egress drive located east of the parking garage. Signs that state "No Pedestrians" should be posted at each end of that drive. The internal pedestrian access routes are shown on **Figure 13**.



LEGEND

Vehicle Activity	Inbound Route	Outbound Route
Elementary School Passenger Vehicle Drop-off / Pick-up	←	→
Elementary School Bus Drop-off / Pick-up	←	→
High School Parking	←	→
High School Passenger Vehicle Drop-off / Pick-up	←	→
High School Bus Drop-off / Pick-up	←	→

High School #4
Elementary #17

Figure 12

Proposed On-Site Vehicle Circulation

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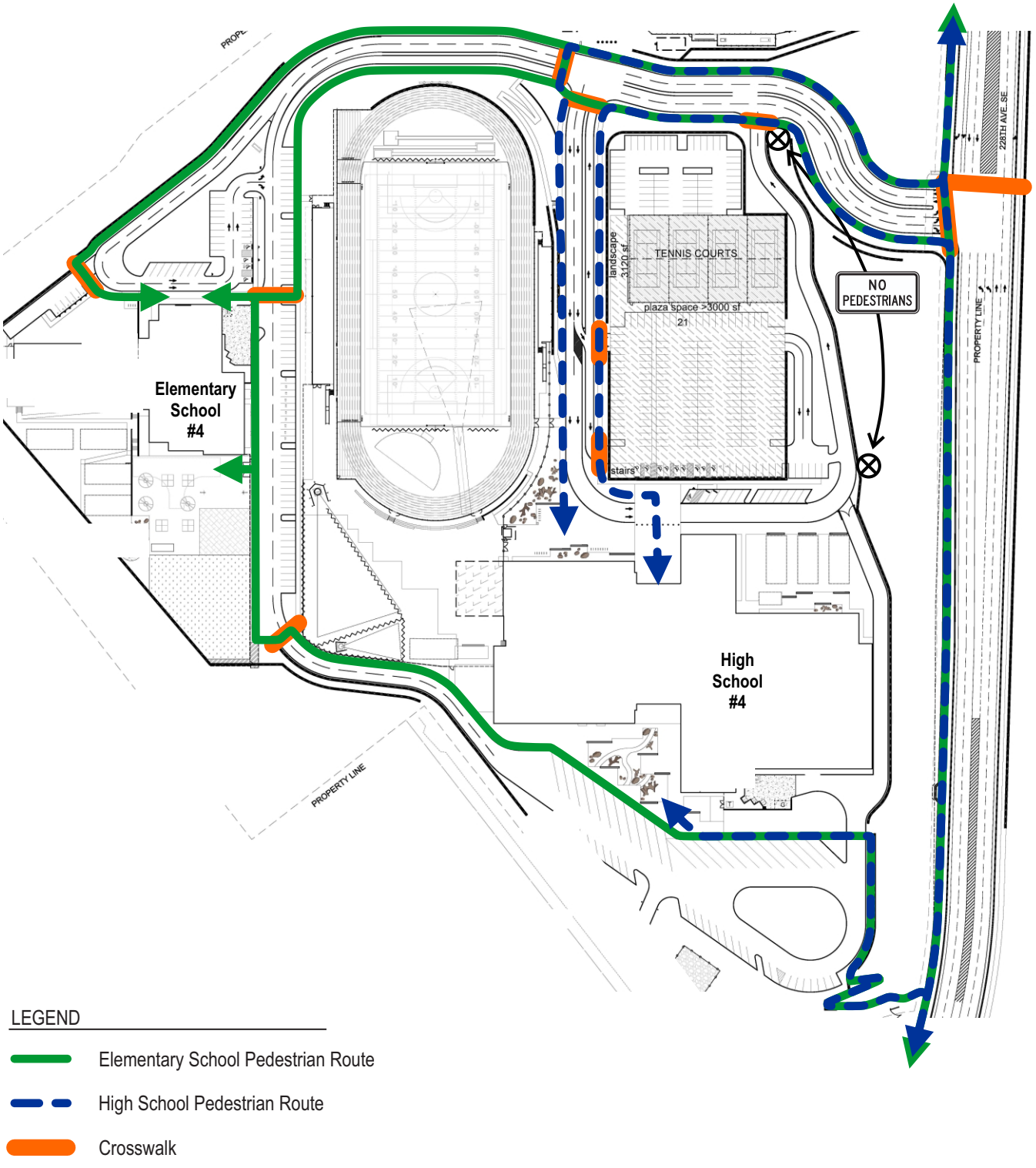

High School #4
Elementary #17

Figure 13

Proposed On-Site Pedestrian Routes

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4.5.3. On-Site Traffic Operations

The on-site vehicular circulation operations along the main access road were evaluated using SimTraffic, a micro-simulation companion to Synchro. This analysis evaluated the peak one-hour period using estimated traffic volumes by 15-minute period. During this time, most of the traffic would be generated by the high school. Vehicle turning patterns and internal pedestrian crossings were input into the model based on the patterns described above. The recommended configuration and signal operating parameters for the 228th Avenue SE/Site Access intersection were coded into the model. It determined that during the morning and afternoon peak periods when school traffic is the highest, all internal intersections are forecast to operate at LOS A. Some short-term queuing would occur on the egress drives that connect from the high school garage and pick-up area in the afternoon, but these would clear quickly. The 95th-percentile queues were estimated to be 100 feet or less during the peak egress period in the afternoon. In the morning, traffic entering the site and then turning left to the garage/drop-off loop could also queue, but the 95th-percentile queue would not reach 228th Avenue SE. Results are presented in **Appendix I.**

4.6. On-Site Drop-off/Pick-Up Operations

When planning and designing new schools, a key aspect is accommodating passenger vehicle queues during morning arrival and afternoon dismissal. Peak on-site queues typically occur five to ten minutes before the school's afternoon dismissal as family drivers arrive and stage in the loading area or in parking stalls before the end-of-day bell. The dismissal-and-departure process typically extends for 20 to 25 minutes. Morning arrival queues and stacking tend to be smaller since the arrival process is typically more spread out over the 20 to 25 minutes before school starts, and drivers usually leave the site immediately after discharging their students. Due to the separation of the school schedules, combined with physical separation of their respective loading areas on the project site, queueing characteristics during the morning arrival period and afternoon dismissal period were considered separately.

The adequacy of each school's proposed loading area was evaluated using several tools and planning metrics, including:

- North Carolina Department of Transportation's (NCDOT) *School Calculator*,[30] which estimates the length of loading area based on student enrollment;
- *Retooling School Drop-off/Pick-up Zones to Meet Demand,*[31] which also estimates length of loading area based on student enrollment;
- Queue analysis for a multi-channel service system, which estimates queue based on arrival and service rates; and
- Queue observations from others schools in the Issaquah School District.

Two of these tools estimate loading length in feet, while the queue model estimates queue in number of vehicles. To compare these results, an average length of each vehicle in queue (from front bumper of vehicle to the front bumper of the following vehicle) was assumed to be 22 feet, which is consistent with estimates in the *School Calculator*.

Loading and queuing characteristics for the two schools are discussed in more detail in the following sections.

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30 North Carolina Department of Transportation, https://connect.ncdot.gov/municipalities/School/Pages/default.aspx, accessed November 23, 2020.

31 Keith B. Higgins, PE, TE – Hatch Mott MacDonald, *Retooling School Drop-off/Pick-up Zones to Meet Demand,* WesternITE Meeting Paper 9C, 2010.

4.6.1. Elementary School Queuing

The passenger vehicle loading area for Elementary School #17 would be located along the north side of the school building, and would have approximately 200 feet of loading length. The access street between the elementary school loading area and 228th Avenue SE would be about 1,500 feet in length. Assuming 22-foot vehicle spacing, the loading area adjacent to the school could accommodate 9 vehicles and the access road could accommodate another 68 vehicles. The school bus loading area is planning along the school's east side and would have over 400 feet of loading space, enough for 10 buses.

Morning Arrival

The morning arrival queue can be modeled directly using Poisson arrival methodologies for a multi-channel service system (i.e., the number of drop-off spaces that can be used simultaneously). Observations conducted by Heffron staff at other schools have found that it takes an average of about 15 to 30 seconds for students to exit a vehicle while at the drop-off space (most recently, observations conducted in Fall 2019 at Pacific Cascade Middle School found an average unload time of 26 seconds). Assuming that elementary school students would be at the higher end of this range, this equates to a service rate for each drop-off space of 2 vehicles per minute (or a rate of 120 vehicles per hour for each loading space). Field observation at existing schools indicates that most student drop-offs occur over about a 30-minute timespan. Based upon the arrival rates observed at Sunny Hills and Discovery Elementary Schools, it is estimated that of the 223 vehicles forecast to drop off students during the morning peak hour, 156 vehicles would arrive during the peak 30 minutes within the hour. This equates to an estimated arrival rate of 312 vehicles per hour. The proposed student loading area would have sufficient length for about 9vehicles to unload at a time. This information was entered into a queueing model (results provided in **Appendix I**), which projected an average queue of 3 vehicles and 95th-percentile queue of 5 vehicles. Therefore, the loading area in front of the school is expected to be sufficient to accommodate morning drop-off activities with little to no backup beyond the passenger vehicle loading area.

Afternoon Dismissal

Although the queue estimation model is reasonable for application to morning arrival queues, the afternoon queueing conditions are different. Parents arrive prior to school dismissal during a time when no vehicles are being loaded (or serviced). This causes vehicle queues to develop prior to the student dismissal. Field observation conducted by Heffron Transportation staff at other schools has found that the maximum afternoon queues occur just prior to dismissal, and typically dissipate in within 10 to 15 minutes after dismissal as students load into their vehicles.

The NCDOT *School Calculator* estimates that an elementary school with a capacity of 744 students would need about 1,230 feet of loading area on an average day and about 1,600 feet of loading area on a high demand day. The *School Calculator's* estimated afternoon peak hour trips during the high demand day are identical to the trips estimated for Elementary #17 during its peak hour. This includes the loading area needed for an estimated 10 buses. Excluding the bus loading need, the loading space would be with the guidance provided by other sources which ranges from 1.2 to 2.0 feet of loading area per student. [32] [33]The estimated loading need is also consistent with traffic counts and observations conducted at Sunny Hills and Discovery Elementary Schools, which adjusted for the proposed 744 student capacity, would estimate that 60 to 70 vehicles would arrive prior to afternoon dismissal, to wait to pick up students. At an average of 22-feet per vehicle, this would relate to an average queue of 1,540 feet, within the 1,700 feet available for the passenger vehicle queues. The proposed site configuration would be adequate to accommodate a queue of this size without affecting other on-site circulation functions.

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[32] Keith B. Higgins, PE, TE – Hatch Mott MacDonald, *Retooling School Drop-off/Pick-up Zones to Meet Demand,* WesternITE Meeting Paper 9C, 2010.

[34] Parking supply estimates provided by AHBL, February 16, 2021.

4.6.2. High School Queuing

The passenger vehicle loading area for High School #4 would be located along the north side of the school building. Approximately 300 feet in length, it would have capacity for simultaneous loading of about 14 vehicles. The access streets between the high school loading area and 228th Avenue SE would be about 1,310 feet in length, and could accommodate about 60 queued vehicles (assuming vehicles would be waiting in one lane). In the afternoon, vehicles could also pull into the parking garage to wait in available spaces. A separate bus loading area for the high school, located south of the school, would have angle loading for 23 buses.

Morning Arrival

Based upon the arrival rates observed at Skyline and Liberty Schools, it is estimated that of the 345 vehicles forecast to drop off students during the morning peak hour, 255 vehicles would arrive during the peak 30 minutes within the hour. This equates to an estimated arrival rate of 510 vehicles per hour. The proposed student loading area would have sufficient length for 13 vehicles to unload at a time. An average student unloading rate of 30 seconds per vehicle (equating to a service rate of 120 vehicles per hour) was assumed; which likely is conservatively high for high school students. This information was entered into a queueing model (results provided in **Appendix I**), which projected an average queue of 5 vehicles and 95th-percentile queue of 8 vehicles. Therefore, the high schools loading zone expected to be sufficient to accommodate morning drop-off activities with little to no backup beyond the passenger vehicle loading area.

Afternoon Dismissal

The NCDOT *School Calculator* estimates that a high school with a capacity of 1,823 students would need about 1,075 feet of loading area on an average day and about 1,400 feet of loading area on a high demand day, which includes space for an estimated 14 buses. The space needed for passenger vehicle pick up is estimated at 700 feet, which would be accommodate by the load zone and circulation drive. It is noted that proportionally, passenger pick up at the high school is much lower than for the elementary school because the majority of high school trips are made by student drivers or faculty who would be parked at the school during the day. Although not expected to be needed for loading, the high school would have an additional 1,310 feet of queue space along the entry drive lane as well as open parking stalls to accommodate afternoon pick up. The queue is not anticipated to extend to 228th Avenue NE.

4.7. Safety Analysis

Historical collision data presented previously in *Section 3.5* indicated no unusual safety patterns in the transportation study area. Transportation improvements constructed by the project would be built to meet design standards established by the City of Sammamish and would not result in adverse safety impacts.

A traffic signal at the 228th Avenue SE/Site Access intersection has been incorporated into the proposal to address traffic operational and queuing needs. Signals typically reduce the likelihood of angle collisions, which can be more severe in terms of injury and property damage, but can result in increased numbers of less-severe rear-end collections.

It is recommended that with the school project, ISD work with the City of Sammamish to implement a school zone speed limit on 228th Avenue SE adjacent to and approaching the site, as provided along 228th Avenue SE near other elementary schools. This would improve safety conditions for both vehicles and pedestrians in the vicinity of the school site.

4.8. Evaluation of Transit, Bicycle and Pedestrian Facilities

As described previously, the site is not directly served by public transit. The nearest transit stop is located approximately ¾-mile to the north on Issaquah-Pine Lake Road. However, the schools would be served by an estimated 30 yellow school buses.

228th Avenue SE currently has no pedestrian or bicycle facilities in the vicinity of the site. The project would provide substantial improvements that would enhance the pedestrian environment along the site frontage, which would be about 1,700 feet in length. Improvements would include construction of a new 6-foot-wide sidewalk and landscaping, and provision of signalized pedestrian crosswalks in the north-south and east-west directions at the Site Access driveway intersection. The project would also provide bike racks to accommodate 68 bicycles on the site. The project is not expected to result in adverse impacts to transit, bicycle or pedestrian facilities.

4.9. Parking Analysis

The following sections summarize parking analysis completed for the project, including estimates of parking demand on a typical school day and during special events, and assessment of potential parking impacts during each of these periods.

4.9.1. Parking Supply

The project would have 644 striped parking stalls and 33 bus stalls. An additional 91 vehicles could park in family vehicle and bus loading areas during off-peak periods, allowing up to 735 vehicles to be parked on site during special events. This exceeds the 667 parking stalls required by code.[34]

4.9.2. Parking Demand on Typical School Day

Future parking demand estimates were developed based on studies at similar elementary and high schools in the area and rates published by the Institute of Transportation Engineers (ITE) in the *Parking Generation Manual*.[35] School day parking counts were conducted on Tuesday, October 1, and Thursday, October 3, 2019, at two existing elementary schools (Discovery and Sunny Hills) and two existing high schools (Skyline and Liberty) in the Issaquah School District. The counts were conducted on days when school was in session between 10:00 A.M. and 2:00 P.M., the period in which peak daytime parking typically occurs for schools.[36] The counts include parking demand generated by employees, students, and visitors to the schools.

The results for the elementary schools are summarized in **Table 13**. As shown, the observed school day parking rates for both schools are in the range observed by ITE, but slightly lower than the average ITE rate.

[34] Parking supply estimates provided by AHBL, February 16, 2021.
[35] ITE, 5th Edition, January 2019.
[36] Ibid.

Table 13. School Day Parking Demand – ISD Elementary Schools

	Observed Parking Counts and Rates		ITE Rate for Elementary Schools (LU 520) [b]
	Discovery Elementary	Sunny Hills Elementary	
Parking Count, Tuesday, October 1, 2019	67	77	
Parking Count, Thursday, October 3, 2019	64	70	
Average Count	66	74	
Student Enrollment	666	795	
Parking Demand Rate (parked vehicles per student) [a]			
Average Rate	0.10	0.09	0.13
Observed Range of Rates	0.10 – 0.10	0.09 – 0.10	0.06 – 0.24

Source: Heffron Transportation, Inc., March 2020.

a. Rates were derived by dividing the observed parking counts by the student enrollment at the time of the counts.

b. ITE, Parking Generation, 5th Edition, January 2019.

The results for the high schools are summarized in **Table 14**. The counts include vehicles parked at the school sites, as well as those parked on street (at Liberty) or in off-site lots leased by ISD (at Skyline). As shown, the observed school day parking rates for both schools are within the range observed by ITE; the average rate for Liberty is the same as the average ITE rate and the average rate for Skyline is slightly higher.

Table 14. School Day Parking Demand – ISD High Schools

	Observed Parking Counts and Rates		ITE Rate for High Schools (LU 530) [b]
	Skyline High School	Liberty High School	
Parking Count, Tuesday, October 1, 2019	598	329	
Parking Count, Thursday, October 3, 2019	575	361	
Average Count	587	345	
Student Enrollment	2,003	1,316	
Parking Demand Rate (parked vehicles per student) [a]			
Average Rate	0.29	0.26	0.26
Observed Range of Rates	0.29 – 0.30	0.25 – 0.27	0.16 – 0.34

Source: Heffron Transportation, Inc., March 2020.

a. Rates were derived by dividing the observed parking counts by the student enrollment at the time of the counts.

b. ITE, Parking Generation, 5th Edition, January 2019.

The combined peak school day parking demand for the project was estimated by applying the highest rate between the observed data and average ITE rate, as presented in the tables above. For Elementary School #17, the average ITE rate of 0.13 parked vehicles per student was applied; this is higher than the observed parking rates at the ISD elementary schools. For High School #4, a rate of 0.30 vehicle was applied; this is the highest observed rate at the ISD high schools, and higher than the ITE average rate. The estimated parking demand for the HS #4 / ES #17 project is summarized in **Table 15**. As shown, the resulting combined estimated peak parking demand for both schools is 644 vehicles, which could be accommodated

with the planned supply. Any measures implemented by ISD to further encourage school-bus usage or carpooling would be expected to result in peak parking demand that is lower than this projected level.

Table 15. School Day Parking Demand for HS #4 / ES #17

School	Student Enrollment	Peak Parking Rate (parked vehicles / student)	Parking demand (parked vehicles)
Elementary #17	744	0.13 [a]	97
High School #4	1,823	0.30 [b]	547
Total Parking Demand			**644**

Source: Heffron Transportation, Inc., March 2020.

a. Source: ITE, Parking Generation Manual, 5th Edition, 2019.

b. Source: Based upon counts conducted at Skyline High School in October 2019.

4.9.3. Event Parking Demand

The highest parking demand for schools typically occurs during special events. Special events most often occur in the early evenings; however, some may occur on school days or on weekends.

The expected types, sizes, and frequencies of events for each school were compiled by ISD, based upon typical events that occur at existing elementary and high schools in the district. Parking demand was then estimated based on Heffron Transportation's observations at numerous other schools. Those observations have found that parent-only meetings (such as a PTSA meeting) typically have 1 to 2 attendees per vehicle. Larger evening events, such as athletic events and arts performances, typically have between 3 and 3.5 attendees per parked vehicle, while low-attendance events may average closer to 2 attendees per parked vehicle.[37] These rates account for multiple attendees who arrive in one vehicle (e.g., students with families) and participants who may be dropped off at an event without generating parking demand.

Additionally, for the two high school event types that typically generate the highest parking demand—varsity football games and Curriculum Night—parking estimates were based upon counts that were conducted at those events at comparable ISD high schools in Fall 2019. Parking counts were conducted during home football games held at both Liberty School and Skyline High School on Friday, September 27, and Friday, October 4, 2019. At Liberty, total parking demand of 430 to 450 vehicles was observed during each of the two football games. At Skyline, total parking demand of 450 to 600 vehicles was observed during each of the two football games.[38] Parking counts were also conducted at Skyline High School during its Curriculum Night event on September 19, 2019. The counts indicated a peak parking demand that exceeded 1,000 vehicles.

The potential parking demand for each elementary school and high school event is also presented in **Table 16** and **Table 17**, respectively.

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37 These rates were most recently corroborated with parking counts conducted by Heffron Transportation at the Northshore Performing Arts Center (NPAC), located at the Bothell High School campus, which hosts music and performance events for all Northshore District schools; the counts found average parking rates of 1.9 to 3.2 parked vehicles per attendee at two music events in May 2018.

38 Parking demand for the Skyline HS football games included vehicles parked in three off-site parking lots (Mary Queen of Peace Church lot, Sammamish Hills Lutheran Church lot, and City Hall/Library/YMCA lot) that were observed to be utilized during high-demand school events, but also accommodate parking unrelated to the school. Since the destinations for all parked cars in these lots could not be differentiated, all were included in the counts.

The proposed site plan would provide 644 permanent vehicle parking stalls at the High School #4 / Elementary School #17 site. An additional 91 vehicles could be accommodated in family vehicle and bus loading areas during off-peak periods, allowing up to 735 vehicles to be parked on site during special events. Most events held by both schools would occur in the evening or on weekends; during these periods all of these parking stalls would be available. During school days, the load zones should be made available for parking to accommodate demand associated with smaller daytime events.

The tables show that the proposed parking supply would be adequate to accommodate all single evening/weekend events held by either school except the high school's Curriculum Night. Additionally, without management, some higher attendance elementary school events during the day have the potential to generate a higher level of parking demand cumulatively with typical school day demand than available supply. Recommended measures presented in *Section 5. Mitigation and Recommendations* include development and implementation of an Event Management Plan to ensure that on-site parking is adequate for all combinations of events.

Table 16. Expected Special Events and Parking Demand – Elementary School #17

Elementary School Event	Approximate Attendance (per occurrence)	Total # of Occurrences (time of year)	Estimated Parking Demand
Daytime Events			
Meet the Teacher	450	2 (prior to start of school)	150 – 225
WaKIDS Family Meetings	30, every half hour	First 3 days of school	20 – 30
Special Classroom Events	100	12 (October through June)	30 – 50
Conferences	200	Throughout 3 days (December)	20 – 30
Talent Show Rehearsals	80	4 (April)	25 – 40
5th Grade Promotion Ceremony	200	1 (June)	55 – 70
Late Afternoon/Evening/Weekend Events			
Kindergarten Parent Night	100	1 (Prior to start of school)	35 – 50
PTSA General Meetings	< 50	5 (Every 1 to 2 months)	25 – 50
PTSA Family Night Events	400	8 (Every 1 to 2 months)	115 – 135
Music Club Concerts	120	4 (December and June)	40 – 60
Music grade level concerts	450	6 (March through June)	130 – 150

Table 16. Expected Special Events and Parking Demand – Elementary School #17

Elementary School Event	Approximate Attendance (per occurrence)	Total # of Occurrences (time of year)	Estimated Parking Demand
Curriculum Night	600	1 or 2 (September or October)	170 – 200
PTSA Family Night Events	400	8 (Every 1 to 2 months)	285 – 330
Walk-a-thon or similar	50 during school day to 1,000 in the evening	1 (varies)	15 – 25 (day) 285 – 330 (eve)
Academic events	350 – 400	2 (October and March)	100 - 135
Special Classroom Events	100	12 (October through June)	30 – 50
Veteran's Day	100	1 (November)	30 – 50
Art Event	100	1 (November)	30 – 50
5th Grade Camp Parent nights	40 – 100	2 (April)	20 – 35
Science Fair	400	1 (May)	115 – 135
5th grade Promotion Ceremony	200	1 (June)	60 – 100

Source: Heffron Transportation, Inc., compiled from information provided by the Issaquah School District, June 2020.

a. Estimated parking demand reflects 1 meeting participant or approximately 2 to 3.5 event attendees per parked vehicle.

Table 17. Expected Special Events and Parking Demand – High School #4

High School Event	Approximate Attendance (per occurrence)	Total # of Occurrences (time of year)	Estimated Parking Demand
Daytime Events			
Freshman Orientation	250 – 300	1 (August or September)	70 – 100
New Hire Academy	<100	4 full days (prior to start of school)	< 100
Conference Day	600	2 full day (prior to start of school)	
Late Afternoon/Evening/Weekend Events			
Curriculum Night	2,800 – 4,000	1 (September or October)	>1,000
Dances	1,000	2 – 3 (Fall and Winter)	
Student Talent Show	300 – 400	1 (Winter)	85 – 135
STEMposium	75	1 Winter	25 – 35
Art Show	75	Winter / Evening	24 – 35
ParentWiser/PTSA Education	200	6 - 8 (throughout school year)	65 – 100
PTSA Meetings	50	5 Varies / Evenings	25 – 50
PTSA SAT/ACT Prep/Exams	50	4 – 8 per month Fall and Spring	15 – 25
Booster Club Meetings	25	0 to 1 per month (throughout year)	15 – 25
Club End of Year Celebrations	30 – 200	12 (May – June)	15 – 70
Senior Parent Nights	300	2 Spring	85 – 100
Drama Performances	450	6 (2 per fall, spring, winter)	125 – 150
Band/Jazz Band Concerts	450	8 (throughout year)	125 – 150
Incoming Freshman Night	1,000	1 (Spring)	290 – 340
Powder Puff Game	300	1 (Fall or Spring)	85 – 100

Table 17. Expected Special Events and Parking Demand – High School #4

High School Event	Approximate Attendance (per occurrence)	Total # of Occurrences (time of year)	Estimated Parking Demand
Varsity Football Games	2,000 – 4,000	4 (August – November)	450 – 600 [b]
JV/JVC Football Games	200	6 (August – November)	55 – 70
Girls JVC/JV/V Soccer Games	75 – 150	8 (September – November)	35 – 50
Volleyball JV/Varsity Games	75 – 150	8 (September – November)	35 – 50
Boys Basketball JV/Varsity Games	125 – 500	12 (November – February)	40 – 170
Girls Basketball JV/Varsity Games	50 – 100	10 (November – February)	15 – 40
Gymnastics Meets	125	5 (November – February)	35 – 50
Wrestling Meets	175	7 (November – February)	50 – 65
Baseball JV/Varsity Games	75 – 100	10 (March – May)	30 – 40
Boys Soccer JVC/JV/V Games	75 – 150	5 (March – May)	30 – 40
Track Meets	600 – 750	2 (March – May)	170 – 250
Fastpitch Softball Games	75	9 (March – May)	25 – 40
Sports Parent Nights	Fall–750, Winter–300, S–500	3 (1 per term)	85 – 250
Sports End of Season Banquets	30 – 300	6 (at end of each season)	15 – 100

Source: Heffron Transportation, Inc., compiled from information provided by the Issaquah School District, June 2020.

a. Estimated parking demand reflects 1 meeting participant or approximately 2 to 3.5 event attendees per parked vehicle, unless otherwise noted.

b. Varsity football game parking estimates based upon counts conducted at two football games each at Skyline and Liberty High Schools on September 27 and October 4, 2019.

4.10. Short-Term Impacts from Construction

Construction of the new building is planned to begin in 2021. The new schools are planned to be complete for occupancy by Fall 2023.

It is estimated that approximately 15,000 cubic yards (cy) of material would be removed from the site and approximately 10,000 cy would be delivered. Assuming an average of 20-cubic yards per truck (truck/trailer combination), the excavation and fill would generate about 2,500 truckloads (1,250 trucks in and 1,250 trucks out). This activity is expected to occur over about 6 months (approximately 130 work days). This would correspond to about 19 truck trips per day and an average of 2 to 3 trips per hour during a typical eight-hour construction work day.

It is expected that most construction activity would occur before the Site Access driveway is signalized and improved to its recommended configuration. Therefore, flagger control and temporary access coning may be required during most construction phases. It is recommended that the contractor be required to prepare a Construction Management Plan to show how trucks and construction workers would access the site, including the plan for flagging and signage on 228th Avenue SE. All plans should conform to MUTCD[39] and other standards.

The construction of the project would also generate employee and equipment trips to and from the site. It is anticipated that construction workers would arrive at the construction site before the morning peak traffic period on local area streets and depart the site prior to the commuter PM peak hour; construction work shifts for schools are usually from 7:00 A.M. to 3:30 P.M., with workers arriving between 6:30 and 6:45 A.M. The number of workers at the project site at any one time would vary depending upon the construction element being implemented. Parking for construction personnel would be provided within the site.

[39] FHWA, 2009.

5. MITIGATION AND RECOMMENDATIONS

The project would incorporate the following transportation improvements into the site and access design. This includes:

A. **Widen and improve SE 228th Avenue SE –** The project would construct extensive improvements of 228th Avenue SE along the site frontage, with a length of approximately 2,000 feet. Improvements would include widening the current two-lane section (one travel lane in each direction) to a five-lane section (two travel lanes in each direction plus a center left-turn lane), consistent with the City of Sammamish's ultimate plans for the street. Additional turn lanes would be constructed at the site driveway intersection as described in Element C below.

B. **Construct pedestrian improvements along 228th Avenue SE –** The project would construct new 6-foot-wide sidewalk and landscaping along the site frontage, with a length of approximately 1,700 feet.

C. **Signalize site driveway intersection at 228th Avenue SE** – The project would install a new traffic signal and widen the intersection as follows:

- **228th Avenue SE: South Leg** – Provide four northbound approach lanes (two left turn lanes and two through lanes) and two southbound (departure) lanes. The lanes in the northbound direction should have a 100-foot inside left turn pocket and a 255-foot minimum outside left turn lane. The outside left turn lane would transition to become the center two-way-left-turn-lane further south.
- **228th Avenue SE: North Leg** – Provide three southbound (approach) lanes (two through lanes plus a right-turn lane with at least 235 feet of storage) and two northbound (departure) lanes.
- **Site Access Driveway:** West Leg – Provide three eastbound (approach) lanes (two left turn lanes and one right turn lane) plus two westbound (departure) lanes.
- **Pedestrian Crosswalks and Phases** – Crosswalks with pedestrian signals would be provided across the east and north intersection legs. North-south pedestrian crossing of the east leg would occur with the southbound through phase (right-turning motorists would need to yield to crossing pedestrians). East-west pedestrian crossings of the north leg would occur with the eastbound phase, and could also overlap with the northbound left turn movement.

D. **Provide on-site motorist and pedestrian wayfinding signage** – The project would install on-site wayfinding signage for motorists and pedestrians to guide them to the respective school drop-off/pick-up zones or parking. In addition, the egress road on the east side of the high school garage should be signed for "No Pedestrians."

The following additional mitigation has been identified for the project:

E. **Capacity Improvement at SE 40th Street / 228th Avenue SE** – ISD would work with the City of Sammamish to identify and implement capacity improvement at this intersection. Analysis found that a Flying T configuration, which would utilize a raised center median and striping to physically separate the southbound through traffic from the other movements at the intersection, would improve operations to better than without-project conditions during all peak periods. The stop sign would remain to control westbound turns from SE 40th Street.

F. **School-Zone Speed Limit** – It is recommended that ISD work with the City of Sammamish to establish a school-zone speed limit on 228th Avenue SE in the vicinity of the project site, as provided along 228th Avenue SE near other elementary schools.

G. **Construction Management Transportation Plan (CMTP)** – The school would require the selected contractor to develop a construction management plan (CMP) that addresses traffic and pedestrian control during school construction. The CMTP should define truck routes, lane closures, and temporary traffic control at the site access on 228th Avenue SE. The CTMP may also include measures to keep adjacent streets clean on a daily basis at the truck exit points (such as street sweeping or on-site truck wheel cleaning) to reduce tracking dirt offsite. The CTMP should identify parking locations for the construction staff; construction employee parking should be contained on-site or at an off-site location with worker shuttles.

H. **Transportation Management Plans (TMPs)** – Prior to the school opening, the District and school principals would develop and implement Transportation Management Plans (TMPs) for each school to educate families about transportation options as well as the access and load/unload procedures for the site layout. A component of the TMPs should identify the walk area for the schools and show the safe walk routes within that area. They should educate families on the ways to reduce congestion at and around the schools including reduced automobile demand and encourage school bus ridership and carpooling.

   The TMPs would be provided via all typical school communication methods and provide consistent information across each. These may consist of a school website, PTA social media outlets, student mail, parent e-mail lists, and paper reminders as appropriate.

   The TMPs would be provided to the City for review prior to issuance of either the building permit or certificate of occupancy. The actual timeline of delivery would be determined by the City.

I. **School-Event Management Plans** – Parking management would be needed for evening events with more than 1,000 expected attendees (for a single event or more than one event combined). It is recommended that the District and both schools develop and implement parking management plans to mitigate parking impacts associated with large events. The following measures could be considered.

   - Allow parking in school load zones during off-peak hours.
   - Coordinate between the two schools to schedule large events.
   - Consider splitting Curriculum night into two nights. If splitting is not possible, then implement the following:
     - Identify an off-site parking location for large events (with expected attendance greater than 1,000 people, either for a single event, or combination of two or more events). The District could potentially coordinate large events such as Curriculum Night between High School #4 and Skyline High School (located about 2 miles to the north) so that each school's parking lot could be used for satellite parking
     - Provide a shuttle between the off-site parking and the school during large events. This would likely be provided using District-operated yellow school buses.
     - Develop a parking permit system for each large event that would identify who would be allowed to park on site and who would be required to park off site.
     - Provide staff enforcement of permit restrictions and access controls at on-site parking entry points. (Vehicles entering to drop students off without parking would be allowed, regardless of their permit group).

J. **Issaquah Transportation Impact Fees** – The project would pay transportation impact fees to the City of Issaquah, in accordance with IMC §3.71.