Fairbanks North Star Borough
High School & Circulation Plan

Federal Project No. NFHWY00844/0002(536)

Existing Conditions Report

February 2025

West Valley High School dismissal queue at Fairbanks Street southbound (FAST Planning)

Prepared For:
State of Alaska Department of Transportation & Public Facilities, Northern Region

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Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ARRC	Alaska Railroad Corporation
ATMS	Alaska Traffic Manual Supplement (to the MUTCD)
CMAQ	Congestion Mitigation and Air Quality
CTC	Career and Technical College (within HHS)
DEED	Alaska Department of Education and Early Development
DOT&PF	Alaska Department of Transportation and Public Facilities
FAST Planning	Fairbanks Area Surface Transportation (FAST) Planning, an MPO organization
FHWA	Federal Highway Association
FNSB	Fairbanks North Star Borough
HHS	Hutchison High School
ITE	Institute of Transportation Engineers
KE	Kinney Engineering
LOS	Level of Service
MACS	Metropolitan Area Commuter System
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
PGDHS	A Policy on Geometric Design of Highways and Streets
PHB (*HAWK*)	Pedestrian Hybrid Beacon (Older terminology referred to this as a “high intensity activated crosswalk” or HAWK)
PHF	Peak Hour Factor
SPED	Special Education Department (and designated busing)
TIP	Transportation Improvement Program (by FAST Planning)
TVCC	Tanana Valley Community College
UAF	University of Alaska Fairbanks
U-Park	University Park Building (now UAF)
v/c	Volume to capacity ratio
vph	Vehicles per hour
vphpl	Vehicles per hour per lane
WVHS	West Valley High School

Definition of Terms

Capacity: The maximum sustainable hourly flow rate under prevailing roadway, environmental, traffic, and control conditions. This is usually expressed in vehicles per hour (vph) or vehicles per hour per lane (vphpl). Capacity is identified at a threshold Level of Service transitioning into the worst flow conditions where the movement of traffic begins to break down into unsteady flow or even fall into “stop and go” conditions.

FAST Planning: Fairbanks Area Surface Transportation (FAST) Planning is the Metropolitan Planning Organization (MPO) for the urbanized areas of the Fairbanks North Star Borough (FNSB), including the cities of North Pole and Fairbanks.

Level of Service (LOS): LOS is a relative grading scale used to rank the operational performance of a facility for summary presentation to users and operating agencies. More detailed system performance measures are computed for various types of facilities; however, these measurements are typically bracketed and simplified into a scale of A (best conditions for individual users) to F (worst conditions). Choosing LOS A can result in excess capacity and high cost, high impact improvements. The transition from LOS E to LOS F is often called “capacity” or “overcapacity”. Under these conditions, the cost of not making improvements can mean significant congestion and safety costs even without projects. Often, choosing LOS C or D in the most congested hours of the day will achieve optimal performance benefits within reasonably accepted construction and maintenance costs.

Peak Hour Factor (PHF): The PHF is a measure of traffic variability over a one-hour period calculated by dividing the total hourly flowrate by four times the peak 15-minute flowrate. PHF values can vary from 0.25 (all traffic for the hour arrives in the same 15-minute period) to 1.00 (traffic is spread evenly throughout the hour). High schools typically experience a high surge of traffic within a 15-minute period, resulting in PHF values in the 0.5 to 0.7 range.

Volume to Capacity Ratio (v/c): The v/c ratio is a measure of how much of the available capacity of a facility is being used, calculated by dividing the demand volume by the capacity of a facility at a LOS E or F threshold. Values of 0.85 or less are an ideal design objective to better ensure available reserve capacity for traffic variations and incidents over time.

Executive Summary

Project Funding and Planning

Safe routes to school and the prioritization of travel modes are best determined at the local level with the support of community adopted goals and plans. Developing engineering solutions to fit within local guidance is a recognized best practice in the Alaska Traffic Manual Supplement (ATMS) and the national Manual on Uniform Traffic Control Devices (MUTCD).

This high school study is funded by FAST Planning's Carbon Reduction Program. More about this program can be found at https://fastplanning.us/cmaq/. This study is intended to lead to capital projects for congestion mitigation and air quality (CMAQ) improvements on the high school campus, regardless of modes of travel.

West Valley High School (WVHS) and Hutchison High School (HHS) were constructed in the early to mid-1970s. Congestion and conflict between users have continually increased over time at WVHS and HHS. Figure 1 on page 10 shows the high school location within the study area.

Local changes can be considered in parallel to national changes. Nationwide, in the 1970s world events caused gasoline prices to soar, fuel economy was a priority, and speed limits were reduced. At that time, the primary travel mode to school was busing and walking. Schools were not designed for high-volume single-vehicle access. Travel desires and behaviors have slowly changed in the fifty plus years since then. Busing and walking is now less than 15% of school travel modes even though site layouts have not changed. Changes leading to shift have typically included more distant housing, more concerns for student safety and security when walking or riding buses, increased levels of automobile ownership, and more convenience of scheduling with automobiles.

These two high schools are major traffic generators operating at the same start and stop times. In addition, the University of Alaska Fairbanks (UAF) plans to repurpose the older University Park Elementary School building into a new childcare facility (also known as the "U-Park" building). The U-Park childcare renovation would also operate at the same hours and add hundreds more vehicles to Sandvik Street introducing additional turning traffic to already busy campus roads and access points.

Geist Road Pedestrian Crossing

Geist Road pedestrian crossing safety has been the top stakeholder and public concern expressed during this public input for this project. Potential options to serve Geist Road pedestrian crossing demand are strongly desired. The older wooden pedestrian overpass was removed because it was not structurally sound. This has made pedestrian routes across Geist Road more difficult between traffic signals spaced at ½ mile on Geist Road. In between the signals, there are not adequate gaps to completely cross Geist Road during daytime peak school hours. Instead, Geist Road must be crossed one-half-width at a time, taking refuge in the center lane. Adequate gaps for the half-width crossing occur in each direction once every minute on average. These crossing opportunities between signals are useable because of their frequency and they exceed the frequency of adjacent traffic signal pedestrian indications for crossing.

Note that a wooden pedestrian overpass for crossing University Avenue at Sandvik Street was removed and replaced with a pedestrian hybrid beacon as part of the University Avenue Widening project.

High School Congestion

The school traffic demand that comes from the east is 1.5 to 2 times that of the demand from the west, depending on the time of the day. Meanwhile, the one traffic signal access is at the west boundary of the school at Fairbanks Street. Most of the parking and drop-off has multiple options for unsignalized access to the east of WVHS. This means a lot of overlapping turning movements occur central to WVHS and HHS, close to Geist Road at unsignalized intersections. WVHS drop-off and pick-up traffic backs up onto Gradelle Avenue and Sandvik Street. HHS drop-off and pick-up traffic backs up onto Geist Road's outside lanes near the University Avenue signal. There is a risk of blocking the signalized intersection at University Avenue and Geist Road. Eastbound Sandvik Street generates long queues at the STOP sign at University Avenue in the afternoon.

Analysis of onsite circulation changes, both temporary and permanent, shows it is possible to separate east versus west conflicts. This would reduce overlaps between drop-off and parking destinations, thus reducing congestion by one-third or more. Making left turns at the Sandvik Street STOP sign at University Avenue is a concern that is more difficult to solve, even with onsite circulation changes. Congestion is expected to worsen with the University's childcare facility renovation at the original University Park Elementary School (U-Park). This may require traffic control device upgrades to increase capacity on the east side of campus. This means evaluating another traffic signal, a roundabout, or new alternative access at another location.

There are other options besides infrastructure changes to mitigate congestion and improve air quality, if desired by the community. These other options take time to build momentum and are not expected to eliminate congestion problems quickly. These options include:

- Varied start and stop hours. Currently both high schools start and stop at the same times.
- Increased morning transit service aligned to the AM and PM school start and stop times. Current transit schedules are not aligned to school start and stop times.
- Carpooling groups or walking student groups (also called a "walking school bus"). Both groups are supervised by volunteer adults and gather students enroute to school. Increased public involvement and online tools could connect users and reduce single vehicle usage.

Safety Concerns

Network congestion and conflicts between users lead to safety concerns which are reviewed throughout this report. In terms of crash history, network crashes occurring at school start and stop hours are as high as crashes during the 5-6 PM commute hour. Teen drivers are involved in about 20% of network crashes throughout the day. Teen drivers are not disproportionally involved during school hours any more than during other hours of the day. Inability to stop under ice and snow conditions, sliding into conflicting vehicles, or sliding off roadsides are the most common safety problems.

Maintenance and Operations

Infrequent maintenance of snow on campus routes is a safety and congestion concern expressed by stakeholders and the public. More winter maintenance on campus is desired. Rear-end and angle collisions in the network area point to a variety of factors, including driver experience, speed too fast for conditions, and limited winter maintenance resources. The School District Facilities Maintenance Division reports snow removal tasks can generally be done to a higher standard as more resources become available. In the fall of 2024, parking lot snow removal has been reported as improved to a reasonable and acceptable quality.

1 Introduction

The State of Alaska, DOT&PF Northern Region, in partnership with Fairbanks Area Surface Transportation (FAST) Planning, initiated a circulation study to mitigate congestion and improve safety for the combined West Valley High School and Hutchison High School campuses.

1.1 Location

West Valley High School (WVHS) and Hutchison High School (HHS) are in Fairbanks, Alaska, north of Geist Road, between Fairbanks Street and University Avenue. They share a campus separated from the University of Alaska Fairbanks (UAF) to the north by the Alaska Railroad (ARR). Access and circulation to the high schools are via Fairbanks Street, Gradelle Avenue, Sandvik Avenue, and driveways directly onto Geist Road. Nearby, UAF's Community and Technical College (CTC) operates in the original University Park Elementary School building (known as "U-Park"). CTC provides teaching and training facilities within the HHS building. Figure 1 shows the high school location within the study area.

Figure 1. Location for West Valley (WVHS) and Hutchison (HHS) high schools

1.2 Purpose

This report determines the existing transportation and site circulation conditions for this campus and the extent of traffic and safety concerns. This report compiles "site facts" and field observations for trip generation and engineering study. These inputs establish baseline performance measures for congestion and air quality. Baseline performance measures from this report will be used to compare with a follow-on "Needs Analysis Report" that will assess possible alternatives to mitigate existing site circulation issues.

1.3 Need

School transportation routes and travel modes are best determined by community adopted goals and plans. An engineering study does not set a priority for driving over walking, or transit over busing. Engineering practice requires evaluating options that fit locally adopted plans. These plans are commonly called "Safe-Routes-to-School" (SRTS) through a combination of walking, busing, or driving. SRTS planning and engineering evaluation supported under the FHWA Manual on Uniform Traffic Control Devices (MUTCD) and the DOT&PF Alaska Traffic Manual Supplement, (ATMS), Chapter 7 Traffic Control for School Areas.

The State of Alaska sets a boundary distance near schools where bus service is not eligible for reimbursement to school districts unless there are eight or more students beyond a distance of 1.5 miles (AS 14.09.010, 4 AAC 27.011 Establishment of Regular Routes). The FNSB School District publishes online that West Valley High School students do not have bus service if they live less than or equal to 1.5 miles radius from the school. As an optional school, Hutchison High School has no regular bus service. This threshold distance is also used in other Alaska school districts. School travel behaviors appear to have changed noticeably over the five decades since these three schools (West Valley High School, Hutchison High School, and the original University Park Elementary School) were opened. Busing and walking/biking mode use appear to have declined while parent-automobile transportation increased. Factors for the shift in modes may have included increased family automobile ownership and demand, continued gasoline affordability, and less investment in alternative modes of travel. Another factor for increased parent drop-off and pick-up could be concerns about child safety.

In the mid-1970s these schools were designed for the dominant student travel modes at the time: walking from adjacent neighborhoods and using the school bus. This is evident in each school's site layout where there are short automobile drop-off areas, large bus loading zones, internal sidewalks, and two pedestrian bridges that were in place across University Avenue and Geist Road.

In 2024, a lower share of students are using busing or walking for school transportation modes. Bus ridership is about 150 students out of the combined WVHS and HHS school population of 1400 students. Walking share has been observed and counted. Traffic counts in the spring of 2024 and fall of 2025 show fewer than two dozen pedestrians walk to and from campus during the AM arrival hour (18 were counted), and about three dozen pedestrians walk to and from campus during the PM dismissal hour (37 were counted). Most of these pedestrians use existing signals for access. With each observation, five or fewer crossings per hour were midblock. Most parents and students use drop-off and pick-up or driving and parking on-campus using personal vehicles.

Adjacent commercial attractions have also developed along Geist Road and University Avenue. These offer lunch, retail, and employment opportunities. This creates increased school pedestrian activity along and across the busy arterial roads.

Another concern that has developed is that Fairbanks has become a non-attainment area for PM 2.5 particulates in air quality measurements. Vehicular congestion at schools is one contributing factor to PM 2.5 and poor air quality.

This Existing Conditions Report assessed the extent of congestion and safety risks on the high schools' campus. Congestion and safety performance measures were developed as a benchmark of current operations. Performance measures include queueing, delay, crash safety, emissions, and nonmotorized crossing gaps and delays. These performance measures will be used to evaluate options for site changes in a follow-on Needs Analysis Report.

1.4 High School Campus Study Funding

FAST Planning's Transportation Improvement Program (TIP) includes a Carbon Reduction Program (CRP) for funding projects in federal fiscal years 2024 through 2027.

This CRP funded planning study is intended to identify separate design and construction projects to improve high school circulation and congestion (TIP Need ID 33863, Project Priority #12). The U.S. Congress expanded federal transportation funding to make high schools eligible for CRP funding under the 2021 Infrastructure Investment and Jobs Act (IIJA). Two other high schools in the FNSB area are also intended for a future study under this CRP funding category.

This study is the first FNSB High School Study, targeting WVHS and HHS for improvement. One placeholder in the FAST Planning TIP is for a possible roundabout project at Sandvik Street and Gradelle Avenue (TIP Need ID, Project Priority #8). However, other options may be identified. Design and construction of some form of capital project is expected in the years following the conclusion of this study.

2 Past and Ongoing Planning

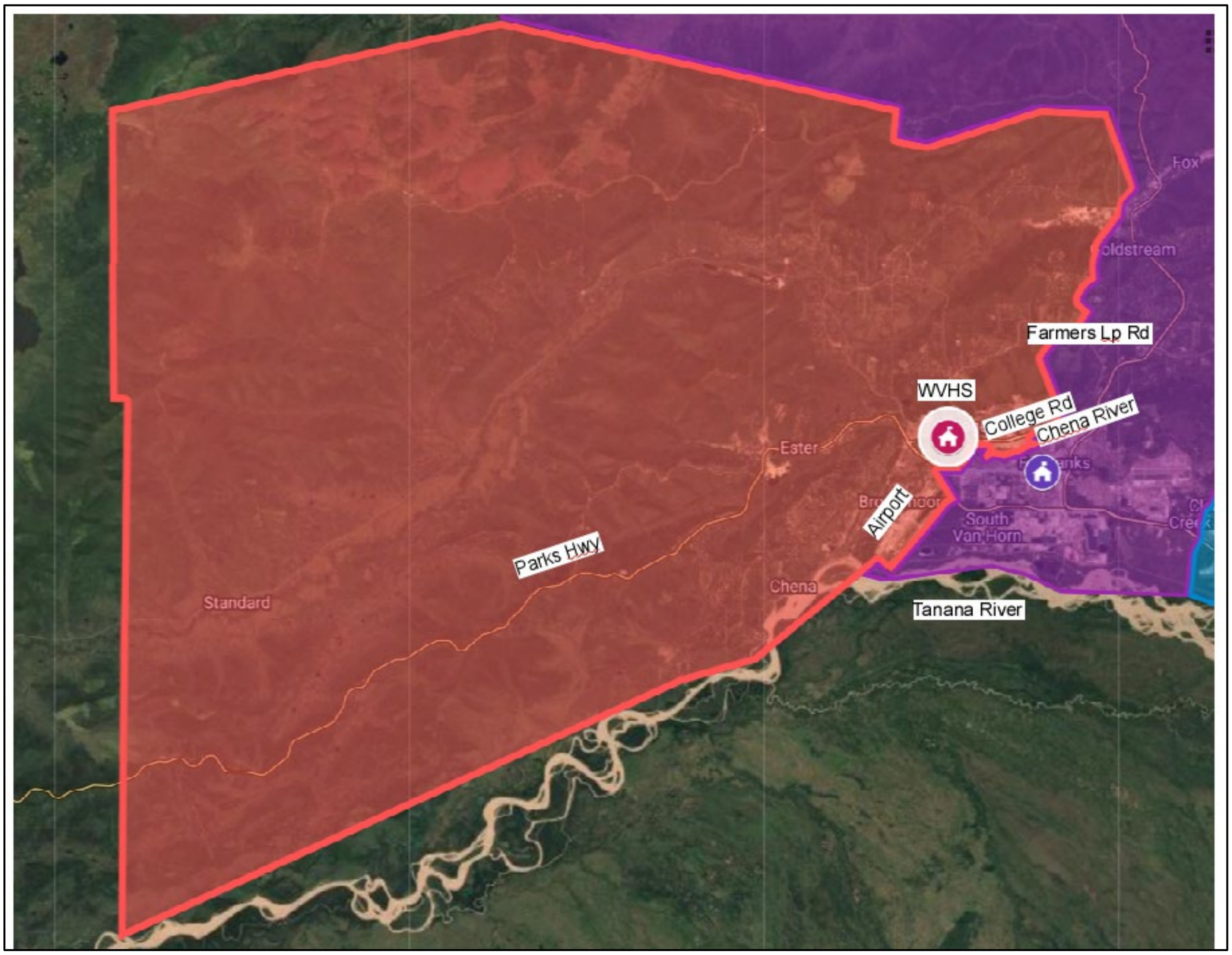
2.1 High School Campuses

The focus of this plan is the West Valley and Hutchison High Schools area, depicted in Figure 2.

Source: Google Earth

Figure 2. FNSB West Valley and Hutchison High Schools Campus

The attendance area for West Valley High School is primarily west of University Avenue and north of the Chena River, including most of College Road and Farmer's Loop Road. The attendance boundaries are shown in Figure 3 on page 15. Hutchison High School is a school of choice. It has no attendance boundaries and instead draws upon the greater Fairbanks area.



Source FNSB School District

Figure 3. High School attendance area for WVHS North and West of Chena River

2.1.1 West Valley High School (WVHS)

WVHS was first constructed and opened in 1976 to serve population growth. With a capacity of over 1,300 students, West Valley's large attendance area includes most of College Road, north of the Chena River, most of Farmer's Loop Road, and residents to the north and west of the city. The WVHS principal estimates the current enrollment is over 800 students and the population has not been increasing. The State of Alaska Department of Education and Early Development (DEED), lists the student population at or near 900 students.

WVHS benefitted from traffic improvement projects in 1985 and in 1997-2000. The site has been significantly improved since 1976. By 1998, Sandvik Street was connected to University Avenue, and by 1999 it was paved. Before the year 2000, there was not a dedicated drop off lane, only parking lots at the southeast and northwest entrance to the building. Improvements in 2000 show how all parking lots have been expanded and relocated, dropoff/pickup lanes were dedicated, and full perimeter circulation roads added to create current site conditions. (See Figure 4 for an aerial view in 1996 and Figure 5 for the same view in 2003.)

In 2005 Fairbanks Street was closed to motor vehicle use north of WVHS. After this time, the northern extension was repurposed to nonmotorized use and community gardens. By 2011 a new driveway connection from the west was allowing WVHS motorists to cut through the UAF's Harper Building access in the northwest quadrant of the Fairbanks and Geist signal to bypass the signal. In 2021 UAF blocked driveway access to Geist Road to preclude this movement.

WVHS has low student walking attendance numbers, with traffic counts of less than two dozen to and from campus. The primary mode of transportation is individual drop-off, pick-up, and onsite personal vehicle parking.

2.1.2 Hutchison High School (HHS) and the UAF Hutchison Center

HHS was constructed in 1973, expanded in 1976, and renovated in 2003. This included adding to the north side of the building and changing parking and perimeter roads. (See Figure 4 for an aerial view in 1996 and Figure 5 for the same view in 2003.) HHS is a "school of choice" open to the entire Fairbanks area. It provides five technical tracks for study and has a current enrollment of around 400 students.

HHS also houses the UAF Career and Technical College (CTC) designated as the Hutchison Center. UAF CTC offers automotive technology, diesel and heavy equipment repair, culinary arts and hospitality, and welding and materials technology. The UAF CTC's busiest traffic occurs for evening classes weeknights during the fall and spring semesters. Additional students attend targeted short courses during and after high school throughout the year. CTC faculty come from UAF and the adjacent U-Park building.

Hutchison High School and UAF CTC programs combine to form what is signed as the Hutchison Institute of Technology. The FNSB School Districts states the combined building facilities are 74% high school and 36% UAF CTC operations.

As a "school of choice", busing service to HHS has not typically been provided; however, a few shuttle buses have been funded and were introduced in 2024. HHS has low student walking attendance numbers, with traffic counts of less than a dozen to and from campus. The primary mode of transportation is individual drop-off, pick-up, and onsite personal vehicle parking.

2.1.3 UAF University Park Center (U-Park)

U-Park was originally an elementary school until 1989, when a replacement University Park Elementary School was opened to the southwest, on Loftus Road. The original U-Park building was converted to a branch of UAF's Community and Technical College (CTC) designated as the University Park Center. UAF's CTC at U-Park provides day and evening classes in fire science, paramedicine, and law enforcement. Workforce training classes are attended by off-campus residents. The busiest class times fill parking lots at U-Park and Hutchison Center CTC back lots during evenings on weeknights.

The U-Park building is also home to the UAF Cooperative Extension Service which also provides some Community and Technical College (CTC) programs. Not all programs held within the U-Park facility require coordination with Hutchinson High school.

UAF has obtained initial funding to convert the U-Park building to a childcare facility serving UAF employees. A childcare facility is a higher volume traffic generator. Phase One is intended to serve 80 children, with later phases to increase capacity to 176. The number of vehicles generated by a childcare facility would be higher than the original elementary school usage, mainly because school busing used to be the primary travel mode for the elementary school, thus fewer vehicles. Field observations for this study showed low use of onsite parking during the AM hour at HHS, with increasing use arriving during the day. By afternoon dismissal, parking lots are closer to full, demonstrating school site use increasing throughout the day

Preliminary estimates using Institute of Transportation Engineers (ITE) trip generation formulas result in childcare use at the anticipated full buildout of the site at nearly 200 vehicles per hour. Childcare use may be more convenient if it were to overlap with high school attendance start and stop times compared to the building's current TVCC CTC uses. This could result in traffic impacts to existing roads which could be much higher compared to existing or past uses.

The impacts of converting the U-Park building to a childcare center should get further consideration of trip generation estimates and whether additional traffic impact analysis is needed to identify mitigation improvements beyond serving high school traffic.

This FNSB High School study will make note of where renovated U-Park childcare operations could have an affect or be a concern on the high school campus; however, this study will not consider site changes or improvements to the U-Park building.

Source: Google Earth

Figure 4. Separate FNSB High Schools before Renovation (1996)

Source: Google Earth

Figure 5. Connected FNSB High Schools during HHS Renovation (2003)

2.2 Arterial Corridors

2.2.1 University Avenue

2.2.1.1 University Ave Rehabilitation and Widening

This University Avenue project was the first segment to receive upgrades in 2018, south of Geist Road (at Wolf Run) to College Road. This was Project NFHWY00270, also called "*North Indiana to Thomas Street*" and referred to as "Segments 1 and 1A". The signal at Geist Road and Johansen Expressway was widened to include dual left turn lanes and improved pedestrian islands and crossings. Sandvik Avenue access was rebuilt, and new drainage was constructed behind HHS for Deadman's Slough. This slough drains east across University Avenue.

A 144-foot wooden pedestrian overcrossing (Bridge #1317, see Figure 6), originally installed in 1975, was removed in 2018 to accommodate the road widening. It was replaced with an "on-demand" or pushbutton-activated Pedestrian Hybrid Beacon (PHB) in 2018 (see Figure 7). (Older terminology referred to this device as a HAWK, or "high intensity activated crosswalk"). The PHB device uses flashing and solid red indications to stop University Avenue traffic. It does not control turning traffic on Sandvik Street.

Source: Google Earth Streetview

Figure 6. University Ave: Sandvik Street pedestrian overpass bridge #1317 (1975-2018)

Source: Google Earth Streetview

Figure 7. University Ave: Sandvik Street Pedestrian Hybrid Beacon (PHB) Geist Road

2.2.1.2 Geist Road Pedestrian Overcrossing Bridge #1318 Demolition

A 162-foot Geist Road wooden pedestrian overcrossing (Bridge #1318, see Figure 8) at Rebecca Street was removed in the fall of 2023 (State-funded Project NSHWY00839). This older structure was also built in 1975 and was becoming structurally deficient. A replacement has not been identified. Some important considerations include funding (a replacement overpass could cost several millions dollars), accessibility, environmental permitting, and the authority and necessity of right-of-way acquisition. These steps take years to complete before construction can occur.

Source: Google Earth Streetview

Figure 8. Geist Road: Rebecca Street pedestrian overpass bridge #1318 (1975-2023)

2.2.1.3 Geist/Chena Pump Road Corridor Study

FAST Planning's FFY 2023-2027 TIP lists a future project to study the Geist Road-Chena Pump Road Corridor, from University Avenue to Chena Small Tracts Road. Initial funding is planned in 2024. The project purpose is to study safety and access control issues, including driveway density, intersection configuration, and conflicts between motorized and non-motorized users. This study could lead to future capital projects for construction.

Findings from this High School Circulation Study could be incorporated into the larger *Geist/Chena Pump Road Corridor Study*.

2.2.1.4 McDonald's Renovation (Underway)

Across from the high schools is a strip of commercial frontage development along the south side of Geist Road. The McDonald's restaurant has been undergoing renovation for several years and is expected to be completed in 2025 or 2026. Reopening will further attract students to cross Geist Road. This report applies ITE Trip Generation to estimate a return of McDonald's vehicular traffic to the existing conditions. McDonald's traffic is incorporated into existing traffic counts in this report.

3 Existing Conditions and Site Facts

3.1 School Facility Travel Demand Features and Description

West Valley High School and Hutchison High School share a common campus and streets including Sandvik Street, Geist Road, and University Avenue. Figure 9 and Figure 10 show an aerial view of each school. Both schools start and end at the same time, resulting in vehicle and pedestrian traffic for both schools interacting in the short time frame of about 20 minutes each period. Table 1 and Table 2 present school "site facts" for both schools that document travel demand and gage site layout. Site facts are tabulated in this section and are used to review trip generation.

Existing trip generation was not gathered for UAF's U-Park building, shown in Figure 11. Trips were very low at the time of traffic observations. Because U-Park is to be renovated to provide additional childcare, trip generation will change significantly. Table 3 presents any known childcare site facts that were gathered and tabulated in this report to inform background conditions.

Source: FAST Planning

Figure 9. West Valley High School WVHS view

Source: FAST Planning

Figure 10. Hutchison HS view north to south, at University Avenue & Geist Road, May 2024

Source: Google Earth

Figure 11. University Park building (UAF)

Table 1. West Valley High School Site Facts for Trip Generation

Feature	Measure	Units	Notes
School	50	acres	Campus area, track and football field, soccer field, baseball field, 1 other field, drainage
	162,000	sq ft	Rounded building footprint
	61	classrooms	plus culinary arts lab
Grades	9-12	-	
Calendar year	Aug 15-May 30		
Year built	1976	-	Site work in 1985. Renovated in 1997-2000
Primary access points	3	each	Fairbanks signal, Gradelle, Sandvik
Enrollment	821	students	2024, not increasing
Capacity	1314	students	Max occupancy per FNSB School District. Around 1,000 published online "about our school"
Faculty / Staff	83	persons	46 faculty, plus staff
Start time	7:30	AM	"Extension" flexes student times
End time	2:00	PM	"Extension" flexes student times
Busing	14-15	buses	17 parking spaces, 50 students observed ridership last 2 weeks of May. 14 buses in Fall 2024. 3 short SPED buses to rear of school.
Bus ridership	150-200	passengers	Varies by month – typically 145+ AM total; 140-200 PM total
Bus loading zone	28,000	sq ft	West-front side diagonal loading zone
Total site parking	158,600	sq ft	Including bus zone, excluding front drop-off, circulating roads between parking lots
Total site parking	417	each	all marked spaces
Student parking spaces	268	each	Including internal aisles, excluding ADA parking
Staff parking spaces	106	each	Rear of building
ADA parking spaces	9	each	6 in front, 3 in rear
Visitor parking spaces	34	each	In front, drop-off aisle
Arriving vehicles	411	each	April 2024 counts, all vehicles, AM start
Departing vehicles	312	each	April 2024 counts, all vehicles, AM departures
Peak Hour Parking usage (min-max)	*100-417*	*each*	*Rounded, minimum estimated from AM arriving minus departing vehicles in April 2024. Front parking observed to be less than 50% full. Maximum would be 100% full.*

Table 2. Hutchison High School and UAF Hutchison Center Site Facts for Trip Generation

Feature	Measure	Units	Notes
School	13.5	acres	Campus area, storage yards, drainage
	129,000	sq ft	Rounded building footprint
	21	classrooms	Plus UAF 2nd floor classrooms (2), 7 shops, 1 culinary arts lab
Grades	9-12	-	Vocational education, plus UAF open classes
Calendar year	Aug 15-May 30		
Year built	1973	-	1975 addition, 2003 addition/ renovations
Primary access points	3	each	Geist driveways split LT and RT turns, Sandvik internal connections from E and W
Enrollment	378	students	2024, not increasing. Excluding CTC intermittent non-high school students
Capacity	510	students	Per DEED
Faculty / Staff	38	persons	23 faculty, plus staff
Start time	7:30	AM	Cafeteria waiting indoors opens at 7:00 AM
End time	2:00	PM	
Weeknights			UAF CTC has busiest traffic for evening classes weeknights during fall, spring semesters
Busing	-	Buses/ Shuttles	No busing in 2023-2024. Informal bus drop-off at Sandvik and HHS back access. In past, buses as shuttles have been operated midday. Fall 2024 up to 4 buses at UAF CTC lot during PM departure.
Bus loading zone	-	sq ft	
Total site parking	130,000	sq ft	Excluding front drop-off, circulating roads between parking lots
Total site parking	274	each	All marked spaces
Student parking spaces	210	each	60 in senior student lot. Includes W lot = 79, N lot =71, and internal aisles. Excludes ADA parking.
UAF-CTC parking spaces	48	each	Rear of building. Full during weeknight CTC evening classes
ADA parking spaces	12	each	4 in front, 4 in rear, 4 at west by field
Visitor parking spaces	6	each	In front side row before drop-off aisle
Arriving vehicles	270	each	April 2024 counts, all vehicles, AM start
Departing vehicles	203	each	April 2024 counts, all vehicles, AM departures
Peak Hour Parking usage (min-max)	70-274	*each*	*Rounded, minimum estimated from AM arriving minus departing vehicles in April 2024. Front parking observed to be less than 50% full. Maximum would be 100% full.*

Table 3. U-Park Childcare Site Facts anticipated for Background Conditions

Feature	Measure	Units	Notes
School	6.5	acres	Area north of Sandvik, East of WVHS fields
	43,000	sq ft	Rounded building footprint
	10	classrooms	
Ages/Grades	Pre-K	-	
Calendar Year	Year-round		
Year built	-	-	Renovation planned for future years
Primary access points	3	each	Sandvik driveways: one for drop-off, open to back lot, and University Avenue in NE corner
Enrollment	80	children	May open to 80 students with current funding
Capacity	176	children	Anticipated full buildout
Faculty / Staff	14	persons	11-14 persons anticipated in opening phase
Start Time	TBD	AM	Anticipated before and up to high school
End Time	TBD	PM	Typical childcare hours may fit usual workdays
Busing	-	buses	None
Bus Loading Zone	-	sq ft	N/A
Total Site Parking	74,000	sq ft	No certain renovations. Intent is to begin with existing layout. Older playgrounds are now partially improved as parking around building
Total Site Parking	150	each	
Student Parking spaces	-	each	No student driving
Staff Parking spaces	15	each	*anticipated*
ADA Parking spaces	3	each	
Visitor Parking spaces	TBD	each	
Arriving Vehicles	TBD	each	
Departing Vehicles	TBD	each	
Peak Hour Parking	TBD	*each*	
Playground area	TBD	*Sq ft*	No certain renovations. Intent is to begin with existing layout. Older playgrounds are now partially improved as parking around building

3.2 Community Input

Community input on existing conditions was gathered in the spring, summer, and fall of 2024 via the following methods:

- initial Stakeholders Advisory Committee (SAC) meeting and Stakeholders Walk Audit held in spring 2024 with representatives of the parents, staff, and administration at the schools, transportation safety personnel, and agency Stakeholders
- public comments through a website and GIS map for gathering and locating concerns
- directions to the website presented in school board meeting announcements and student-parent newsletters
- follow-up interviews with Stakeholders
- second Stakeholders' input meeting and status report after school was underway in fall 2024

3.2.1 Stakeholders Advisory Committee (SAC) Input

SAC Meeting #1. Stakeholders included agencies and managers with a responsibility to ensure safety and delivery of services on the WVHS and HHS campus. KE and DOT&PF met with Stakeholders on Thursday, May 2, 2024, at the WVHS library. Stakeholders attending included the FNSB School District, the WVHS Principal, the HHS Principal, safety officers for both schools, and UAF U-Park administrators.

Walk Audit. During the May 2, 2024 meeting, Stakeholders participated in a Walk Audit led by the consultant team. The Walk Audit included a route map and survey. Surveys allowed Stakeholders to review and comment on walking facilities, safety conditions, conflicts with other users (such as motorists), nearby services (such as transit), and access to adjacent roadways.

SAC Follow-up. Additional Stakeholders were interviewed during the summer. These included UAF police and fire officials, the FNSB Fire Chief, MACS officials (the Borough's Metropolitan Area Commuter System), and FNSB Student Transportation Managers.

SAC Meeting #2. A second meeting with Stakeholders was held on Friday, September 20, 2024, at the HHS library. Agency participants were the same as in the spring with some new administrators for the 2024-2025 school year. Changes since the spring and fall traffic levels were discussed. Options for a one-week field traffic control demonstration in October 2024 were reviewed. This one-week fall demonstration, or traffic control plan (TCP), would test low-cost circulation changes. The fall TCP demonstration would involve a contractor placing orange traffic cones and signs and include public information releases by KE and the Stakeholders, along with handouts to inform users of the test. The benefit of a one-week TCP is to better inform this study of the potential for more permanent changes. A demonstration project reveals what works and what doesn't before making more significant and costly investments into permanent changes.

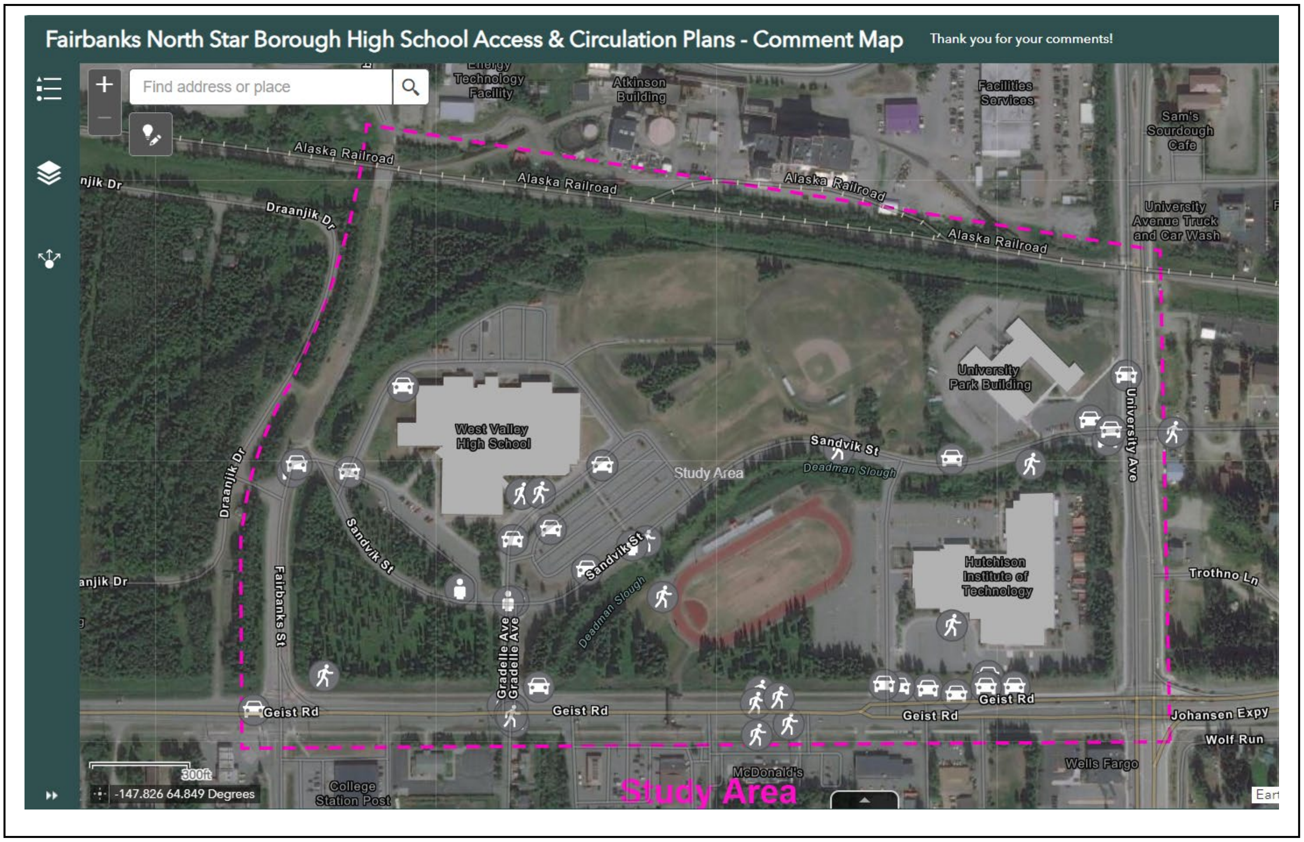
A list of significant Stakeholders' concerns discussed with KE is summarized in Table 4 on page 28.

Table 4. Stakeholder Advisory Committee (SAC) Input

Feature	SAC Input
Geist Road Ped Xing	• Top concern: Most frequently cited by school partner agencies • Lunch, coffee, McDonald's, and jobs attract students to cross Geist
WVHS Main Entrance	• Top conflict area between pedestrians and vehicles • Drivers seem to comply with one-way dropoff and pickup lane at peak times, but some drive contraflow during off peak hours • ADA parking is blocked at peak times
HHS Main Entrance	• Difficult to keep traffic moving at drop-off • Conflicts high near frontage access with very little storage area
Walking on campus	• Icy, dark conditions are unfavorable, poor lighting • No marked crossings at the back of HHS
Geist Driveways	• Traffic backs out to Geist, and onto Geist
Sandvik & University	• Encourage University Avenue access • Left turns from Sandvik are difficult, a safety concern, with no storage in median • Existing pedestrian beacon operations and indications appears confusing to some users
UAF University Park	• Childcare renovation impacts are expected to be significant • Full capacity use is expected • North side access uncomfortable for safety
Geist Road Streets	• Right turn lanes/slip lane concerns for conflicts with ped/bike users
Parking	• Lighting locations and signing assemblies do not meet latest standards and practices for crosswalks and intersections • UAF CTC programs fill back HHS lot; blocked in at departure times
Fairbanks Street	• Wide street design does not encourage lower speeds and traffic calming, more difficult for pedestrian crossing • Width helps with snow storage
Sandvik Street	• No shoulder. Unbuffered, parallel parking on rolled curb • Snow narrows roadway, difficult for walking in winter • Pedestrian conflicts on shoulders where no sidewalks or plowing • Lighting obsolete and damaged upon inspection
Busing	• WVHS bus ridership is about 150 students. This ranges from 140-200 students depending on time of day/month of year. • No bus service to HHS, but minimal use of shuttles being tested midday in recent years. Some informal AM stops at Sandvik for HHS • Onsite loading zone changes have occurred before and could be considered, however, it is critical that busing be able to depart from a location onsite and get to Fairbanks Street signal without being cut off by student departure from parking/pick-up aisles. Typical practice is to site busing doors at or near curbside and loading entrances to school building.
Start/Stop times	• WVHS "Extension" hours work well and alleviate congestion
Sandvik & Gradelle	• Existing all-way stop appears to work well; consider a roundabout

3.2.2 Public Comment

Over 50 public comments were gathered through informational flyers, school board meeting announcements, online social media, and a GIS map on the project website. Figure 12 is a screenshot of the comment map. One of the top public concerns was for students crossing Geist Road between traffic signals. This concern was echoed by elected officials in emailed input.



Source: DOT&PF project website for this FNSB High School and Circulation Plan
Figure 12. Public comment GIS map

The public comments are summarized in Table 5 on page 30:

Table 5. Public Input

Feature	Public Input
Geist Road Ped Xing	• A safe pedestrian crossing is needed. Signal or pedestrian bridge suggested, possibly at Gradelle Avenue. • Kids jump the fence to take the path of least resistance and not the intersections. It's a long walk to signal crossings, and kids run across the road. McDonald's reopening will increase this concern. • It is difficult to see pedestrians crossing, especially in winter during darkness. • A group of up to 35 students cross from a religious class across Geist Road during peak morning times.
WVHS Main Entrance	• Student crossing is high enough to cause long backups in drop-off lanes and using the parking lot for drop-off. Consider moving drop-off location. The parent drop-off lane should be moved. Consider the rear of the school for drop-off. • There is only one outlet for drop-off/pick-up in front of school, causing congestion and pedestrian safety issues. • People drive the wrong way in the one-way drop-off/pick-up zone of WVHS.
HHS Main Entrance	• Pedestrians at the drop-off can often be seen darting across the road. Parents don't pull all the way forward, causing Geist Road backups. • Consider moving parent drop-off
Walking on campus	• Students walk hourly between HHS and WVHS. An improved path around the football fields is desirable. • Safer pedestrian paths along Sandvik are requested, with more room, especially behind HHS in the congested area • Lack of winter plowing creates berms. Walking is more difficult.
HHS Geist Driveways	• HHS traffic backs up onto Geist Road towards University Ave. • There should be a right turn lane to prevent backups onto Geist Road. • Difficult to make a left turn onto Geist Road.
Sandvik & University	• There is not always enough time to cross University Avenue when the light is flashing. Crossing is more difficult under icy conditions. • Need to make a southbound right turn from University to Sandvik safer. • Difficulty making a left turn creates traffic backups on Sandvik Street.
Geist Road Streets	• The westbound right turn lane to Gradelle Avenue is not well plowed and gets huge bumps and chunks of ice in winter.
Parking	• Secondary drop-off/pick-up occurs in the student parking lots. This creates its own congestion. • Lack of winter plowing makes parking lots icier, difficult
Fairbanks Street	• A lighted path (diagonally) to and from the signal makes sense in winter for students walking year around. • There is eastbound congestion at this signal during school hours. • The corner at Fairbanks Extension is sharp and can be icy. It is difficult to make room for buses and to see pedestrian routes on this corner.
Sandvik Street	• Vehicles do not always stop long enough at STOP signs.

Feature	Public Input
	• Vehicles park along both sides of Sandvik in front of WVHS for drop-off/pick-up. Relieves internal congestion but narrows Sandvik. • Students must walk on snow berms in winter. • Lack of plowing in winter makes speed bumps disappear. • Speed bumps are hard to see. Must drive slower than speed limit to avoid undercarriage damage.
Busing	• Buses waiting to turn into loading zone block Sandvik and back into the all-way stop at Sandvik and Gradelle Avenues.
Sandvik & Gradelle	• Buses and cars conflict at this intersection. • It is difficult to see WVHS traffic entering from the north one-way loop. During winter this is noticeable because this is a snow storage area with a few trees.

3.3 Data Collection

Data collection included drone footage, traffic signal video counts, radar counts, and observed unsignalized intersection counts. Information was collected on vehicles, buses, pedestrians, and bicyclists.

3.3.1 Drone Footage (FAST Planning)

FAST Planning provided a drone footage snapshot of peak queuing during the afternoon dismissal on February 13, 2023, as shown in Figure 13. This showed daylight winter conditions and queues back to Gradelle Avenue when buses exit all at once onto arterial roadways.

Source FAST Planning

Figure 13. Winter queues during dismissal towards Fairbanks Street and Geist Road

Additional oblique aerial footage was taken by FAST Planning during the last days of school on May 8-9, 2024, as shown in Figure 14 to Figure 16. This provided a snapshot of the campus layout, bus loading activity, and peak crowds of lunch time students crossing to the Circle K gas station/food mart at the Fairbanks and Geist signal. Circle K is an example of students walking to commercial businesses. Students also cross to the West Valley Plaza and the McDonald's that is still under renovation.

Source: FAST Planning

Figure 14. Students crossing to Circle K gas station at lunch time (5/8/24 10:57 AM)

Source: FAST Planning

Figure 15. Bus Loading Zone (5/8/24 before 2:00 PM)

Source: FAST Planning

Figure 16. Bus Queued Departures all at once (5/8/24 after 2:00 PM)

3.3.2 Traffic Signal Counts at Arterial Intersections (DOT&PF)

DOT&PF collected 24-hour turning movement counts at three signalized intersections using Miovision cameras. These locations are shown with yellow stars in Figure 17 on page 35 at:

- Geist Road & Fairbanks Street (Tuesday, April 30, 2024)
- Geist Road & University Avenue (Monday, April 29, 2024)
- University Avenue & Sandvik Street (Monday, April 29, 2024)

3.3.3 Unsignalized Turning Movement Counts (KE)

Turning movement counts were collected by KE staff at campus access points to arterials and internal campus intersections. Data was gathered during weekdays from April 11 through April 24, 2024. Additional field observations were made the second to last week of school (April 29 through May 3, 2024) to view circulation on road segments and interactions between users.

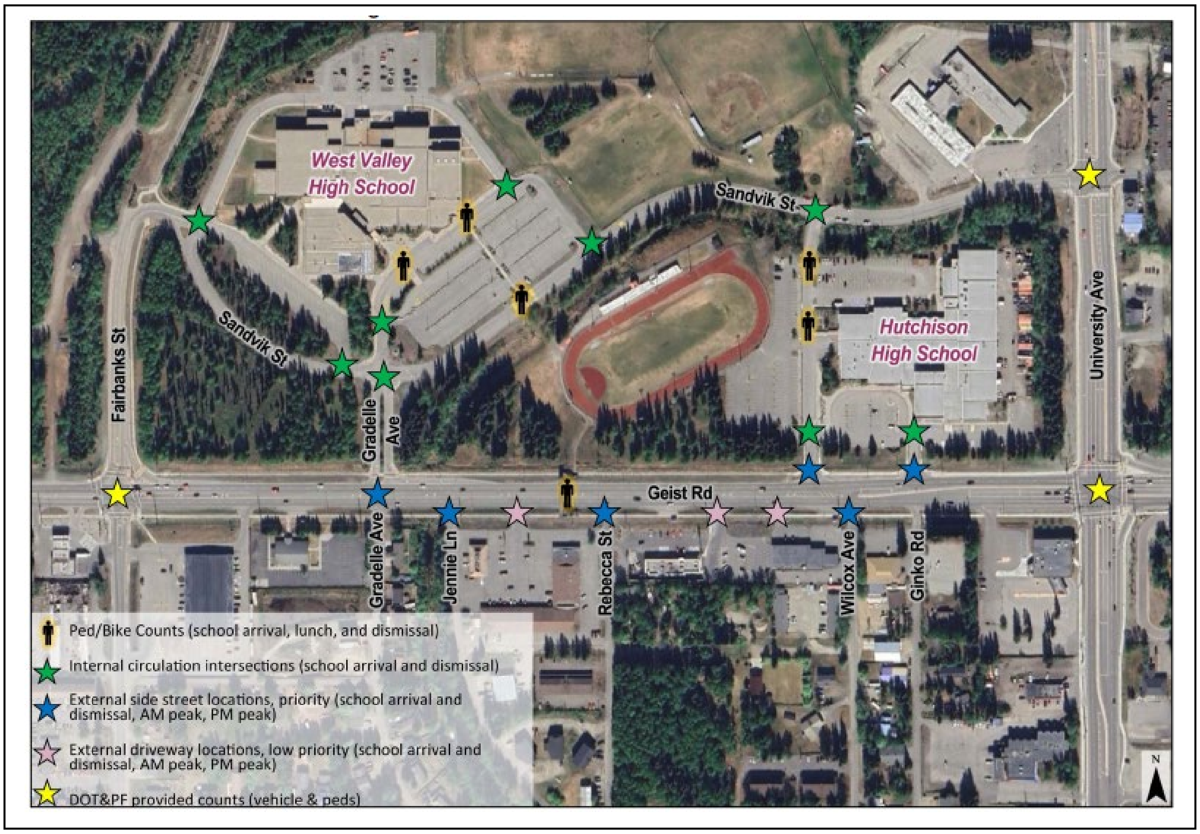


Figure 17. Turning movement count locations, Spring 2024

All turning movement counts included pedestrians and bicyclists. Counts were gathered during the school arrival and dismissal periods. PM peak hour counts were gathered at the two traffic signals. All other school intersections were quiet at that time.

On-campus pedestrian crosswalks were observed, as well as the Geist Road crossing shown by pedestrian symbols in Figure 17 above. No Geist Road pedestrian crossings occurred during spring data collection, most likely due to McDonald's being closed for renovation. However, subsequent field visits in the fall of 2024 did find pedestrians crossing along Geist Road at and between signals.

Spring field observations included the lunch hour. It was found lunch hour traffic levels were significantly less of a vehicular conflict than the volumes seen at school start and dismissal. No traffic counts were taken on the campus during the lunch hour.

Figure 18 on page 36 and Figure 20 on page 38 provide peak hour traffic volumes for 7:30 AM school start. Figure 19 on page 37 and Figure 21 on page 39 show the peak hour volumes for school dismissal at 2:00 PM. Peak traffic for each period lasts about 20 minutes and occurs just before school start and just after school dismissal. Turning movements were re-balanced for further analysis by calculating the differential in counts between intersections and distributed to each intersection until inbound and outbound counts were equal other than adjustments for parking. Prohibited turns and turning movements of concern are shown in red.

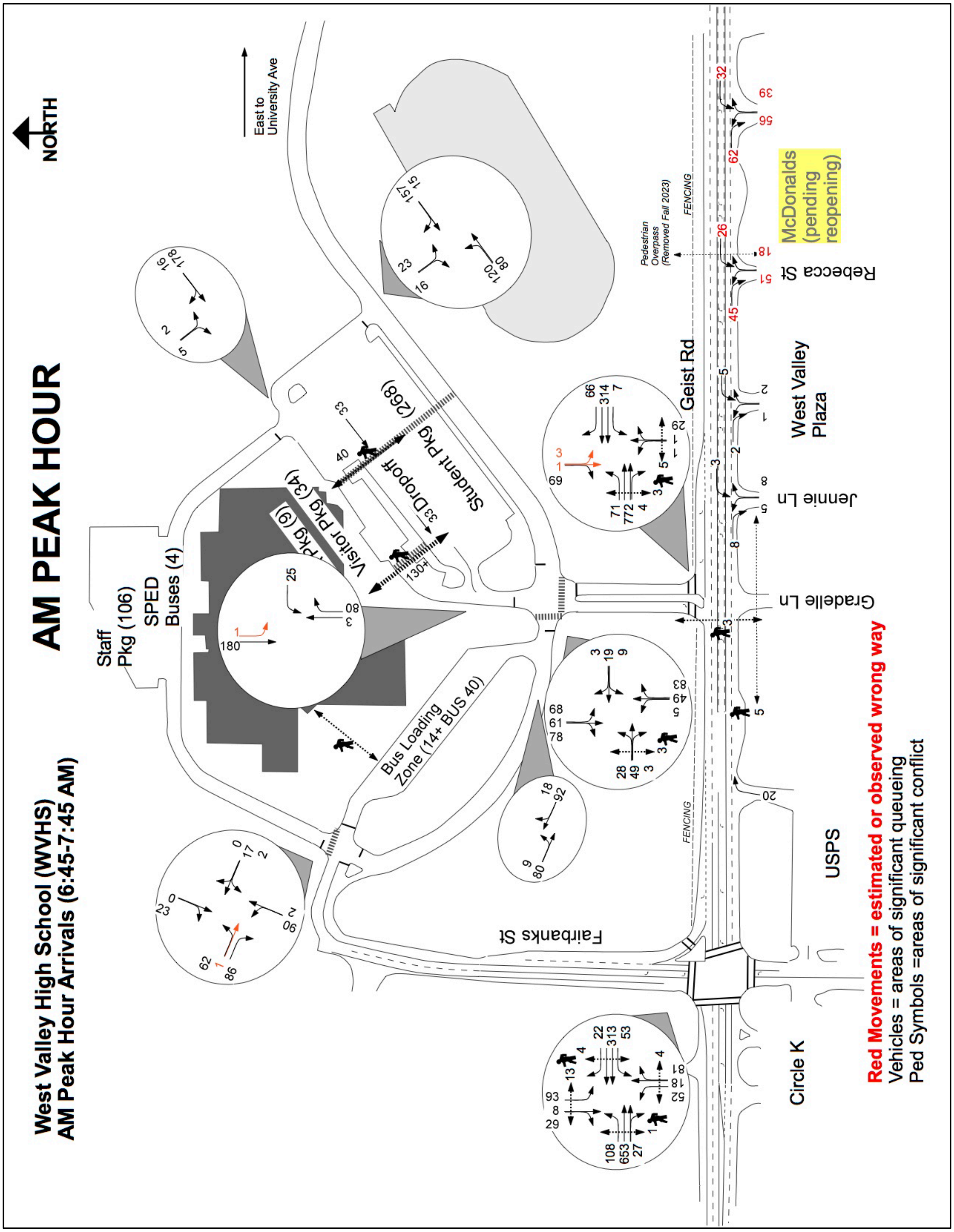


Figure 18. WVHS arrival 7:30 AM peak hour turning movement volumes (TMV)

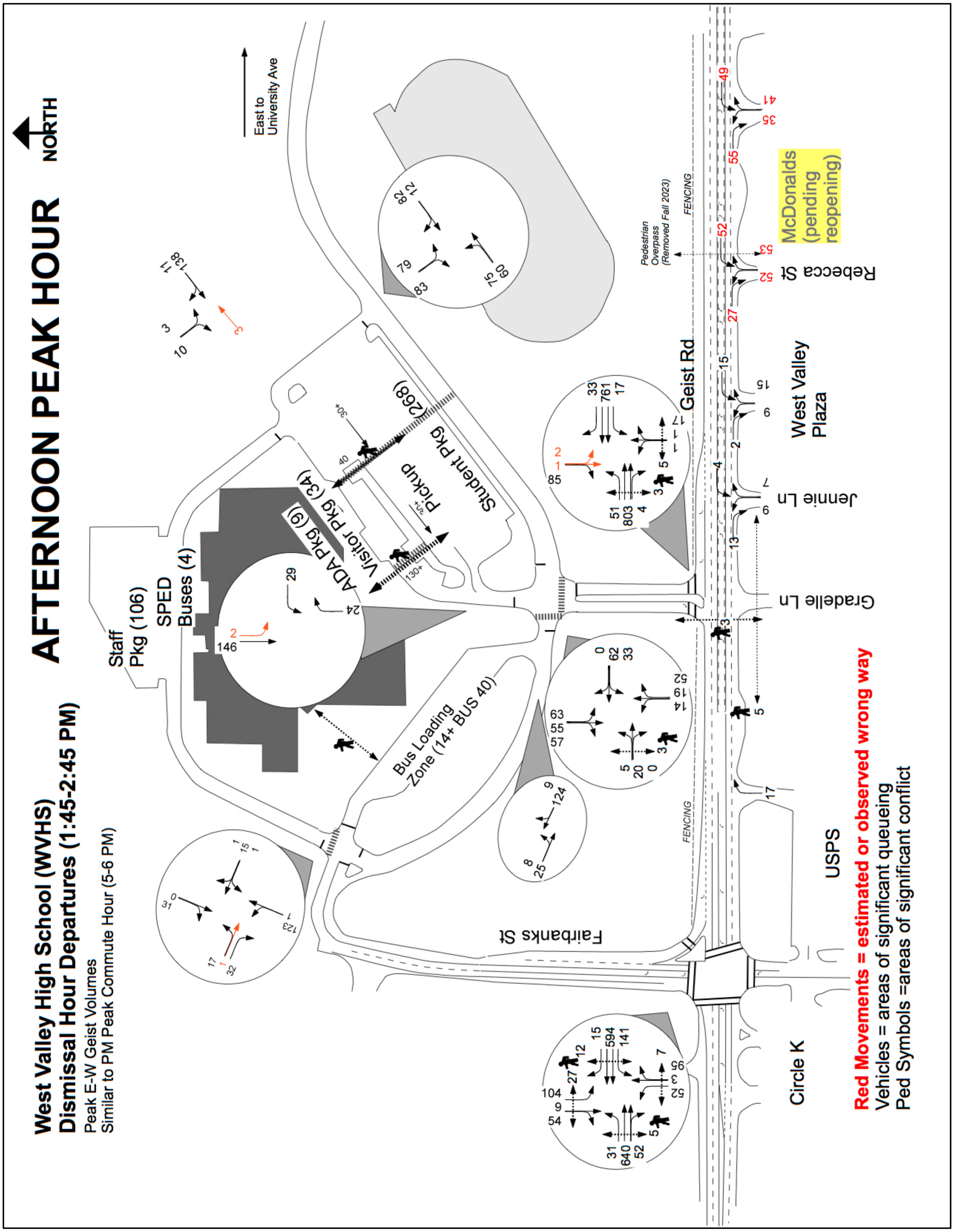


Figure 19. WVHS dismissal 2:00 PM hour turning movement volumes (TMV)

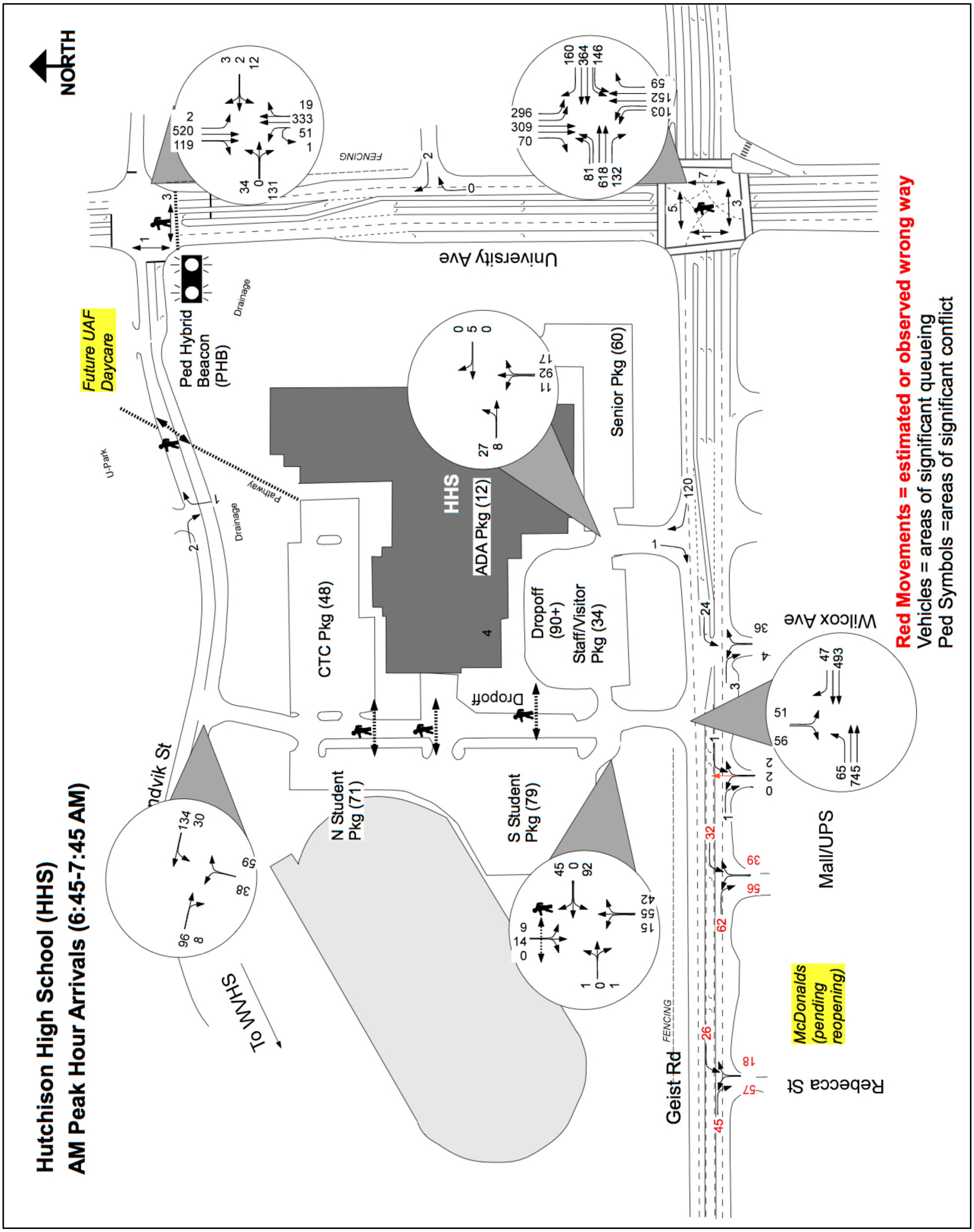


Figure 20. HHS arrival 7:30 AM peak hour turning movement volumes (TMV)

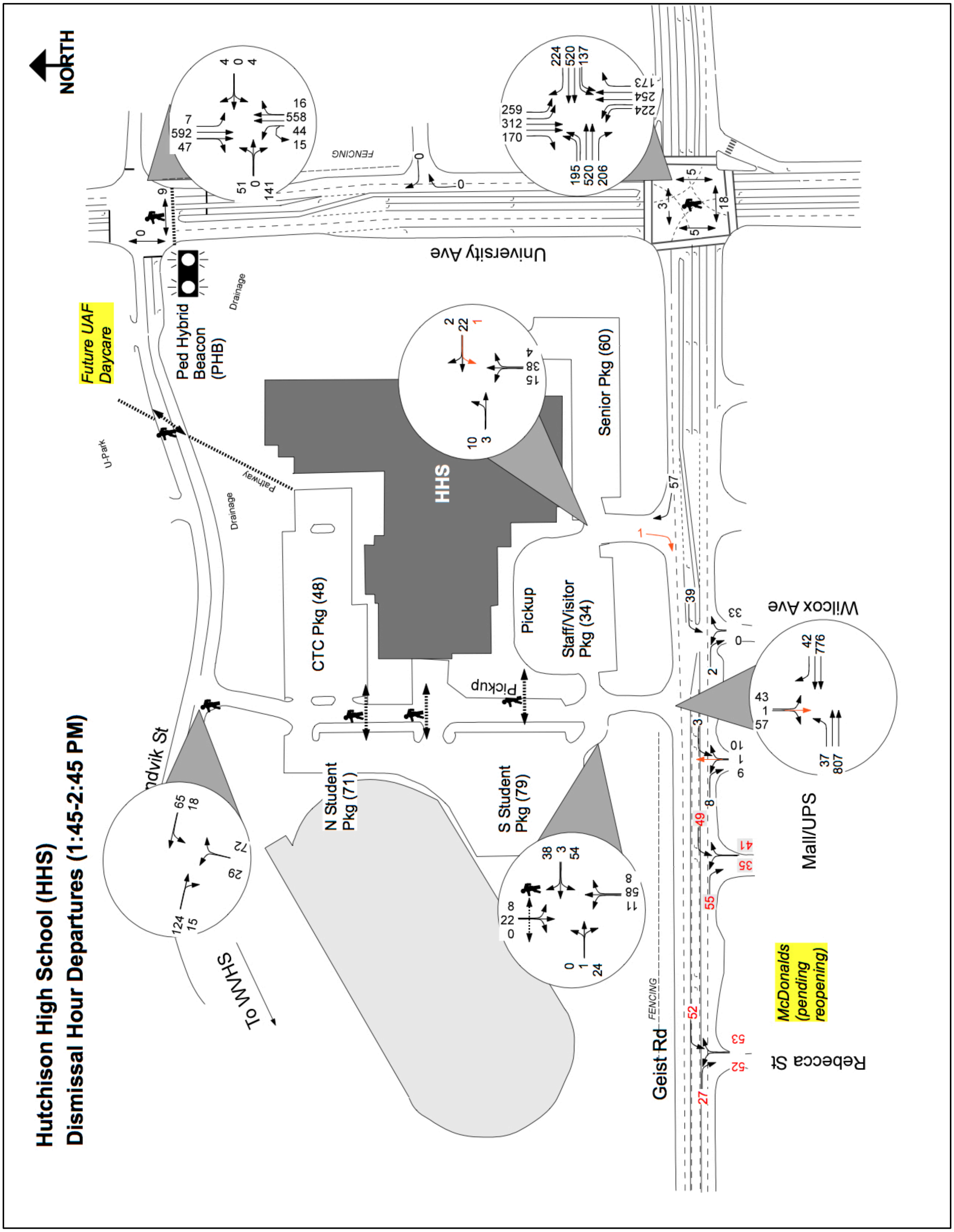


Figure 21. HHS dismissal 2:00 PM hour turning movement counts

Off-campus turning movement counts were gathered for the 5-6 PM peak hour. While school traffic was not active at this time, this is the highest adjacent peak hour for comparison to school peak times.

A review of the turning movement volume data shows:

- The highest number of conflict points for traffic associated with WVHS occurs at the intersection of Gradelle Avenue and Sandvik Street.
- At HHS, the main conflict point occurs along the north-south “spine” road at the entrances to the parking areas directly off of Geist Road.
- The biggest conflict points between the traffic from both schools occurs on Sandvik Street, at the north end of the “spine” road on HHS.
- Queues were observed along Sandvik Street during WVHS drop-off/pick-up and backing onto Geist Road during HHS drop-off/pick-up.

3.4 Traffic Patterns

West Valley High School and Hutchison High School have a peak hour factor (PHF) ranging from 0.4 to 0.6. This means nearly all arrival traffic is concentrated within ½ hour in the morning before school starts and ½ hour after school ends. Instead of being spread out over an entire hour, this concentration of school traffic has congestion and queuing equivalent to as if twice the traffic counted were present for a whole hour.

Synchro 11 software was used to analyze the peak hour of traffic when school begins (6:45 to 7:45 AM) and when school is dismissed (1:45 to 2:45 PM). The software's SimTraffic module was used to simulate congestion and queuing and calibrate results to reflect observed peak 15-minute periods before and after school (7:15 to 7:30 AM and 2:00 to 2:15 PM).

3.4.1 West Valley High School Patterns

WVHS volumes in the morning were around 800 vehicles per hour entering and exiting. Non-motorized traffic counts were less than 10 people.

3.4.1.1 WVHS AM Start: Arrivals and Departures – Turning Movement Distribution

Figure 22 and Figure 23 depict how traffic arrives and departs from WVHS in the morning.

Arrivals: WVHS demonstrates a higher ratio of arrivals coming from the east compared to coming from the west at school start times. Total inbound demand is about 460 vehicles per hour. Ratios of inbound traffic are shown below.

Departures: After parking and drop-off, AM-departing traffic favors heading to the east by a ratio of 2:1, depending heavily on the Geist Road and Fairbanks traffic signal and the Sandvik exit to University Avenue. Total outbound demand is about 300 vehicles per hour.

Parking: The difference between inbound and outbound traffic suggests nearly 160 vehicles remained parked after the morning peak hour was over. This amount of parking demand occurs in the AM and reverses to become exiting traffic in the PM.

Buses: At least fourteen (14) buses were observed with each site visit. Bus route schedules are posted on the School District Transportation website. Eight (8) buses during AM routes arrive from the west after picking up students. These buses enter the campus by making left turns onto Gradelle Avenue from Geist Road. Then they travel into the bus loading zone. Six (6) buses during AM routes make right turns coming from the east end of Geist Road, turning onto Gradelle Avenue, then into the bus loading zone. Ingress can vary between Gradelle Avenue or Fairbanks Street, depending upon congestion levels impacting left turns from Geist Road. In the Spring of 2024, field observations showed no buses making an eastbound left onto Gradelle Street. However, Gradelle Street is the desired arrival route for AM bus schedules shown for the fall of 2024. Gradelle Avenue offers an unsignalized access which can have less delay due to not having left turn signalization, contingent upon available gaps in traffic between existing signals. Three (3) shorter special eduction (SPED) buses were noted to travel to the rear of the school for closer access to classroom dropoff.

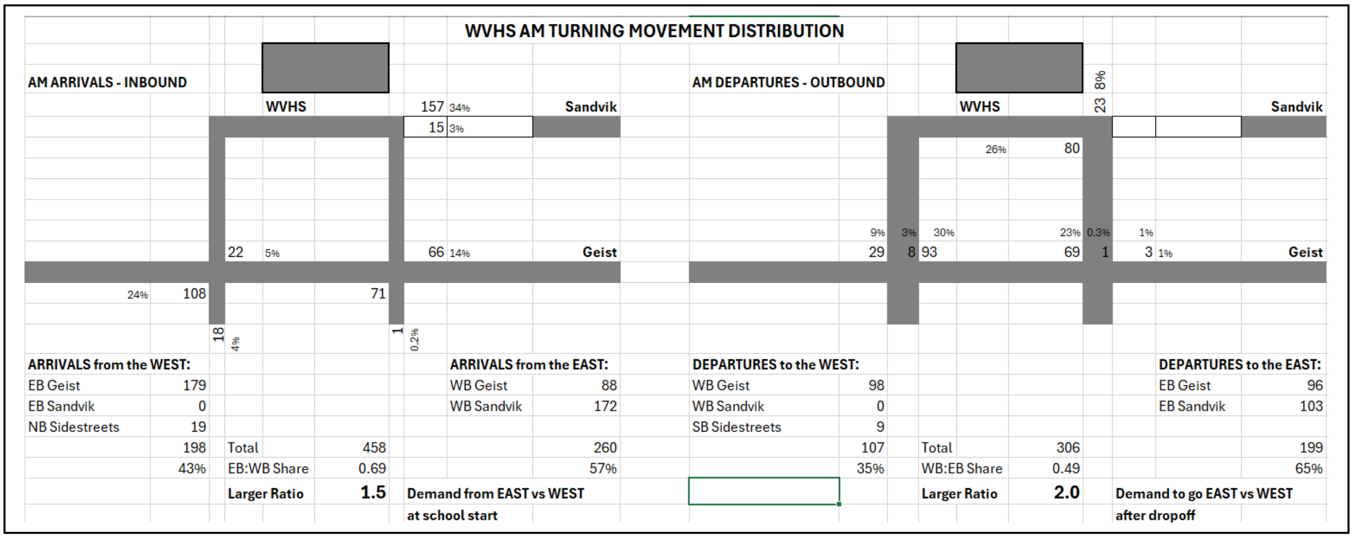


Figure 22. WVHS AM arrivals and ratios via existing major points of access

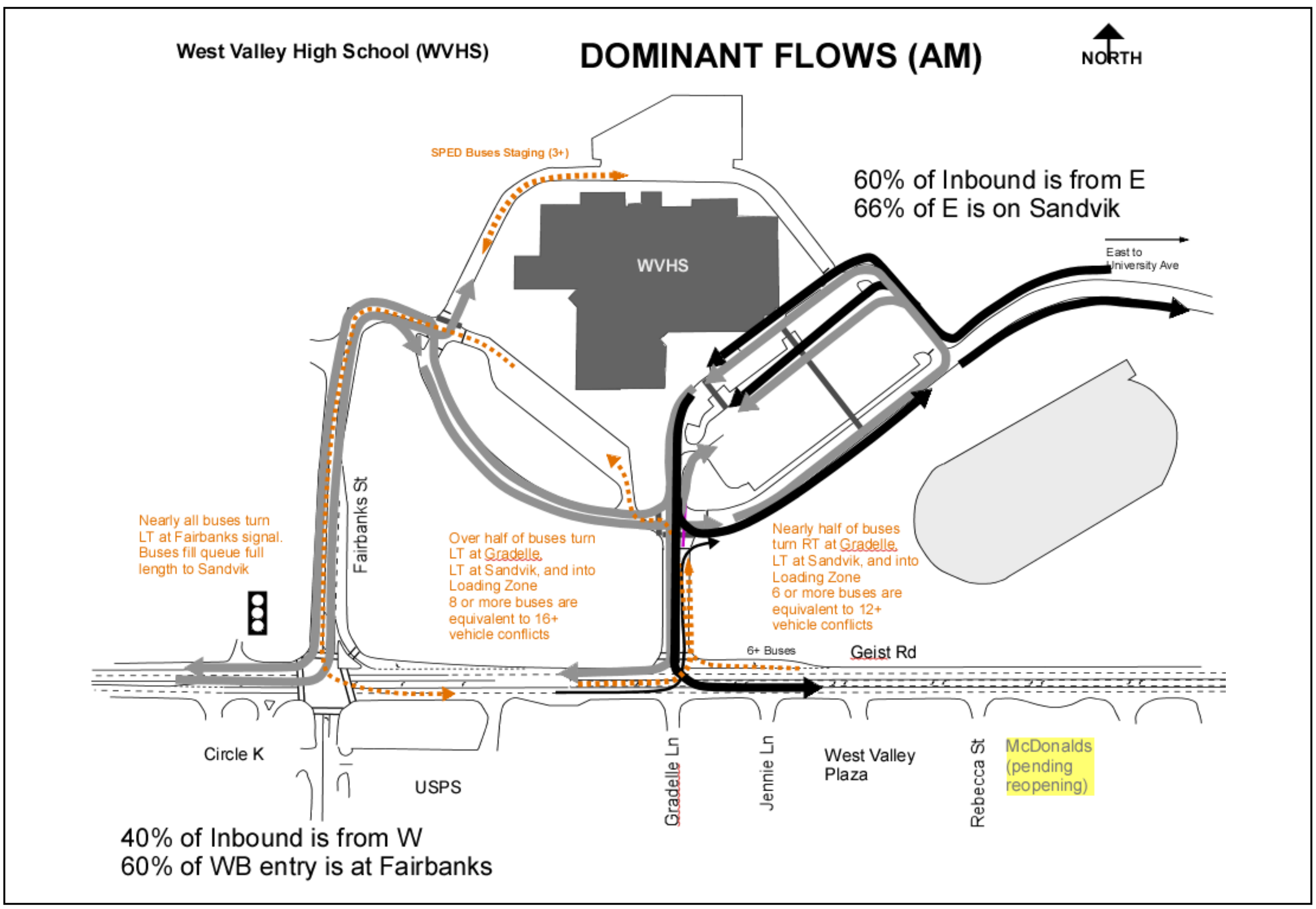


Figure 23. WVHS higher demand circulation patterns (AM arrivals and departures)

3.4.1.2 WVHS PM Dismissal: Arrivals and Departures

Figure 24 and Figure 25 depict how traffic arrives and departs from WVHS in the afternoon.

Arrivals: In the afternoon, WVHS demonstrates a 1.7:1 ratio of arrival demand from the east compared to the west. Total inbound demand is about 230 vehicles per hour.

Departures: Total outbound demand is about 400 vehicles per hour. Departing traffic primarily uses the Fairbanks Street signal to turn left onto Geist Road. More than one-quarter of WVHS traffic departs via Sandvik Street to University Avenue, overlapping with HHS departures.

Parking: The difference between outbound and inbound demand indicates WVHS parking as high as 170 vehicles during the day. This is comparable to the AM turning movement counts differential. The rapid emptying of the parking lot to the east and west are large dominant movements in the afternoon.

Buses: Bus routes are different in the afternoon with a single concentrated departure. All buses are staged onsite at WVHS, with 14 buses currently scheduled to queue diagonally in the west side bus loading zone. Three or more shorter SPED buses are staged at the back of the school for closer proximity loading of students. After 2:00 PM bus loading requires less than ten minutes, then buses depart to Fairbanks Street. All buses make a southbound left turn onto Geist Road to head to two middle schools to the east.

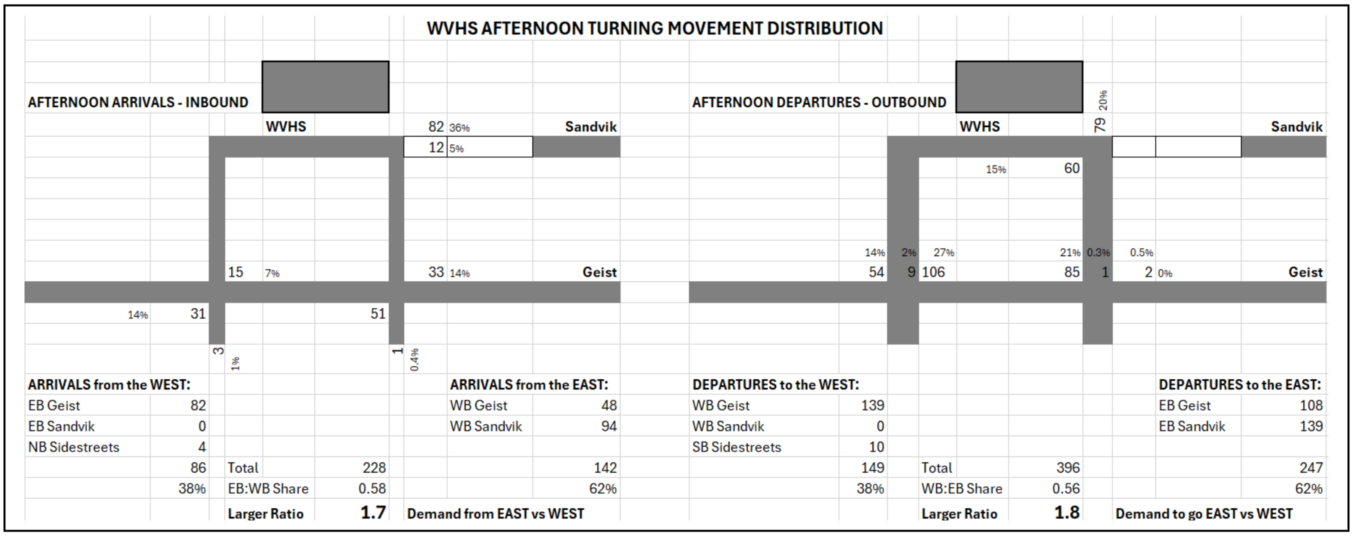
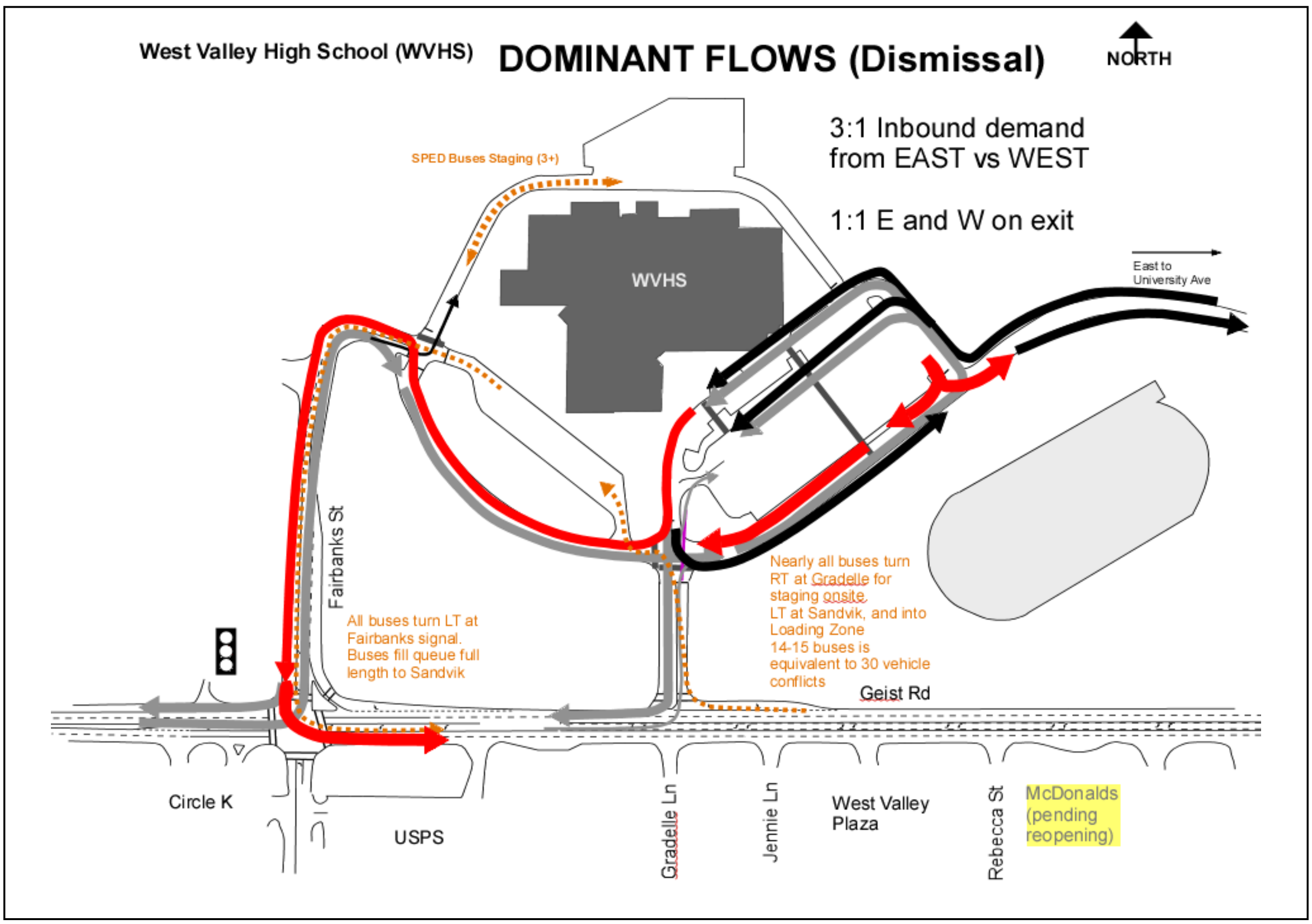


Figure 24. WVHS afternoon arrivals and ratios via existing major points of access



PM changes that differ from AM dominant directions from parking lot exits are shown in red.

Figure 25. WVHS overall higher demand afternoon circulation pattern (PM dismissal)

3.4.1.3 WVHS Pedestrians and Bicyclists

Offsite: Pedestrian and bicyclist counts were observed in April and May and again in October. There were less than a dozen offsite users per peak hour in the late spring. However, drone footage demonstrates higher uses during the lunch hour to and from commercial areas, primarily to the Circle K gas station. Stakeholder and public input mention higher midday use can be expected once McDonald's reopens, combined with West Valley Plaza attractions.

October observations showed a significant number of students walking from the campus at dismissal time, with about two dozen students walking in groups of one to three to the Fairbanks Street and Geist Road signalized crosswalks, mostly to get to Circle K. About a dozen students were observed to walk to Gradelle Avenue at Geist Road, with most walking along the north side sidewalk. Of these, a few crossed Geist Road at the unsignalized intersection, with at least one waiting at the transit stop across the roadway.

Onsite: Pedestrian counts are very high from the parking areas to and from the school entrances. The highest pedestrian conflicts are to and from the main entrance and nearly equivalent to motorized vehicles in the drop-off/pick-up zones.

Dismissal: A steady stream of pedestrian demand during afternoon dismissal at the WVHS main entrance was observed to be heavy enough to hold up motorized traffic in the pick-up lanes. Pedestrians must be flagged by staff to help create breaks to release vehicles.

"Extension": This is the term for flexible scheduling of each student's start and end times at WVHS. This significantly helps redistribute pedestrian and vehicular demand over an hour. In the morning peak hour, many pedestrians arrive in large numbers through the parking lot and across the drop-off lanes. They are more concentrated as they wait for the school starting bell. Extension students wait for delayed start and exit their vehicles after 7:30 AM, when conflicts with vehicles are lower.

Ped Safety Zones: Pedestrian safety zone is the official State of Alaska term for facilities dedicated to pedestrian use such that motorists are prohibited or must otherwise yield the right-of-way to pedestrians (13 AAC 02.155). These zones include sidewalks, separated pathways, and marked crosswalks. The entire route between school entrances through the track and football field would be one example.

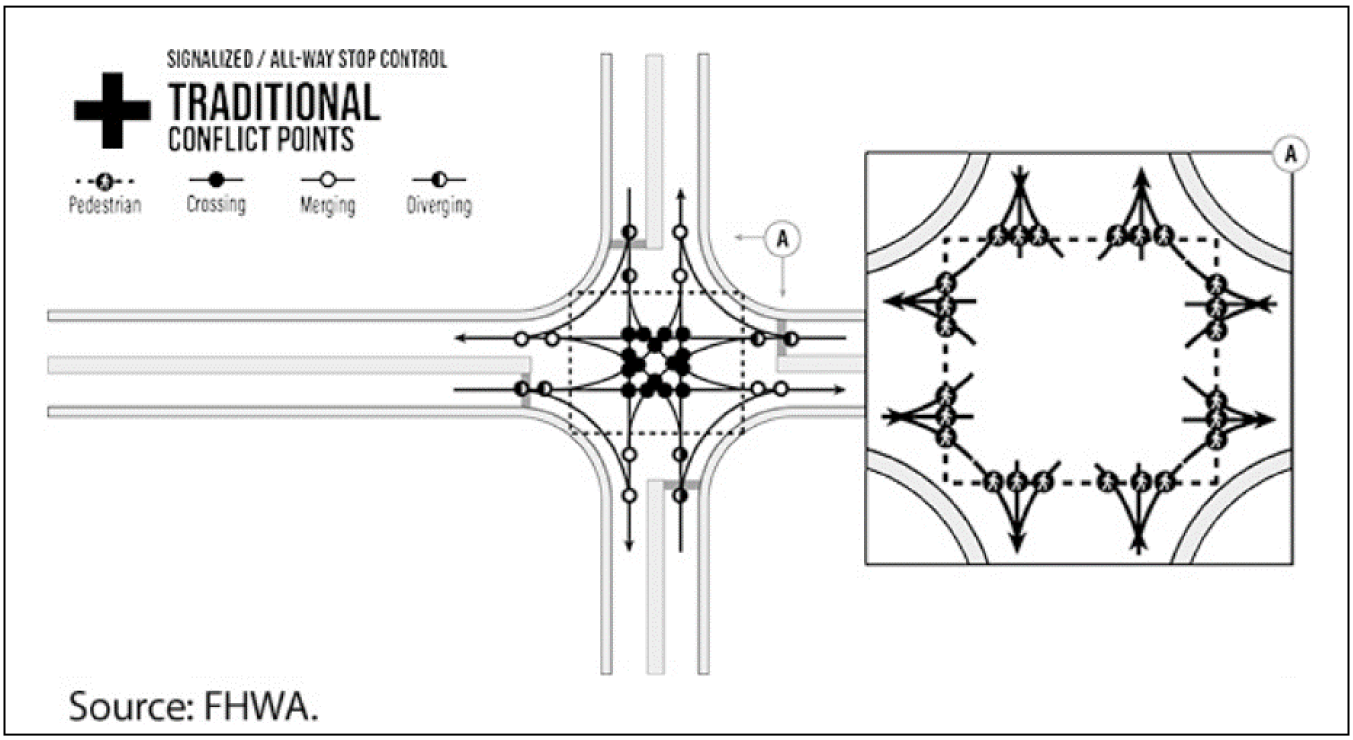
During arrival, lunch hour, and dismissal times, pedestrians not only walk along sidewalks and use crosswalks, but also walk outside of pedestrian safety zones along shoulders, such as on Sandvik Street, and midblock crossings on all streets. Outside of dedicated and marked non-motorized facilities, pedestrians are more vulnerable to vehicles and crash risks compared to pedestrian safety zones.

Pedestrians cross Geist Road outside of marked crossing locations for various reasons: to catch a ride with a driver who is avoiding congestion onsite, to catch the transit system, to access retail development, and to walk to home.

3.4.1.4 WVHS Existing Conditions Concerns: Conflicting Volumes and Operations

Turning traffic at intersections typically overlaps with through traffic. These overlaps represent "conflicts" with a potential for crashes. When turns are allowed in every direction combined with pedestrians crossing all legs of the intersection, there can be as much as 56 points of conflict within the intersection. During school start and dismissal times, having traffic in all 56 points of conflict presents more difficulty for visibility and attention. Figure 26 below shows the conflict points at a generic four-way intersection.

Figure 27 on page 47 and Table 6 on page 48 show existing conditions and issues gathered and presented to stakeholders. This map includes queueing lengths indicated as lines of vehicles or map notes. These traffic queues are based on stakeholder input, drone footage and data collection, and project observations from spring 2024. When considering campus changes to circulation, each movement that is relocated can decrease conflict points at an intersection. Conflict points were not counted as a performance measure on the FNSB campus. Instead, options for more efficient routing are expected to reduce conflict points in a way that will be measured as performance outcomes in terms of less congestion and less delay in the network overall.



Source: FHWA Publication No.: FHWA-SA-21-013 Safe Systems for Intersections (SSI)

Figure 26. Example of maximum conflicts at an intersection with movements in all directions (32 vehicular conflicts and 24 pedestrian conflict points; 56 total)

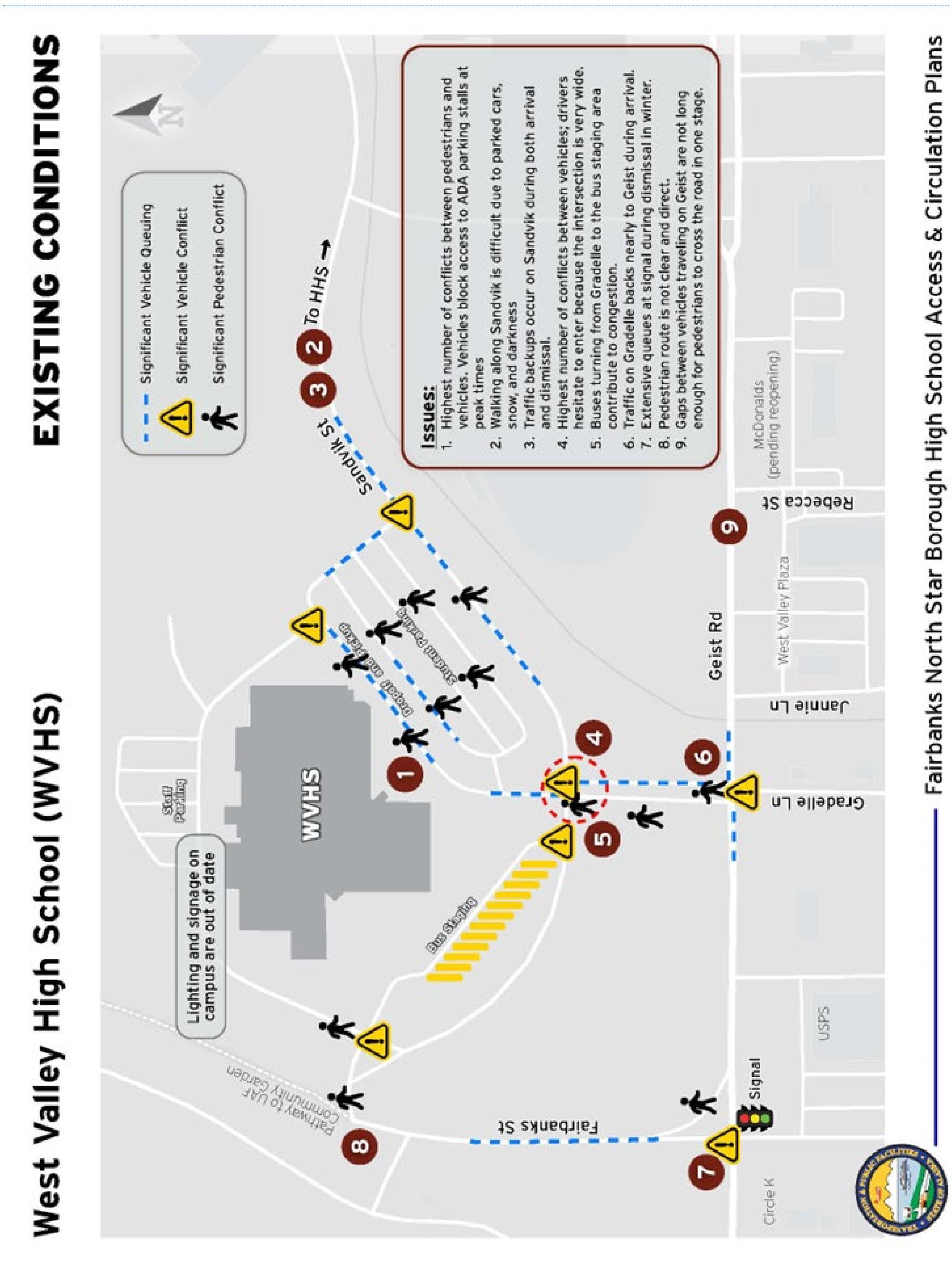


Figure 27. WVHS Existing Conditions Operational Concerns

Table 6. WVHS Existing Conditions – Operational Concerns related to Potential Future Needs

Concern	Location	Description	Potential Future Needs
1	**Main School entrance (Dropoff/Pickup)**	High pedestrian volumes	Address conflicts, reduce or separate some conflicting volumes
2	**Main parking lot**	Lighting, signing, visibility, plowing concerns	Improve visibility, design for plowing
3	**Sandvik & Gradelle**	Wide intersection, high conflicts, STOP compliance	Improve intersection shape, channelization, and reduce or separate conflicts
4	**Gradelle & Geist**	Queuing, pedestrian crossing safety across arterial, and at STOP sign with westbound right turn lane	Address queuing source upstream, improve intersection, and reduce or separate conflicts
5	**Bus loading entrance**	Close to Gradelle and Sandvik, queuing	Relocate intersection and reduce or separate conflicts
6	**Bus loading exit**	Pedestrian crossing in loading zone off sidewalks, less visibility	Improve visibility and reduce or separate conflicts
7	**Fairbanks Extension**	Pedestrian routes not clear or used	Provide walking routes meeting demand paths
8	**Fairbanks & Geist**	Queuing on departure	Improve capacity and reduce congestion
9	**USPS driveway**	Steady traffic uses gaps	Improve gaps for school
10	**Back parking lot**	No concerns noted	N/A
11	**Geist Road queuing**	Longer queues noted at Loftus Road westbound for Elementary access than at Fairbanks Street eastbound	N/A

3.4.2 **Hutchison High School Patterns**

Total entering and exiting volume generated by HHS in the morning is around 500 vehicles per hour. Nonmotorized traffic counts were less than 10 people walking to and from the campus.

Figure 28 and Figure 29 depict how traffic arrives and departs from HHS in the morning.

3.4.2.1 HHS AM Arrivals and Departures: Turning Movement Distribution

Arrivals: HHS demonstrates a 2.7:1 ratio of demand of arrivals from the east compared to the west in the morning at school start times, mainly right turns. Total inbound demand is about 270 vehicles per hour.

Departures: During morning drop-off, HHS demonstrates a 1.2:1 ratio of demand to head east compared to west. Total outbound demand is about 200 vehicles per hour.

Parking: The difference between inbound and outbound traffic suggests nearly 70 vehicles remained parked after the morning peak hour was over.

Busing: No direct busing service was observed in spring 2024. Buses have been noted by stakeholders to drop-off some students at Sandvik Street and the north HHS access spine road. Three to four buses are being used as part of a bus shuttle program that has been implemented in the afternoons for fall of 2024.

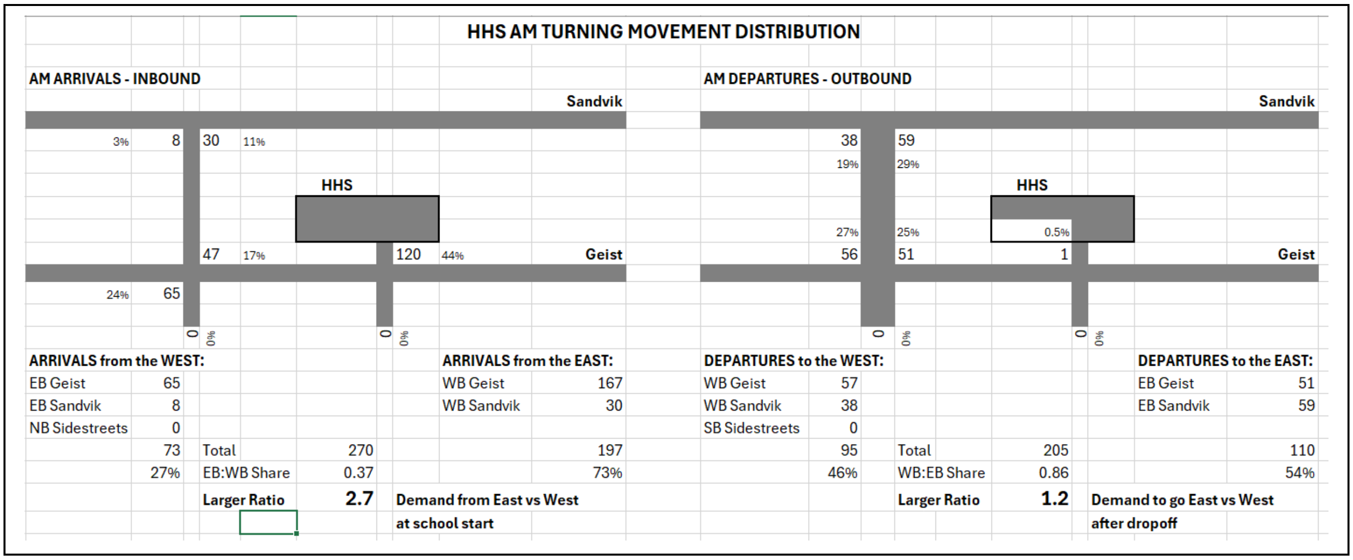
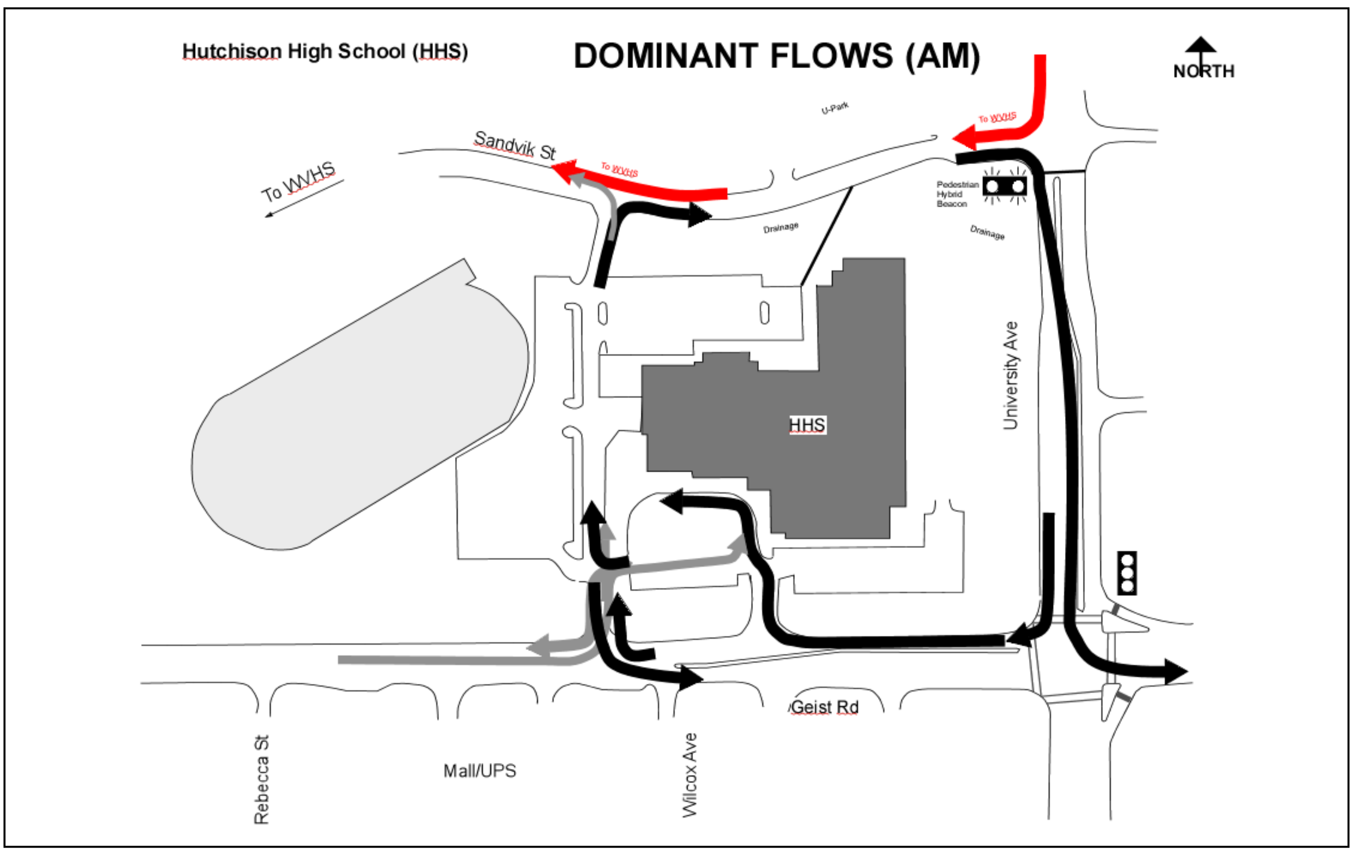


Figure 28. HHS AM arrivals and ratios via existing major points of access



WVHS arrivals are shown in red on perimeter of HHS traffic.

Figure 29. HS overall circulation pattern (AM arrival)

3.4.2.2 HHS Afternoon Arrivals and Departures: Turning Movement Distribution

Figure 30 and Figure 31 depict how traffic arrives and departs from HHS in the morning.

Arrivals: HHS demonstrates a 2.3:1 ratio of demand of arrivals from the east compared to the west at school dismissal time. Total inbound demand is about 170 vehicles per hour, mostly right turns.

Departures: During afternoon pick-up time, HHS demonstrates a 1.3:1 ratio of demand to head east compared to west. Total outbound demand is about 200 vehicles per hour.

Parking: The difference between inbound and outbound traffic suggests that at least 30 vehicles remain parked after the dismissal hour is over. Because HHS has evening courses, the smaller difference in inbound vs outbound traffic in the afternoon indicates a staggered departure and more students and faculty staying for more than a ½ hour after dismissal.

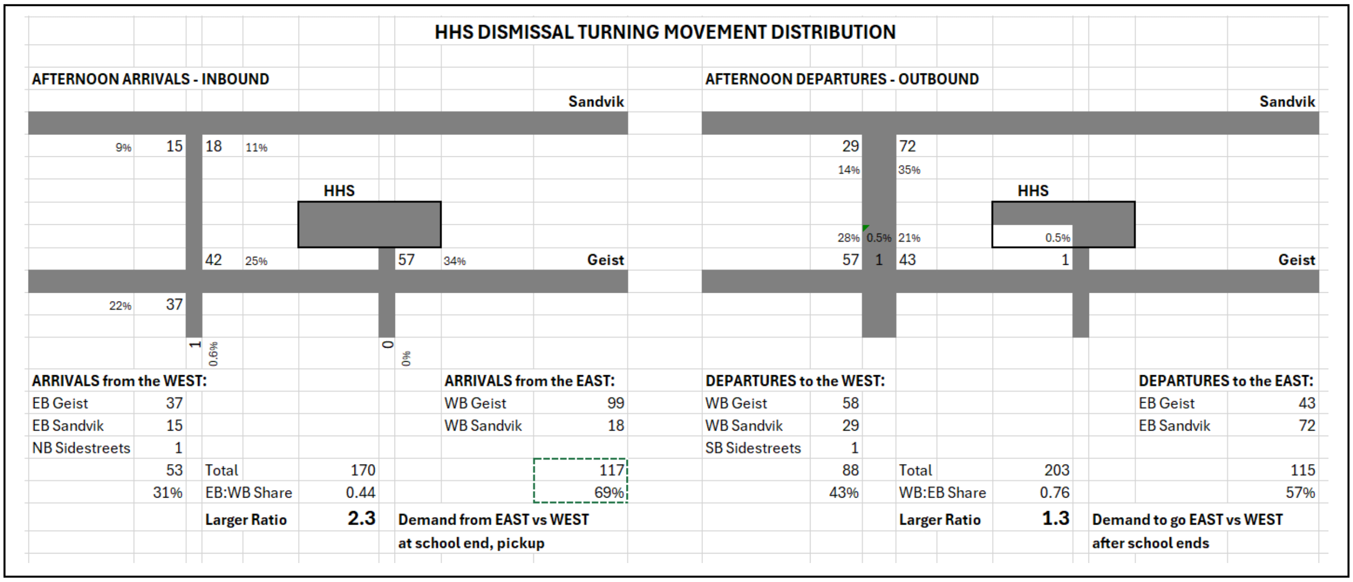
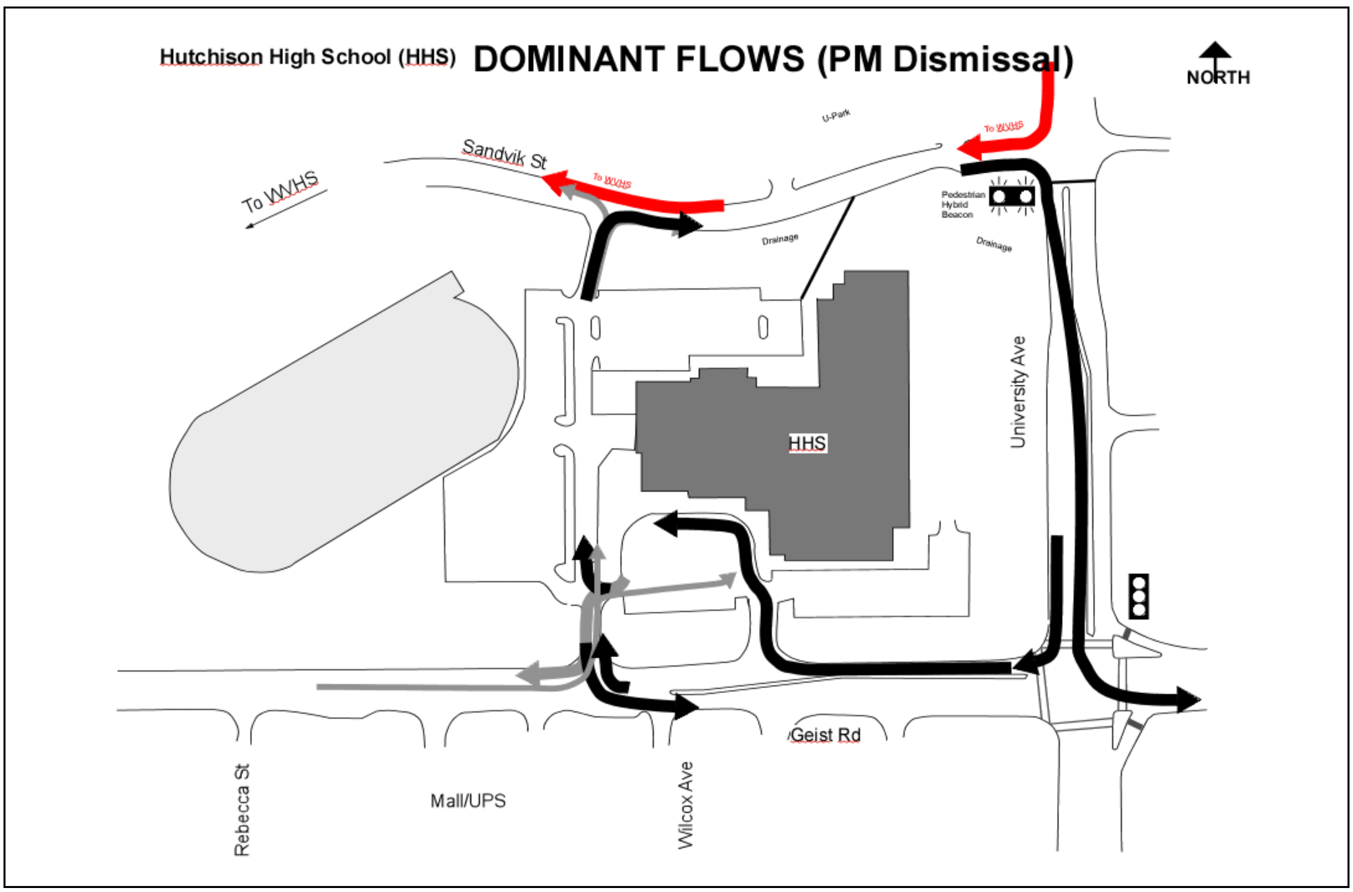


Figure 30. HHS afternoon arrivals and ratios via existing major points of access



Red arrows are traffic to WVHS

Figure 31. HHS overall afternoon circulation pattern (PM dismissal)

3.4.2.3 HHS Pedestrians and Bicyclists

Pedestrian and bicycle counts were low to and from the HHS campus with less than ten users per peak hour. Internal to the campus, pedestrian counts are high from the school entrances to the parking areas. The highest pedestrian conflicts were observed to and from the main entrance.

A few pedestrians were observed to cross Geist Road directly at HHS driveways after school dismissal. This is outside of pedestrian safety zones such as the marked signalized crosswalks at University Avenue. The signal is 400 feet or just over one block from the HHS east driveway and nearly two blocks from the HHS west driveway. The primary purpose of crossing observed was for parent pickup or to catch the transit stop.

3.4.2.4 HHS Conflicting Volumes and Operational Concerns

Figure 32 on page 54 and Table 7 on page 55 show the same substantial motorist turning conflicts and pedestrian crossing conflicts at HHS in the afternoon as in the AM arrival hours. Areas of queueing are indicated based on stakeholder input, drone footage and data collection, and observations made in spring 2024.

The drop-off area was underutilized, as vehicles would not pull forward, cutting usable curb frontage by one-half. The queueing and vehicle storage area between Geist Road and the parallel “frontage” lane is inadequate for higher volume demand and does not accommodate queueing lengths at recommended engineering setbacks. The frontage relies on ambiguous sign messaging which instructs motorists of “no left turns during congestion” on the western drive, as well as conflicting messaging at the eastern drive by using a STOP sign southbound. The eastern driveway is one-way northbound only, while a STOP sign does not clearly instruct that southbound traffic is a wrong way movement.

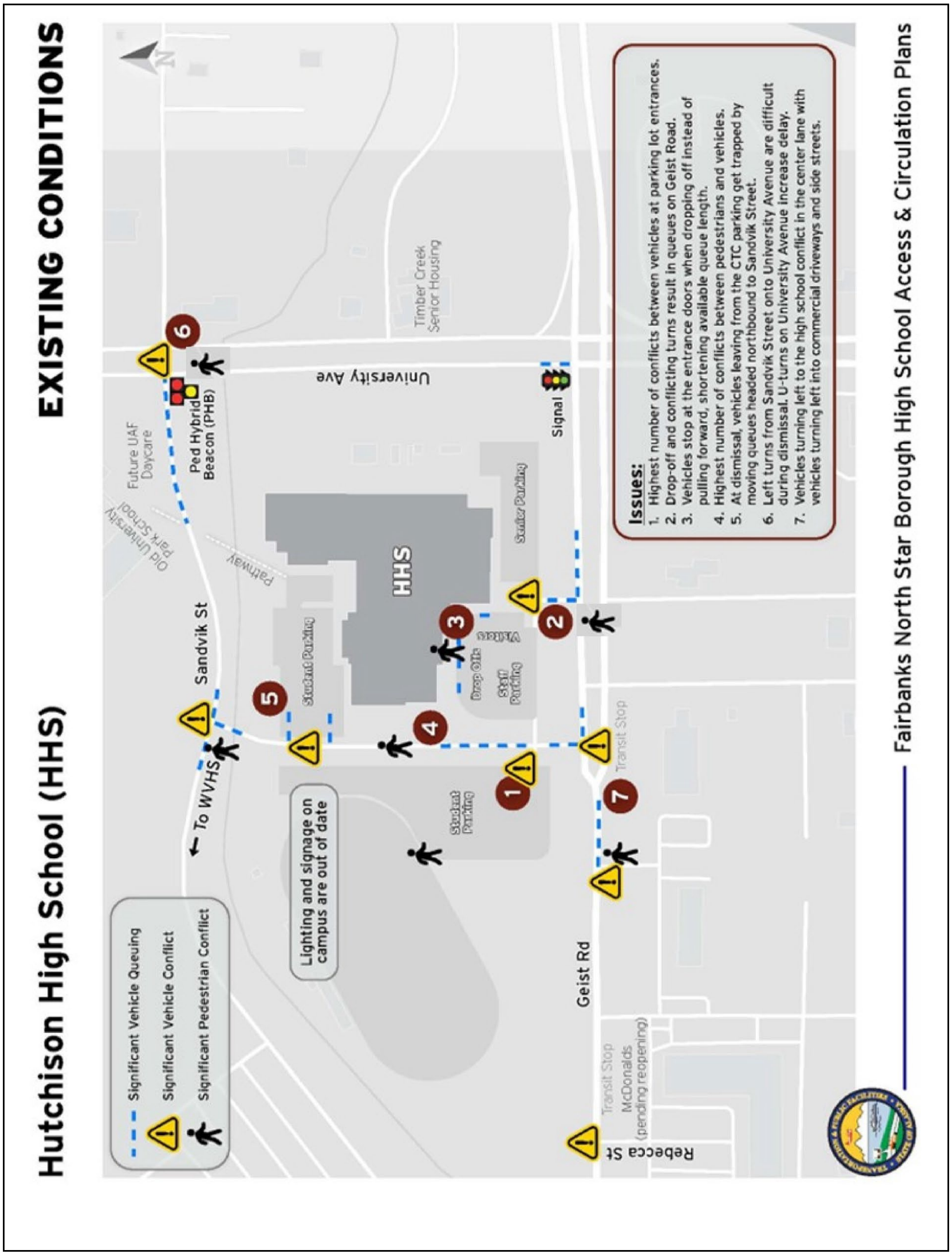


Figure 32. HHS operational concerns and higher points of conflict

Table 7. HHS Existing Conditions – Concerns gathered and potential future needs

Concern	Location	Description	Potential Future Needs
1	**Main Frontage Intersection**	Highest conflict area, backs onto Geist Road, narrows in winter	Improve or relocate intersection, reduce or separate conflicts
2	**Main Access & Geist**	Traffic backs into Geist Road. Difficult left turns out.	Improve or relocate intersection, right turn lane, reduce or separate conflicts
3	**Frontage & E Driveway**	Backs onto Geist Road, conflicts with circulating parking traffic	Improve or relocate drop-off, reduce or separate conflicts
4	**E Driveway & Geist**	Backs onto Geist Road. Ambiguous signing for DO NOT ENTER and STOP at Geist Rd	Improve storage or relocate access, reduce or separate conflicts. Clear up signing.
5	**Main Entrance**	Drop-off/pick-up does not move forward, causes queues	Improve or relocate, reduce or separate conflicts. Entrance changes may help.
6	**Sculpture Walkway**	Underutilized space, visibility, higher pedestrian crossing	Improve, reroute, or relocate, reduce or separate conflicts
7	**Culinary Arts Loading**	Wide area, informal drop-off	Improve, channelize, or relocate, reduce or separate conflicts
8	**Back lot parking**	Difficult to get back out	Improve or add access and reduce or separate conflicts
9	**Sandvik & HHS**	Wide intersection, visibility, pedestrian space	Improve or channelize intersection and reduce or separate conflicts
10	**U-Park Ped Xing**	Outdated, visibility	Improve visibility
11	**Sandvik & University**	Difficult left turns and crossing times.	Improve intersection and reduce or separate conflicts
12	**Trothno Lane**	Timber Creek limited to right turns and u-turns at Sandvik Street	Improve access options for any future expansion

Concern	Location	Description	Potential Future Needs
13	**Geist South Side Driveways**	Dense spacing, limited left turn storage	Manage/consolidate access, improve spacing, and reduce conflicts
14	**Transit Stops**	More midblock, timing not at school hours	Revisit proximity to signals and scheduling consideration
15	**Outdated signing**	Uncoordinated with rest of site	Upgrade traffic control devices to current standards
16	**Geist Ped Crossings**	Fence breaks, high ped crossings away from signals	Improve ped routes and crossing locations

3.4.3 U-Park Building

The existing U-Park building is scheduled for redevelopment to a childcare facility to match the size of the building. Aerial photos and ground observations (see Figure 33) show site modifications for the current training school compared to the building's original elementary school. The west and rear of the lot have expanded parking and motor vehicle plug-ins. The elementary school drop-off loop is small, dating back to a time when most students were bused and there was minimal single vehicle drop-off.

The back lot's driveway heads east to University Avenue near an at-grade railroad crossing. This driveway is restricted to right-in, right-out use. Without connectivity between west parking and east dropoff and parking lot in front of the building at Sandvik Street forces the east lot to both exit and enter in the short congested segment of Sandvik Street. The west lot of U-Park has alternative right turn only access to the north at University Avenue. Making a left turn from both driveways onto Sandvik Street would be difficult during peak arrival and dismissal hours for WVHS and HHS.

Figure 33. UAF U-Park Existing Conditions

3.4.4 Adjacent Geist Road development

The McDonald's restaurant on Geist Road is across from HHS. It has been closed for reconstruction since the fall of 2023 and is anticipated to reopen in 2024 or 2025. KE calculated estimated trip generation for a McDonald's of this size and distributed turning movement volumes to existing Geist Road traffic counts in order to model past use and near-term conditions.

At Fairbanks Street, the Holiday gas station has rebranded as Circle K. No other development changes are anticipated. Pedestrian and vehicular demand is served by the Fairbanks Street signal.

Adjacent commercial development along the south side of Geist Road includes the West Valley Plaza. West Valley Plaza is not anticipated to make any near-term development changes. This mall and other parallel businesses attract students during lunch hours and after school for employment and services. The density of access points for vehicles creates overlaps with peak hour school turning traffic at north side access points. Breaks in fencing along the north side of Geist Road are open locations for students to choose to cross Geist Road. Pedestrian crossing and gap analysis are evaluated in Section 4 of this report.

3.4.5 Adjacent University Avenue development

Timber Creek Senior Housing is a newer assisted living facility on Trothno Lane. The housing has 68 rooms and was at full capacity in the spring of 2024. While there are no formal plans for expansion, the site has room to expand in the future. No access points to Timber Creek are permitted to the Johansen Expressway. Access to Timber Creek is right-in, right-out only from University Avenue. Right-out traffic was observed to make regular northbound u-turns at Sandvik Street.

3.4.6 Transit Service (MACS)

The Borough's Metropolitan Area Commuter System (MACS) provides transit stops and routes located along Geist Road and University Avenue. Red, Yellow, and Blue routes travel adjacent to HHS and WVHS (shown as a red box in Figure 34). Upon review of the hours of service and stop locations, transit service schedules do not appear to be convenient for students by timing of stops at or near school start or dismissal times. Transit service schedules are not closely matched to school start and stop times. A commuter may be able to arrive by 8 AM but not by 7 AM. A later time is more likely if the commuter must transfer between routes. Morning schedules generally don't begin in time for arrival at school start. Afternoon schedules may be of use. Route times are long and may be hard to use if AM service is not available.

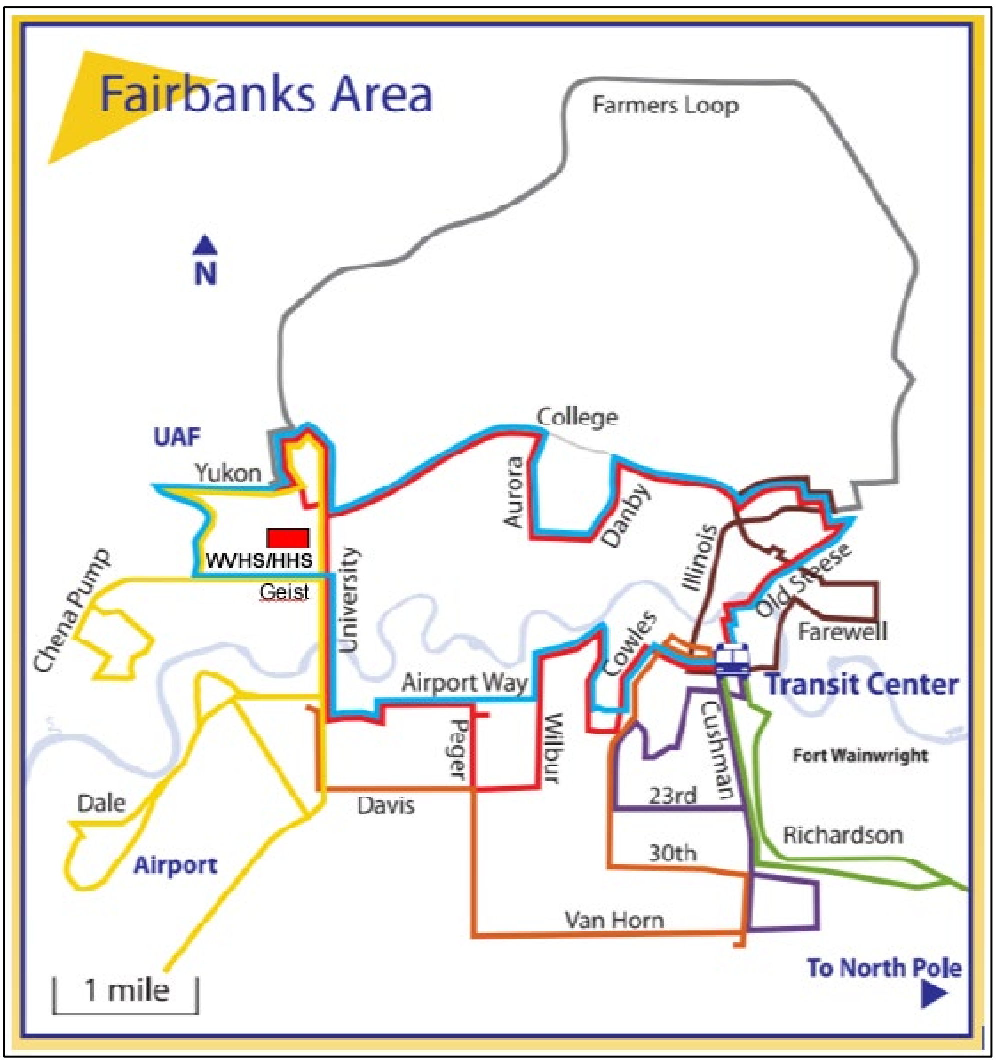


Figure 34. MACS routes in the Geist Road and University Avenue area

Figure 35 depicts the Blue Line, which serves potential school attendance around the larger Fairbanks Bowl. Bus stops near the WVHS and HHS schools (shown as a red box) are located east of Fairbanks Street, east of Gradelle Avenue, and at the HHS spine road. The WVHS attendance area is primarily located along College Road.

Morning service along the Blue Line is not early enough to serve WVHS, as it generally begins too late to arrive to WVHS on time. Blue Line stops begin along the attendance area route at the following times and stops labeled in Figure 35 below: (2) 7:28 AM, (3) 7:35 AM, (4) 7:45 AM, and (5) 8:00 AM. This schedule could be of use to some "Extension" students.

The Blue Line could be of service to students after school. Blue Line pick-up at Wood Center (4) begins 30 minutes after school is dismissed at 2:30 and gets to College Road sites at (2) 3:28 PM and (3) 3:35 PM – about 1.5 hours after school dismissal. This would not be ideal for WVHS, but the route loop south of the Chena River may offer some benefits to HHS attendance.

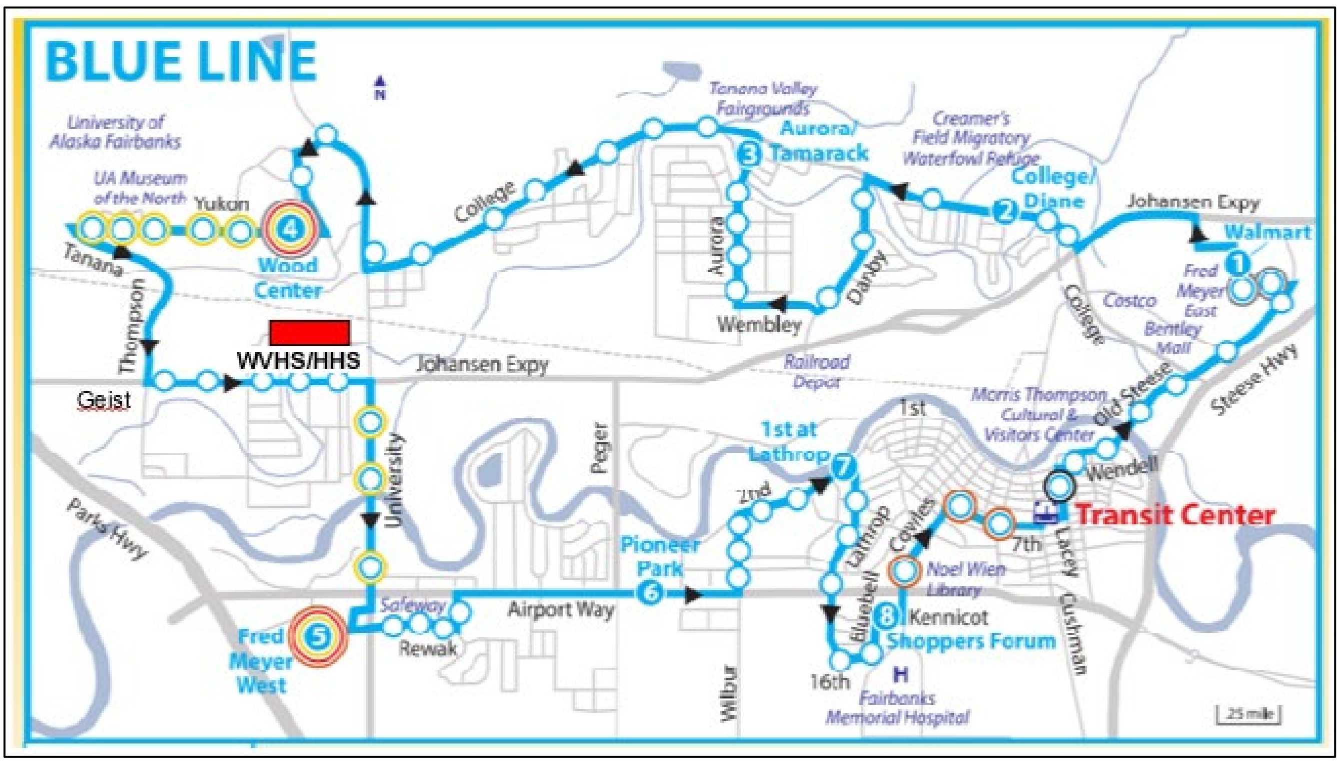


Figure 35. MACS Blue Line and stops

Red Line bus stops are located south of Sandvik and near the ARRC railroad crossing and U-Park north Access (The WVHS and HHS location is shown as a red box in Figure 36).

Morning service begins at (4) 7:30 AM at UAF's Wood Center. This is too late to offer both high school's arrival services within the attendance area.

Red Line service after school at Fred Meyer West (3) occurs after school ends at 2:09 PM and circulates to Wood Center (4) at 2:30 PM, Aurora/Tamarack (5) at 2:37 PM, and back to Wood Center (4) at 3:00 PM and Aurora/Tamarack (5) at 3:07 PM. This afternoon service could feasibly serve high school ridership, but it may be less attractive without the use of morning service.

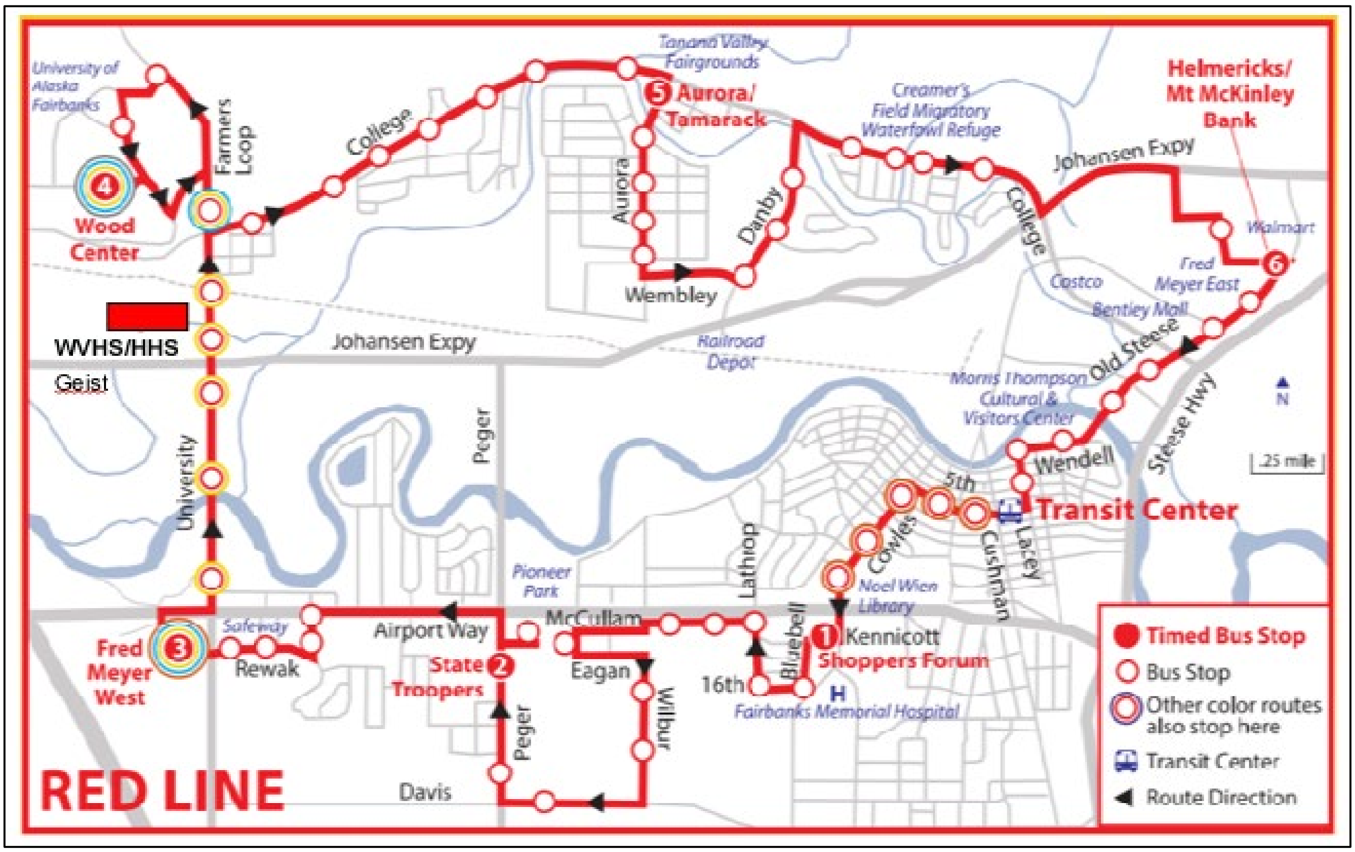


Figure 36. MACS Red Line and stops

The Yellow Line serves a smaller area of potential high school attendance to the west of University Avenue with bus stops located near the schools at Sandvik Street and College Road. The Fairbanks Bowl is not served by the Yellow Line. (The WVHS and HHS location is shown as a red box in Figure 37.)

Morning service along the Yellow Line begins at Chena Pump Road (5) at 7:15 AM and gets to Wood Center (4) at 7:30 AM. It passes by the high schools at Sandvik Street and University Avenue. It arrives at Fred Meyer West (1) at 8:14 AM. This is too late to meet the starting bell at the high schools, but may be able to serve some "Extension" students. After riding the bus, students must walk from the transit stops to the schools.

The Yellow Line could offer a slower route service to students in the afternoons. Yellow Line pick-up at Wood Center (4) begins just after school lets out at 2:37 PM, but then goes back to Chena Pump Road, to Wood Center (4) at 3:05 PM, and then arrives at Fred Meyer West (1) at 3:14 PM – about one hour after school ends.

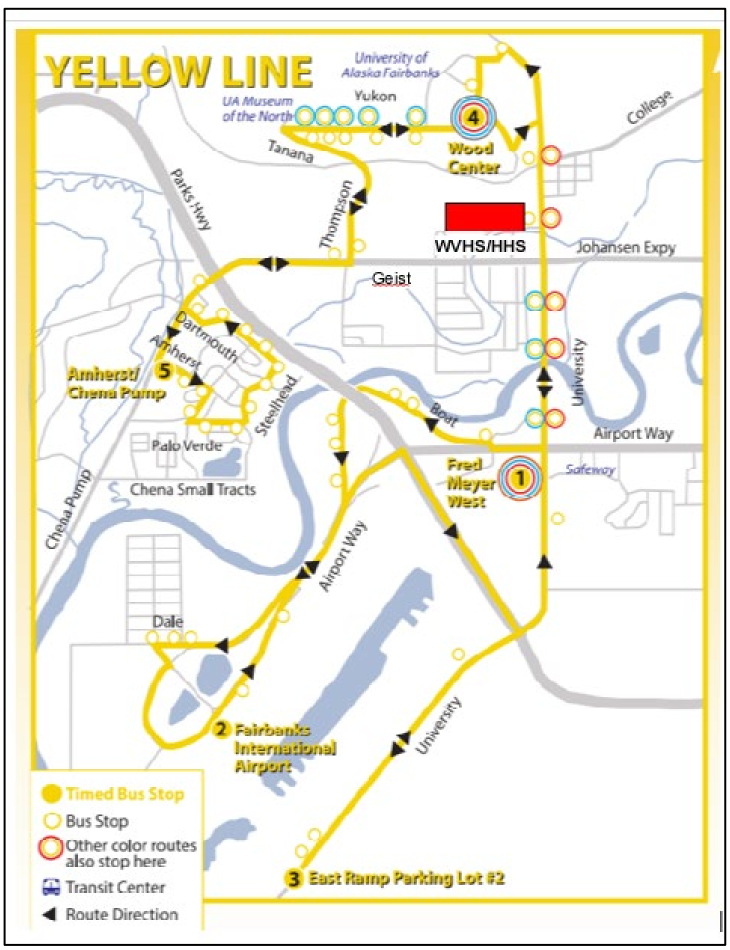


Figure 37. MACS Yellow Line and stops

Figure 38 below shows transit stop locations spaced 400 to 650 feet from traffic signals and otherwise located on the opposing side of arterials from the campus. These stops indicate at least three considerations:

- When transit stops are located farther than 300 feet from traffic signals, riders may cross the arterial directly to the transit stop rather than walk to adjacent traffic signals.
- With transit stops located across from the high school campus, riders have been observed to cross arterials directly rather than walk to adjacent traffic signals.
- When stops are located upstream of traffic signals, buses can become blocked by traffic queues from re-entering traffic. When stops are located downstream of traffic signals, buses have the option to re-enter traffic streams when a gap in traffic is caused by the upstream signal.

Figure 38. MACS Transit Stop Locations

4 Congestion Analysis (Time and Emissions)

4.1.1 Vehicular Congestion and Air Quality

Synchro 11 and SimTraffic 11 were used to simulate the peak 15 minutes of the peak hour. The peak 15 minutes were the highest congestion times during the AM and Dismissal times on the FNSB High Schools' campus. Intersection count data was input into the simulation model. Simulation results were calibrated to reflect field observations, pedestrian activity levels, and Stakeholder input. Calibration methods are described in the next section. SimTraffic provides benchmark performance measures of peak existing conditions, including:

<u>Network ratings</u>

- Total delay (hours)
- Average delay per vehicle (seconds/vehicle)
- Vehicle Miles of Travel (VMT) (miles)
- Total Travel Time (TTT) (hours)
- Emissions: hydrocarbons (HC), carbon monoxide (CO), and nitrous oxides (NOx) (grams)

<u>Intersection and Segment ratings</u>

- Delay per vehicle per lane or movement (seconds/vehicle)
- Delay per intersection (hours)
- Volume to capacity (v/c) ratios
- Queue lengths (95^{th} percentile in feet and in number of vehicles stopped) per movement
- Emissions (HC)(CO)(NOx)
- unsignalized pedestrian crossing gap availability and delays

Any proposed changes to the campus network can measured by these performance measures. This helps confirm where intersections and segments are improved. While performance measures are not exact predictions, they provide a relative and quantitative comparison between options. Changes in congestion and emissions can indicate the desirability of solutions.

4.1.1.1 Calibration of Model Conditions

SimTraffic peak 15-minute models for AM arrival and PM dismissal were calibrated to match existing conditions. The list of Synchro modifications made to calibrate simulations includes:

1) Added pedestrian crossing intersections
2) Adjusted pedestrian crossing volumes
3) Added pedestrian hybrid beacon (PHB) at Sandvik Street
4) Input pedestrian demand across Geist Road
5) Adjusted busing volumes
6) Changed deceleration and lane widths for winter
7) Adjusted center median of Geist for left turns
8) Balanced Peak Hour Factor (PHF) and Turning Movement Volumes (TMV)

9) Estimated traffic demand for each user group

1. **Added major pedestrian crossings as intersections.** Inputting multiple pedestrian crosswalk locations in drop-off and pick-up lanes is critical to showing one of the main sources of network congestion. Six major pedestrian crossings were identified internal to the campus. These were modeled as STOP-controlled intersections with high pedestrian crossing volumes at the stop bar conflicting with vehicular flow. These crossings require all users' attention and frequent stopping of motorists. SimTraffic better modeled this activity as a "stop-and-go" movement of vehicles rather than as a yielding movement. Stop-and-go simulation matches school staff input describing how they often have to stop pedestrians in order to keep vehicular traffic moving. Sometimes staff must direct vehicles when confusion occurs.
   a. WVHS pedestrian crossings. Two main crosswalks lead to and from the school across the drop-off and pick-up lanes and then across the secondary aisles in the student parking lot. This creates four major points of high pedestrian demand. A similar crossing occurs on the west doorway of WVHS where 150 students get on and off buses in the bus loading zone. Other crossings exist to and from the back parking lot and across Sandvik Street to HHS; however, these volumes are low enough to not affect simulation modeling results.
   b. HHS pedestrian crossings. The majority of students enter and exit the school's main entrance. Over 100 students cross to and from vehicles in the drop-off and pick-up lane at the main entrance. Other students walk east-west across the busy north/south HHS "spine road" from the west parking lots. Another major crossing is at the north end of the HHS building, to and from the northwest side parking lot to get to entrances at the back and west sides of the school. Lower use crossings exist within the Senior Parking lot, within the back CTC parking lot, and along a pathway to the U-Park building, however, these volumes are low enough to not affect simulation modeling results.
2. **Adjusted pedestrian volumes to reflect peak 15-minute flows.** The volume of pedestrians is also critical to simulation of existing conditions. Otherwise, without high pedestrian conflicting volumes, vehicle traffic flows well throughout the campus with few signs of congestion. Pedestrian entrance counts in the spring of 2024 were reviewed and found to be not as high as total student attendance. These lower counts also did not reflect observed congestion at major crossings.

   First, the full student population was distributed to school entrances in proportion to the travel modes available at each entrance. This better reflects pedestrian-vehicle conflicts and congestion observed, especially in winter. About 150 students on average are known to use the bus loading zone and west entrance of WVHS. Up to two-thirds of the students are estimated to use the main entrance crosswalk where most vehicles are located for drop-off and pick-up lanes and parking. The remaining one-third of students that don't use the bus have been distributed to the eastern crosswalk to access more distant parking. A small number of students load into buses at the back parking lot.

Second, pedestrian volumes were factored to peak or surge in 15 to 20 minute periods around the school start and end times. However, Synchro only assigns pedestrian volumes per hour. It does not have a PHF adjustment to more accurately concentrate pedestrian counts in peak 15 minute periods. Because pedestrians arrive and depart primarily within a 15-minute window and are not subject to PHF application, actual pedestrians per hour were multiplied as if they occurred at four times their 15-minute volumes in order to better represent peak conditions during the15 minute simulation. Synchro then distributes total conflicting pedestrians evenly over the hour, resulting in peak 15-minute pedestrian volumes matching the actual student population of 900 students entering and exiting portions of the building.

3. **Activated Pedestrian Hybrid Beacon (PHB).** To better simulate Sandvik Street and University Avenue delays, the PHB beacon on University Avenue was included in the network model. The PHB is located just south of Sandvik Street. Minimal pedestrian flows were observed at less than 10 pedestrians per hour. The PHB was simulated on a fixed cycle with an actuation every 3 minutes. This results in 5 actuations in a peak 15-minute period or shown as serving 20 pedestrians per hour.

   Simulating the PHB several times within a peak 15-minute period demonstrates the value of red signal time stopping traffic on University Avenue, helping Sandvik Street turns. It also demonstrates the disadvantage of STOP sign control on Sandvik Street by showing how difficult left turns are to make from Sandvik Street during most of the hour. The less the PHB is activated under lower pedestrian use, the more difficult it is for Sandvik Street turns to enter University Avenue.

4. **Input Pedestrian Crossing Demand across Geist Road**. Midblock pedestrian crossing safety from Gradelle Avenue to Rebecca Street was a top concern gathered during stakeholder and public input. Pedestrian demand is simulated at a minimum of 10 pedestrians per hour. While traffic modeling software does not provide performance measure outputs for pedestrians crossing midblock, the simulation does allow visualization of vehicle-pedestrian conflicts. Simulated gaps in traffic can be measured and compared with actual gaps in traffic measured in the field. Simulated gaps in traffic can also be used for comparison to other simulated gaps when making changes to the network. Simulated traffic in the model is forced to yield to pedestrians to avoid a collision. In actual conditions, risks are higher and yielding less certain. The key value of simulation at a midblock crossing is the relative change in gaps for pedestrians under various solutions.

5. **Busing volume adjustments.** Drone footage and field observations show bus loads arrive in a short window around 7:10 to 7:20 AM, staggering in from the east and west. They mostly enter Gradelle Avenue off of Geist Road. In the afternoon, all buses stage onsite before peak traffic, and then exit all at once heading southbound to make a left turn at the Fairbanks Street and Geist Road signal. After arriving or departing, busing on campus drops to zero the rest of the hour. Like pedestrians, buses as individual vehicle types are only represented by Synchro and

SimTraffic over the whole peak hour. While there is a PHF, this applies to all vehicles on an approach, it does not allow concentration or simulation of all the buses restricted to a 15-minute window.

To better reflect the normal 5 minutes of concentrated bus movement within a peak 15-minute period, bus volumes were adjusted to three times actual bus counts. This estimates the same concentrations of buses within any 5-minute period. This means 18 buses an hour were adjusted to the equivalent of 54 peak trips to and from Fairbanks Street, Gradelle Avenue, and the bus loading zone. Percent heavy vehicles were then re-proportioned to match. When entering and exiting the bus loading zone, for example, bus trips become 100% heavy vehicles. PHFs overall still apply and were not changed. Even with bus adjustments for simulation and performance, the relatively low number of buses turned out to be not as significant an effect on performance results as pedestrians. However, the proximity of buses making multiple turns to get to the loading zone near Gradelle Avenue does have some effect on simulated congestion.

6. **Deceleration and lane widths for winter.** Stakeholders and the public input noted winter conditions are worse than the traffic levels observed in spring 2024. Concerns raised include the effect of narrower lanes, limited plowing, darkness, slow traffic movement, and ice and snow conditions. SimTraffic was modified to reduce campus traffic lanes to 11 feet, and driver deceleration rates were reduced by half for ice and snow conditions. FHWA cites an AASHTO Green Book recommendation for deceleration rates which are about half that of ideal conditions when the road surface has ice and snow conditions.
7. **Geist median storage.** The UPS driveway was excluded from SimTraffic to better model eastbound left turn storage to HHS. The UPS driveway has very low westbound left turn volumes, as opposed to eastbound HHS left turns, which are dominant and end up being the primary utilization of the center lane. This change more effectively models peak traffic left turn storage and resulting congestion the HHS west entrance.
8. **Balanced PHF and turning movements.** Turning movement counts for school traffic showed similar PHFs primarily in the 0.50 to 0.55 range. Arterial traffic demonstrated PHF ranges of 0.85 to 0.92. When using raw PHF values in simulation, adjusted traffic flows between intersections “drop” vehicles or make them disappear or appear in between intersections even without other parking or destinations. Using widely varying PHFs further imbalances traffic between intersections. While this minor variation should occur as traffic enters and exits driveways to other destinations, this makes traffic simulation of arrivals and departures harder to track. Instead, when all destinations around campus are included, it is reasonable to assume a common PHF across each school site and on each arterial. This results in more balanced total traffic simulated between intersections.
9. **Estimated Traffic Demand for each User Group.** Total traffic counting methods are not able to distinguish types of users or trip purposes other than distinguishing buses from other vehicles. Using the school site facts from Section 2 and traffic counts from Section 3, traffic demand and

most likely travel routes were divided up and estimated for each user group. Each user group has a different trip purpose and goal on campus. Distinguishing these trip purposes and goals is critical to site planning and site renovation because site changes affect each user group's routing differently. Changing individual user groups is a more accurate way to simulate impacts than applying a percentage to total trips, without considering user groups. Several critical user groups or travel modes are identified on the high schools' campus:

a. Busing
b. Student Parking
c. Staffing and Faculty
d. Drop-off and Pick-up
e. Visitors
f. Pedestrians

Total counts for the two high schools were divided into these user groups. User groups were estimated and apportioned to intersection turning movements for each high school as follows:

a. *Busing* – bus volumes are well known from onsite observations, traffic counts, and interviews with FNSB School District Transportation officials. Up to 15 full size buses were counted to and from the west side bus loading zone on WVHS campus. Up to three special education buses are also routed to the rear of the school. HHS has had no direct busing service for years, but at least one bus may choose routing along Sandvik Street with a courtesy stop at the NW quadrant of the HHS campus. In 2024, up to four buses stage at the rear of HHS as shuttles to other schools. WVHS busing is assigned to the existing conditions network as shown in Figure 39 on page 68:

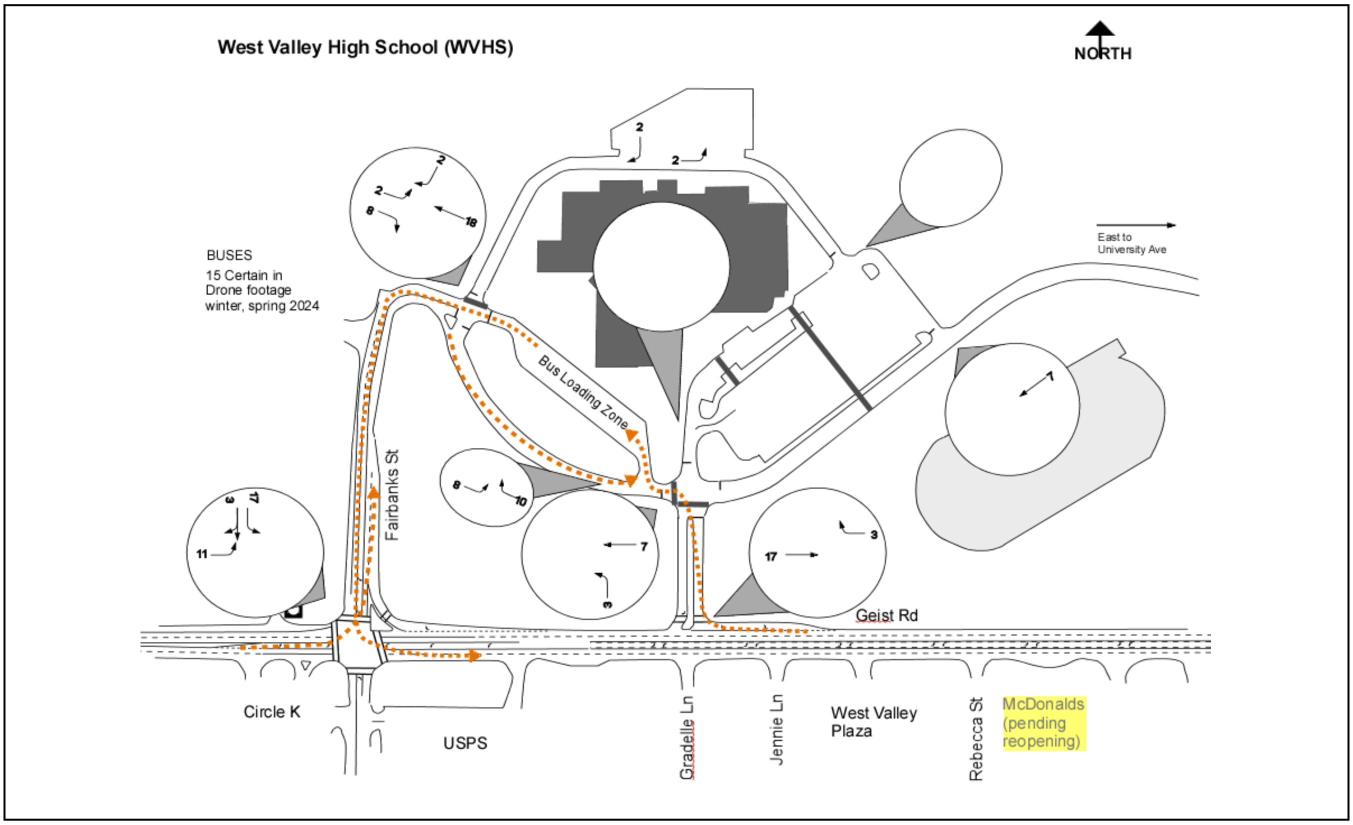


Figure 39. Typical Bus Routing for the WVHS campus (AM and Dismissal Hours)

b. *Student Parking* - During AM arrival, available parking spaces for students are noted on the traffic count figures in Section 3.3. Student parking volumes are estimated based on the amount of traffic entering the campus minus the traffic leaving the perimeter of the WVHS and HHS campus parking areas, each determined separately. This difference is then proportioned to the access points to and from each designated parking area in the same proportions as the total turning movements counted for all users, and with consideration of available parking lot size. Figure 40 shows the resulting parking-related volumes.

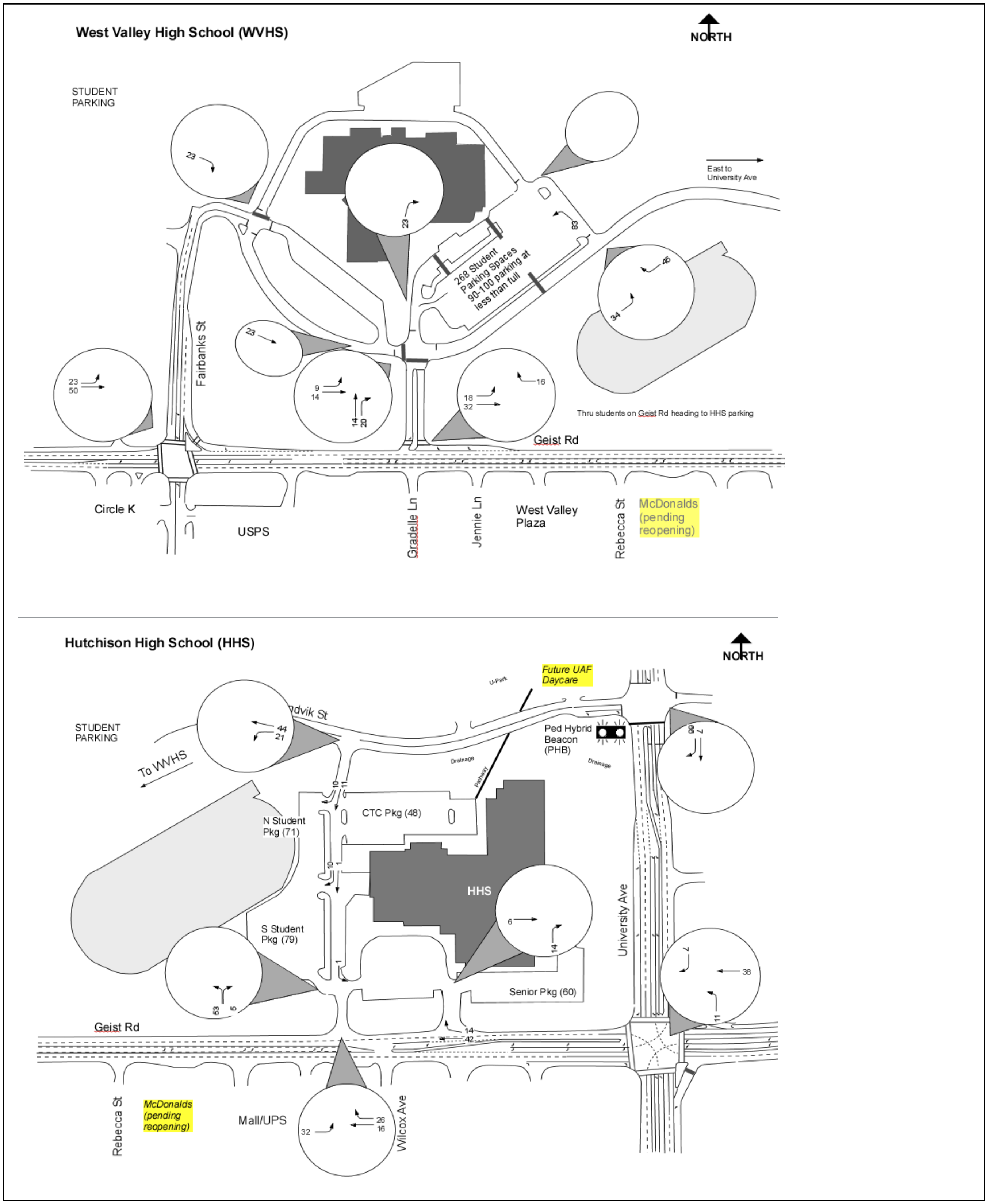


Figure 40. AM Arrival Student Parking Routing Estimated for WVHS and HHS

c. *Staffing, Faculty* – Staffing and Faculty population numbers are found in Section 3, school site facts. The amount of parking spaces for staffing are found in the maps for traffic counts in Section 3. Staff and faculty volumes are assigned as a share of traffic to and from assigned parking areas, which are then routed to adjacent arterials via internal campus routes. The proportion of staff and faculty on each turn and each route is proportional to the total turning movements counted for all users, as shown in Figure 42.

d. *CTC Parking at HHS*. Similar to student parking, the CTC parking demand is prorated to distribute parking movements to and from all directions, the same as total demand, as shown in Figure 41.

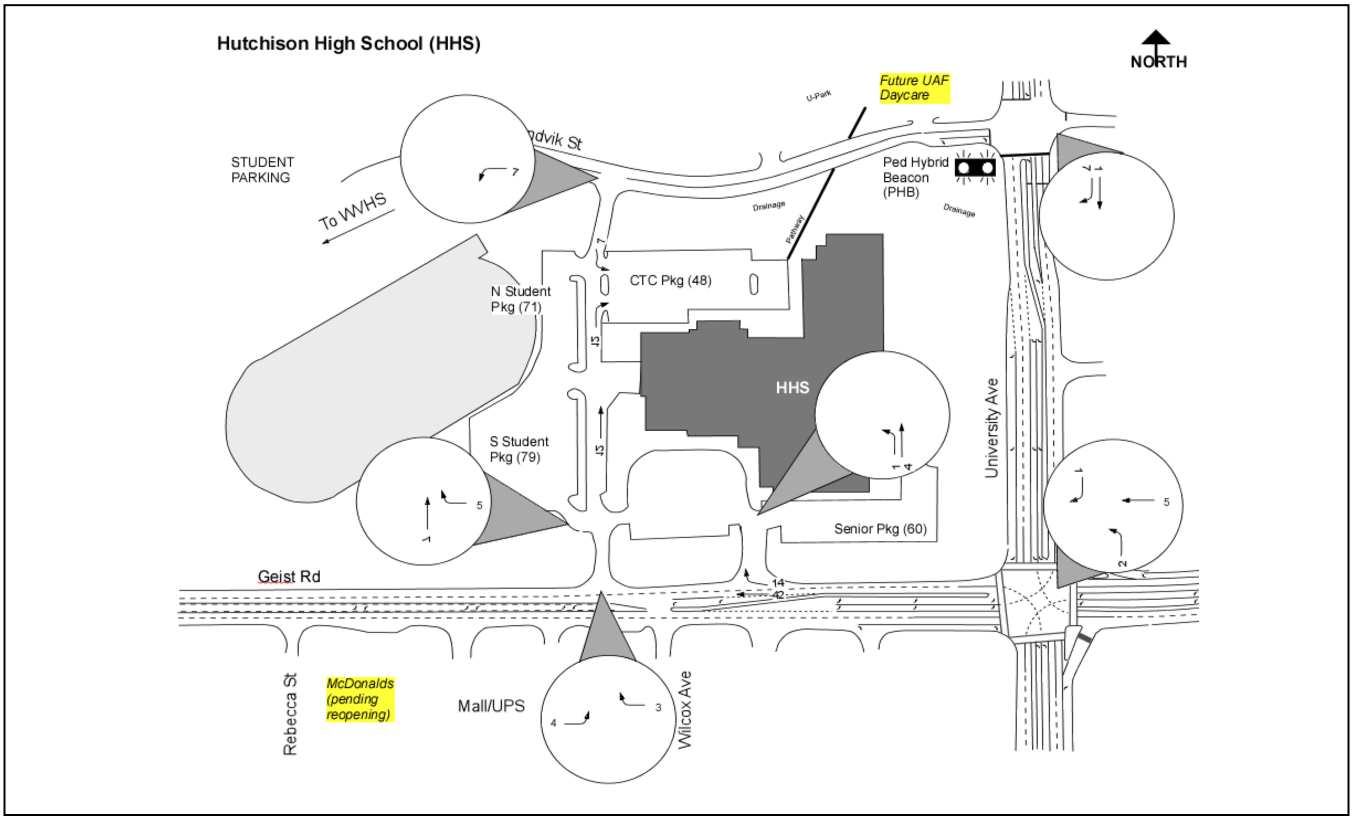


Figure 41. AM Start CTC Parking Estimated for HHS

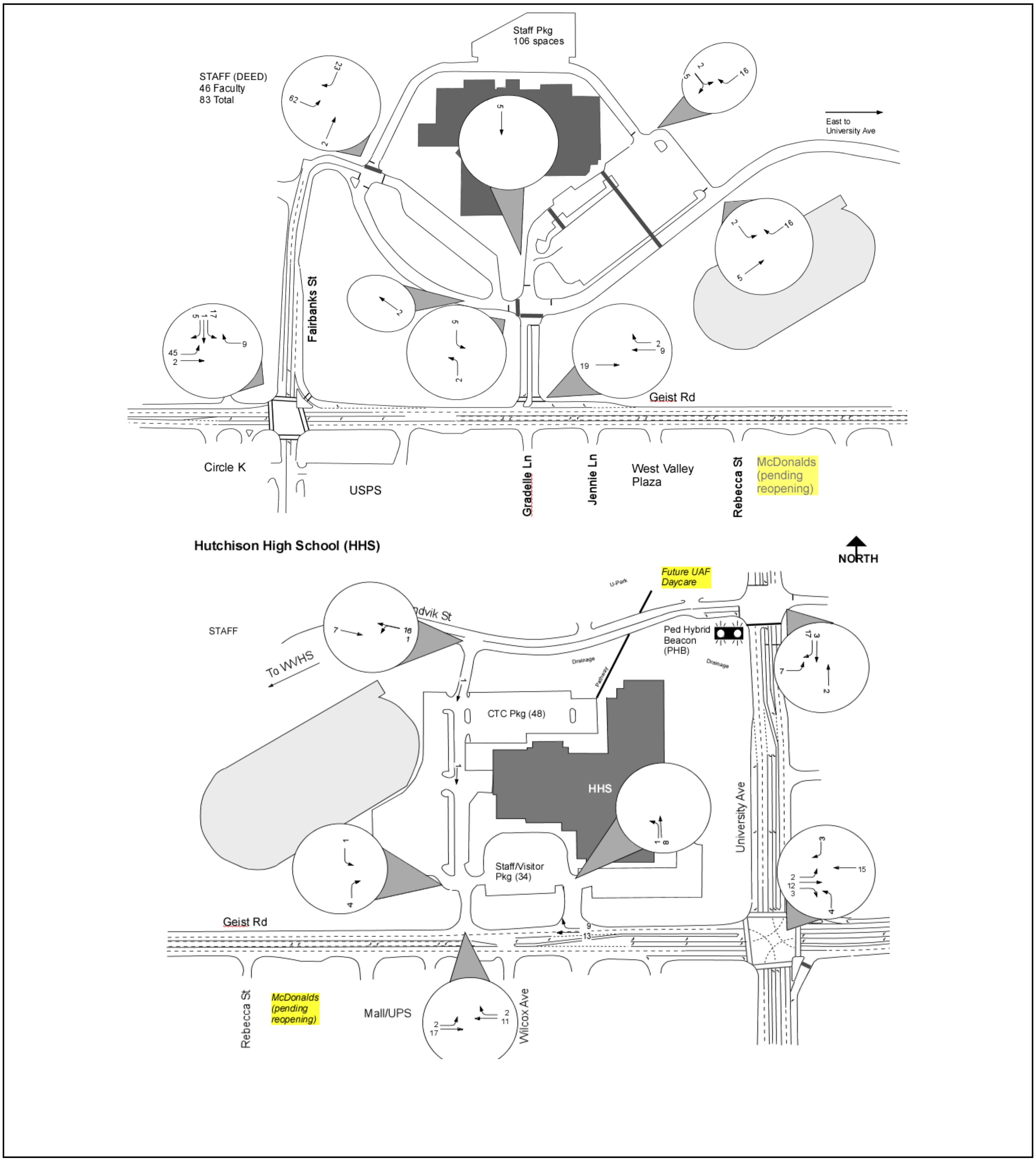


Figure 42. AM Start Staff and Faculty Parking Estimated for WVHS and HHS

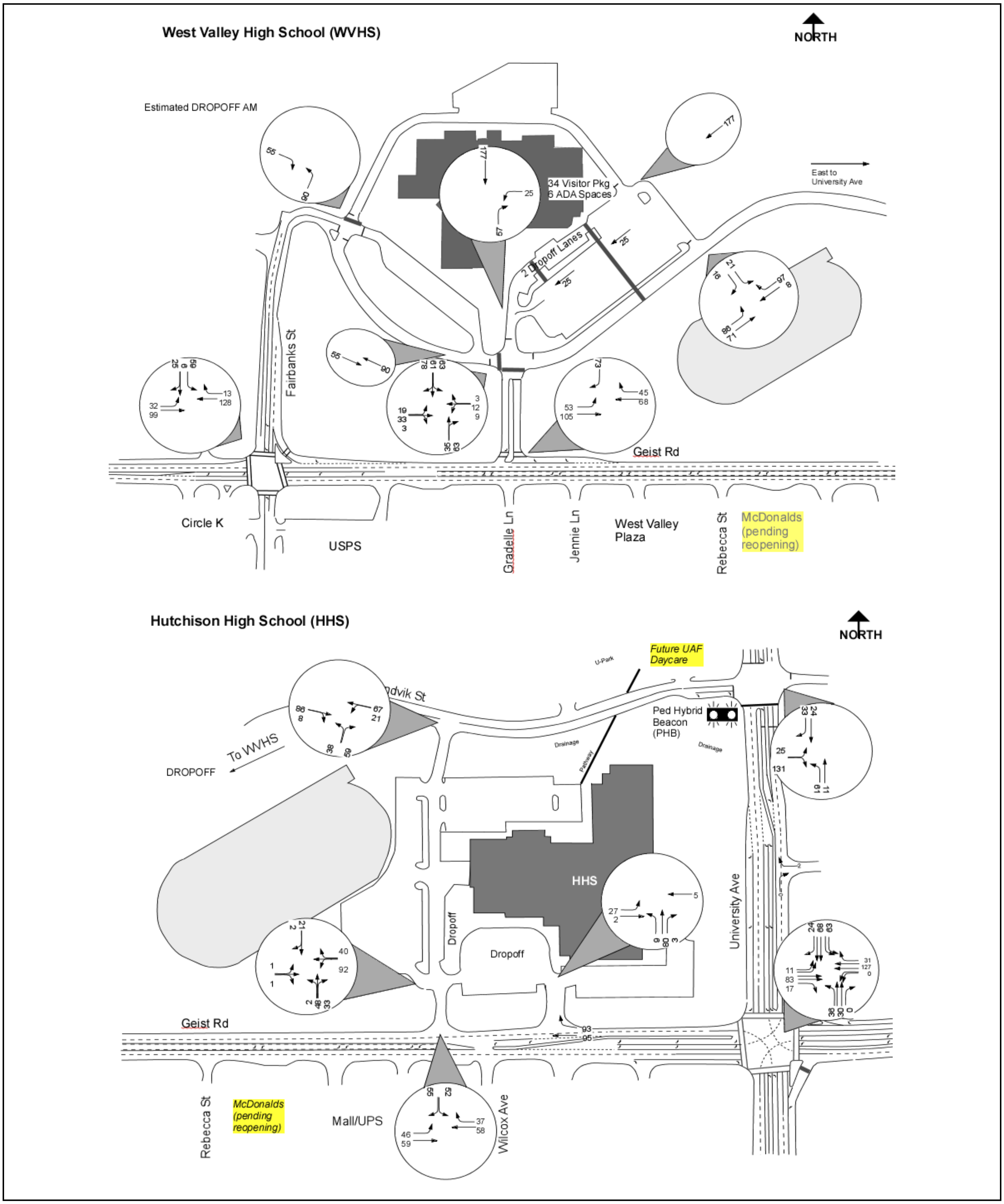


Figure 43. AM Start Drop-off Routing Estimated for WVHS and HHS campus

e. *Drop-off* – Subtracting the better-known traffic user groups (busing, staffing, faculty, and student parking retention) leaves drop-off and pick-up as the remainder and majority of traffic to be assigned. This is shown in Figure 43 on page 72.

f. *Visitors* – Visitor parking is one of the smaller quantities on each campus. Assuming most visitors do not stay and park all day means some stay less than an hour and some stay for a part of the school day. Without more information, visitor parking was assumed to be part of the drop-off and pick-up cycle, arriving and departing within an hour. Visitor parking is not separated out as an individual movement throughout the campus.

g. *Pedestrians* – Pedestrians during peak periods are mostly students walking to and from parked vehicles, drop-off and pick-up vehicles, bus loading zones, and to and from campus. Pedestrians are very important to this analysis. High concentrations occur at each entry point to the school buildings where motorists must yield to pedestrians crossing to and from parking lots and across drop-off and pick-up lanes. Pedestrians unloading and loading from buses and drop-off / pick-up lanes also require vehicles to frequently stop and allow pedestrian crossings. Figure 44 on page 74 shows pedestrian routing and pedestrian volume locations on the high schools' campus.

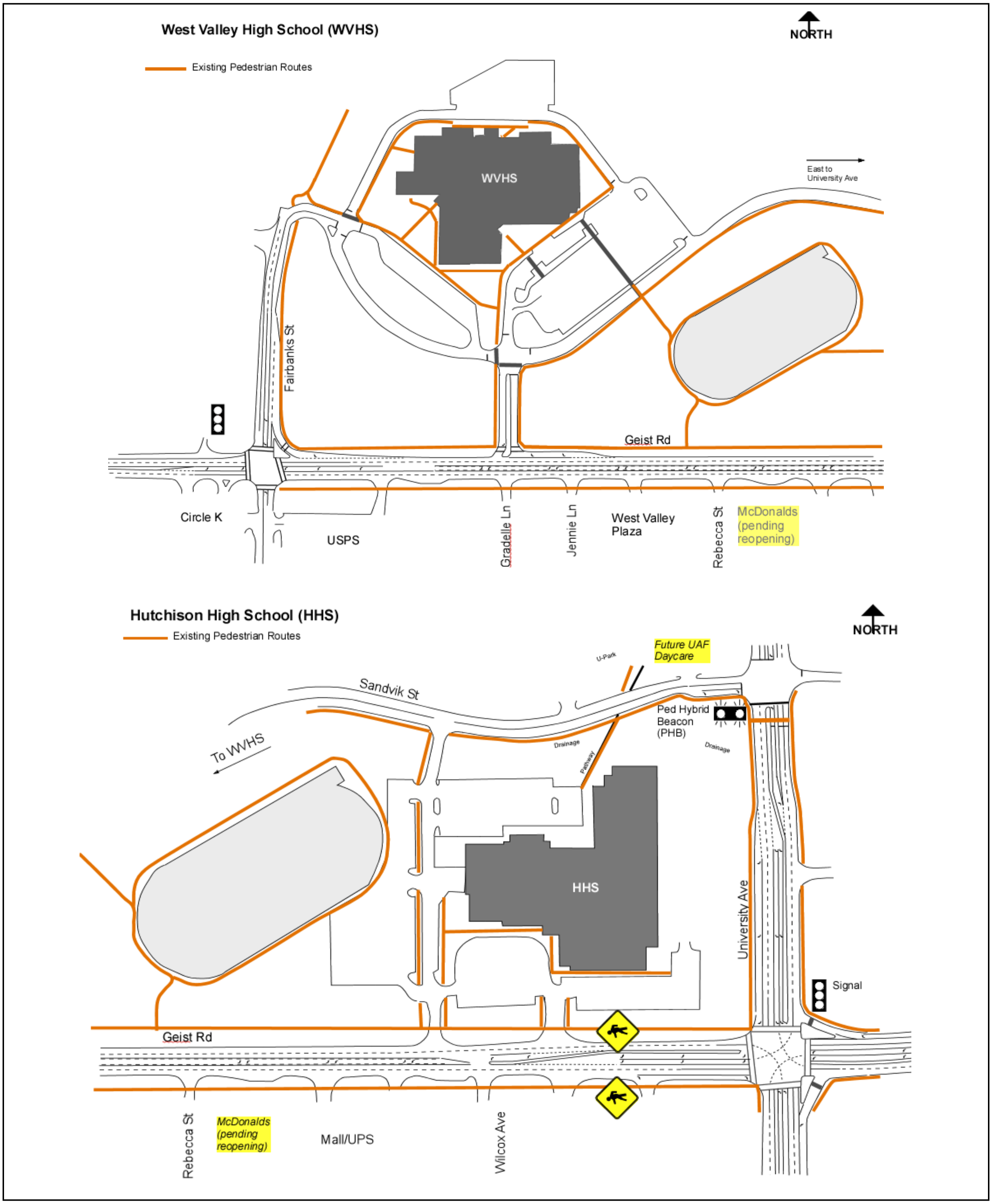


Figure 44. Pedestrian volumes and routing on WVHS and HHS campus (AM, PM)

Sensitivity Analysis

Of the nine adjustments listed, inputs 1 and 2 (pedestrian crossing locations and pedestrian volumes) and input 9 (assignment of user groups) had the most significant impacts on simulation results. The other adjustments did not significantly change or calibrate peak 15-minute simulation results.

Input item 9, user groups, is a valuable adjustment tool. Estimating user groups from traffic counts and site layout makes it easier to reroute user groups and analyze solutions. Rather than change total demand, it is more insightful to change circulation patterns and destinations for each user group.

4.1.1.2 Model Performance

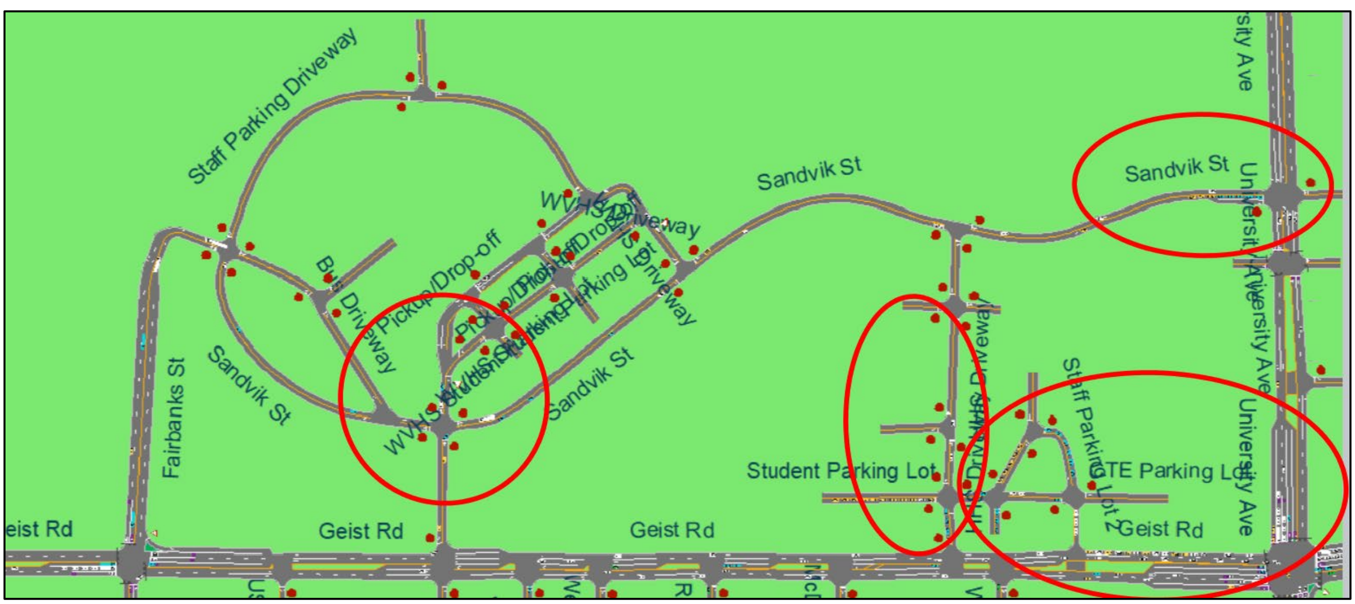
SimTraffic modeling provides performance results for the peak 15 minutes of traffic simulation. Running multiple simulations helps show where intersections interact and spill over to an adjacent intersection. This is an improvement over evaluating capacity of each intersection in isolation.

SimTraffic of existing conditions (Figure 45 and Figure 46) demonstrates matched observations and input, including:

- Pick-up and drop-off at the high schools conflicts with high pedestrian flows from parking areas, causing significant backups.
- Parking demand overlaps with pick-up and drop-off to create most congestion and conflicts.
- Queues spill back onto Sandvik Street and nearly Geist Road for WVHS.
- Queues spill back onto Geist Road and Sandvik Street for HHS.
- Queues were not as long as observed at Sandvik Street and University Avenue. However, LOS and delays are still found to be significant for Sandvik's STOP-controlled turns.
- Fairbanks Street at Geist Road experiences queueing of left turns in all directions, but left turns are served well by the signal. Observed queues in winter conditions are somewhat longer than modeled, even with winter adjustments to SimTraffic.

(Peak queues circled)

Figure 45. SimTraffic Calibrated Modeling of Queues for Existing Conditions, AM Start



(Peak queues circled)

Figure 46. SimTraffic Calibrated Modeling of Queues for Existing Conditions, PM Dismissal

Table 8 below shows performance measures for peak 15-minute conditions summarized for the road network as a whole. Table 9 and Table 10 address AM and PM dismissal at intersections of concern within the network. These tables include delay per vehicle, queueing length in feet and vehicles, hours of delay per approach, and emissions. These tables list only the most concerning existing conditions at the network level and at the worst performing intersections. These measures are a benchmark to compare to other solutions to see if these locations can be improved.

Table 8. Network Performance Reporting for School Peak 15 Min Periods

Performance Measure	Units	AM Startup	PM Dismissal
Total Travel Time (TTT)	Hours	52	56.3
Vehicle Miles of Travel (VMT)	Miles	725	799
Total Delay	Hours	25.9	28.7
Average Delay per Vehicle	Seconds	70.1	62.3
Total Vehicle STOPS	Stops	2,977	2,850
Turning Movement TMV v/c ratios	Campus Lanes	Some STOP Approaches to Arterials > 0.8	Some STOP Approaches to Arterials > 0.8
	Arterial Lanes	All < 0.8	All < 0.8
Fuel Used	gallons	36.2	40.5
HC – Hydrocarbons	grams	627	788
CO – Carbon Monoxide	grams	21,412	25,793
NOx – Nitrous Oxides	grams	1,898	2,362

Table 9. 95th Percentile Queue Lengths for Existing School Peak 15 Minute Periods

Location #	Location	Access points of concern (20 ft per vehicle) *		
		Turning Movement	AM Startup	Dismissal
21	Fairbanks St & Geist Rd (Signal)	EB Through Only	35	21
		EB Through & Right	27	16
		WB Through 1	9	16
		WB Through 2	9	17
		SB Left	14	15
105	Bus Driveway	NB All	8	11
33 + 34 + 5	WVHS Drop-off/pick-up Lanes	WB Through	12	13
		WB Through & Left	12	11
24 + 9	HHS Entrance for Drop-off / Pick-up	WB All	11	8
11	University & Geist Road	EB Through 1	18	14
		EB Through 2	18	15
		EB Right	15	12
		WB Through 1	7	16
		WB Through 2	10	15
*Thresholds of Concern Used:				
Non-Signalized Intersections: Any queue of 10 vehicles (200 ft) or more.				
Signalized Intersections: Queues of 15 vehicles (300 ft) or more.				

Table 10. Delay per Vehicle for School Peak 15 Minute Periods

Location #	Location	Locations with LOS E/F >= 45 seconds per vehicle		
		Turning Movement	AM Startup	PM Dismissal
33	WVHS NW Drop-off/pick-up Lanes	WB All	88.7	81.1
8	HHS West Driveway & Student / Staff Parking Lot	EB Right	----	82.2
		SB Left	33.8	49.3
		SB Through	33.9	66.5
		WB Left	14.2	46.8
14	HHS West Driveway & Geist Rd	SB Left	34.7	60.8
24	HHS Entrance for Drop-off / Pick-up	WB Left	28.4	48.3
31	HHS Frontage Rd & Staff Pkg Internal	NB Left	21.7	314.2
		SB Right	20.9	150.7
10	University Ave & Sandvik St	WB Through	172	----
		WB Left	165.9	----
11	University Ave & Geist Rd	NB Left	50.9	73.8
		EB Left	56.3	42.8
		SB Left	53.3	57.3
		WB Left	58.6	48.9
17	Geist Rd & Rebecca St	NB Left	18.5	58.1
21	Geist Rd & Fairbanks St	EB Through	50.6	38.2
		EB Left	82.5	39.9

4.1.2 Pedestrian Crossing Gaps and Delay

4.1.2.1 Pedestrian Crossings on School Campus

Pedestrian volumes at both high schools are high within loading zones and to and from the parking lots.

With a population of 900 students at WVHS, 150 are known to use the existing bus loading zone in front of the west side of the school, while a smaller number of special education students board 2 to 3 short buses and one longer bus in the rear of the school. The remaining 700+ students use the two marked crosswalks into the east side drop-off/pick-up area and student parking lot during peak start/stop times.

With a capacity of 500 students, HHS generates hundreds of students at the main south entrance drop-off/pick-up area as well as to and from the adjacent student parking lots. There is enough backlot parking to the north to generate up to 100 students crossing the northwest quadrant of the school access roads. Many vehicles remain in student parking lots long after dismissal time. This demonstrates more of a trickle of students over the hours after 2:00 PM compared to the surge from WVHS.

Low speed courtesy gaps occur in both school's drop-off/pick-up zones. Pedestrian crossing also occurs at internal campus intersections and marked crosswalks on circulation roads. Vehicle speeds are low at 10-25 mph internally. Stop-and-go traffic occurs in loading zones and at all-way stops. Intersections are wide and have minimal signing, lighting, and channelization when compared to what would be selected under modern design guidance. Sight distance appears adequate at crossings, with some signing and objects poorly located within sight triangles.

No significant pedestrian delays were noted on campus. High pedestrian volumes dominate and force vehicles to yield. Pedestrian-vehicle conflicts are a safety concern within drop-off and pick-up circulation areas and alongside traffic when roads narrow or at all-way stop locations.

4.1.2.2 Pedestrian Crossings on Adjacent Arterials

University Avenue has a Pedestrian Hybrid Beacon (PHB) next to the Sandvik Street intersection. The PHB is located at the recently removed pedestrian overcrossing site. Using pedestrian pushbutton activation "on demand", this beacon provides a yellow, red, and flashing red beacon to motorists as pedestrians cross. This beacon is located 750 feet north of the University Avenue and Geist Road signal.

There are two traffic signals adjacent to the school campus on Geist Road, at Fairbanks Street, and at University Avenue. These signals cycle every two to three minutes and serve all directions of traffic, including pedestrian crossings. These signals are ½ mile apart along Geist Road.

4.1.2.3 Geist Road Pedestrian Crossing Review

Pedestrian crossing gaps were considered on Geist Road at the original pedestrian overcrossing location east of Gradelle Avenue. Three different methods were compared for pedestrian crossing: measurements, calculations, and simulation. Field data was gathered Wednesday, April 23 through Friday, April 26, 2024. The location was observed again during site visits Tuesday, April 30 through Thursday May 2, 2024. Geist Road at this crossing has a posted 40 mph speed limit. Most motorists were observed to travel between 45-50 mph. Sight distance to the east and west was found to be adequate.

Full-width gaps. No gaps were measured during peak school arrival or dismissal hours which would support crossing the full-width of Geist Road in one continuous movement. Pedestrian delay would require having to wait at least 5 minutes, if not a whole hour, for a full-width opening in traffic. This is an undesirable delay. Existing conditions require pedestrians choose other options. Other options for a mid-block crossing include:

a) increasing walking speeds to fit available gaps
b) crossing the road in two stages
c) walking one-quarter mile each way to and from the nearest traffic signal.

Two-stage gap findings. For option b) above, pedestrians can cross from the roadside to the center median lane, and then from the center median lane to the opposing roadside. Gap measurements demonstrate one or more gaps are available every minute (60 seconds) or sooner throughout the day. Having a gap every minute on average means pedestrians can safely cross the road in two stages. Having a gap-a-minute for half-width crossings adds up to two to three minutes total to complete a full-width crossing. Existing signals operate on three-minute cycle lengths at both Fairbanks Street and at University Avenue. The combined effort of two-stage crossings can be performed equally as often as a person would be served at adjacent traffic signals. This is not counting the walking time to get to adjacent signals. Overall, half-width, two-stage crossing conditions are of equal or faster service in providing adequate gaps.

Gap Charts. Figure 47 and Figure 48 on page 82 show measured two-stage pedestrian crossing gaps for each hour during the four weekdays surveyed in April 2024, from 11:00 AM on Wednesday April 23rd to 12:00 PM on Friday April 26th. The low points of each day occur during school startup until the end of the PM commute hour. At over 100 gaps per hour, the hourly average gaps are nearly two gaps per minute to cross either eastbound through lanes or westbound through lanes. Each crossing has to be made separately, or in two-stages, to utilize adequate gaps.

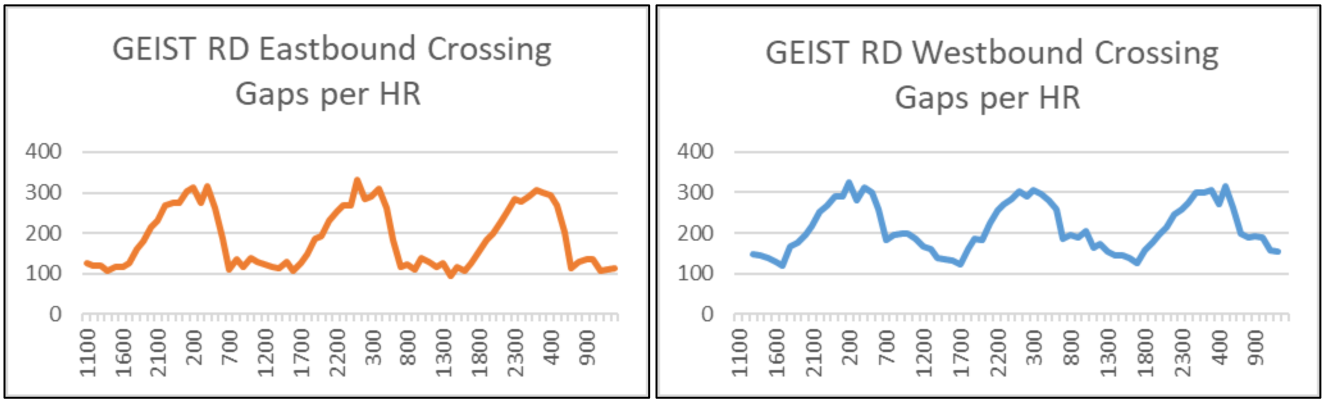


Figure 47. Geist Road Half-Width Pedestrian Gaps April 23-26, 2024 (military time)

The peaks of these charts demonstrate significant gaps exist after 10:00 PM, or (2000 hours). Converting the y-axis of these charts shows the average gaps per minute over each hour. Late night gaps peak at over 5 gaps per minute, when there is little to no vehicle traffic present. Daytime gaps average two gaps per minute over each hour.

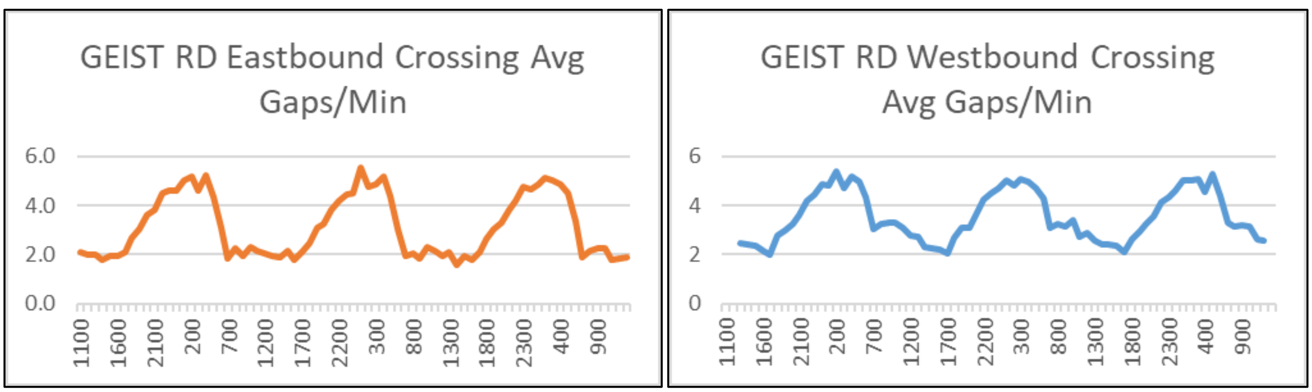


Figure 48. Geist Road Half-Width Average Pedestrian Gaps April 23-26, 2024 (military time)

***Measured* Gaps and Delays for Pedestrian Crossing.** Looking further into the highest peak 15-minute school periods shows lower gaps during school arrival times (7:15-7:30 AM) and school dismissal times (2:00-2:15 PM). Table 11 shows some of the lowest gap times during the full day surveys graphed above. There were no full-width gaps adequate for pedestrians to cross Geist Road at these times. However, for the peak 15-minute period, two-stage pedestrian gaps were calculated in detail and found to be just over 1 gap per minute. This is an adequate gap frequency for pedestrian crossing absent other traffic control devices. A gap-per-minute to cross half the road at a time is equal or faster than the cycle available to pedestrians at adjacent traffic signals.

Table 11. Two-Stage Pedestrian Crossing Performance, Geist Road, peak school period

GEIST ROAD Bridge Site (Existing Conditions) Measured Pedestrian Gaps - Radar Data from 04/24/24 Two -Stage, 1/2 Width Crossing School Peak Periods (7:15-7:30 AM and 2:00-2:15 PM)				
Performance Measure	AM (Eastbound)	AM (Westbound)	Dismissal (Eastbound)	Dismissal (Westbound)
Number of whole gaps (G)	20	19	17	23
Total Survey Time in Seconds (T)	900	900	900	900
Gaps per Minute	1.33	1.27	1.13	1.53
TOTAL GAP SECONDS (t)	376	479	348	434
Total Delay (D%) = Total No-Gap Time	58.22%	46.78%	61.33%	51.78%
Minimum Gaps Available/ Minutes survey period	25	34	23	29
Total Minimum Gaps available / Minute	**1.67**	**2.27**	**1.53**	**1.93**
Pedestrian Delay (sec)	**21**	**12**	**24**	**16**

***Calculated* Gaps and Delays for Pedestrian Crossing.** Pedestrian crossing waiting times on Geist Road were also estimated using ITE formulas for gaps and delays. The results are below and are generally longer than actual delays measured in the field.

Calculated full-width crossing times during peak school periods reflect unreasonably long delays and essentially unstable and infinite waiting times until traffic levels decrease, which is later at night. This calculated finding is consistent with field observations in the previous section which showed inadequate full-width gaps available during peak school times.

Calculations show half-width crossings are adequate. Two-stage crossings are consistent with pedestrian choices noted during field observations. Half-width crossing delays during peak school hours are shown in Table 12 below. These delays are calculated to be less than one minute for each half of the road crossed. Delays longer than 30 seconds are considered less tolerable to pedestrians by falling into the Level of Service (LOS) E or F rating. While these calculated delays fall into the LOS E or F range, measured delays were above this rating. This means calculated delays are a more conservative estimate of delay than actual measured conditions. When delays rise above 180 seconds, or 3 minutes, per crossing, then they exceed the waiting times at adjacent signals. Longer delays than existing signal cycles would be an even higher-ranking concern.

Table 12. Calculated Pedestrian Crossing Delay and LOS, Geist Road, peak school periods

Geist Road at Ped Overcrossing Bridge Site	Crossing Width (ft)	AM Ped Delay		Dismissal Ped Delay		PM Ped Delay	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Full-width Single Stage Crossing	68	11,011	Below F	60,395	Below F	98,643	Below F
Half-width Crossing Eastbound Traffic	30	43	E	46	F	36	E
Half-width Crossing Westbound Traffic	30	11	C	44	E	63	F
Combined Two Stage Crossing Eastbound plus Westbound, with Center Refuge	68	54	F	90	F	99	F

***Simulated* Gaps and Delays for Pedestrian Crossing.** Peak school arrival and dismissal simulation of traffic levels was also used as another way to measure pedestrian gaps across Geist Road. Simulated results in Table 13 below show gaps and delays which are worse than measured conditions. One reason for differences may be that traffic simulation uses randomly seeded vehicles and may not represent larger scale platooning of vehicles which occurs from traffic signals well beyond the study area.

While the simulated results are not as desirable as the field measured results, they are useful for relative comparison. The same simulation method used for existing conditions can be used to make relative comparisons of future options under changed conditions. Future options can be analyzed not only for congestion and air quality, but also for relative changes in pedestrian gaps and delay.

Table 13. Simulated Pedestrian Crossing Performance, Geist Road, peak school periods

GEIST ROAD Bridge Site (Existing Conditions) Simulated Pedestrian Gaps Two -Stage, 1/2 Width Crossing School Peak Periods (7:15-7:30 AM and 2:00-2:15 PM)				
Performance Measure	AM (Eastbound)	AM (Westbound)	Dismissal (Eastbound)	Dismissal (Westbound)
Number of whole gaps (G)	13	19	13	11
Total Survey Time in Seconds (T)	900	900	900	900
Gaps per Minute	0.87	1.27	0.87	0.73
TOTAL GAP SECONDS (t)	254	358	209	198
Total Delay (D%) = Total No-Gap Time	71.78%	60.22%	76.78%	78.00%
Minimum Gaps Available/ Minutes survey period	17	23	14	12
Total Minimum Gaps available / Minute	**1.13**	**1.53**	**0.93**	**0.80**
Pedestrian Delay (sec)	**38**	**24**	**49**	**59**

5 Crash Analysis

5.1.1 Crash Rates (2013 to 2022)

DOT&PF provided ten years of crash data from 2013-2022. The data was reviewed to confirm the crashes occurred within the network study area and to verify the crash type and severity level. Removing duplicate records and crashes out of the study area led to 356 crash reports of concern over ten years. Figure 49 below shows the concentration of crash locations located along arterials in the study area.

Crash reports were concentrated along the arterial roadways, at or near signals. There are very few reported crashes on-campus, which suggests that either on-campus crashes are rare, on-campus crash reports are not being sent to the State of Alaska database, or the data is otherwise unavailable. Given that nearly all crashes shown on the arterial network have been minor injury to no injury, it is assumed that any unreported crashes on-campus would be lower speed of minor to no injury.

Figure 49. Total Crashes Located Along the Arterial Network (2013-2022)

Crash rates over the 10 years were computed for signalized intersections using annual traffic counts, resulting in crashes per million entering vehicles (MEV) (Figure 50 on page 87). A segment crash rate was also computed for Geist Road in between traffic signals. University Avenue segment crash rates were not computed because there were only two crashes reported in 10 years between the traffic signal and Sandvik Street. All other crashes on University Avenue occurred at the intersections with Geist Road or Sandvik Street.

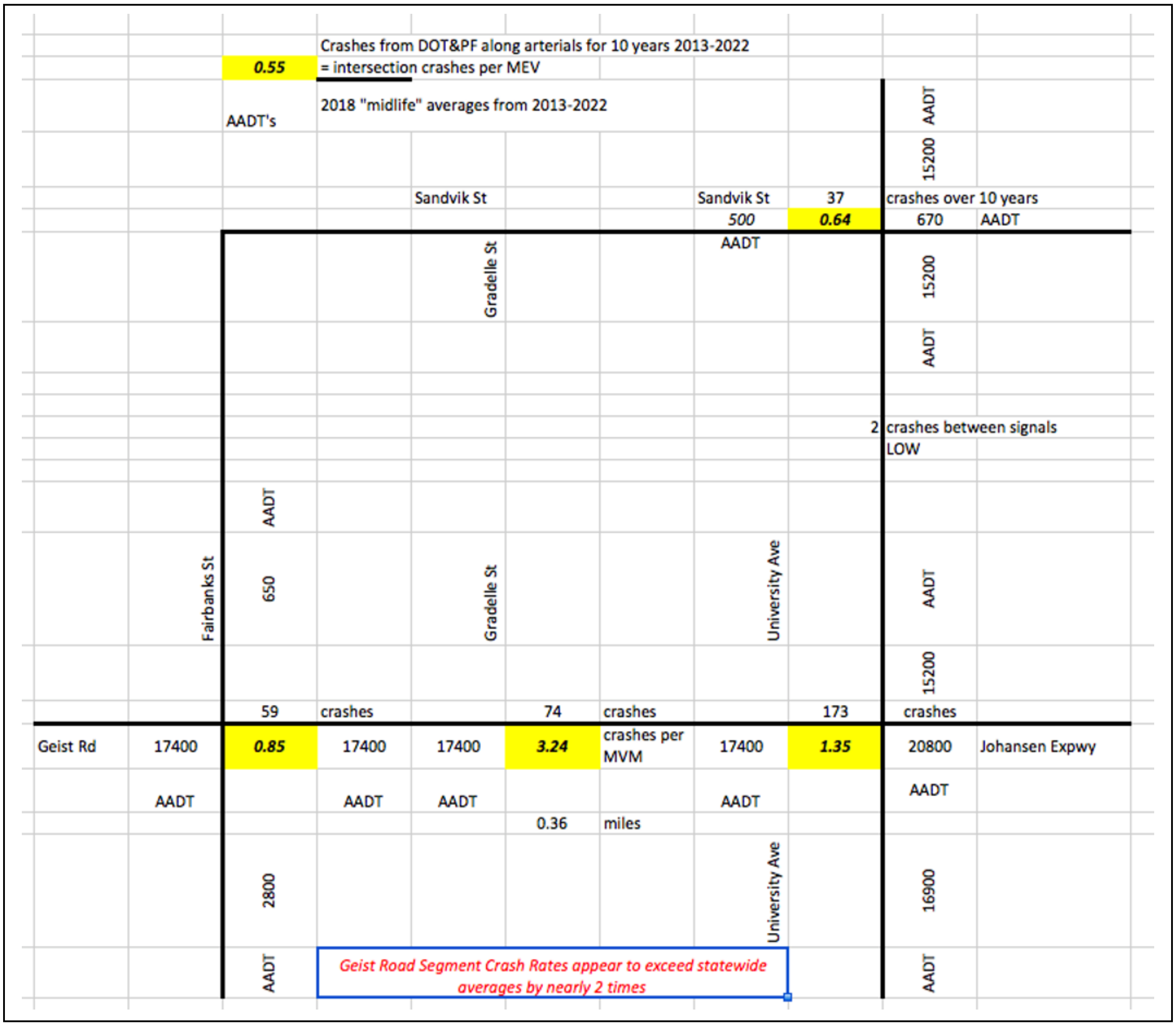


Figure 50. Total Crash Rates for the FNSB High School Campus Network 2013-2022

HSIP Handbook 2017			
Avg Segment Crash Rate	4 Lanes, Undivided, Urban	1.90	crashes/MVM
Avg Intersection Crash Rate	2 Way STOP, 3 approaches	0.52	crashes/MEV
	2 Way STOP, 4 approaches	0.55	crashes/MEV
	Signal, 4 Approaches	1.58	crashes/MEV

Sidestreet Intersection Crash Rates (AADT's estimated) 2013-2022

Sidestreets	Gradelle	Jennie	Rebecca	McDonalds	Wilcox	Ginko
crashes	6	5	15	6	11	7
Side AADT	*500*	*500*	*500*	*500*	*500*	*500*
Opposing AADT	*200*	*0*	*0*	*0*	*0*	*0*
Geist AADT	17400	17400	17400	17400	17400	17400
crashes /MEV	0.09	0.08	0.23	0.09	0.17	0.11

No intersections appear close to or exceeding Statewide averages

Figure 51. Estimated Side Street Intersection Crash Rates along Geist Road

Intersection crash rates are shown in Figure 51 above. No intersection crash rates are above average when compared to statewide crash rates last published in 2017. Statewide crash rates in 2017 are the last published statewide average rates. These were based on data from 2008 through 2012.

Because Alaska's crash reporting form changed in 2013, earlier data is not directly comparable; however, it is our understanding that the number of crashes reported each year has decreased with the new form. From this, we can conclude that a location with a higher than average crash rate compared to the 2017 report is also higher than average when using data from 2013 forward.

Crash rates for major intersections on the campus network are below the 2017 statewide average. The segment crash rate on Geist Road between signals is nearly two times the 2017 statewide average crash rate for urban four lane roadways (*through lanes*). These high segment crash rates reflect frequently spaced side streets with turns. Turning traffic overlaps in the center turn lane. Trip generation estimates and turning movement counts suggest several approaches exceed 100 vehicles per hour, which is a general threshold of concern for further traffic study.

Side street and commercial driveway spacing ranges from 160 feet to 300 feet. South side access is about 200 feet apart on average. In contrast, intersection stopping sight distance minimums require 305 to 360 feet per intersection at 40 to 45 mph, under good pavement conditions. This means there is little time for "one decision at a time" when simultaneous turning movements occur at each driveway, especially during snow and ice conditions. Managing and increasing access spacing to 300 feet or more would reduce the frequency of left turns along Geist Road. Spacing of busier access points at or above stopping sight distance levels is one way to reduce segment crash rates by helping drivers make judgments "one decision at a time".

5.1.2 Ten Year Crash Data Factors

The top findings from correlating factors in the ten-year crash history are:

- Most school access crashes occur in winter months December to February.
- Most school access crashes involve difficulty stopping or sliding on ice or snow.
- Total network crashes at AM, lunch hour, and PM dismissal times are 2 times higher than most hours and are as high as crash totals in the 5-6 PM commute hour.
- Teen drivers are involved in about 7 network crashes per year.
- Teen drivers are involved in about 20 percent of network crashes overall during daytime hours.
- Teen drivers are reported as the at-fault driver in about 13 percent of all crashes. Teens have the same causal or "at-fault" proportions during school hours as during other hours of the network.

The data set showed little to no police or citizen reporting of crashes in the internal campus area. This is either due to a) few internal crashes in general, b) reporting not getting completed, or c) reporting not getting into the statewide database. More positively, most of the total crashes which are reported are property damage only. While some crashes resulted in minor injuries, serious injuries are rare. No fatal crashes have been reported in the recent ten years.

A subset of school access related combined with all younger driver related crashes within the network study area were further examined for common features. Table 14 below summarizes basic factors which can be learned from the data fields. Areas in grey are not significant, while unshaded areas provide useful findings:

Table 14. School Access or School Age Related Crash Factors Review

Crash Factor	School Related Factor	School Related Finding
Month of Year	Dec-Jan-Feb **2X monthly average occurs in these months**	Highest months are December through February. Correlates to ice and snow road surface conditions.
Time of Day	7-8 AM = 2X 11-12 PM = 2X	AM, Lunch, and Dismissal Hour crashes are 2X higher than average hourly crashes.

Crash Factor	School Related Factor	School Related Finding
	2-3 PM = 2x 5-6 PM = 2X **School Bell Times a Major Factor**	Peak school hour crashes = peak PM rush hour crashes at 5-6 PM
Year	No distinction	School related and non-school related crashes are declining over the past ten years
Road Surface Conditions	74% snow/ice or wet/water **Driving too fast for conditions in winter months (above) and braking ability is a Major Factor.**	Most school and non-school related crashes are not on dry roads. 66% occur on snow or ice surfaces. **Sliding is a significant factor in rear-end, angle or run-off-road collisions** *In some narratives, this has been described as worsened by freeze/thaw from stop-and-go vehicles' exhaust and braking.*
Light Conditions	No distinction	Half of school and non-school related collisions occur in daylight or darkness. It is evenly split. Lighting does not appear to be a major factor in crashes.
Driver's Age	Teenage drivers are involved in crashes at the same rates during key school hours as the rest of the day. There are 46 crashes involving teen drivers considered at fault in the network over 10 years, or 4.6 per year. There are 68 crashes involving teen drivers in the	12% of "school hour" collisions involve teen drivers as the cited or causal driver. Most are 18 years old. 13% of all crashes in the area, all hours of the day, involve teen drivers cited as the causal driver. 20% of all crashes involve teen drivers. In 7% of these crashes they drive the second vehicle, and are not considered causal or at fault.

Crash Factor	School Related Factor	School Related Finding
	network regardless of fault over 10 years, or 6.8 per year. In 5 collisions, or less than one per year, both drivers are teenagers. **Teen crashes are not overrepresented compared to the network as a whole. Older adult drivers also crash at the same rates.**	A crash diagram shows 11 teen drivers involved at direct access turns or about 1 crash per year. **Most teen crashes are out on the arterial network.** A large share of 20-29 year old drivers also appears evident upon inspection of the data, possibly due to students out of high school, but of a younger prevailing age at or near UAF in this area.
Injury Severity	No distinction from total crashes.	¾ of crashes have no apparent injury. 20 percent involve minor injuries, with half of possible injuries even less certain.
Crash Type	No distinction from total crashes.	39 % are rear-end collisions (often sliding on ice/snow). 25% are angle collisions, often making left turns (also on ice/snow and sliding) and sometimes sliding into or through the traffic signal red indication or right turn lane. Reported pedestrian crashes are low. Sideswipe of adjacent vehicles, head-on crashes, or run-off-road crashes make up the remainder of crashes at lower shares.

Figure 52 through Figure 60 further help to show trends for the entire network dataset of total crashes:

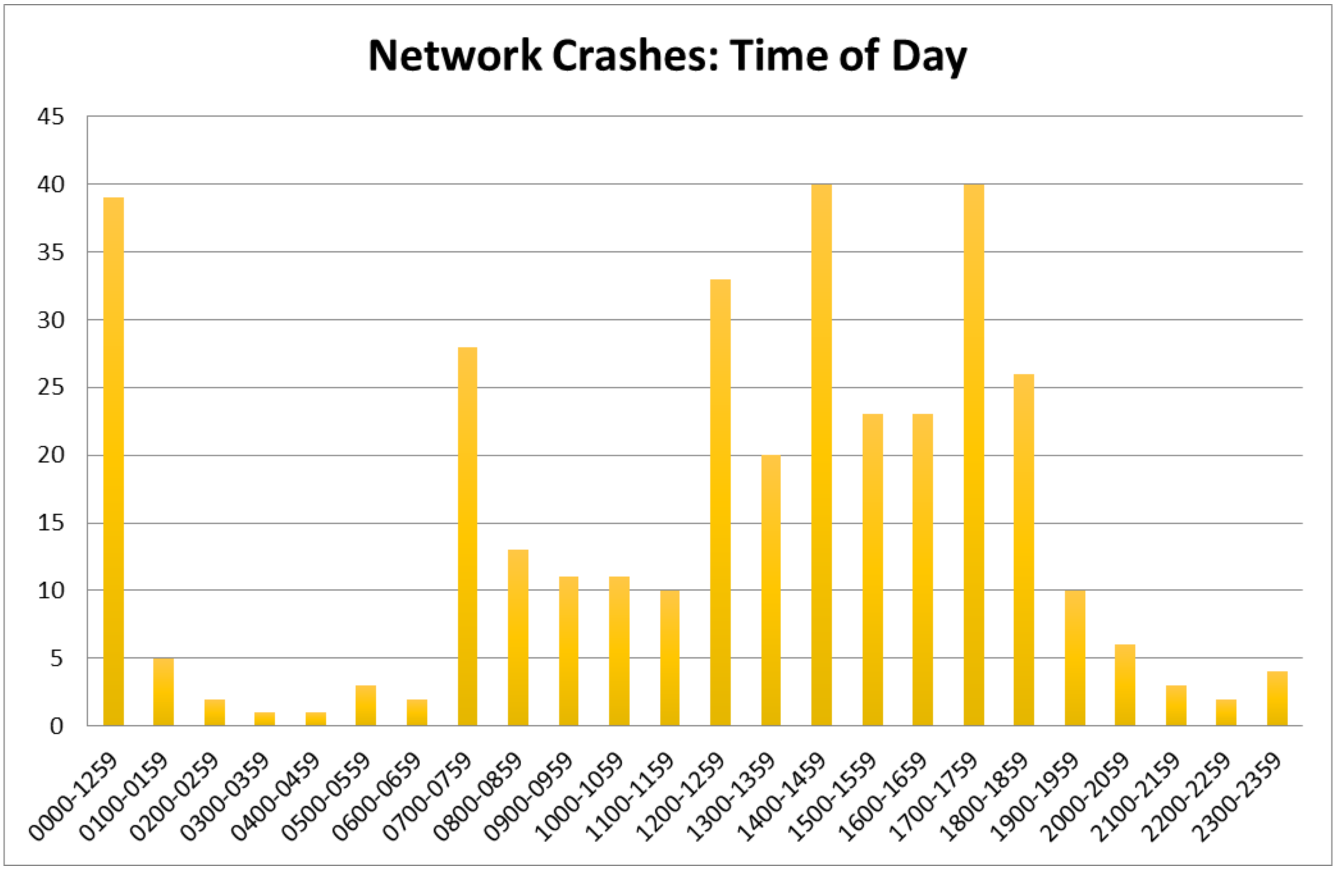


Figure 52. Network Crashes by Time of Day

Figure 52 above shows AM, Lunch, and Dismissal Hour crashes are two times higher than average hourly crashes. Peak school hour crashes are just as high as PM peak rush hour crashes at 5-6 PM.

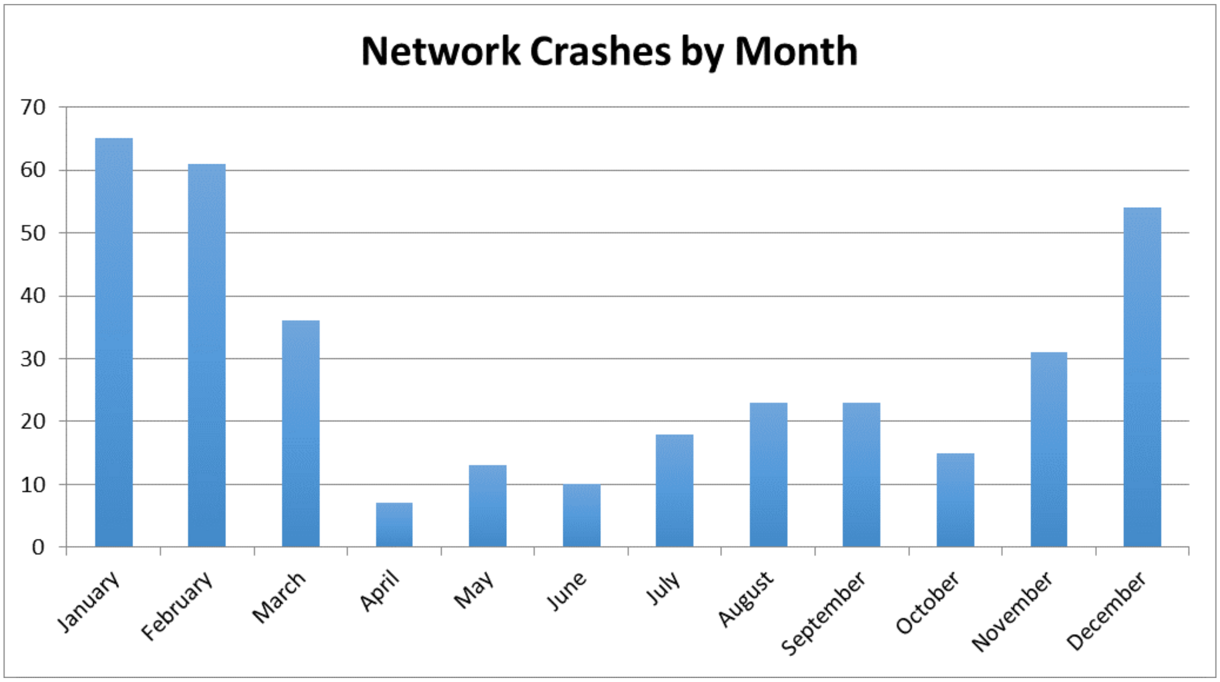


Figure 53. Network Crashes by Month

Figure 53 above shows the highest crash months are December through February. These months are two times higher than average. These months have the most significant ice and snow road surface conditions.

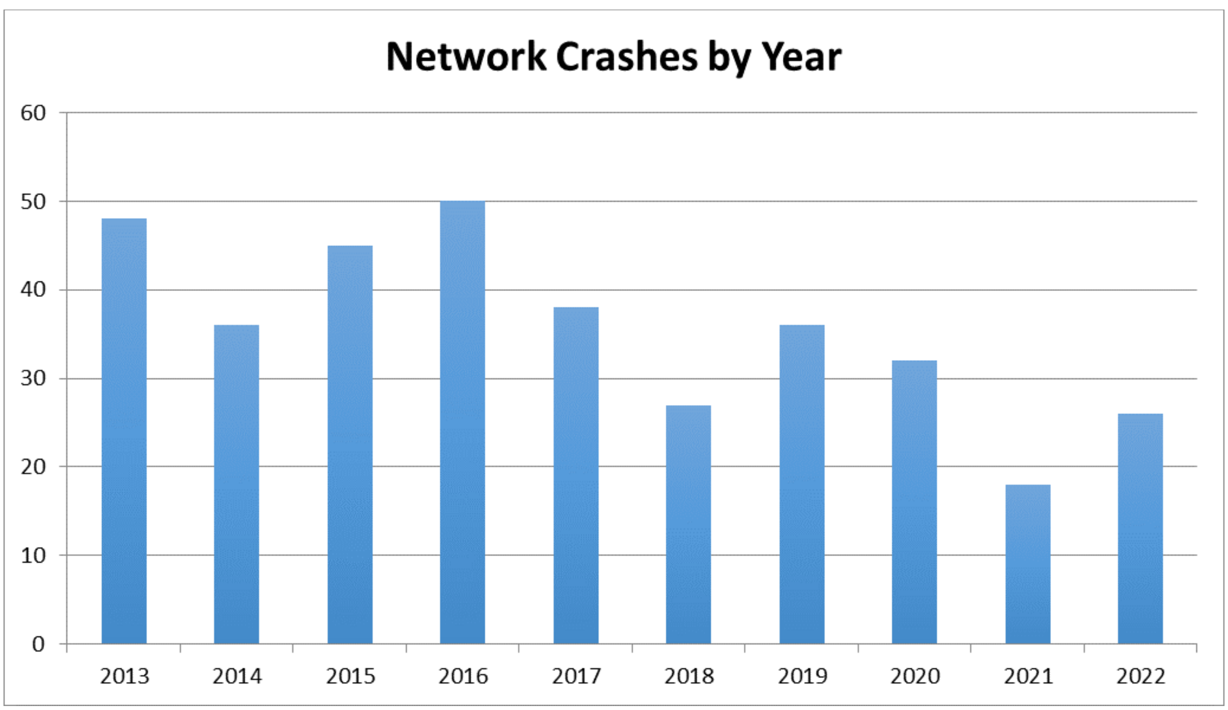


Figure 54. Network Crashes by Year

Figure 54 above shows school related and non-school related crashes are generally declining over the past ten years.

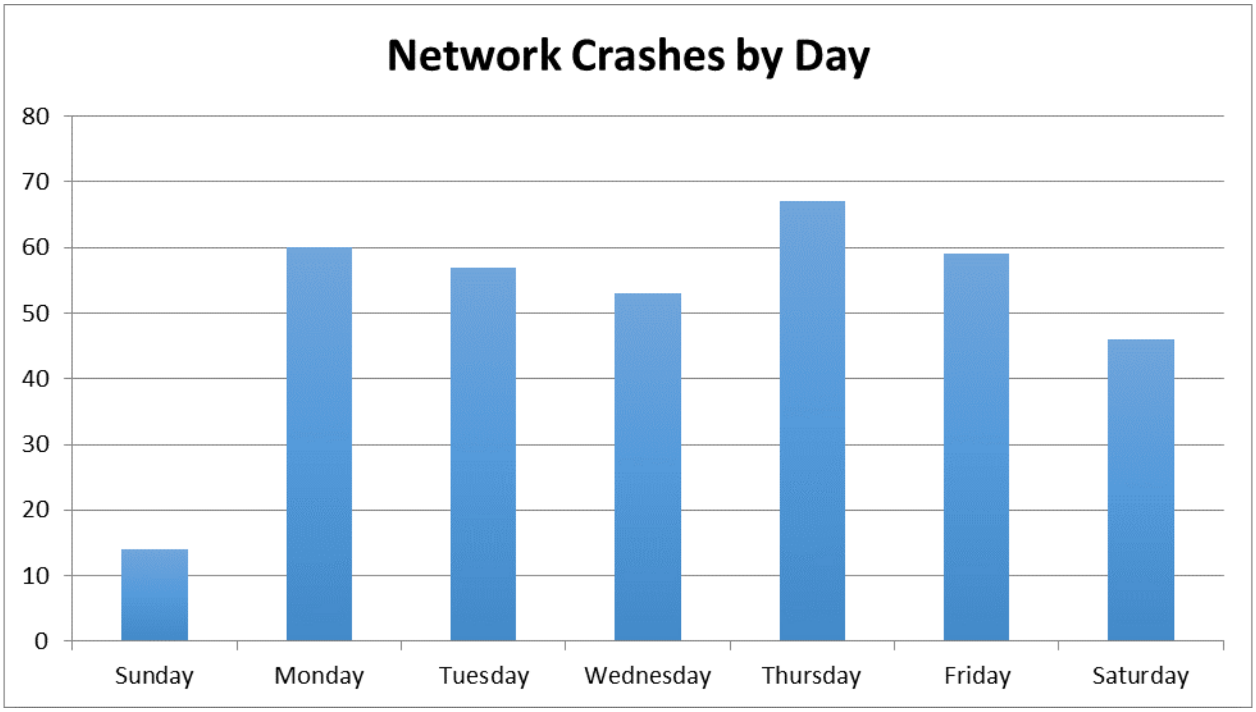


Figure 55. Network Crashes by Day

Figure 55 above shows that Sundays are the lowest crash days and that weekdays are evenly distributed.

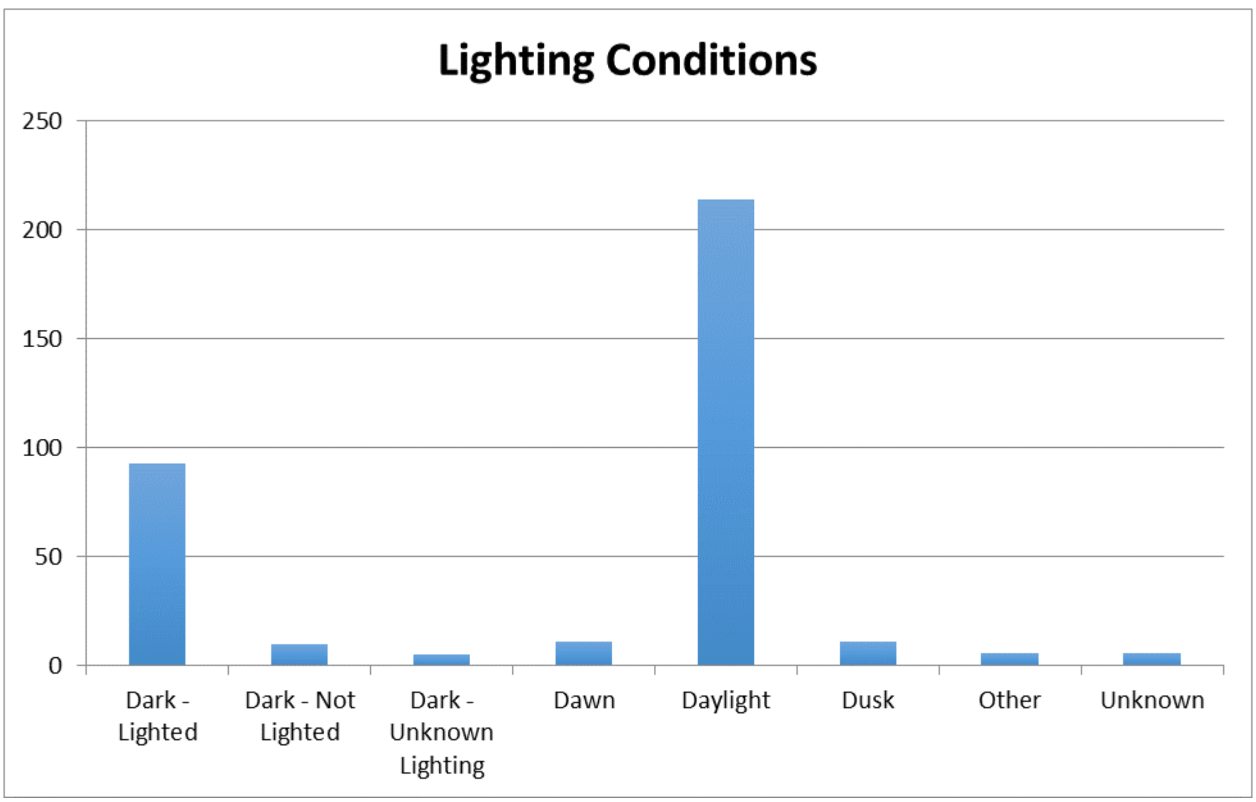


Figure 56. Network Crashes' Lighting Conditions

In Figure 56 on page 94, half of school and non-school related collisions occur in daylight or darkness. It is evenly split. Lighting does not appear to be a major factor in crashes.

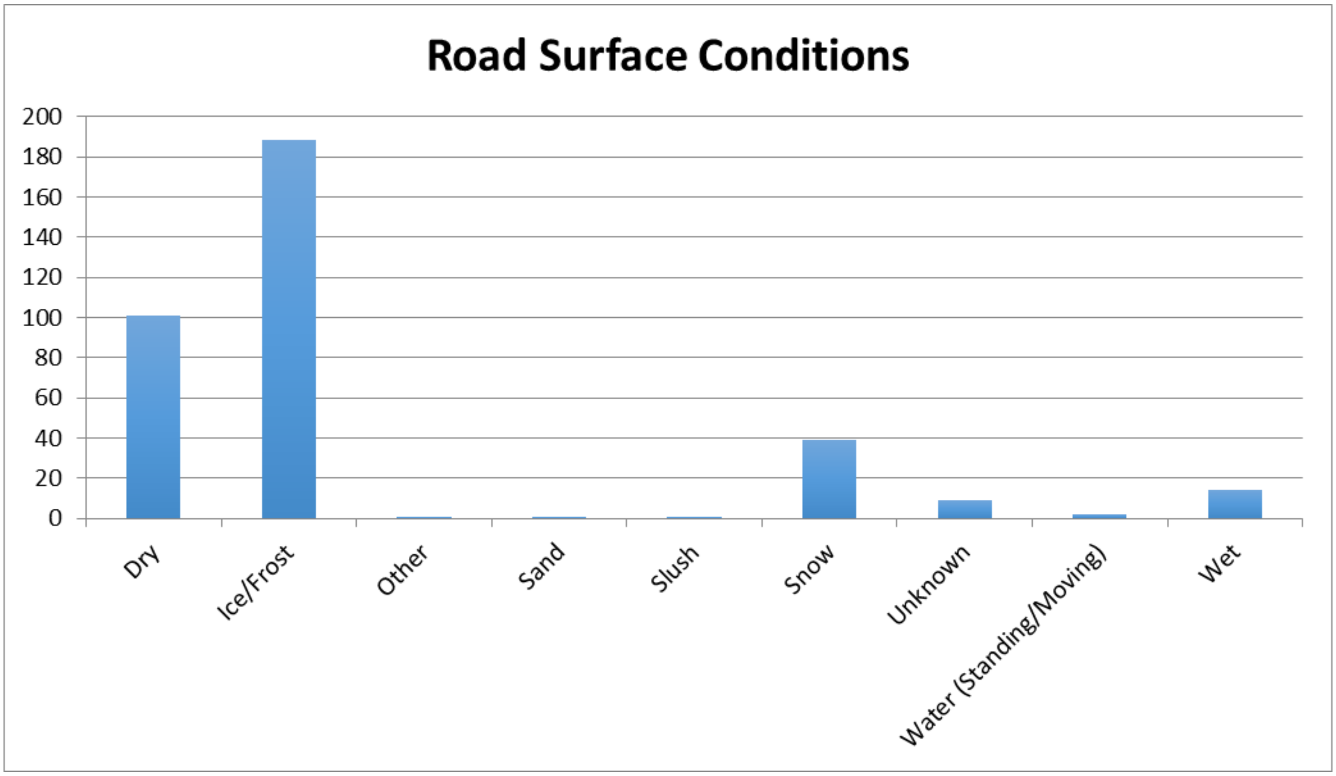


Figure 57. Network Crashes' Road Surface Conditions

As shown in Figure 57 above, most school and non-school related crashes occur on snow or ice surfaces (66%). This rises to 74% when adding in wet and water surface conditions. Dry roads are not a common factor.

Sliding is a significant factor in rear-end, angle or run-off-road collisions. In some narratives, this has been described as worsened by freeze/thaw from stop-and-go vehicles' exhaust and braking. Driving too fast for conditions in winter months (above) and braking ability appears to be a major factor.

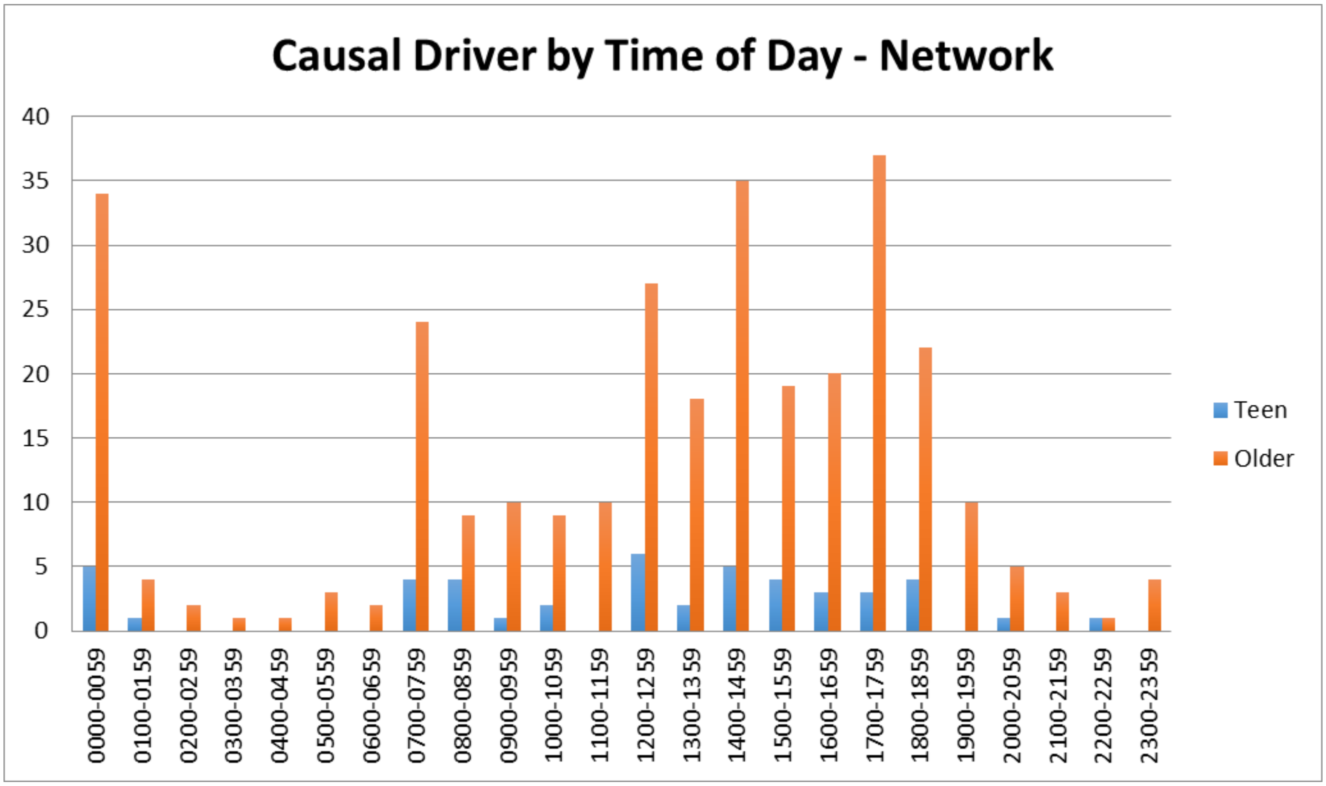


Figure 58. Network Crashes by Driver Age and Time of Day

Figure 58 above shows teen crashes are not overrepresented compared to the network as a whole. Older adult drivers also crash at the same rates. Teenage drivers are involved in crashes at the same rates during key school hours as the rest of the day.

There are 46 crashes involving teen drivers considered at fault in the network over 10 years, or 4.6 per year. There are 68 crashes involving teen drivers in the network regardless of fault over 10 years, or 6.8 per year. In 5 collisions, or less than one per year, both drivers are teenagers.

A large share of 20-29 year old drivers also appears evident upon inspection of the data, possibly due to students out of high school, but of a younger prevailing age at or near UAF in this area

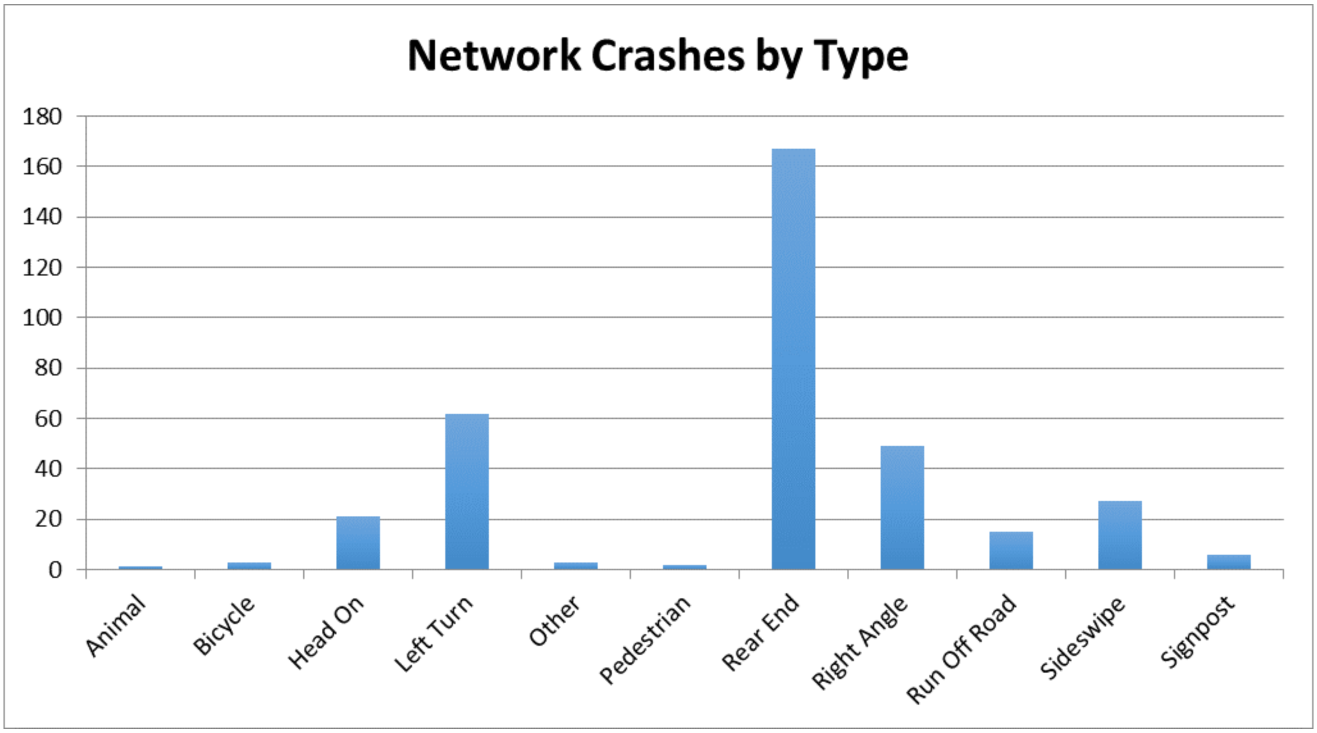


Figure 59. Network Crashes by Crash Type

Figure 59 above shows most crashes are rear-end collisions (39%). These are often reported as sliding on ice or snow surface conditions. One-fourth of collisions are reported as angle collisions (25%). These are often due to making left turns and sliding during ice and snow surface conditions. Some crashes involve sliding into or through the intersection or right turn lane during traffic signal red indication.

Sideswipe of adjacent vehicles, head-on crashes, or run-off-road crashes make up most of the remainder of crashes at lower shares. Reported pedestrian crashes are low.

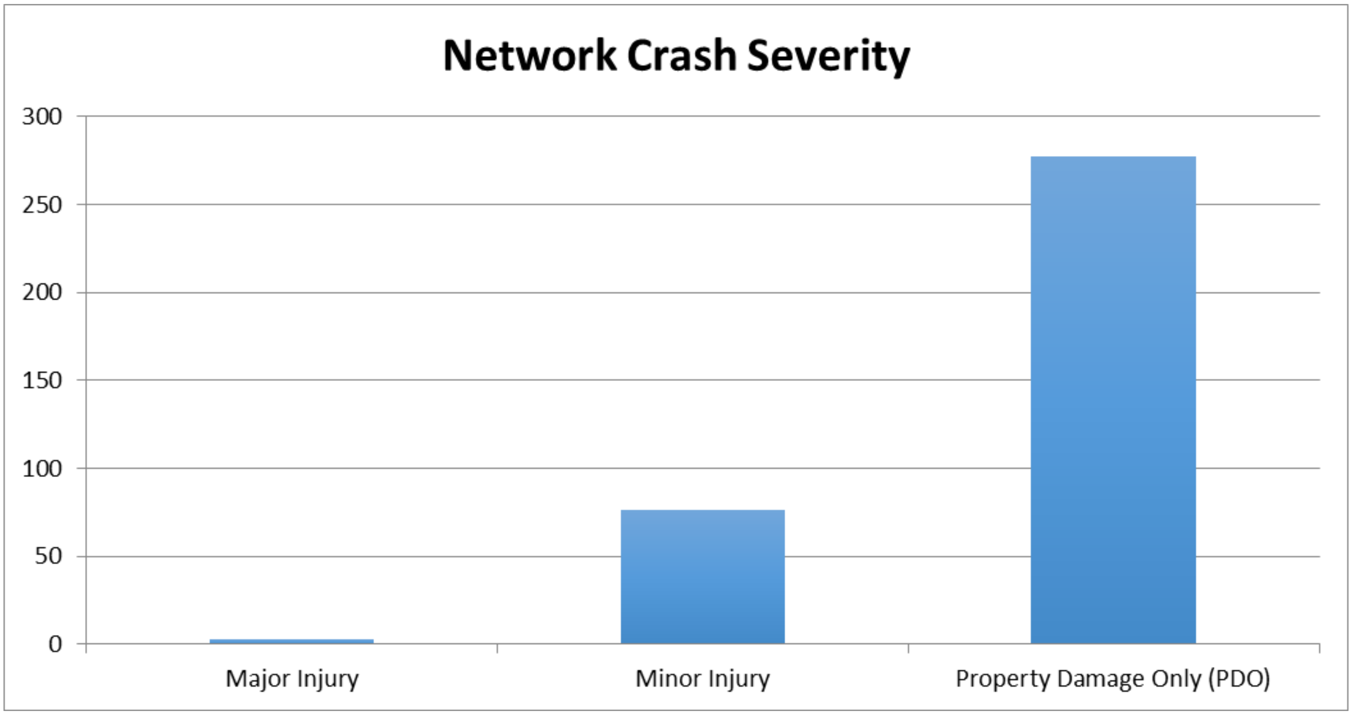


Figure 60. Network Crashes by Crash Severity

Figure 60 above shows 20 percent of crashes involving minor injuries. Half of minor injury reports are listed as possible injuries which are less certain. Three-quarters of all crashes are not reported to result in injury.

5.1.3 Ten Year Crash Diagrams Filtered for School Conditions

Crash narratives, diagrams, and sketches provide additional observations to police and citizen reports. This extra information improves interpretation of events more than data fields alone. Data fields may provide a first indication of crash type or direction of travel, but crash narratives further explain the data coding and improve engineering interpretation towards a consolidated crash diagram of the area.

It is not possible to gather all the trip intentions of each driver for each hour of the day even when reading crash narratives. Instead, an engineering diagram to summarize area crashes was focused on specific patterns that may better represent school related concerns. An area crash diagram was developed based on the following factors that better correlate to school travel:

- Teenage drivers (Ages 14-19), any hour of the day
- AM School Start Hour (7-8 AM) for turning access to schools
- School Lunch Hour (variable 10:30AM-12 PM) and turning access to schools
- PM School Dismissal Hour (2-3 PM) and turning access to schools
- During school months with classes (all months other than July)

- When narratives reveal school related transportation at adjacent signals

Using these criteria, potential school access and driver related collisions were narrowed to 104 crashes out of the 356 total network crashes. This subset has narratives that boil down to a) teen drivers any time of day, or b) crashes at direct access points to the school campus, and are also at school start, stop, or lunch hours. These 104 crashes have sufficient information to produce focused crash diagrams for the network study area.

All other indirect or non-school crashes were not considered further for diagramming in order to focus on campus-related factors. Crashes not considered for diagramming typically involved through traffic on arterials, non-school side streets, or non-teen related crashes at University Avenue and Geist Road. These other crashes were unable to be directly linked to the school destinations.

Figure 61 on page 100 and Figure 62 on page 101 diagram the 104 reported crashes for school related collisions at direct access points at both high schools, during school hours, or involving teen drivers. Teens' ages are shown in a circle adjacent to the arrow with the data about the crash. When teens are considered not at-fault or otherwise not causal factors, teens' ages are moved to the secondary vehicle's shorter arrow, which has less data posted on that vehicle's actions. Eight of the crashes involved teen drivers on campus approach roads leading to arterials. Most teen crashes occur out on the arterial network. The same is true for older adult drivers.

Some other rates of teenage driver involvement are as follows:

- 12% of "school hour" collisions involve teen drivers as the cited or causal driver. Most are 18 years old.
- 13% of all crashes in the area, all hours of the day, involve teen drivers cited as the causal driver.
- 20% of all crashes involve teen drivers. In 7% of these crashes they drive the second vehicle, and are not considered causal or at fault.

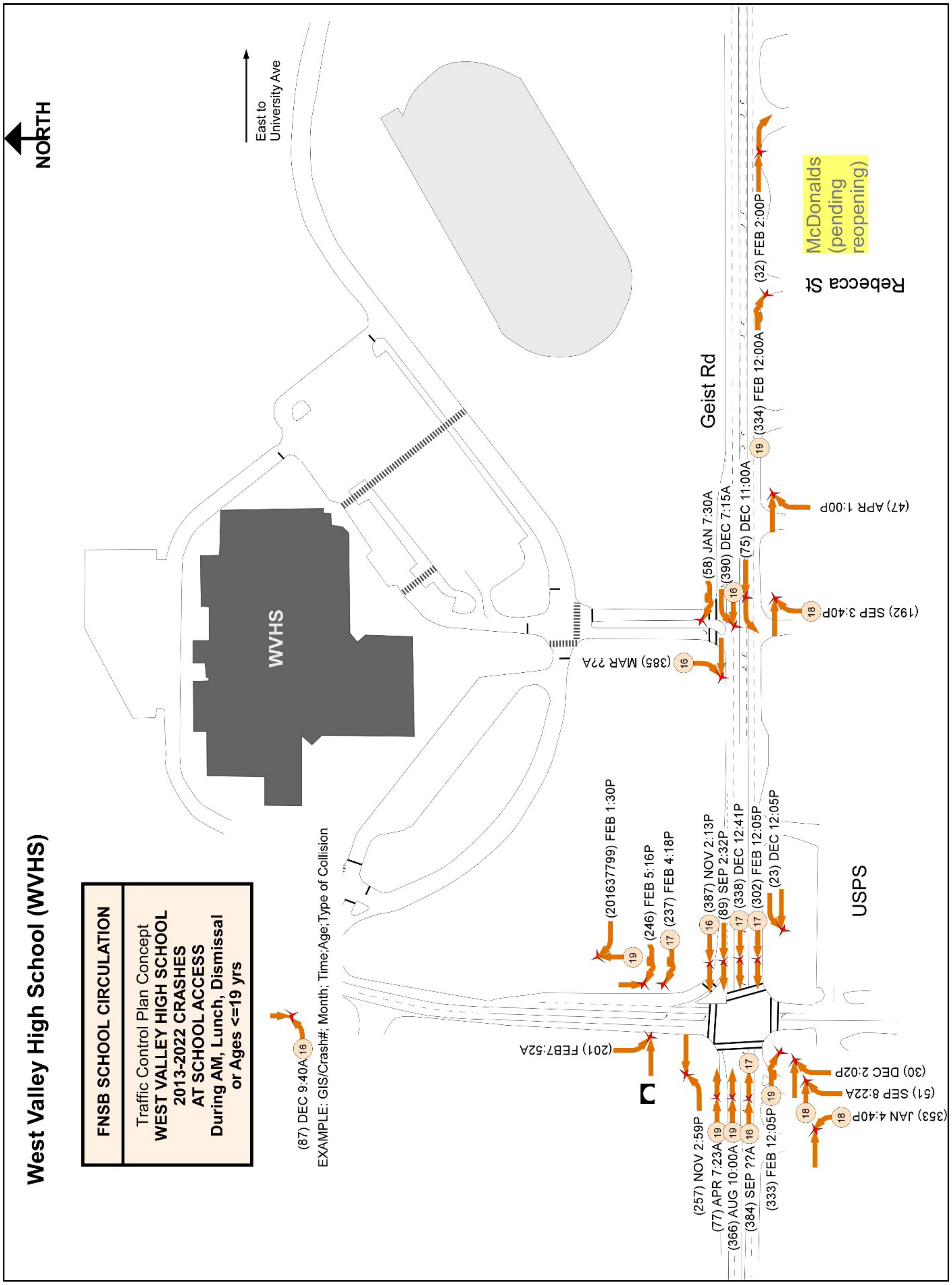


Figure 61. WVHS School Hour, School Access, or Teen Age Related Collisions 2013-2022

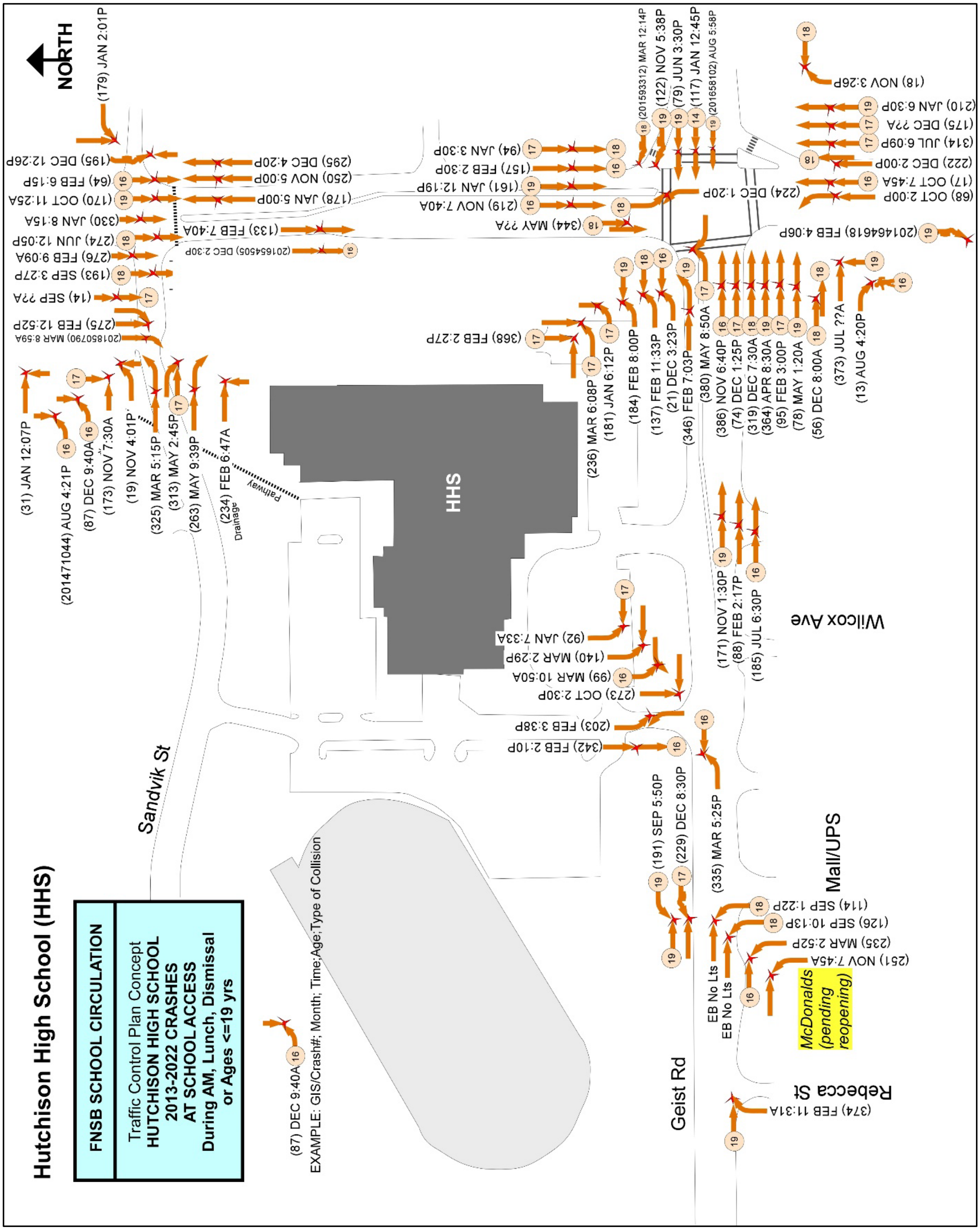


Figure 62. HHS School Hour, School Access, or Teen Age Related Collisions 2013-2022

6 Conclusions

This high school study was defined and funded by the local community through FAST Planning. The study intent is to identify ways to reduce congestion and improve safety for all transportation modes.

In the decades since first constructing these schools, travel behaviors have changed towards personal vehicle use. Many options are available to affect congestion and mode of travel.

Engineering standards recommend school transportation routes and travel modes be prioritized by following goals and plans set by the community. The engineering task is to find technical solutions which serve those goals and plans. This report measures congestion and air quality performance under existing conditions as shown in Table 8 on page 77 through Table 14 on page 89. These performance measures can be used as a benchmark to evaluate options for future changes.

Table 15 below lists concerns and potential solutions presented throughout this report. Concerns are linked to potential solutions for further evaluation. This offers a start towards options for future analysis.

Table 15. Existing Conditions Report Findings

Identified Findings and Concerns	Potential Ways Forward for this Study
Site Layout: School sites were not originally designed around high-volume single vehicle access. Existing conditions suggest a greater demand for vehicular travel with some transit and walking options. Public and Stakeholder input reveal a desire to improve all modes of travel.	Gather additional community input on desired safe routes and safe modes to school. Review safe routes to school infrastructure, bus stop safety, busing needs, and school side entry improvements to increase ridership. Consider carpooling connections and "apps" that could decrease drop-off and pick-up traffic levels. Consider varied start and stop time potential at each school. Gauge walking student groups gathered by adults enroute (also called a "walking school bus") interest and options within 1 to 1.5 miles of schools in lieu of vehicular travel.
Congestion: Congestion and making left turns at the Sandvik Street STOP sign is a safety concern.	Consider increased traffic control device capacity options to serve the east side of campus.

Identified Findings and Concerns	Potential Ways Forward for this Study
Congestion: Gradelle Avenue and Sandvik Street is the central overlapping conflict point for all WVHS travel modes. **Congestion:** The HHS front parking access at Geist Road and the north-south HHS "spine" road is the central overlapping conflict point for all travel modes.	Look for ways to pull apart conflicting user groups or modes in the Needs Analysis Report when choosing options. Reduce conflicts and improve safety by reducing overlapping uses of the campus parking and lanes.
Congestion: Onsite congestion from WVHS drop-off-pick-up backs up east and west along Sandvik Street. High pedestrian volumes concentrated at school frontages increase queue spillover from main entrances.	Examine options to increase drop-off/pick-up efficiency and reduce conflicts.
Congestion: Offsite congestion includes HHS drop-off and pick-up queues onto Geist Road, risking backing into the University Avenue signal. WVHS drop-off and pickup queues briefly back to the edge of Geist Road along Gradelle Avenue also risking Geist Road congestion.	Examine ways to relocate internal demand and to store queuing traffic off arterials.
Congestion: WVHS Demand from the east is 1.5 to 2 times that from the west primarily through Gradelle Avenue and Sandvik Street. HHS Demand from the east is at least 2 times that from the west primarily through the HHS frontage road and north-south "spine" 3-way STOP. Traffic demand is primary to and from the east even though the student population is mostly from the west.	Pull apart east and west conflicting movements to reduce congestion. Increase options for east side traffic access and circulation.
Pedestrian Crossing Safety:	Develop and recommend pedestrian crossing options between existing traffic signals on

Identified Findings and Concerns	Potential Ways Forward for this Study
Geist Road pedestrian crossing safety is a top concern. There are no full-width unsignalized gaps available to cross Geist Road at peak school hours; the speed limit is 45 mph; and an estimated 20 pedestrians a day, including students during school hours, are crossing between signals. Adequate gaps exist for pedestrians to cross half-width, at-grade, on average once every minute. This frequency exceeds the frequency of signal-controlled gaps for full-width crossings at adjacent traffic signals. “Midblock” pedestrian crossing occurs outside of pedestrian safety zones for various reasons, as an alternative means to pick-up congestion onsite, to catch the transit system, to access retail development, and to walk to home.	Geist Road with this project and the subsequent Geist Road Corridor Study.
Pedestrian Route Safety: On-campus walking routes are a concern under snow conditions and when overlapping with vehicular use on roadways. The large conflict between vehicular drop-off/pick-up and pedestrian crossing/loading are the starting point where congestion begins under existing conditions. Vehicle-pedestrian conflict zones are signed and lighted to lower levels than would be required under current standards.	Planning and funding to ensure continuous and dedicated walking routes as pedestrian safety zones with more winter maintenance on campus is desired. Improve signing, lighting and layouts to meet current safety standards and encourage pulling forward. Consider building improvements to entryways which could expand or improve distribution of drop-off/pick-up areas.
Transit Schedules: Transit service schedules are not closely matched to school start and stop times. A commuter may be able to arrive by 8 AM but not by 7 AM. A	Consider how MACS transit scheduling and services could complement high school start and dismissal times.

Identified Findings and Concerns	Potential Ways Forward for this Study
later time is more likely if the commuter has to transfer between routes.	
Transit Stops: Transit stops are not closely located to benefit from adjacent signal crosswalks or gap creation. Transit stops are on the opposing side of the arterials from the schools.	Review and revise transit stop locations to promote safer pedestrian crossings at or near pedestrian safety zones.
Crashes: Geist Road crash rates between signals are nearly two times past statewide averages Closely spaced commercial acces and sidestreets require multiple decision points. Access spacing is closer than the time it takes to stop a vehicle under good road conditions, and less for snow and ice conditions.	Manage busier access spacing at 300 feet or more to benefit motorists with "one decision at a time" and to reduce crash rates.
Crashes at peak school times are high, at or near those of the later PM commute hour. Teen drivers are involved in about 20 percent of crashes. Teen drivers are not disproportionally involved during school hours than any other hours of the day in this network. Inability to stop under ice and snow conditions, sliding into conflicting vehicles or roadsides is the most common safety problem. Rear-end and angle collisions under these conditions point to a variety of possible factors, including experience, maintenance, and speed for conditions.	Moving overlapping congestion and trip purposes will help reduce congestion, icing, and stopped traffic. A review of traffic speed options could be performed. Planning and funding for more winter maintenance or changing methods on the arterial is desired.
Growth: The first phase of U-Park childcare renovation could add 80 trips per	Plan and budget for site circulation changes for U-Park renovation.

Identified Findings and Concerns	Potential Ways Forward for this Study
hour to the AM and PM peak traffic. Further expansion could double new trips. U-Park childcare can be expected to introduce high "on and off" turning traffic onto a busy road segment serving the two high schools.	Coordinate childcare circulation with site circulation changes recommended in subsequent reports for this project.

7 References

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State of Alaska, Department of Education, School Profiles for WVHS and HHS - https://education/alaska.gov/compass

FHWA Deceleration under Winter Conditions - Common deceleration rates and reductions for snow and ice conditions.
https://highways.dot.gov/safety/speed-management

UAF Community and Technical College at www.ctc.uaf.edu
UAF Cooperative Extension Service at uaf.edu/ces/districts/tanana/