

**ATTACHMENT 1**  
**LESSONS LEARNED SUMMARY**

## LESSONS LEARNED SUMMARY (October 14-18, 2024)

### Traffic Control Plan (TCP) Changes

Using the existing campus layout, the following principal traffic control plan changes were made for one week:

At **West Valley High School (WVHS)** changes included:

- bus loading zone moved to the WVHS back lot,
- east side WVHS circulation road to the back lot was closed to all but emergency vehicles,
- staff and west side drop-off and pickup demand was moved to enter the bus loading zone in the west front of WVHS curbside and major entry,
- WVHS frontage main entrance row was dedicated to staff parking, *worked – did not create conflicts in PM, left later.*
- the east side of WVHS drop-off and pickup loop was unchanged.
- ADA and visitor parking was unchanged.

At **Hutchison High School (HHS)** changes included:

- front access to student parking closed to conflicting turns,
- senior student parking lot closed and moved to the west side of HHS,
- senior student parking lot coned off to force drop-off and pick-up traffic to make a right-turn-only at the HHS east drive, and u-turn within the senior parking lot, for more storage off of Geist Road,
- the HHS central “spine” road was closed to Geist Road south of the Culinary Arts entrance, and restricted to one-way northbound from the drop-off and pick-up zone at the school’s main entrance,
- Drop-off and pick-up exit options were unchanged.
- The CTC and student parking lots from Culinary Arts entry to the north were unchanged,
- Sandvik Street north of HHS was unchanged.

Traffic control plan (TCP) preparation, approval, and adjustments are included in the attachments. Photographs of traffic control device changes for this project are shown in the photo attachments.

The first snowfall of the season occurred overnight on October 14/15, resulting in snow and ice conditions throughout most of the demonstration period.

## **What traffic control changes taught us: Kinney Engineering data and observations**

Attachment 1 shows maps and table with locations of Kinney Engineering findings. Kinney Engineering staff were at key conflict points around the campus during the demonstration. Effort was focused on collecting observations during peak periods ½ hour before school start and ½ hour after school dismissal. Staff was present for the entire hour around these periods. Other staff roved to frequently observe impacts to user groups. Data observation locations are defined in Attachment 4. Photos and snapshots of basic traffic features were taken from spot locations and drive-through dash camera still-shots are in Attachment 5.

### **Observed Successes:**

#### **WVHS**

- Bus loading at the rear of the school is possible.
- Bus loading was well directed by WVHS staff at doorways and Durham Services
- West Loop drop-off and parking can function well and has room for designated parking.
- West Loop drop-off doorways are well designed with wide, visible features like the main entrance.
- Adding the West Loop drop-off area reduced congestion in the East Loop dropoff by 27 percent in morning
- No traffic control changes had to be made to visitor parking or East Loop drop-off in front of the WVHS main entrance. Traffic control changes elsewhere were minimized to affect the fewest user groups possible.
- The morning “extension” period allows students to arrive later in the morning to start classes. This trickling of students beyond the 7:30 AM starting bell noticeably reduces congestion.
- Fairbanks Street and Geist Road signal. While past drone footage shows an impressively long queue can be from the signal all the way to Grabelle Avenue and Sandvik Street, this only lasts for one signal cycle or a few minutes. When buses depart in one single group this holds up other campus departures. The buses are nearly all served in one cycle and the remaining departures then clear very quickly within one other signal cycle.

#### **HHS**

- East driveway traffic did not queue onto Geist Road but would have without the temporary u-turn storage in the senior parking area.
- Front parking lot turning conflicts were reduced near Geist Road. Parking lot turning conflicts were increased at the back lots of HHS.

#### **Both High Shools**

- Moving user groups reduced conflicting volumes internal to the campus.
- Congestion was primarily kept on low-speed campus routes, not higher speed arterials.
- Geist Road access was not congested during dismissal. However, traffic entering HHS and WVHS from the east came close to backing onto Geist Road
- University Avenue high turning demand did not backup onto the arterial
- No major incidents or crashes appear to have been reported or observed.
- Motorists and pedestrians slowed for conditions during first snowfall.
- Staff arrived earlier without congestion.

- Interactions between KE staff and students/faculty at the schools demonstrated awareness of fall demonstration project.
- Prior to snowfall, visibility was difficult.
- All light fixtures appeared to be working during the fall demonstration.

## Observed Problems or Concerns:

### WVHS

- Fairbanks Street and Geist Road eastbound left-turns waited for multiple red lights at AM Arrival time, spilling out of the left-turn bay storage. This congestion at the Fairbanks signal was not predicted in traffic control modeling with full green times available. KE staff measured AM left turn signal timing intervals of only one-half of programmed green time. *(First snowfall may have caused “gap-outs” or slower starts by motorists meant not triggering signal extension times. DOT&PF has rechecked signal timing in early December and found full green time and signal extensions are programmed and working.)*
- Fairbanks Street and Geist Road buses forced into this one entry point in the AM increases congestion. Having options for buses reduces congestion. Up to 8 morning buses arrive at the eastbound left turn Fairbanks Street signal in a short interval of a few minutes. *BUS vehicle arrival rates are difficult to serve within a single green interval. This demonstrates the value of more access options for buses.*
- Fairbanks Street and Geist Road southbound traffic cleared out very well with each cycle, with green time lasting longer than needed compared to other approaches to the signal, during first snowfall and ice conditions. It may be that maximum green times can be adjusted to favor other heavy movements. This informs Kinney Engineering that early concepts to consider southbound split-phase signal timing for dual left turns is not a critical need.
- Back lot doorways and hallways are not designed for large student volumes or lighted visible entry and staffing in contrast to the front of the building.
- Back lot Special Education buses have limited parallel parking space. Up to four buses narrowed through access to the back lot to one- and one-half lanes.
- West Loop pick-up lanes were poorly used in the dismissal hour as shown by very low traffic levels. Some commenters indicated possible lack of awareness and difficulty changing routes in afternoons.
- Sandvik Street sidewalks were helpful as alternative pick-up locations in the dismissal hour. Students and parents could be seen staying in contact with cellular phones.

## HHS

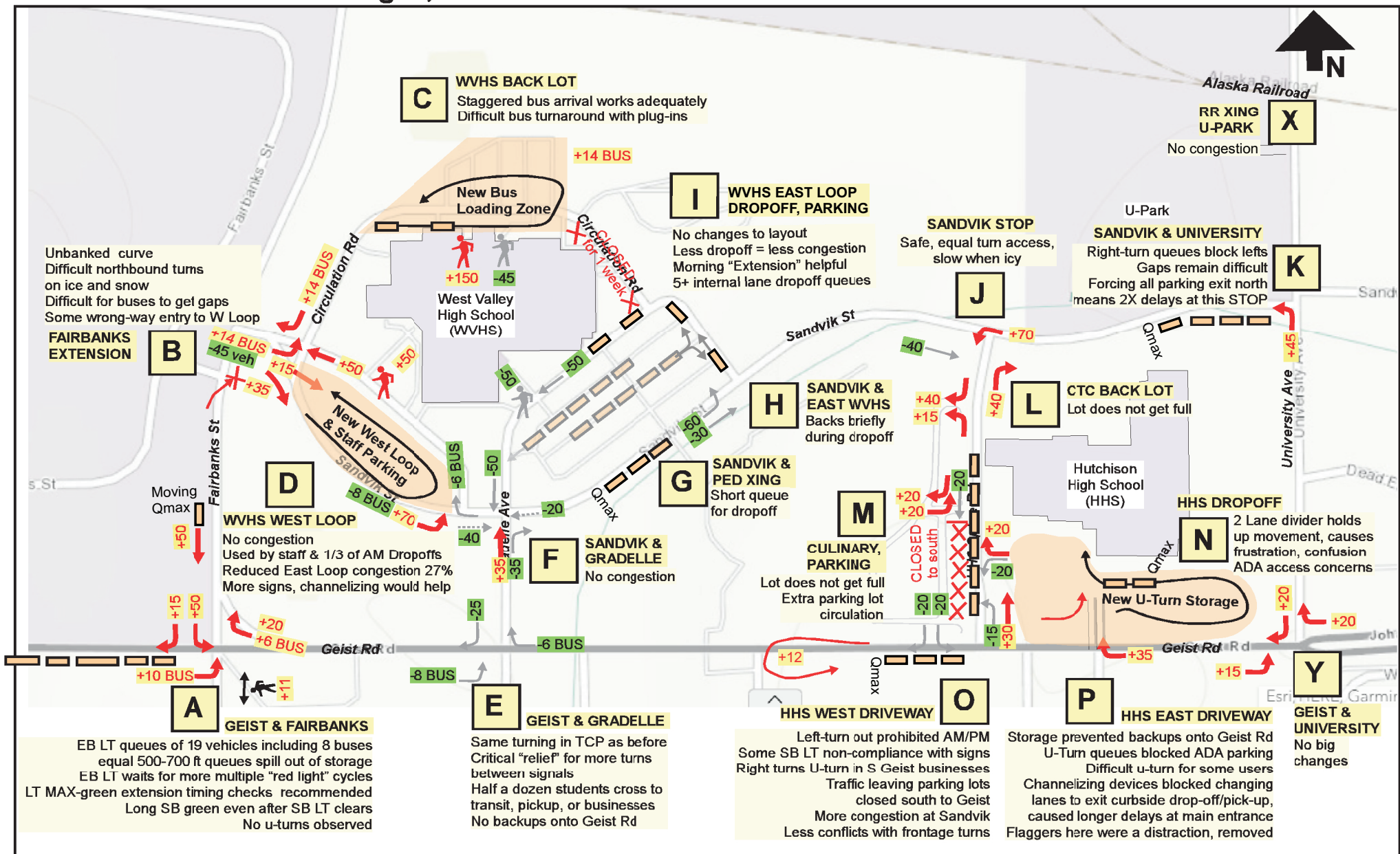
- Closure of the internal central “spine” road southbound greatly impacted dismissal.
- Sandvik and HHS All-way STOP northbound right-turns onto Sandvik Street tripled. Queues on Sandvik Street lasted 15 minutes longer on this east side of campus compared to the queues to the west on Gradelle Avenue and at Fairbanks Street.
- HHS West Driveway in the dismissal hour queued within one vehicle length of reaching Geist Road
- The CTC back lot introduced 4 large buses used as shuttles for HHS students. Dismissal of these buses was located within the highest congestion area during the demonstration.
- HHS East Drive main entrance drop-off and pickup does not operate as well with channelizing dividers. This forces traffic to stay in their lane after unloading or loading. This holds up traffic that could otherwise weave to an exit lane and depart where sooner gaps may allow.
- HHS East Drive ADA parking was blocked by the HHS u-turn storage and made parking stalls impossible to use in the same alignment as striped.

## Both High Schools

- Forcing HHS student parking and CTC back lot parking to exit north increased congestion for all users on Sandvik Street to University Avenue.
- Sandvik Street sidewalks pedestrian traffic to and from WVHS to HHS used the sidewalk and the north shoulder. Both sides of Sandvik Street have low definition or channelization during snow buildup events.
- Sandvik Street and University Avenue queues worsened, as modeling predicted. Queues were worse than modeled possibly due to first snowfall events and very icy conditions.
- Geist Road access breaks in fencing experienced small numbers of pedestrian crossing to access transit stops, pick-up vehicles, and commercial areas.
- Transit Stops are located 400 to 650 feet away from existing signals. As defined in the MUTCD, Chapter 4, Signals, distances more than 300 feet are considered as further from existing signalized crosswalks. Distances of 300 feet or less (one block or less) are considered as within the immediate vicinity of signalized crosswalks.

**Traffic Volume Changes (+/-)  
compared to Existing Conditions  
are shown in green and yellow boxes**

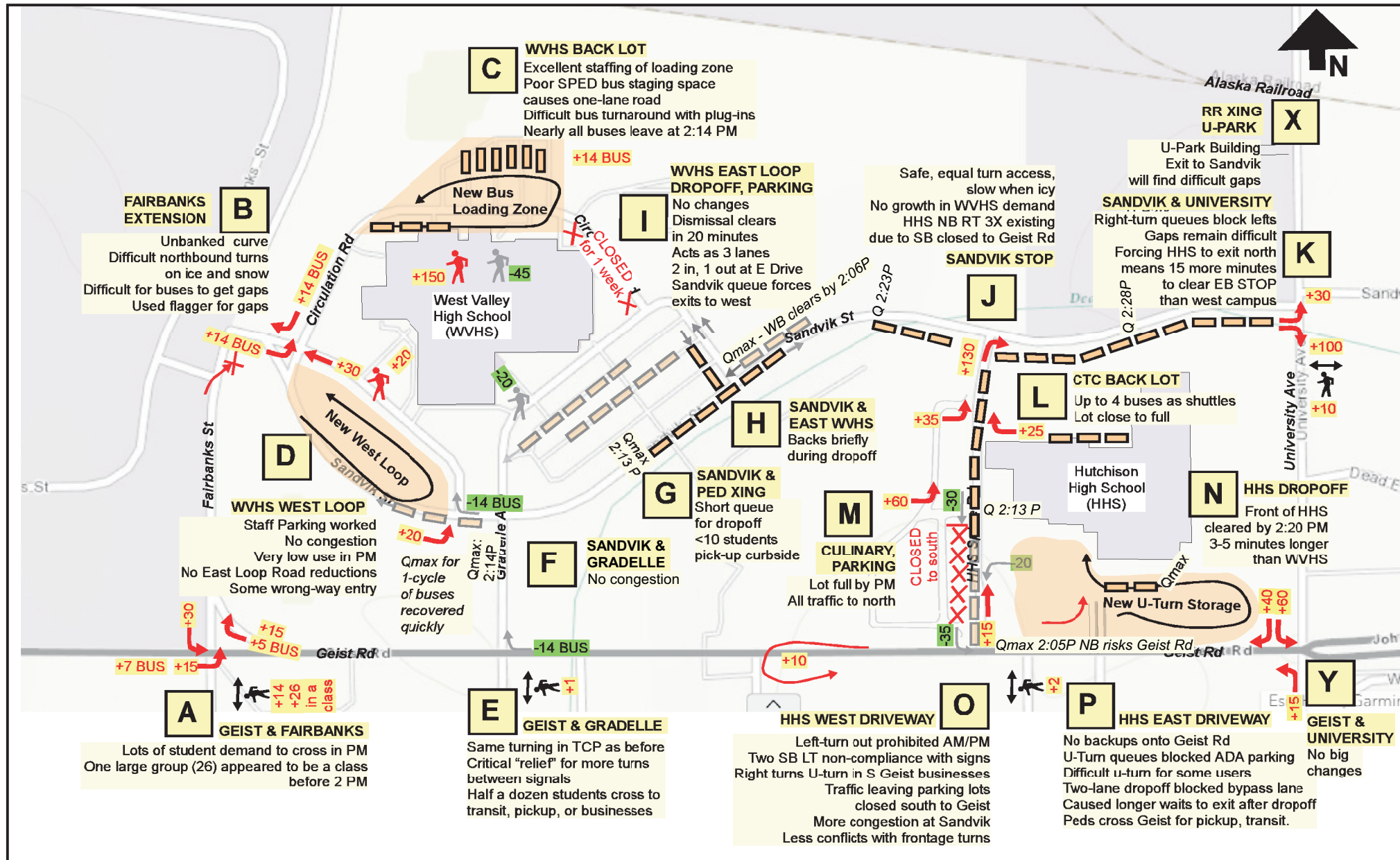
# AM Arrival



## Fall Demonstration: Changes, Lessons Learned

**Traffic Volume Changes (+/-)  
compared to Existing Conditions  
are shown in green and yellow boxes**

# PM Dismissal



## FALL DEMONSTRATION PROJECT Oct 14-18, 2024

## Traffic Control Plan (TCP) LESSONS LEARNED

Site Map	Location Impacted	TCP change affecting Site Location	Benefits Observed	Disbenefits Observed
<b>A</b>	Geist Rd & Fairbanks St Signal	Test Moving Bus Loading to WVHS Back Lot  No Changes at signal	<u>PM Dismissal: (No change)</u> Confirmed signal access is well used by students even with snow/ice conditions  Departing buses clears in 1-2 signal cycles. Dismissal traffic clears in 20 minutes or less.  Ten or more groups of 2-3 students crossed at Fairbanks St signal primarily to Circle K, with some individually headed to residences.	<u>AM Arrival:</u> Longer LT left-turn backups through multiple red lights. Eastbound queues were 19 vehicles, including buses (8). Queue lengths were 500-700 feet backing out of left turn bay onto Geist Road.  About half of Max green time for left turns was not realized in two staff observations <b><i>FOLLOWUP: Reviewed radar detection with DOTPF, found to be working. Snow/ice gapouts could have been occurring. Recommend monitoring.</i></b>  <u>PM Dismissal:</u> All buses departing at once backs Sandvik exiting traffic to Gradelle Avenue. This cleared rapidly within one cycle.  <b><i>FOLLOWUP: Recommend additional Durham input.</i></b>
<b>B</b>	Fairbanks & Sandvik	No Change	<u>AM Arrival:</u> No banking on roadway turn to Sandvik. Icy conditions lead some northbound turns into oncoming lanes	Buses had difficulty getting gaps to depart from back lot
<b>C</b>	Back lot at WVHS (was Staff parking, SPED bus loading)	Moved Bus Loading Zone to WVHS Back Lot	Bus staging did function with low traffic.  Excellent staff assistance at doors.  <u>PM Dismissal:</u> Excellent Durham assistance staging PM bus arrangements for loading	Even with no change, 3 short plus 1 long SPED buses do not fit in existing dumpster staging area. Not enough space or visibility at dumpster area.  SPED bus staging difficult with greater back lot use.



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## Traffic Control Plan (TCP) LESSONS LEARNED

Site Map	Location Impacted	TCP change affecting Site Location	Benefits Observed	Disbenefits Observed
				<p>Circulation road reduced to 1 lane. A few parents and staff had to travel wrong way in one lane.</p> <p>Buses had difficulty turning around plug-in bollards in lot</p> <p>Doorway entry points not designed for large student volumes. Staffing required</p>
<b>D</b>	West Loop, Exit to Sandvik St	Made new West Loop Dropoff/PU at WVHS. Moved staff parking here and at East Loop.	<p>West Loop Exit driveway is wide, adaptable</p> <p>Staff parking was adequate, reverse diagonal worked ok</p> <p>Reduced load on East Loop Dropoff in AM by ~50 vehicles (27+%)</p>	<p><u>AM Arrival:</u> Some wrong-way entry despite no change to existing signs</p> <p><u>PM Dismissal :</u> Very low use in PM, most pickup may have gone to the east loop</p> <p>More channelizing curb could better direct traffic</p>
<b>E</b>	Gradelle & Geist	No changes	<p>No backups on Gradelle to Geist Road</p> <p>Gradelle St is a critical left-turn LT relief valve between traffic signals. Helps morning bus arrival avoid queues at Fairbanks St signal</p> <p>Low ped xing demand at school dismissal.</p>	<p>Half a dozen individual students crossed Geist Road at Gradelle Street or HHS driveways to and from transit, an offsite source, pick-up, or go to a business. These are 2 stage unsignalized pedestrian crossings.</p> <p><b><i>FOLLOWUP: Recommend more input from Durham Services on reliance on EB LT at Gradelle?</i></b></p>
<b>F</b>	Sandvik & Gradelle	No changes	No congestion. Not the source of queues and backups across the campus.	
<b>G</b>	Sandvik Pedestrian Crossing	No changes	<u>PM Dismissal:</u> About a dozen students waited curbside along Sandvik for parallel parking	

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Site Map	Location Impacted	TCP change affecting Site Location	Benefits Observed	Disbenefits Observed
			pickup via cel phone contact. No congestion. Four or more cars waited ahead of school dismissal and departed.	
<b>H</b>	East Loop Dropoff/PU at WVHS	No changes	<u>AM Arrivals:</u> Moved faster with reduced demand due to west loop	No significant problems at East Loop area.
<b>I</b>	WVHS East Dropoff/Pickup and Parking	No changes	<p><u>AM Arrival:</u> Temporary West Loop dropoff reduced east side demand by 27%, about 50 vehicles.</p> <p>Staff parked in the east side ahead of and well after congestion periods.</p> <p>Existing “extension” student schedules are observed to be a boost to reducing the potential for congestion.</p>	PM Dismissal: Existing east side acts at 3 lanes back to Sandvik St. Two lanes inbound, one lane out, without clear definition.
<b>J</b>	Sandvik and HHS Extension N-S AWSC	No changes	<p>All Way Stop is safer and equal access, but slow.</p> <p><u>AM Arrival:</u> The temporary West Loop (Site D) reduced WVHS demand on Sandvik eastbound to University Avenue by one-third.</p>	<p><u>PM Dismissal:</u> There was no change in WVHS traffic eastbound to University Avenue (~120 veh) matching that the West Loop (Site D) was not effectively used in the PM. This could be due to the peak congestion at the Fairbanks and Geist signal.</p> <p><u>PM Dismissal:</u> Northbound right turns from HHS tripled due to blocking access to Geist Road. ((230+ vehicles vs less than 75 normally)</p> <p>Traffic congestion backs up through All-Way Stop at HHS. Decision and gap time slows all-way stop and queues from WVHS</p>

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## Traffic Control Plan (TCP) LESSONS LEARNED

Site Map	Location Impacted	TCP change affecting Site Location	Benefits Observed	Disbenefits Observed
				<p>move slower to HHS than from HHS to University.</p> <p>HHS dismissal congestion was “held” onsite for 15+ minutes longer after WVHS cleared.</p>
<b>K</b>	Sandvik & University	No changes	UPark site has alternative access to University Avenue without using Sandvik Street, but it is unimproved, disconnected from original dropoff/pickup lane for buses	<p><u>PM Dismissal:</u> Closing HHS parking dismissals to Geist worsened queues at Sandvik Street by 2X or more. Significant. Less access to Geist Rd means large traffic increases on Sandvik Street at U-Park as predicted in traffic simulation</p> <p>Existing right-turn lane storage backs out into Sandvik Street and blocks left-turn LT access to University.</p> <p>U-Park Daycare renovation will face long queues, lack of gaps on Sandvik.</p>
<b>L</b>	HHS CTC Lot	No changes	4 full size buses/shuttles observed in CTC lot. Lot slowly fills through the day instead of all at once.	
<b>M</b>	HHS Culinary Parking, Loading Zone	Closed Southbound from this point	West lot slowly fills through the day instead of all at once.	Closure southbound creates internal loops or parking lot circulation into and out to the north.
<b>N</b>	HHS Drop-off, Pick-up Zone	Closed Sr Parking for U-Turn Storage	Main entrance did not queue to Geist Road or u-turn. Stayed in front of building. Would have queued to Geist without increased storage distance.	<p>2 lane channelizing divider holds up curbside after loaded. Not easy to exit to left lane due to separation.</p> <p>Cleared fast, but took 3-5 minutes longer than WVHS to clear. This was due to northbound</p>

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Site Map	Location Impacted	TCP change affecting Site Location	Benefits Observed	Disbenefits Observed
				<p>congestion from HHS to Sandvik Street.</p> <p>Existing ADA Parking affected by u-turn loop. Too difficult to park other than parallel parking. Confusing to users.</p>
<b>O</b>	HHS West Drive	<p>HHS SB to Geist closed.</p> <p>S Student Parking closed.</p> <p>Dual No LT Signs 7:00-7:30A, 2:00-2:30P</p>	<p>No conflicts with parking closure at closest frontage road.</p> <p>Turns at frontage south of sculpture island were simpler.</p>	<p><u>PM Dismissal:</u> NB dropoff/pick-up inbound was served, but congested to the north due to NB exit at Sandvik. Southbound closure of access to Geist caused a tripling of demand to northbound right turns, resulting in significant backups to the north on Sandvik St to HHS (Site J), as was predicted. These backups then delayed northbound pickup in PM Dismissal period, and nearly backed onto Geist Road.</p> <p>LT Prohibition signs were not 100% effective. More than signing will be needed to encourage changes. Numerous vehicles violated the LT prohibition. 10+ vehicles turned right and made u-turns in Geist Road or south side business driveways.</p>
<b>P</b>	HHS East Drive	HHS Dropoff Rerouting at Front Doors	<p>No backups onto Geist Road</p> <p>All queues contained onsite</p> <p>Flaggers relocated from driveway entry to keep traffic moving, reducing hesitation and stopping at entry</p>	<p>U-turn loop made ADA parking at front difficult, not perpendicular</p> <p>2 lane dividing markers made dropoff exiting a problem, waiting in line longer</p> <p>Posting flagger at Geist driveway entrance confused entering traffic. Led to hesitation and questions, risking queues on Geist Road</p>

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## Traffic Control Plan (TCP) LESSONS LEARNED

Site Map	Location Impacted	TCP change affecting Site Location	Benefits Observed	Disbenefits Observed
X	University Ave & ARRC Crossing	No change	No increased traffic queues caused to RR Xing	
Y	Geist & University	No change	Southbound dual left turns quickly absorb traffic increases from Sandvik Street	
Z	Education, Awareness	Overall	<p>Multiple notices from schools, principals CMS signs onsite Student and teacher awareness appeared high</p> <p>About 1/3 liked the change and were affected positively</p> <p>No crashes or serious incidents during TCP. No near misses observed</p> <p>Same day sanding of roads in Wednesday snowstorm was a rapid response, positive.</p>	<p>About 1/3 disliked the change or were affected by the results negatively</p> <p>More arterial access would divide and reduce conflicting volumes to campus. Access consolidation would concentrate conflicts to/from campus.</p> <p>Lack of sidewalk plowing led to students walking in streets.</p> <p><u>PM Dismissal:</u> Parents with students at both high schools have difficulty, experience “twice” the delays if they need to go to both schools in the same afternoon.</p>
Z	Costs	Overall	One week fall demo costs were thousands. Long term improvements could cost millions. One week demo was informative generating significant public input. This will better inform long term permanent solutions.	TCP was a disruption to parent, student, bus, user group schedules for one week. This informed where congestion concerns were high based on evidence and feedback.