

Central Kitsap High School & Middle School Replacement Project

Central Kitsap School District

Traffic Impact Study

December, 2016



Prepared by



Central Kitsap High School & Middle School Replacement

The Central Kitsap School District will replace several aged buildings at the Central Kitsap High School (CKHS) and Central Kitsap Middle School (CKMS) sites, and form a centralized, shared and integrated campus to better serve students, faculty, and the community. The construction and development will occur in multiple phases, to accommodate students and maintain educational services during construction of the project.

The schools are currently located at 3700 NW Anderson Hill Rd and 10130 Frontier Pl NW in the Silverdale Urban Growth Area of Kitsap County. Currently, CKHS is located in the southern portion of the property with access via NW Anderson Hill Road and NW Bucklin Hill Road, and CKMS is located to the north with access via Frontier Place NW. The schools will be reconstructed and co-located into a new, facility of approximately 325,000 sf in the center of the campus with additional support facilities (i.e. parking and sports fields) for CKHS to the north and west, and CKMS to the south.

In order to enlarge the campus space, the district purchased two parcels on the east side of the campus, located at 3890 and 3898 NW Windy Ridge Rd and two parcels on the northwest corner of the campus. Existing residences on the parcels will be demolished. Including new acquisitions, the project covers an area of approximately 59 Acres.

Also located onsite and to be relocated offsite are the following facilities: the District's transportation/bus barn facility, centralized kitchen, New Frontiers building, alternative high school and daycare portable (accessed via Frontier Place NW), and the science kit building (accessed via NW Anderson Hill Rd). These buildings will be demolished as part of the project.

Currently for the 2016-2017 school year, CKHS enrolls 1,490 students (1,360 full-time equivalent FTE students) and CKMS enrolls 719 students, and there are 233 students attending the alternative high school for a total enrollment of 2,442 students on the site. The new facility is being designed for an opening day capacity of 1,400 high school and 700 middle school students, for a total of 2,100 students. This traffic study is based on a more conservative student population of 1,500 high school students and 800 middle school students (2,300 students total).





At build-out, on-site programming facilities for CKHS will include: a new football/soccer field with synthetic turf and track, field lighting and seating for up to 1,500 spectators; up to two baseball fields, one softball field, one soccer field and up to eight tennis courts. Additionally, a new concession stand and restroom facility is being considered. Programming facilities for CKMS will include one multi-purpose athletic field and track. Both schools will share a new joint-use auditorium that will be co-located with the new CKHS gymnasium in the center of the campus. In the future, the District also intends to construct additional ball fields with associated parking at the site of the existing CKHS at the south end of the campus. The future ball field will be accessed via NW Bucklin Hill Rd and NW Anderson Hill Rd.

The access roads for student / visitor vehicular traffic and for district buses are designed as separate circulation systems, to avoid conflicts and provide efficiency. Vehicular access for CKHS will primarily be via Frontier Rd near the current CKMS driveway location, and access for CKMS will be provided via NW Anderson Hill Rd at a new driveway, south of the existing Windy Ridge Rd driveway. A new, separate driveway will be added on Frontier Rd for district bus access only. Vehicle loops for parents and visitors will be separated for each school; the CKHS loop to the north and CKMS to the south. The campus will also feature an extensive system of pedestrian paths and amenities for internal circulation. Pedestrian connections and linkages may be provided to adjacent community resources depending on site conditions.

The project includes construction of frontage improvements to NW Anderson Hill Rd, to include a 5-foot-wide bike lane, 5-foot-wide sidewalks, curbs, and gutters. A southbound, left turn pocket lane will be added on NW Anderson Hill Road to accommodate access to the CKMS driveway.

The schools currently have a combined total of 460 parking spaces. The new campus will provide a total of 439 parking spaces distributed throughout the campus for convenient access to the school and support facilities, plus an additional 33 spaces for use during special events, within the bus loop. An additional 159 parking spaces may be constructed when the high school buildings are demolished and the south end is redeveloped with ball fields and parking, for a future total parking at 631 spaces. Prior to demolition of the high school, the existing 86 CKHS parking spaces will be available for overflow/special event use, for an interim total of 558 parking spaces. The main high school parking lot will be accessed from both Frontier PI NW and from the main visitor drive. Additionally an internal access drive is proposed to connect the south end of the high school parking lot with the NW Anderson Hill Road driveway. Multiple access points for the large parking lot are provided to minimize traffic congestion.

Construction will occur in five phases to accommodate ongoing educational use of the facilities. The first phase will begin construction in Spring 2017 and the final phase is expected to conclude construction in 2020. The timing of the demolition of the high school and construction of accessory ball fields at the south end of the site is undetermined at this time.

Traffic Analysis for the Project

This report documents the expected changes to site traffic and operations for both the morning and afternoon peak hours associated with the high school and middle school. Kitsap County Public Works Traffic Division has identified a focused scope of the study for SEPA review and permitting for the schools replacement project. The combined high school and middle school campus will result in a net decrease in the daily traffic generated by the School District functions on Frontier Place and through the roundabout intersection. The focus of the study is on the expected traffic operation of the site driveways to NW Anderson Hill Road and to Frontier Place NW and on the operation of the NW Anderson Hill Road at Frontier Place NW roundabout intersection. As such, the focus of the traffic analysis is on the expected morning and afternoon school peak operation at site driveways and through the roundabout.

Background Transportation Conditions

Central Kitsap High School (CKHS) and Middle School (CKMS) are located within close proximity in the Silverdale area of Kitsap County, and locations are shown in this screen shot from Google maps. NW Anderson Hill Road and NW Bucklin Hill Road are the two arterial roadways adjacent to the CKHS with Frontier Place NW providing direct access to CKMS. This summary of background conditions includes a review of the roadway characteristics, the current traffic volumes on the street network and an overview of the existing traffic operations in the project vicinity.



Street Network

NW Anderson Hill Road is a two-lane minor arterial roadway with posted 25 MPH speed limit between NW Bucklin Hill Road and Provost Road NW. The high school has multiple driveway access points to NW Anderson Hill Road providing connections from the main high school parking lot with bus loading plus visitor parking (exit only) and connections to staff parking lot, parent drop-off areas and access to student parking lots. From the signal at NW Bucklin Hill Road to the roundabout at Frontier Place NW, Central Kitsap School District has continuous property along the northeast side of NW Anderson Hill Road. A sidewalk extends along the

northeast side of the roadway between NW Bucklin Hill Road and the roundabout at Frontier Place NW with a paved shoulder along the southwest side of the roadway, to within 150' of the roundabout. West of the roundabout, there are paved shoulders on both sides of Anderson Hill Road NW with varying width. Kitsap County has identified a sidewalk project for NW Anderson Hill Road between Provost Road NW and the roundabout at Frontier Place NW.

Frontier Place NW is a two-lane local roadway extending north from Anderson Hill Road NW (roundabout). Frontier Place NW provides access to 37 homes, a church and multiple school district operations including Central Kitsap Middle School (CKMS), the West Alternative High School, the district transportation bus barn, the food service kitchen and the warehouse facility for education materials. Speed limit on Frontier Place NW is 25 MPH and the roadway has sidewalk along the school frontage and a paved shoulder on the west side.

NW Bucklin Hill Road is an east-west arterial in Silverdale with two travel lanes plus center turn lane adjacent to the high school. NW Bucklin Hill Road has sidewalks on both sides of the street and is posted for 25 MPH adjacent to the school. The intersection of NW Anderson Hill Road at NW Bucklin Hill Road has signal control with crosswalks. The high school has two driveway access points to NW Bucklin Hill Road; one provides the entrance for buses and visitors, the other provides access to a small parking lot adjacent to portable classrooms.

Pedestrian and Bicycle Facilities

This segment of NW Anderson Hill Road adjacent to the project is part of a designated bicycle route in Kitsap County.

Pedestrian facilities in the study area were inventoried by AHBL staff for a one-mile walking distance from the schools, with a map (to the right and in the appendix) showing locations of sidewalks (green) and shoulders (yellow) available for student walk routes. Red lines on the diagram indicate that there is no available walkway along a roadway. NW Anderson Hill Road, NW Bucklin Hill Road and Frontier Place NW have sidewalks along the school frontage. Crosswalks exist on NW Anderson Hill Road at the Frontier Place NW roundabout and at the NW Bucklin Hill Road signal.



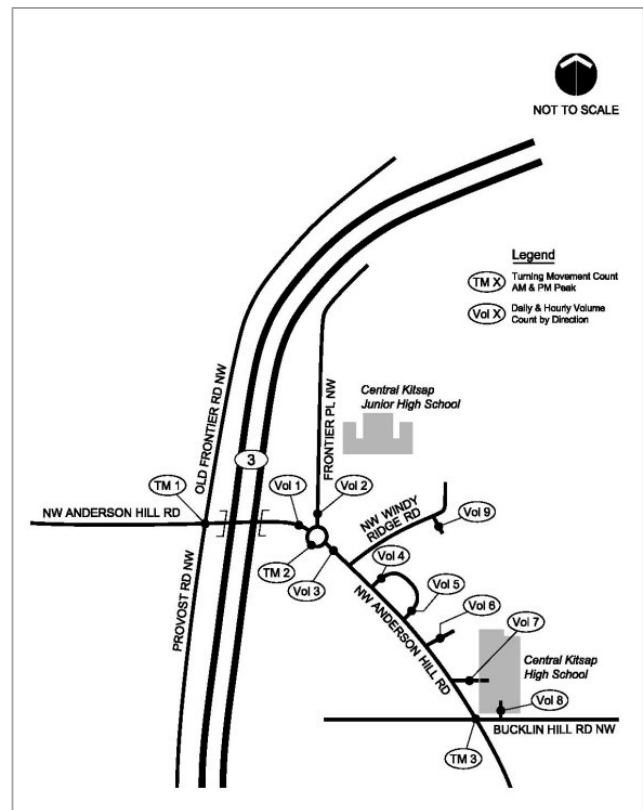
According to Kattie Nepper, Director of Transportation for Central Kitsap School District, the one-mile walk for Central Kitsap Middle School extends east on NW Bucklin Hill Road to Blaine Avenue, north on Silverdale Way to Ridgetop Boulevard, north on Randall Way to Plaza

Avenue, and south on Silverdale Way to 8790 Silverdale Way. The area on Anderson Hill Road to the west of the roundabout at Frontier Place NW is served by buses. One area is missing a walkway within the CKMS walking area – along Silverdale Loop Road to the west of Bucklin Hill Road at Anderson Hill Road. This roadway extends into a low-volume neighborhood which is anticipated for redevelopment in the near future. Sidewalk or walkway can be expected to be implemented with a new housing development.

The one-mile walk for Central Kitsap High School extends west along NW Anderson Hill Road to Apex Road, north on Old Frontier Road to 10880 Old Frontier Road, east on NW Bucklin Hill Road to Cranway Avenue, south on Silverdale Way NW to 8187 Silverdale Way NW, north on Silverdale Way NW to NW Myhre Road and north on Randall Way NW to Highway 3. Within the walking area for the high school, several segments of local roads are missing walkways, however all are served with either sidewalks or shoulders along the arterial roadways.

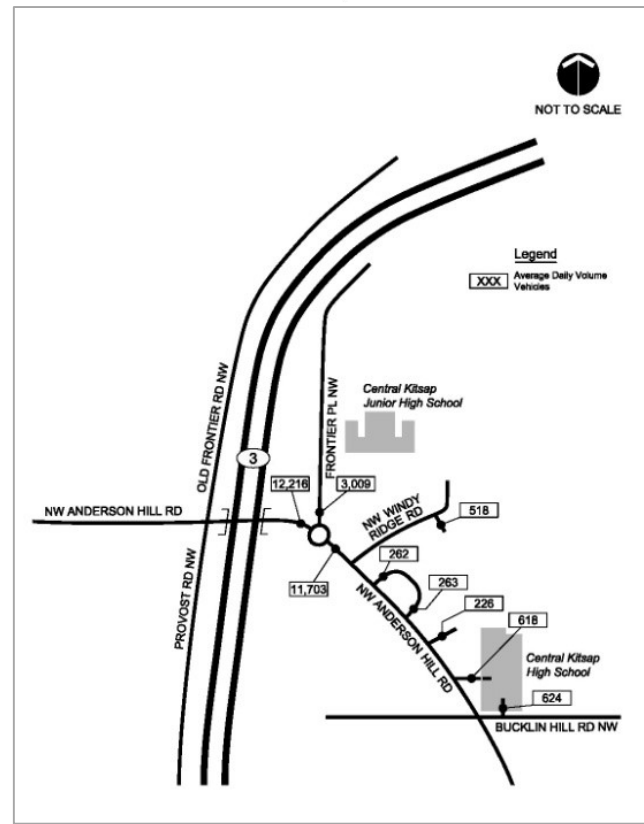
Traffic Volumes

Vehicle traffic volume counts were conducted in May and June 2016 to document current or baseline traffic conditions near the proposed HS/MS Replacement with counts during the school year. These counts document the current school district uses along Frontier Place that are planned to relocate to the Consolidated Transportation, Food Service and Warehouse (CTFW) facility on Dickey Road – these are the bus barn (Transportation), school food service production and distribution (Food Service) and the warehouse for District-wide learning materials and distribution (Warehouse). The counts also document the existing high school traffic at multiple driveways onto Anderson Hill Road and Bucklin Hill Road – a combination of traffic associated with students, parents and employees to the school. The count data helps to illustrate the current traffic volumes and patterns throughout the day for travel on NW Anderson Hill Road and through three key intersections (NW Anderson Hill Road at Provost Road NW, NW Anderson Hill Road at Frontier Place NW (roundabout) and NW Anderson Hill Road at NW Bucklin Hill Road). The counts were conducted during the construction of NW Bucklin Hill Bridge at Clear Creek when the roadway was closed for construction which may have affected the arterial traffic volumes on NW Anderson Hill Road. The NW Bucklin Hill Bridge was re-opened in late July 2016.



Traffic counts for the several days measured on NW Anderson Hill Road reflect a very regular daily traffic volume and flow on this arterial. The roadway is classified as an urban minor arterial roadway with an estimated roadway capacity of 11,100-11,500 vehicles per day. The counts collected indicate that the roadway operates near its capacity on weekdays where travelers on the roadway during the peak periods can experience congestion and delays at the signals.

Traffic counts on Frontier Place NW indicate that the roadway operates under the capacity threshold for the local roadway, however, there are periods of congestion and delays which are associated with the CKMS facility, specifically associated with parent drop off and pick up activities.



Frontier Place NW traffic reflects school operations and activities, with an average 3009 vehicles per day (vpd) on the roadway. The 37 homes and church are estimated to generate about 350 vpd of the total, or around 12% of the traffic is residential. The Transportation, Food Service and Warehouse (bus barn, kitchen and warehouse) operations generate an estimated 850 vpd of the traffic on Frontier Place (information assembled as part of the Consolidated Transportation Food Services and Warehouse (CTFW) project) – comprised of bus trips, management, employee trips and deliveries – around 28% of the total traffic on Frontier Place. What makes up the rest of the Frontier Place NW traffic is travel to/from the Middle School and the Alternative High School sites – about 1,810 vpd to serve the 952 students at the middle school and alternative high school. The resulting trip generation rate for the Middle and Alternative High schools is 1.9 daily vehicle trips per student. This trip generation rate for the schools is higher than the average trip generation rate for middle school (Land Use Code 522) as documented in the Institute of Transportation Engineers (ITE) Trip Generation Report (9th Edition, 2012, an industry reference) and lies within the overall data range cited by ITE.

CK High School traffic volumes amount to an average of 2,600 vpd for the high school, from the various driveways (plus an estimated amount at two small lots). Using the 1,490 student enrollment for the school, this translates into a trip generation rate of 1.74 vehicle trips per day per student, or a rate comparable to the average trip generation rate (ITE Land Use Code 530, 1.71 trips per day per student).

Turning movement counts collected at the three key intersections were compared with other counts conducted at the signalized intersections. The counts at NW Anderson Hill Road and Provost Road NW are comparable to count values reported by Kitsap County for a November 2015 count (and are attached for reference.) Counts conducted in 2013 by Kitsap County for a NW Bucklin Hill Road study indicate the same high movements, but appear to be higher in 2013 than the counts in 2016. This could be a function of the NW Bucklin Hill Bridge construction and closure – where travel patterns have shifted and may be expected to return to previous patterns.

Traffic volumes fluctuate throughout the day and by day of week – the counts collected in May and June of 2016 reflect a sampling of the traffic flows at and near the CK High and CK Middle schools. These volumes were used to calculate trip generation rates for the existing school facilities, for use in estimating the expected site traffic for the project.

Existing Schools and Access

Frontier Place NW is a roadway serving both school district uses (middle school, bus barn, food service, warehouse, alternative high school) and a combination of single family homes (37) and a small church. The combined traffic from these several uses results in the traffic volumes counted on the roadway.

CK Middle School has access only to/from Frontier Place NW. CK High School has multiple parking lots and driveways and thus the site traffic for the school is a combination of driveway volumes from NW Anderson Hill Road and NW Bucklin Hill Road. The current enrollment for the 2016-2017 school year (as of October 2016) reflects 719 students at CKMS, 233 students at the Alternative High School (West campus) and 1,490 students (1,360 FTE) at CKHS.

Current Traffic Operations

Existing intersection operations were modeled and analyzed using Synchro 9 traffic analysis software with the current traffic volumes for both the morning school peak hour (7-8 AM) and the afternoon school peak hour (2-3 PM) for the study area network. Figure 1 shows the current traffic volumes for the study area intersections, NW Anderson Hill Road at Provost Road NW, at Frontier Place NW and at NW Bucklin Hill Road. Table 1 provides a summary of current traffic operations at study area intersections for the school peak hours.

Intersection level of service (LOS) is a measure of the operation of the traffic control at the intersection, measured in seconds of delay per vehicle averaged over the analysis period. Intersection levels of service range from LOS A to LOS F, where LOS A reflects a low level of vehicle delay with very good operation of traffic through the intersection and LOS E represents a theoretical capacity of the intersection and LOS F reflects breakdown conditions with high levels of vehicle delay.



NOT TO SCALE

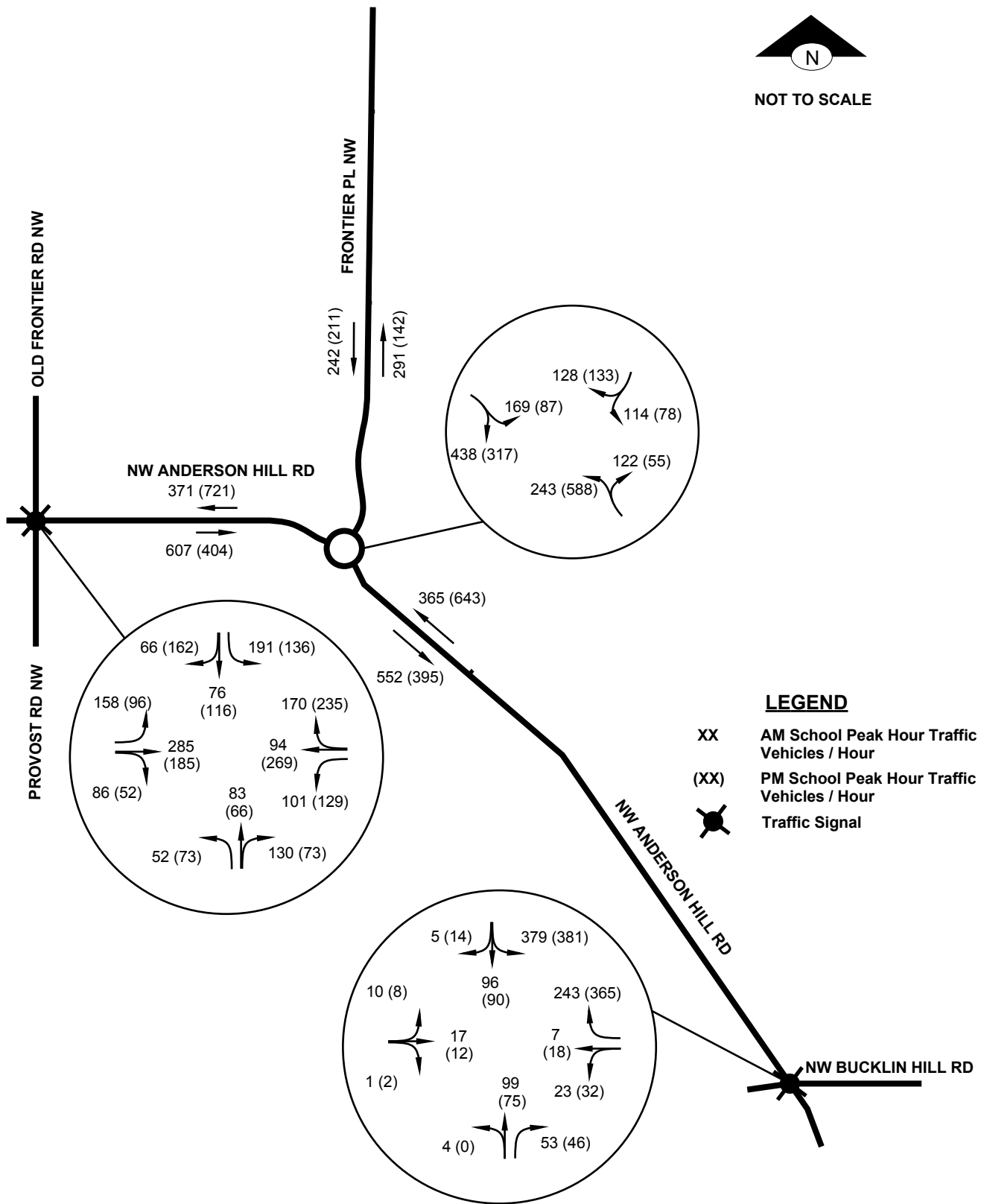


Figure 1
2016 Volumes at Study Area Intersections

Table 1 Current Traffic Operations at Study Area Intersections

Location	AM School Peak Hour (7-8 AM)	PM School Peak Hour (2-3 PM)
NW Anderson Hill Road at Provost Road NW, signal	LOS C (34 seconds/vehicle average delay)	LOS C (26 seconds/vehicle average delay)
NW Anderson Hill Road at Frontier Place NW, roundabout	LOS C (19 seconds/vehicle average delay)	LOS E (42 seconds/vehicle average delay)
NW Anderson Hill Road at Bucklin Hill Road NW, signal	LOS C (23 seconds/vehicle average delay)	LOS C (27 seconds/vehicle average delay)

Current traffic flows through the roundabout can experience queues and backups, specifically during the morning school peak at the CK Middle School where on-site space for parent drop-off activity is very limited and traffic can backup along Frontier Place from the school driveway to the roundabout. At other times, traffic queues can extend along NW Anderson Hill Road from the signal at Provost Road NW and can block up the roundabout operation. Analysis for the roundabout intersection operation incorporates the current peaking characteristics of the CK Middle School traffic where arrivals and departures are condensed into a 25-30 minute period within the peak hour for the school.

Planned Projects and Changes

As noted earlier, three school district functions will be relocated from Frontier Place NW to Dickey Road NW – Transportation, Food Services and Warehouse – at a combined facility. This will result in less traffic on Frontier Place NW, approximately 850 daily vehicle trips. The District also plans to relocate the Science Kits storage and the West Alternative High School campus to other District building locations.

Kitsap County has a capital project planned for 2018 construction at the intersection of NW Anderson Hill Road and Provost Road NW which will add a southbound right turn pocket to increase intersection capacity and help ease peak period operation.

Future Baseline Traffic without Replacement Project

The High School & Middle School Replacement is scheduled with buildings to be completed for the 2019-2020 school year and the fields will be completed thereafter in 2020. Year 2020 was identified to represent the year of opening for the project. Traffic volumes for the 2020 baseline future year (2020 AM and 2020 PM) were developed by first removing school district traffic and by applying a 1.5% annual growth rate (total 6% growth) to the background traffic in the study area, onto which the new school campus traffic can be added. The background traffic reflects a theoretical traffic condition where HS and MS traffic was removed and traffic from CTFW and relocated facilities was removed.

High School & Middle School Replacement Project Traffic

The traffic analysis for the Central Kitsap High School and Middle School Replacement is based on an enrollment of 1,500 high school and 800 middle school students on site. The proposed site will have a designated access drive off of NW Anderson Hill Road for the Middle School drop-off/pick up and visitor traffic and will also have a designated bus access drive and loading area off of Frontier Place NW. Two additional driveways on Frontier Place NW will provide access to staff and student parking and access to the High School drop-off/pick up area.

The proposed project will provide 439 parking spaces distributed throughout the re-configured campus plus 33 spaces for event use (bus loop) and an additional 86 spaces will be available for use on the existing CKHS site to the south to accommodate special events and overflow parking. When the existing CKHS site is redeveloped with ball fields, 159 permanent parking spaces will be provided for a total of 631 parking spaces at project completion.

Trip generation

Traffic generated by the project is based on the trip generation rates derived from the traffic counts collected in May/June 2016 and student enrollment anticipated for the facility. This traffic analysis is based on traffic generated by a total of 1,500 high school students plus 800 middle school students, using the trip generation rates specific to the existing schools. By using these enrollment values, the analysis reflects a conservative approach to evaluate the expected operation of the campus site access points and traffic operation at the nearby roundabout.

Table 2 Site Traffic

Site Traffic and Trip Generation									
	Daily Site Traffic			Morning School Peak Hour Traffic			Afternoon School Peak Hour Traffic		
	Total Vehicle Trips	Entering Vehicle Trips	Exiting Vehicle Trips	Total Vehicle Trips	Entering Vehicle Trips	Exiting Vehicle Trips	Total Vehicle Trips	Entering Vehicle Trips	Exiting Vehicle Trips
High School - 1500 students	2620	1310	1310	830	540	290	380	133	247
Middle School - 800 students	1520	760	760	432	238	194	240	108	132
Total Estimated Site Traffic	4140	2070	2070	1262	778	484	620	241	379

Daily traffic for the planned schools is estimated at 4,140 vehicle trips per day (2,070 trips into the site and 2,070 trips out from the site each school day). Current combined traffic of the existing high school, middle school and alternative high school is estimated at 4,410 vehicle trips per day, based on the May/June 2016 counts conducted. The projected daily traffic would

be very close to the existing traffic generated by the schools in the study area – which now include the 719 middle school students plus 233 students at the alternative high school and 1,490 high school students (1,360 FTE) at the main campus, a total of 2,442 students.

The estimated site traffic for the CK High School and Middle School Replacement would be approximately 6% lower than the current amount of daily traffic generated by the existing High School, Middle School and the West Alternative High School on site. When considering the net change in school-based traffic on Frontier Place NW and NW Anderson Hill Road (with the relocated Transportation, Food Service and Warehouse operations plus the relocated Alternative High School and the Science Kits storage), the CK High School and Middle School Replacement project represents a net reduction in daily traffic generated by the School District.

Bell times for the schools are currently 7:25 AM and 2:05 PM for the middle school and 7:50 AM and 2:35 PM for the high school – and these bell times are anticipated to remain in place for the school campus. This analysis reflects the continued school operation with a half hour interval between the afternoon bell times for these two schools, and thus reflects the two peaks of site traffic over the single peak hour for the facility. Morning peak hour for the schools is between 7 and 8 AM. The afternoon peak hour for the schools is between 2 and 3 PM.

Trip Distribution and Assignment

The distribution of schools project traffic to the study area network is based on a review of the areas served by each school. The adjacent figures show the serving area for CKHS and CKMS (shown as CKJHS in the figure). For this analysis, high school traffic was assigned with half oriented to the east and half oriented to the west via NW Anderson Hill Road. Middle school traffic was assigned with one-third oriented to the east and two-thirds oriented to the west via NW Anderson Hill Road. Since this is a replacement project within the same properties, outside the limited study area for this study, high school and middle school traffic would be comparable to the existing traffic already on the network.

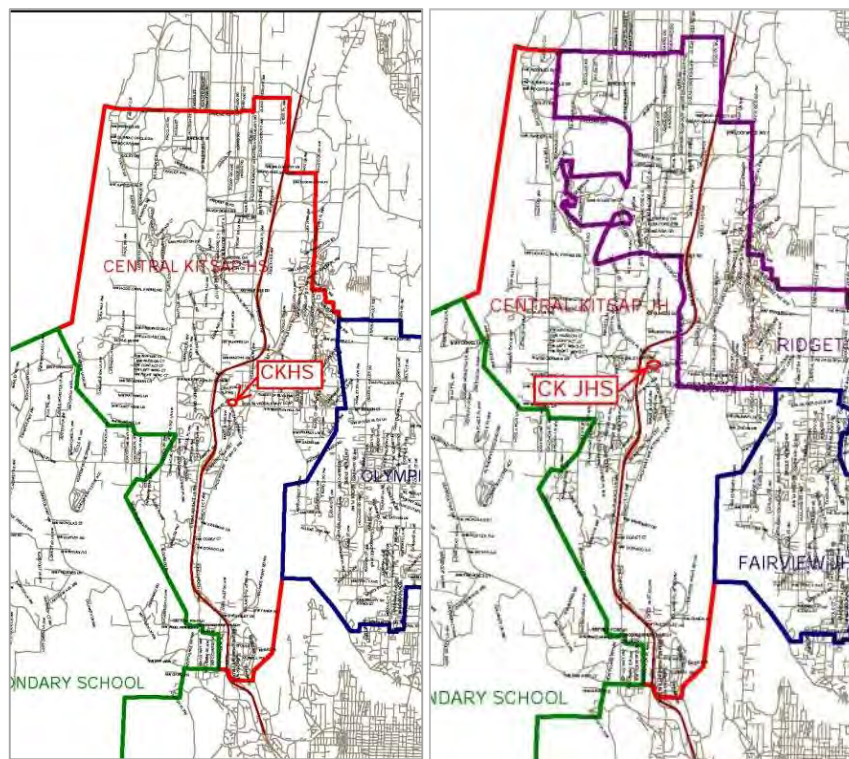




Figure 2 shows the traffic assignment of the project traffic to and from the high school and middle school for both the morning and afternoon peak hours for the schools. Figure 3 shows the expected study area traffic in year 2020 with the High School & Middle School Replacement project complete and in operation.

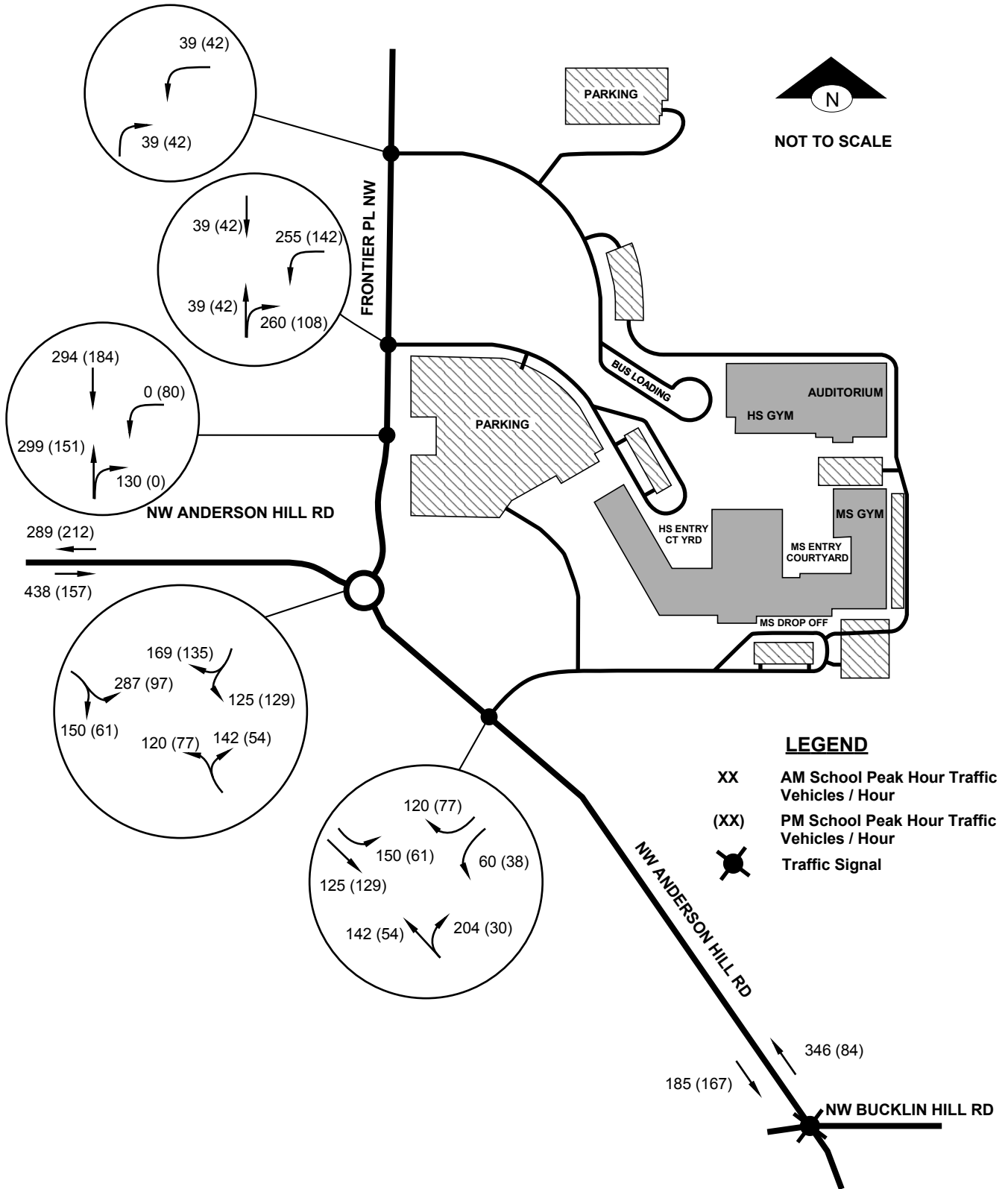


Figure 2
HS / MS Replacement
Site Traffic

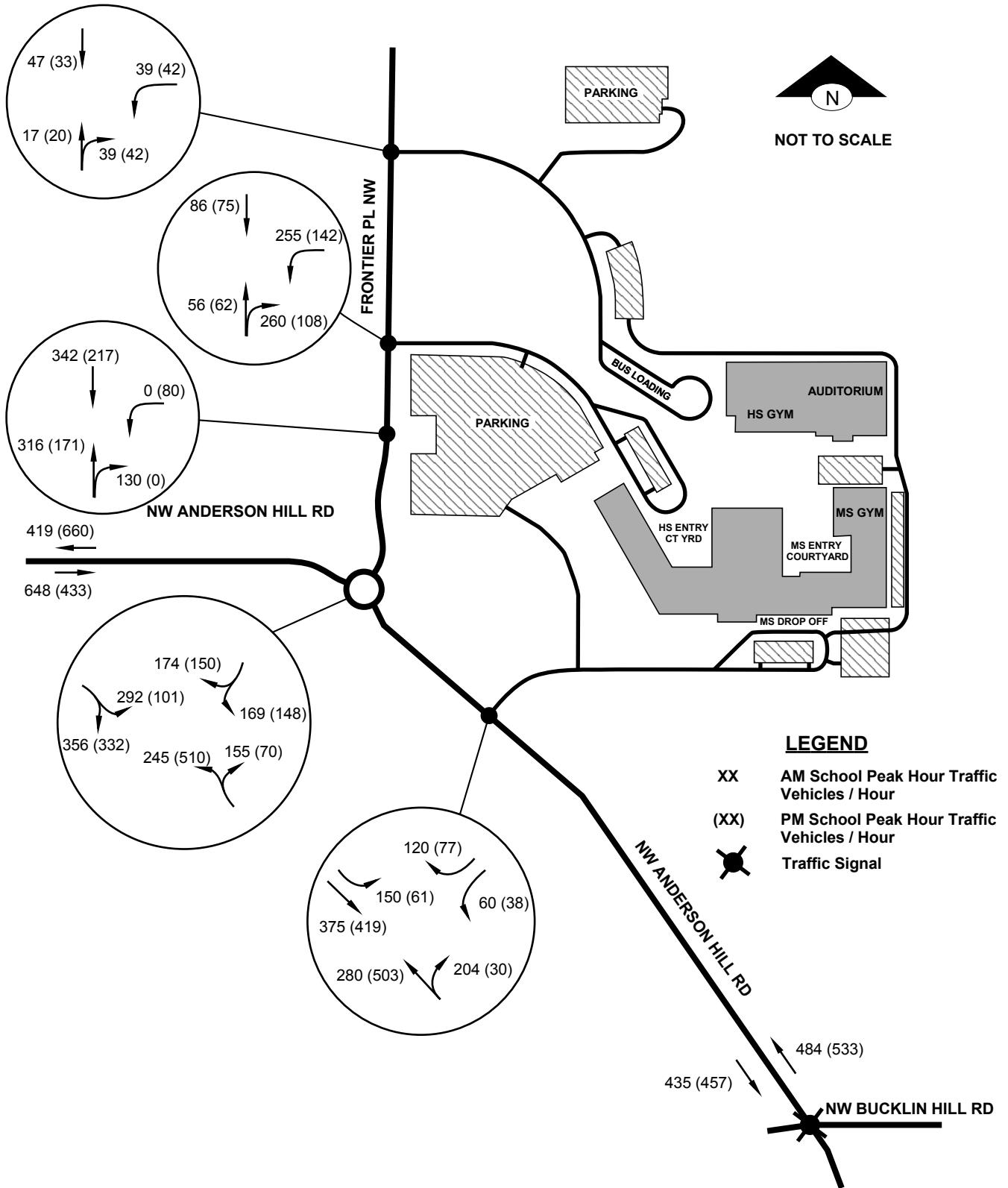


Figure 3
2020 with HS / MS Replacement

Traffic Operations with Project

Future operation in year 2020 is expected to improve during the afternoon school peak hour for regular school days over current traffic operation of the roundabout at NW Anderson Hill Road and Frontier Place NW. The roundabout is also expected to operate better in the morning peak with the Replacement project with the proposed parent drop-off located further from the public street, providing more on-site space for loading and waiting for students.

The new location for the Middle School access driveway is designed to better manage the on-site queues drop off activity plus provide separate left-turn and right-turn lanes for leaving the site. The project will construct a left-turn pocket on NW Anderson Hill Road to facilitate left-turns entering the school. The new driveway will be located with increased spacing to provide for a backup from the roundabout (up to 7 cars) plus space for stopping sight distance at the 25 MPH posted speed limit (155’).

Table 3 2020 Traffic Operations with High School & Middle School Replacement

2020 Future Traffic Operations with HS/MS Replacement				
Location	Morning Peak Hour, 7-8 AM		Afternoon Peak Hour, 2-3 PM	
	Existing	2020 with HS/MS Replacement	Existing	2020 with HS/MS Replacement
NW Anderson Hill Road at Frontier Place NW Roundabout	LOS C (19sec/veh)	LOS C (24sec/veh)	LOS E (43sec/veh)	LOS C (22sec/veh)
Eastbound approach	LOS D	LOS D	LOS A	LOS B
Westbound approach	LOS B	LOS C	LOS E	LOS C
Southbound approach	LOS B	LOS C	LOS F	LOS D
Middle School Parent Access Driveway on NW Anderson Hill Road	n/a	LOS E (39sec/veh)	n/a	LOS D (26sec/veh)
Bus Access Driveway on Frontier Place NW	n/a	LOS B (10sec/veh)	n/a	LOS B (10sec/veh)
High School Parent Access on Frontier Place NW	n/a	LOS B (14sec/veh)	n/a	LOS B (11/sec/veh)
High School Student Parking Access on Frontier Place NW	n/a	LOS A (no delays)	n/a	LOS B (12sec/veh)
NW Anderson Hill Road at Provost Road NW	LOS C (34sec/veh)	LOS D (36sec/veh)	LOS C (26sec/veh)	LOS C (24sec/veh)
NW Anderson Hill Road at NW Bucklin Hill Road	LOS C (23sec/veh)	LOS C (23sec/veh)	LOS C (27sec/veh)	LOS C (28sec/veh)

Site Driveways and Sight Distance Evaluation

Using survey information for the centerline of NW Anderson Hill Road and for the centerline of Frontier Place NW along the project frontage the available sight distance was determined for each of the proposed driveways to the High School and Middle School Replacement campus, as noted in the table below. For travel on these roadways with posted speed of 25 MPH, the intersection sight distance required for passenger cars is 275 feet and for buses and single unit trucks is 350 feet. Sight distance at the driveways meets the requirements as defined in WSDOT Design Manual (M22-01.12, November 2015).

Table 4 Intersection Sight Distance at HS & MS Replacement Driveways

Driveway Location	Available Sight Distance		Required Sight Distance	Meets Requirements?
	Direction	Distance		
Middle School Access to NW Anderson Hill Road	to Northwest	350 feet	275' passenger car, 350' bus	Yes
	to Southeast	> 400 feet	275' passenger car, 350' bus	Yes
South Driveway Access to Frontier Place NW	to North	> 400 feet	275' passenger car	Yes
	to South	300 feet, to roundabout	275' passenger car	Yes
High School Access to Frontier Place NW	to North	> 400 feet	275' passenger car, 350' bus	Yes
	to South	> 500 feet, to roundabout	275' passenger car, 350' bus	Yes
Bus Access to Frontier Place NW	to North	> 500 feet	275' passenger car, 350' bus	Yes
	to South	> 400 feet, beyond next driveway	275' passenger car, 350' bus	Yes

Special Event Traffic

The High School & Middle School Replacement will include improvements to the sports fields and facilities that can accommodate competition events, which is a change from the existing school sites. The proposed football and soccer field will include seating for up to 1,500 spectators. The on-site parking supply of 513 spaces is expected to meet the parking demand for the CKHS football games, based on the experience for existing football games held at Silverdale Stadium.

Currently the Central Kitsap High School football games are held at a common location at Silverdale Stadium which serves all the high schools in the district. Silverdale Stadium is co-located with Olympic High School on Stampede Boulevard NW. There are 4-5 home football games per year which start typically at 7:15pm. Approximately 1,000 spectators attend a varsity game at Silverdale Stadium, possibly higher with an in-district opponent. Currently, the 358 spaces of parking at Olympic HS is not always sufficient for the parking demand at a game, and overflow parking can extend along Stampede Boulevard and into the tennis court parking nearby. Below is a summary of the types of games and events held at the schools.

Central Kitsap Middle School Athletics (outdoor athletics only)

	# of Home Games	Approx. # of spectators
Football (varsity, jr. varsity)	3 each	75-100
X-Country	3	100-125
Girls Soccer (varsity, jr. varsity)	4-5 each	50-75
Fastpitch	5	50-75
Track/Field	3-4 reg season + potentially 1 sub-district and 1 league game	300-400
Community sports include: Lacrosse Youth soccer Boys baseball Priv. School Fastpitch Track/Field from Peace Lutheran Girls on the Run x-country	Occasional use 1 meet only	 10-12 girls

Central Kitsap High School Athletics (outdoor athletics only)

	# of Home Games	Approx. # of spectators
Football (varsity, jr. varsity, c-team)	4-5 reg season +1 for playoff	Varsity = up to 1500 JV = 100 C-team = 50-75
X-Country	Up to 4 meets	300
Boys Soccer (varsity, jr varsity)	8-9 games each	400
Girls Soccer (varsity, jr. varsity)	8-9 games each	200
Fastpitch	10 games	100
Baseball	10 games	150
Track/Field	4-5 meets	300



Summary and Overview

Central Kitsap School District will construct the High School and Middle School Replacement project which will replace several district buildings and functions at the CKHS and CKMS sites and form a centralized, shared and integrated high school and middle school campus to better serve students, faculty and the community. Overall site traffic generated by School District facilities in the area is expected to decline with the HS & MS Replacement and current traffic operation along Anderson Hill Road NW is expected to remain approximately the same, with improved roundabout operation during the afternoon school peak hour.

The project will construct four access driveways and will include frontage improvements of sidewalk along NW Anderson Hill Road and Frontier Place NW. Access to the Middle School from NW Anderson Hill Road will be located 350 feet from the roundabout, with a left-turn pocket for entering traffic. The main access to the High School will be from Frontier Place NW.



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Appendix A: Intersection and Driveway Synchro Traffic Analysis Results

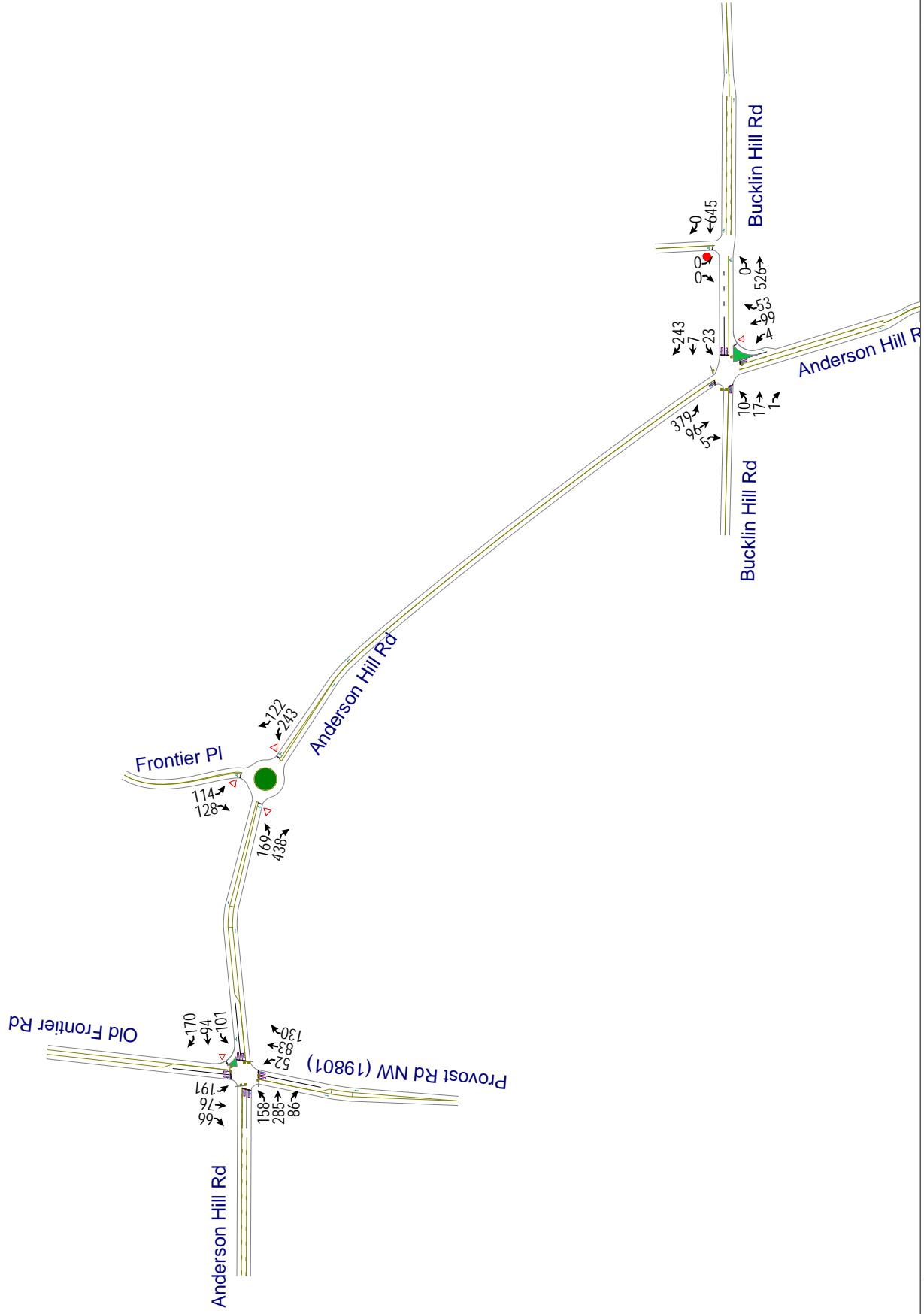
Appendix B: Pathways Inventory by AHBL

Appendix C: Road Plan and Profiles

Appendix A

- **AM Peak Period Traffic Conditions Results – Existing, 2020 with HS/MS Replacement Project**






















- **PM Peak Period Traffic Conditions Results – Existing, 2020 with HS/MS Replacement Project**



Intersection			
Intersection Delay, s/veh	19.1		
Intersection LOS	C		
Approach	EB	SB	NW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	732	433	487
Demand Flow Rate, veh/h	761	472	526
Vehicles Circulating, veh/h	222	350	212
Vehicles Exiting, veh/h	600	388	771
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	25.9	14.8	12.7
Approach LOS	D	B	B
Lane	Left	Left	Left
Designated Moves	LR	LR	LR
Assumed Moves	LR	LR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	761	472	526
Cap Entry Lane, veh/h	905	796	914
Entry HV Adj Factor	0.962	0.917	0.926
Flow Entry, veh/h	732	433	487
Cap Entry, veh/h	871	730	846
V/C Ratio	0.841	0.593	0.575
Control Delay, s/veh	25.9	14.8	12.7
LOS	D	B	B
95th %tile Queue, veh	10	4	4



















HCM 2010 Signalized Intersection Summary
 6010: Provost Rd/Old Frontier Rd & Anderson Hill Rd

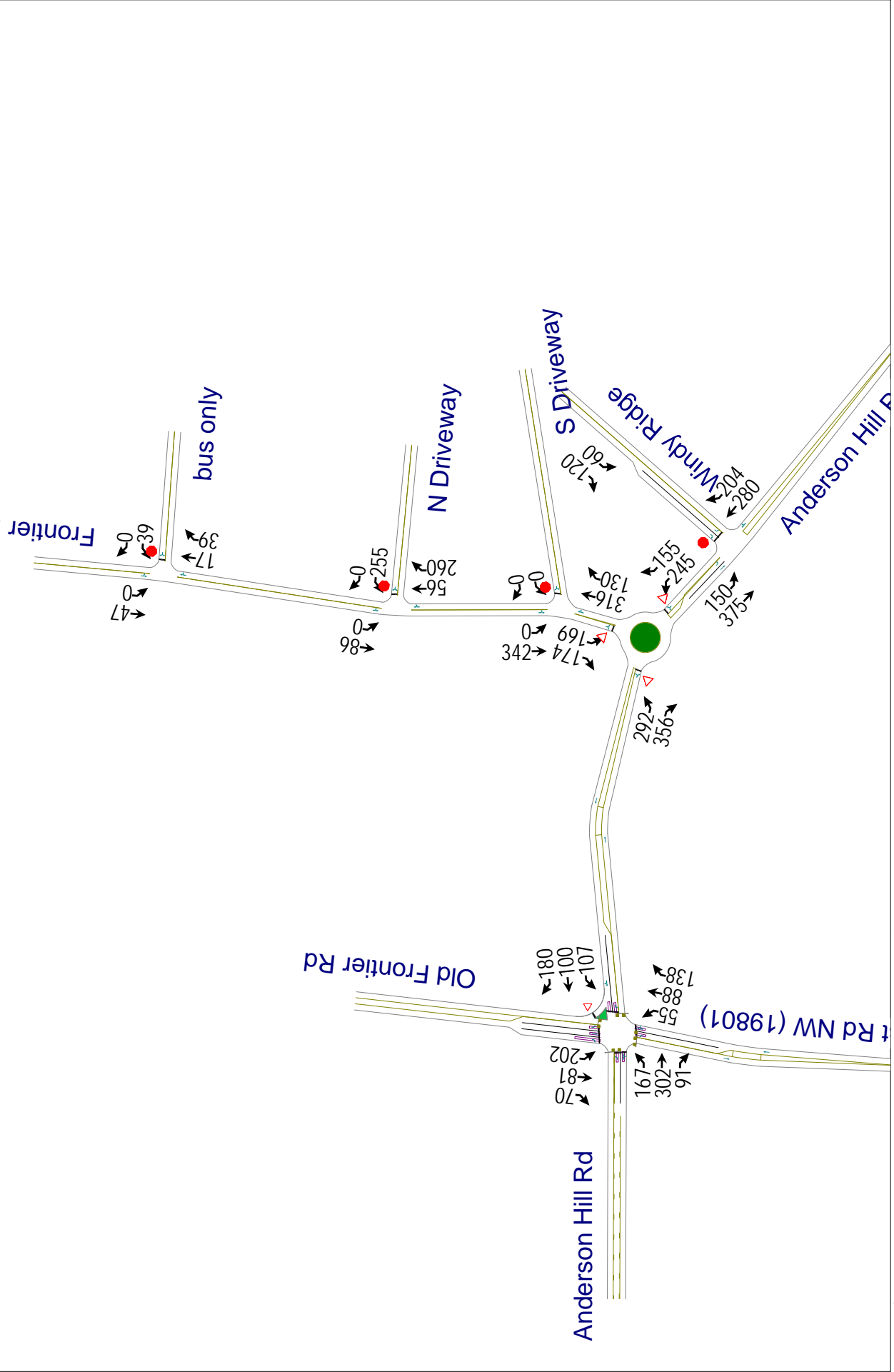
10/31/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	285	86	101	94	170	52	83	130	191	76	66
Future Volume (veh/h)	158	285	86	101	94	170	52	83	130	191	76	66
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1792	1792	1900	1810	1810	1900	1810	1810	1900
Adj Flow Rate, veh/h	195	361	112	120	104	0	72	97	165	265	96	84
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.81	0.79	0.77	0.84	0.90	0.80	0.72	0.86	0.79	0.72	0.79	0.79
Percent Heavy Veh, %	5	5	5	6	6	6	5	5	5	5	5	5
Cap, veh/h	567	408	127	276	542	0	309	122	208	285	198	173
Arrive On Green	0.09	0.31	0.31	0.08	0.30	0.00	0.05	0.20	0.20	0.08	0.22	0.22
Sat Flow, veh/h	1723	1326	411	1707	1792	0	1723	603	1026	1723	892	780
Grp Volume(v), veh/h	195	0	473	120	104	0	72	0	262	265	0	180
Grp Sat Flow(s),veh/h/ln	1723	0	1737	1707	1792	0	1723	0	1629	1723	0	1672
Q Serve(g_s), s	5.9	0.0	19.6	3.5	3.3	0.0	2.5	0.0	11.6	6.0	0.0	7.1
Cycle Q Clear(g_c), s	5.9	0.0	19.6	3.5	3.3	0.0	2.5	0.0	11.6	6.0	0.0	7.1
Prop In Lane	1.00		0.24	1.00		0.00	1.00		0.63	1.00		0.47
Lane Grp Cap(c), veh/h	567	0	535	276	542	0	309	0	330	285	0	371
V/C Ratio(X)	0.34	0.00	0.88	0.44	0.19	0.00	0.23	0.00	0.79	0.93	0.00	0.49
Avail Cap(c_a), veh/h	567	0	626	312	674	0	320	0	516	285	0	552
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.1	0.0	24.9	18.3	19.6	0.0	23.3	0.0	28.7	28.1	0.0	25.7
Incr Delay (d2), s/veh	0.3	0.0	12.3	0.4	0.1	0.0	0.3	0.0	3.5	35.0	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	11.2	1.7	1.6	0.0	1.2	0.0	5.5	5.4	0.0	3.3
LnGrp Delay(d),s/veh	16.3	0.0	37.3	18.7	19.7	0.0	23.6	0.0	32.3	63.0	0.0	26.4
LnGrp LOS	B		D	B	B		C		C	E		C
Approach Vol, veh/h		668			224			334			445	
Approach Delay, s/veh		31.1			19.2			30.4			48.2	
Approach LOS		C			B			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	21.3	12.6	29.8	10.5	22.8	13.0	29.4				
Change Period (Y+Rc), s	7.0	7.0	7.5	7.5	7.0	7.0	7.5	7.5				
Max Green Setting (Gmax), s	5.0	23.0	6.7	26.3	4.0	24.0	5.5	27.5				
Max Q Clear Time (g_c+I1), s	8.0	13.6	5.5	21.6	4.5	9.1	7.9	5.3				
Green Ext Time (p_c), s	0.0	0.8	0.0	0.7	0.0	0.9	0.0	1.3				
Intersection Summary												
HCM 2010 Ctrl Delay			33.9									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary
6023: Anderson Hill Rd & Bucklin Hill Rd

10/31/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	17	1	23	7	243	4	99	53	379	96	5
Future Volume (veh/h)	10	17	1	23	7	243	4	99	53	379	96	5
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1800	1872	1890	1835	1835	1900	1863	1863	1900	1810	1900
Adj Flow Rate, veh/h	16	20	4	32	20	308	8	124	0	412	135	12
Adj No. of Lanes	0	1	0	0	1	1	0	1	1	0	1	0
Peak Hour Factor	0.63	0.85	0.25	0.72	0.35	0.79	0.50	0.80	0.60	0.92	0.71	0.42
Percent Heavy Veh, %	4	4	4	3	3	3	2	2	2	5	5	5
Cap, veh/h	54	67	13	221	138	547	14	220	199	455	149	13
Arrive On Green	0.08	0.08	0.06	0.18	0.20	0.20	0.13	0.13	0.00	0.38	0.35	0.37
Sat Flow, veh/h	692	865	173	1096	685	1560	113	1745	1583	1282	420	37
Grp Volume(v), veh/h	40	0	0	52	0	308	132	0	0	559	0	0
Grp Sat Flow(s),veh/h/ln	1730	0	0	1781	0	1560	1857	0	1583	1739	0	0
Q Serve(g_s), s	1.5	0.0	0.0	1.6	0.0	10.7	4.5	0.0	0.0	20.3	0.0	0.0
Cycle Q Clear(g_c), s	1.5	0.0	0.0	1.6	0.0	10.7	4.5	0.0	0.0	20.3	0.0	0.0
Prop In Lane	0.40		0.10	0.62		1.00	0.06		1.00	0.74		0.02
Lane Grp Cap(c), veh/h	135	0	0	360	0	547	234	0	199	617	0	0
V/C Ratio(X)	0.30	0.00	0.00	0.14	0.00	0.56	0.56	0.00	0.00	0.91	0.00	0.00
Avail Cap(c_a), veh/h	505	0	0	360	0	547	598	0	510	1288	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	29.2	0.0	0.0	22.3	0.0	17.6	27.5	0.0	0.0	19.9	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.1	0.0	1.1	1.6	0.0	0.0	4.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	0.8	0.0	5.7	2.4	0.0	0.0	10.5	0.0	0.0
LnGrp Delay(d),s/veh	30.1	0.0	0.0	22.4	0.0	18.7	29.1	0.0	0.0	24.1	0.0	0.0
LnGrp LOS	C			C		B	C			C		
Approach Vol, veh/h		40			360			132			559	
Approach Delay, s/veh		30.1			19.2			29.1			24.1	
Approach LOS		C			B			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.2		8.7		12.9		17.0				
Change Period (Y+Rc), s		4.5		5.0		4.5		5.0				
Max Green Setting (Gmax), s		49.5		18.0		21.5		12.0				
Max Q Clear Time (g_c+I1), s		22.3		3.5		6.5		12.7				
Green Ext Time (p_c), s		1.3		0.0		0.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				23.3								
HCM 2010 LOS				C								



Intersection

Int Delay, s/veh 0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	0	0	316	130	0	342
Future Vol, veh/h	0	0	316	130	0	342
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	351	144	0	380

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	803	423	0	0	496	0
Stage 1	423	-	-	-	-	-
Stage 2	380	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	353	631	-	-	1068	-
Stage 1	661	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	353	631	-	-	1068	-
Mov Cap-2 Maneuver	353	-	-	-	-	-
Stage 1	661	-	-	-	-	-
Stage 2	691	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	0		0		0
HCM LOS	A				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1068
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0

Intersection

Int Delay, s/veh 5.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	255	0	56	260	0	86
Future Vol, veh/h	255	0	56	260	0	86
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	283	0	62	289	0	96

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	303	207	0	0	351	0
Stage 1	207	-	-	-	-	-
Stage 2	96	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	689	833	-	-	1208	-
Stage 1	828	-	-	-	-	-
Stage 2	928	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	689	833	-	-	1208	-
Mov Cap-2 Maneuver	689	-	-	-	-	-
Stage 1	828	-	-	-	-	-
Stage 2	928	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	13.8		0		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 689	1208	-
HCM Lane V/C Ratio	-	- 0.411	-	-
HCM Control Delay (s)	-	- 13.8	0	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q(veh)	-	- 2	0	-

Intersection

Int Delay, s/veh 2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	39	0	17	39	0	47
Future Vol, veh/h	39	0	17	39	0	47
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	100	2	2	100	2	2
Mvmt Flow	43	0	19	43	0	52

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	93	41	0	0	62	0
Stage 1	41	-	-	-	-	-
Stage 2	52	-	-	-	-	-
Critical Hdwy	7.4	6.22	-	-	4.12	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	715	1030	-	-	1541	-
Stage 1	780	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	715	1030	-	-	1541	-
Mov Cap-2 Maneuver	715	-	-	-	-	-
Stage 1	780	-	-	-	-	-
Stage 2	770	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	10.4		0		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 715	1541	-
HCM Lane V/C Ratio	-	- 0.061	-	-
HCM Control Delay (s)	-	- 10.4	0	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q(veh)	-	- 0.2	0	-

Intersection

Int Delay, s/veh 8.9

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations	↕	↕	↕		↕	↕
Traffic Vol, veh/h	150	375	280	204	60	120
Future Vol, veh/h	150	375	280	204	60	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	200
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	75	75	56	56
Heavy Vehicles, %	2	2	6	2	2	2
Mvmt Flow	181	452	373	272	107	214

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	645	0	1322
Stage 1	-	-	509
Stage 2	-	-	813
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	940	-	173
Stage 1	-	-	604
Stage 2	-	-	436
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	940	-	140
Mov Cap-2 Maneuver	-	-	140
Stage 1	-	-	604
Stage 2	-	-	352

Approach	SE	NW	SW
HCM Control Delay, s	2.8	0	38.7
HCM LOS			E

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1	SWLn2
Capacity (veh/h)	-	-	940	-	140	564
HCM Lane V/C Ratio	-	-	0.192	-	0.765	0.38
HCM Control Delay (s)	-	-	9.7	-	85.8	15.2
HCM Lane LOS	-	-	A	-	F	C
HCM 95th %tile Q(veh)	-	-	0.7	-	4.6	1.8

Intersection			
Intersection Delay, s/veh	24.2		
Intersection LOS	C		
Approach	EB	SB	NW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	781	440	534
Demand Flow Rate, veh/h	812	491	562
Vehicles Circulating, veh/h	221	334	366
Vehicles Exiting, veh/h	604	594	667
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	32.3	15.4	19.7
Approach LOS	D	C	C
Lane	Left	Left	Left
Designated Moves	LR	LR	LR
Assumed Moves	LR	LR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	812	491	562
Cap Entry Lane, veh/h	906	809	784
Entry HV Adj Factor	0.962	0.896	0.950
Flow Entry, veh/h	781	440	534
Cap Entry, veh/h	871	725	745
V/C Ratio	0.896	0.607	0.717
Control Delay, s/veh	32.3	15.4	19.7
LOS	D	C	C
95th %tile Queue, veh	12	4	6

HCM 2010 Signalized Intersection Summary
 6010: Provost Rd/Old Frontier Rd & Anderson Hill Rd

11/15/2016



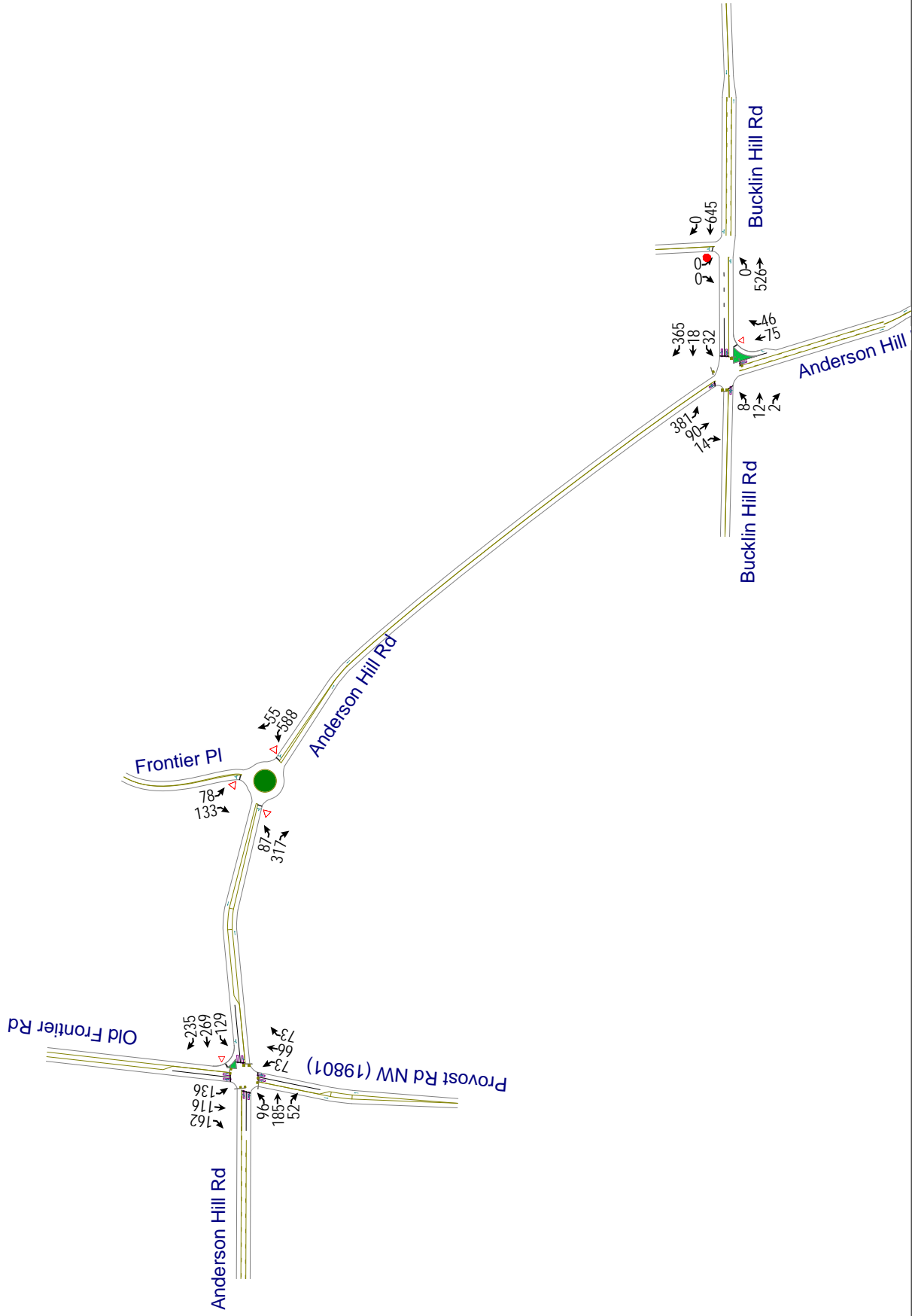
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↑	↗
Traffic Volume (veh/h)	158	285	86	101	94	170	52	83	130	191	76	66
Future Volume (veh/h)	158	285	86	101	94	170	52	83	130	191	76	66
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1792	1792	1900	1810	1810	1900	1810	1810	1810
Adj Flow Rate, veh/h	207	382	118	127	111	0	77	102	174	281	102	89
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.81	0.79	0.77	0.84	0.90	0.80	0.72	0.86	0.79	0.72	0.79	0.79
Percent Heavy Veh, %	5	5	5	6	6	6	5	5	5	5	5	5
Cap, veh/h	541	419	129	231	530	0	382	121	207	343	490	417
Arrive On Green	0.09	0.32	0.32	0.07	0.30	0.00	0.05	0.20	0.20	0.13	0.27	0.27
Sat Flow, veh/h	1723	1327	410	1707	1792	0	1723	602	1027	1723	1810	1538
Grp Volume(v), veh/h	207	0	500	127	111	0	77	0	276	281	102	89
Grp Sat Flow(s),veh/h/ln	1723	0	1737	1707	1792	0	1723	0	1628	1723	1810	1538
Q Serve(g_s), s	7.3	0.0	23.9	4.4	4.0	0.0	3.1	0.0	14.1	10.9	3.8	3.9
Cycle Q Clear(g_c), s	7.3	0.0	23.9	4.4	4.0	0.0	3.1	0.0	14.1	10.9	3.8	3.9
Prop In Lane	1.00		0.24	1.00		0.00	1.00		0.63	1.00		1.00
Lane Grp Cap(c), veh/h	541	0	548	231	530	0	382	0	328	343	490	417
V/C Ratio(X)	0.38	0.00	0.91	0.55	0.21	0.00	0.20	0.00	0.84	0.82	0.21	0.21
Avail Cap(c_a), veh/h	541	0	576	231	559	0	382	0	367	343	533	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.9	0.0	28.5	22.3	22.9	0.0	26.4	0.0	33.2	23.7	24.4	24.4
Incr Delay (d2), s/veh	0.3	0.0	18.2	1.6	0.1	0.0	0.2	0.0	14.1	14.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	0.0	14.2	2.2	2.0	0.0	1.5	0.0	7.6	6.4	1.9	1.7
LnGrp Delay(d),s/veh	19.2	0.0	46.7	24.0	23.0	0.0	26.6	0.0	47.3	37.6	24.5	24.6
LnGrp LOS	B		D	C	C		C		D	D	C	C
Approach Vol, veh/h		707			238			353			472	
Approach Delay, s/veh		38.7			23.5			42.8			32.3	
Approach LOS		D			C			D			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.0	23.4	12.3	33.8	11.0	29.4	14.0	32.1				
Change Period (Y+Rc), s	7.0	7.0	7.5	7.5	7.0	7.0	7.5	7.5				
Max Green Setting (Gmax), s	18.5	18.5	4.8	27.7	4.0	24.5	6.5	26.0				
Max Q Clear Time (g_c+M), s	16.1	16.1	6.4	25.9	5.1	5.9	9.3	6.0				
Green Ext Time (p_c), s	0.0	0.3	0.0	0.3	0.0	1.1	0.0	1.3				
Intersection Summary												
HCM 2010 Ctrl Delay			35.8									
HCM 2010 LOS			D									

HCM 2010 Signalized Intersection Summary
6023: Anderson Hill Rd & Bucklin Hill Rd

11/15/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕		↑	↕		↕	
Traffic Volume (veh/h)	10	17	1	23	7	243	4	99	53	379	96	5
Future Volume (veh/h)	10	17	1	23	7	243	4	99	53	379	96	5
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1800	1872	1890	1835	1835	1900	1863	1863	1900	1810	1900
Adj Flow Rate, veh/h	16	20	4	32	20	308	8	124	0	412	135	12
Adj No. of Lanes	0	1	0	0	1	1	0	1	1	0	1	0
Peak Hour Factor	0.63	0.85	0.25	0.72	0.35	0.79	0.50	0.80	0.60	0.92	0.71	0.42
Percent Heavy Veh, %	4	4	4	3	3	3	2	2	2	5	5	5
Cap, veh/h	54	67	13	221	138	547	14	220	199	455	149	13
Arrive On Green	0.08	0.08	0.06	0.18	0.20	0.20	0.13	0.13	0.00	0.38	0.35	0.37
Sat Flow, veh/h	692	865	173	1096	685	1560	113	1745	1583	1282	420	37
Grp Volume(v), veh/h	40	0	0	52	0	308	132	0	0	559	0	0
Grp Sat Flow(s),veh/h/ln	1730	0	0	1781	0	1560	1857	0	1583	1739	0	0
Q Serve(g_s), s	1.5	0.0	0.0	1.6	0.0	10.7	4.5	0.0	0.0	20.3	0.0	0.0
Cycle Q Clear(g_c), s	1.5	0.0	0.0	1.6	0.0	10.7	4.5	0.0	0.0	20.3	0.0	0.0
Prop In Lane	0.40		0.10	0.62		1.00	0.06		1.00	0.74		0.02
Lane Grp Cap(c), veh/h	135	0	0	360	0	547	234	0	199	617	0	0
V/C Ratio(X)	0.30	0.00	0.00	0.14	0.00	0.56	0.56	0.00	0.00	0.91	0.00	0.00
Avail Cap(c_a), veh/h	505	0	0	360	0	547	598	0	510	1288	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	29.2	0.0	0.0	22.3	0.0	17.6	27.5	0.0	0.0	19.9	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.1	0.0	1.1	1.6	0.0	0.0	4.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	0.8	0.0	5.7	2.4	0.0	0.0	10.5	0.0	0.0
LnGrp Delay(d),s/veh	30.1	0.0	0.0	22.4	0.0	18.7	29.1	0.0	0.0	24.1	0.0	0.0
LnGrp LOS	C			C		B	C			C		
Approach Vol, veh/h		40			360			132			559	
Approach Delay, s/veh		30.1			19.2			29.1			24.1	
Approach LOS		C			B			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.2		8.7		12.9		17.0				
Change Period (Y+Rc), s		4.5		5.0		4.5		5.0				
Max Green Setting (Gmax), s		49.5		18.0		21.5		12.0				
Max Q Clear Time (g_c+I1), s		22.3		3.5		6.5		12.7				
Green Ext Time (p_c), s		1.3		0.0		0.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				23.3								
HCM 2010 LOS				C								



Intersection			
Intersection Delay, s/veh	42.3		
Intersection LOS	E		
Approach	EB	SB	NW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	440	406	974
Demand Flow Rate, veh/h	449	447	1003
Vehicles Circulating, veh/h	165	918	97
Vehicles Exiting, veh/h	1200	182	517
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	3	1	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	9.5	74.3	43.8
Approach LOS	A	F	E
Lane	Left	Left	Left
Designated Moves	LR	LR	LR
Assumed Moves	LR	LR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	449	447	1003
Cap Entry Lane, veh/h	958	451	1025
Entry HV Adj Factor	0.980	0.908	0.971
Flow Entry, veh/h	440	406	974
Cap Entry, veh/h	938	410	996
V/C Ratio	0.469	0.991	0.978
Control Delay, s/veh	9.5	74.3	43.8
LOS	A	F	E
95th %tile Queue, veh	3	12	18

HCM 2010 Signalized Intersection Summary
 6010: Provost Rd/Old Frontier Rd & Anderson Hill Rd

11/1/2016



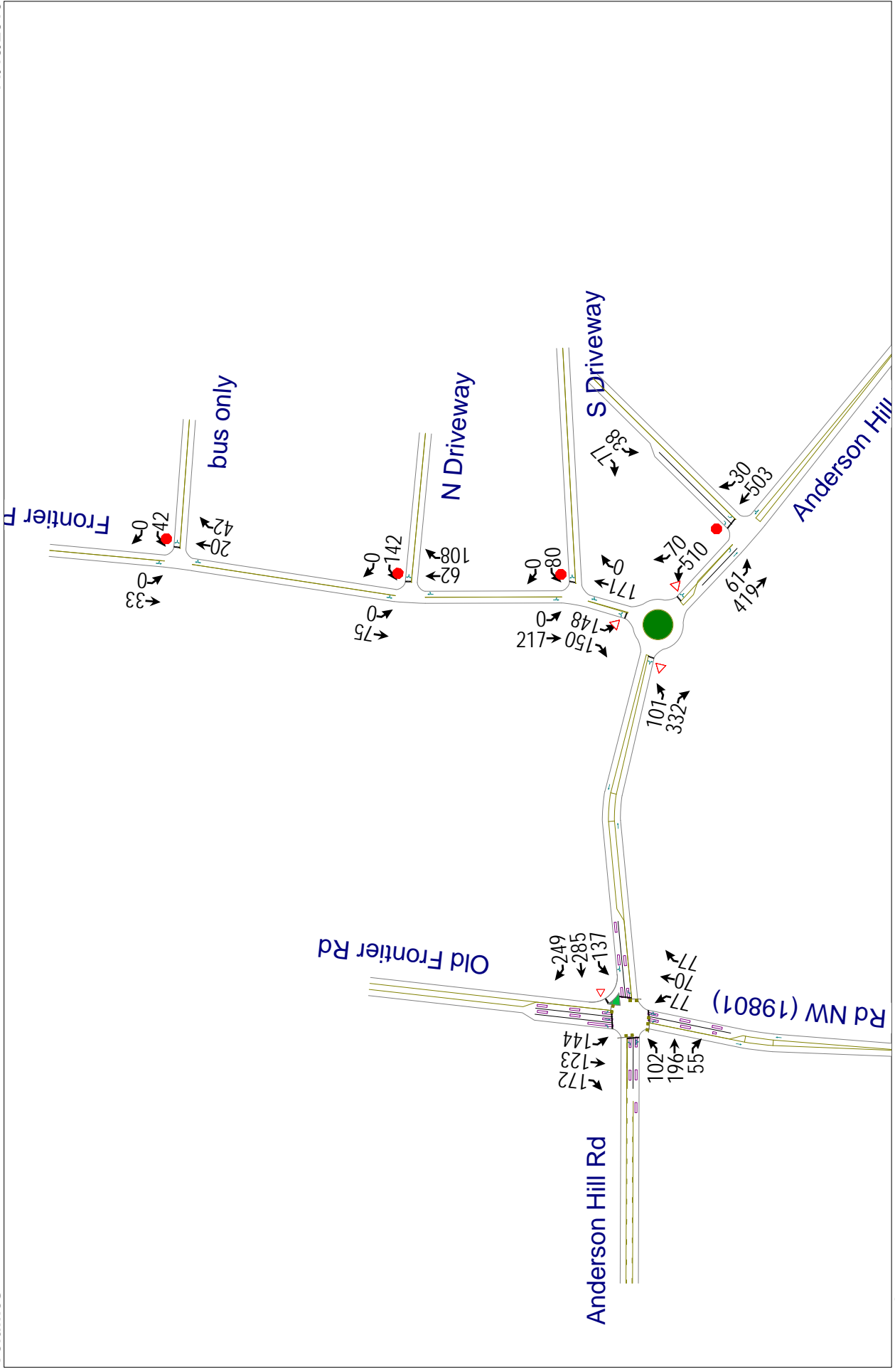
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (veh/h)	96	185	52	129	269	235	73	66	73	136	116	162
Future Volume (veh/h)	96	185	52	129	269	235	73	66	73	136	116	162
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1727	1727	1900	1827	1827	1900	1827	1827	1900
Adj Flow Rate, veh/h	139	213	68	140	316	0	104	84	96	153	153	200
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.69	0.87	0.76	0.92	0.85	0.70	0.70	0.79	0.76	0.89	0.76	0.81
Percent Heavy Veh, %	3	3	3	10	10	10	4	4	4	4	4	4
Cap, veh/h	324	300	96	343	401	0	239	188	215	424	184	240
Arrive On Green	0.09	0.22	0.22	0.10	0.23	0.00	0.06	0.24	0.24	0.08	0.26	0.26
Sat Flow, veh/h	1757	1341	428	1645	1727	0	1740	779	891	1740	718	939
Grp Volume(v), veh/h	139	0	281	140	316	0	104	0	180	153	0	353
Grp Sat Flow(s),veh/h/ln	1757	0	1769	1645	1727	0	1740	0	1670	1740	0	1657
Q Serve(g_s), s	4.2	0.0	10.4	4.5	12.3	0.0	3.2	0.0	6.5	4.6	0.0	14.4
Cycle Q Clear(g_c), s	4.2	0.0	10.4	4.5	12.3	0.0	3.2	0.0	6.5	4.6	0.0	14.4
Prop In Lane	1.00		0.24	1.00		0.00	1.00		0.53	1.00		0.57
Lane Grp Cap(c), veh/h	324	0	396	343	401	0	239	0	404	424	0	424
V/C Ratio(X)	0.43	0.00	0.71	0.41	0.79	0.00	0.44	0.00	0.45	0.36	0.00	0.83
Avail Cap(c_a), veh/h	324	0	678	357	691	0	239	0	562	424	0	581
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.3	0.0	25.5	18.7	25.7	0.0	20.8	0.0	23.0	18.1	0.0	25.1
Incr Delay (d2), s/veh	0.7	0.0	1.8	0.3	2.6	0.0	0.9	0.0	0.6	0.4	0.0	6.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	5.3	2.0	6.1	0.0	1.6	0.0	3.1	2.2	0.0	7.4
LnGrp Delay(d),s/veh	19.9	0.0	27.3	19.0	28.3	0.0	21.8	0.0	23.5	18.5	0.0	31.7
LnGrp LOS	B		C	B	C		C		C	B		C
Approach Vol, veh/h		420			456			284			506	
Approach Delay, s/veh		24.8			25.5			22.9			27.7	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	23.2	13.6	22.5	11.0	24.2	13.0	23.0				
Change Period (Y+Rc), s	7.0	7.0	7.5	7.5	7.0	7.0	7.5	7.5				
Max Green Setting (Gmax), s	23.0	23.0	6.7	26.3	4.0	24.0	5.5	27.5				
Max Q Clear Time (g_c+1), s	10.6	8.5	6.5	12.4	5.2	16.4	6.2	14.3				
Green Ext Time (p_c), s	0.0	1.1	0.0	1.2	0.0	0.9	0.0	1.2				
Intersection Summary												
HCM 2010 Ctrl Delay			25.6									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary
6023: Anderson Hill Rd & Bucklin Hill Rd

11/1/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕		↑	↕		↕	
Traffic Volume (veh/h)	8	12	2	32	18	365	0	75	46	381	90	14
Future Volume (veh/h)	8	12	2	32	18	365	0	75	46	381	90	14
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1717	1872	1890	1872	1872	0	1776	1776	1900	1810	1900
Adj Flow Rate, veh/h	16	20	8	48	28	388	0	115	0	454	148	20
Adj No. of Lanes	0	1	0	0	1	1	0	1	1	0	1	0
Peak Hour Factor	0.50	0.60	0.25	0.67	0.64	0.94	1.00	0.65	0.61	0.84	0.61	0.70
Percent Heavy Veh, %	9	9	9	1	1	1	0	7	7	5	5	5
Cap, veh/h	51	64	25	211	123	520	0	217	184	492	160	22
Arrive On Green	0.09	0.09	0.07	0.16	0.18	0.18	0.00	0.12	0.00	0.41	0.39	0.40
Sat Flow, veh/h	588	734	294	1146	668	1591	0	1776	1509	1267	413	56
Grp Volume(v), veh/h	44	0	0	76	0	388	0	115	0	622	0	0
Grp Sat Flow(s),veh/h/ln1616	0	0	0	1814	0	1591	0	1776	1509	1736	0	0
Q Serve(g_s), s	1.9	0.0	0.0	2.6	0.0	13.5	0.0	4.5	0.0	24.9	0.0	0.0
Cycle Q Clear(g_c), s	1.9	0.0	0.0	2.6	0.0	13.5	0.0	4.5	0.0	24.9	0.0	0.0
Prop In Lane	0.36		0.18	0.63		1.00	0.00		1.00	0.73		0.03
Lane Grp Cap(c), veh/h	140	0	0	334	0	520	0	217	184	675	0	0
V/C Ratio(X)	0.31	0.00	0.00	0.23	0.00	0.75	0.00	0.53	0.00	0.92	0.00	0.00
Avail Cap(c_a), veh/h	430	0	0	334	0	520	0	521	443	1173	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	31.5	0.0	0.0	25.8	0.0	21.1	0.0	30.2	0.0	20.8	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.3	0.0	5.5	0.0	1.5	0.0	5.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln0.9	0.0	0.0	1.3	0.0	8.6	0.0	2.3	0.0	13.0	0.0	0.0	0.0
LnGrp Delay(d),s/veh	32.5	0.0	0.0	26.1	0.0	26.7	0.0	31.7	0.0	26.5	0.0	0.0
LnGrp LOS	C			C		C		C		C		
Approach Vol, veh/h		44			464			115			622	
Approach Delay, s/veh		32.5			26.6			31.7			26.5	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		33.0		9.8		13.5		17.0				
Change Period (Y+Rc), s		4.5		5.0		4.5		5.0				
Max Green Setting (Gmax), s		49.5		18.0		21.5		12.0				
Max Q Clear Time (g_c+I1), s		26.9		3.9		6.5		15.5				
Green Ext Time (p_c), s		1.5		0.0		0.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				27.2								
HCM 2010 LOS				C								



Intersection




Int Delay, s/veh 2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	80	0	171	0	0	217
Future Vol, veh/h	80	0	171	0	0	217
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	89	0	190	0	0	241

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	431	190	0	0	190	0
Stage 1	190	-	-	-	-	-
Stage 2	241	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	581	852	-	-	1384	-
Stage 1	842	-	-	-	-	-
Stage 2	799	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	581	852	-	-	1384	-
Mov Cap-2 Maneuver	581	-	-	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	799	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	12.3		0		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	581	1384	-
HCM Lane V/C Ratio	-	-	0.153	-	-
HCM Control Delay (s)	-	-	12.3	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.5	0	-

Intersection						
Int Delay, s/veh	4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	142	0	62	108	0	75
Future Vol, veh/h	142	0	62	108	0	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	158	0	69	120	0	83
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	212	129	0	0	189	0
Stage 1	129	-	-	-	-	-
Stage 2	83	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	776	921	-	-	1385	-
Stage 1	897	-	-	-	-	-
Stage 2	940	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	776	921	-	-	1385	-
Mov Cap-2 Maneuver	776	-	-	-	-	-
Stage 1	897	-	-	-	-	-
Stage 2	940	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	10.8		0		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 776	1385	-		
HCM Lane V/C Ratio	-	- 0.203	-	-		
HCM Control Delay (s)	-	- 10.8	0	-		
HCM Lane LOS	-	- B	A	-		
HCM 95th %tile Q(veh)	-	- 0.8	0	-		

Intersection

Int Delay, s/veh 3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	42	0	20	42	0	33
Future Vol, veh/h	42	0	20	42	0	33
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	100	2	2	100	2	2
Mvmt Flow	47	0	22	47	0	37

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	83	46	0	0	69	0
Stage 1	46	-	-	-	-	-
Stage 2	37	-	-	-	-	-
Critical Hdwy	7.4	6.22	-	-	4.12	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	725	1023	-	-	1532	-
Stage 1	775	-	-	-	-	-
Stage 2	784	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	725	1023	-	-	1532	-
Mov Cap-2 Maneuver	725	-	-	-	-	-
Stage 1	775	-	-	-	-	-
Stage 2	784	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	10.3		0		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 725	1532	-
HCM Lane V/C Ratio	-	- 0.064	-	-
HCM Control Delay (s)	-	- 10.3	0	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q(veh)	-	- 0.2	0	-

Intersection

Int Delay, s/veh 4.1

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations	↕	↕	↕		↕	↕
Traffic Vol, veh/h	61	419	503	30	38	77
Future Vol, veh/h	61	419	503	30	38	77
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	200
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	75	75	56	56
Heavy Vehicles, %	2	2	6	2	2	2
Mvmt Flow	73	505	671	40	68	138

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	711	0	1343
Stage 1	-	-	691
Stage 2	-	-	652
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	888	-	168
Stage 1	-	-	497
Stage 2	-	-	518
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	888	-	154
Mov Cap-2 Maneuver	-	-	154
Stage 1	-	-	497
Stage 2	-	-	475

Approach	SE	NW	SW
HCM Control Delay, s	1.2	0	26.2
HCM LOS			D

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1	SWLn2
Capacity (veh/h)	-	-	888	-	154	445
HCM Lane V/C Ratio	-	-	0.083	-	0.441	0.309
HCM Control Delay (s)	-	-	9.4	-	45.6	16.7
HCM Lane LOS	-	-	A	-	E	C
HCM 95th %tile Q(veh)	-	-	0.3	-	2	1.3

Intersection			
Intersection Delay, s/veh	21.7		
Intersection LOS	C		
Approach	EB	SB	NW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	471	397	773
Demand Flow Rate, veh/h	504	453	789
Vehicles Circulating, veh/h	221	694	136
Vehicles Exiting, veh/h	926	231	589
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	12.2	34.7	20.7
Approach LOS	B	D	C
Lane	Left	Left	Left
Designated Moves	LR	LR	LR
Assumed Moves	LR	LR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	504	453	789
Cap Entry Lane, veh/h	906	564	986
Entry HV Adj Factor	0.935	0.876	0.980
Flow Entry, veh/h	471	397	773
Cap Entry, veh/h	847	495	966
V/C Ratio	0.556	0.802	0.800
Control Delay, s/veh	12.2	34.7	20.7
LOS	B	D	C
95th %tile Queue, veh	4	8	9

HCM 2010 Signalized Intersection Summary
 6010: Provost Rd/Old Frontier Rd & Anderson Hill Rd

11/15/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	96	185	52	129	269	235	73	66	73	136	116	162
Future Volume (veh/h)	96	185	52	129	269	235	73	66	73	136	116	162
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1727	1727	1900	1827	1827	1900	1827	1827	1827
Adj Flow Rate, veh/h	147	225	73	149	335	0	111	89	102	162	162	212
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.69	0.87	0.76	0.92	0.85	0.70	0.70	0.79	0.76	0.89	0.76	0.81
Percent Heavy Veh, %	3	3	3	10	10	10	4	4	4	4	4	4
Cap, veh/h	358	352	114	383	493	0	324	160	183	348	350	296
Arrive On Green	0.08	0.26	0.26	0.10	0.29	0.00	0.07	0.21	0.21	0.07	0.19	0.19
Sat Flow, veh/h	1757	1335	433	1645	1727	0	1740	778	892	1740	1827	1545
Grp Volume(v), veh/h	147	0	298	149	335	0	111	0	191	162	162	212
Grp Sat Flow(s),veh/h/ln	1757	0	1768	1645	1727	0	1740	0	1670	1740	1827	1545
Q Serve(g_s), s	4.2	0.0	10.4	4.4	12.0	0.0	3.6	0.0	7.2	5.0	5.5	9.0
Cycle Q Clear(g_c), s	4.2	0.0	10.4	4.4	12.0	0.0	3.6	0.0	7.2	5.0	5.5	9.0
Prop In Lane	1.00		0.24	1.00		0.00	1.00		0.53	1.00		1.00
Lane Grp Cap(c), veh/h	358	0	466	383	493	0	324	0	342	348	350	296
V/C Ratio(X)	0.41	0.00	0.64	0.39	0.68	0.00	0.34	0.00	0.56	0.47	0.46	0.72
Avail Cap(c_a), veh/h	358	0	868	383	886	0	350	0	451	348	441	373
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	0.0	22.7	16.4	22.1	0.0	21.3	0.0	24.8	21.4	25.0	26.4
Incr Delay (d2), s/veh	0.6	0.0	1.1	0.2	1.2	0.0	0.5	0.0	1.1	0.7	0.7	4.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	5.2	2.0	5.8	0.0	1.7	0.0	3.4	2.5	2.8	4.1
LnGrp Delay(d),s/veh	17.9	0.0	23.8	16.6	23.3	0.0	21.7	0.0	25.9	22.1	25.7	30.5
LnGrp LOS	B		C	B	C		C		C	C	C	C
Approach Vol, veh/h		445			484			302			536	
Approach Delay, s/veh		21.9			21.3			24.4			26.5	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	1.0	20.3	13.5	24.9	11.9	19.3	12.0	26.4				
Change Period (Y+Rc), s	7.0	7.0	7.5	7.5	7.0	7.0	7.5	7.5				
Max Green Setting (Gmax), s	17.8	6.0	33.2	6.0	15.8	4.5	34.7					
Max Q Clear Time (g_c+1), s	9.2	6.4	12.4	5.6	11.0	6.2	14.0					
Green Ext Time (p_c), s	0.0	2.0	0.0	4.7	0.0	1.3	0.0	4.7				
Intersection Summary												
HCM 2010 Ctrl Delay			23.5									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary
6023: Anderson Hill Rd & Bucklin Hill Rd

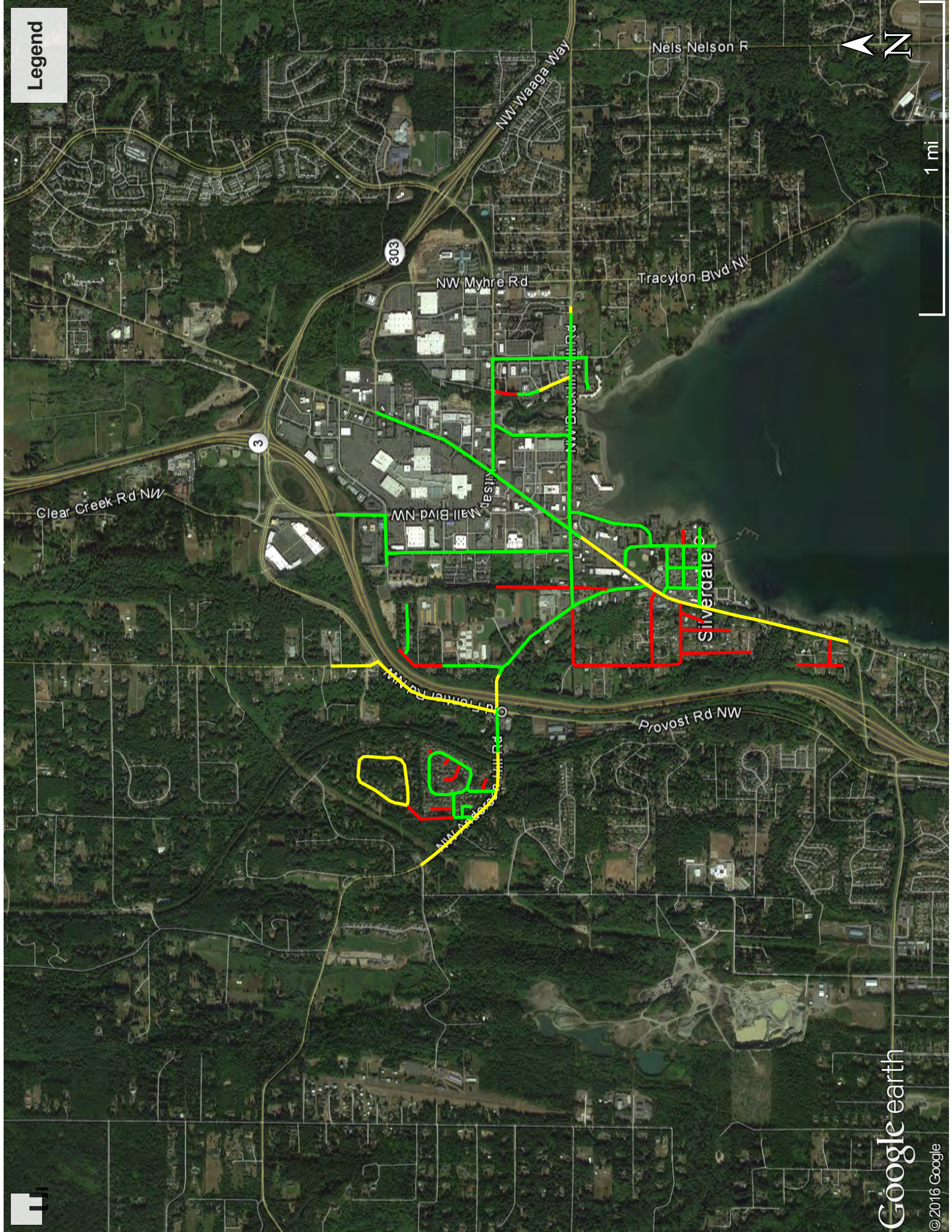
11/15/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕		↑	↕		↕	
Traffic Volume (veh/h)	8	12	2	32	18	365	0	75	46	381	90	14
Future Volume (veh/h)	8	12	2	32	18	365	0	75	46	381	90	14
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1717	1872	1890	1872	1872	0	1776	1776	1900	1810	1900
Adj Flow Rate, veh/h	13	14	8	44	51	462	0	94	0	414	127	33
Adj No. of Lanes	0	1	0	0	1	1	0	1	1	0	1	0
Peak Hour Factor	0.63	0.85	0.25	0.72	0.35	0.79	0.50	0.80	0.60	0.92	0.71	0.42
Percent Heavy Veh, %	9	9	9	1	1	1	0	7	7	5	5	5
Cap, veh/h	49	53	30	169	195	539	0	209	177	455	140	36
Arrive On Green	0.08	0.08	0.06	0.18	0.20	0.20	0.00	0.12	0.00	0.39	0.36	0.38
Sat Flow, veh/h	594	640	366	847	982	1591	0	1776	1509	1247	383	99
Grp Volume(v), veh/h	35	0	0	95	0	462	0	94	0	574	0	0
Grp Sat Flow(s),veh/h/ln1600	0	0	0	1829	0	1591	0	1776	1509	1729	0	0
Q Serve(g_s), s	1.4	0.0	0.0	3.0	0.0	13.5	0.0	3.3	0.0	21.3	0.0	0.0
Cycle Q Clear(g_c), s	1.4	0.0	0.0	3.0	0.0	13.5	0.0	3.3	0.0	21.3	0.0	0.0
Prop In Lane	0.37		0.23	0.46		1.00	0.00		1.00	0.72		0.06
Lane Grp Cap(c), veh/h	133	0	0	364	0	539	0	209	177	631	0	0
V/C Ratio(X)	0.26	0.00	0.00	0.26	0.00	0.86	0.00	0.45	0.00	0.91	0.00	0.00
Avail Cap(c_a), veh/h	460	0	0	364	0	539	0	562	478	1261	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	29.3	0.0	0.0	23.3	0.0	19.3	0.0	27.9	0.0	19.9	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.3	0.0	12.8	0.0	1.1	0.0	4.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.0	1.5	0.0	10.4	0.0	1.7	0.0	10.9	0.0	0.0
LnGrp Delay(d),s/veh	30.1	0.0	0.0	23.6	0.0	32.1	0.0	29.0	0.0	24.1	0.0	0.0
LnGrp LOS	C			C		C		C		C		
Approach Vol, veh/h		35			557			94			574	
Approach Delay, s/veh		30.1			30.7			29.0			24.1	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.2		9.2		12.5		17.0				
Change Period (Y+Rc), s		4.5		5.0		4.5		5.0				
Max Green Setting (Gmax), s		49.5		18.0		21.5		12.0				
Max Q Clear Time (g_c+I1), s		23.3		3.4		5.3		15.5				
Green Ext Time (p_c), s		1.4		0.0		0.1		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				27.6								
HCM 2010 LOS				C								

Appendix B: Pathways Inventory by AHBL

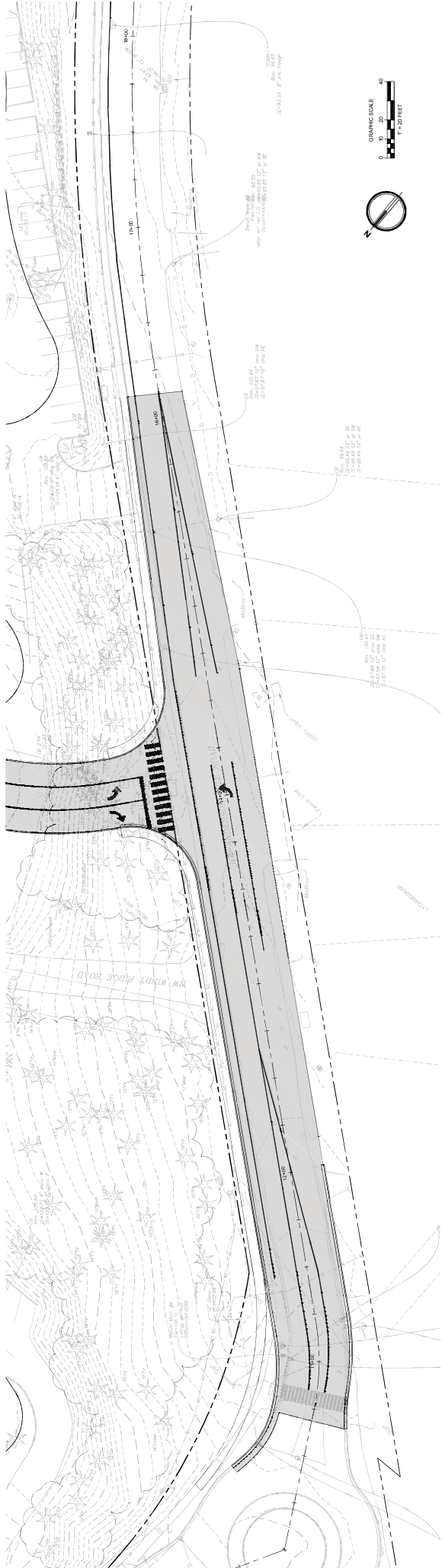
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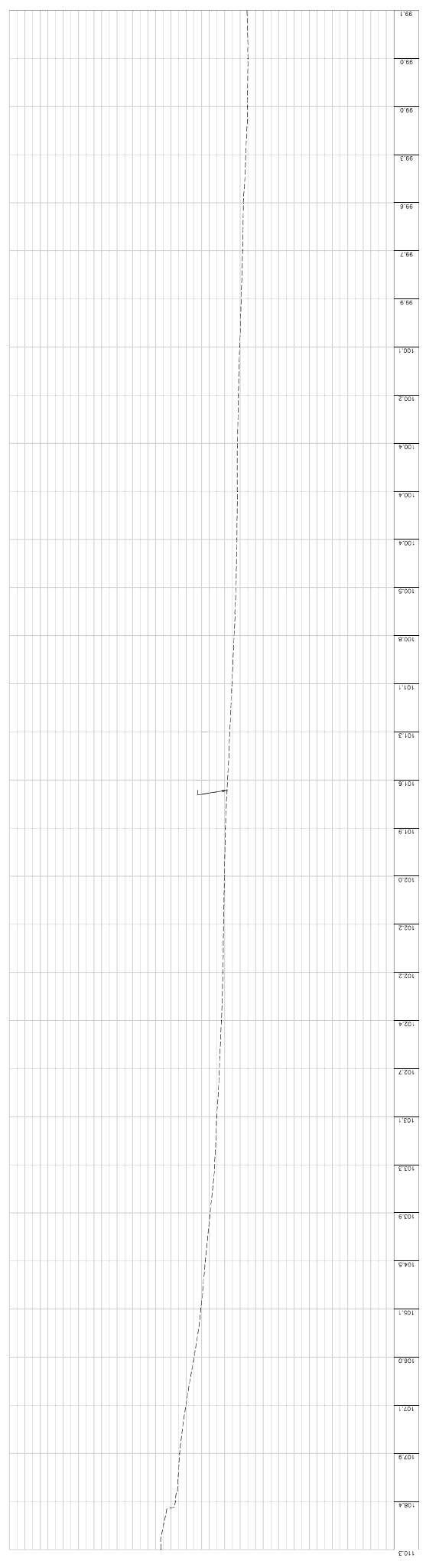
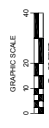
NW Anderson Hill Rd	Start	Apex Airport Road	asphalt/gravel shoulder on south/west side(s)
		East of Peach Tree Pl NW	
		East of Peach Tree Pl NW	curb and sidewalk on south side.
		Old Frontier Rd NW	
		Old Frontier Rd NW	asphalt shoulder on both sides
		Frontier Pl NW Roundabout	
		Frontier Pl NW Roundabout	curb and sidewalk on northeast side
		NW Windy Ridge Rd	
		NW Windy Ridge Rd	curb and sidewalk on northeast side, asphalt shoulder on southwest side
		Silverdale Loop Rd NW / NW Bucklin Hill Rd	
		Silverdale Loop Rd NW / NW Bucklin Hill Rd	curb and sidewalk on both sides
	End	Silverdale Way NW	
Old Frontier Rd NW	Start	NW Anderson Hill Rd	asphalt shoulder on west side
		Greaves Way	
		Greaves Way	asphalt shoulder on east side
	End	10880 Old Frontier Rd NW	
Silverdale Way NW	Start	8187 Silverdale Way	asphalt shoulder on both sides
		NW Cariton St	
		NW Cariton St	curb and sidewalk on east side
		NW Anderson Hill Rd	
		NW Anderson Hill Rd	asphalt shoulder on both sides
		Oxford Suites	
		Oxford Suites	curb and sidewalk on east side
		NW Bucklin Hill Rd	curb and sidewalk on both sides
	NW Bucklin Hill Rd		
	End	NW Myhre Rd	
NW Bucklin Hill Rd	Start	Crawney Ln NW	asphalt shoulder on north side
		Driveway immediately south of Crawney Ln NW	
		Driveway immediately south of Crawney Ln NW	curb and sidewalk on north side
		Driveway to Bucklin Place	
		Driveway to Bucklin Place	curb and sidewalk on both sides
	End	NW Anderson Hill Rd	
NW Randall Way	Start	NW Bucklin Hill Rd	curb and sidewalk on both sides
		Highway 3	
Frontier Pl NW	Start	NW Anderson Hill Rd	curb and sidewalk on east side
		Driveway to NW Ballard Ln	
		Driveway to NW Ballard Ln	no shoulder or sidewalk
	End	Dead End	
NW Highland Ct	Start	Frontier Pl NW	sidewalk on south side
	End	Dead End	
Sirocco Cir NW	Start	Sirocco Cir NW (Loop)	asphalt shoulder on outside of loop
		Sirocco Cir NW (Loop)	
		Sirocco Cir NW	nothing
		NW Wikes St	
		NW Wikes St	mountable curb and sidewalk on east side
	End	NW Anderson Hill Rd	
NW Springtree Ct	Start	Cul-de-Sac	mountable curb and sidewalk on west/south side
	End	Sirocco Cir NW	
NW Wikes St	Start	Ashley Cir NW	mountable curb and sidewalk on south side
	End	Sirocco Cir NW	
Wikes Ct NW	Start	NW Wikes St	no shoulder or sidewalk
	End	Dead End	
Hamilton Pl NW	Start	NW Wikes St	no shoulder or sidewalk
	End	Dead End	
Savannah St NW	Start	Ashley Cir NW	no shoulder or sidewalk
	End	Dead End	
Hamilton Pl NW	Start	Ashley Cir NW	no shoulder or sidewalk
	End	Dead End	
Blaine Ave NW	Start	Ridgetop Blvd NW	vertical curb and sidewalk on east side
	End	NW Bucklin Hill Rd	
Ridgetop Blvd NW	Start	Mickelberry Rd NW	vertical curb and sidewalk on both sides
	End	Silverdale Way NW	
Levin Rd NW	Start	Ridgetop Blvd NW	nothing
		North of 9657 Levin Road NW	
		North of 9657 Levin Road NW	vertical curb and sidewalk on east side
		North of Obstetrics & Gynecology	
		North of Obstetrics & Gynecology	asphalt shoulder on west side
	End	NW Bucklin Hill Rd	

Knute Ln NW	Start Silverdale Way NW End Dead End	no shoulder or sidewalk
NW Lowell St	Start Silverdale Way NW End Silverdale Loop Rd NW	no shoulder or sidewalk
Rainier View Ln NW	Start NW Lowell St End Dead End	no shoulder or sidewalk
Ernie Ave NW	Start NW Lowell St End Dead End	no shoulder or sidewalk
Martin Ave NW	Start NW Lowell St End NW View Ln	no shoulder or sidewalk
Silverdale Loop Rd NW	Start NW Lowell St End NW Anderson Hill Rd	no shoulder or sidewalk
NW Munson St	Start Silverdale Loop Rd NW End Silverdale Way NW	no shoulder or sidewalk
NW Byron St	Start Silverdale Way NW End Dead End	curb and sidewalk on both sides
Pacific Ave NW	Start Dead End (South) NW Byron St NW Byron St End NW Carlton St	curb and sidewalk on both sides curb and sidewalk on east side
McConnell Ave NW	Start Dead End (South) End NW Carlton St	curb and sidewalk on both sides
NW Lowell St	Start Pacific Ave NW Washington Ave NW Washington Ave NW End NW Carlton St	curb and sidewalk on both sides no shoulder or sidewalk
NW Carlton St	Start Silverdale Way NW End Washington Ave NW	curb and sidewalk on both sides
Washington Ave NW	Start Dead End (South) End Bayshore Dr NW	curb and sidewalk on both sides
Linder Way NW	Start Washington Ave NW End Silverdale Way NW	curb and sidewalk on west side
Bayshore Dr NW	Start Washington Ave NW End NW Bucklin Hill Rd	curb and sidewalk on east side
Dahl Rd NW	Start NW Anderson Hill Rd End Dead End (North)	no shoulder or sidewalk
NW Mt Cintage Way	Start NW Randall Way End Dead End (East)	curb sidewalk on south side

Appendix C: Road Plan and Profiles



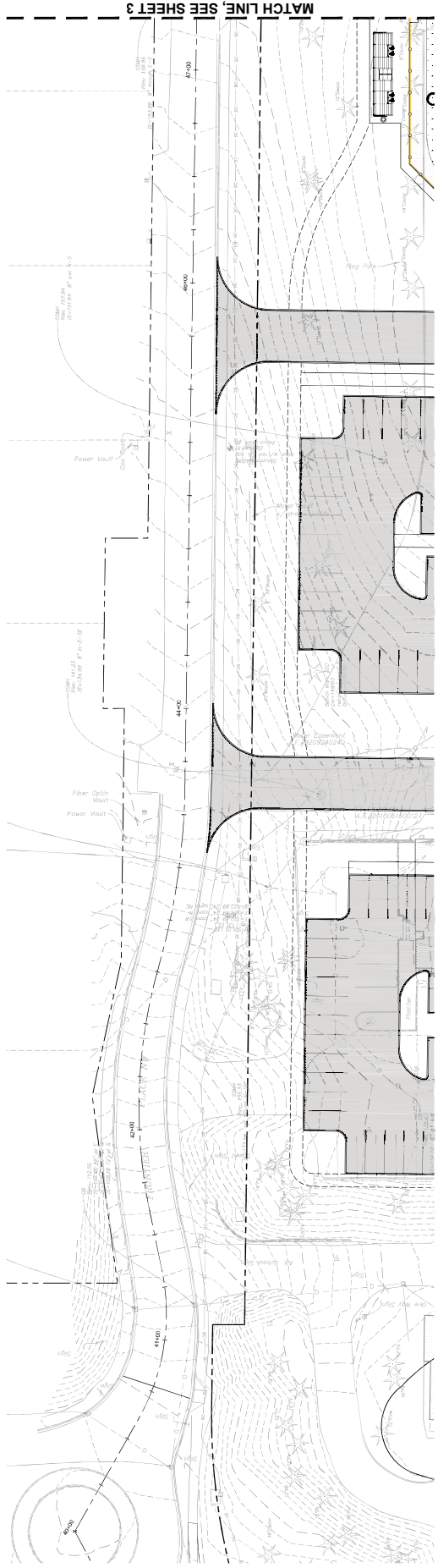
ANDERSON HILL ROAD PLAN



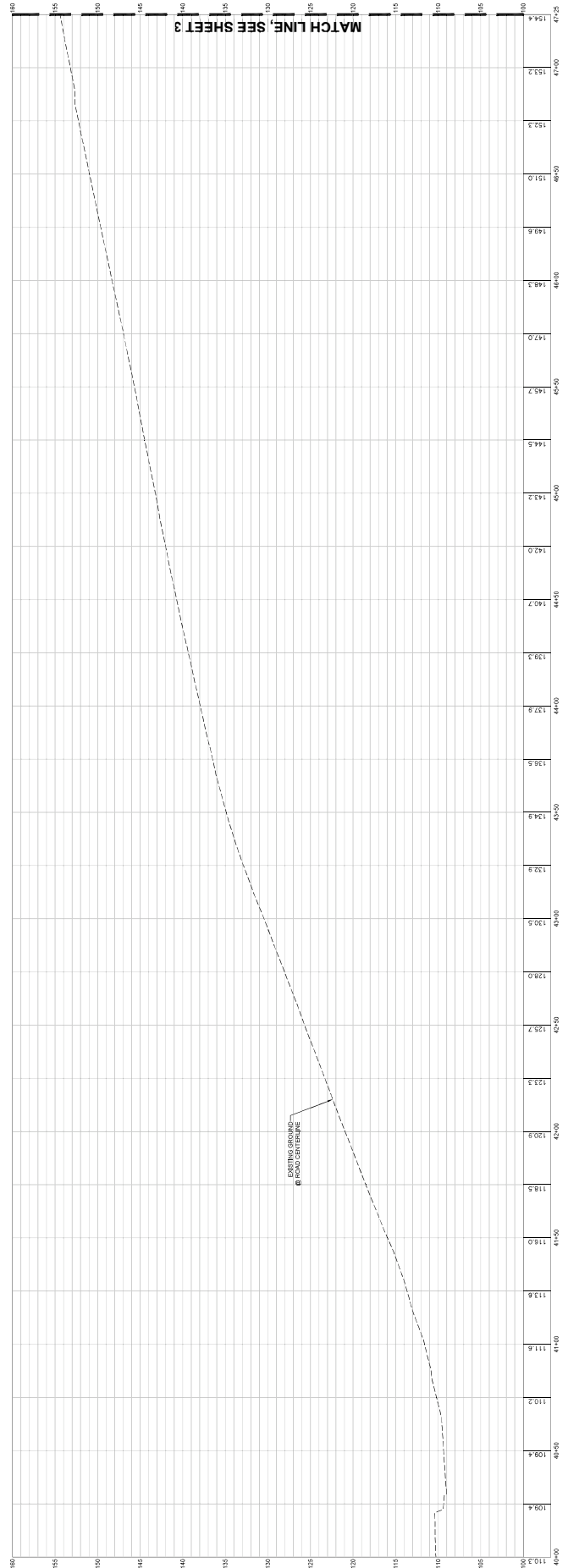
ANDERSON HILL ROAD PROFILE



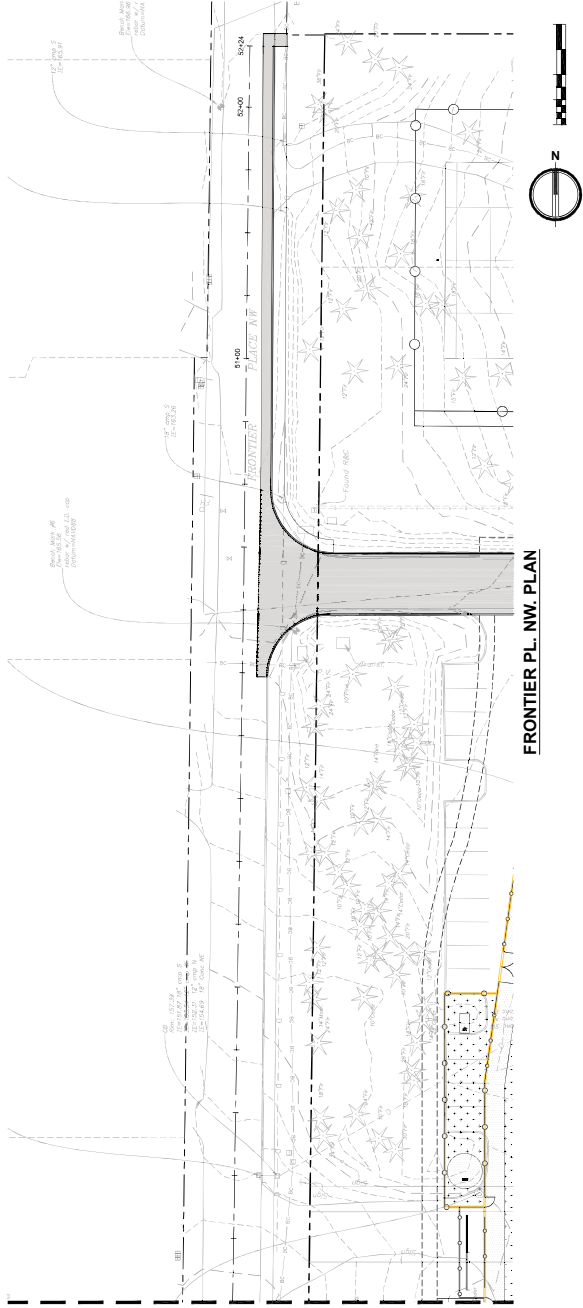
NW ANDERSON HILL ROAD
PLAN AND PROFILE EXHIBIT
SHEET 1 of 3



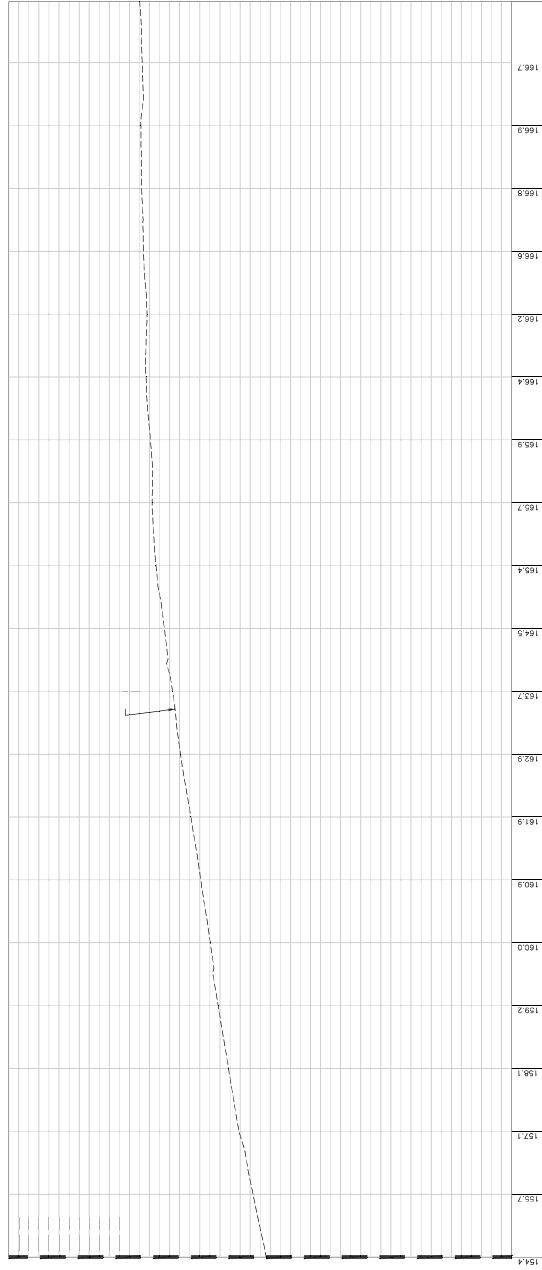
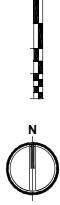
FRONTIER PL. NW. PLAN



FRONTIER PL. NW. PROFILE



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