

REPORT

Government of Yukon

École Whitehorse Elementary School Traffic Impact Assessment Final Study



MARCH 2025





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REVISIONS PAGE

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EXECUTIVE SUMMARY

The Government of Yukon is planning to replace the existing École Whitehorse Elementary School (EWES) with a new school next to the existing Takhini Elementary School in the Takhini North neighbourhood. To understand how this new school will affect traffic, Associated Engineering completed a Traffic Impact Assessment (TIA). The study looks at nearby roads and intersections to identify existing conditions, potential impacts, and possible improvements.

The focus area of the study is on Range Road between Two Mile Hill Road and Mountain View Drive. The key intersections adjacent to the school site are:

- Range Road / University Drive (north of the school)
- Range Road / Normandy Road (south of the school)

The Yukon Government anticipates 90% of students will be bused to/from the school, which will minimize traffic caused by parents driving children to/from school. The main findings of the study are:

- The Range Road / Normandy Road intersection: Traffic is expected to operate acceptably, a mini roundabout is recommended to reduce vehicle speeds and improve safety near the schools.
- The Range Road /University Drive intersection: Traffic operates acceptably when 90% of students are bused. It will need a roundabout or traffic signal if more students are driven to/from school. A mini roundabout is an ideal intersection improvement to slow vehicle speeds and improve safety near the schools.
- Range Road / Two Mile Hill and Range Road / Mountain View Drive: These intersections already experience traffic issues due to existing traffic conditions and the growth of this traffic into the future. The additional traffic generated by the school is minimal compared to the overall volume at these intersections, and it will not contribute to deterioration. Future improvements will be required as overall traffic demand increases, even if the school is not built. Future improvements are planned by the City of Whitehorse at Two Mile Hill to make the intersection safer and more comfortable for people walking and biking.

Key recommendations:

- Construct mini roundabouts at Range Road / Normandy Way and Range Road / University Drive to slow down vehicle traffic and improve safety.
- Extend the school zone along Range Road and create a new school zone along University Drive.
- Build a bike lane and new pedestrian crosswalks along Range Road, as recommended in a recent Range Road Corridor Study.
- Create a detailed parking plan for staff, visitors, buses, and parents dropping off/picking up students. Design safe drop-off and pick-up areas with enough space for school buses and vehicles.
- If a mini roundabout is constructed at Range Road / Normandy Way, the mid-block pedestrian crossing at the Takhini Elementary School entrance should be relocated to the mini roundabout intersection. The northbound bus stop should also be relocated to south side of the intersection.

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1 INTRODUCTION

The Government of Yukon is replacing the currently operating École Whitehorse Elementary School with a new École Whitehorse Elementary School ('EWES') proposed to be situated next to the Takhini Elementary School in the Takhini North Subdivision in the City of Whitehorse. Associated Engineering ('Associated') has been retained by Kobayashi + Zedda Architects to complete a Traffic Impact Assessment ('TIA') of the proposed development. The TIA will assess the traffic impact of the proposed school development on the surrounding intersections for opening day and post-opening future horizons and recommend potential mitigations if needed.

This report outlines the impacts of the school on the surrounding network, including traffic, safety, active transportation, and transit connections. Based on discussions with the City, the development-generated traffic will be analyzed in three Scenarios accounting for different rates of students busing to/from school. The TIA also comments on the site circulation considerations for drop off/ pickup-up of students and proposed active transportation connections from the new development to the adjacent area. This TIA refers to the City of Whitehorse (CoW) Guidelines¹.

This study will review the traffic impacts on the following existing intersections:

- 1. Range Road / University Drive Stop-Control Intersection
- 2. Range Road / Normandy Road / Vimy Place Stop-Control Intersection
- 3. Range Road / Two Mile Hill Signalized Intersection
- 4. Range Road / Mountain View Drive Signalized Intersection

1.1 Study Area

The study area is Range Road between the major intersections at Two Mile Hill Road and Mountain View Drive. The proposed site is located on the west side of Range Road. University Drive is located to the north, and Normandy Road is to its south. The site access is proposed via University Drive. The proposed site is surrounded by Takhini Elementary School and low-rise residential houses to the south, a forested area to the northwest, Whitehorse Correctional Centre, Yukon University to the north, and the Pepsi Softball Centre to the northeast.

The existing Takhini Elementary School lot contains a school building, parking lot, bus drop off and parking at the southeast corner of the lot. The school will continue to operate independently of the EWES. The school has outdoor play areas spread throughout the site including a basketball course, a soccer field, three softball fields and a forested area with trails.

Range Road and University Drive are both two-lane undivided collector roads with a posted speed limit of 50 km/h. A school zone with limit 30 km/h is in place along Range Road during school operation and extends from University Drive in the north to Dieppe Drive to the south. Normandy Road is a local road with a posted speed limit of 30 km/h.

Two Mile Hill Road is a four/five lane arterial road that acts as a major connection between downtown Whitehorse and The Alaska Highway. The intersection of Range Road / Two Mile Hill Road is part of the Hamilton Boulevard, Alaska Highway, Range Road, and Two Mile Hill (HART) intersection upgrade project being undertaken by the City of Whitehorse. The project proposes two intersection upgrade options for the Two Mile Hill / Range Road intersection.

¹ City of Whitehorse Guidelines for Transportation Impact Assessments: https://www.whitehorse.ca/wpcontent/uploads/2023/10/CoW-TIA-Guidelines-Current_Final-Oct-2023.pdf

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The first option is lower cost option and includes left protected left turning phases only and right turn only except bus lanes along Two Mile Hill Road. The second option is more costly and includes restricting the southbound through and westbound left turn movements.²

Mountain View Drive is a two-lane undivided arterial that provides major connection between the Marwell light industrial area and the north areas of the City (Porter Creek and Whistle Bend).

Figure 1-1 shows the location of the proposed development and the study area.

² HART Combined Intersection Upgrades Round 2 Public Information Session Slide Deck, April 3, 2024.

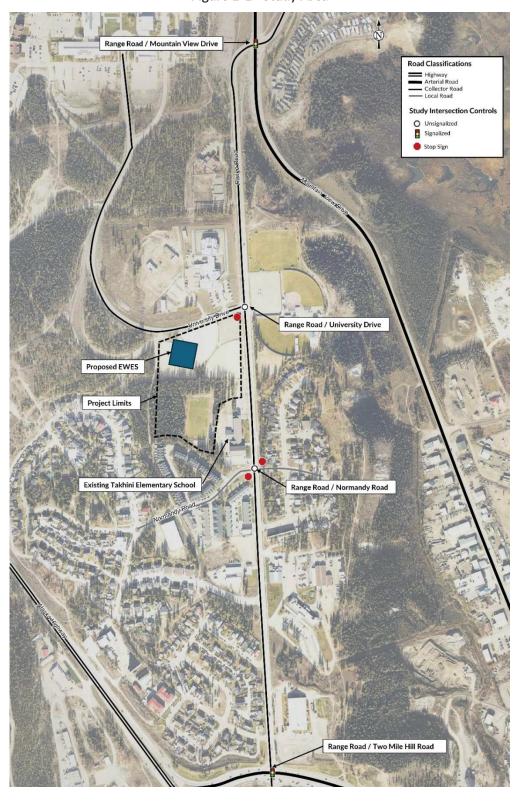


Figure 1-1 Study Area

1.2 Proposed Development

The proposed school is intended to accommodate 600 students from Kindergarten to Grade 7 and 55 staff. The school building, bus loop, and parking lot will be located at the northwest corner of the site where softball fields are currently located. The EWES provides a French Immersion program, which is a distinct program with a regional catchment area. The existing Takhini Elementary School will be maintained in the southeast portion of the site. A multi-sport field will be located in the middle of the site.

The most recent concept plan includes a two to three storey high school building constructed on the existing field location. The footprint of the two or three storey building would be very similar.

Figure 1-2 shows the concept plan of the proposed development.³

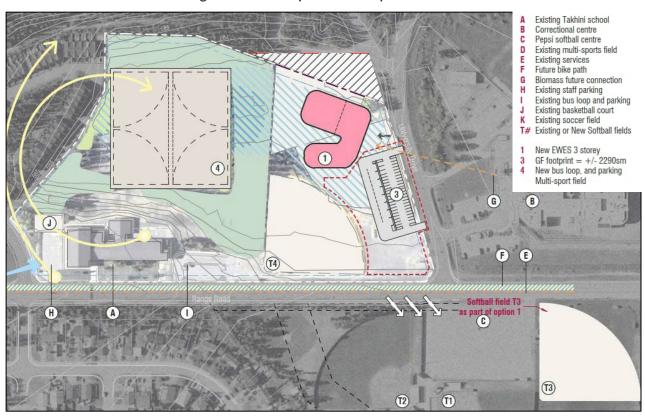


Figure 1-2 Concept Plan of Proposed School

³ École Whitehorse Elementary School Replacement – Test Fit Figure Option 1 – 2 to 3 Storey On the Field. December 172024.

2 TRAFFIC VOLUMES

The school is expected to be opened in 2029, and two future horizons were selected to review traffic impacts. The pre- and post-development AM and PM peak hour traffic performances at the study intersections were assessed for the following assumed horizons:

- 1. 2024 Existing conditions
- 2. 2029 Opening day
- 3. 2035 5 Years post-opening day
- 4. 2040 10 Years post-opening day

The hourly traffic volume forecast at the study intersections was developed using existing traffic counts, expected annual traffic growth rate and traffic generation from the school development.

2.1 Existing Traffic Data

Traffic data was collected by Associated Engineering for the intersections near the school site. Traffic counts from 2023 were provided by the City for Two Mile Hill Road and Mountain View Drive.

- Range Road / Two Mile Hill Road: CoW counts August 1, 2023
- Range Road / Normandy Road: AE counts October 22, 2024
- Range Road / University Drive: AE counts October 21, 2024
- Range Road / Mountain View Drive CoW counts June 1, 2023

2.2 Background Traffic

Based on the traffic counts, the peak hours identified for consideration in this study are the following:

- 1. AM Peak hour: 8:00 AM 9:00 AM.
- 2. PM Peak hour: 3:00 PM 4:00 PM (this peak hour was selected to capture traffic conditions that correspond with the end of school, not with the peak hour traffic of the adjacent streets).

Previous traffic counts at the Intersection of Range Road / Two Mile Hill Road were compared to the latest counts to determine background growth rates.⁴ The comparison showed that there was no traffic volume growth therefore the counts at Range Road / Two Mile Hill and Range Road / Mountain View Drive intersections were assumed to be representative of 2024 counts. To have a conservative analysis, a 2.0% linear traffic growth rate is used to account for population growth in Whitehorse for the horizon study years. This approach complies with the City's TIA Guidelines. This 2.0% growth rate is applied to all turning movements at the study intersections and accounts for:

- Increase in students enrolled at Yukon University. Projections from the University show an expected 2% linear growth from 2025 to 2030. This same rate is applied for the study horizon years beyond 2030.
 Correspondence and the expected student enrollment increase is found in Appendix A.
- Development behind Normandy Living. A future senior community and future apartment building is planned. No specifics on the project have been received by the City since 2020. As no additional details are available, a 2% growth of existing traffic on Normandy Road is applied to account for the new development.

⁴ Previous 2015 counts were referred from the City of Whitehorse Range Road Building Project Traffic Analysis Memorandum June 22, 2015. The 2015 counts at the Range Road / Two Mile Hill intersection show 2593 and 3418 vehicles entering the intersection the AM and PM peak respectively compared to 2249 and 3345 from the latest 2023 counts.

- Development at Whistle Bend. Whistle Bend is a residential neighbourhood development in the north area of Whitehorse which is currently being development. When fully built, it will accommodate up to 8000 residents⁵. The main roads that provide access to Whistle Bend are Mountain View Drive and Range Road. Based on the expected steady growth of Whistle Bend and the influence on these roads, 2% annual growth rate was used to represent the anticipated growth in traffic.
- Development at Range Point. A planned development with approximately 387 units is expected to be constructed along Range Road and utilize the Range Road / Mountain View Drive intersection. The traffic studies for the development completed to date⁶ note the need for improvements at Range Road / Mountain View Drive due to future traffic impacts.

The 2024 traffic count data was used to represent background traffic volumes at each study intersection. The counts along Range Road were collected during school operations, reflecting typical traffic conditions related to the school. Counts for the intersections at Two Mile Hill Road and Mountain View Drive were collected during summer months, where higher traffic volumes entering Range Road allow for a more conservative analysis of traffic conditions at those intersections. As such, no adjustments to balance the volumes between intersections were made.

Appendix A shows the background traffic in 2024, 2029, 2035, and 2040 respectively.

2.3 Development Traffic

1.1.1 Trip Generation

The Government of Yukon expects that up to 90% of students attending EWES will be bused. The current EWES in downtown Whitehorse has 80% of students who bus, and this number is expected to be maintained or increase with the school in a new location. Due to the French Immersion program at EWES, the school draws a higher number of students who use the busing program when compared to a typical elementary school. After discussion with the City of Whitehorse, in order to understand how the bus program can impact traffic operations, this TIA includes a sensitivity analysis of different mix of students driven vs bused to school. Three trip generation Scenarios have been analyzed to account for different levels of students using the available bus service to get to/from the school. The three trip generation Scenarios are:

- Scenario 1 90% Students Bused
- Scenario 2 50% Students Bused (Yukon Average Bus Rate). Busing data was provided by The Government of Yukon and is found in Appendix B.
- Scenario 3 ITE Trip Gen Rate

⁵ Accommodating Future Residential Demand in Whitehorse, City of Whitehorse, 2021: https://www.whitehorse.ca/wp-content/uploads/2022/06/Accommodatingresidentialde.pdf

⁶ https://www.whitehorse.ca/wp-content/uploads/2023/06/Range-Point-Joint-Master-Plan.pdf

Scenario 1 - 90% Students Bused:

Once EWES is operating, the Government and School Superintendent anticipate that up to 90% of the students enrolled at the elementary school will be bused to/from their homes. The following assumptions were made to determine the number of trips generated for this Scenario:

- A total of 540 students will use the school bus with a maximum occupancy of 48 children to get to school. The remaining 60 students will use single-occupancy vehicles.
- Once, the children are dropped off, buses and private vehicles will leave the school site. Thus, each would generate two trips during each peak hour.
- There will be 55 staff trips to the school during the AM peak hour using single occupancy vehicles. No staff trips are considered in PM peak considering the staff generally do not leave along with the students. Teachers may stay behind to complete work tasks.

Table 2-1 shows the vehicle trips generated by the proposed development for Scenario 1 with the above assumptions.

Mode	Children/Staff	ļ	AM Peak Hou	r	F	PM Peak Hour			
Mode	Ciliuleil/Stail	Trips	ln	Out	Trips	In	Out		
School Bus	540	24	12	12	24	12	12		
Private Vehicle	60	120	60	60	120	60	60		
Private Vehicle	55	55	55	0	0	0	0		
Total	655	199	127	72	144	72	72		

Table 2-1 Trip Generation - Scenario 1 (90% students bused)

Scenario 2 - 50% Students Bused:

Based on information provided by the Government of Yukon found in **Appendix B**, the average busing rate for schools within Whitehorse is 50%. The following assumptions were made to determine the number of trips generated for this Scenario:

- A total of 300 students will use the school bus with a maximum occupancy of 48 children to get to school. The remaining 300 students will use single-occupancy vehicles.
- Once, the children are dropped off, buses and private vehicles will leave the school site. Thus, each would generate two trips during each peak hour.
- There will be 55 staff trips to the school during the AM peak hour using single occupancy vehicles. No staff
 trips are considered in PM peak considering the staff generally do not leave along with the students. Teachers
 may stay behind to complete work tasks.

Table 2-2 shows the vehicle trips generated by the proposed development for Scenario 2 with the above assumptions.

		•		•	•				
Mada	Children (Shoff	,	AM Peak Hou	r	PM Peak Hour				
Mode	Children/Staff	Trips	ln	Out	Trips	In Out			
School Bus	300	14	7	7	14	7	7		
Private Vehicle	300	600	300	300	600	300	300		
Private Vehicle	55	55	55	0	0	0	0		
Total	655	669	362	307	614	307	307		

Table 2-2 Trip Generation - Scenario 2 (50% students bused)

Scenario 3 - ITE Trip Rate:

This Scenario assumes the estimated number of trips trip generated are taken from the latest 11th edition of the Trip Generation Manual (TGM11) of the Institute of Transportation Engineers (ITE). The TGM11 is an industry-accepted method of estimating the number of trips a development will generate. The trip generation rates are developed from many studies that determine the number of trips generated at various times of the day and day of the week for a wide variety of land uses.

"Elementary School" (land use code - 520) land use was used for the trip generation of the proposed development, the data sources have been taken from sites that may have a low amount of bus service, but the exact percentage of students bused in the ITE data is unknown. Average rates⁷ for the trips in peak hours of the generator (school development) were used to estimate the hourly inbound and outbound traffic of the proposed development. Note as previously mentioned the peak hour of the school does not coincide with the peak hour of the adjacent street. The peak hour of generator time period was used as this will estimate the maximum number of trips related to the school development.

Table 2-3 shows the vehicle trips generated by the proposed development. ITE Trip generation reports can be found in **Appendix C**.

Chudanta	AN	1 Peak H	our	A٨	1 Peak Ho	our	PM	1 Peak Ho	our	PM Peak Hour		
Students	Rate	ln	Out	Trips	ln	Out	Rate	ln	Out	Trips	ln	Out
600	0.75	54%	46%	450	243	207	0.45	46%	54%	270	124	146

Table 2-3 Trip Generation – Scenario 3 (ITE Trip Generation Vehicle Rate)

1.1.2 Trip Distribution and Trip Assignment

The school is expected to welcome students from all areas of the city. The distribution of trips to/from north on Range Road and to/from south on Range Road was calculated based on the October 2024 traffic counts at Range Road / University Drive and Range Road / Normandy Road. 57% of the vehicles are bound to and from the south of Takhini and the remaining 43% are bound to and from the north.

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⁷ Fitted curve equation not available.

Vehicles to/from the south are assigned to the following directions at the Range Road / Two Mile Hill intersection based on the proportions from the background volumes:

- 33% West along Two Mile Hill Road
- 58% East along Two Mile Hill Road
- 10% Continue south along Range Road

Vehicles from the south once on Range Road drive northbound along Range Road through Range Road / Normandy Road intersection and turn northbound left at Range Road / University Drive to access the school.

Vehicles to/from the north will are assigned to the following directions at the Range Road / Mountain View Drive intersection based on the proportions from the background volumes:

- 24% Continue east along Range Road
- 11% South along Mountain View Drive
- 64% North along Mountain View Drive

Vehicles from the north once on Range Road travel southbound along Range Road and turn southbound right at Range Road / University Drive to Access the school. Vehicles will follow the same path for the return journey.

The trip distribution is considered the same in the AM and the PM peak hours.

Figure 2-1 shows the trip distribution in the AM and PM peak hours. The trip assignment of development generated traffic for each busing Scenario is in **Appendix D**

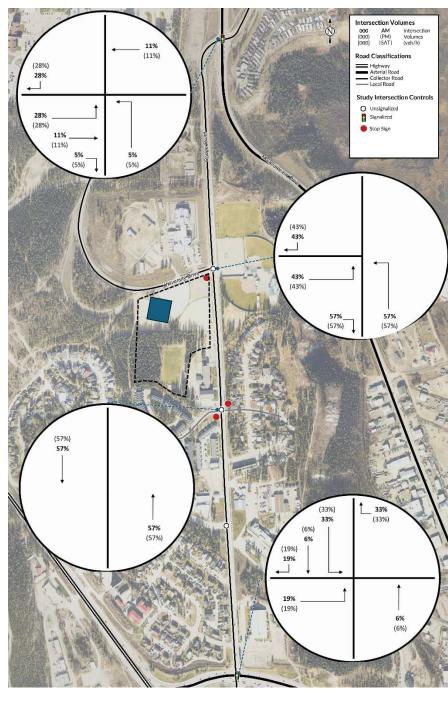


Figure 2-1 Trip distribution

2.4 Total Traffic

Total traffic is estimated by summing up the background traffic volumes at each of the horizon years with the trips generated by the proposed school under each of the trip generation Scenarios. The 2029 – Opening Day Total Traffic, 2035 – 5 Year Post Opening Day Total Traffic, and 2040 – 10 Year Post Opening Day Total Traffic under each development Scenario are in **Appendix E.**

3 TRAFFIC ANALYSIS

3.1 Analysis Criteria

Intersection analysis was completed based on the Transportation Research Board (TRB) Highway Capacity Methodology (HCM) methodology, using the Synchro 12. This methodology quantifies the intersection performance using the following parameters:

- Volume to Capacity Ratio (v/c) measured in terms of a ratio of demand flow rate (v) to maximum capacity (c). Values closer to 1.0 are nearing capacity, and values over 1.0 are over capacity.
- Queue Length The expected maximum queue length for one lane of traffic. The 95% percentile queue length represents the length of which there is a 5% chance of exceeding during the traffic peak hour.
- Control Delay average vehicle delay measured in seconds per vehicle on an intersection or movement.
- **Level of Service** a measure of average vehicle delay ranging from A (minimal delay) to F (unacceptable delay).

The LOS of each intersection movement is based on the relationship between LOS and control delay as shown in **Table 3-1**. For signalized intersections, the LOS for the overall intersection is calculated based on the average delay of the individual movements. LOS for a stop-controlled intersection is estimated for the individual movements to and from the side street. However, the overall intersection LOS for a stop-controlled intersection is not reported as the through movements on the major street are free-flowing they skew the average delay results.

Level of	Service	Control Delay per Vehicle (seconds)				
v/c ≤ 1	v/c >1	Signalized Intersection	Unsignalized Intersection			
А	F	Less than 10	Less than 10			
В	F	10 - 20	10 - 15			
С	F	20 - 35	15 - 25			
D	F	35 – 55	25 – 35			
Е	F	55 – 80	35 – 50			
F	F	Greater than 80	Greater than 50			

Table 3-1 Level of Service Characteristics⁸

The generally acceptable minimum performance targets for the capacity analysis of signalized and unsignalized intersections are:

- v/c ratio ≤ 0.90 and LOS of E for individual movements, and
- LOS of D for the overall intersections.

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⁸ Highway Capacity Manual, 7th Edition, Exhibit 19-8 and Exhibit 20-2

The following is a summary of Synchro and SimTraffic parameters and relevant assumptions used in the analysis:

- A minimum of 5 veh/h will be used for each movement.
- A base saturated flow rate of 1,800 veh/hour/lane is used.
- Intersection approach gradients are based on the existing grades at each intersection approach. These grades were measured using Google Earth Pro.
- Heavy vehicle percentages of 3% will be used along Range Road and along Mountain View Drive and Two
 Mile Hill Road. These are based on heavy vehicle proportions on counts provided by the City of Whitehorse.
- PHFs of 0.92 is used for the analysis.
- Optimized signal settings produced by Synchro are used.

3.2 Intersection Capacity Analysis

The intersection capacity analysis tables for all the study intersections at all horizons for all scenarios are found in **Appendix F**. Full Synchro reports can be provided upon request.

The two intersections closest to the EWES site are University Drive / Range Road and Normandy Drive/Range Road. These two intersections will be reviewed in more detail due to their proximity to the school site, and because they have lower existing traffic volumes, therefore will be impacted more by school traffic.

University Drive / Range Road

At the University Drive / Range Road intersection, the eastbound lane does not meet the minimum LOS in 2030 under Scenarios 2 in the AM peak hour. This is due to the significant additional traffic added to this leg. The additional traffic does not have sufficient gaps to turn onto Range Road and causes the increased delays and the performance of this lane to fail. By 2040 under Scenario 3, the EB lane performance does not meet the minimum threshold as well. However, under Scenario 1, all the movements will meet the minimum LOS D or better for both peak hours for all study years. At this intersection the development is expected to impact the performance of the EB lane. Mitigation measures to improve the performance of the EB lane is proposed in **Section 4** of this report to accommodate all busing Scenarios.

Table 3-2 University Drive / Range Road Intersection Performance Summary

	Table 0 2 0111	versity Drive / Karige Ki	Jua Inter	occuon i ci	Torritarice Summe	,		
Scenario	Eastbound University Dri	ve		orthbound ange Road		Southbound Range Road		
	Left Right		Left	Thru	Left	Thru	Right	
	יור'		7	1		1		
		AM Pea	k Hour					
Existing	В		Α	Α		А		
2029 bk	В		Α	Α		А		
2029 S1	В		Α	А		А		
2029 S2	F		А	Α		А		
2029 S3	D		А	А		А		
2035 bk	В		А	А		А		
2035 S1	С		А	А		А		
2035 S2	F		В	А		А		
2035 S3	D		А	А		А		
2040 bk	В		Α	А		А		
2040 S1	С		Α	А		А		
2040 S2	F		В	Α		А		
2040 S3	Е		Α	Α		А		
		PM Pea	k Hour					
Existing	В		Α	Α		А		
2029 bk	В		Α	Α		А		
2029 S1	В		Α	Α		А		
2029 S2	F		Α	А		А		
2029 S3	С		Α	Α		А		
2035 bk	В		Α	А		А		
2035 S1	В		Α	Α		А		
2035 S2	F		А	Α		А		
2035 S3	С		А	Α		А		
2040 bk	В		Α	Α		А		
2040 S1	С		Α	Α		А		
2040 S2	F		Α	Α		А		
2040 S3	С		Α	А		А		

Normandy Drive/Range Road

At the Normandy Drive/Range Road intersections, all approaches and movements will meet the minimum LOS for all planning year horizons under all busing Scenarios with the current stop configuration. The Range Road Corridor Study ⁹ indicates a mini roundabout as an alternate intersection control to the stop control on the minor leg. This is not needed operationally but could be considered from a traffic calming perspective.

Table 3-3 Normandy Drive / Range Road Intersection Performance Summary

Scenario	Eastbound University Drive			Westbound Normandy Drive			Northbound Range Road			Southbound Range Road		
Scenario	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	+				+			+		$lack {f +}$		
					AM I	Peak Hou	r					
Existing		А			В			А			А	
2029 bk		В			В			Α			А	
2029 S1		В			В			Α			Α	
2029 S2		В			С			Α			Α	
2029 S3	В				С		А			А		
2035 bk	В		В			А		А				
2035 S1	В			С		А		А				
2035 S2	В		С			Α		Α				
2035 S3		В		С		А		А				
2040 bk		В		В		А		А				
2040 S1		В		С		А		А				
2040 S2		В		С		А		А				
2040 S3		В			С			Α			Α	
					PM F	Peak Hou	r					
Existing		В			В			Α			Α	
2029 bk		В			В			Α			Α	
2029 S1		В			В			Α			Α	
2029 S2		С			С			Α		А		
2029 S3		В			С			А		А		
2035 bk		В		В		Α		А				
2035 S1		В		С		Α		А				
2035 S2		С		С			Α				А	

 $^{^9}$ Range Road Corridor Study – Conceptual Design Report by Urban Systems March 8, 2021. https://www.whitehorse.ca/wp-content/uploads/2022/06/20210308RangeRoadConceptua.pdf

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2035 S3	В	С	Α	А
2040 bk	В	С	А	А
2040 S1	В	С	Α	А
2040 S2	С	С	Α	А
2040 S3	В	С	А	А

Mountain View Drive/Range Road

The intersection of Mountain View / Range Road is a larger intersection that has more background traffic already impacting the operations. Mountain View Drive carries a large volume of traffic though Whitehorse and is only one lane in each direction.

The background traffic at Mountain View / Range Road with the current laning configuration will operate below acceptable standards by 2040. The intersection will operate with acceptable LOS D or better for both peak hours, however as shown in **Appendix F**, the v/c of the SBT movement is over 1.0 in the AM peak hour with queue length over 350 m. Additional traffic due to Scenario 2 or Scenario 3 for EWES would exacerbate the issue. **Table 3-4** summarizes the intersection LOS in 2040 for all scenarios.

Table 3-4 Mountain View Drive / Range Road Intersection Performance Summary

Scenario	Intersection LOS AM Peak Hour	Intersection LOS PM Peak Hour
Existing	В	В
2040 bk	D*	В
2040 S1	D*	В
2040 S2	E*	С
2040 S3	D*	В

^{*}Critical v/c is over 1.0.

As more traffic utilizes this intersection in the future, consideration for laning configuration, including left-turn lanes and adding protected/permissive phasing with adjusted traffic signal timings would help accommodate traffic volumes.

Two Mile Hill / Range Road

At Two Mile Hill / Range Road, the intersection was assessed under the following configurations:

- The existing laning configuration in place onsite at the intersection
- HART Option 1¹⁰

¹⁰ HART Option 1¹⁰ understand the impact the school development traffic will have on future planned infrastructure. Option 2 requires restricting movements and re-assignment turning movement counts that is beyond the scope of this TIA.

Existing laning configuration:

The existing lane configuration was only evaluated for the background traffic and busing Scenario 2 for the horizon years (as this Scenario has the most generated trips). The intersection performs better with the existing lane configurations than with HART Option 1. The long crossing distance for pedestrians in the north-south direction causes a long green time allocation for the NBT movement which impacts the performance of the SBL movement. The SBL movement fails by 2029 in the AM peak hour with background traffic only. The proposed development exacerbates this issue depending on how many trips are completed by private vehicle versus school bus. The only critical movement in the PM is the SBL for development Scenario 2 by 2040.

HART Option 1

As indicated in the HART Design Options - Round 2 Public Engagement, the eastbound, southbound, and westbound left turns would occur on protected phases only. This will improve safety and minimize conflicts with pedestrians and cyclists using the intersection. The performance of the intersection for vehicles will decrease as a result and irrespective of the development of the elementary school, the intersection will not meet acceptable LOS under all study horizon years.

Table 3-5 summarizes the intersection LOS in 2040 for all scenarios.

Table 3-5 Two Mile Hill / Range Road Intersection Performance Summary

Scenario	Intersection LOS AM Peak Hour	Intersection LOS PM Peak Hour
Existing	В	С
2040 bk Ex Lane	D*	С
2040 bk HART	E	D
2040 S1 Ex Lane	D*	С
2040 S1 HART	E*	D
2040 S2 Ex Lane	D*	С
2040 S2 HART	E*	D*
2040 S3 HART	E*	D*

^{*}Critical v/c is over 1.0

4 MITIGATIONS

Mitigation measures are proposed at the University Drive / Range Road intersection. A signal is warranted under busing Scenario 2 in the year 2040 as provided in **Appendix G**. As a signal is warranted, a roundabout was also reviewed to determine if it would operate as an acceptable alternative to traffic signals.

The Normandy Drive / Range Road intersection will meet all performance requirements under all busing Scenarios and under all planning horizon years.

The Mountain View Drive / Range Road and Two Mile Hill Road / Range Road intersections will experience degradation in performance in the future regardless of the school development.

Mini roundabout at University Drive / Range Road:

A roundabout is evaluated at the University Drive / Range Road intersection as proposed in The Range Road Corridor Study to accommodate increased traffic resulting from the proposed school. **Table 4-1** shows that the intersection will perform with LOS B or better at all approaches under both peak hours under the worst-case traffic Scenario 2 at the 2040 horizon year.

Table 4-1 University Drive / Range Road Mitigation - Roundabout

University Dr / Range Rd	Eastbound University Drive						Northbound Range Road		Southbound Range Road				
Roundabout - Performance	Left	Right					Left	Thru		Left	Thru	Right	
				1A	И Peak I	Hour							
Volume (veh/h)	159	215					357	99			178	268	
Movement (v/c)	0	.37					0.4	44			0.54		
95th QLength (m/ln)	11	11					1	7			2	2	
Movement LOS		А					А	А				В	
Intersection LOS		A											
				PI	И Peak I	Hour							
Volume (veh/h)	195	284					235	218			182	168	
Movement (v/c)	0	.47					0.4	45			0.	37	
95th QLength (m/ln)		14					1	7			1	2	
Movement LOS		А					Α	Α			/	Α	
Intersection LOS	А												

Signal control at University Drive / Range Road:

A signal control was evaluated at the University Drive / Range Road intersection to accommodate the increase in traffic generated from the proposed school. **Table 4-2** shows that as a signal control the intersection will perform with LOS B or greater at all approaches under both peak hours under the worst-case traffic Scenario 2 at the 2040 horizon year.

Table 4-2 University Drive / Range Road Mitigation - Signal

Performance	Eastbound University Drive						Northbound Range Road		Southbound Range Road		
	Left	Right					Left	Thru	Left	Thru	Right
				А	M Peal	k Hour					
Volume (veh/h)	125	171					313	99		178	234
Movement (v/c)	0	.69					0.51	0.44	0.50		50
95th QLength (m/ln)	35.9	35.9					#39.0	37.5	45.1		5.1
Movement LOS		В					В	В		А	
Intersection LOS							В				
				Р	M Peal	(Hour					
Volume (veh/h)	162	200					191	218		182	135
Movement (v/c)	0	.73					0.44	0.35		0.44	
95th QLength (m/ln)	41.5	41.5					31.4	35.2		37	7.6
Movement LOS	В					В	В		I	3	
Intersection LOS							В				

Intersection Control Option Comparison.

At both intersections, a mini roundabout will operate as an acceptable alternative to either a signalized intersection (University Drive) or stop-controlled intersection (Normandy Road). Mini roundabouts were proposed as an alternate intersection treatment in the 2021 Conceptual design of Range Road^{11.}

The comparison in Table 4-3 evaluates the pros and cons of these two intersection types to guide the decision making.

¹¹ Range Road Corridor Study Conceptual Design Report, Urban Systems, 2021

Table 4-3 University Drive / Range Road Mitigation - Signal

Criteria	Mini Single Lane Roundabout	Traffic Signal or Stop-Control				
Safety	Significantly reduces severity and frequency of collisions due to lower vehicle speeds and fewer conflict points.	Traffic signals help control vehicle movements when traffic volumes are high. Stop controlled intersection has greater risk for vehicles entering free-moving road.				
	Act as a traffic calming device to slow vehicle traffic along Range Road within the school zone.	More conflict points and higher risk of severe crashes such as red-light running or high-speed collisions.				
Active transportation	Slower speeds enhance pedestrian and cyclist safety by reducing crash risks and crossing distances.	Traditional signalized intersection with stop phases may feel safer for pedestrians.				
	People only need to cross one direction of travel at a time	Stop-controlled intersections are less safe for people walking and biking				
	Traffic is expected to operate acceptably at both intersections.	Traffic is expected to operate acceptably at both intersections.				
Traffic Operations	Mini roundabouts provide the same traffic control as full-size roundabouts in a smaller footprint. Traffic is managed by the geometry of the roundabout.	Signals can be added to stop-controlled intersections, and signal timings can be adjusted in the future based on needs.				
Environmental Impact	Minimizes emissions and fuel consumption through reduced idling and stop-and-go traffic during times when there is no train activity.	Increased emissions and fuel consumption due to frequent stopping at signalized intersections.				
Cost	Mini roundabouts have lower initial construction costs compared to full size roundabouts. Lower lifecycle costs due to less maintenance and operational costs required.	Higher lifecycle costs due to operational and maintenance expenses, like power, signal upkeep, etc.				

5 TRAFFIC COLLISION REVIEW

The Whitehorse Transportation Master Plan¹² was reviewed to understand collision frequencies along the study corridor. **Figure 5-1** shows a traffic related collision heatmap, the map shows no collisions along Range Road within the vicinity of the proposed school site.



Figure 5-1 Collision Heat Map (Yukon Government Collision Data, 2015-2019)

30 crashes/year

0 crashes/year

Source: Whitehorse Transportation Master Plan Figure 9.

The Two Mile Hill / Range Road intersection has upwards of almost 30 crashes per year. This is the study intersection with the most collisions. This could be attributed to the higher traffic volumes, as well as more complex configuration compared to the other study intersections. The Mountain View Drive / Range Road intersection has the second highest number of yearly collisions at less than 15 collisions per year.

¹² The Whitehorse Transportation Master Plan 2024. https://www.engagewhitehorse.ca/26725/widgets/108184/documents/125601

6 TRAFFIC CIRCULATION REVIEW

At this stage in the development process, a detailed site plan has not been developed, only a high-level preliminary access plan is provided in **Figure 1-2**.

Site Access:

Two access points are shown from the school site to/from University Drive. It is recommended that the western access is the entrance and the eastern access the egress. The eastern access is more than 5 m from the curb return of the adjacent intersection¹³. Spacing between driveways meet the minimum of 8 m per City of Whitehorse standards. The current site plan has located the assumed egress west of the existing Whitehorse Correctional Centre access, this may cause some conflicts from vehicles turning left into the entrance access of the proposed development and the Whitehorse Correctional Centre access. Given the relatively low volume of vehicles expected to turn left into the Correctional Facility, there is not a significant risk. At the next design stage, consider aligning the school egress with the Correctional Centre access.

Sightlines at the egress driveway are greater than required sight distances.¹⁴ Given the proximity of the proposed egress access to the Range Road / University Drive intersection, it is important to maintain sightlines to minimize conflict between vehicles turning onto University Drive from Range Road and vehicles leaving the site.

Staff and Visitor Parking:

The current site plan includes 51 stalls - 40 perpendicular parking stalls, three accessible parking stalls, and eight parallel parking stalls. Based on the Test Fit Report¹⁵ there are 24 classrooms proposed, which requires 48 parking stalls and one loading space¹⁶. Although the proposed staff parking spaces proposed is less than the expected maximum 55 staff, its not anticipated that every staff member will drive to/from school. Some staff may be dropped off/picked up, carpool, transit, walk or bike. By providing safe and connected active transportation facilities, and connection to transit, alternate modes of transportation will be viable options for staff.

There are no requirements for additional parking spaces for visitors to the school. The provision of some on-street parking adjacent to the school along University Drive could provide a flexible space for additional parking needs but is not currently permitted along University Drive. A detailed site circulation design should be developed to account for staff parking onsite.

21

¹³ TAC Figure 8.9.2. Street corner clearance for commercial / industrial accesses at

¹⁴ TAC Section 9.9 Sight distance for right turn from stop – 95 m for 50 km/h roadway and sight distance for left turn from stop – 105 m. Vehicles coming from the right will be using the adjacent intersection and be travelling at lower speeds.

¹⁵ École Whitehorse Elementary School Replacement – Test Fit Page 2, December 2023.

¹⁶2 parking spaces per classroom. City of Whitehorse Zoning Bylaw 2012-20 Table 7.3.6d) https://www.whitehorse.ca/wp-content/uploads/2022/06/2012-20-Zoning-Bylaw-2012-20.pdf

Short term pickup / drop-off requirements:

The current proposed site plan has not detailed the bus and parent pickup and drop-off requirements. As the detailed design is developed, it should accommodate adequate on-site short-term parking for both parents in private vehicles and school buses. The pickup/drop-off locations should provide direct access for students to/from the school without the need to walk through any other parking or driving lanes.

There would be 12 buses required under Scenario 1, seven buses under Scenario 2, and up to two buses in Scenario 3, assuming there are 48 students in each bus. As the detailed plan develops, off site parking should be included as part of the design if needed.

The capacity needed for pickup / drop-off using buses and private vehicles are the following, assuming four minutes are needed for pickup / drop-off with private vehicle (6 m vehicle length) and 10 minutes with school buses (12 m length):

Storage Length for Passenger Vehicles =
$$6 \text{ m} * (Vehicle Demand) * \left(4 \frac{min}{stall}\right) / 60 \text{ minutes}$$

Storage Length for School Buses =
$$12 \text{ m} * (Vehicle Demand) * \left(10 \frac{min}{stall}\right) / 60 \text{ minutes}$$

The pickup / drop-off storage lengths needed under the three busing Scenarios is the following:

- Scenario 1:
 - Vehicle Storage Space: 24 m
 - Bus Storage Space: 48m
- Scenario 2:
 - Vehicle Storage Space: 120 m
 - Bus Storage Space: 28 m
- Scenario 3 (assuming 55 of the 243 trips generated are staff, and only 1-2 school buses would be utilized):
 - Vehicle Storage Space: 78 m
 - Bus Storage Space: 12 m

As the detailed site plan is developed, circulation within the site should be considered that has safety in mind for children. The detailed site circulation design should provide safe facilities for children and parents by creating sufficient separation between vehicles and children (pedestrian and cyclists) both in the parking area and within the site. Pickup/drop-off and bus zones should provide access to the school area without the need to cross any other parking lot travel lanes.

School Zone Considerations

A portion of Range Road from Normandy Drive to just south of University Drive is currently designated as a school zone with reduced speed limit to 30 km/h during school days and operational hours. As the proposed development is expected to occur north of the existing school, the northern limits of the school zone are recommended to be extended farther north. As the new school is expected to have access to the road network from University Drive, an additional school zone reducing the speed limit to 30km/h is recommended. A detailed school zone plan is recommended to be developed at later design stages to accompany the construction of the school site.

7 ACTIVE TRANSPORTATION AND TRANSIT REVIEW

The assessment presented in the previous sections was conducted with the assumption that all trips generated would travel to / from the school by auto vehicles and/or buses to evaluate the performance of worst-case Scenarios for the study intersections. However, some school trips may still be completed by walking, biking, or on the bus. Well-connected and maintained active transportation facilities such as sidewalks and multi-use paths (MUP) help to encourage the use of active transportation modes in the study area. Where applicable the development should advance the vision of the City's Transportation Master Plan and the City's Bicycle Network Plan¹⁷.

Existing Facilities:

1.4 m and 1.7 m sidewalks exist on the west and east sides Range Road from Two Mile Hill to University Drive respectively. The west 1.4 m wide sidewalk continues from University Drive to Mountain View Drive. A MUP is present on the west side of the proposed development connecting University Drive to Falaise Road. There are existing crosswalks at the Takhini School north of Normandy Road at a midblock crossing and where the Trans Canada Trail crosses Range Road adjacent to the Yukon Young Offenders Facility. There are currently no designated cycling facilities along Range Road. **Figure 7-1** is from the City's online web map and shows existing and proposed cycling connections adjacent to the study area.

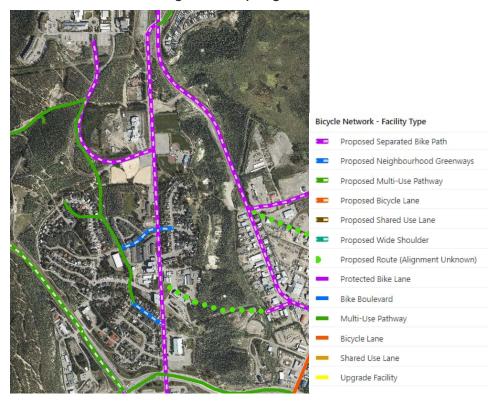


Figure 7-1 Cycling Facilities

¹⁷ City of Whitehorse Bicycle Network Plan 2018. https://www.whitehorse.ca/wp-content/uploads/2022/06/20180508CityofWhitehorseBi.pdf

Proposed Facilities:

The City of Whitehorse TMP identifies Range Road for a proposed protected bike lane following the Bicycle Network Plan designation of Range Road as an all ages and ability road. The Range Road Corridor Study recommends a 3.0 m bi-directional physically separated bike lane on the west side of Range Road. This will make it safer and more comfortable for students to reach the existing school and proposed EWES minimizing crossings of Range Road. A future boulevard separated sidewalk extension between Mountain View Drive and University Drive is identified on the east side of Range Road. The City does not have a timeline for the implementation of this facility, and opportunities to incorporate the bike lane into the school design would be beneficial to provide active transportation connections for students.

The bi-directional lane will cross roads at:

- Falaise Road South and west approaches (new)
- Rhine Road South and west approaches (new)
- Normandy Road all approaches (new)
- Range Road Fronting the existing Takhini Elementary School (this is a re-location of the existing Takhini
 Elementary School crossing) and where the Trans Canada Trail Crosses Range Road (existing midblock
 crossing). Both crossings are proposed with curb bulb outs.
- University Drive South (new), west (new), and north (existing) approaches in conjunction with curb extensions to reduce the turning radii at the NW and SW corners of the intersection.

The existing midblock crossing on Range Road provides a direct connection for pedestrians accessing Takhini Elementary School from the east, as well as the northbound bus stop on Range Road. If a mini roundabout is implemented at Range Road / Normandy Road, it is recommended to relocate this pedestrian crossing to the north side of the roundabout. Additionally, the northbound transit stop should be moved to the south side of the Range Road / Normandy Road / Vimy Road intersection to discourage shortcutting across Range Road.

As part of the development of the detailed site plan, connections to existing and future active transportation facilities are recommended to create a safe and accessible environment. There should be comfortable and safe access from the existing 1.4 m sidewalk on the west side of Range Road and the proposed 3.0 m wide physically separated bidirectional bike lane to the proposed school site. Connections on-site should also be made to the existing MUP that is west of the proposed development. Adequate bike parking infrastructure should be considered as part of the detailed school site design.

Transit Facilities:

Range Road is current served by transit routes #402, in the northbound and southbound directions and #101, in the southbound direction only. There are four bus stops along the corridor for the northbound direction, located at Normandy Road (south), Rhine Way, Takhini Elementary School, and the Yukon Young Offenders Facility and two bus stops for the southbound direction at the Whitehorse Correctional Centre and the Yukon University, none of which include bus shelters. The #101 bus runs hourly with extra service at 07:30, 08:30, 15:30 and 16:30. The #402 runs hourly. The stops are well spaced (approx. 250 m) and serve many key destinations and generators such as the Takhini Arena, Takhini School, Yukon Young Offenders Facility, and the Yukon University.

The Transit Master Plan¹⁸ identifies a new Whistle Bend bus route that will run between the Yukon University and Whistle Bend at 30-minute frequencies during the peak hour only in anticipation of development and population growth in Whistle Bend. The Yukon University will act as transit exchange connecting the Porter Creek Line to the Riverdale line.

Raised bike lanes are proposed at the existing bus stops to accommodate transit boarding. A new curb bulge is recommended at the stop adjacent to the Yukon Young Offenders Facility that will act as a boarding island. Proposed road crossings are adjacent to the existing stops and will make it easier for passengers to go to/from the west side of Range Road.

8 SUMMARY OF FINDINGS AND RECOMMENDATIONS

We completed the traffic impact analysis of the proposed École Whitehorse Elementary School development. Understandably, the impacts the school traffic will have on the road network depends on how many students are bused to and from the school. The Yukon Government expects that busing at the new EWES will increase from the currently number of 80% students bused to 90% students bused. If this is the case, then impacts to the study intersections are mainly due to background traffic growth at the various study horizons.

The Range Road / Normandy Road intersection will perform with acceptable LOS for all movements even with development traffic and under all busing Scenarios. There is an opportunity to introduce a mini roundabout at this intersection, as noted in the Range Road Study, to help reduce speeds along Range Road near the schools.

Although the current stop-controlled intersection at Range Road / University Drive operates acceptably in Scenario 1, where 90% of students take the bus, the intersection would require improvements in the other Scenarios. Both a mini roundabout or a traffic signal would operate acceptably at this intersection.

The expected background traffic growth in Whitehorse will cause the Range Road / Two Mile Hill and Range Road / Mountain View Drive intersections to perform with below acceptable operational performance regardless of development traffic. Future improvements at Range Road / Two Mile Hill Road may are planned that may impact traffic and help connect people walking and biking.

If the commitment is made to bus 90% of students to/from the school, the following recommendations are proposed:

- Implement mini roundabouts at Range Road / Normandy Way and Range Road / University Drive to help traffic calm through the school zone on Range Road and create a safer environment for students in the area.
- Include active transportation facilities proposed as part of The Range Road Corridor Study including a 3.0 m bi-directional cycle lane and new pedestrian crossings that make it easier for pedestrians and transit users to access key destinations and origins along Range Road.
- Extend the school zone north along Range Road and add a new school zone along University Drive. This plan should be developed as the detailed design of the site progresses as part of the design package
- Develop a detailed site circulation and parking plan that provides adequate parking stalls and bus parking area for Scenario 1 requirements. The site plan should have dedicated and separated pickup/drop-off areas for vehicles and buses with direct access to school. For Scenario 1, 24 m vehicle storage and 48 m bus storage are needed.

¹⁸ City of Whitehorse Transit Master Plan – April 10, 2018. https://www.whitehorse.ca/wpcontent/uploads/2022/05/MasterPlan_Final_Apr10.pdf 25

The detailed site plan will support additional submission requirements to the City to support the develop permit application. The detailed site plan should also include:

- Safe access to / from the newly proposed bidirectional bike lane and sidewalk along Range Road.
- Access to/from the existing MUP located west of the proposed development.
- Adequate bike parking and end of trip facilities.
- Adequate sight distance from the driveway access points along University Drive.
- Maintain a minimum of 8 m driveway spacing along University Drive.
- School zone sign locations.
- Consider including the Range Road bidirectional bike lane design adjacent to the school site as part of the school design.

CLOSURE

This report was prepared for the Government of Yukon to quantify the impact of the proposed development and recommend any improvement if needed.

The services provided by Associated Engineering (B.C.) Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

Associated Engineering (B.C.) Ltd.

Breanna Jackson, P.Eng.

Transportation Planning Engineer

Andrei Radu, M.Sc.

Transportation Planning EIT



Steven Bartsch, P.Eng. Project Manager

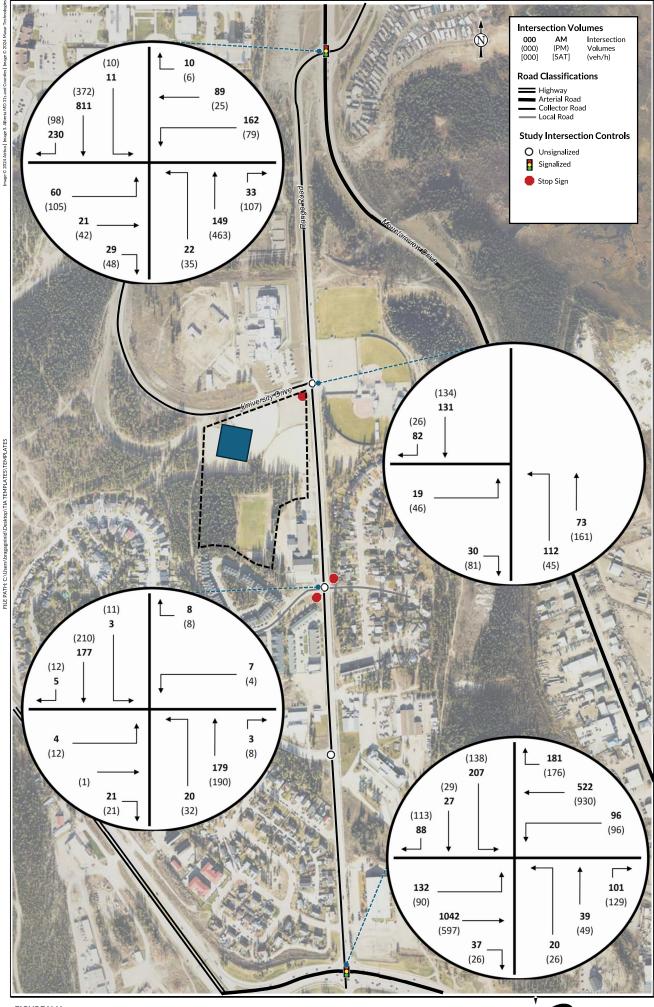
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ASSOCIATED ENGLISHING (BC) LTD.
SIGNATURE

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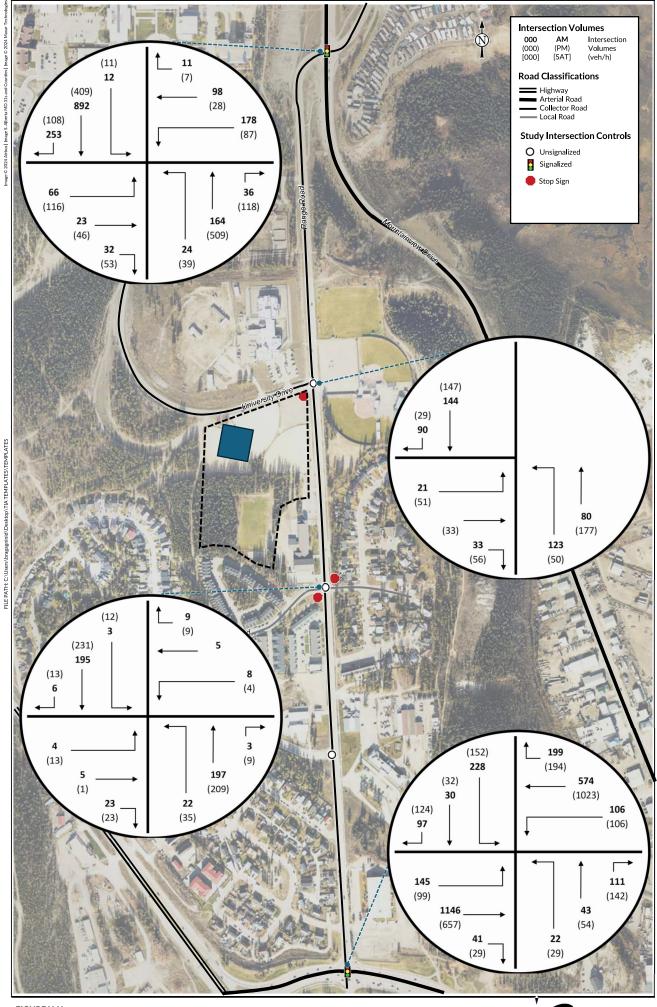
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Engineers of Yukon

PERMIT STAMP

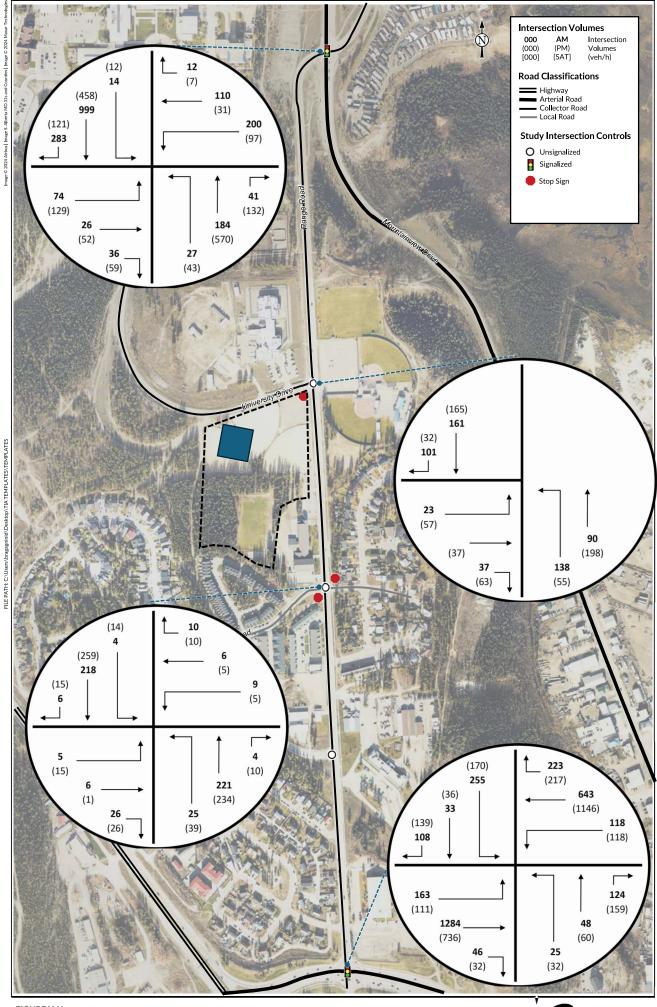
APPENDIX A - BACKGROUND TRAFFIC VOLUMES



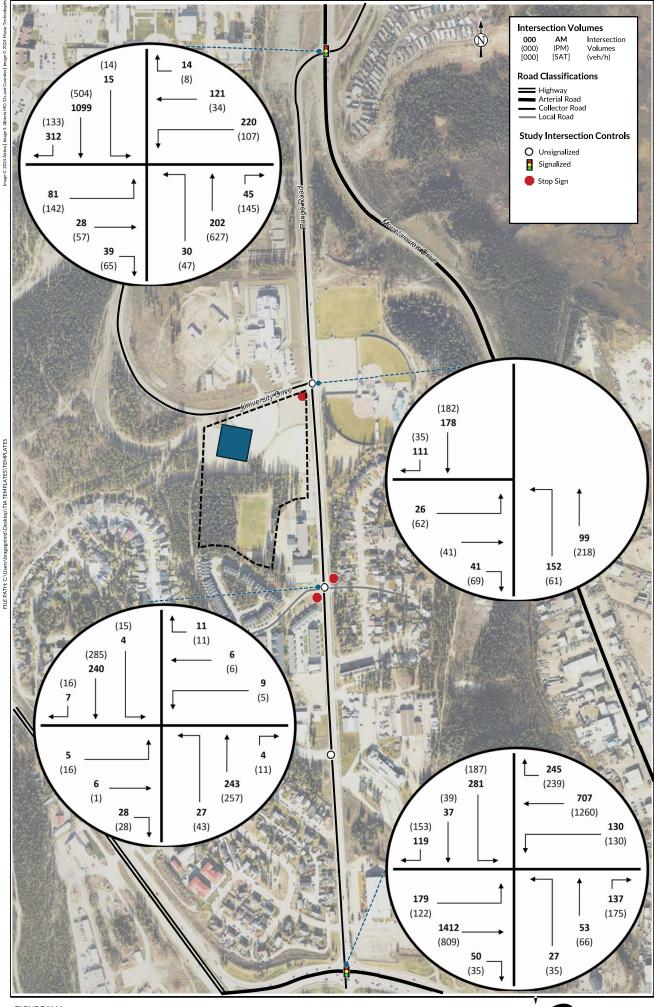












Yukon University Student Projections

Andrei David Radu

From: Marlene Robles <mrobles@yukonu.ca>

Sent: November 6, 2024 8:35 AM

To: Andrei David Radu

Subject: Projected Student Population at YukonU

Hi Andre,

I have the data that you've asked. Based on our strategic enrolment plan, below are the numbers of full-time enrolments that we have projected for the coming years:

Academic year 2025-26 ==== 740 Academic year 2027-28 ==== 784 Academic year 2029-30 ==== 816

Kind regards,

Marlene

Marlene Robles
Admissions Officer
Admissions and Recruitment
t 867 668-8710 Ext. 1 f 867 668-8899



500 University Drive, PO Box 2799
Whitehorse, Yukon, Y1A 5K4 Canada
<u>YukonU.ca</u>

Acknowledging that we live and work in the traditional territory of the Kwanlin Dün First Nation and the Ta'an Kwäch'än Council.

This email may contain information that is privileged or confidential. If you have received this email in error, please delete it. Thank you for your co-operation.

From: Marlene Robles

Sent: October 30, 2024 2:37 PM

To: Brent Langbakk <blangbakk@yukonu.ca>
Subject: Projected Student Population at YukonU

Hi Brent,

In our Strategic Enrolment Management Plan, do we have a projected number of students in 2025-2030? I'm asking because I received a call from Andre, who works at Associated Engineering in Vancouver, and they are conducting a study in relation to a future school building project close to YukonU, and they asked if we have a forecast of how many students will be attending the University in the coming years (he mentioned 2030).

I can connect you with Andre if you require further details. Thank you.

Kind regards,

Marlene

Marlene Robles
Admissions Officer
Admissions and Recruitment
t 867 668-8710 Ext. 1 f 867 668-8899



Acknowledging that we live and work in the traditional territory of the Kwanlin Dün First Nation and the Ta'an Kwäch'än Council.

This email may contain information that is privileged or confidential. If you have received this email in error, please delete it. Thank you for your co-operation.

APPENDIX B - BUSING RATES

School # of Riders Registered Current Enrollment

Schools	# Registered Riders	Current Enrollment	% Students Enrolled
CSSC	69	160	43
CKES	194	353	55
EET	154	218	71
EWES	360	453	80
ESES	150	275	55
FHC	257	739	35
GHES	204	247	83
GMP	19	86	22
HVES	144	185	78
HFES	116	184	63
JHES	156	313	50
PCSS	175	587	30
SES	176	369	48
SFA	196	455	43
TES	98	157	62
WBES	47	218	22
Wood	25	80	31
Totals	2540	5079	
Average	50%		

APPENDIX C - ITE TRIP GENERATION VEHICLE RATE

Elementary School (520)

Vehicle Trip Ends vs: Students

On a: Weekday,

AM Peak Hour of Generator

Setting/Location: General Urban/Suburban

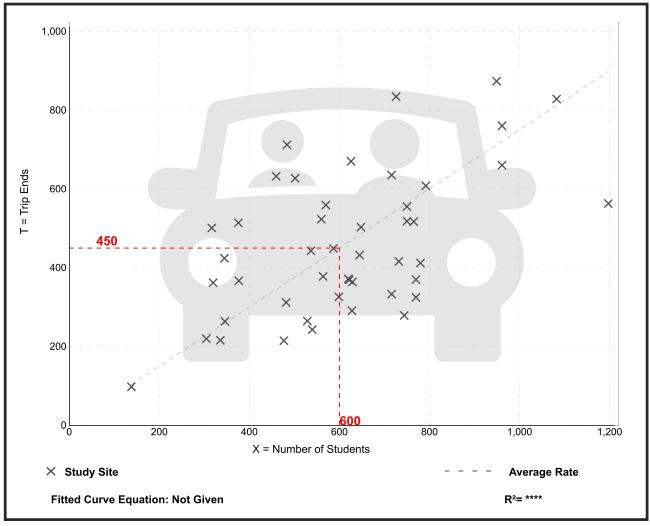
Number of Studies: 46 Avg. Num. of Students: 616

Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.75	0.38 - 1.58	0.27

Data Plot and Equation



Elementary School (520)

Vehicle Trip Ends vs: Students

On a: Weekday,

PM Peak Hour of Generator

Setting/Location: General Urban/Suburban

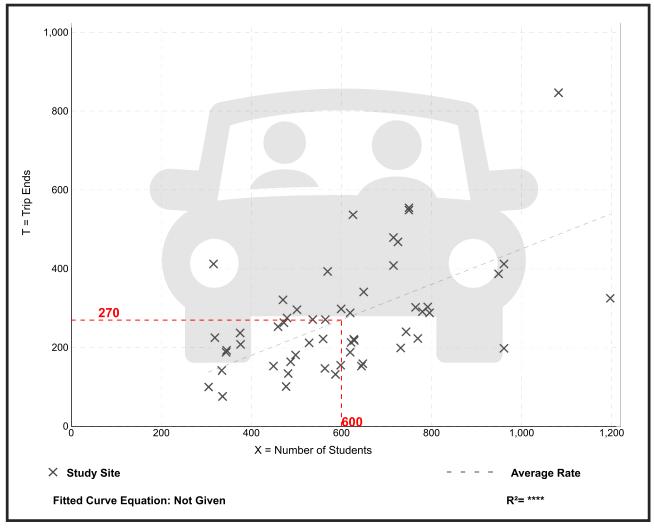
Number of Studies: 54 Avg. Num. of Students: 608

Directional Distribution: 46% entering, 54% exiting

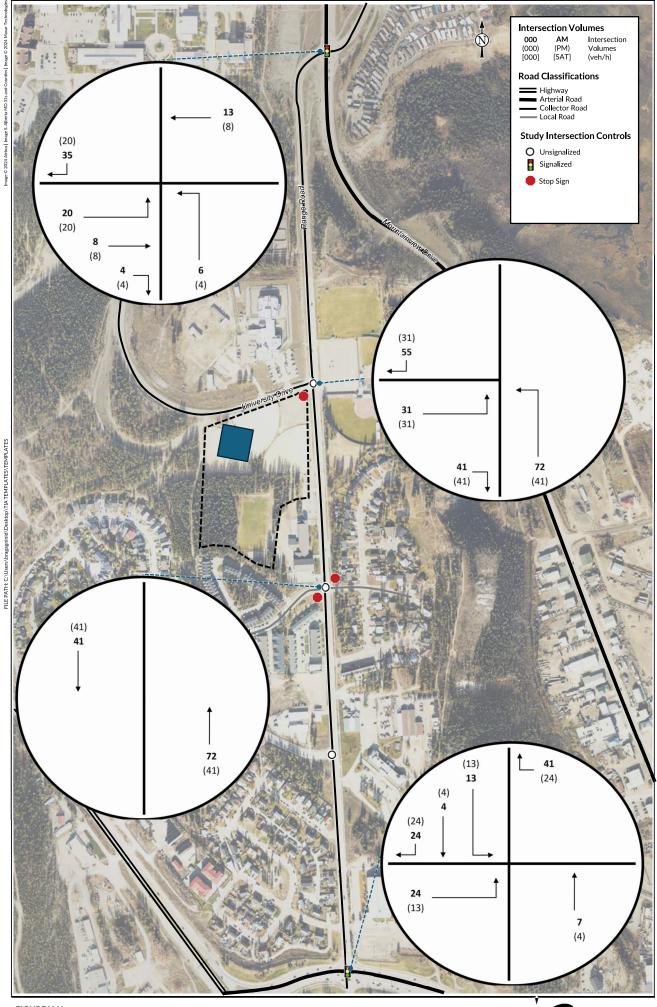
Vehicle Trip Generation per Student

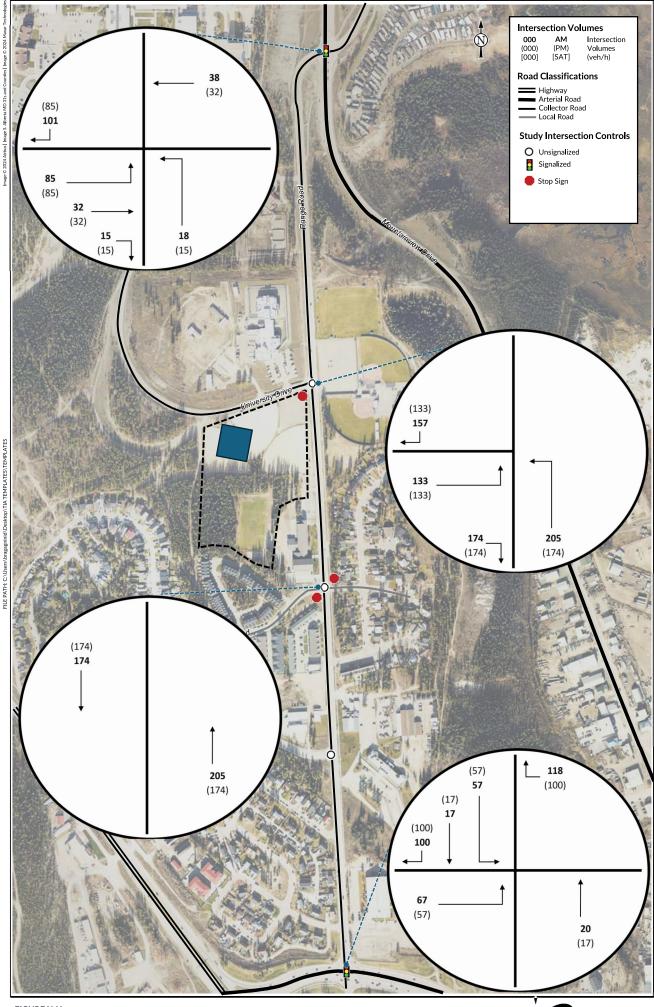
Average Rate	Range of Rates	Standard Deviation
0.45	0.21 - 1.30	0.19

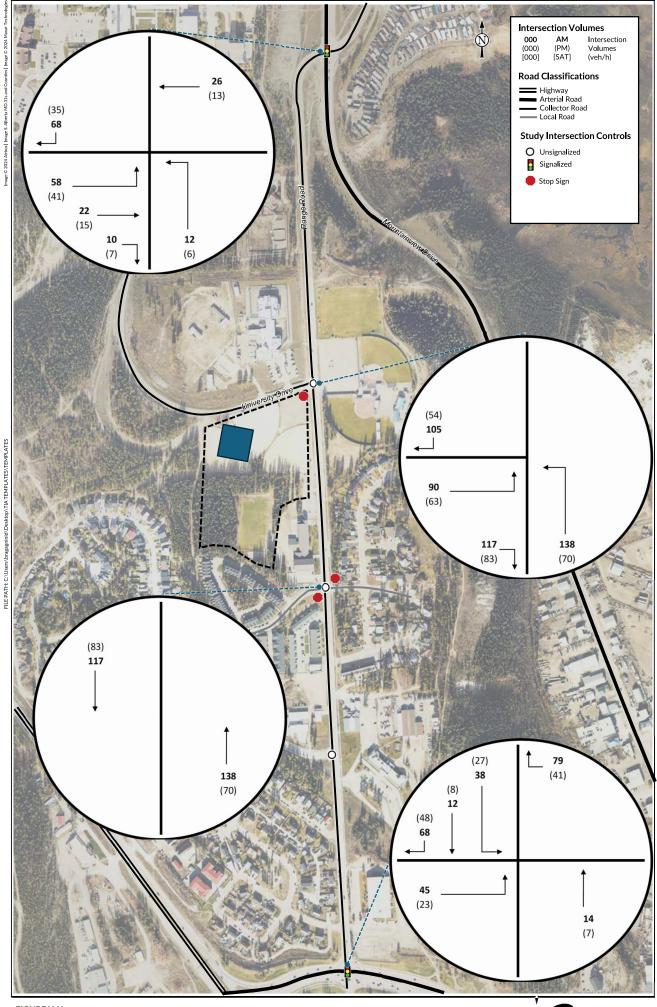
Data Plot and Equation



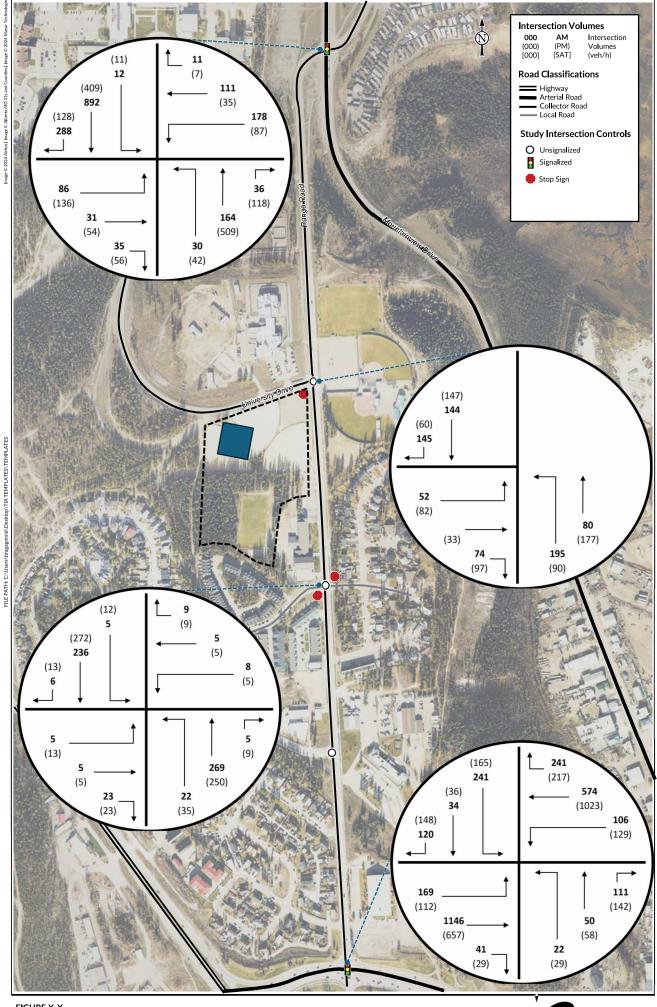
APPENDIX D - DEVELOPMENT GENERATED TRAFFIC



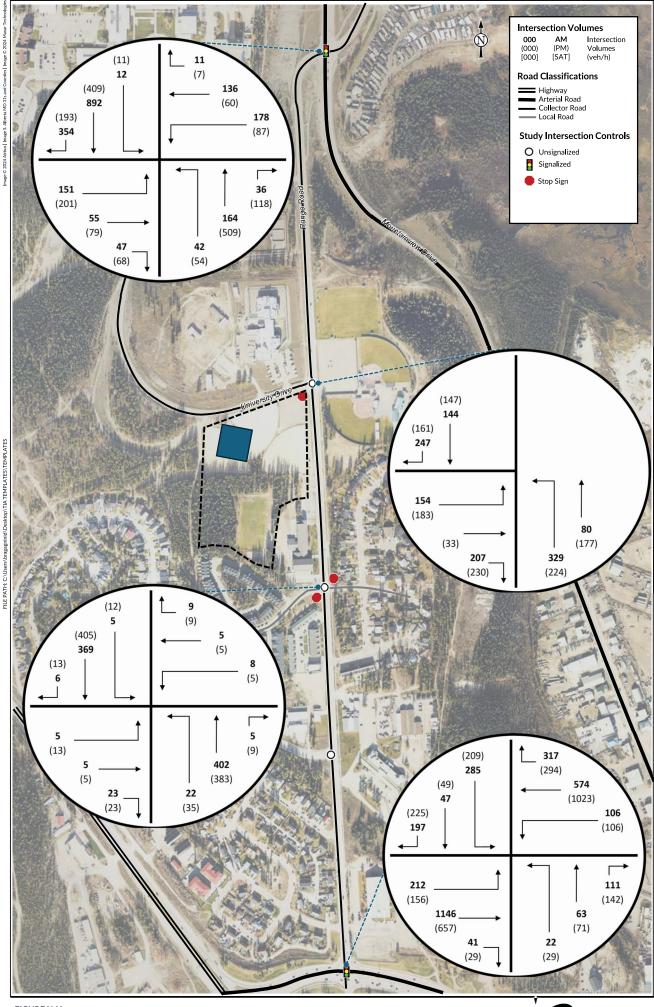




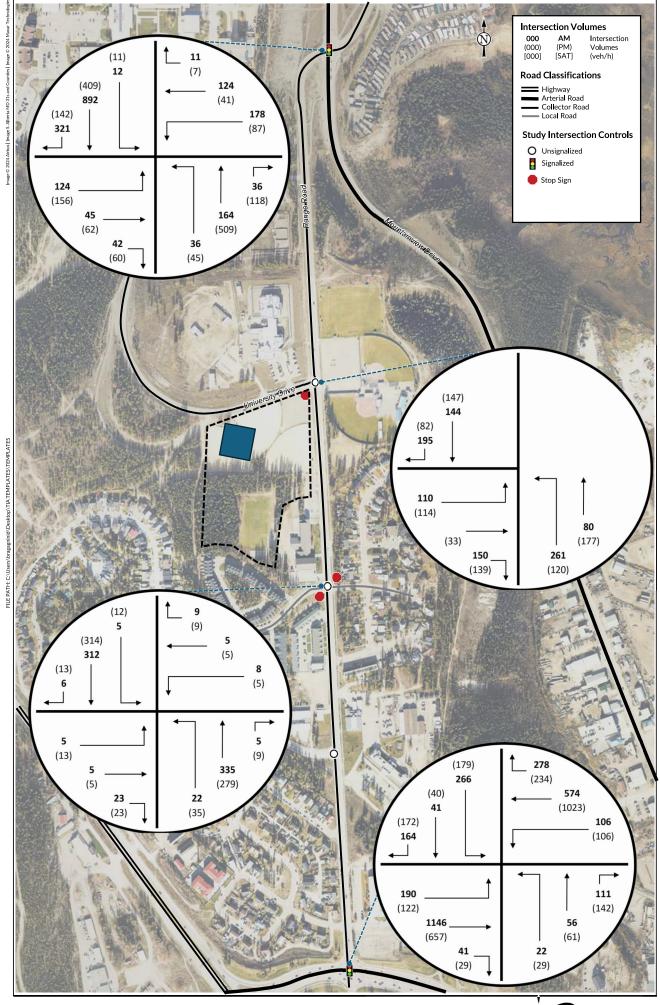
APPENDIX E - TOTAL TRAFFIC



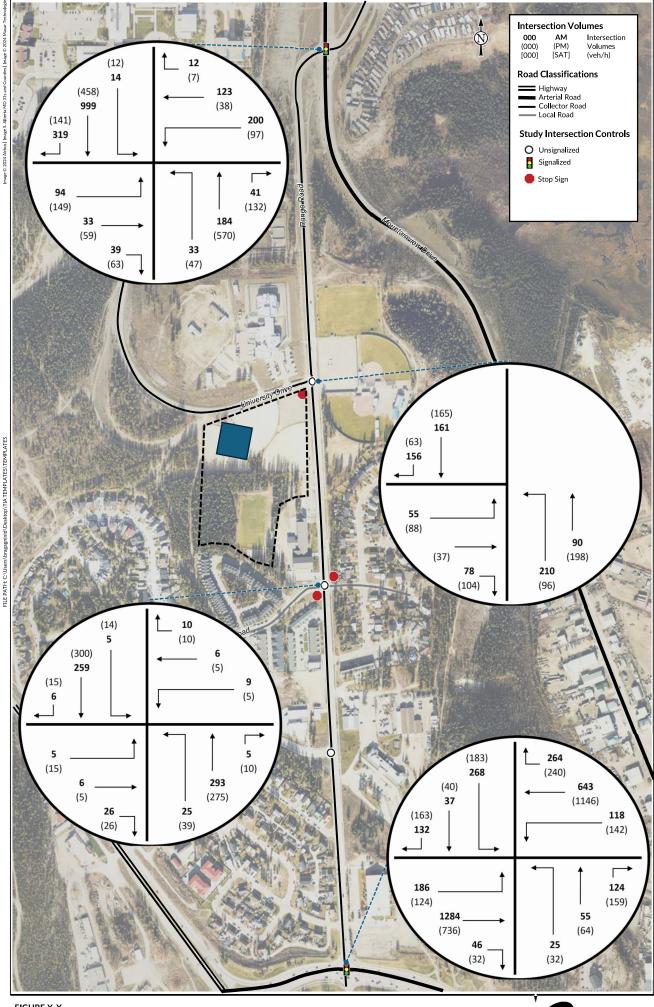


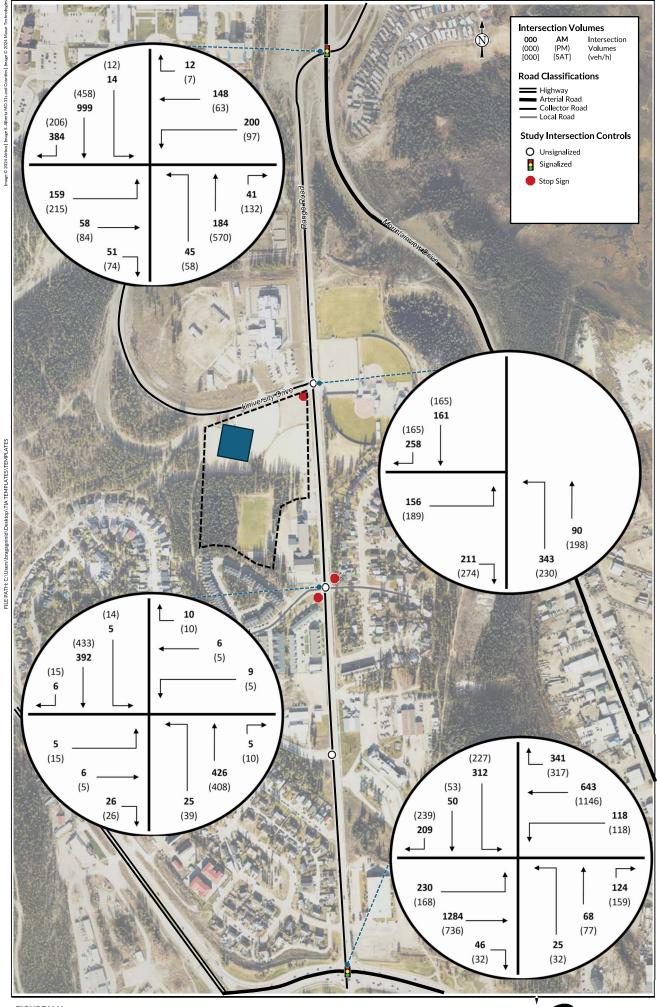




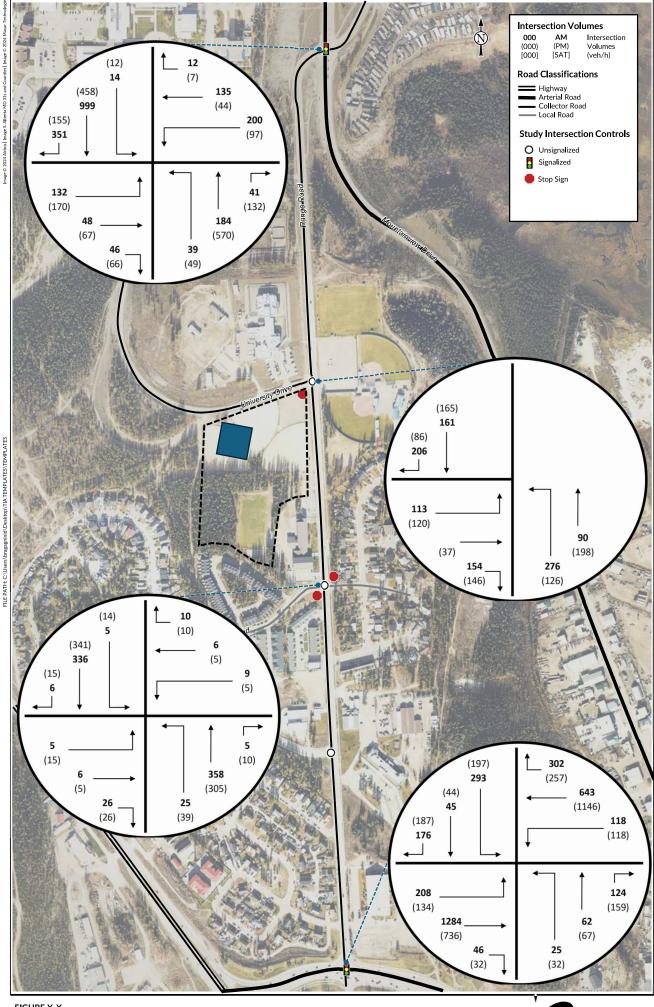




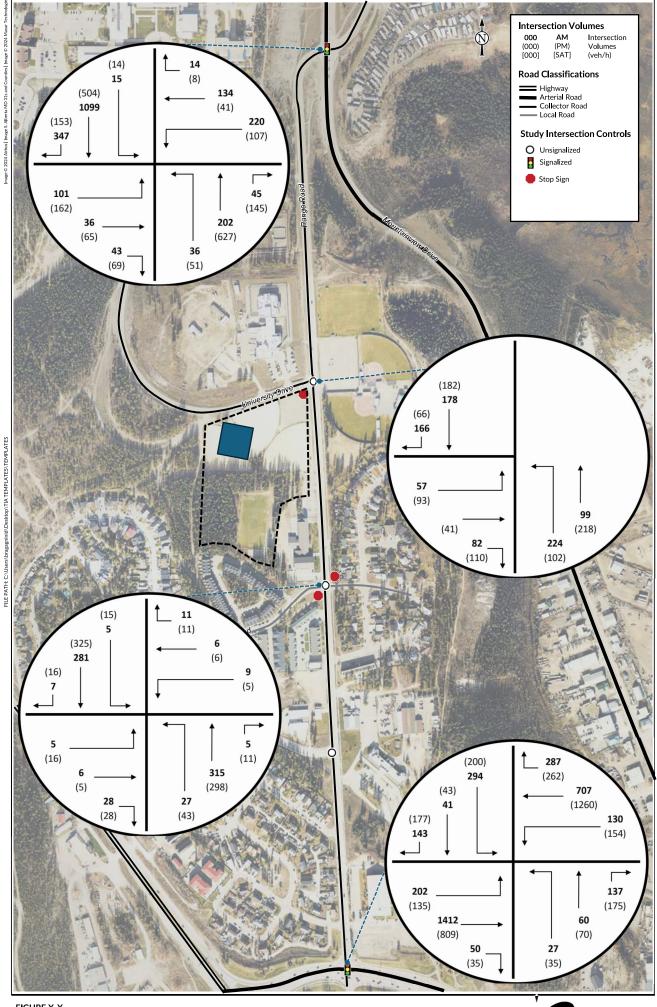




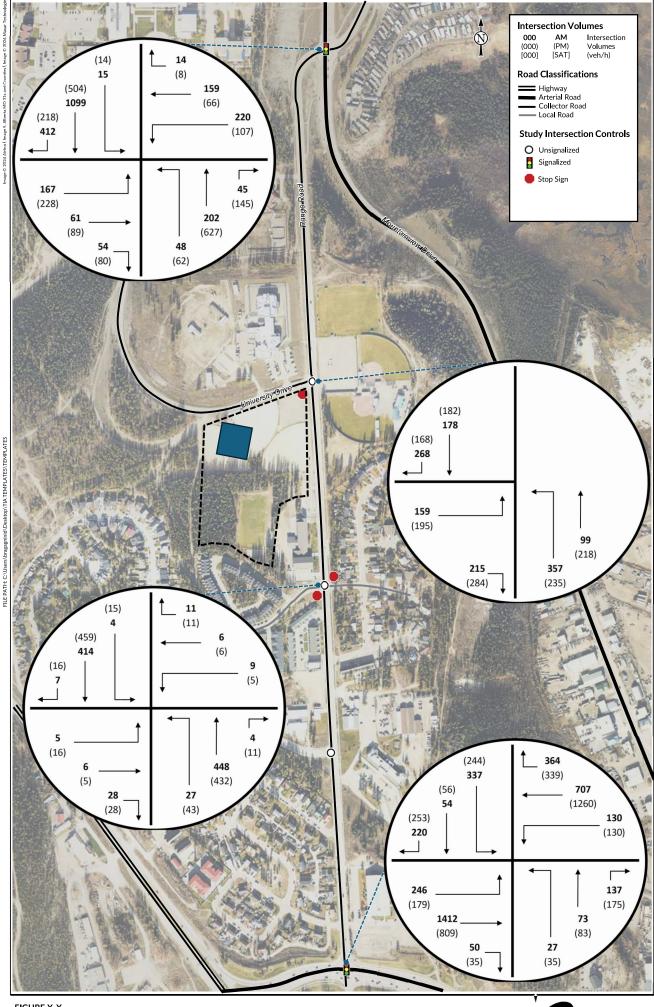


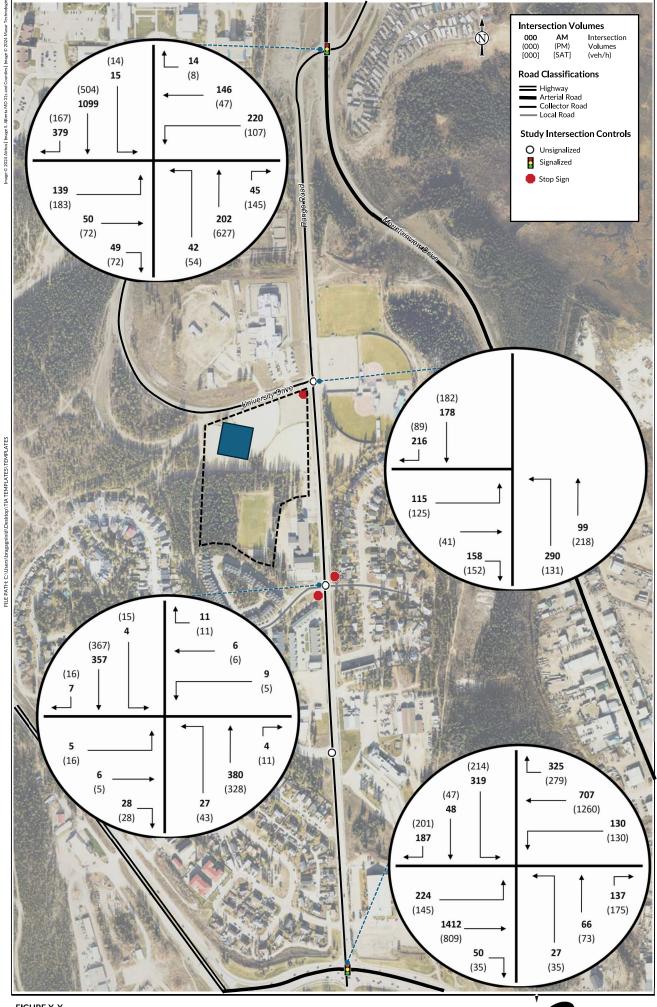














APPENDIX F - INTERSECTION PERFORMANCE TABLES

University Dr / Range Rd	U	Eastbound Iniversity Dr						Northbound Range Road			Southbound Range Road	
	Left	Right					Left	Thru		Left	Thru	Right
							<u> </u>	1				
					AM Peak Ho	our						
Volume (veh/h)	21	33					123	80			144	90
Movement (v/c)	0.09	0.09					0.103	0.00			0.00	0.00
95th QLength (m/ I n)	2	2					2	0			0	0
Movement LOS	В	В					Α	Α			Α	Α
Intersection LOS												
					PM Peak Ho	our						
Volume (veh/h)	51	56					50	177			147	29
Movement (v/c)	0.168	0.168					0.04	0.00			0.00	0.00
95th QLength (m/ I n)	5	5					1	0			0	0
Movement LOS	В	В					Α	Α			Α	Α
Intersection LOS												
	N	Eastbound lormandy Dr		N	Westbound ormandy Dr			Northbound Range Road			Southbound Range Road	
Normandy Rd / Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Righ
		←			→			4			←	
		_			AM Peak Ho	NIE .						
Volume (veh/h)	4	5	23	8	5	9	22	197	3	3	195	6
Movement (v/c)		0.05	20		0.047			0.018			0.002	
		2			1			1			0	
		В			В			A			A	
95th QLength (m/In)												
95th QLength (m/ln) Movement LOS												
95th QLength (m/ln) Movement LOS					PM Peak Ho	our						
95th QLength (m/ln) Movement LOS Intersection LOS	13	1	23	4			35	209	9	12	231	13
95th QLength (m/ln) Movement LOS Intersection LOS Volume (veh/h)	13	1 0.066	23	4	0	our 9	35	209	9	12	231	13
95th QLength (m/ln) Movement LOS Intersection LOS Volume (veh/h) Movement (v/c)	13	1 0.066 2	23	4			35		9	12	231 0.01 0	13
95th QLength (m/ln) Movement LOS Intersection LOS Volume (veh/h) Movement (v/c) 95th Movement (v/c) Movement LOS	13	0.066	23	4	0 0.026		35	0.03	9	12	0.01	13

		Eastbound Range Road			Westbound Range Road		Northbound Mountain View Drive			Southbound Mountain View Drive		
Mountain View Dr / Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		1		•	1	L	7	1		4	1	
					AM Peak Ho	ur						
Volume (veh/h)	66	23	32	178	98	11	24	164	36	12	892	253
Movement (v/c)	().47	0.11		0.63		0.19	0.17	0.04	0.02	0.88	0.27
95th QLength (m/ln)	2	24.7	5.7		31.6		6.4	19.8	2.6	2.8	#205.4	8.7
Movement LOS		C	Α		С		В	Α	Α	Α	С	Α
Intersection LOS						(0					
					PM Peak Ho	ur						
Volume (veh/h)	66	46	53	87	28	7	39	509	118	11	409	108
Movement (v/c)	().47	0.12		0.19		0.09	0.55	0.14	0.03	0.43	0.13
95th QLength (m/ln)		38.2	7.6		13.2		7.7	82.4	7.1	3.2	60.6	6.8
Movement LOS		С	Α		В		Α	В	Α	Α	В	Α
Intersection LOS		В										

Two Mile Hill Rd / Range Rd	Tw	Eastbound o Mile Hill R		Tw	Westbound o Mile Hill R		Northbound Range Road			Southbound Range Road		
(HART)	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	1	1		1	1	→		I F	>	7	1	\Rightarrow
					AM Peak Ho	our						
Volume (veh/h)	145	1146	41	106	574	199	22	43	111	228	30	97
Movement (v/c)	0.72	0.86	0.06	0.80	0.49	0.31		0.49		0.86	0.	24
95th QLength (m/ln)	68.9	#247.4	0.0	#74.4	108.2	19.9		19.1		#132.6	18	8.6
Movement LOS	E	D	Α	F	С	Α		С		E		A
Intersection LOS						[D					
					PM Peak Ho	our						
Volume (veh/h)	99	657	29	106	1023	194	29	54	142	152	32	124
Movement (v/c)	0.87	0.57	0.05	0.62	0.82	0.30		0.50		0.87	0.	30
95th QLength (m/In)	#64.8	101.7	0.0	#53.1	#188.2	23.3		17.7		#86.7	1	7.1
Movement LOS	F	С	Α	E	С	Α		В		F		A
Intersection LOS						(С					

	Tw	Eastbound o Mile Hill F		Tw	Westbound o Mile Hill R			Northboun Range Road		Southbound Range Road		
Two Mile Hill Rd / Range Rd (NO HART)	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	1	1	L	7	1	→	←	1	4	7	1	→
					AM Peak Ho	our						
Volume (veh/h)	145	1146	41	106	574	199	22	43	111	228	30	97
Movement (v/c)	0.42	0.86	0.86	0.65	0.46	0.46	0.	32	0.30	0.89	0	28
95th QLength (m/In)	33.4	#207.3	#207.3	#43.0	66.0	66.0	20	0.9	0.0	53.0	1	5.3
Movement LOS	В	С	С	С	С	С	-	С	Α	Е		A
Intersection LOS						(2					
					PM Peak Ho	our						
Volume (veh/h)	99	657	29	106	1023	194	29	54	142	152	32	124
Movement (v/c)	0.59	0.60	0.60	0.41	0.75	0.75	0.	36	0.39	0.53	0	30
95th QLength (m/In)	#35.1	90.7	90.7	25.9	#120.9	#120.9	2:	2.5	10.5	30.0	1	4.4
Movement LOS	С	С	С	В	С	С	-	С	Α	С		A
Intersection LOS						(2					

University Dr / Range Rd	Rd							Northboun Range Road	Southbound Range Road			
	Left	Right					Left	Thru	Left	Thru	Right	
								1		1		
					AM Pea	ak Hour						
Volume (veh/h)	52	74					195	80		144	145	
Movement (v/c)	0.256	0.256					0.172	0.00		0.00	0.00	
95th QLength (m/ln)	8	8					5	0		0	0	
Movement LOS	В	В					Α	А		Α	Α	
Intersection LOS												
					PM Pea	k Hour						
Volume (veh/h)	82	97					90	177		147	60	
Movement (v/c)	0.307	0.307					0.074	0.00		0.00	0.00	
95th QLength (m/ln)	10	10					2	0		0	0	
Movement LOS	В	В					Α	А		Α	Α	
Intersection LOS												

Normandy Rd / Range	N	Eastbound ormandy Dri	ive		Westbound Normandy Drive			Northbound Range Road			Southbound Range Road			
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
		+			+			+			+			
					AM Pea	ak Hour								
Volume (veh/h)	5	5	23	8	5	9	22	269	5	5	236	6		
Movement (v/c)		0.057			0.058			0.019			0.004			
95th QLength (m/ln)		2			2			1			0			
Movement LOS		В			В			Α			Α			
Intersection LOS														
					PM Pea	ak Hour								
Volume (veh/h)	13	5	23	5	5	9	35	250	9	12	272	13		
Movement (v/c)		0.084			0.052			0.031			0.01			
95th QLength (m/ln)		2			2			1			0			
Movement LOS	В		В			А			Α					
Intersection LOS														

Mountain View Dr /		Eastbound Range Road			Westbound Range Road		Northbound Mountain View Drive			Southbound Mountain View Drive		
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	•	1	C	+	1			1		4	1	~
					AM Pea	ak Hour						
Volume (veh/h)	86	31	35	178	111	11	30	164	36	12	892	288
Movement (v/c)	0	.59	0.11		0.63		0.26	0.17	0.04	0.02	0.89	0.30
95th QLength (m/In)	3	1.3	6.2		32.8		9.2	21.6	2.7	3.1	#217.3	9.9
Movement LOS		D	Α		С		В	Α	Α	Α	С	Α
Intersection LOS						(С					
					PM Pea	k Hour						
Volume (veh/h)	86	54	56	87	35	7	42	509	118	11	409	128
Movement (v/c)	0	.60	0.13		0.21		0.14	0.71	0.18	0.05	0.56	0.19
95th QLength (m/In)	4	6.8	7.7		14.4		9.0	89.8	7.6	3.5	66.2	7.8
Movement LOS		С	Α		В		В	В	Α	Α	В	Α
Intersection LOS							В					

Two Mile Hill Rd /		Eastbound o Mile Hill Ro	oad		Westbound o Mile Hill R			Northbound Range Road		Southbound Range Road		
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(HART)	7	1	→	1	1	-	+	1		4		
					AM Pea	ak Hour						
Volume (veh/h)	169	1146	41	106	574	241	22	50	111	241	34	120
Movement (v/c)	0.75	0.87	0.07	0.80	0.52	0.38		0.51		0.87	0.	.28
95th QLength (m/ln)	77.8	#250.7	0.0	#74.3	112.4	22.8		20.4		#139.9	20	0.4
Movement LOS	Е	D	Α	F	D	Α		С		E		A
Intersection LOS						[)					
					PM Pea	k Hour						
Volume (veh/h)	112	657	29	129	1023	217	29	58	142	165	36	148
Movement (v/c)	0.84	0.57	0.05	0.68	0.82	0.34		0.53		0.81	0.	.34
95th QLength (m/In)	#71.6	107.9	0.0	#64.4	#197.1	29.7		19.9		#92.2	1'	9.7
Movement LOS	F	С	Α	Е	D	Α		В		E		A
Intersection LOS						(3					

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University Dr / Range Rd	Uı	Eastbound niversity Dr					thbound		Southbound Range Road	
	Left	Right				Left	Thru	Left	Thru	Right
							1			
				AM Pea	k Hour					
Volume (veh/h)	154	208				331	82		147	248
Movement (v/c)	1.151	1.151				0.323	0.00		0.00	0.00
95th QLength (m/ln)	120	120				11	0		0	0
Movement LOS	F	F				Α	Α		Α	Α
Intersection LOS										
				PM Pea	k Hour					
Volume (veh/h)	184	265				225	180		150	162
Movement (v/c)	1.076	1.076				0.203	0.00		0.00	0.00
95th QLength (m/ln)	120	120				6	0		0	0
Movement LOS	F	F				Α	Α		Α	Α
Intersection LOS										

Normandy Rd / Range	N	Eastbound ormandy Dr	ive	Ne	Westbound ormandy Dr			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		+			4			+			+	
					AM Pea	ak Hour						
Volume (veh/h)	5	5	24	8	5	9	22	406	5	5	372	6
Movement (v/c)		0.076			0.09			0.021			0.005	
95th QLength (m/ln)		2			2			1			0	
Movement LOS		В			С			Α			Α	
Intersection LOS												
					PM Pea	ak Hour						
Volume (veh/h)	13	5	24	5	5	9	36	387	9	12	409	13
Movement (v/c)		0.118			0.081			0.036			0.012	
95th QLength (m/In)		3		0.081				1			0	
Movement LOS		С			С			Α			Α	
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound ntain View I			Southbound Intain View I	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	+	1	~	•	1		1	1		7	1	C
					AM Pe	ak Hour						
Volume (veh/h)	153	56	47	181	138	11	42	167	37	12	908	358
Movement (v/c)	0.	82	0.12		0.56		0.52	0.19	0.05	0.02	0.99	0.39
95th QLength (m/In)	#6	2.7	7.1		36.3		#22.7	26.3	3.3	3.7	#250.2	12.6
Movement LOS	- 1)	Α		С		D	В	Α	В	D	Α
Intersection LOS						(
					PM Pea	ak Hour						
Volume (veh/h)	153	79	69	88	60	7	54	519	120	11	417	195
Movement (v/c)	0.	75	0.14		0.22		0.20	0.76	0.19	0.05	0.59	0.28
95th QLength (m/In)	#7	5.4	8.2		16.5		12.5	102.6	8.4	3.9	75.1	10.4
Movement LOS	4	0	Α		В		В	С	Α	В	В	Α
Intersection LOS						E	3					

Two Mile Hill Rd /		Eastbound Mile Hill R	oad		Westbound o Mile Hill R			Northbound Range Road			Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(HART)	4	1	→	7	ŧ	→		41	>	7	1	→
					AM Pea	k Hour						
Volume (veh/h)	215	1167	41	108	585	321	22	64	113	289	47	199
Movement (v/c)	0.81	0.92	0.07	0.90	0.61	0.50		0.54		0.93	0.	40
95th QLength (m/ln)	#110.7	#265.1	0.0	#79.6	116.8	26.9		23.0		#164.9	32	2.4
Movement LOS	Е	D	Α	F	D	Α		С		F		3
Intersection LOS						[
					PM Pea	ık Hour						
Volume (veh/h)	158	669	29	108	1042	297	29	72	144	211	50	227
Movement (v/c)	0.85	0.52	0.05	0.66	0.85	0.45		0.61		0.87	0.	49
95th QLength (m/In)	#100.0	120.4	0.0	54.2	#224.7	52.3		26.1		#125.1	43	3.3
Movement LOS	F	С	Α	E	D	В		С		F		3
Intersection LOS						[

Two Mile Hill Rd /	Two	Eastbound Mile Hill R			Westbound o Mile Hill R			Northboun Range Road			Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(NO HART)	4	1		7		—	←	1	L	7	1	→
					AM Pea	ık Hour						
Volume (veh/h)	212	1146	41	106	574	317	22	63	111	285	47	197
Movement (v/c)	0.73	0.60	0.60	0.65	0.39	0.39	0.4	45	0.38	1.29	0.	54
95th QLength (m/In)	#66.5	152.4	152.4	#59.7	64.1	64.1	31	1.8	12.6	#110.2	34	1.6
Movement LOS	С	В	В	D	В	В)	Α	F		В
Intersection LOS						(2					
					PM Pea	ık Hour						
Volume (veh/h)	156	657	29	106	1023	294	29	71	142	209	49	225
Movement (v/c)	0.84	0.58	0.58	0.42	0.83	0.83	0.4	43	0.38	0.72	0.	53
95th QLength (m/In)	#63.1	89.2	89.2	25.9	#138.4	#138.4	26	5.4	10.5	40.8	36	5.3
Movement LOS	D	С	С	С	С	С	(0	Α	С		В
Intersection LOS						(

2029: Total Traffic - Scenario 3

University Dr / Range Rd	U	Eastbound niversity Dri					Northboun Range Roa		Southbound Range Road	
Performance	Left	Right				Left	Thru	Left	Thru	Right
							1		1	
				AM Pe	ak Hour					
Volume (veh/h)	111	151				263	82		147	197
Movement (v/c)	0.66	0.66				0.245	0.00		0.00	0.00
95th QLength (m/ln)	35	35				8	0		0	0
Movement LOS	D	D				Α	А		А	А
Intersection LOS										
				PM Pe	ak Hour					
Volume (veh/h)	115	173				121	180		150	83
Movement (v/c)	0.517	0.517				0.102	0.00		0.00	0.00
95th QLength (m/ln)	23	23				2	0		0	0
Movement LOS	С	С				Α	А		А	А
Intersection LOS										

Normandy Rd / Range	N	Eastbound ormandy Dri	ve		Westbound ormandy Dri			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Performance		+			+			+			+	
					AM Pea	ak Hour						
Volume (veh/h)	5	5	24	8	5	9	22	338	5	5	316	6
Movement (v/c)		0.068			0.073			0.02			0.005	
95th QLength (m/ln)		2			2			1			0	
Movement LOS		В			С			А			А	
Intersection LOS												
					PM Pea	ık Hour						
Volume (veh/h)	13	5	24	5	5	9	36	283	9	12	318	13
Movement (v/c)		0.094			0.059			0.033			0.011	
95th QLength (m/ln)		2			2			1			0	
Movement LOS		В			С			А			Α	
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound ntain View			Southbound Intain View I	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(HART)	+	1		+	1		7	1		4	1	C
					AM Pea	ak Hour						
Volume (veh/h)	125	45	43	181	125	11	37	167	37	12	908	325
Movement (v/c)	0.	.74	0.12		0.58		0.44	0.18	0.05	0.02	0.95	0.35
95th QLength (m/ln)	4:	5.4	6.9		34.5		#19.2	26.3	3.3	3.7	#250.2	12.1
Movement LOS		D	Α		С		С	Α	А	А	D	Α
Intersection LOS						(
					PM Pea	ık Hour						
Volume (veh/h)	125	62	61	88	41	7	45	519	120	11	417	144
Movement (v/c)	0.	.65	0.14		0.22		0.15	0.73	0.18	0.05	0.57	0.21
95th QLength (m/ln)	5:	5.1	8.0		15.2		10.2	97.8	8.0	3.7	71.6	8.7
Movement LOS	1	С	Α		В		В	В	Α	В	В	А
Intersection LOS						E	3					

Two Mile Hill Rd /	Twe	Eastbound o Mile Hill R			Westbound o Mile Hill R			Northbound Range Road			Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(NO HART)	7	1	→	7	ŧ	→	←	1		7	1	→
					AM Pea	ık Hour						
Volume (veh/h)	193	1167	41	108	585	282	22	57	113	270	42	166
Movement (v/c)	0.79	0.90	0.07	0.89	0.57	0.44		0.52		0.92	0.	35
95th QLength (m/ln)	#99.0	#259.1	0.0	#78.9	112.7	24.1		21.4		#155.4	2	5.3
Movement LOS	Е	D	Α	F	D	Α		С		F		A
Intersection LOS						[)					
					PM Pea	k Hour						
Volume (veh/h)	124	669	29	108	1042	238	29	62	144	182	41	174
Movement (v/c)	0.84	0.56	0.05	0.67	0.87	0.38		0.54		0.85	0.	38
95th QLength (m/ln)	#77.4	107.6	0.0	#60.1	#208.9	34.2		20.7		#101.6	2:	1.8
Movement LOS	F	С	Α	E	D	А		С		Е		A
Intersection LOS						[)					

2035: Background Traffic

University Dr / Range Rd	Uı	Eastbound niversity Dri				Northboun Range Roa		Southbound Range Road	
Ku	Left	Right			Left	Thru	Left	Thru	Right
	-				7	1		1	
			Al	M Peak Hour					
Volume (veh/h)	23	37			138	90		161	101
Movement (v/c)	0.106	0.106			0.119	0.00		0.00	0.00
95th QLength (m/In)	3	3			3	0		0	0
Movement LOS	В	В			Α	Α		Α	Α
Intersection LOS									
			19	M Peak Hour					
Volume (veh/h)	57	100			55	198		165	32
Movement (v/c)	0.245	0.245			0.045	0.00		0.00	0.00
95th QLength (m/ I n)	8	8			1	0		0	0
Movement LOS	В	В			А	Α		Α	Α
Intersection LOS									

Normandy Rd / Range	N	Eastbound ormandy Dr			Westbound ormandy Dr			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		+			4			+			+	
					AM Pe	ak Hour						
Volume (veh/h)	5	0	26	9	0	10	25	221	4	4	218	6
Movement (v/c)		0.047			0.041			0.021			0.003	
95th QLength (m/In)		1			1			1			0	
Movement LOS		В			В			Α			Α	
Intersection LOS												
					PM Pe	ak Hour						
Volume (veh/h)	15	1	26	5	5	10	39	234	10	14	259	15
Movement (v/c)		0.082			0.052			0.034			0.012	
95th QLength (m/In)		2		2				1			0	
Movement LOS		В			В			А			Α	
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound Intain View I			Southbound Intain View I			
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
	+	1		+	1	_	7	1	C	4	1			
					AM Pea	ak Hour								
Volume (veh/h)	74	26	36	200	110	12	27	184	41	14	999	283		
Movement (v/c)	0.	60	0.12		0.91d		0.28	0.17	0.05	0.02	0.91	0.28		
95th QLength (m/In)	35	5.4	7.9		46.5		9.6	26.0	4.0	3.6	#298.6	9.5		
Movement LOS	- 1	D	В		D		В	Α	Α	Α	С	Α		
Intersection LOS						(3							
					PM Pea	ak Hour								
Volume (veh/h)	74	52	59	97	31	7	43	570	132	12	458	121		
Movement (v/c)	0.	60	0.14		0.24		0.14	0.75	0.19	0.05	0.59	0.17		
95th QLength (m/In)	45	5.5	8.2		15.4		9.1	104.1	7.8	3.7	74.6	7.5		
Movement LOS		С	Α		В		В	В	Α	Α	В	Α		
Intersection LOS						E	3				14 999 0.02 0.91 3.6 #298.6 A C 12 458 0.05 0.59 3.7 74.6			

Two Mile Hill Rd /	Two	Eastbound Mile Hill R	oad		Westbound o Mile Hill R			Northbound Range Road			Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(HART)	7	1	r	7	ŧ	→		1	→	7	f	→
					AM Pea	k Hour						
Volume (veh/h)	163	1284	46	118	643	223	25	48	124	255	33	108
Movement (v/c)	0.76	0.93	0.07	1.07	0.56	0.35		0.52		0.99	0.:	27
95th QLength (m/ln)	#89.3	#286.1	0.0	#89.4	117.5	19.8		20.5		#153.1	19	9.8
Movement LOS	E	D	Α	F	С	Α		С		F		4
Intersection LOS						[)					
					PM Pea	k Hour						
Volume (veh/h)	111	736	32	118	1146	217	32	60	159	170	36	139
Movement (v/c)	0.83	0.56	0.05	0.70	0.85	0.32		0.58		0.86	0.3	34
95th QLength (m/ln)	#74.9	122.0	0.0	#67.6	#232.8	34.6		23.1		#102.8	21	8
Movement LOS	F	С	Α	E	D	Α		С		F	- 1	4
Intersection LOS						[)					

Two Mile Hill Rd /	Tw	Eastbound o Mile Hill F			Westbound o Mile Hill R			Northbound			Southbound Range Road		
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
(NO HART)	4	1		4	1		←	1	_	4	1	\rightarrow	
					AM Pea	ak Hour							
Volume (veh/h)	163	1284	46	118	643	223	25	48	124	255	33	108	
Movement (v/c)	0.48	0.88	0.88	0.74	0.46	0.46	0.	38	0.36 1.09		0.	.33	
95th QLength (m/In)	36.3	#243.9	#243.9	#56.8	79.2	79.2	25.5		3.8	#72.0	18	8.5	
Movement LOS	В	С	С	D	С	С		D	Α	F		В	
Intersection LOS						(2						
					PM Pea	ak Hour							
Volume (veh/h)	111	736	32	118	1146	217	32	60	159	170	36	139	
Movement (v/c)	0.65	0.64	0.64	0.41	0.76	0.76	0.	42	0.44	0.63	0.	35	
95th QLength (m/In)	#41.8	108.9	108.9	27.9	#138.2	#138.2	2 27.6		14.0	38.9	1	7.7	
Movement LOS	С	С	С	В	С	С	D		Α	С		Α	
Intersection LOS		С											

University Dr / Range Rd	U	Eastbound niversity Dri					Northbound Range Road		Southbound Range Road	
	Left	Right				Left	Thru	Left	Thru	Right
							1			
				AM Pea	ak Hour					
Volume (veh/h)	55	78				210	90		161	156
Movement (v/c)	0.29	0.29				0.191	0.00		0.00	0.00
95th QLength (m/ln)	9	9				5	0		0	0
Movement LOS	С	С				Α	А		Α	Α
Intersection LOS										
				PM Pea	k Hour					
Volume (veh/h)	88	141				96	198		165	63
Movement (v/c)	0.395	0.395				0.08	0.00		0.00	0.00
95th QLength (m/ln)	14	14				2	0		0	0
Movement LOS	В	В				А	Α		Α	Α
Intersection LOS										

Normandy Rd / Range	N	Eastbound ormandy Dri	ive	N	Westbound ormandy Dri			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		+			+			+			+	
					AM Pea	ık Hour						
Volume (veh/h)	5	6	26	9	6	10	25	293	5	5	259	6
Movement (v/c)	0.067				0.072			0.022			0.004	
95th QLength (m/ln)	2				2			1			0	
Movement LOS		В			С			Α			Α	
Intersection LOS												
					PM Pea	ık Hour						
Volume (veh/h)	15	5	26	5	5	10	39	275	10	14	300	15
Movement (v/c)	0.102				0.059			0.035			0.012	
95th QLength (m/ln)	2			2			1			0		
Movement LOS	В			С			Α			Α		
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound ntain View		Мог	Southbound Intain View I	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	+	1		+	1		7	1	r	1	1	
					AM Pea	ak Hour						
Volume (veh/h)	94	33	39	200	123	12	33	184	41	14	999	319
Movement (v/c)	0.	.75	0.13		0.89dl		0.38	0.17	0.05	0.02	0.92	0.31
95th QLength (m/ln)	4:	45.3 8.1			48.4		15.4	27.3	4.2	3.7	#307.2	10.3
Movement LOS		E	В		D		С	Α	Α	Α	С	Α
Intersection LOS						(C					
					PM Pea	k Hour						
Volume (veh/h)	94	59	63	97	38	7	47	570	132	12	458	141
Movement (v/c)	0.	.65	0.15		0.24		0.16	0.76	0.19	0.06	0.60	0.20
95th QLength (m/In)	5:	2.5	8.2		16.0		10.3	109.8	8.1	3.9	78.7	8.4
Movement LOS		С	Α		В		В	С	Α	В	В	Α
Intersection LOS		В										

Two Mile Hill Rd /	Twe	Eastbound o Mile Hill R	oad		Westbound o Mile Hill R			Northbound Range Road			Southboun Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(HART)	4	1	\Rightarrow	7	1	\rightarrow		4F	>	7		\rightarrow
					AM Pea	ak Hour						
Volume (veh/h)	186	1284	46	118	643	264	25	55	124	268	37	132
Movement (v/c)	0.78	0.95	0.07	1.08	0.60	0.41		0.54		0.99	0	.30
95th QLength (m/ln)	#96.4	#289.7	0.0	#89.4	122.4	24.0		21.7		#159.4	2	1.4
Movement LOS	Е	D	Α	F	D	Α		С		F		A
Intersection LOS						[)					
					PM Pea	ık Hour						
Volume (veh/h)	124	736	32	142	1146	240	32	64	159	183	40	163
Movement (v/c)	0.84	0.56	0.05	0.75	0.84	0.35		0.62		0.85	0	.38
95th QLength (m/ln)	#84.6	130.8	0.0	#79.6	#242.6	41.7		26.0		#111.8	2	7.4
Movement LOS	F	С	Α	Е	D	В		С		F		В
Intersection LOS		D										

2035:	Total	Traffic -	Scenario	2

University Dr / Range Rd	Uı	Eastbound niversity Dr	ive				Northbour Range Roa		Southbound Range Road	
	Left	Right				Left	Thru	Left	Thru	Right
		7					1		1	
				AM Pe	ak Hour		•			
Volume (veh/h)		211				343	90		161	258
Movement (v/c)	1.258	1.258				0.342	0.00		0.00	0.00
95th QLength (m/In)	140	140				11	0		0	0
Movement LOS	F	F				В	Α		Α	Α
Intersection LOS										
				PM Pe	ak Hour					
Volume (veh/h)	189	274				230	198		165	165
Movement (v/c)	1.165	1.165				0.211	0.00		0.00	0.00
95th QLength (m/In)	144	144				6	0		0	0
Movement LOS	F	F				Α	Α		Α	Α
Intersection LOS										

Normandy Rd / Range Rd	N	Eastbound ormandy Dr	ive	Ne	Westbound ormandy Dr			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		+			4			+			+	
					AM Pea	ak Hour						
Volume (veh/h)	5	6	26	9	6	10	25	426	5	5	392	6
Movement (v/c)		0.087			0.113			0.024			0.005	
95th QLength (m/ln)	2				3			1			0	
Movement LOS		В			С			А			Α	
Intersection LOS												
					PM Pea	ak Hour						
Volume (veh/h)	15	5	26	5	5	10	39	408	10	14	433	15
Movement (v/c)		0.14			0.092			0.04			0.014	
95th QLength (m/In)	4				2			1			0	
Movement LOS	С			С			А			Α		
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound ntain View I			Southbound Intain View I	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	+	1	L	•	1		1	1		4	1	C
					AM Pe	ak Hour						
Volume (veh/h)	159	58	51	200	148	12	45	184	41	14	999	384
Movement (v/c)	1.	01	0.13		0.90d l		0.74	0.19	0.05	0.02	1.00	0.39
95th QLength (m/In)	#97.5 9.1			54.0		#30.2	27.3	4.2	3.7	#307.2	11.2	
Movement LOS		F A			D		E	Α	Α	Α	D	Α
Intersection LOS						[)					
					PM Pea	ak Hour						
Volume (veh/h)	159	84	74	97	63	7	58	570	132	12	458	206
Movement (v/c)	0.	81	0.15		0.25		0.22	0.79	0.20	0.07	0.62	0.28
95th QLength (m/In)	#9	0.7	8.7		18.5		12.9	112.3	8.3	4.0	80.4	10.2
Movement LOS		D	Α		В		В	С	Α	В	В	Α
Intersection LOS						(

Two Mile Hill Rd /	Twe	Eastbound Mile Hill R	oad		Westbound o Mile Hill R			Northbound Range Road			Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(HART)	4	1	→	4	1	→		41	>	7		→
					AM Pea	k Hour						
Volume (veh/h)	230	1284	46	118	643	341	25	68	124	312	50	209
Movement (v/c)	0.81	0.99	0.07	1.08	0.69	0.54		0.56		1.06	0.	43
95th QLength (m/ln)	#126.2	#297.1	0.0	#89.4	126.0	32.1		24.0		#184.6	35	5.7
Movement LOS	E	E	Α	F	D	Α		С		F		В
Intersection LOS						[
					PM Pea	ık Hour						
Volume (veh/h)	168	736	32	118	1146	317	32	77	159	227	53	239
Movement (v/c)	0.97	0.58	0.05	0.69	0.92	0.48		0.64		0.94	0.	52
95th QLength (m/ln)	#112.3	135.0	0.0	58.7	#257.6	60.5		28.0		#137.6	49	9.3
Movement LOS	F	С	Α	Е	D	В		С		F B		В
Intersection LOS						[

Two Mile Hill Rd /	Tw	Eastbound o Mile Hill R	oad	Tw	Westbound o Mile Hill R			Northbound Range Road			Southbound Range Road		
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
(NO HART)	4	1		4	1		←	1	C	1		\Rightarrow	
					AM Pea	ak Hour							
Volume (veh/h)	230	1284	46	118	643	341			124	312	50	209	
Movement (v/c)	0.69	0.88	0.88	0.82	0.57	0.57	0.49 0.37		1.11	0.	51		
95th QLength (m/In)	#62.2	#254.0	#254.0	#61.2	97.1	97.1	34.6		6.3	#107.9	34	1.7	
Movement LOS	С	С	С	Е	С	С		D	Α	F		В	
Intersection LOS						[)						
					PM Pea	ak Hour							
Volume (veh/h)	168	736	32	118	1146	317	32	77	159	227	53	239	
Movement (v/c)	0.78	0.60	0.60	0.42	0.85	0.85	0.	50	0.43	0.85	0.	57	
95th QLength (m/In)	#68.7	105.5	105.5	27.9	#163.2	#163.2	32.8		14.1	53.1	39	9.2	
Movement LOS	D	С	С	В	С	С	D		Α	D	1	В	
Intersection LOS		С											

University Dr / Range Rd	U	Eastbound niversity Dr					Northbound Range Road		Southbound Range Road	
	Left	Right				Left	Thru	Left	Thru	Right
									1	
				AM Pea	ak Hour					
Volume (veh/h)	113	154				276	90		161	206
Movement (v/c)	0.72	0.72				0.262	0.00		0.00	0.00
95th QLength (m/ln)	42	42				8	0		0	0
Movement LOS	D	D				А	Α		Α	Α
Intersection LOS										
				PM Pea	k Hour					
Volume (veh/h)	120	183				126	198		165	86
Movement (v/c)	0.566	0.566				0.108	0.00		0.00	0.00
95th QLength (m/ln)	27	27				3	0		0	0
Movement LOS	С	С				Α	Α		Α	Α
Intersection LOS										

Normandy Rd / Range	No	Eastbound ormandy Dri	ve	N	Westbound ormandy Dr			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		+			+			+			+	
					AM Pea	ak Hour						
Volume (veh/h)	5	5 6 26 0.077			6	10	25	358	5	5	336	6
Movement (v/c)		0.077			0.091			0.023			0.005	
95th QLength (m/ln)		2			2			1			0	
Movement LOS	2 B				С			А			А	
Intersection LOS												
					PM Pea	k Hour						
Volume (veh/h)	15	5	26	5	5	10	39	305	10	14	341	15
Movement (v/c)	0.111				0.066			0.037			0.013	
95th QLength (m/ln)	3				2			1			0	
Movement LOS	В				С			А			Α	
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound Intain View			Southbound Intain View I	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	+	1		4	1	C	4	1	L	4	1	
					AM Pea	ak Hour						
Volume (veh/h)	132	48	46	200	135	12	39	184	41	14	999	351
Movement (v/c)	0.	90	0.13		0.88d l		0.62	0.18	0.05	0.02	0.97	0.35
95th QLength (m/In)	#75.8 8.7			51.3		#25.9	27.3	4.2	3.7	#307.2	10.8	
Movement LOS		E	Α		D		Е	Α	Α	Α	D	Α
Intersection LOS						(
					PM Pea	k Hour						
Volume (veh/h)	132	67	66	97	44	7	49	570	132	12	458	155
Movement (v/c)	0.	71	0.15		0.24		0.17	0.77	0.19	0.06	0.60	0.21
95th QLength (m/In)	63	1.3	8.5		16.6		10.7	109.8	8.1	3.9	78.7	8.7
Movement LOS	(С	Α		В		В	С	Α	В	В	Α
Intersection LOS						E	3					

Two Mile Hill Rd /		Eastbound o Mile Hill Ro	oad		Westbound o Mile Hill R			Northbound Range Road		_	Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(HART)	4	1	→	1	1	—		41	>	4		→
					AM Pea	ak Hour						
Volume (veh/h)	208	1284	46	118	643	302	25	62	124	293	45	176
Movement (v/c)	0.80	0.97	0.07	1.08	0.64	0.48		0.55		1.04	0.	38
95th QLength (m/ln)	#105.7	#293.4	0.0	#89.4	126.0	29.5		22.8		#174.1	28	3.9
Movement LOS	Е	D	Α	F	D	Α		С		F		В
Intersection LOS						[)					
					PM Pea	ık Hour						
Volume (veh/h)	134	736	32	118	1146	257	32	67	159	197	44	187
Movement (v/c)	0.84	0.56	0.05	0.68	0.87	0.38		0.62		0.87	0.	43
95th QLength (m/In)	#89.8	134.8	0.0	58.3	#249.6	46.3		26.3		#119.1	34	4.3
Movement LOS	F	С	Α	Е	D	В		С		F		В
Intersection LOS						[)					

2040: Background Traffic

University Dr / Range Rd	U	Eastbound niversity Dr					Northboun Range Roa		Southbound Range Road	
	Left	Right				Left	Thru	Left	Thru	Right
						1	1		1	_
				AM Pe	ak Hour					
Volume (veh/h)	26	41				152	99		178	111
Movement (v/c)	0.127	0.127				0.134	0.00		0.00	0.00
95th QLength (m/ln)	3	3				4	0		0	0
Movement LOS	В	В				Α	Α		Α	Α
Intersection LOS										
				PM Pe	ak Hour					
Volume (veh/h)	62	110				61	218		182	35
Movement (v/c)	0.281	0.281				0.05	0.00		0.00	0.00
95th QLength (m/ln)	8	8				2	0		0	0
Movement LOS	В	В				Α	Α		Α	Α
Intersection LOS										

Normandy Rd / Range	N	Eastbound ormandy Dr	ive		Westbound ormandy Dr			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
					AM Pe	ak Hour						
Volume (veh/h)	5	0	28	9	0	11	27	243	4	4	240	7
Movement (v/c)		0.052			0.046			0.023			0.003	
95th QLength (m/ln)		2			1			1			0	
Movement LOS		2 B			В			Α			Α	
Intersection LOS												
					PM Pea	ak Hour						
Volume (veh/h)	16	1	28	5	6	11	43	257	11	15	285	16
Movement (v/c)	0.094				0.063			0.038			0.013	
95th QLength (m/ln)	2			2			1			0		
Movement LOS		В			С			Α			Α	
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound ntain View I			Southbound Intain View I	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	•	1		+	1		1	1		4	1	C
					AM Pea	ak Hour						
Volume (veh/h)	81	28	39	220	121	14	30	202	45	15	1099	312
Movement (v/c)	0	.65	0.12		0.94d		0.45	0.19	0.05	0.02	1.03	0.32
95th QLength (m/In)	3	8.6	8.0		50.2		#19.2	30.2	4.4	3.9	#352.5	17.9
Movement LOS		D	Α		D		D	Α	Α	Α	D	Α
Intersection LOS						[)					
					PM Pea	ak Hour						
Volume (veh/h)	81	57	65	107	34	8	47	627	145	14	504	133
Movement (v/c)	0	.65	0.16		0.26		0.17	0.80	0.20	0.07	0.63	0.18
95th QLength (m/In)	5	0.1	8.4		16.7		10.5	128.4	8.6	4.2	89.8	8.2
Movement LOS		С	Α		В		В	С	Α	В	В	Α
Intersection LOS							3					

Two Mile Hill Rd /	Twe	Eastbound Mile Hill R	oad		Westbound o Mile Hill R			Northbound Range Road			Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(HART)	7	1			ŧ	→		41	>	7		→
					AM Pea	k Hour						
Volume (veh/h)	179	1412	50	130	707	245	27	53	137	281	37	119
Movement (v/c)	0.78	1.03	0.08	1.08	0.63	0.39		0.56		1.10	0.	29
95th QLength (m/In)	#95.6	#333.7	0.0	#95.9	134.2	26.9		22.3		#173.5	2:	L.3
Movement LOS	E	E	Α	F	D	Α		С		F		4
Intersection LOS												
					PM Pea	ık Hour						
Volume (veh/h)	122	809	35	130	1260	239	35	66	175	187	39	153
Movement (v/c)	0.90	0.60	0.05	0.73	0.91	0.35		0.64		0.91	0.	37
95th QLength (m/In)	#85.9	143.9	0.0	#72.3	#276.1	43.9	26.8 #117.1		#117.1	25	5.9	
Movement LOS	F	С	Α	E	D	В	C F			3		
Intersection LOS						[

Two Mile Hill Rd /	Tw	Eastbound o Mile Hill R	oad		Westbound o Mile Hill R	-		Northbound Range Road			Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(NO HART)	1	1		1		→	+	1		4		→
					AM Pea	ak Hour						
Volume (veh/h)	179	1412	50	130	707	245			137	281	37	119
Movement (v/c)	0.55	0.90	0.90	0.82	0.45	0.45	0.46		0.44	1.16	0.	37
95th QLength (m/In)	40.7	#295.8	#295.8	#71.8	93.5	93.5	33.5		12.9	#109.0	23	3.3
Movement LOS	В	С	С	E	С	С		D	А	F		В
Intersection LOS)					
					PM Pea	ak Hour						
Volume (veh/h)	122	809	35	130	1260	239	35	66	175	187	39	153
Movement (v/c)	0.74	0.68	0.68	0.49	0.81	0.81	0	.46	0.49	0.70	0.	39
95th QLength (m/In)	#50.5	#128.2	#128.2	30.3	#162.3	#162.3	.3 30.0		18.3	42.8	22	2.7
Movement LOS	D	С	С	В	С	С	D		В	D	1	В
Intersection LOS						(:					

2040: Total Traffic - Scenario 1

University Dr / Range	Uı	Eastbound niversity Dri	ve				Northboun Range Roa		Southbound Range Road	
Rd	Left	Right				Left	Thru	Left	Thru	Right
						7	1		1	
				AM Pea	ak Hour					
Volume (veh/h)	57	82				224	99		178	166
Movement (v/c)	0.325	0.325				0.208	0.00		0.00	0.00
95th QLength (m/ln)	11	11				6	0		0	0
Movement LOS	С	С				Α	Α		Α	Α
Intersection LOS										
				PM Pea	k Hour					
Volume (veh/h)	93	151				102	218		182	66
Movement (v/c)	0.441	0.441				0.087	0.00		0.00	0.00
95th QLength (m/ln)	17	17				2	0		0	0
Movement LOS	С	С				Α	Α		Α	Α
Intersection LOS										

Normandy Rd / Range	N	Eastbound ormandy Dri			Westbound ormandy Dr			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		+			+			+			+	
					AM Pea	k Hour						
Volume (veh/h)	5	6	28	9	6	11	27	315	5	5	281	7
Movement (v/c)	0.073				0.08			0.024			0.005	
95th QLength (m/ln)	2				2			1			0	
Movement LOS		В			С			Α			Α	
Intersection LOS												
					PM Pea	k Hour						
Volume (veh/h)	16	5	28	5	6	11	43	298	11	15	325	16
Movement (v/c)	0.116				0.072			0.04			0.014	
95th QLength (m/In)	3				2			1			0	
Movement LOS	В			С			Α			Α		
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound			Southbound	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	+	1		+	1	_	7	1		4	1	C
					AM Pea	k Hour						
Volume (veh/h)	101	36	43	220	134	14	36	202	45	15	1099	347
Movement (v/c)	0.	78	0.13		0.90d		0.57	0.20	0.05	0.02	1.04	0.35
95th QLength (m/In)	49.7 8.3			53.1		#25.6	35.1	5.0	4.5	#388.5	21.3	
Movement LOS		E	Α		D		D	Α	Α	Α	Е	Α
Intersection LOS)					
					PM Pea	k Hour						
Volume (veh/h)	101	65	69	107	41	8	51	627	145	14	504	153
Movement (v/c)	0.	71	0.16		0.26		0.19	0.80	0.20	0.07	0.63	0.20
95th QLength (m/ln)	58	3.5	8.6		17.5		11.3	128.4	8.6	4.3	89.8	8.7
Movement LOS		СА			В		В	С	Α	В	В	Α
Intersection LOS						E	3					

	Two	Eastbound Mile Hill R	oad		Westbound o Mile Hill R			Northbound Range Road			Southbound Range Road	
Two Mile Hill Rd /	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Range Rd (HART)	4	1	→	1	1	→		41	+	1	1	
					AM Pea	k Hour						
Volume (veh/h)	202	1412	50	130	707	287	27	60	137	294	41	143
Movement (v/c)	0.79	1.04	0.08	1.07	0.67	0.45		0.57		1.15	0.3	33
95th QLength (m/In)	#102.1	#334.0	0.0	#95.7	#139.3	34.6		23.2		#182.1	24	1.8
Movement LOS	E	E	Α	F	D	Α		С		F	1	4
Intersection LOS							E					
					PM Pea	k Hour						
Volume (veh/h)	135	809	35	154	1260	262	35	70	175	200	43	177
Movement (v/c)	0.92	0.63	0.05	0.77	0.93	0.38		0.65		0.93	0.4	42
95th QLength (m/ln)	#94.1	148.4	0.0	#85.8	#282.5	49.1		28.0		#124.6	33	3.4
Movement LOS	F	С	Α	E	D	В		С		F	E	3
Intersection LOS							D					

Two Mile Hill Rd /	Two	Eastbound o Mile Hill F	load		Westbound o Mile Hill F			Northboun Range Roa			Southboun Range Roa		
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
(NO HART)	4	1		7		\rightarrow	←		_	4		\rightarrow	
					AM Pea	ık Hour							
	202	1412	50	130	707	287	27	60	137	294	41 143		
Movement (v/c)	0.62	0.88	0.88	0.77	0.47	0.47			0.46	1.10	0	42	
95th QLength (m/ln)	47.5	#306.3	#306.3	#72.2	107.1	107.1	38.9		17.4	#122.6	3	3.9	
Movement LOS	В	С	С	E	С	С			В	F	В		
Intersection LOS)						
					PM Pea	k Hour							
Volume (veh/h)	135	809	35	154	1260	262	35	70	175	200	43	177	
Movement (v/c)	0.74	0.67	0.67	0.57	0.84	0.84	0.	47	0.46	0.75	0	43	
95th QLength (m/ln)	#55.1	#121.9	#121.9	#39.4	#168.9	#168.9	31.5		15.3	46.2	2	5.8	
Movement LOS	D	С	С	С	С	С	D		Α	D		В	
Intersection LOS		C											

2040	T-4-I T KE-	C

University Dr / Range Rd	Uı	Eastbound University Drive						Northbound Range Road		Southbound Range Road	
Rd	Left	Right					Left	Thru	Left	Thru	Right
		7						1		1	
					AM Pe	ak Hour					
Volume (veh/h)	159	215					357	99		178	268
Movement (v/c)	1.404	1.404					0.365	0.00		0.00	0.00
95th QLength (m/ln)	165	165					13	0		0	0
Movement LOS	F	F					В	Α		Α	A
Intersection LOS											
					PM Pe	ak Hour					
Volume (veh/h)	195	284					235	218		182	168
Movement (v/c)	1.273	1.273					0.22	0.00		0.00	0.00
95th QLength (m/ln)	172	172					6	0		0	0
Movement LOS	F	F					Α	Α		Α	Α
Intersection LOS											

Normandy Rd / Range	Eastbound Normandy Drive			N	Westbound ormandy Dr			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		+			4			+			+	
					AM Pea	ak Hour						
Volume (veh/h)	5	6	28	9 6 11			27	448	4	4	414	7
Movement (v/c)		0.095			0.124			0.027			0.004	
95th QLength (m/In)	2				3			1			0	
Movement LOS		В			С			Α			Α	
Intersection LOS												
					PM Pea	ak Hour						
Volume (veh/h)	16	5	28	5	6	11	43	432	11	15	459	16
Movement (v/c)	0.162				0.112			0.045			0.015	
95th QLength (m/In)	5				3			1			0	
Movement LOS	С		С			Α			Α			
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound Intain View I		Мог	Southbound Intain View [
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	+	1		+	1	_	4	1	_	4	1	_
					AM Pe	ak Hour						
Volume (veh/h)	167	61	54	220	159	14	48	202	45	15	1099	412
Movement (v/c)	1.	14	0.14		1.03d		0.79	0.21	0.05	0.02	1.10	0.41
95th QLength (m/In)	#107.1		9.6		60.1		#32.3	30.1	4.3	3.9	#355.0	12.2
Movement LOS		F	Α	D		F	Α	Α	Α	F	Α	
Intersection LOS						E						
					PM Pea	ak Hour						
Volume (veh/h)	167	89	80	107	66	8	62	627	145	14	504	218
Movement (v/c)	0.	86	0.16		0.28		0.26	0.84	0.21	0.09	0.66	0.29
95th QLength (m/In)	#99.8 9.1			20.1		14.4	131.2	8.8	4.5	91.8	10.4	
Movement LOS	- 1	D	Α		В		В	С	Α	В	В	Α
Intersection LOS		С										

	Two	Eastbound Mile Hill R	oad		Westbound o Mile Hill R			Northbound Range Road			Southbound Range Road			
Two Mile Hill Rd / Range Rd (HART)	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Range Ru (HART)	4	1	→	7	ŧ	→		41	•	1				
					AM Pea	k Hour								
Volume (veh/h)	246	1412	50	130	707	364	27	73	137	337	54	220		
Movement (v/c)	0.82	1.08	0.08	1.08	0.76	0.58		0.59		1.21	0.	47		
95th QLength (m/ln)	#135.1	#341.0	0.0	#95.9	#148.5	44.2		25.6		#207.5	44	1.2		
Movement LOS	Е	F	Α	F	D	В		С		F		3		
Intersection LOS						E								
					PM Pea	k Hour								
Volume (veh/h)	179	809	35	130	1260	339	35	83	175	244	56	253		
Movement (v/c)	1.04	0.63	0.06	0.73	1.00	0.51		0.67		1.07	0.	56		
95th QLength (m/In)	#120.0	147.1	0.0	#72.3	#293.9	70.2		30.1		#152.9	56	5.2		
Movement LOS	F	С	Α	E	E	В		С		F		3		
Intersection LOS						[

Two Mile Hill Rd /	Eastbound Two Mile Hill Road				Westbound o Mile Hill R			Northboun Range Road			Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(NO HART)	4	1		4			←	1	~	4	1	→
					AM Pea	ak Hour						
Volume (veh/h)	246	1412	50	130	707	364	27	73	137	337	54 22	
Movement (v/c)	0.73	0.92	0.92	0.84	0.57	0.57	0.57		0.45	1.19	0.	58
95th QLength (m/In)	71.8	#312.3	#312.3	#75.7	122.3	122.3	43.8		16.1	#154.9	58.0	
Movement LOS	С	D	D	Е	С	С		Ē	В	F	(2
Intersection LOS						[)					
					PM Pea	ak Hour						
Volume (veh/h)	179	809	35	130	1260	339	35	83	175	244	56	253
Movement (v/c)	0.80	0.60	0.60	0.46	0.86	0.86	0.	56	0.47	0.97	0.	62
95th QLength (m/In)	#77.7	120.8	120.8	29.6	#187.3	#187.3	39.2		16.2	65.7	48	3.1
Movement LOS	D	С	С	В	С	С	D		Α	F		3
Intersection LOS						(3					

University Dr / Range Rd	U	Eastbound niversity Dr					Northboun Range Road		Southbound Range Road	
	Left	Right				Left	Thru	Left	Thru	Right
							1		1	
				AM Pe	ak Hour					
Volume (veh/h)	115	158				290	99		178	216
Movement (v/c)	0.796	0.796				0.283	0.00		0.00	0.00
95th QLength (m/ln)	52	52				9	0		0	0
Movement LOS	Е	Е				А	Α		Α	Α
Intersection LOS										
				PM Pea	ak Hour					
Volume (veh/h)	125	192				131	218		182	89
Movement (v/c)	0.621	0.621				0.114	0.00		0.00	0.00
95th QLength (m/ln)	32	32				3	0		0	0
Movement LOS	С	С				Α	Α		Α	Α
Intersection LOS										

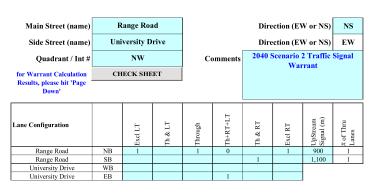
Normandy Rd / Range	Eastbound Normandy Drive			N	Westbound ormandy Dr			Northbound Range Road			Southbound Range Road	
Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		+			+			+			+	
					AM Pe	ak Hour						
Volume (veh/h)	5	6	28	9	6	11	27	380	4	4	357	7
Movement (v/c)		0.084			0.1			0.026			0.004	
95th QLength (m/ln)	2			2				1			0	
Movement LOS		В		С				А			Α	
Intersection LOS												
					PM Pea	ak Hour						
Volume (veh/h)	16	5	28	5	6	11	43	328	11	15	367	16
Movement (v/c)	0.127				0.08			0.041			0.014	
95th QLength (m/ln)	3			2				1			0	
Movement LOS	В		С				Α			Α		
Intersection LOS												

Mountain View Dr /		Eastbound Range Road			Westbound Range Road			Northbound	•		Southbound Intain View I	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
	+	1		•	1	C	7	1	C	1	1	~
					AM Pea	ak Hour						
Volume (veh/h)	139	50	49	220	146	14	42	202	45	15	1099	379
Movement (v/c)	1.06 0.13		0.13		1.03dl		0.77	0.20	0.05	0.02	1.04	0.37
95th QLength (m/In)	#96.7 9.8		9.8		#64.3		#17.9	29.5	4.1	3.8	#369.6	11.0
Movement LOS		F	В		D		F	Α	Α	Α	Е	Α
Intersection LOS)					
					PM Pea	k Hour						
Volume (veh/h)	139	72	72	107	47	8	54	627	145	14	504	167
Movement (v/c)	0.	.75	0.15		0.26		0.21	0.82	0.20	0.08	0.64	0.22
95th QLength (m/In)	#6	7.8	8.8		17.8		12.4	131.2	8.8	4.4	91.8	9.2
Movement LOS		D	Α		В		В	С	Α	В	В	Α
Intersection LOS						E	3					

Two Mile Hill Rd /		Eastbound Mile Hill R	oad		Westbound o Mile Hill R			Northbound Range Road			Southbound Range Road	
Range Rd	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
(HART)	7	1	\rightarrow	1	1	\rightarrow		41	>	1		
					AM Pea	ak Hour						
Volume (veh/h)	224	1412	50	130	707	325	27	66	137	319	48	187
Movement (v/c)	0.82	1.06	0.08	1.08	0.71	0.51		0.58		1.16	0.4	41
95th QLength (m/ln)	#127.0	#340.7	0.0	#96.8	138.1	36.4		24.6		#196.6	34	1.7
Movement LOS	Е	Е	Α	F	D	Α		С		F	E	В
Intersection LOS						1	E					
					PM Pea	k Hour						
Volume (veh/h)	145	809	35	130	1260	279	35	73	175	214	47	201
Movement (v/c)	1.05	0.63	0.06	0.72	0.94	0.41		0.64		0.97	0.4	45
95th QLength (m/In)	#102.9	145.8	0.0	#71.1	#280.8	53.4		27.9		#132.3	37	7.1
Movement LOS	F	С	Α	Е	D	В		С		F	E	В
Intersection LOS						[)					

APPENDIX G - UNIVERSITY DRIVE / RANGE ROAD SIGNAL WARRANT

City of Whitehorse Canadian Matrix Traffic Signal Warrant Analysis



Road Authority:	City of Whitehorse
City:	Whitehorse
Analysis Date:	2024 November, 11
Count Date:	2024 Oct 23, Wed
Date Entry Format:	(yyyy-mm-dd)

Demographics		
Elem. School/Mobility Impaired	(y/n)	у
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	35,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Range Road	NS	50	3.0%	n	
University Drive	EW	50	3.0%	n	

Set Peak Hours								Ped1	Ped2	Ped3	Ped4					
Traffic Input		NB			SB			WB			EB		NS	NS	EW	EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:00 - 8:00	357.1725	98.9296	0	0	177.5312	267.7363	0	0	0	158.5644	0	214.8404	0	0	0	0
8:00 - 9:00	357.1725	98.9296	0	0	177.5312	267.7363	0	0	0	158.5644	0	214.8404	0	0	0	0
9:00 - 10:00	357.1725	98.9296	0	0	177.5312	267.7363	0	0	0	158.5644	0	214.8404	0	0	0	0
14:00 - 15:00	235.1684	218.1872	0	0	181.5968	168.0508	0	0	0	184.3356	0	264.9044	0	0	0	0
15:00 - 16:00	235.1684	218.1872	0	0	181.5968	168.0508	0	0	0	184.3356	0	264.9044	0	0	0	0
16:00 - 17:00	235.1684	218.1872	0	0	181.5968	168.0508	0	0	0	184.3356	0	264.9044	0	0	0	0
Total (6-hour peak)	1,777	951	0	0	1,077	1,307	0	0	0	1,029	0	1,439	0	0	0	0
Average (6-hour peak)	296	159	0	0	180	218	0	0	0	171	0	240	0	0	0	0

