

# Traffic and Pavement Monitoring Year 7 (2022) and Year 8 (2023) Report

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*Prepared in accordance with*

*Construction Safety Management Plan: Section 5.4.12 Traffic and Pavement  
Monitoring*

*and*

*Appendix B: Traffic Monitoring and Mitigation Plan – Fort St. John  
and North Bank Area Roads*

*Site C Clean Energy Project*

*February 7, 2025*

**Contents**

1.0 Background .....2  
    1.1 Site C Clean Energy Project.....2  
    1.2 Traffic Assessment .....2  
    1.3 Traffic Monitoring .....3  
    1.4 Pavement Monitoring .....4  
    1.5 Project Activities During Monitoring Period.....4  
2.0 Traffic Performance Monitoring.....6  
    2.1 Monitoring Period and Locations .....6  
    2.2 Summary of Results.....7  
    2.3 Conclusions .....10  
3.0 Road Safety Monitoring Program.....11  
    3.1 Monitoring Period and Locations .....11  
    3.2 Summary of Results.....11  
    3.3 Conclusions .....12  
4.0 Road Safety Mitigation – Road Safety Audits .....13  
5.0 Traffic Technical Working Group .....13  
6.0 Next Steps.....13  
7.0 References.....14

Appendix A Traffic Performance Monitoring Program

Appendix B Road Safety Monitoring Program

## 1.0 Background

### 1.1 Site C Clean Energy Project

The Site C Clean Energy Project (the Project) is a hydroelectric dam and generating station under construction in northeast B.C. Construction started in July 2015 and the facility will be in service in 2024. The Project will help meet future electricity needs by providing 1,100 megawatts of dependable capacity, and producing about 5,100 gigawatt hours of energy each year — enough to power the equivalent of 450,000 homes per year. Once built, the Project will be a source of clean, reliable and cost-effective electricity in B.C. for more than 100 years.

The key components of the Project are:

- Access roads and a temporary construction bridge across the river, at the dam site.
- Worker accommodation at the dam site.
- Upgrades to 240, 269, 271 and Old Fort roads.
- The realignment of six segments of Highway 29.
- Two temporary cofferdams across the river to allow for construction of the earthfill dam.
- Two new 500 kilovolt transmission lines connecting Site C to the Peace Canyon Substation, within an existing right-of-way.
- Shoreline protection at Hudson's Hope, including upgrades to DA Thomas Road.
- An 800-metre roller-compacted-concrete buttress to enhance seismic protection.
- An earthfill dam, approximately 1,050 metres long and 60 metres high above the riverbed.
- A generating station with six generating units.
- An 83-kilometre-long reservoir that will be, on average, two to three times the width of the current river.

### 1.2 Traffic Assessment

The Project's Environmental Assessment assessed how the Project traffic might affect both road safety and potential delays on the local road network by segment (BC Hydro 2013a). The assessment quantified the forecasted impact of the peak year traffic for major Project components in addition to forecasted base case traffic (BC Hydro 2013b). The assessment and all associated data are found in Volume 4, Section 31 Transportation and Volume 4, Appendix B Project Traffic Analysis Report of the Site C Clean Energy Project Environmental Impact Statement.

Traffic forecasts are affected by the planned location and schedule of the Project construction activities, and results illustrate that Project traffic patterns will be different between seasons, between years and in different parts of the region due to the location and schedule of Project activities. Examples include:

- the majority of Project traffic is associated with construction and commuter traffic entering the dam site construction area on the north bank;

- there is generally expected to be more Project traffic in the summer than the winter due to the requirement to schedule some work outside of winter conditions, resulting in a larger summer workforce commuting into the site on north bank roads;
- Project traffic in the vicinity of Hudson’s Hope increases during months in which construction activities for shoreline protection works and Highway 29 realignment works are active;
- Project contractors will have the option to access the dam site from the north or south bank over the temporary construction bridge across the Peace River within the dam site;
- Private vehicles are not permitted within the dam site or over the temporary construction bridge across the Peace River, therefore no changes to public traffic patterns are forecast as a result of the Project;
- Project plan changes since the Assessment with potential impacts on road use:
  - Peace River Hydro Partners has decided that the majority of the riprap from West Pine Quarry will be transported by rail and as such, large scale road mitigation measures including the Project Access Road are unnecessary;
  - Materials and equipment transport for the worker accommodation will come from the north bank roads.

### 1.3 Traffic Monitoring

Traffic monitoring is described in two locations in the Construction Safety Management Plan:

- Construction Safety Management Plan: Section 5.4.12 Traffic and Pavement Monitoring (BC Hydro, 2017a) and
- Appendix B: Traffic Monitoring and Mitigation Plan – Fort St. John and North Bank Area Roads (TMMP) (BC Hydro, 2017b)

The schedule for traffic monitoring during Years 7 and 8 of Project construction are shown in Tables 2 and 4.

The TMMP was developed by BC Hydro with the City of Fort St. John (City) to describe monitoring that will occur within and near the City, conditions that may trigger the need for additional mitigation measures, and to assess potential mitigation measures. In addition to monitoring seven locations forecasted to be used by Project traffic, BC Hydro is also providing raw count data for one additional intersection of interest to the City at 100<sup>th</sup> Ave at West Bypass Rd. The data for this one intersection is provided directly to the City for their purposes and is not included in this report. Section 4.1.2 of the TMMP describes that in the first 12 months of the Project, turning movement counts at the intersections listed below would occur quarterly to provide seasonal traffic information useful for future construction years. Future years would include annual monitoring until the year before the anticipated peak year of traffic when quarterly monitoring would begin again. Year 5 was the anticipated peak year of traffic; thus, quarterly monitoring was conducted, with subsequent years returning to annual monitoring activities.

BC Hydro also collected pre-construction baseline intersection data in 2014-2015. The methodology and results of this data collection were provided in the Traffic and Pavement Monitoring Report (January 22, 2016).

## 1.4 Pavement Monitoring

Pavement monitoring is described in the Construction Safety Management Plan: Section 5.4.12 Traffic and Pavement Monitoring. Pre-construction baseline pavement monitoring was conducted in summer 2014 by the Ministry of Transportation and Transit (MoTT). Construction phase pavement monitoring by MoTT was completed every other year in the summer/fall, with events in 2016, 2018, 2020, and 2022. The next pavement monitoring period was scheduled to be in 2024. The results of the monitoring are retained by MoTT and are not included in the results of this report.

BC Hydro and MoTT have an agreement for BC Hydro to pay the reasonable costs associated with pavement surveys that are in addition to MoTT's normal monitoring program.

## 1.5 Project Activities During Monitoring Period

Year 7 and Year 8 of Project construction: dam site construction works continued, and activities in work areas away from the dam site decreased.

The following Project activities occurred during Year 7 and Year 8 of construction at or in the vicinity of the dam site, as well as away from the dam site:

- Between August 2021 and July 2023, there was a monthly average of 4,846 total workers. The monthly average for total PRRD residents is 931 or 22%.
- In response to the global COVID-19 pandemic and by order of the Provincial Health Officer for Industrial Projects, the number of workers at the Site C camp remained scaled back or with additional precautionary measures in place for 2021 and parts of 2022. Effective November 17, 2022, provincial regulations changed to allow the Site C camp to return to normal operations.
- In December 2021, BC Hydro completed the Project's roller-compacted concrete program. Since 2017, a total of 1.68 million cubic metres of roller-compacted concrete was placed in three large buttresses that support the powerhouse, spillways and the dam abutment.
- In March 2022, the second of two 500 kilovolt, 75-kilometre transmission lines was completed and energized.
- In November 2022, BC Hydro completed the shoreline protection berm at Hudson's Hope.
- Also during the Year 7 and Year 8 monitoring periods, BC continued to work on the approach channel, spillway gates and powerhouse intake gates. Construction of boat launches at Lynx Creek and Halfway River was started in 2021 and both sites were substantially completed by Fall 2023.

### 1.5.1 Project Workforce

BC Hydro collected workforce information since the start of the Project. Workforce information regarding the number of PRRD residents was captured between August 2021-July 2023 and is displayed in Table 1 below. Based on the data available, the Project has a high number of local hires (e.g. workers who are primary residents of the PRRD). While local workers may commute daily to the site because they are predominately existing PRRD residents, they are likely people who would be on the road to work in the region anyway. Their route may have changed but the volume of traffic would not have increased along main routes such as Highway 97 due to the Project.

Table 1- Project Workforce from August 2021- July 2023

Reporting Period (Month)	Total Workforce	Construction and Environmental Contractors Workforce Numbers (Onsite Workforce)	# of PRRD Primary Residents of Onsite Workforce	% of PRRD Primary Residents of Onsite Workforce
August 2021	5,087	4,362	1,050	24%
September 2021	4,963	4,248	1,031	24%
October 2021	4,633	3,913	984	25%
November 2021	4,562	3,833	905	24%
December 2021	4,175	3,445	840	24%
January 2022	3,991	3,255	775	24%
February 2022	4,513	3,410	772	23%
March 2022	4,430	3,664	798	22%
April 2022	4,659	3,879	758	20%
May 2022	5,060	4,248	918	22%
June 2022	5,209	4,388	951	22%
July 2022	5,414	4,609	1,017	22%
August 2022	5,396	4,578	1,004	24%
September 2022	5,420	4,606	1,105	22%
October 2022	5,554	4,731	1,085	23%
November 2022	5,238	4,414	1,015	23%
December 2022	4,476	3,681	788	21%
January 2023	4,778	3,978	935	24%
February 2023	4,856	4,067	863	21%
March 2023	5,233	4,415	905	20%
April 2023	5,705	4,861	959	20%
May 2023	5,985	5,119	967	19%
June 2023	6,069	5,182	977	19%
July 2023	5,986	5,109	933	18%

Source: BC Hydro 2021-2023 <https://www.sitecproject.com/document-library/employment-statistics>

## 2.0 Traffic Performance Monitoring

### 2.1 Monitoring Period and Locations

The Construction Safety Management Plan and the TMMP identify the intersections and frequency for traffic data collection. In accordance with the Plans, Table 2, Table 3 and Table 4 show the data collection schedule for Project construction. Project “Years” start on July 27<sup>th</sup> and continue until July 26<sup>th</sup> of the following year.

Within each monitoring period, data collection dates are selected to avoid holiday weeks, weekends or short-term road works to avoid their possible influences on normal traffic patterns.

**Table 2 - Quarterly Monitoring Periods**

Q1	January - February
Q2	April - May
Q3	July - August
Q4	October - November

**Table 3 - Quarterly Traffic Performance Monitoring Schedule (Year 1, Year Prior to Anticipated Peak, and Anticipated Peak Year)**

Road Corridor	Intersection	Q4	Q1	Q2	Q3
Hwy 29	Canyon Drive / Beattie (Hwy 29)			1	
Hwy 29	Hwy 29 (Canyon Drive) / Clarke Road			1	
Hwy 97	Hwy 97 / 269 Rd (Year 1 Only) <sup>1</sup>			1	
Hwy 97 N	Hwy 97 / Old Fort Road	1	1	1	1
Hwy 97 N	Hwy 97 / 100 Street	1	1	1	1
Hwy 97 N	Hwy 97 / 85 <sup>th</sup> Avenue	1	1	1	1
Hwy 97 S	Hwy 97 / Hwy 29 (Chetwynd)			1	
Jackfish Lake Road	Hwy 29 / Jackfish Lake Road			1	
NB Roads	Old Fort Road / 85 <sup>th</sup> Avenue	1	1	1	1
NB Roads	85 <sup>th</sup> Avenue / 100 <sup>th</sup> Street	1	1	1	1
NB Roads	Dam Site Entrance – Gate B	1	1	1	1
NB Roads	Dam Site Entrance – Gate D <sup>2</sup>	1	1	1	1
NB Roads	Hwy 97 / 86 <sup>th</sup> Street	1	1	1	1
NB Roads	100 <sup>th</sup> Avenue / West Bypass	1	1	1	1

Note 1: In addition to the intersections listed in the TMMP, data was also captured for Highway 97 at 269 Rd in April 2016 because of road improvements. These improvements were completed summer 2017 and this intersection was included in any future years.

Note 2: Gate A was renamed to Gate D in 2016.

**Table 4 - Project Year 7 and 8 Intersection Function Monitoring Schedule (Year Post Peak Year)**

Road Corridor	Intersection	Project Year 7 and 8			
		Q4	Q1	Q2	Q3
Hwy 29	Canyon Drive / Beattie (Hwy 29)			1	
Hwy 29	Hwy 29 (Canyon Drive) / Clarke Road			1	
Hwy 97 N	Hwy 97 / Old Fort Road			1	
Hwy 97 N	Hwy 97 / 100 <sup>th</sup> Street			1	
Hwy 97 N	Hwy 97 / 85 <sup>th</sup> Avenue			1	
Hwy 97 S	Hwy 97 / Hwy 29 (Chetwynd)			1	
Jackfish Lake Road	Hwy 29 / Jackfish Lake Road			1	
NB Roads	Old Fort Road / 85 <sup>th</sup> Avenue			1	
NB Roads	85 <sup>th</sup> Avenue / 100 <sup>th</sup> Street			1	
NB Roads	Dam Site Entrance – Gate B			1	
NB Roads	Dam Site Entrance – Gate D <sup>1</sup>			1	
NB Roads	100 <sup>th</sup> Avenue / West Bypass			1	

Note 1: Gate A was renamed to Gate D in 2016.

Note 2: Hwy 97 at 86<sup>th</sup> Avenue intersection function data gathering ceased after Year 1 of construction as traffic lights have been installed at the intersection.

## 2.2 Summary of Results

Please see Appendix A for the full Year 7 and Year 8 traffic performance monitoring program methodology and results completed in accordance with Section 4.1.2 of the TMMP. Traffic performance monitoring is carried out for all intersections identified in the TMMP and the four regional intersections in Hudson’s Hope and Chetwynd.

### Year 7 Traffic Volumes

- Hudson’s Hope Intersections |
  - When compared to the baseline, there was a general increase (37 to 51%) in the traffic volumes at both study intersections in Year 7 Construction during both peak hours.
  - Traffic volumes decreased (-26 to -28%) during the AM peak while the PM peak remained relatively similar when comparing Year 6 to Year 7 Construction.
  
- Chetwynd Intersections |
  - When compared to the baseline, there was a general increase in the traffic volumes at both study intersections in Year 7 Construction during both peak hours, except only a slight increase in the evening peak hour at Highway 29 and Jackfish Lake Road.
  - When compared to Year 6 Construction, traffic volumes collected in Year 7 saw slight decrease during both peak hours.



- Fort St. John Intersections |
  - There was substantially large increase of around 150% in traffic volumes from the Year 7 baseline traffic volume at the intersection of Old Fort Road and 85<sup>th</sup> Avenue in both peak hours.
  - Year 7 Construction volumes at the other study intersections saw a general increase during the PM peak hours when compared to the Year 7 baseline.
  - The AM peak hours saw a slight increase in traffic volume, except at 100<sup>th</sup> Street and 85<sup>th</sup> Avenue which saw a more substantial increase in traffic.
  - When compared to Year 6 Construction, the Year 7 Construction volumes experienced slight changes (+ 13% or less) during both peak hours except for the 85<sup>th</sup> Avenue and Old Fort Road intersection during the AM peak (+ 41%).

### **Year 7 Study Intersection Peak Hours**

#### **Morning Peak Hour**

- It was identified that the construction traffic peaked at a different time compared to typical commuter traffic during the AM peak period for most study intersections. Commuter traffic volumes at the study intersections in Fort St. John peaked between 7:45 AM and 8:45 AM while construction activities recorded at Gate B and Gate D / 269 Road entrance peaked earlier, between 6:00 AM and 7:15 AM.
- The peak hour timing at 85<sup>th</sup> Avenue and Old Fort Road in Fort St. John aligned with the Gate Peak hours at 6:15-7:15 AM.
- Highway 97 / 85<sup>th</sup> Ave had a slightly earlier peak hour than other intersections on Highway 97 in Fort St. John at 6:45-7:45 AM.
- Intersections in Hudson's Hope peaked earlier than Fort St. John and Chetwynd, with Canyon Drive and Highway 29 / Beattie Drive peaking at 6:45-7:45 AM and Highway 29 and Clarke Avenue peaking at 6:30-7:30 AM.
- Intersections in Chetwynd peaked later, from 8:00-9:00 AM.

#### **Afternoon Peak Hour**

- Construction volumes at Gate B and Gate D / 269 Road Entrance peak activities did not coincide with commuter traffic peak traffic volumes, except for 85<sup>th</sup> Avenue and Old Fort Road.

### **Year 7 Traffic Operational Analysis**

- All movements operate at Level of Service (LOS) C or better during the AM peak hour for Year 7 Construction.
- All movements operate at LOS C or better during the PM peak hour for Year 7 Construction, except for the westbound left turn movement at the intersection of Highway 97 and Old Fort Road / 100<sup>th</sup> Avenue which operates at LOS E and experiences a two LOS degradation compared to background conditions, and the westbound left turn movement at the intersection of Highway 97 and 100<sup>th</sup> Street which operates at LOS D but does not experience any LOS degradation compared to

background conditions. As such, the two LOS degradation on the westbound left turn movement at the Highway 97 and Old Fort Road and 100<sup>th</sup> Avenue intersection constitutes a technical deficiency.

- For all movements, 95<sup>th</sup> percentile queue lengths do not exceed the available storage during the AM peak hour for Year 7 Construction. Though 95<sup>th</sup> percentile queue lengths exceed the available storage for some movements during the PM peak hour, the average queue lengths for these movements do not exceed the available storage lengths.

### **Year 8 Traffic Volumes**

- Hudson's Hope Intersections |
  - When compared to the baseline, there was a general increase (25 to 60%) in the traffic volumes at both study intersections in Year 8 Construction during both peak hours.
  - Traffic volumes slightly increased during the AM peak and remained similar ( $\pm 5\%$ ) in the PM peak when comparing Year 7 to Year 8 Construction.
- Chetwynd Intersections |
  - When compared to the baseline, there was a general increase in the traffic volumes at both study intersections in Year 8 Construction during both peak hours.
  - The peak for Year 8 Construction at all intersections increased from Year 7 volumes, except Highway 29 and Jackfish Lake Road was similar to Year 7 in the AM Peak.
- Fort St. John Intersections |
  - Traffic volumes at the study intersections saw a general increase during PM peak hours when comparing the Year 8 Construction to the baseline, with Highway 97 and 100<sup>th</sup> Street having a smaller increase than other intersections.
  - When comparing the Year 8 study intersections to the baseline in the AM peak, the Highway 97 intersections were similar and the 85<sup>th</sup> Avenue intersections experienced general increases.
  - When compared to Year 7 Construction, the Year 8 Construction volumes experienced minor changes ( $\pm 6\%$  or less) during both peak hours except for a somewhat significant increase at the 85<sup>th</sup> Avenue and Old Fort Road intersection.
  - The intersection of 85<sup>th</sup> Avenue and Old Fort Road experienced large increases in Year 8 Construction traffic compared to the baseline, in the order of 150% in the AM Peak and 180% in the PM peak.

## Year 8 Study Intersection Peak Hours

### Morning Peak Hour

- It was identified that the construction traffic peaked at a different time compared to typical commuter traffic during the AM peak period, except at the intersection of 85th Ave and Old Fort Road. Commuter traffic volumes at the study intersections in Fort St. John peaked between 7:00 AM and 9:00 AM while construction activities recorded at Gate B and Gate D / 269 Road entrance peaked earlier, between 6:00 AM and 7:15 AM.
- At 85th Ave and Old Fort Road, the commuter peak coincided with the Gate Peak at 6:15-7:15 AM.

### Afternoon Peak Hour

- Construction volumes at Gate B and Gate D / 269 Road Entrance peak activities were roughly 15-30 minutes (5:00 – 6:15 PM) later than the commuter traffic peak traffic volumes in Fort St. John (4:30- 6:00PM).
- Commuter peak hours in Chetwynd and Hudson’s Hope were earlier than Fort St. John and the gates, from 4:00-5:15PM, with the exception of Highway 29 / Clarke Ave which peaked at 5:15-6:15 PM.

## Year 8 Traffic Operational Analysis

- All movements operate at LOS C or better during the AM peak hour for Year 8 Construction.
- All movements operate at LOS C or better during the PM peak hour for Year 8 Construction, except for the eastbound and westbound left turn movements at the intersection of Highway 97 and Old Fort Road / 100 Avenue which operate at LOS D and experience a one LOS degradation compared to background conditions, and the westbound left turn movement at the intersection of Highway 97 and 100 Street which also operates at LOS D but does not experience any LOS degradation compared to background conditions.
- For all movements, 95<sup>th</sup> percentile queue lengths do not exceed the available storage during the AM peak hour for Year 8 Construction. Though 95<sup>th</sup> percentile queue lengths exceed the available storage for some movements during the PM peak hour, the average queue lengths for these movements do not exceed the available storage lengths.

## 2.3 Conclusions

Based on the findings of this study, the following is concluded:

- Based on the traffic operational analysis for the two construction years (Year 7 and Year 8), no operational deficiencies are observed during the AM peak hour.
- Based on the traffic operational analysis during the PM peak hour for the two construction years (Year 7 and Year 8), with the addition of construction traffic, a single technical deficiency is identified in Year 7 but was resolved in Year 8.

- Additionally, for both years, monitoring indicated that construction traffic increased queue lengths for some of the movements at the study intersections resulting in 95th percentile queues for those movements to exceed the storage lengths. However, the average queue lengths did not exceed the storage lengths at any of the study intersections.
- No additional mitigation measures are recommended at this time.

### **3.0 Road Safety Monitoring Program**

In accordance with the TMMP, collision data from ICBC was used to complete the road safety monitoring program for Year 7 and Year 8.

#### **3.1 Monitoring Period and Locations**

Study years:

- Year 8 Construction collision review from August 1, 2022 to July 31, 2023;
- Year 7 Construction collision review from August 1, 2021 to July 31, 2022;
- Year 7 Construction collision review from August 1, 2020 to July 31, 2021;
- Year 6 Construction collision review from August 1, 2019 to July 31, 2020;
- Year 6 Construction collision review from August 1, 2018 to July 31, 2019;
- Year 3 Construction collision review from August 1, 2017 to July 31, 2018;
- Year 2 Construction collision review from August 1, 2016 to July 31, 2017;
- Year 1 Construction collision review from August 1, 2015 to July 31, 2016
- Previous collision history August 1, 2010 to July 31, 2015

Study intersections in Fort St. John:

- 85<sup>th</sup> Avenue and Old Fort Road,
- Highway 97 and Old Fort Road,
- Highway 97 and 100<sup>th</sup> Street,
- Highway 97 and 85<sup>th</sup> Avenue, and
- 85<sup>th</sup> Avenue and 100<sup>th</sup> Street.

#### **3.2 Summary of Results**

Please see Appendix B for the full Year 7 and Year 8 road safety monitoring program methodology and results completed in accordance with section 4.2.2 of the TMMP. Road safety monitoring is carried out for the intersections identified in the TMMP as they would be the most likely to experience a change due to the Project due to their proximity to the dam site and anticipated vehicle routings. It is not completed for the four regional intersections in Hudson's Hope and Chetwynd due to their distance from the Project and the results of the environmental assessment.

The results from the road safety monitoring program are summarized below:

Table 5 below shows the pre-construction and benchmark annual average collision rates against the number of collisions in Years 7 and 8 for both total and severe collisions at each of the study intersections. At intersections where collisions in Years 7 or 8 have exceeded the benchmark, the

section following Table 5 provide more context as to whether the Site C Project has affected road safety at these intersections.

**Table 5 - Project Year 7 and 8 Intersection Function Monitoring Schedule (Year Post Peak Year)**

Intersection	Collision Rates (per year)							
	Pre-Construction Average		BENCHMARK Pre-Construction Average +10%		Year 7		Year 8	
	Total	Severe	Total	Severe	Total	Severe	Total	Severe
Highway 97 / Old Fort Road	19.2	7.4	21.1	8.1	11	3	16	5
85 <sup>th</sup> Avenue / Old Fort Road	0.4	0.0	0.4	0.0	2	0	1	0
Highway 97 / 100 <sup>th</sup> Street	17.6	5.0	19.4	5.5	10	3	14	4
Highway 97 / 85 <sup>th</sup> Avenue	5.0	1.2	5.5	1.3	8	5	5	1
85 <sup>th</sup> Avenue / 100 <sup>th</sup> Street	1.2	0.6	1.3	0.7	3	1	2	0

### 3.3 Conclusions

There were three intersections where the annual collision frequency during Year 7 or Year 8 exceeded the benchmark; however, all three intersections have likely explanations outside of the Site C Project’s control as to why the benchmark was exceeded:

- At the intersections of 85 Avenue and Old Fort Road, and 85 Avenue and 100 Street, the benchmark collision frequencies were respectively 0.4 and 1.2 collisions per year. These are low, such that one or two collisions at either intersection in any year would exceed the benchmarks. Given the rare and random nature of collisions, it is unlikely that a benchmark exceedance is reflective of any decrease or improvement in safety at either of these intersections.
- At the intersection of Highway 97 and 85 Avenue the benchmark collision frequencies were exceeded in Year 7, but not in Year 8. Year 7 appears to be an anomaly and there may have been other differences in conditions that could have contributed to the increase, such as construction activities on an alternate route which could have increased traffic volumes at the study intersection, or winter conditions. It also appears to be a temporary condition as the collision frequency returned to more regular conditions in Year 8.

Based on the reasons above for benchmarks being exceeded, we can conclude that the Site C project has not had any negative impacts on the road safety at any of the study intersections in Years 7 and 8 of the construction period. Given these results, no additional mitigation measures are recommended at this time.

## **4.0 Road Safety Mitigation – Road Safety Audits**

Under Section 5.2 of the TMMP it states, “BC Hydro proposes to complete an in-service road safety audit after road upgrades are complete at the intersections of:

1. 85<sup>th</sup> Avenue and Old Fort Road
2. 240 Road and 269 Road
3. 85<sup>th</sup> Avenue and 100<sup>th</sup> Street

Public road improvements to 240 Road and 269 Road were substantially completed in fall 2016. Upgrades to Old Fort Road and 271 Road were completed in 2017. At the time of the report, no road safety audit has been completed.

## **5.0 Traffic Technical Working Group**

BC Hydro coordinated a Traffic Technical Working Group meeting with representatives from MoTT, Fort St. John and the PRRD to participate in a review of annual results. The meetings to discuss each year’s report were held annually from 2017 to 2021, however due to no reported exceedances of the thresholds identified in the TMMP, the representatives recommended and endorsed conclusion of the working group.

## **6.0 Next Steps**

Complete Year 9 monitoring and reporting.

## 7.0 References

BC Hydro. 2013a. *Site C Clean Energy Project Environmental Impact Statement: Section 31 Transportation*. Vancouver, BC.

BC Hydro. 2013b. *Site C Clean Energy Project Environmental Impact Statement: Volume 4, Appendix B: Project Traffic Analysis*. Vancouver, BC.

BC Hydro. 2023a. *Construction Safety Management Plan: Section 5.4 Traffic Management Plan*. Vancouver, BC.

BC Hydro. 2023b. *Construction Safety Management Plan, Appendix B: Traffic Monitoring and Mitigation Plan – Fort St. John and North Bank Area Roads*. Vancouver, BC.

BC Hydro 2021-2023. Employment Statistics. Vancouver BC. Available at:  
<https://www.sitecproject.com/document-library/employment-statistics>. Accessed.  
January 30, 2025.

**Appendix A. Traffic Performance Monitoring Program**





2025-02-07

Confidential

**File:** CA-WSP-16M0177806

Site C Clean Energy Project  
BC Hydro & Power Authority

**Attention:** Ben Rauscher, Project Manager – Community and Social Mitigation Manager

Dear Ben,

**Reference:** Years 7 and 8 (2021-2022 and 2022-2023) Traffic Performance Monitoring Program –  
Transportation Review Site C Clean Energy Project – Fort St. John, BC

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## INTRODUCTION

We are pleased to provide the following letter report outlining the results and findings for the Years 7 (2021-22) and 8 (2022-23) Construction Traffic Monitoring Program for the Site C Clean Energy Project (the Project). Construction started in July 2015 and became operational in 2024.

As part of the Site C Clean Energy Project's Environmental Impact Statement (EIS), BC Hydro developed the Construction Safety Management Plan: Section 5.4.12 Traffic and Pavement Monitoring and the Traffic Monitoring and Mitigation Plan (TMMP) that form the framework for studying the potential effects that an increase in vehicle traffic during construction on the regional road network may have on traffic performance.

As part of the Traffic Monitoring and Mitigation Plan (TMMP) program, BC Hydro committed to providing on-going traffic performance monitoring efforts at the defined intersections in Chetwynd, Hudson's Hope, Fort St. John, and the Peace River Regional District (PRRD) at regular periods throughout Project Construction. The data collection program is scheduled to be completed quarterly for the dam site at Gate B and Gate D (269 Road entrance) and annually for typical construction years at the defined intersections while the following years were proposed to be conducted quarterly for the horizons:

- First year (Construction Year 1);
- The year prior to the peak year (Construction Year 4); and,
- The peak year of construction (Construction Year 5).

The data collection program was completed at the study intersections as well as at the gates. One intersection count was conducted at the study intersections in Chetwynd, Hudson's Hope and Fort St. John. Data at the gates were collected quarterly for Years 7 and 8 Construction, as required. This letter report summarizes the results of the Years 7 and 8 Construction Traffic Performance Monitoring Program identifying characteristics and operations of traffic patterns at the study intersections between August 2021 and August 2023.



## METHODOLOGY

In order to satisfy the monitoring program, WSP completed the following work program:

### Study Horizon Years:

- Year 7 Construction (August 2021 to August 2022)
- Year 8 Construction (August 2022 to August 2023)

### Study Scenarios:

- May 2022 (intersections in Chetwynd, Hudson's Hope and Fort St. John)
- June 2023 (intersections in Chetwynd, Hudson's Hope and Fort St. John)
- 2021 – November, 2022 – March June August and November, 2023 – February May and August (Gates B and D)

### Study Periods:

- Weekday AM peak (6:00 AM to 9:00 AM)
- Weekday PM peak (15:30 PM to 18:30 PM)
- 24 hours (Gate B and Gate D only)

### Study Area Intersections:

- Learmonth Street / Beattie Drive and Canyon Drive – Hudson's Hope
- Canyon Drive and Clarke Avenue – Hudson's Hope
- Highway 29 / 50<sup>th</sup> Street and Highway 97 – Chetwynd
- Highway 29 and Jackfish Lake Road – Chetwynd
- Highway 97 and Old Fort Road / 100 Avenue – Fort St. John
- Highway 97 and 100 Street – Fort St. John
- Highway 97 and 85 Avenue / 92A Street – Fort St. John
- Old Fort Road and 85 Avenue – Fort St. John
- 100 Street / 265 Road and 85 Avenue – Fort St. John
- Site Access Gate D (269 Road entrance) – PRRD
- Site Access Gate B – PRRD
- Reviewed traffic data provided by BC Hydro
- Reviewed the signal timing plans for the signalized study intersections from the British Columbia Ministry of Transportation and Infrastructure (Ministry).

### Assessed traffic operations:

- Reviewed existing transportation network and identified changes, if any;
- Analyzed intersection operations for Background Forecast scenarios (no Site C construction) using the estimated 2022 and 2023 baseline volumes;
- Analyzed intersection operating conditions for Total Forecast scenarios (Site C Construction) based on the traffic data provided, using Synchro 11 to evaluate operating parameters, including level of service (LOS), volume-to-capacity ratio (v/c ratio), and queuing (95<sup>th</sup> percentile queues) at the study intersections.
- The results of the traffic analysis were compared against thresholds at which mitigation measures could be considered for implementation. As indicated in the TMMP, the thresholds are:
- Left-turn and right-turn queue lengths that exceed the available storage; and



- Delays that result in vehicles experiencing a degradation of two levels of service or more (relative to service levels associated with no project traffic).

If these thresholds are exceeded, then additional traffic observations or counts would be taken at the location(s) of concern to confirm that the reduction in traffic performance is frequent and continuous, and not just periodic.

Intersections that experience traffic performance that reaches / exceeds these thresholds would be considered for mitigation and mitigation measures will be proposed.

## FINDINGS

### *Study Road Network*

Traffic data at the study area intersections in Hudson's Hope, Chetwynd, Fort St. John and the PRRD was collected using Miovision Scout video collection units during the weekday AM peak (6:00 AM – 9:00 AM) and PM peak (3:30 PM – 6:30 PM) periods. **Table 1** identifies the gate counts, study intersections and traffic data collection periods for Years 8 and 9 of the Project Construction.

**Table 2** describes the study road network. **Figure 1**, **Figure 2**, and **Figure 3** illustrate the laning configuration of the study roadway network.



Table 1 | Year Traffic Count Locations and Data Collection Periods

Intersection	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8			
	Nov 15	Feb 16	Apr 16	Jul 16	Oct 16	Feb 17	May 17	Jul 17	Oct 17	Feb 18	Apr* / May 18	Jul 18	Oct / Nov 18	Jan 19	Apr* / May 19	Aug 19	Dec 19	Jan 20	Apr* / May 20	Jul 20	Nov / Dec 20	Feb / Mar 21	May 21	Aug 21	Nov 21	March 22	May# 22	Aug 22	Nov 22	Feb 23	Jun† 23	Aug 23
Learmonth Street / Beattie Drive and Canyon Drive (Hudson's Hope)	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-
Canyon Drive and Clarke Avenue (Hudson's Hope)	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-
Highway 29 and 50th Street / Highway 97 (Chetwynd)	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-
Highway 29 and Jackfish Lake Road (Chetwynd)	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-	-	-	✓	-
Highway 97 and Old Fort Road / 100 Avenue (Fort St. John)	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	-	-	✓	-
Highway 97 and 100 Street (Fort St. John)	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	-	-	✓	-
Highway 97 and 85 Avenue / 92A Street (Fort St. John)	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	-	-	✓	-
Old Fort Road and 85 Avenue (Fort St. John)	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	-	-	✓	-
100 Street / 265 Road and 85 Avenue (Fort St. John)	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	-	-	✓	-
Site Access Gate D (PRRD)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Site Access Gate B (PRRD)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: \*Traffic Counts for intersections in Fort St. John were performed in late April. †Traffic Counts at Highway 97 and 85 Avenue in Fort St. John were recorded in July in 2023 and at Gates B and D in May 2023. #Traffic counts at Gates B and D were recorded in June 2022.



Table 2 | Road Network Characteristics

Street	Street Classification	Function	Laning	Land Access
<b>Highway 29 (Hudson's Hope)</b>	Highway	Carries regional traffic connecting surrounding communities	North of Canyon Drive: 2 lanes undivided; unsignalized control South of Canyon Drive: 4 lanes undivided; unsignalized control	<ul style="list-style-type: none"> <li>- Primarily serves commercial areas with connection to road systems that serve the general community and residential areas.</li> <li>- Direct vehicle access is provided.</li> </ul>
<b>Highway 97 (Chetwynd)</b>	Highway	Carries regional traffic connecting surrounding communities	2 lanes; signal control at most major intersections	<ul style="list-style-type: none"> <li>- Primarily serves commercial and industrial areas.</li> <li>- Direct vehicle access is limited.</li> </ul>
<b>Highway 29 (Chetwynd)</b>	Highway	Carries regional traffic connecting surrounding communities	Mostly 2 lanes, some sections also have between 3 to 4 lanes and raised or striped medians; signal control at most major intersections	<ul style="list-style-type: none"> <li>- Primarily serves commercial and industrial areas with connection to road systems that serve the general community, and residential, and commercial areas.</li> <li>- Direct vehicle access is limited.</li> </ul>
<b>Highway 97 (Fort St. John)</b>	Highway	Carries regional traffic connecting surrounding communities	4 lanes with isolated raised medians and turning lanes at most intersections; signal control at most major intersections	<ul style="list-style-type: none"> <li>- Primarily serves service commercial and light industrial areas.</li> <li>- Direct vehicle access is limited.</li> </ul>
<b>Old Fort Road</b>	Collector	Serves both traffic mobility and land service; Provides connection between local and major roadways	2 lanes; unsignalized control	<ul style="list-style-type: none"> <li>- Primarily serves service commercial and light industrial areas.</li> <li>- Direct vehicle access is provided.</li> </ul>
<b>100 Street</b>	Arterial	Accommodates medium to high traffic demands for local and regional traffic; connects between neighbourhoods and community to regional thoroughfares; limited access	<u>North of Highway 97</u> : 4 lanes with turning lanes and parking on both sides of the road; signal control at major intersections. <u>South of Highway 97</u> : 2 lanes; unsignalized control	<ul style="list-style-type: none"> <li>- Primarily serves service commercial and light industrial areas.</li> <li>- Direct vehicle access is provided.</li> </ul>
<b>85 Avenue</b>	Collector	Serves both traffic mobility and land service; Provides connection between local and major roadways	2 lanes; unsignalized control	<ul style="list-style-type: none"> <li>- Primarily serves service commercial and light industrial areas.</li> <li>- Direct vehicle access is provided.</li> </ul>



Figure 1 | Laning Configuration (Fort St. John)

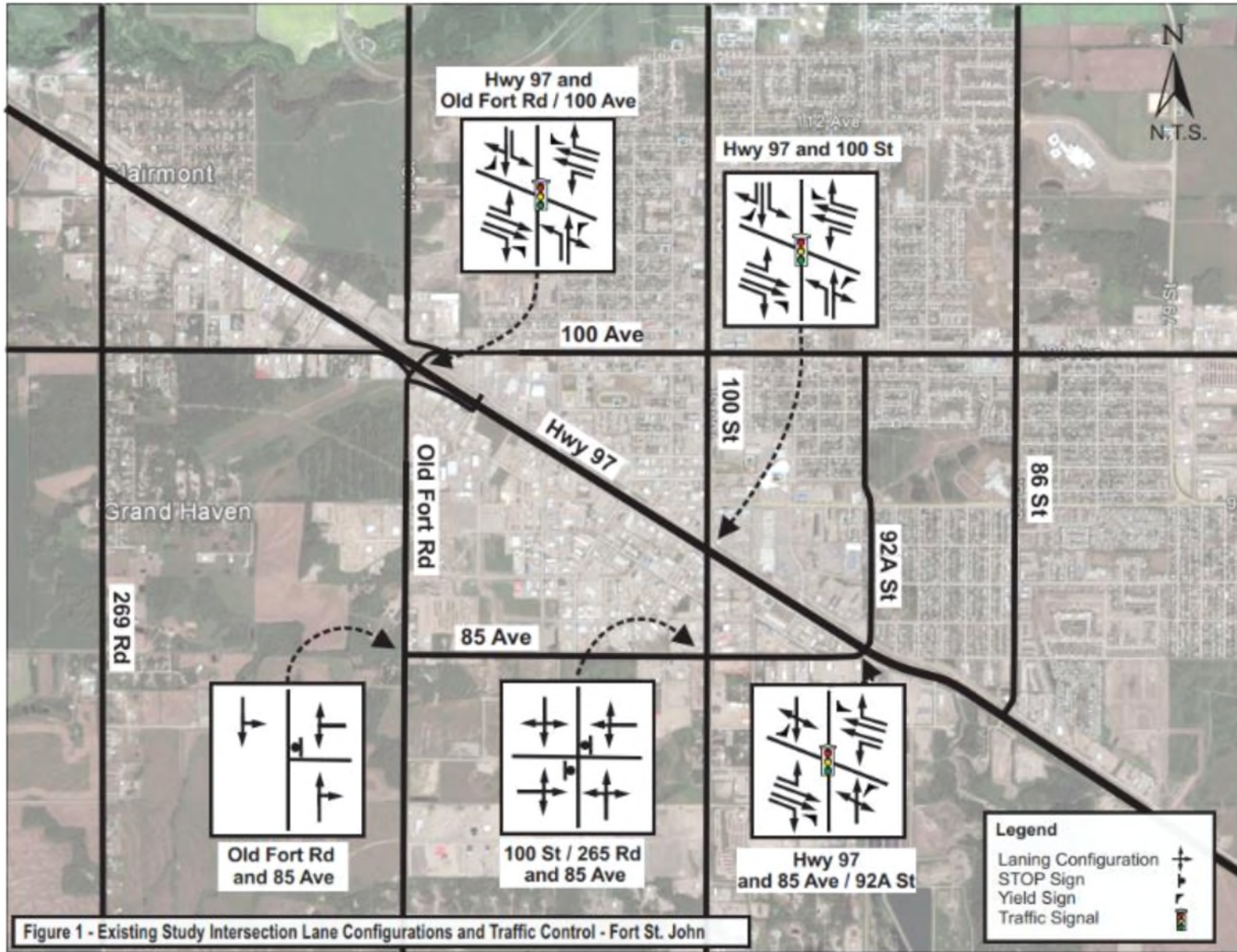


Figure 1 - Existing Study Intersection Lane Configurations and Traffic Control - Fort St. John



Figure 2 | Laning Configuration (Hudson's Hope)

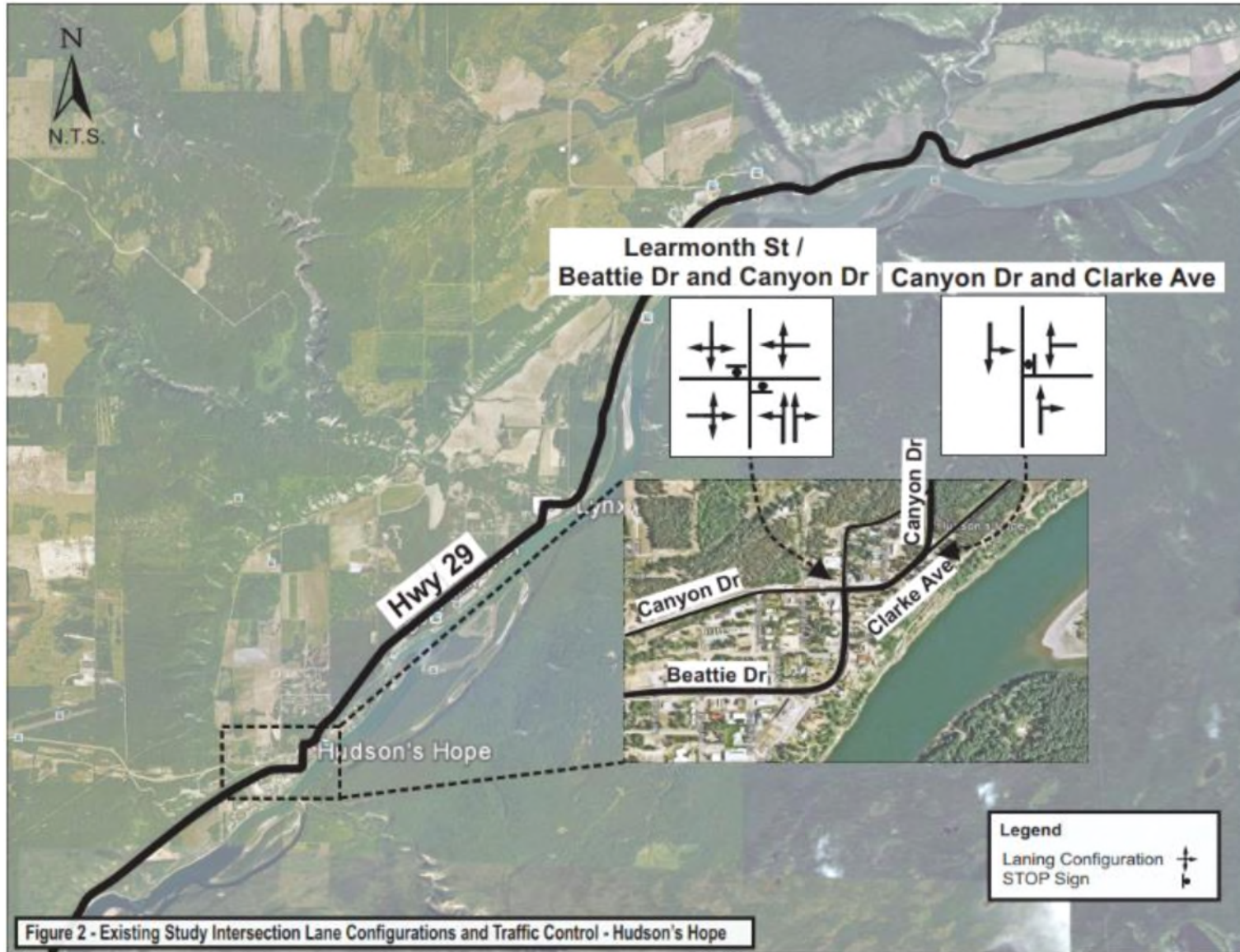
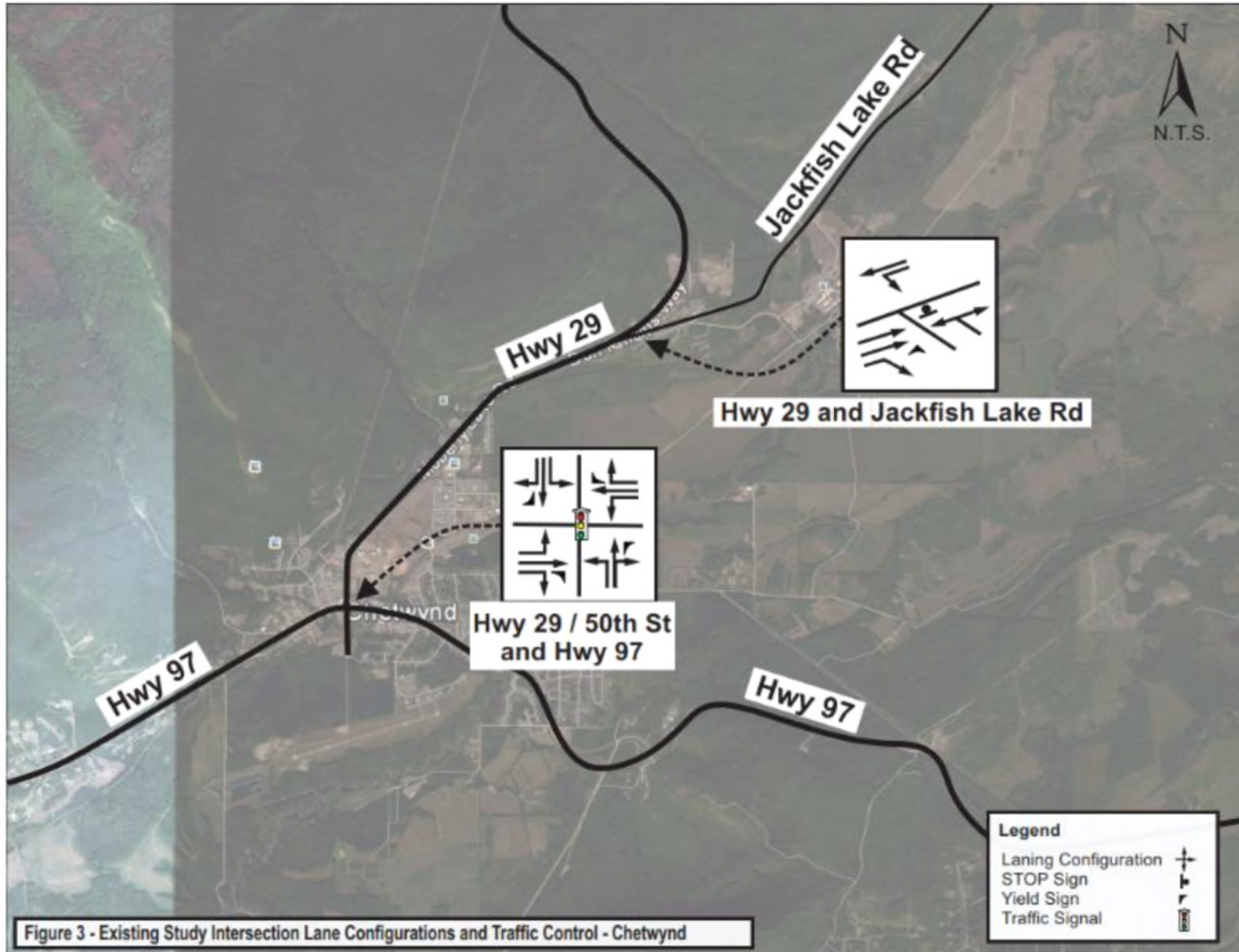




Figure 3 | Laning Configuration (Chetwynd)







## YEAR 7 TRAFFIC VOLUMES

The following sections summarize the traffic volumes and travel patterns observed in Year 7 of Project Construction.

### ***Background Traffic Volumes***

For the Year 7 traffic monitoring report, a comparison between 2014 (pre-construction of Site C) and 2022 annual average daily traffic volumes (AADT) was conducted to identify the changes in traffic volumes, using the Ministry permanent count station data at Inga Lake (P-44-1NS). Note that 2014 data was not available for the count station at Willow Flats (P-43-2NS), while 2022 data was not available for the count station at Farmington (P-43-3-NS). In comparison to year 2014, for year 2022, a significant decrease (24%) in weekday traffic volumes was observed at the station P-44-1NS at Inga Lake.

A summary of the comparison is attached in **Appendix A**.

For conservative estimates, the 2022 background traffic volumes (without Site C Construction) was estimated by applying the -24% reduction rate to the traffic volumes collected in 2014 pre-construction conditions. The 2022 background volumes were calculated to develop a baseline comparison for the Year 7 (2022) Site C Construction traffic volumes to determine potential impacts to the adjacent road network, if any.

### ***Existing Traffic Volumes with Year 7 Construction Traffic***

Year 7 (2022) construction traffic volumes were collected once at all study intersections during the AM and PM peak periods in May-June 2022 while the volumes at Gates B and D were collected quarterly.

**Table 3** and **Table 4** present the comparison between 2022 Baseline / Background traffic volumes and the 2022 Year 7 construction traffic volumes. The traffic data provided insights to changes in traffic volumes for the previous years, Year 1 to Year 6 Construction (shown in grey), compared to Year 7 Construction.

Using the available traffic volumes for all study intersections in Chetwynd, Hudson's Hope and Fort St. John, key findings include:

- There was a general decrease (-5% to -28%) in Year 7 traffic volumes in Chetwynd and Hudson's Hope when compared to traffic in 2021, during Year 6 construction volumes. This is with the exception of Beattie Drive, Canyon Drive and Learmonth Street which had a 7% increase in the PM peak.
- Fort St. John's 85 Avenue and Old Fort Road intersection had a substantially large increase of around 150% from the Year 7 baseline in both peak hours.
- Total traffic volume through each community's key intersections during both peak hours increased by 2-152% compared to the Year 7 baseline, with Fort St. John seeing more volume in the PM peak and Hudson's Hope seeing the largest increase across both peaks.
- Construction volumes recorded at both Gate D (269 Road entrance) and Gate B were highest in November 2021 and March 2022 in the PM and AM peaks. Gate B saw an increase of over 100% throughout the year.

### **Hudson's Hope Intersections |**

- When compared to the baseline, there was a general increase (37-51%) in the traffic volumes at both study intersections in Year 7 Construction during both peak hours.



- Traffic volumes decreased (-26 to -28%) during the AM peak while the PM peak remained relatively similar when comparing Year 6 to Year 7 Construction.

#### **Chetwynd Intersections |**

- When compared to the baseline, there was a general increase in the traffic volumes at both study intersections in Year 7 Construction during both peak hours, except only a slight increase in the evening peak hour at Highway 29 and Jackfish Lake Road.
- When compared to Year 6 Construction, traffic volumes collected in Year 7 saw a slight decrease during both peak hours.

#### **Fort St. John Intersections |**

- There was substantially large increase of around 150% in traffic volumes from the Year 7 baseline traffic volume at the intersection of Old Fort Road and 85 Avenue in both peak hours.
- Year 7 Construction volumes at the other study intersections saw a general increase during the PM peak hours when compared to the baseline.
- The AM peak hours saw a slight increase in traffic volume, except at 100 Street and 85 Avenue which saw a more substantial increase in traffic.
- When compared to Year 6 Construction, the Year 7 Construction volumes experienced slight changes (+ 13% or less) during both peak hours except for the 85 Avenue and Old Fort Road intersection during the AM peak (+41%).



Table 3 | Year 7 Intersection Traffic Comparison – AM Peak

Intersection	2022 - AM	2015	2016	2016	2016	2017	2018	2019	2020	2021	2022
	Background	Nov	Feb	Apr	Jul	May	May	Peak*	Peak**	May	May
	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)
Learmonth Street / Beattie Drive and Canyon Drive (Hudson's Hope)	90	-	-	124	-	149	176	144	133	178	129
				46%		75%	107%	69%	56%	109%	43%
Canyon Drive and Clarke Avenue (Hudson's Hope)	74	-	-	85	-	110	125	89	104	141	104
				21%		57%	79%	27%	49%	101%	41%
Highway 29 / 50th Street and Highway 97 (Chetwynd)	502	-	-	701	-	802	686	725	489	700	632
				48%		69%	44%	53%	3%	47%	26%
Highway 29 and Jackfish Lake Road (Chetwynd)	156	-	-	211	-	204	220	242	189	231	197
				44%		39%	50%	65%	29%	57%	26%
Highway 97 and Old Fort Road / 100 Avenue (Fort St. John)	1513	1804	1722	1701	1521	1728	1684	1780	1732	1728	1737
		26%	20%	19%	6%	21%	17%	24%	21%	21%	15%
Highway 97 and 100 Street (Fort St. John)	1506	1766	1692	1629	1739	1739	1675	1677	1602	1538	1630
		24%	18%	14%	22%	22%	17%	17%	12%	8%	8%
Highway 97 and 85 Avenue / 92A Street (Fort St. John)	1307	1629	1339	1338	1411	1506	1469	1521	1433	1321	1335
		32%	8%	8%	14%	22%	19%	23%	16%	7%	2%
Old Fort Road and 85 Avenue (Fort St. John)	126	168	119	111	197	285	182	230	217	226	318
		28%	-9%	-15%	50%	118%	39%	76%	66%	73%	152%
100 Street / 265 Road and 85 Avenue (Fort St. John)	259	350	267	263	253	359	276	325	364	339	382
		42%	9%	7%	3%	46%	12%	32%	48%	38%	47%

Note: \*Peak traffic demand in Fort St. John occurred in October / November quarterly count period and data collection only collected in May in Chetwynd and Hudson's Hope.

\*\* Peak traffic demand in Fort St. John occurred in December quarterly count period and data only collected in May in Chetwynd and Hudson's Hope.



Table 4 | Year 7 Intersection Traffic Comparison – PM Peak

Intersection	2022 - PM	2015	2016	2016	2016	2017	2018	2019	2020	2021	2022
	Background	Nov	Feb	Apr	Jul	May	May	Peak*	Peak**	May	May
	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)
Learmonth Street / Beattie Drive and Canyon Drive (Hudson's Hope)	166	-	-	222	-	259	282	271	211	234	250
				41%		65%	80%	73%	34%	49%	51%
Canyon Drive and Clarke Avenue (Hudson's Hope)	113	-	-	137	-	170	169	159	144	164	155
				28%		59%	58%	49%	35%	53%	37%
Highway 29 / 50th Street and Highway 97 (Chetwynd)	757	-	-	944	-	1027	1014	1079	996	994	946
				31%		43%	41%	50%	39%	38%	25%
Highway 29 and Jackfish Lake Road (Chetwynd)	222	-	-	241	-	243	266	309	292	281	239
				15%		16%	27%	47%	39%	34%	8%
Highway 97 and Old Fort Road / 100 Avenue (Fort St. John)	1706	2056	1857	1941	1958	2233	1805	2083	2130	2185	2275
		27%	15%	20%	21%	38%	12%	29%	32%	35%	33%
Highway 97 and 100 Street (Fort St. John)	1945	2416	2040	2126	2190	2354	1984	2288	2302	2184	2398
		31%	11%	15%	19%	28%	8%	24%	25%	19%	23%
Highway 97 and 85 Avenue / 92A Street (Fort St. John)	1342	1779	1527	1530	1815	1903	1530	1848	1776	1640	1740
		40%	20%	20%	43%	49%	20%	45%	40%	29%	30%
Old Fort Road and 85 Avenue (Fort St. John)	136	209	181	178	187	266	231	297	354	267	338
		61%	39%	37%	44%	105%	78%	128%	172%	105%	149%
100 Street / 265 Road and 85 Avenue (Fort St. John)	306	329	328	245	282	365	284	346	354	386	399
		13%	13%	-16%	-3%	26%	-2%	19%	27%	33%	30%

Note: \*Peak traffic demand in Fort St. John occurred in October / November quarterly count period and data collection only collected in May in Chetwynd and Hudson's Hope.

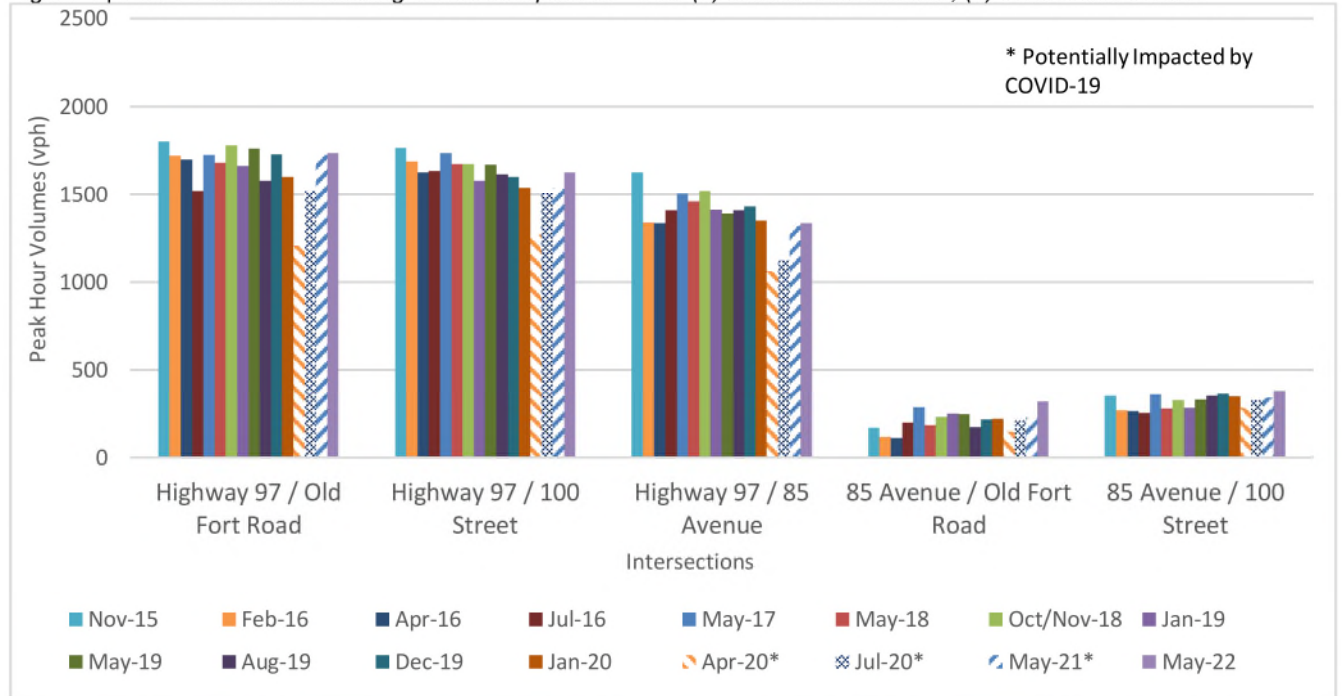
\*\* Peak traffic demand in Fort St. John occurred in December quarterly count period and data only collected in May in Chetwynd and Hudson's Hope.

**Figure 4** and **Figure 5** illustrate the AM and PM peak hour traffic volumes at the study intersections in Fort St. John. Note that the data collection program was conducted once annually for Year 2 (2017), Year 3 (2018), Year 6 (2021), and Year 7 (2022) while Year 1 (2016), Year 4 (2019) and Year 5 (2020) data was collected quarterly at key intersections in Fort St. John, as required. Traffic volumes for Year 7 Construction of the area are illustrated in **Appendix B**.

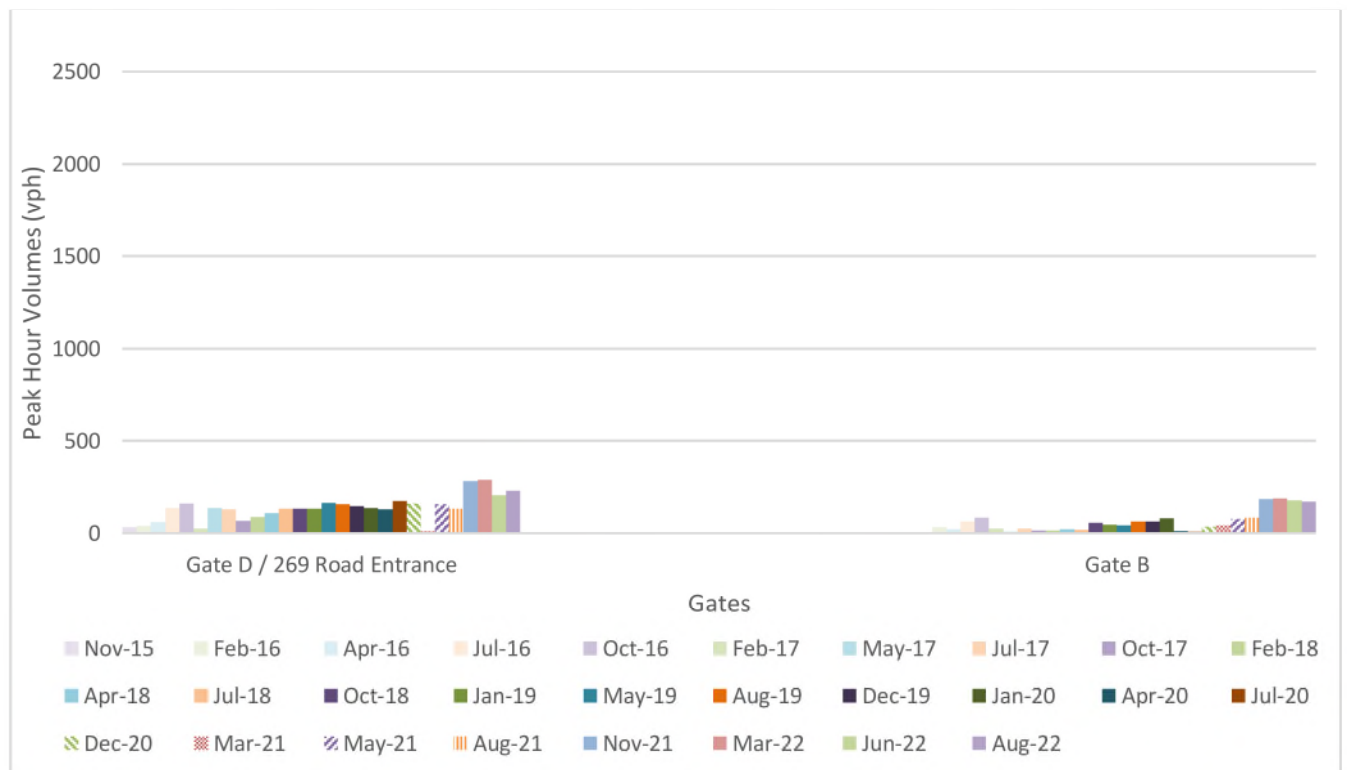
Activities at Gate D and Gate B were both higher in Year 7 than any other year during the project, with the peak construction activities recorded at Gate B and Gate D (269 Road entrance) occurred during the March quarter.



Figure 4 | Year 7 Peak Hour Entering Traffic Comparison – AM: (a) Studied Intersections; (b) Gate B and Gate D



(a)



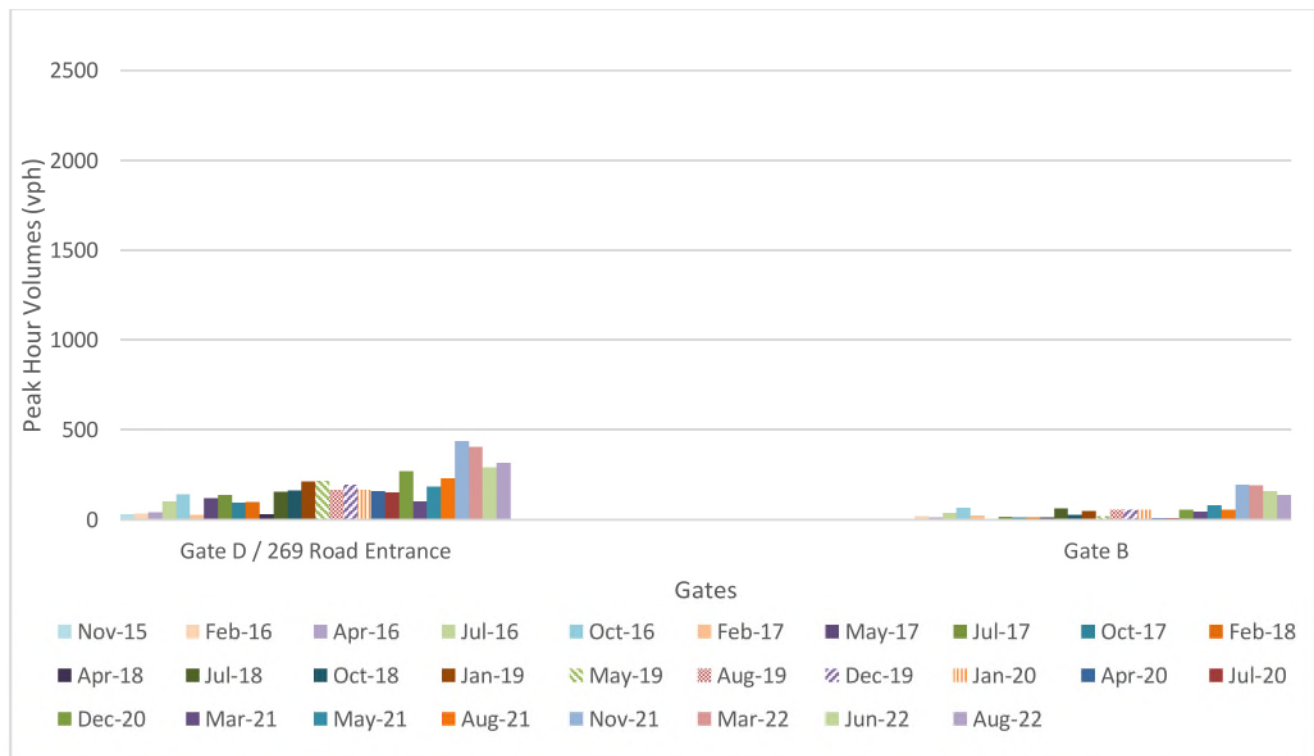
(b)



Figure 5 | Year 7 Peak Hour Entering Traffic Comparison – PM (a) Studied Intersections; (b) Gate B and Gate D



(a)



(b)



## YEAR 8 TRAFFIC VOLUMES

The following sections summarize the traffic volumes and travel patterns observed in Year 8 of Project Construction.

### ***Background Traffic Volumes***

For the Year 8 traffic monitoring report, a comparison between 2014 (pre-construction of Site C) and 2023 annual average daily traffic volumes (AADT) was conducted to identify the changes in traffic volumes, using the Ministry permanent count station data at Inga Lake (P-44-1NS). Note that 2014 data was not available for the count station at Willow Flats (P-43-2NS), while 2023 data was not available for the count station at Farmington (P-43-3-NS). In comparison to year 2014, for year 2023, a significant decrease (18%) in weekday traffic volumes was observed at the station P-44-1NS at Inga Lake.

A summary of the comparison is attached in **Appendix A**.

For conservative estimates, the 2023 background traffic volumes (without Site C Construction) was estimated by applying the -18% reduction rate to the traffic volumes collected in 2014 pre-construction conditions. The 2023 background volumes were calculated to develop a baseline comparison for the Year 8 (2023) Site C Construction traffic volumes to determine potential impacts to the adjacent road network, if any.

### ***Existing Traffic Volumes with Year 8 Construction Traffic***

Year 8 (2023) construction traffic volumes were collected once at all study intersections during the AM and PM peak periods in June 2023 while the volumes at Gates B and D were collected quarterly.

**Table 5** and **Table 6** present the comparison between 2023 Baseline / Background traffic volumes and the 2023 Year 8 construction traffic volumes. The traffic data provided insights to changes in traffic volumes for the previous years, Year 1 to Year 7 Construction (shown in grey), compared to Year 8 Construction.

Using the available traffic volumes for all study intersections in Chetwynd, Hudson's Hope and Fort St. John, key findings include:

- There was an increase between 10-30% in traffic volumes in Chetwynd's study intersections in the PM peak when compared to the baseline.
- Traffic volumes at study intersections in Hudsons Hope saw a general increase (10-20%) during the AM peak.
- Fort St. John's intersections with Highway 97 had minimal ( $\pm 5\%$ ) change compared to Year 7, except for Old Fort Road and 85 Avenue.
- Old Fort Road and 85 Avenue had a substantially larger (150-180%) volume in Year 8 Construction than the baseline.
- Construction volumes recorded at both gates was highest during the February period, with volumes increasing almost 100% in February 2023 compared to other periods.

### **Hudson's Hope Intersections |**

- When compared to the baseline, there was a general increase (25%-60%) in the traffic volumes at both study intersections in Year 8 Construction during both peak hours.
- Traffic volumes slightly increased during the AM peak, and remained similar ( $\pm 5\%$ ) in the PM peak when comparing Year 7 to Year 8 Construction.



### **Chetwynd Intersections |**

- When compared to the baseline, there was a general increase in the traffic volumes at both study intersections in Year 8 Construction during both peak hours.
- The peak for Year 8 Construction at all intersections increased from Year 7 volumes, except Highway 29 and Jackfish Lake Road was similar to Year 7 in the AM Peak.

### **Fort St. John Intersections |**

- Traffic volumes at the study intersections saw a general increase during PM peak hours when comparing the Year 8 Construction to the baseline, with Highway 97 and 100 Street having a smaller increase than other intersections
- When comparing the Year 8 study intersections to the baseline in the AM peak, the Highway 97 intersections were similar and the 85 Avenue intersections experienced general increases.
- When compared to Year 7 Construction, the Year 8 Construction volumes experienced minor changes (+/- 6% or less) during both peak hours except for a somewhat significant increase at the 85 Avenue and Old Fort Road intersection.
- The intersection of 85 Avenue and Old Fort Road experienced large increases in Year 8 Construction traffic compared to the baseline, in the order of 150% in the AM Peak and 180% in the PM peak.





Table 5 | Year 8 Intersection Traffic Comparison – AM Peak

Intersection	2023 - AM	2015	2016	2016	2016	2017	2018	2019	2020	2021	2022	2023
	Background	Nov	Feb	Apr	Jul	May	May	Peak*	Peak**	May	May	Jun
	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)
Learmonth Street / Beattie Drive and Canyon Drive (Hudson's Hope)	98	-	-	124	-	149	176	144	133	178	129	142
				46%		75%	107%	69%	56%	109%	43%	45%
Canyon Drive and Clarke Avenue (Hudson's Hope)	79	-	-	85	-	110	125	89	104	141	104	126
				21%		57%	79%	27%	49%	101%	41%	59%
Highway 29 / 50th Street and Highway 97 (Chetwynd)	541	-	-	701	-	802	686	725	489	700	632	739
				48%		69%	44%	53%	3%	47%	26%	37%
Highway 29 and Jackfish Lake Road (Chetwynd)	167	-	-	211	-	204	220	242	189	231	197	204
				44%		39%	50%	65%	29%	57%	26%	22%
Highway 97 and Old Fort Road / 100 Avenue (Fort St. John)	1634	1804	1722	1701	1521	1728	1684	1780	1732	1728	1737	1717
		26%	20%	19%	6%	21%	17%	24%	21%	21%	15%	5%
Highway 97 and 100 Street (Fort St. John)	1624	1766	1692	1629	1739	1739	1675	1677	1602	1538	1630	1662
		24%	18%	14%	22%	22%	17%	17%	12%	8%	8%	2%
Highway 97 and 85 Avenue / 92A Street (Fort St. John)	1410	1629	1339	1338	1411	1506	1469	1521	1433	1321	1335	1382
		32%	8%	8%	14%	22%	19%	23%	16%	7%	2%	-2%
Old Fort Road and 85 Avenue (Fort St. John)	150	168	119	111	197	285	182	230	217	226	318	378
		28%	-9%	-15%	50%	118%	39%	76%	66%	73%	152%	152%
100 Street / 265 Road and 85 Avenue (Fort St. John)	279	350	267	263	253	359	276	325	364	339	382	362
		42%	9%	7%	3%	46%	12%	32%	48%	38%	47%	30%

Note: \*Peak traffic demand in Fort St. John occurred in October / November quarterly count period and data collection only collected in May in Chetwynd and Hudson's Hope.

\*\* Peak traffic demand in Fort St. John occurred in December quarterly count period and data only collected in May in Chetwynd and Hudson's Hope.



Table 6 | Year 8 Intersection Traffic Comparison – PM Peak

Intersection	2023 - PM	2015	2016	2016	2016	2017	2018	2019	2020	2021	2022	2023
	Background	Nov	Feb	Apr	Jul	May	May	Peak*	Peak**	May	May	Jun
	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)
Learmonth Street / Beattie Drive and Canyon Drive (Hudson's Hope)	179	-	-	222	-	259	282	271	211	234	250	259
				41%		65%	80%	73%	34%	49%	51%	45%
Canyon Drive and Clarke Avenue (Hudson's Hope)	121	-	-	137	-	170	169	159	144	164	155	153
				28%		59%	58%	49%	35%	53%	37%	26%
Highway 29 / 50th Street and Highway 97 (Chetwynd)	817	-	-	944	-	1027	1014	1079	996	994	946	1041
				31%		43%	41%	50%	39%	38%	25%	27%
Highway 29 and Jackfish Lake Road (Chetwynd)	239	-	-	241	-	243	266	309	292	281	239	307
				15%		16%	27%	47%	39%	34%	8%	28%
Highway 97 and Old Fort Road / 100 Avenue (Fort St. John)	1841	2056	1857	1941	1958	2233	1805	2083	2130	2185	2275	2400
		27%	15%	20%	21%	38%	12%	29%	32%	35%	33%	30%
Highway 97 and 100 Street (Fort St. John)	2098	2416	2040	2126	2190	2354	1984	2288	2302	2184	2398	2256
		31%	11%	15%	19%	28%	8%	24%	25%	19%	23%	8%
Highway 97 and 85 Avenue / 92A Street (Fort St. John)	1447	1779	1527	1530	1815	1903	1530	1848	1776	1640	1740	1802
		40%	20%	20%	43%	49%	20%	45%	40%	29%	30%	25%
Old Fort Road and 85 Avenue (Fort St. John)	149	209	181	178	187	266	231	297	354	267	338	420
		61%	39%	37%	44%	105%	78%	128%	172%	105%	149%	182%
100 Street / 265 Road and 85 Avenue (Fort St. John)	331	329	328	245	282	365	284	346	354	386	399	406
		13%	13%	-16%	-3%	26%	-2%	19%	27%	33%	30%	23%

Note: \*Peak traffic demand in Fort St. John occurred in October / November quarterly count period and data collection only collected in May in Chetwynd and Hudson's Hope.

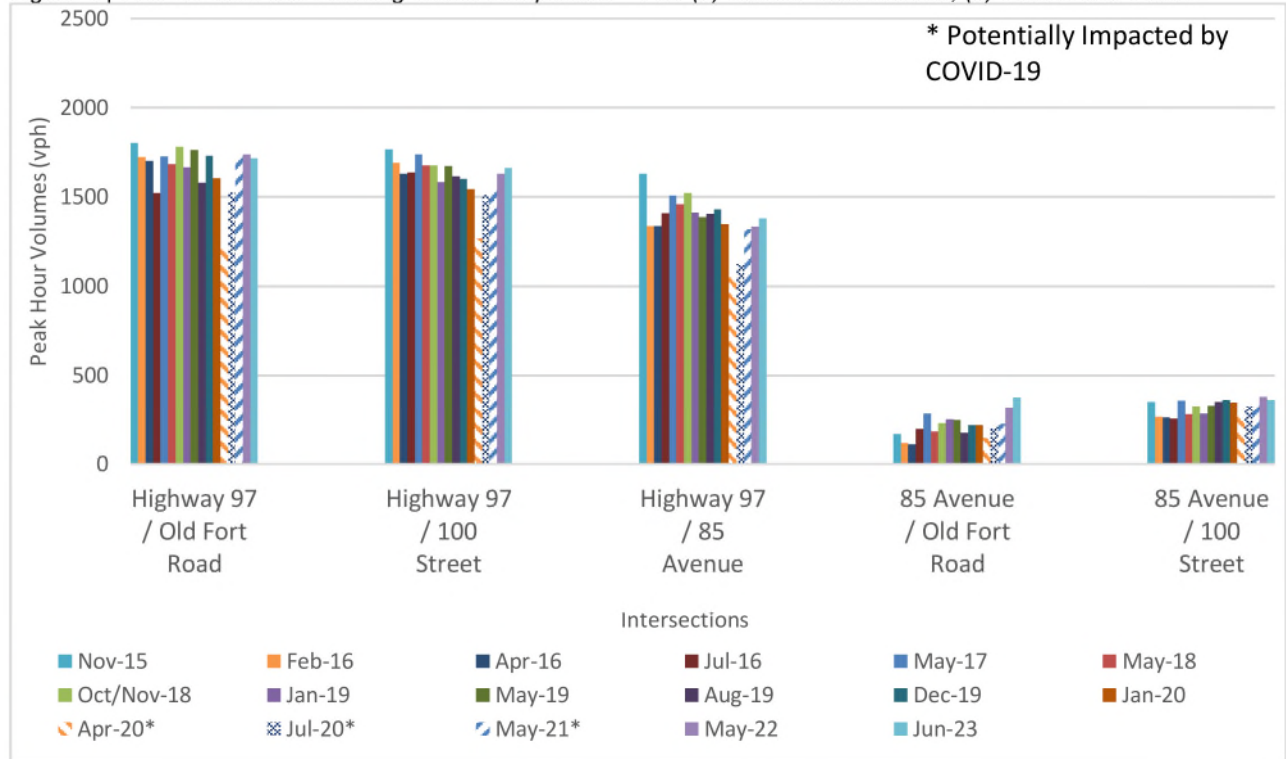
\*\* Peak traffic demand in Fort St. John occurred in December quarterly count period and data only collected in May in Chetwynd and Hudson's Hope.

**Figure 6** and **Figure 7** illustrate the AM and PM peak hour traffic volumes at the study intersections in Fort St. John. Note that the data collection program was conducted once annually for Year 2 (2017), Year 3 (2018), Year 6 (2021), and Year 7 (2022) while Year 1 (2016), Year 4 (2019) and Year 5 (2020) data was collected quarterly at key intersections in Fort St. John, as required. Traffic volumes for Year 8 Construction of the area are illustrated in **Appendix B**.

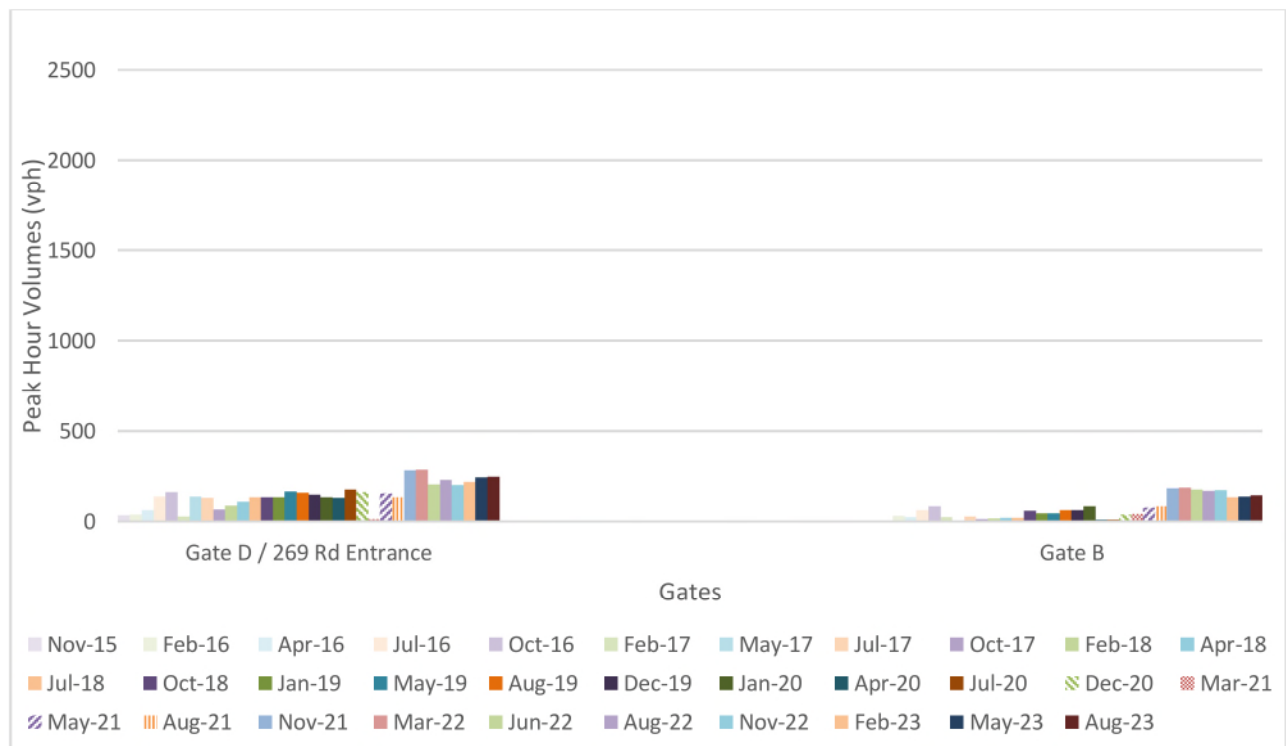
Activities at both Gate D and Gate B were relatively higher compared to pre-covid (2019) volumes in Year 8, but were consistently lower than the volumes seen at both gates in Year 7. The peak construction activities recorded at Gate B and Gate D (269 Road entrance) occurred during the November quarter at Gate B, and during the August period at Gate D (269 Road entrance).



Figure 6 | Year 8 Peak Hour Entering Traffic Comparison – AM: (a) Studied Intersections; (b) Gate B and Gate D



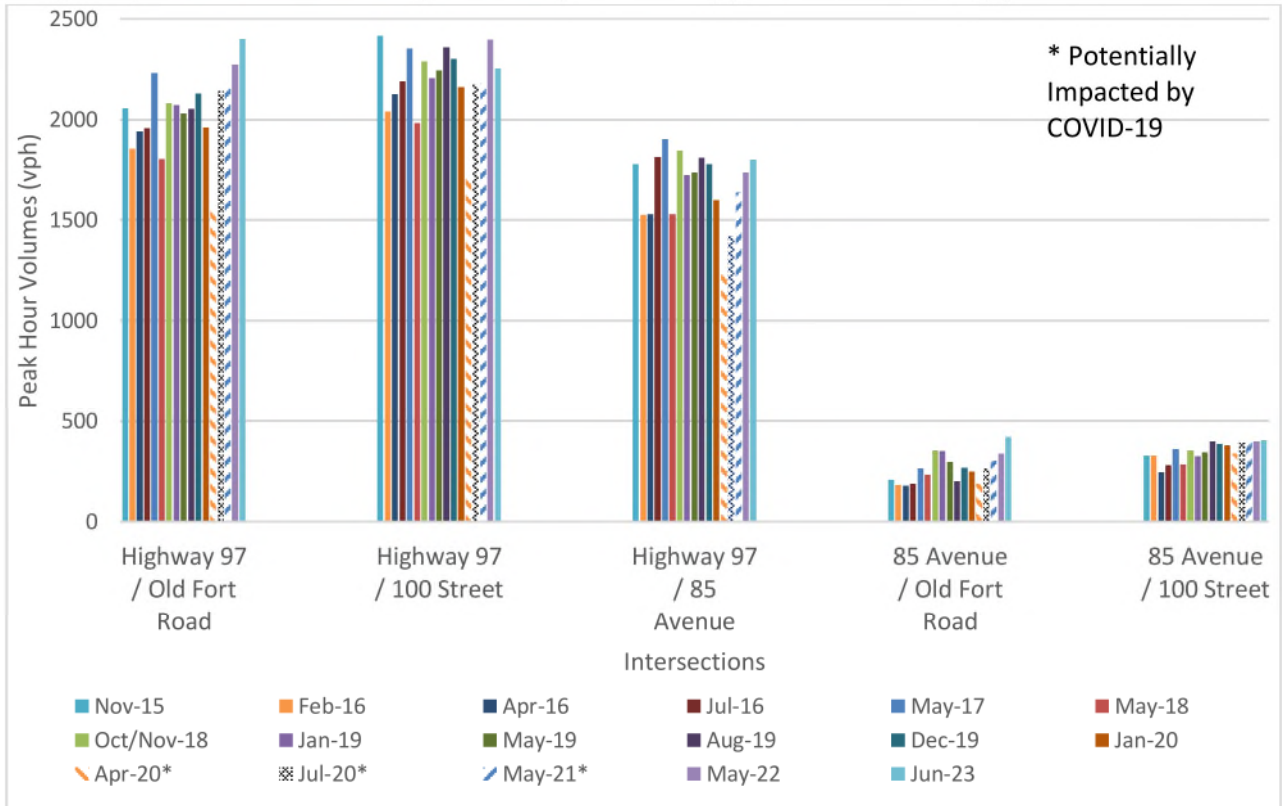
(a)



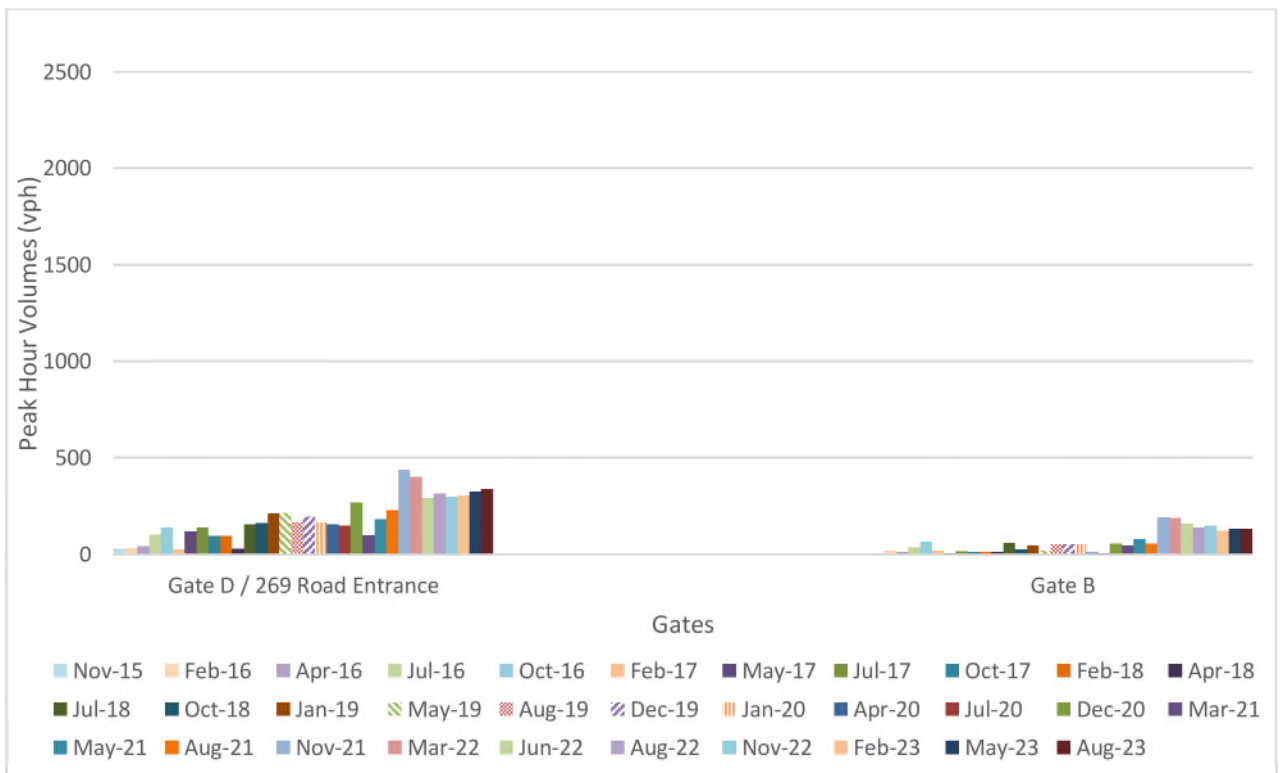
(b)



Figure 7 | Year 8 Peak Hour Entering Traffic Comparison – PM (a) Studied Intersections; (b) Gate B and Gate D



(a)



(b)



## STUDY INTERSECTION PEAK HOURS

### Year 7 Peak Hours

Figure 8 and Figure 9 illustrate the percentage of hourly intersection volumes compared against the peak hour volume at the same intersection at the AM and PM peak periods.

Figure 8 | Hourly Intersection Traffic Comparison – AM Peak – Year 7 Peak Traffic (May/June).

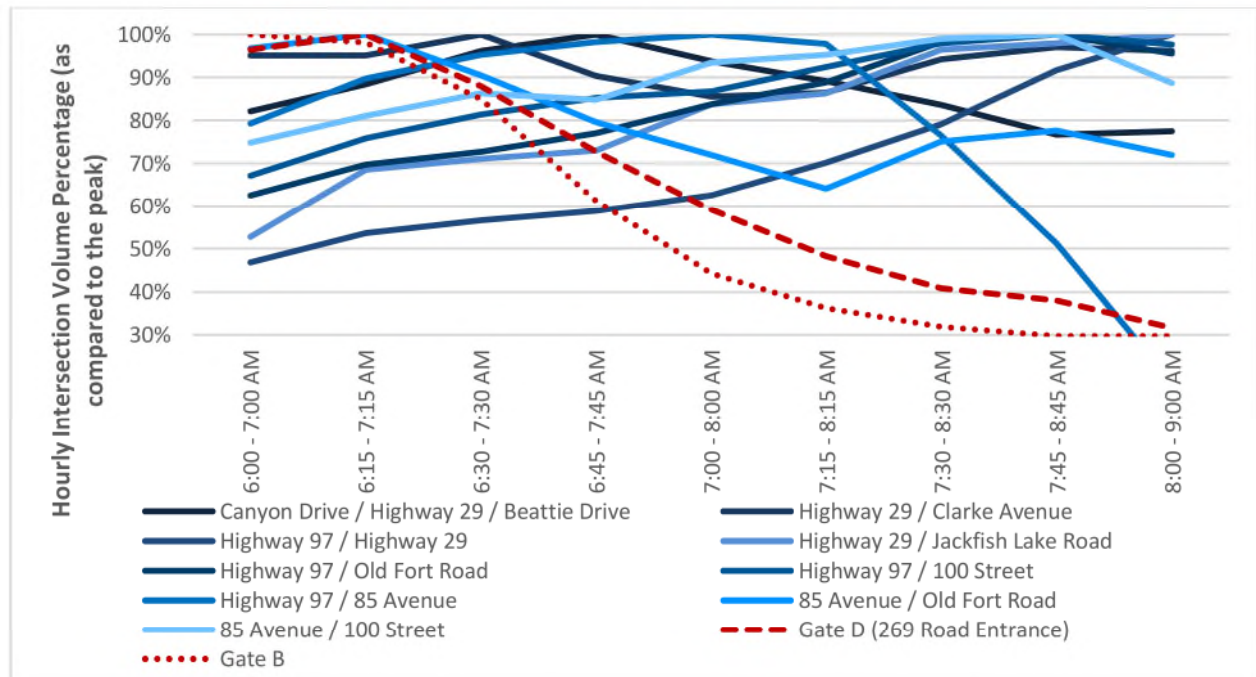
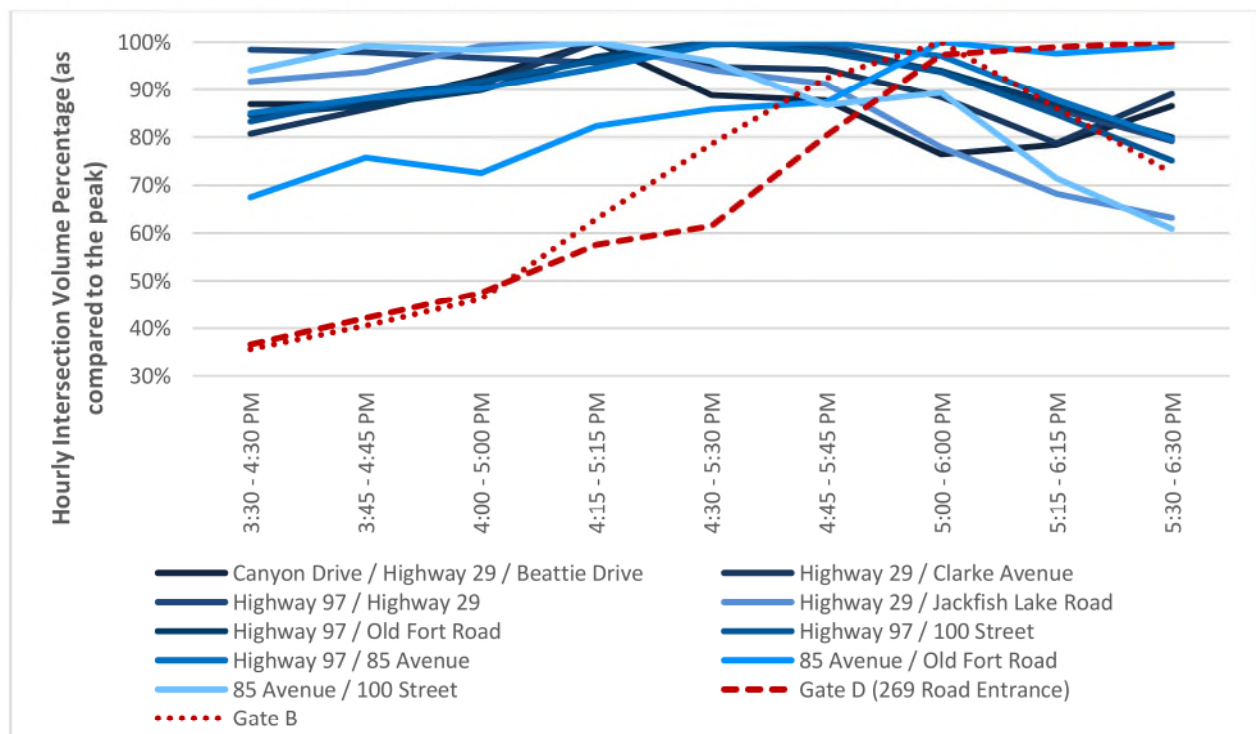


Figure 9 | Hourly Intersection Traffic Comparison – PM Peak – Year 7 Peak Traffic (May/June)





Key findings include:

### AM Peak Hour |

- It was identified that the construction traffic peaked at a different time compared to typical commuter traffic during the AM peak period for most study intersections. Commuter traffic volumes at the study intersections in Fort St. John peaked between 7:45 AM and 8:45 AM while construction activities recorded at Gate B and Gate D (269 Road entrance) peaked earlier, between 6:00 AM and 7:15 AM.
- The peak hour timing at 85 Avenue and Old Fort Road in Fort St. John aligned with the Gate Peak hours at 6:15-7:15 AM.
- Highway 97 and 85 Avenue had a slightly earlier peak hour than other intersections on Highway 97 in Fort St. John at 6:45-7:45 AM.
- Intersections in Hudsons Hope peaked earlier than Fort St. John and Chetwynd, with Canyon Drive, Highway 29 and Beattie Drive peaking at 6:45-7:45 AM, and Highway 29 and Clarke Avenue peaking at 6:30-7:30 AM.
- Intersections in Chetwynd peaked later, from 8:00-9:00 AM.

### PM Peak Hour |

- Construction volumes at Gate B and Gate D (269 Road entrance) peak activities did not coincide with commuter traffic peak traffic volumes, except for 85 Avenue and Old Fort Road.

### Year 8 Peak Hours

Figure 10 and Figure 11 illustrate the percentage of hourly intersection volumes compared against the peak hour volume at the same intersection at the AM and PM peak periods.

Figure 10 | Hourly Intersection Traffic Comparison – AM Peak – Year 8 Peak Traffic (May/June)

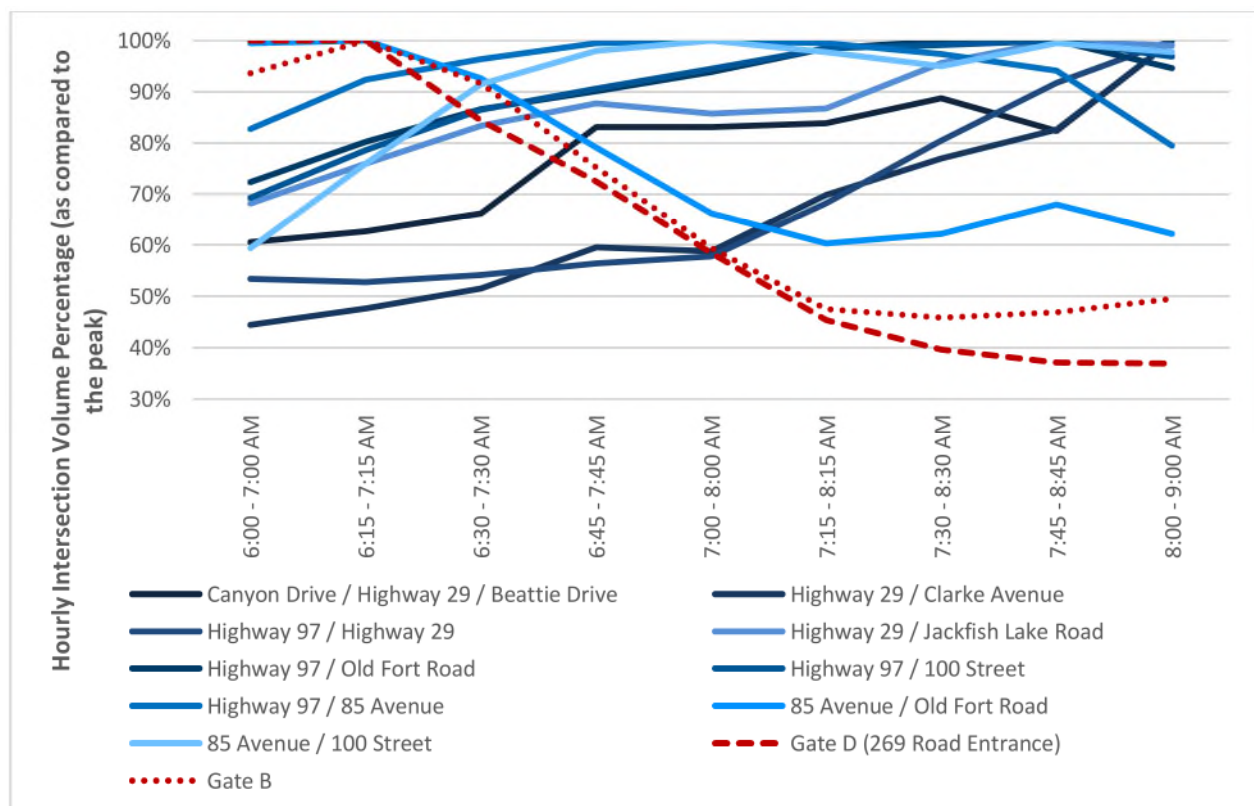
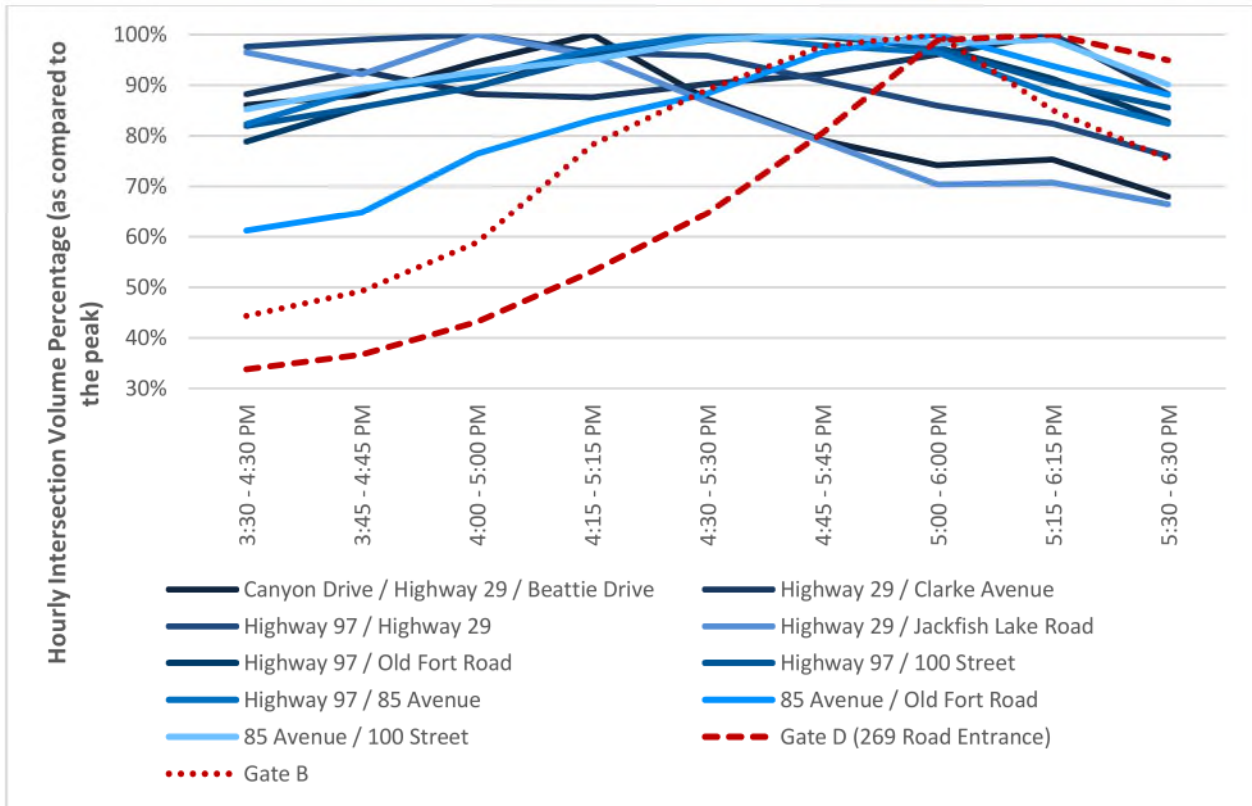




Figure 11 | Hourly Intersection Traffic Comparison – PM Peak – Year 8 Peak Traffic (May/June)



Key findings include:

**AM Peak Hour |**

- It was identified that the construction traffic peaked at a different time compared to typical commuter traffic during the AM peak period, except at the intersection of 85 Avenue and Old Fort Road. Commuter traffic volumes at the study intersections in Fort St. John peaked between 7:00 AM and 9:00 AM while construction activities recorded at Gate B and Gate D (269 Road entrance) peaked earlier, between 6:00 AM and 7:15 AM.
- At 85 Avenue and Old Fort Road, the commuter peak coincided with the Gate Peak at 6:15-7:15 AM.

**PM Peak Hour |**

- Construction volumes at Gate B and Gate D (269 Road entrance) peak activities were roughly 15-30 minutes (5:00 – 6:15 PM) later than the commuter traffic peak traffic volumes in Fort St. John (4:30-6:00PM).
- Commuter peak hours in Chetwynd and Hudsons Hope were earlier than Fort St. John and the gates, from 4:00-5:15PM, with the exception of Highway 29 and Clarke Avenue which peaked at 5:15-6:15 PM.



## TRAFFIC OPERATIONAL ANALYSIS

Synchro (Version 11) software was used to evaluate the performance of intersections in the study area for the study scenarios during both AM and PM peak hours. Reported measures of traffic performance include volume to capacity (v/c) ratio and a delay-based traffic Level of Service (LOS) indicator ranging from LOS A (ideal) to LOS F (over-saturated) conditions. As a rule, LOS E and F indicate congested operations.

The results of the traffic analysis were compared against thresholds to determine traffic operational deficiencies. As indicated in the TMMP, the thresholds are:

- Delays that result in vehicles experiencing a degradation in two LOS or more (relative to service levels associated with no Project traffic); and
- 95<sup>th</sup> percentile left and right turn queue lengths that exceed the available storage. The 95<sup>th</sup> percentile queue length is the maximum back of the queue with 95<sup>th</sup> percentile traffic volumes (on a typical cycle). The 95<sup>th</sup> percentile queue is not typically experienced mainly when upstream metering controls the incoming volumes; therefore, the queue is not necessarily observed. The 95<sup>th</sup> percentile queue represents the worst-case scenario and is used as an indicator to determine where further examination of storage length is required. The value reported as the 95<sup>th</sup> percentile queue must be used with caution since it may result in a significant over-design if applied as reported. Therefore, for movements where the 95<sup>th</sup> percentile queue exceeds the storage length, 50<sup>th</sup> percentiles were also reviewed. 50<sup>th</sup> percentile queue length represents the maximum back of the queue with 50<sup>th</sup> percentile traffic volumes.

### *Year 7 Traffic Operational Analysis*

**Table 7** and **Table 8** summarize the capacity analysis results for the Year 7 (2022) background/baseline and total scenarios during the AM and PM peak hours respectively.

Key findings include:

- All movements operate at LOS C or better during the AM peak hour for Year 7 Construction.
- All movements operate at LOS C or better during the PM peak hour for Year 7 Construction, except for the following:
  - Westbound left turn movement at the intersection of Highway 97 and Old Fort Road / 100 Avenue which operates at LOS E in the 2022 Total PM peak scenario. Compared to the 2022 Background PM peak scenario, this movement has experienced two LOS degradation **and would therefore constitute as a deficiency**.
  - Westbound left turn movement at the intersection of Highway 97 and 100 Street which operates at LOS D in the 2022 Total PM peak scenario. Compared to the 2022 Background PM scenario, this movement has not experienced any LOS degradation.
- For all movements, 95<sup>th</sup> percentile queue lengths do not exceed the available storage during the AM peak hour for Year 7 Construction.
- 95<sup>th</sup> percentile queue lengths exceed the available storage during the PM peak hour for Year 7 Construction only for the following movements:
  - Shared eastbound through-right movement at the intersection of Highway 97 and Old Fort Road / 100 Avenue. However, the 95<sup>th</sup> percentile queue for this movement does not exceed the available storage length in the 2022 Background PM peak scenario. In the 2022 Total PM peak scenario, the 95<sup>th</sup> percentile queue exceeds the available storage length by approximately three car lengths (21 m). The queue spills over and blocks the adjacent intersection of Old Fort Road and Alaska Road S. However, the average queue for this movement does not exceed the available storage length under this scenario.





- Eastbound left turn movement at the intersection of Highway 97 and 100 Street. However, the 95<sup>th</sup> percentile queue for this movement does not exceed the available storage length in the 2022 Background PM peak scenario. In the 2022 Total PM peak scenario, the 95<sup>th</sup> percentile queue exceeds the available storage length by less than one car length (5 m). Therefore, this queuing deficiency can be considered negligible. Additionally, the average queue for this movement does not exceed the available storage length under this scenario.
- Shared eastbound through-right movement at the intersection of Highway 97 and 100 Street. The 95<sup>th</sup> percentile queue for this movement also exceeds the available storage length in the 2022 Background PM peak scenario. In the 2022 Total PM peak scenario, the 95<sup>th</sup> percentile queue exceeds the available storage length by approximately two car lengths (14 m). The queue spills over and blocks the adjacent intersection of 100 Street and Alaska Road S. However, the average queue for this movement does not exceed the available storage length under this scenario.
- Shared eastbound left-through-right movement at the intersection of Highway 97 and 85 Avenue / 92A Street. However, the 95<sup>th</sup> percentile queue for this movement does not exceed the available storage length in the 2022 Background PM peak scenario. In the 2022 Total PM peak scenario, the 95<sup>th</sup> percentile queue exceeds the available storage length by approximately one car length (8 m). The queue spills over and blocks the adjacent intersection of 93 Street and 85 Avenue. However, the average queue for this movement does not exceed the available storage length under this scenario.

Table 7 | Operational Analysis Result – 2022 (AM)

Location	Movement	Background 2022 AM Peak Hour					Total 2022 AM Peak Hour				
		LOS	Delay (s)	V/C Ratio	Queue (m)	Storage (m)	LOS	Delay (s)	V/C Ratio	Queue (m)	Storage (m)
Learmonth Street / Beattie Drive and Canyon Drive	EB L/T/R	A	1	0.00	0	90	A	0	0.00	0	90
	WB L/T/R	A	5	0.02	1	80	A	3	0.02	0	80
	NB L/T	A	10	0.03	1	>100	A	10	0.07	2	>100
	NB T/R	A	9	0.03	1	>100	A	9	0.06	1	>100
	SB L/T/R	A	10	0.02	0	>100	A	10	0.02	0	>100
Canyon Drive and Clarke Avenue	WB L/R	A	9	0.02	1	>100	A	9	0.02	0	>100
	NB T/R	A	0	0.03	0	>100	A	0	0.06	0	>100
	SB L/T	A	1	0.01	0	>100	A	1	0.01	0	>100
Highway 29 / 50th Street and Highway 97	EB L	A	9	0.05	5	75	A	9	0.06	7	75
	EB T	A	9	0.13	15	>100	A	9	0.16	19	>100
	EB R	A	2	0.02	1	70	A	3	0.02	1	70
	WB L	A	9	0.03	3	35	A	9	0.04	6	35
	WB T	A	9	0.20	16	>100	A	9	0.25	26	>100
	WB R	A	3	0.12	4	80	A	4	0.10	6	80
	NB L	A	9	0.02	2	40	A	9	0.06	3	40
	NB T/R	A	7	0.14	4	15	A	6	0.09	5	15
	SB L	B	10	0.19	9	85	B	12	0.29	11	85
	SB T	A	9	0.06	3	>100	A	9	0.04	3	>100
Highway 29 and	SB R	A	4	0.09	2	20	A	4	0.08	3	20
	WB L/R	A	9	0.06	2	>100	B	11	0.13	3	>100
	NB T	A	0	0.01	0	>100	A	0	0.04	0	>100



Jackfish Lake Road	NB R	A	0	0.06	0	20	A	0	0.02	0	20
	SB L	A	7	0.01	0	40	A	8	0.01	0	40
	SB T	A	0	0.01	0	>100	A	0	0.04	0	>100
Highway 97 and Old Fort Road / 100 Avenue	EB L	C	21	0.10	5	40	C	23	0.28	16	40
	EB T/R	B	17	0.33	23	65	B	18	0.42	25	65
	WB L	C	22	0.28	18	50	C	25	0.44	24	50
	WB T/R	C	23	0.71	41	95	C	25	0.66	40	95
	NB L	A	9	0.21	10	160	A	10	0.32	16	160
	NB T	C	25	0.62	40	>200	C	22	0.52	34	>200
	NB R	A	6	0.18	8	90	A	6	0.22	8	90
	SB L	B	11	0.48	26	145	A	10	0.40	26	145
	SB T	B	17	0.32	28	>200	C	23	0.64	43	>200
Highway 97 and 100 Street	SB R	A	0	0.03	0	90	A	5	0.17	0	90
	EB L	C	22	0.30	14	15	C	20	0.25	13	15
	EB T/R	B	15	0.32	20	40	B	17	0.32	19	40
	WB L	C	23	0.34	19	45	C	20	0.26	12	45
	WB T	C	21	0.30	18	>200	C	22	0.47	22	>200
	WB R	A	6	0.26	8	85	A	4	0.17	4	85
	NB L	A	7	0.16	9	115	A	8	0.16	7	115
	NB T	B	16	0.48	44	>200	B	18	0.59	51	>200
	NB R	A	4	0.20	8	120	A	3	0.15	4	120
	SB L	A	7	0.18	12	160	A	8	0.16	4	160
Highway 97 and 85 Avenue / 92A Street	SB T	B	15	0.24	25	>200	B	17	0.50	42	>200
	SB R	A	2	0.10	2	115	A	2	0.12	1	115
	EB L/T/R	A	9	0.34	11	25	A	9	0.22	6	25
	WB L/T/R	B	17	0.66	23	115	C	20	0.69	32	115
	NB L	B	12	0.29	13	95	B	14	0.41	17	95
	NB T	B	13	0.60	36	>200	B	14	0.66	32	>200
	NB R	A	3	0.05	1	95	A	1	0.02	0	95
	SB L	B	11	0.13	5	100	B	11	0.15	5	100
100 Street / 265 Road and 85 Avenue	SB T	A	10	0.28	17	>200	B	10	0.31	18	>200
	SB R	A	2	0.04	1	100	A	2	0.04	1	100
	EB L/T/R	B	11	0.07	2	>200	B	12	0.15	4	>200
	WB L/T/R	B	11	0.16	4	>200	B	13	0.32	11	>200
Old Fort Road and 85 Avenue	NB L/T/R	A	1	0.01	0	>200	A	1	0.01	0	>200
	SB L/T/R	A	3	0.03	1	>200	A	2	0.02	1	>200
	WB L/R	A	9	0.06	1	>200	B	11	0.12	3	>200
Old Fort Road and 85 Avenue	NB T/R	A	0	0.03	0	>200	A	0	0.05	0	>200
	SB L/T	A	3	0.02	0	>200	A	0	0.01	0	>200

Note: NB = Northbound, etc.; NBT = Northbound through, etc.; NBT/R = Northbound through and right, etc.  
 LOS = Level of Service; v/c Ratio = volume to capacity ratio; Queue = 95th percentile queue in metres



Table 8 | Operational Analysis Result – 2022 (PM)

Location	Movement	Background 2022 PM Peak Hour					Total 2022 PM Peak Hour				
		LOS	Delay (s)	V/C Ratio	Queue (m) <sup>1</sup>	Storage (m)	LOS	Delay (s)	V/C Ratio	Queue (m) <sup>1</sup>	Storage (m)
Learmonth Street / Beattie Drive and Canyon Drive	EB L/T/R	A	2	0.01	0	90	A	2	0.02	0	90
	WB L/T/R	A	6	0.03	1	80	A	7	0.09	2	80
	NB L/T	B	10	0.04	1	>100	B	13	0.05	1	>100
	NB T/R	A	9	0.06	1	>100	A	10	0.09	2	>100
	SB L/T/R	B	10	0.03	1	>100	B	12	0.05	1	>100
Canyon Drive and Clarke Avenue	WB L/R	A	9	0.02	1	>100	A	10	0.07	2	>100
	NB T/R	A	0	0.05	0	>100	A	0	0.05	0	>100
	SB L/T	A	0	0.00	0	>100	A	0	0.00	0	>100
Highway 29 / 50th Street and Highway 97	EB L	B	10	0.10	7	75	B	11	0.16	8	75
	EB T	B	11	0.18	15	>100	B	13	0.39	25	>100
	EB R	A	4	0.06	3	70	A	4	0.06	2	70
	WB L	A	10	0.08	5	35	B	10	0.06	5	35
	WB T	B	10	0.14	13	>100	B	13	0.35	23	>100
	WB R	A	4	0.19	6	80	A	4	0.24	4	80
	NB L	A	9	0.10	6	40	A	9	0.09	5	40
	NB T/R	A	7	0.20	8	15	A	6	0.20	7	15
	SB L	B	14	0.47	22	85	B	19	0.60	25	85
	SB T	A	9	0.10	8	>100	A	9	0.14	9	>100
Highway 29 and Jackfish Lake Road	WB L/R	B	10	0.21	6	>100	B	10	0.09	2	>100
	NB T	A	0	0.02	0	>100	A	0	0.02	0	>100
	NB R	A	0	0.03	0	20	A	0	0.03	0	20
	SB L	A	7	0.01	0	40	A	7	0.00	0	40
	SB T	A	0	0.03	0	>100	A	0	0.08	0	>100
Highway 97 and Old Fort Road / 100 Avenue	EB L	C	22	0.20	9	40	C	27	0.43	27	40
	EB T/R	B	19	0.53	34	65	C	32	0.77	<b>86 [47]</b>	65
	WB L	C	25	0.40	23	50	<b>E</b>	79	0.91	46	50
	WB T/R	B	19	0.65	30	95	B	20	0.54	52	95
	NB L	A	8	0.21	10	160	B	12	0.39	22	160
	NB T	C	22	0.59	41	>200	C	29	0.73	50	>200
	NB R	A	6	0.19	8	90	A	5	0.23	7	90
	SB L	A	10	0.42	24	145	B	14	0.50	25	145
	SB T	B	17	0.40	34	>200	C	26	0.61	44	>200
Highway 97 and 100 Street	SB R	A	0	0.04	0	90	A	5	0.17	4	90
	EB L	B	19	0.22	15	15	C	23	0.27	<b>20 [10]</b>	15
	EB T/R	C	22	0.61	<b>41 [28]</b>	40	C	31	0.75	<b>54 [38]</b>	40
	WB L	D	38	0.68	42	45	D	53	0.74	28	45



	WB T	B	19	0.25	22	>200	C	21	0.17	17	>200
	WB R	A	5	0.21	10	85	A	6	0.26	9	85
	NB L	A	9	0.09	5	115	A	10	0.25	10	115
	NB T	C	25	0.66	43	>200	C	26	0.75	65	>200
	NB R	A	5	0.32	7	120	A	4	0.18	5	120
	SB L	B	12	0.44	24	160	B	16	0.64	26	160
	SB T	B	17	0.50	42	>200	C	25	0.76	79	>200
	SB R	A	0	0.06	0	115	A	0	0.07	0	115
Highway 97 and 85 Avenue / 92A Street	EB L/T/R	B	12	0.49	23	25	B	14	0.56	33 [13]	25
	WB L/T/R	B	12	0.41	18	115	B	18	0.62	30	115
	NB L	B	11	0.15	10	95	B	12	0.21	9	95
	NB T	A	10	0.33	23	>200	B	12	0.49	30	>200
	NB R	A	4	0.05	3	95	A	4	0.08	4	95
	SB L	B	11	0.19	10	100	B	16	0.43	20	100
	SB T	B	10	0.40	32	>200	B	14	0.63	41	>200
	SB R	A	1	0.02	0	100	A	1	0.03	0	100
100 Street / 265 Road and 85 Avenue	EB L/T/R	B	11	0.17	5	>200	B	14	0.29	9	>200
	WB L/T/R	B	11	0.13	3	>200	B	12	0.23	7	>200
	NB L/T/R	A	1	0.01	0	>200	A	1	0.01	0	>200
	SB L/T/R	A	2	0.02	1	>200	A	2	0.02	0	>200
Old Fort Road and 85 Avenue	WB L/R	A	9	0.05	1	>200	B	11	0.07	2	>200
	NB T/R	A	0	0.04	0	>200	A	0	0.17	0	>200
	SB L/T	A	3	0.01	0	>200	A	2	0.01	0	>200

Note: NB = Northbound, etc.; NBT = Northbound through, etc.; NBT/R = Northbound through and right, etc.  
 LOS = Level of Service; v/c Ratio = volume to capacity ratio; Queue = 95th percentile queue in metres  
 Level of service higher than LOS D or queues exceeding storage lengths have been highlighted in red.  
 \*For movements where the 95th percentile queue exceeds the storage length, the 50th percentile queue has been reported in paranthesis.

### Year 8 Traffic Operational Analysis

**Table 9** and **Table 10** summarize the capacity analysis results for the Year 8 (2023) background/baseline and total scenarios during the AM and PM peak hours respectively.

Key findings include:

- All movements operate at LOS C or better during the AM peak hour for Year 8 Construction.
- All movements operate at LOS C or better during the PM peak hour for Year 8 Construction, except for the following:
  - Eastbound left turn movement at the intersection of Highway 97 and Old Fort Road / 100 Avenue which operates at LOS D in the 2023 Total PM peak scenario. Compared to the 2023 Background PM peak scenario, this movement has experienced one LOS degradation.
  - Westbound left turn movement at the intersection of Highway 97 and Old Fort Road / 100 Avenue which operates at LOS D in the 2023 Total PM peak scenario. Compared to



the 2023 Background PM peak scenario, this movement has experienced one LOS degradation.

- Westbound left turn movement at the intersection of Highway 97 and 100 Street which operates at LOS D in the 2023 Total PM peak scenario. Compared to the 2023 Background PM peak scenario, this movement has not experienced any LOS degradation.
- For all movements, queue lengths do not exceed the available storage during the AM peak hour for Year 8 Construction.
- Queue lengths exceed the available storage during the PM peak hour for Year 8 Construction only for the following movements:
  - Shared eastbound through-right movement at the intersection of Highway 97 and Old Fort Road / 100 Avenue. However, the 95<sup>th</sup> percentile queue for this movement does not exceed the available storage length in the 2023 Background PM peak scenario. In the 2023 Total PM peak scenario, the 95<sup>th</sup> percentile queue exceeds the available storage length by approximately three car lengths (24 m). The queue spills over and blocks the adjacent intersection of Old Fort Road and Alaska Road S. However, the average queue for this movement does not exceed the available storage length under this scenario.
  - Eastbound left turn movement at the intersection of Highway 97 and 100 Street. The 95<sup>th</sup> percentile queue for this movement also exceeds the available storage length in the 2023 Background PM peak scenario. In the 2023 Total PM peak scenario, the 95<sup>th</sup> percentile queue exceeds the available storage length by less than one car length (1 m). Therefore, this queuing deficiency can be considered negligible. Additionally, the average queue for this movement does not exceed the available storage length under this scenario.
  - Shared eastbound through-right movement at the intersection of Highway 97 and 100 Street. The 95<sup>th</sup> percentile queue for this movement also exceeds the available storage length in the 2023 Background PM peak scenario. In the 2023 Total PM peak scenario, the 95<sup>th</sup> percentile queue exceeds the available storage length by less than two car lengths (11 m). The queue spills over and blocks the adjacent intersection of 100 Street and Alaska Road S. However, the average queue for this movement does not exceed the available storage length under this scenario.
  - Shared eastbound left-through-right movement at the intersection of Highway 97 and 85 Avenue / 92A Street. The 95<sup>th</sup> percentile queue for this movement also exceeds the available storage length in the 2023 Background PM peak scenario. In the 2023 Total PM peak scenario, the 95<sup>th</sup> percentile queue exceeds the available storage length by less than one car length (5 m). Therefore, this queuing deficiency can be considered negligible. Additionally, the average queue for this movement does not exceed the available storage length under this scenario.

Table 9 | Operational Analysis Result – 2023 (AM)

Location	Movement	Background 2023 AM Peak Hour					Total 2023 AM Peak Hour				
		LOS	Delay (s)	V/C Ratio	Queue (m)	Storage (m)	LOS	Delay (s)	V/C Ratio	Queue (m)	Storage (m)
Learmonth Street / Beattie Drive and Canyon Drive	EB L/T/R	A	1	0.00	0	90	A	1	0.00	0	90
	WB L/T/R	A	5	0.02	1	80	A	6	0.05	1	80
	NB L/T	A	10	0.04	1	>100	B	10	0.02	1	>100
	NB T/R	A	9	0.03	1	>100	A	9	0.06	2	>100
	SB L/T/R	A	10	0.02	1	>100	B	11	0.02	0	>100
Canyon Drive and Clarke Avenue	WB L/R	A	9	0.02	1	>100	A	9	0.03	1	>100
	NB T/R	A	0	0.03	0	>100	A	0	0.04	0	>100
	SB L/T	A	1	0.01	0	>100	A	1	0.00	0	>100
	EB L	A	9	0.05	5	75	A	9	0.08	6	75



Highway 29 / 50th Street and Highway 97	EB T	A	9	0.14	16	>100	A	9	0.21	21	>100
	EB R	A	2	0.02	1	70	A	4	0.05	2	70
	WB L	A	9	0.03	3	35	A	9	0.06	5	35
	WB T	A	9	0.21	18	>100	A	9	0.23	26	>100
	WB R	A	3	0.13	5	80	A	3	0.13	7	80
	NB L	A	9	0.02	2	40	A	9	0.07	4	40
	NB T/R	A	7	0.14	4	15	A	6	0.12	3	15
	SB L	B	10	0.21	10	85	B	11	0.26	13	85
	SB T	A	9	0.06	4	>100	A	9	0.07	5	>100
	SB R	A	4	0.10	2	20	A	4	0.09	3	20
Highway 29 and Jackfish Lake Road	WB L/R	A	9	0.07	2	>100	A	10	0.08	2	>100
	NB T	A	0	0.01	0	>100	A	0	0.02	0	>100
	NB R	A	0	0.07	0	20	A	0	0.03	0	20
	SB L	A	7	0.01	0	40	A	7	0.00	0	40
	SB T	A	0	0.01	0	>100	A	0	0.04	0	>100
Highway 97 and Old Fort Road / 100 Avenue	EB L	C	22	0.12	6	40	C	25	0.41	21	40
	EB T/R	B	18	0.34	26	65	B	18	0.31	26	65
	WB L	C	23	0.29	20	50	C	23	0.40	25	50
	WB T/R	C	25	0.73	48	95	C	24	0.65	48	95
	NB L	A	10	0.23	11	160	A	10	0.25	11	160
	NB T	C	26	0.65	44	>200	C	23	0.57	33	>200
	NB R	A	6	0.19	9	90	A	6	0.24	7	90
	SB L	B	12	0.54	27	145	B	10	0.39	24	145
	SB T	B	18	0.34	30	>200	B	20	0.51	38	>200
	SB R	A	0	0.04	0	90	A	5	0.17	2	90
Highway 97 and 100 Street	EB L	C	23	0.31	14	15	C	24	0.35	14	15
	EB T/R	B	16	0.33	22	40	B	17	0.33	19	40
	WB L	C	24	0.35	21	45	C	21	0.17	13	45
	WB T	C	22	0.31	20	>200	C	23	0.41	22	>200
	WB R	A	6	0.27	8	85	A	4	0.17	3	85
	NB L	A	7	0.17	10	115	A	8	0.20	12	115
	NB T	B	17	0.52	48	>200	B	18	0.52	56	>200
	NB R	A	4	0.21	8	120	A	4	0.13	8	120
	SB L	A	7	0.20	13	160	A	8	0.20	12	160
	SB T	B	15	0.26	27	>200	B	16	0.31	35	>200
	SB R	A	3	0.11	3	115	A	5	0.15	2	115
Highway 97 and 85 Avenue / 92A Street	EB L/T/R	A	10	0.37	13	25	B	10	0.26	12	25
	WB L/T/R	B	19	0.69	26	115	B	18	0.66	32	115
	NB L	B	12	0.31	14	95	B	13	0.38	18	95
	NB T	B	14	0.64	39	>200	B	14	0.65	33	>200
	NB R	A	3	0.06	1	95	A	2	0.04	0	95



	SB L	B	11	0.15	5	100	A	10	0.09	4	100
	SB T	B	10	0.30	18	>200	A	10	0.31	20	>200
	SB R	A	2	0.04	2	100	A	4	0.07	2	100
100 Street / 265 Road and 85 Avenue	EB L/T/R	B	11	0.08	2	>200	B	12	0.09	2	>200
	WB L/T/R	B	12	0.18	5	>200	B	14	0.36	13	>200
	NB L/T/R	A	1	0.01	0	>200	A	1	0.01	0	>200
	SB L/T/R	A	3	0.03	1	>200	A	1	0.01	0	>200
Old Fort Road and 85 Avenue	WB L/R	A	9	0.07	2	>200	B	12	0.15	4	>200
	NB T/R	A	0	0.05	0	>200	A	0	0.07	0	>200
	SB L/T	A	3	0.02	0	>200	A	1	0.01	0	>200

Note: NB = Northbound, etc.; NBT = Northbound through, etc.; NBT/R = Northbound through and right, etc.  
 LOS = Level of Service; v/c Ratio = volume to capacity ratio; Queue = 95th percentile queue in metres

Table 10 | Operational Analysis Result – 2023 (PM)

Location	Movement	Background 2023 PM Peak Hour					Total 2023 PM Peak Hour				
		LOS	Delay (s)	V/C Ratio	Queue (m) <sup>1</sup>	Storage (m)	LOS	Delay (s)	V/C Ratio	Queue (m) <sup>1</sup>	Storage (m)
Learmonth Street / Beattie Drive and Canyon Drive	EB L/T/R	A	2	0.02	0	90	A	2	0.03	1	90
	WB L/T/R	A	6	0.04	1	80	A	6	0.06	1	80
	NB L/T	B	11	0.05	1	>100	B	13	0.12	3	>100
	NB T/R	A	9	0.06	2	>100	B	10	0.09	2	>100
	SB L/T/R	B	10	0.04	1	>100	B	12	0.08	2	>100
Canyon Drive and Clarke Avenue	WB L/R	A	9	0.03	1	>100	A	9	0.02	1	>100
	NB T/R	A	0	0.06	0	>100	A	0	0.05	0	>100
	SB L/T	A	0	0.00	0	>100	A	1	0.01	0	>100
Highway 29 / 50th Street and Highway 97	EB L	B	10	0.11	7	75	B	11	0.14	10	75
	EB T	B	11	0.20	16	>100	B	12	0.32	29	>100
	EB R	A	4	0.06	3	70	A	4	0.04	2	70
	WB L	B	10	0.09	5	35	A	10	0.07	5	35
	WB T	B	10	0.15	14	>100	B	11	0.27	24	>100
	WB R	A	4	0.21	6	80	A	4	0.28	1	80
	NB L	A	9	0.11	6	40	A	9	0.10	7	40
	NB T/R	A	7	0.21	8	15	A	6	0.20	11	15
	SB L	B	15	0.50	24	85	B	17	0.54	28	85
	SB T	A	9	0.11	8	>100	A	9	0.10	9	>100
	SB R	A	4	0.13	4	20	A	4	0.14	6	20
Highway 29 and Jackfish Lake Road	WB L/R	B	11	0.23	7	>100	B	11	0.15	4	>100
	NB T	A	0	0.02	0	>100	A	0	0.03	0	>100
	NB R	A	0	0.04	0	20	A	0	0.03	0	20
	SB L	A	7	0.01	0	40	A	8	0.01	0	40



	SB T	A	0	0.04	0	>100	A	0	0.07	0	>100
Highway 97 and Old Fort Road / 100 Avenue	EB L	C	24	0.24	10	40	D	41	0.66	35	40
	EB T/R	C	20	0.56	38	65	C	31	0.76	<b>89 [47]</b>	65
	WB L	C	28	0.46	26	50	D	49	0.71	38	50
	WB T/R	C	21	0.69	36	95	C	24	0.66	86	95
	NB L	A	9	0.23	11	160	B	12	0.37	18	160
	NB T	C	24	0.62	46	>200	C	29	0.72	51	>200
	NB R	A	6	0.20	8	90	A	6	0.24	7	90
	SB L	B	10	0.46	27	145	B	14	0.52	27	145
	SB T	B	18	0.42	38	>200	C	27	0.68	49	>200
	SB R	A	0	0.04	0	90	A	2	0.11	2	90
Highway 97 and 100 Street	EB L	B	20	0.22	<b>16 [8]</b>	15	C	23	0.25	<b>16 [9]</b>	15
	EB T/R	C	23	0.61	<b>46 [32]</b>	40	C	27	0.67	<b>51 [32]</b>	40
	WB L	D	43	0.72	<b>50 [18]</b>	45	D	48	0.74	27	45
	WB T	B	19	0.24	24	>200	C	21	0.20	17	>200
	WB R	A	5	0.21	11	85	A	4	0.18	7	85
	NB L	A	10	0.11	5	115	A	10	0.23	11	115
	NB T	C	27	0.70	47	>200	C	28	0.78	66	>200
	NB R	A	5	0.34	7	120	A	5	0.23	10	120
	SB L	B	13	0.51	26	160	B	13	0.54	27	160
	SB T	B	18	0.55	46	>200	C	21	0.58	58	>200
Highway 97 and 85 Avenue / 92A Street	EB L/T/R	B	13	0.51	<b>27 [10]</b>	25	B	11	0.51	<b>30 [12]</b>	25
	WB L/T/R	B	14	0.44	21	115	B	19	0.64	26	115
	NB L	B	11	0.17	11	95	B	15	0.33	13	95
	NB T	A	10	0.35	25	>200	B	15	0.60	34	>200
	NB R	A	4	0.05	3	95	A	4	0.09	3	95
	SB L	B	11	0.20	11	100	B	19	0.49	20	100
	SB T	B	11	0.42	34	>200	B	15	0.63	39	>200
	SB R	A	1	0.02	0	100	A	3	0.06	1	100
100 Street / 265 Road and 85 Avenue	EB L/T/R	B	12	0.19	5	>200	B	13	0.23	7	>200
	WB L/T/R	B	11	0.14	4	>200	B	12	0.18	5	>200
	NB L/T/R	A	1	0.01	0	>200	A	1	0.01	0	>200
	SB L/T/R	A	2	0.03	1	>200	A	2	0.02	1	>200
Old Fort Road and 85 Avenue	WB L/R	A	9	0.06	1	>200	B	12	0.15	4	>200
	NB T/R	A	0	0.05	0	>200	A	0	0.19	0	>200
	SB L/T	A	3	0.02	0	>200	A	2	0.02	1	>200

Note: NB = Northbound, etc.; NBT = Northbound through, etc.; NBT/R = Northbound through and right, etc.  
 LOS = Level of Service; v/c Ratio = volume to capacity ratio; Queue = 95th percentile queue in metres  
 Level of service higher than LOS D or queues exceeding storage lengths have been highlighted in red.  
<sup>1</sup>For movements where the 95<sup>th</sup> percentile queue exceeds the storage length, the 50<sup>th</sup> percentile queue has been reported in paranthesis.





## SUMMARY AND CONCLUSION

### YEAR 7 SUMMARY

#### *Year 7 Traffic Volumes*

- There was a general decrease (-5% to -28%) in Year 7 traffic volumes in Chetwynd and Hudson's Hope when compared to traffic in 2021, during Year 6 construction volumes. This is with the exception of Beattie Drive and Canyon Drive which had a 7% increase in the PM peak.
- Fort St. John's 85 Avenue and Old Fort Road intersection had a substantially large increase of around 150% from the Year 7 baseline in both peak hours.
- Total traffic volume through each community's key intersections during both peak hours increased by 2-152% compared to the Year 7 baseline, with Fort St. John seeing more volume in the PM peak and Hudson's Hope seeing the largest increase across both peaks.
- Construction volumes recorded at both Gate D (269 Road entrance) and Gate B were highest in November 2021 and March 2022 in the PM and AM peaks. Gate B saw an increase of over 100% throughout the year.

#### **Hudson's Hope Intersections |**

- When compared to the baseline, there was a general increase (37-51%) in the traffic volumes at both study intersections in Year 7 Construction during both peak hours.
- Traffic volumes decreased (-26 to -28%) during the AM peak while the PM peak remained relatively similar when comparing Year 6 to Year 7 Construction.

#### **Chetwynd Intersections |**

- When compared to the baseline, there was a general increase in the traffic volumes at both study intersections in Year 7 Construction during both peak hours, except only a slight increase in the evening peak hour at Highway 29 and Jackfish Lake Road.
- When compared to Year 6 Construction, traffic volumes collected in Year 7 saw a slight decrease during both peak hours.

#### **Fort St. John Intersections |**

- There was substantially large increase of around 150% in traffic volumes from the Year 7 baseline traffic volume at the intersection of Old Fort Road and 85 Avenue in both peak hours.
- Year 7 Construction volumes at the other study intersections saw a general increase during the PM peak hours when compared to the baseline.
- The AM peak hours saw a slight increase in traffic volume, except at 100 Street and 85 Avenue which saw a more substantial increase in traffic.
- When compared to Year 6 Construction, the Year 7 Construction volumes experienced slight changes (+ 13% or less) during both peak hours except for the 85 Avenue and Old Fort Road intersection during the AM peak (+41%).

#### *Year 7 Study Intersection Peak Hours*

##### **AM Peak Hour |**

- It was identified that the construction traffic peaked at a different time compared to typical commuter traffic during the AM peak period for most study intersections. Commuter traffic volumes at the study intersections in Fort St. John peaked between 7:45 AM and 8:45 AM while construction activities recorded at Gate B and Gate D (269 Road entrance) peaked earlier, between 6:00 AM and 7:15 AM.



- The peak hour timing at 85 Avenue and Old Fort Road in Fort St. John aligned with the Gate Peak hours at 6:15-7:15 AM.
- Highway 97 and 85 Avenue had a slightly earlier peak hour than other intersections on Highway 97 in Fort St. John at 6:45-7:45 AM.
- Intersections in Hudsons Hope peaked earlier than Fort St. John and Chetwynd, with Canyon Drive, Highway 29 and Beattie Drive peaking at 6:45-7:45 AM and Highway 29 and Clarke Avenue peaking at 6:30-7:30 AM.
- Intersections in Chetwynd peaked later, from 8:00-9:00 AM.

#### **PM Peak Hour |**

- Construction volumes at Gate B and Gate D (269 Road entrance) peak activities did not coincide with commuter traffic peak traffic volumes, except for 85 Avenue and Old Fort Road.

### ***Year 7 Traffic Operational Analysis***

Key findings of the Year 7 traffic operational analysis include:

- All movements operate at LOS C or better during the AM peak hour for Year 7 Construction.
- All movements operate at LOS C or better during the PM peak hour for Year 7 Construction, except for the westbound left turn movement at the intersection of Highway 97 and Old Fort Road / 100 Avenue which operates at LOS E and experiences a two LOS degradation compared to background conditions, and the westbound left turn movement at the intersection of Highway 97 and 100 Street which operates at LOS D but does not experience any LOS degradation compared to background conditions. As such, the two LOS degradation on the westbound left turn movement at the Highway 97 and Old Fort Road / 100 Avenue intersection constitutes a technical deficiency.
- For all movements, 95<sup>th</sup> percentile queue lengths do not exceed the available storage during the AM peak hour for Year 7 Construction. Though 95<sup>th</sup> percentile queue lengths exceed the available storage for some movements during the PM peak hour, the average queue lengths for these movements do not exceed the available storage lengths.

## **YEAR 8 SUMMARY**

### ***Traffic Volumes***

- There was an increase between 10-30% in traffic volumes in Chetwynd's study intersections in the PM peak when compared to the Year 8 baseline.
- Traffic volumes at study intersections in Hudsons Hope saw a general increase (10-20%) during the AM peak.
- Fort St. John's intersections with Highway 97 had minimal ( $\pm 5\%$ ) change compared to Year 7, except for Old Fort Road and 85 Avenue.
- Old Fort Road and 85 Avenue had a substantially larger (150-180%) volume in Year 8 Construction than the baseline.
- Construction volumes recorded at both gates was highest during the February period, with volumes increasing almost 100% in February 2023 compared to other periods.

#### **Hudson's Hope Intersections |**

- When compared to the baseline, there was a general increase (25%-60%) in the traffic volumes at both study intersections in Year 8 Construction during both peak hours.
- Traffic volumes slightly increased during the AM peak, and remained similar ( $\pm 5\%$ ) in the PM peak when comparing Year 7 to Year 8 Construction.



### **Chetwynd Intersections |**

- When compared to the baseline, there was a general increase in the traffic volumes at both study intersections in Year 8 Construction during both peak hours.
- The peak for Year 8 Construction at all intersections increased from Year 7 volumes, except Highway 29 and Jackfish Lake Road was similar to Year 7 in the AM Peak.

### **Fort St. John Intersections |**

- Traffic volumes at the study intersections saw a general increase during PM peak hours when comparing the Year 8 Construction to the baseline, with Highway 97 and 100 Street having a smaller increase than other intersections
- When comparing the Year 8 study intersections to the baseline in the AM peak, the Highway 97 intersections were similar and the 85 Avenue intersections experienced general increases.
- When compared to Year 7 Construction, the Year 8 Construction volumes experienced minor changes (+/- 6% or less) during both peak hours except for a somewhat significant increase at the 85 Avenue and Old Fort Road intersection.
- The intersection of 85 Avenue and Old Fort Road experienced large increases in Year 8 Construction traffic compared to the baseline, in the order of 150% in the AM Peak and 180% in the PM peak.

### ***Study Intersection Peak Hours***

#### **AM Peak Hour |**

- It was identified that the construction traffic peaked at a different time compared to typical commuter traffic during the AM peak period, except at the intersection of 85 Avenue and Old Fort Road. Commuter traffic volumes at the study intersections in Fort St. John peaked between 7:00 AM and 9:00 AM while construction activities recorded at Gate B and Gate D (269 Road entrance) peaked earlier, between 6:00 AM and 7:15 AM.
- At 85 Avenue and Old Fort Road, the commuter peak coincided with the Gate Peak at 6:15-7:15 AM.

#### **PM Peak Hour |**

- Construction volumes at Gate B and Gate D (269 Road entrance) peak activities were roughly 15-30 minutes (5:00 – 6:15 PM) later than the commuter traffic peak traffic volumes in Fort St. John (4:30-6:00PM).
- Commuter peak hours in Chetwynd and Hudsons Hope were earlier than Fort St. John and the gates, from 4:00-5:15PM, with the exception of Highway 29 and Clarke Avenue which peaked at 5:15-6:15 PM.

### ***Traffic Operational Analysis***

Key findings of the Year 8 traffic operational analysis include:

- All movements operate at LOS C or better during the AM peak hour for Year 8 Construction.
- All movements operate at LOS C or better during the PM peak hour for Year 8 Construction, except for the eastbound and westbound left turn movements at the intersection of Highway 97 and Old Fort Road / 100 Avenue which operate at LOS D and experience a one LOS degradation compared to background conditions, and the westbound left turn movement at the intersection of Highway 97 and 100 Street which also operates at LOS D but does not experience any LOS degradation compared to background conditions. It is to be noted that the operational deficiency for the westbound left turn movement at the intersection of Highway 97 and Old Fort Road / 100 Avenue in Year 7 is resolved in Year 8 without implementing any mitigation measures at this intersection.
- For all movements, 95<sup>th</sup> percentile queue lengths do not exceed the available storage during the AM peak hour for Year 8 Construction. Though 95<sup>th</sup> percentile queue lengths exceed the available storage



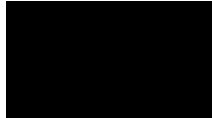
for some movements during the PM peak hour, the average queue lengths for these movements do not exceed the available storage lengths.

- Based on the traffic operational analysis for the two construction years (Year 7 and Year 8), no operational deficiencies are observed during the AM peak hour. However, during the PM peak hour, with the addition of construction traffic, only one LOS deficiency occurs in Year 7 but this is resolved in Year 8. Additionally, for both years, construction traffic results in increase in queue lengths for some of the movements at the study intersections resulting in 95<sup>th</sup> percentile queues for those movements to exceed the storage lengths. However, the average queue lengths for none of these movements exceed the storage lengths.

\* \* \* \* \*

We trust that this review has been completed to your satisfaction. If you have any questions, please contact me at [selby.thannikary@wsp.com](mailto:selby.thannikary@wsp.com) or 403-973-1054.

Yours sincerely,



Selby Thannikary, PE (FL, VA), P.Eng. (BC, AB, SK, YT)  
Director, Transportation Planning (Canada West)



WSP Canada Inc.  
Engineers & Geoscientists BC  
Permit #1000200



# APPENDIX

## A 2014 vs 2022/3 ANNUAL AVERAGE DAILY TRAFFIC COMPARISONS

Annual Day of Week Traffic Volumes Comparison

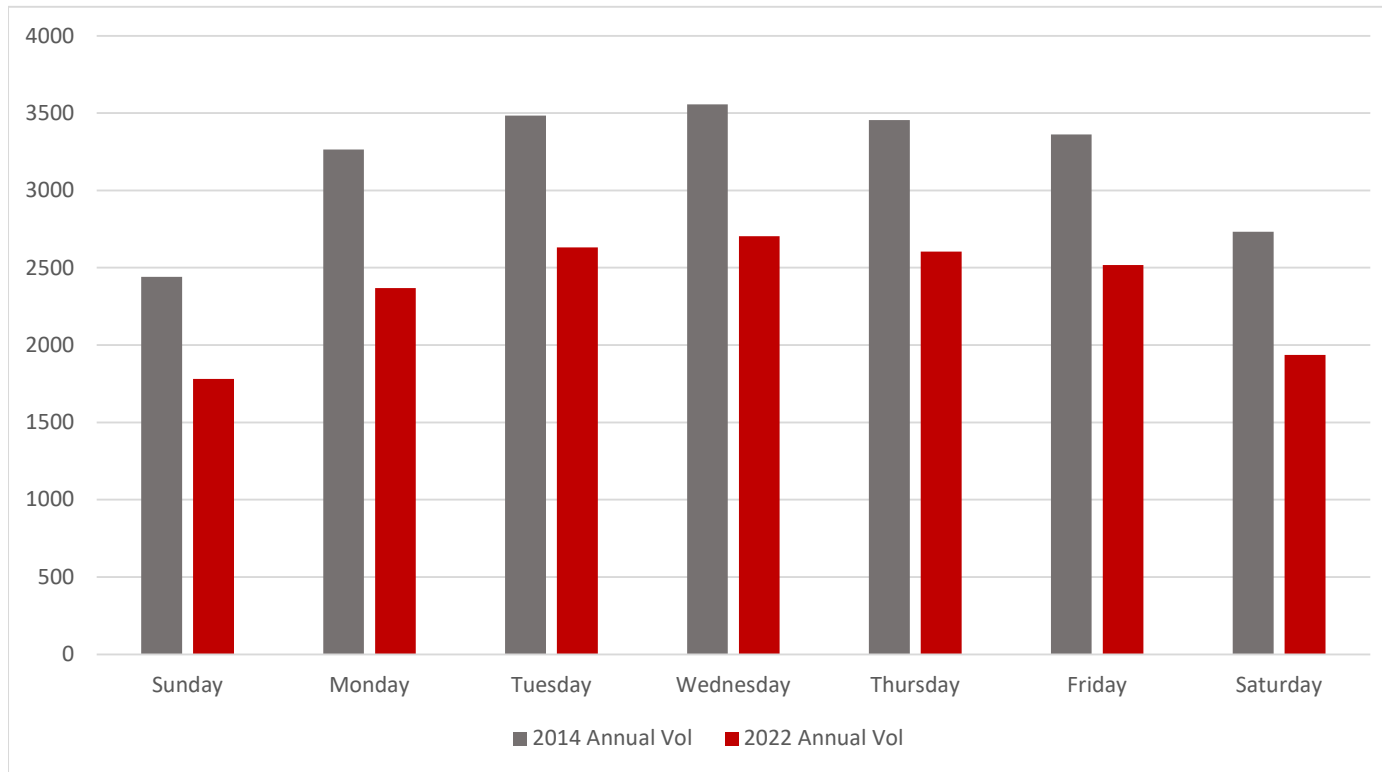
Year: 2014 vs. 2022

Station: Inga Lake P-44-1NS-NY

Location: Route 97, 2.4 km south of Inga Lake Compressor Road, south of Wonowon

Appendix A: 2014 vs 2022 Annual Average Daily Traffic Comparisons

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
2014 Annual Vol	2441	3265	3485	3557	3456	3363	2733	3,499
2022 Annual Vol	1780	2368	2631	2703	2604	2517	1935	2,646
<b>%CHANGE</b>	<b>-27%</b>	<b>-27%</b>	<b>-25%</b>	<b>-24%</b>	<b>-25%</b>	<b>-25%</b>	<b>-29%</b>	<b>-24%</b>



Annual Day of Week Traffic Volumes Comparison

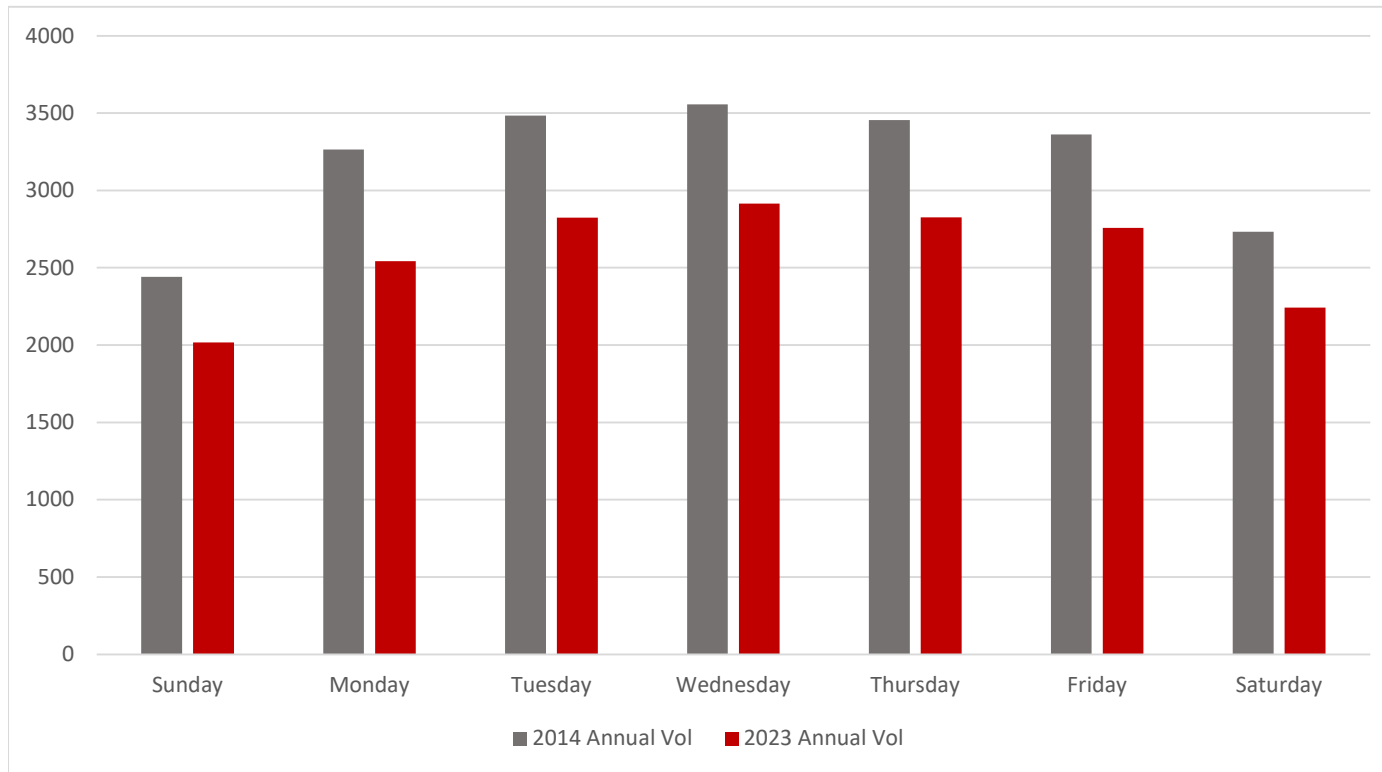
Year: 2014 vs. 2023

Station: Inga Lake P-44-1NS-NY

Location: Route 97, 2.4 km south of Inga Lake Compressor Road, south of Wonowon

Appendix A: 2014 vs 2023 Annual Average Daily Traffic Comparisons

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
2014 Annual Vol	2441	3265	3485	3557	3456	3363	2733	3,499
2023 Annual Vol	2017	2543	2823	2915	2827	2757	2243	2,855
<b>%CHANGE</b>	<b>-17%</b>	<b>-22%</b>	<b>-19%</b>	<b>-18%</b>	<b>-18%</b>	<b>-18%</b>	<b>-18%</b>	<b>-18%</b>

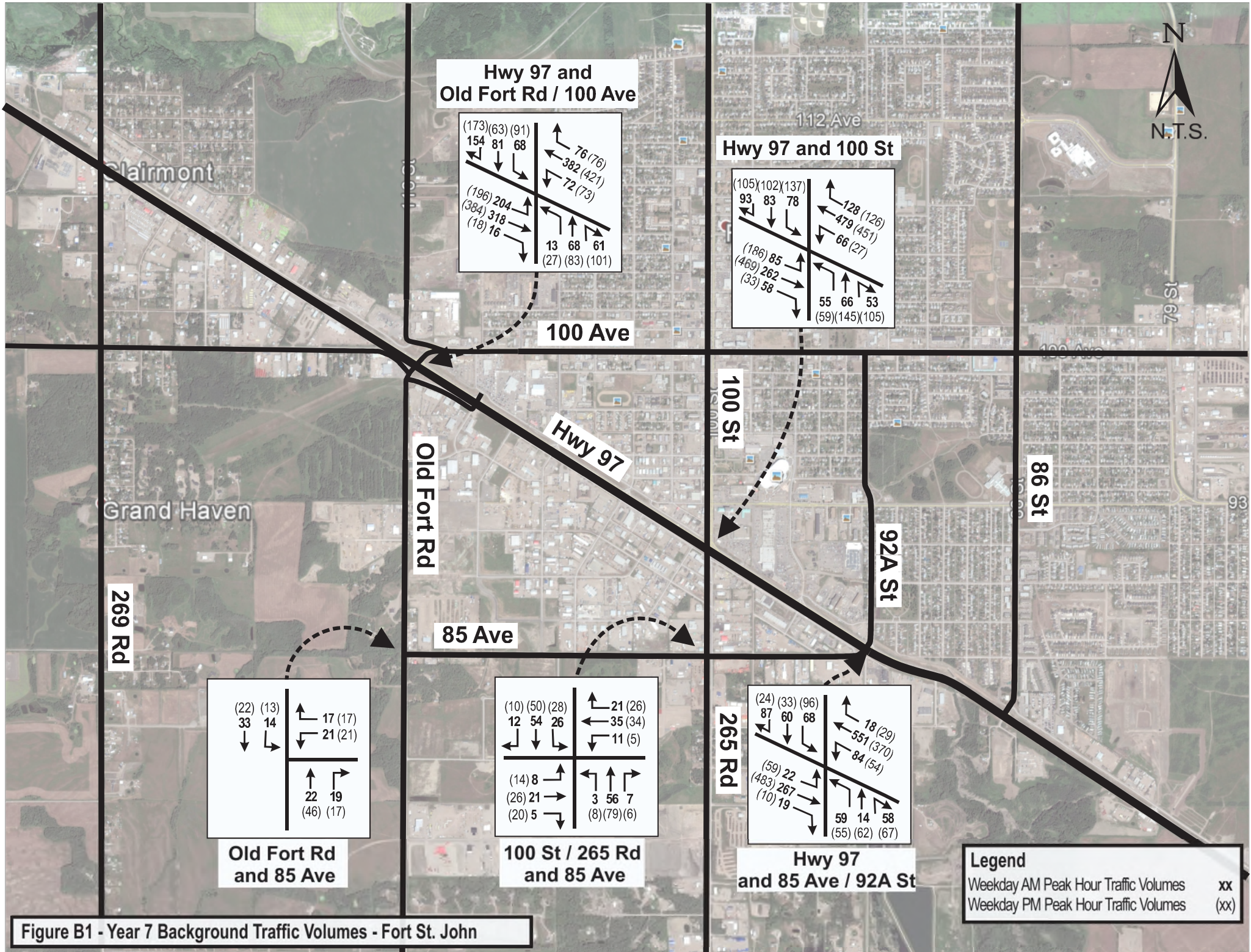


# APPENDIX

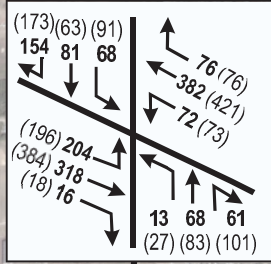
## **B** TRAFFIC MOVEMENT DIAGRAMS



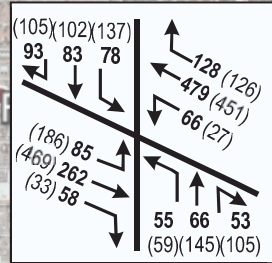




**Hwy 97 and  
Old Fort Rd / 100 Ave**



**Hwy 97 and 100 St**



**100 Ave**

**100 St**

**Old Fort Rd**

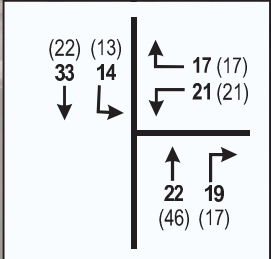
**Hwy 97**

**92A St**

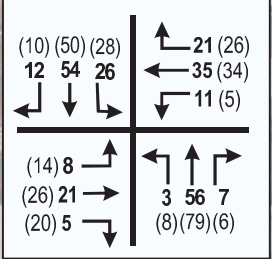
**86 St**

**269 Rd**

**85 Ave**

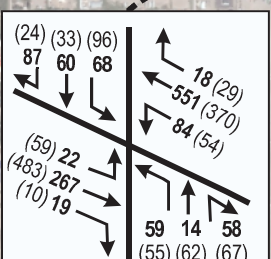


**Old Fort Rd  
and 85 Ave**



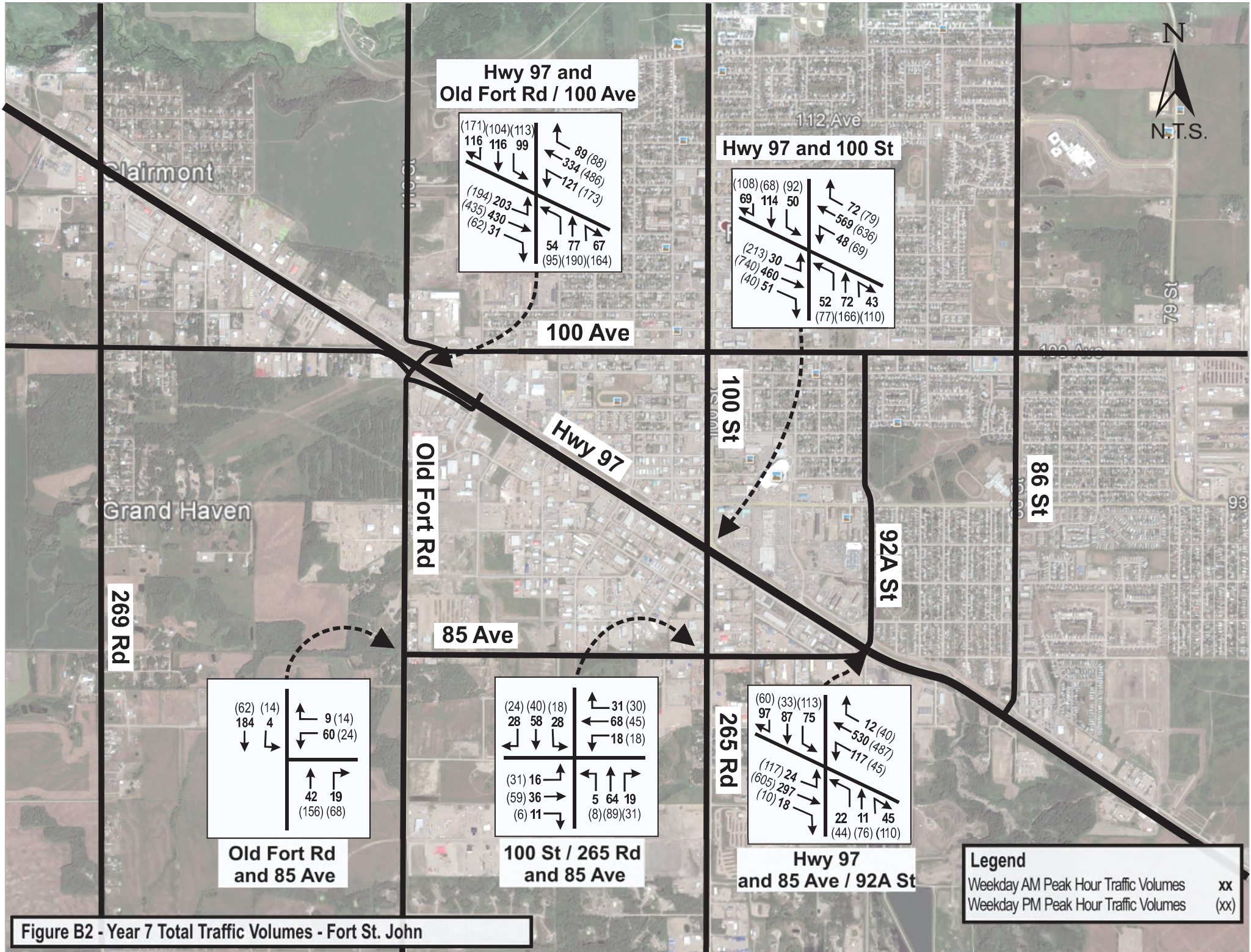
**100 St / 265 Rd  
and 85 Ave**

**265 Rd**

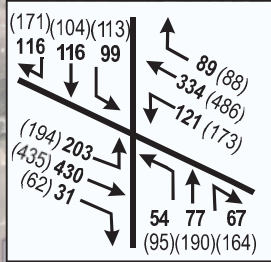


**Hwy 97  
and 85 Ave / 92A St**

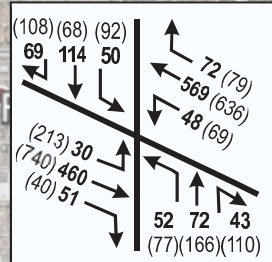
**Figure B1 - Year 7 Background Traffic Volumes - Fort St. John**



**Hwy 97 and  
Old Fort Rd / 100 Ave**



**Hwy 97 and 100 St**



**100 Ave**

**Old Fort Rd**

**Hwy 97**

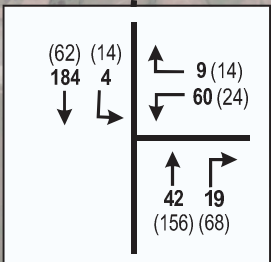
**100 St**

**92A St**

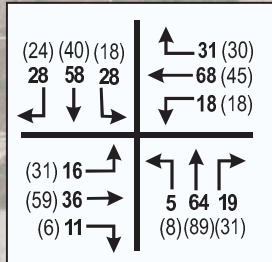
**86 St**

**269 Rd**

**85 Ave**

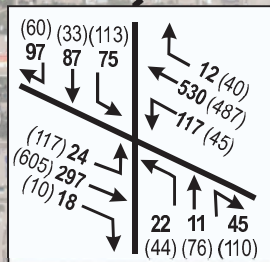


**Old Fort Rd  
and 85 Ave**



**100 St / 265 Rd  
and 85 Ave**

**265 Rd**



**Hwy 97  
and 85 Ave / 92A St**

**Legend**

Weekday AM Peak Hour Traffic Volumes **xx**  
 Weekday PM Peak Hour Traffic Volumes **(xx)**

**Figure B2 - Year 7 Total Traffic Volumes - Fort St. John**



**Learmonth St /  
Beattie Dr and Canyon Dr**

**Canyon Dr and Clarke Ave**

(3) (10) (2)	↑	1 (1)
0 5 1	←	8 (6)
↓ ↓ ↓	↘	27 (36)
<hr/>		
(9) 2	↗	12 4 17
(11) 5	→	(17) (12) (34)
(25) 8	↘	

(36) (1)	↑	2 (1)
35 2	←	8 (8)
↓ ↓ ↓	↘	
<hr/>		
	↗	24 3
	→	(59) (8)
	↘	



Hudson's Hope

Hwy 29

**Legend**

Weekday AM Peak Hour Traffic Volumes	xx
Weekday PM Peak Hour Traffic Volumes	(xx)

**Figure B3 - Year 7 Background Traffic Volumes - Hudson's Hope**



**Learmonth St /  
Beattie Dr and Canyon Dr**

**Canyon Dr and Clarke Ave**

(3) (10) (3)	↑ 1 (2)
0 2 1	← 21 (16)
↓ ↓ ↓	↘ 16 (80)
<hr/>	
(9) 0	↗ 29 2 34
(25) 14	↑ (15) (12) (43)
(32) 9	↓

(64) (2)	↑ 2 (4)
19 5	↘ 9 (18)
↓ ↓	
<hr/>	
	↑ 55 14
	(57) (10)



**Hwy 29**

**Hudson's Hope**

**Legend**

Weekday AM Peak Hour Traffic Volumes	<b>xx</b>
Weekday PM Peak Hour Traffic Volumes	<b>(xx)</b>

**Figure B4 - Year 7 Total Traffic Volumes - Hudson's Hope**

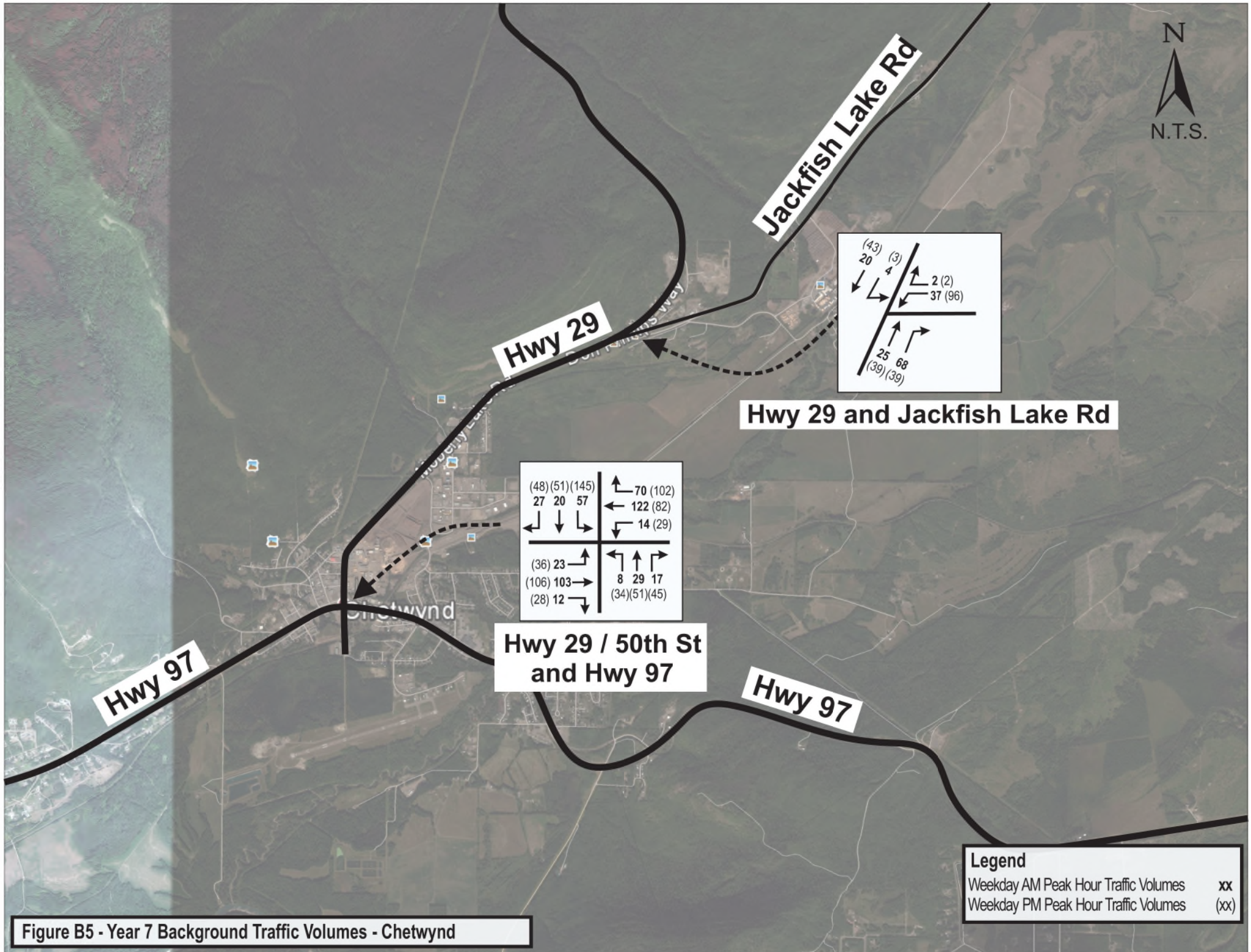
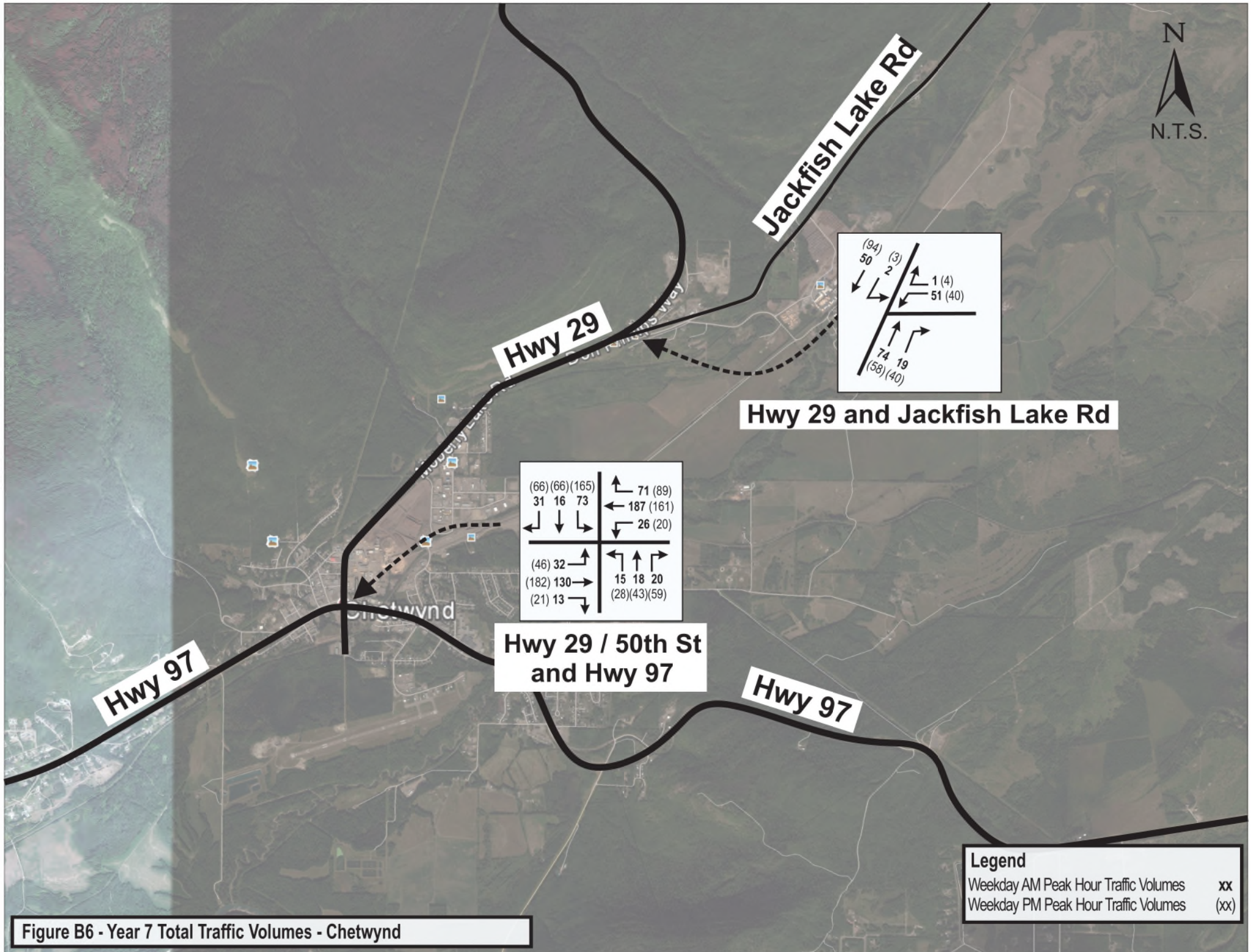


Figure B5 - Year 7 Background Traffic Volumes - Chetwynd



**Hwy 29 and Jackfish Lake Rd**

(94)	(3)		
50	2	1 (4)	
↓	↘	↗	51 (40)
		↑	
		↖	
		74	19
		(58)	(40)

**Hwy 29 / 50th St and Hwy 97**

(66)	(66)	(165)	↑	71	(89)
31	16	73	←	187	(161)
↓	↓	↓	↘	26	(20)
—			—		
(46)	32	↑	↖	↑	↑
(182)	130	→	15	18	20
(21)	13	↘	(28)	(43)	(59)

**Legend**

Weekday AM Peak Hour Traffic Volumes	xx
Weekday PM Peak Hour Traffic Volumes	(xx)

Figure B6 - Year 7 Total Traffic Volumes - Chetwynd

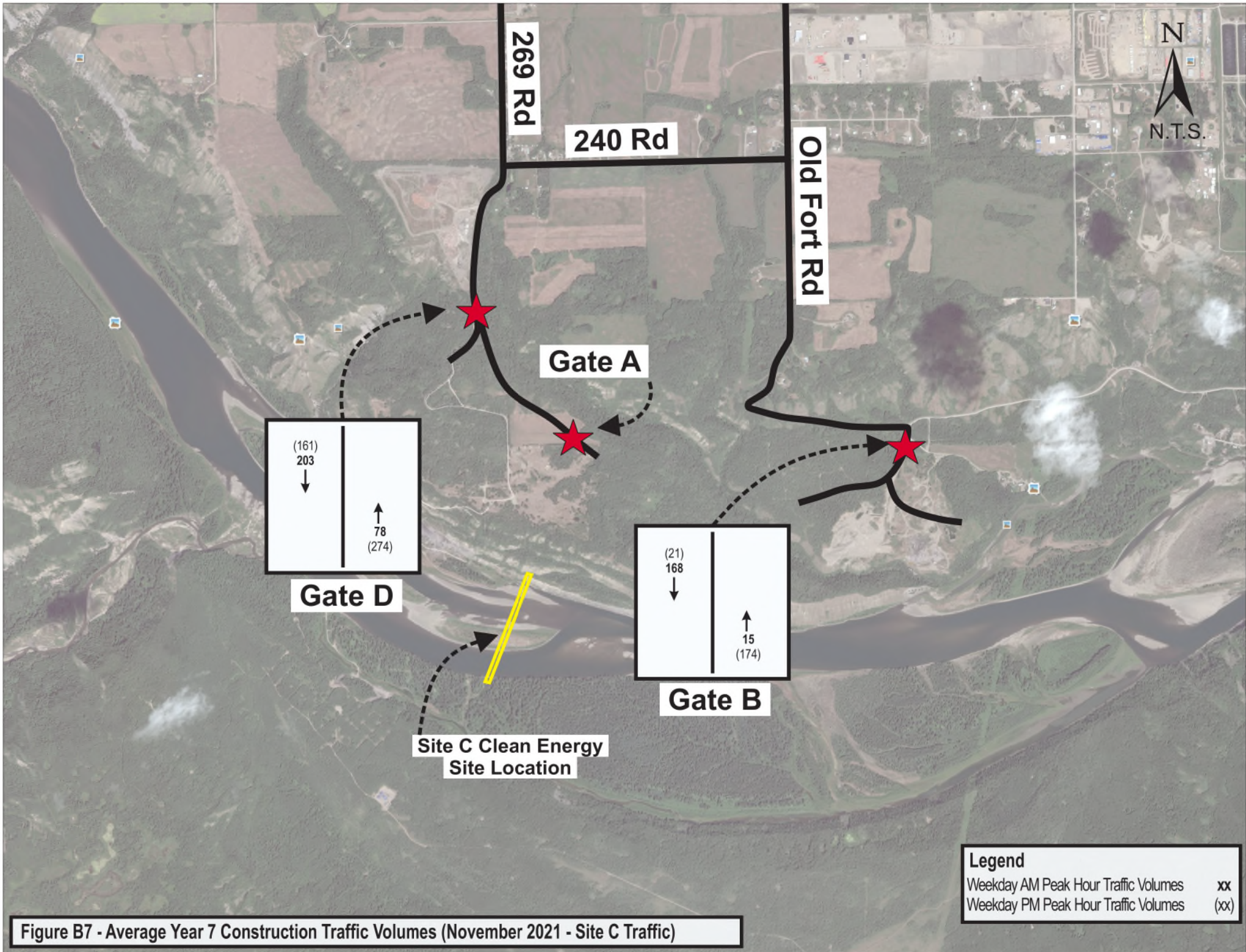


Figure B7 - Average Year 7 Construction Traffic Volumes (November 2021 - Site C Traffic)

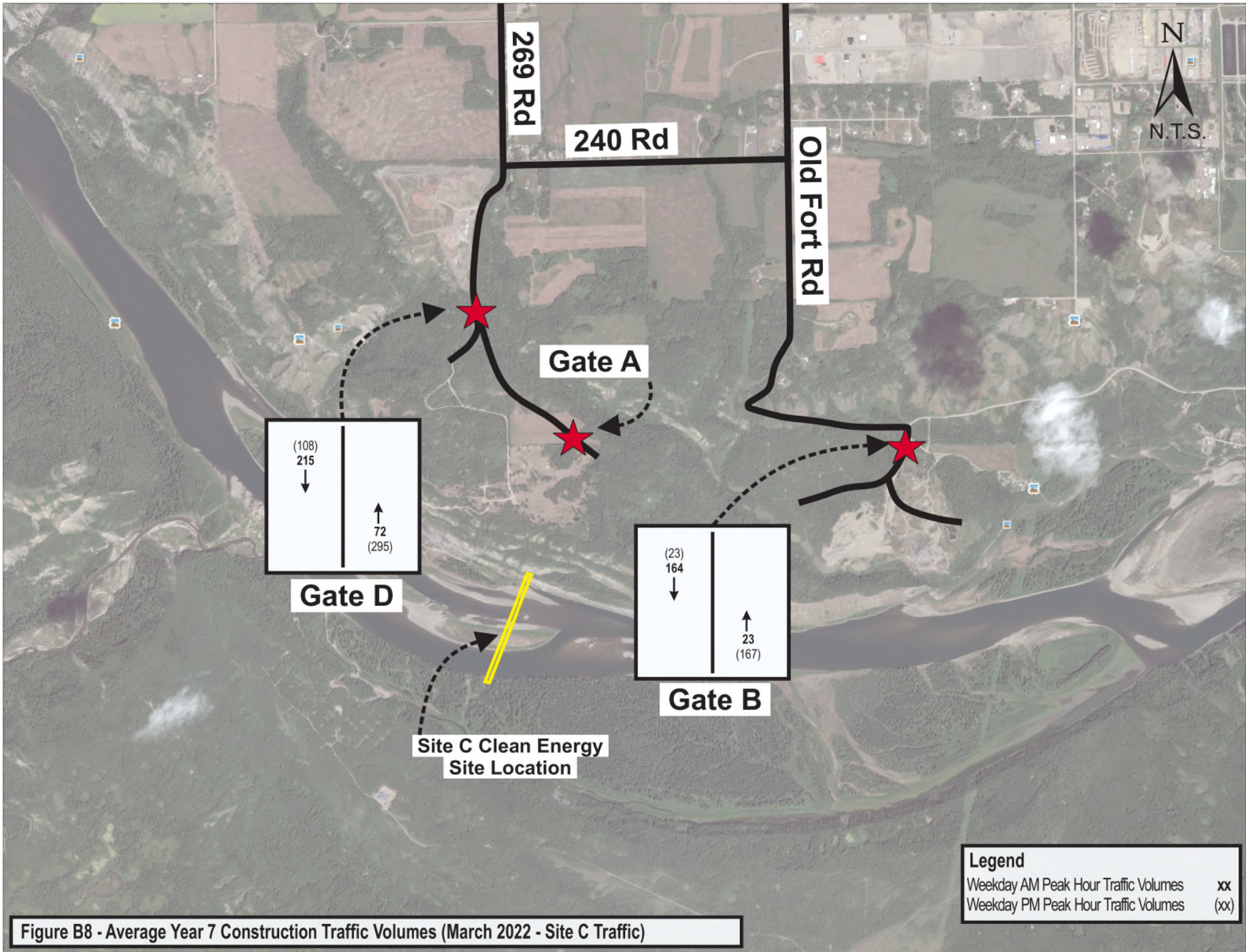
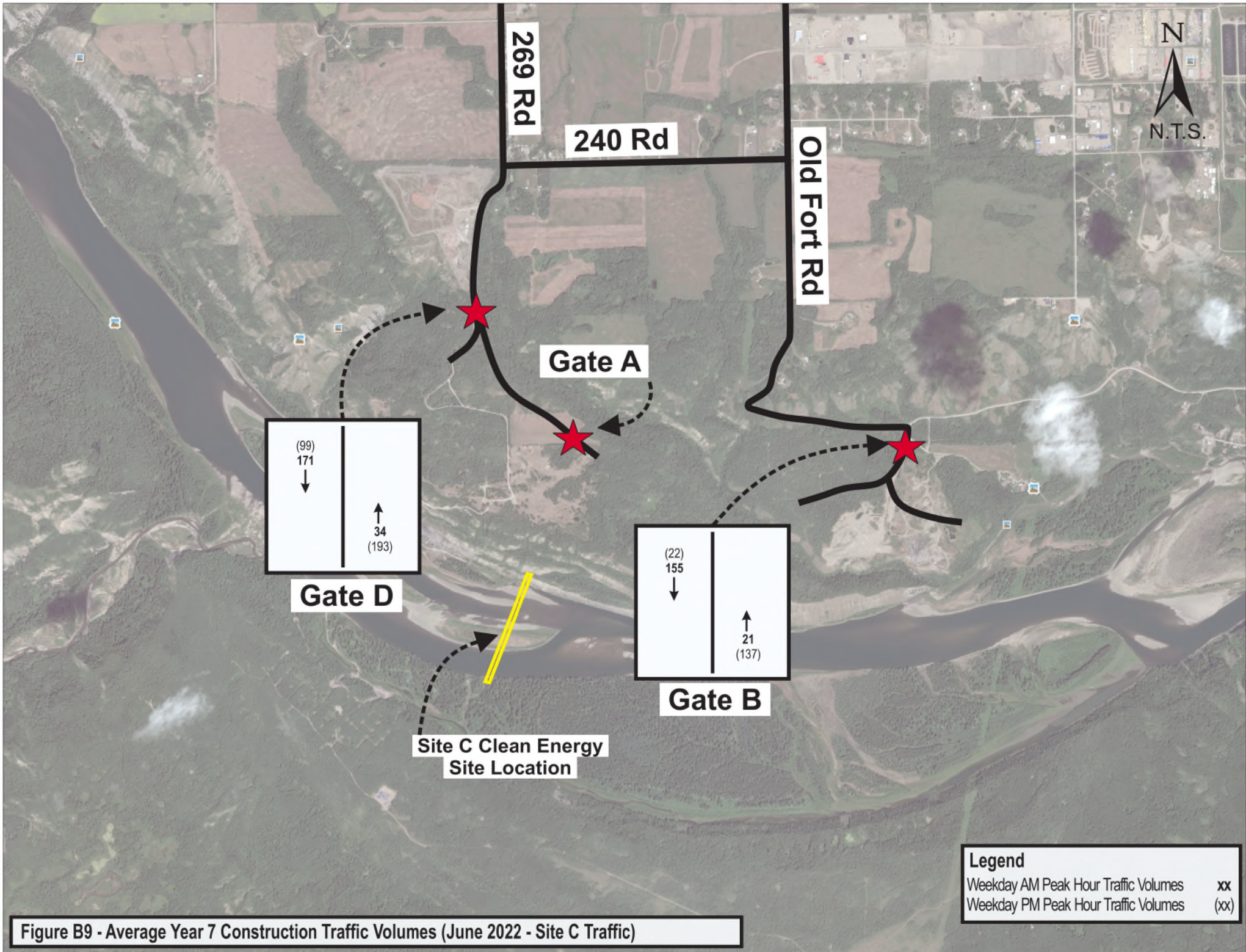
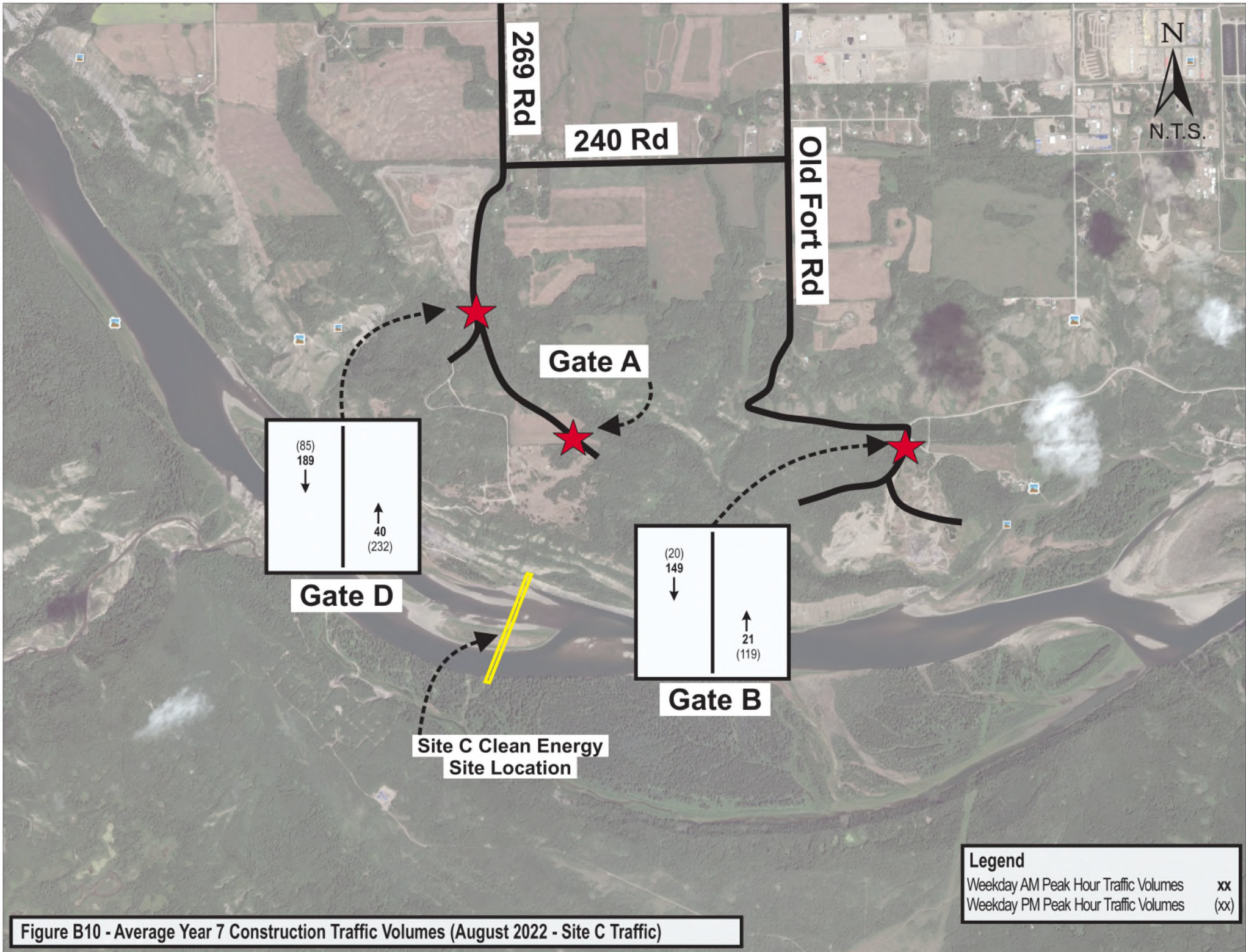
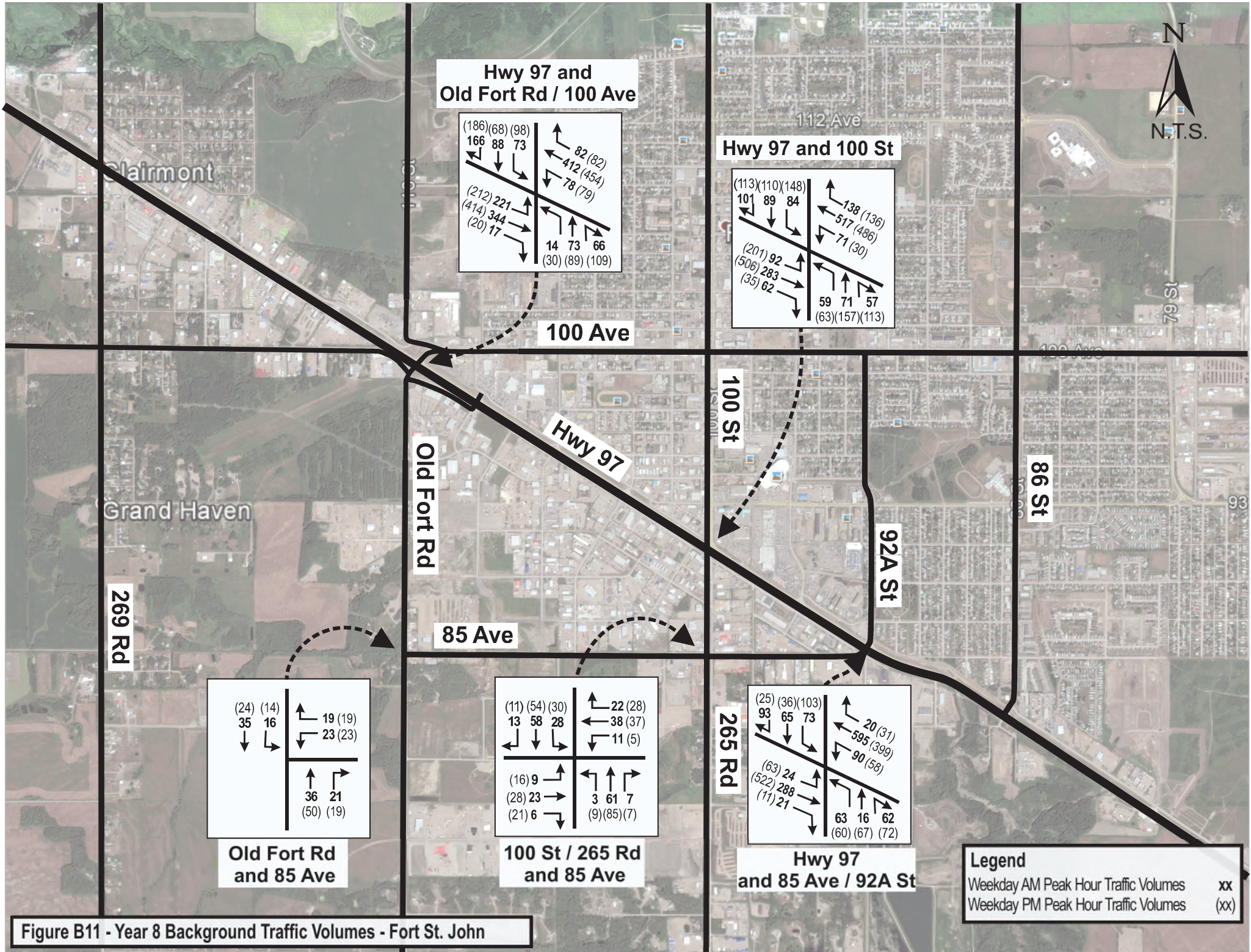


Figure B8 - Average Year 7 Construction Traffic Volumes (March 2022 - Site C Traffic)

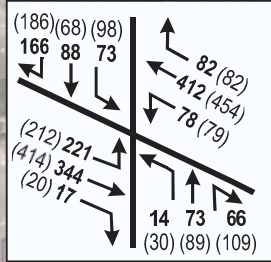




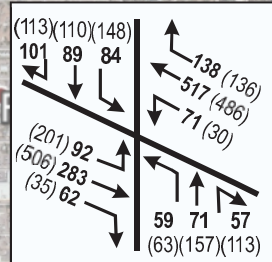




**Hwy 97 and  
Old Fort Rd / 100 Ave**



**Hwy 97 and 100 St**



**100 Ave**

**100 St**

**Old Fort Rd**

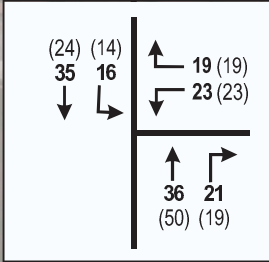
**Hwy 97**

**92A St**

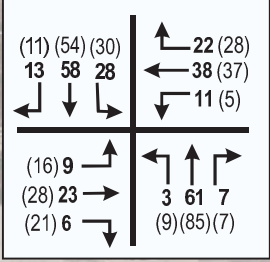
**86 St**

**269 Rd**

**85 Ave**

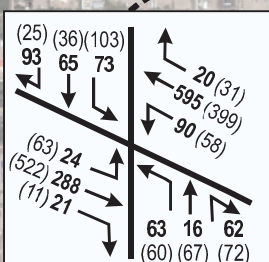


**Old Fort Rd  
and 85 Ave**



**100 St / 265 Rd  
and 85 Ave**

**265 Rd**

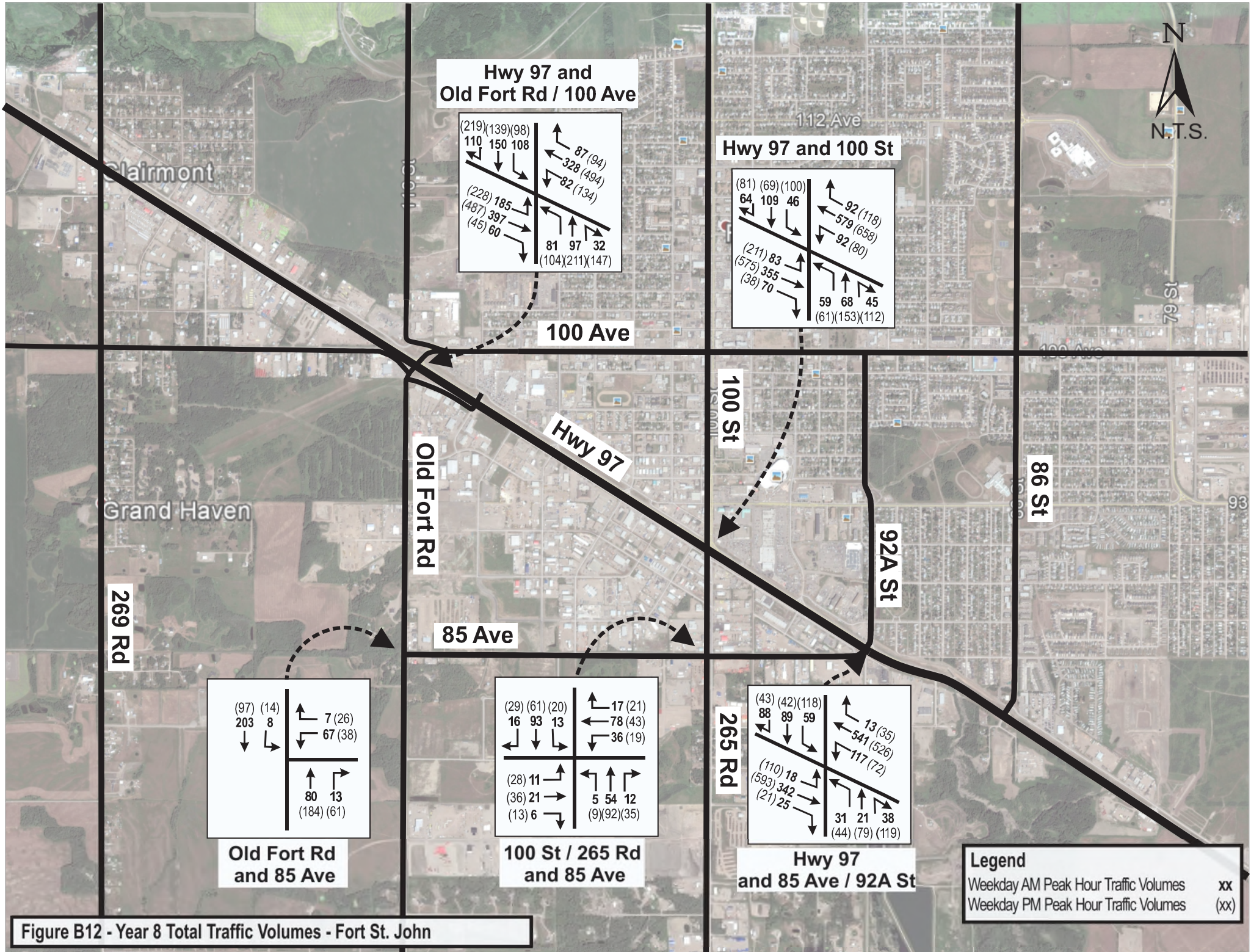


**Hwy 97  
and 85 Ave / 92A St**

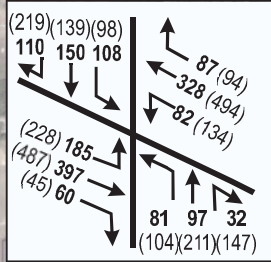
**Legend**

Weekday AM Peak Hour Traffic Volumes    xx  
Weekday PM Peak Hour Traffic Volumes    (xx)

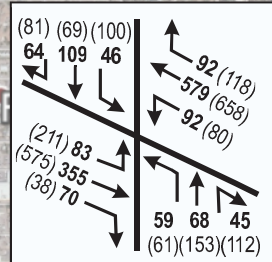
**Figure B11 - Year 8 Background Traffic Volumes - Fort St. John**



**Hwy 97 and  
Old Fort Rd / 100 Ave**



**Hwy 97 and 100 St**



**100 Ave**

**Old Fort Rd**

**Hwy 97**

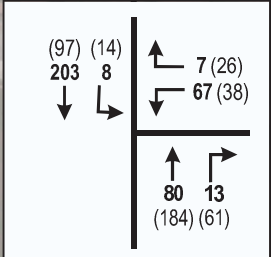
**100 St**

**92A St**

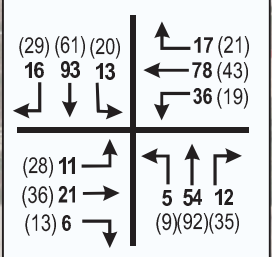
**86 St**

**269 Rd**

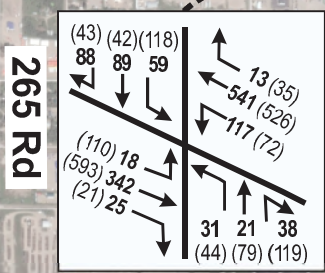
**85 Ave**



**Old Fort Rd  
and 85 Ave**



**100 St / 265 Rd  
and 85 Ave**



**Hwy 97  
and 85 Ave / 92A St**

**Legend**

Weekday AM Peak Hour Traffic Volumes    **xx**  
 Weekday PM Peak Hour Traffic Volumes    **(xx)**

**Figure B12 - Year 8 Total Traffic Volumes - Fort St. John**



**Learmonth St /  
Beattie Dr and Canyon Dr**

**Canyon Dr and Clarke Ave**

(3) (11) (2)	↑	1 (1)
0 6 1	←	8 (7)
↓ ↓ ↓	↘	30 (39)
<hr/>		
(10) 2	↗	13 4 18
(11) 6	→	(18) (13) (37)
(27) 9	↘	

(39) (1)	↑	2 (1)
38 2	←	8 (9)
↓ ↓ ↓	↘	
<hr/>		
	↗	26 3
	→	(63) (8)
	↘	



**Hwy 29**

**Hudson's Hope**

**Legend**  
 Weekday AM Peak Hour Traffic Volumes **xx**  
 Weekday PM Peak Hour Traffic Volumes **(xx)**

**Figure B13 - Year 8 Background Traffic Volumes - Hudson's Hope**



**Learmonth St /  
Beattie Dr and Canyon Dr**

**Canyon Dr and Clarke Ave**

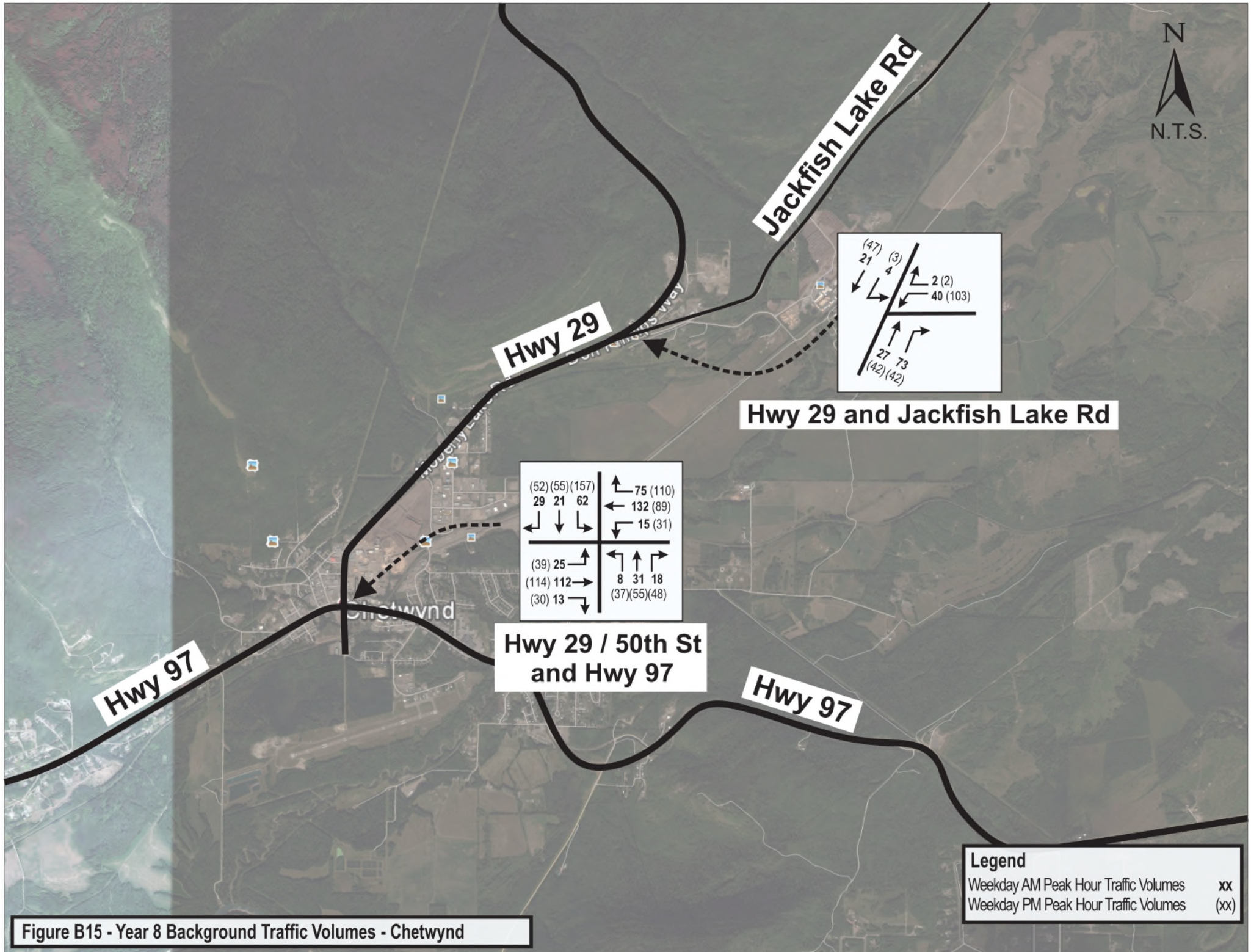
(6) (13) (4)	↑	1 (2)
0 3 2	←	9 (14)
↓ ↓ ↓	↘	55 (59)
<hr/>		
(14) 2	↗	5 2 37
(20) 15	→	(24) (23) (47)
(33) 11	↘	

(72) (4)	↑	4 (2)
59 2	←	8 (6)
↓ ↓ ↓	↘	
<hr/>		
	↗	45 8
	→	(59)(10)
	↘	



<b>Legend</b>	
Weekday AM Peak Hour Traffic Volumes	<b>xx</b>
Weekday PM Peak Hour Traffic Volumes	<b>(xx)</b>

**Figure B14 - Year 8 Total Traffic Volumes - Hudson's Hope**



**Hwy 29 and Jackfish Lake Rd**

(47) 24	(3) 4	2 (2)	40 (103)
↓	↘	↗	↘
↘	↗	↑	↗
27	73	(42)	(42)

**Hwy 29 and Jackfish Lake Rd**

**Hwy 29 / 50th St and Hwy 97**

(52) 29	(55) 21	(157) 62	↑ 75 (110)	← 132 (89)	↓ 15 (31)
↓	↓	↓	↖	↖	↖
(39) (114)	25 112	↗	↖	↑ 8	↑ 31
(30) 13	13	↘	(37)	(55)	(48)

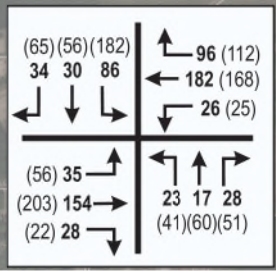
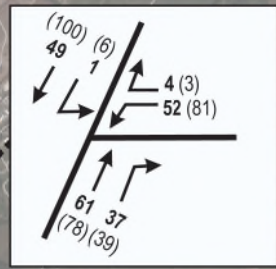
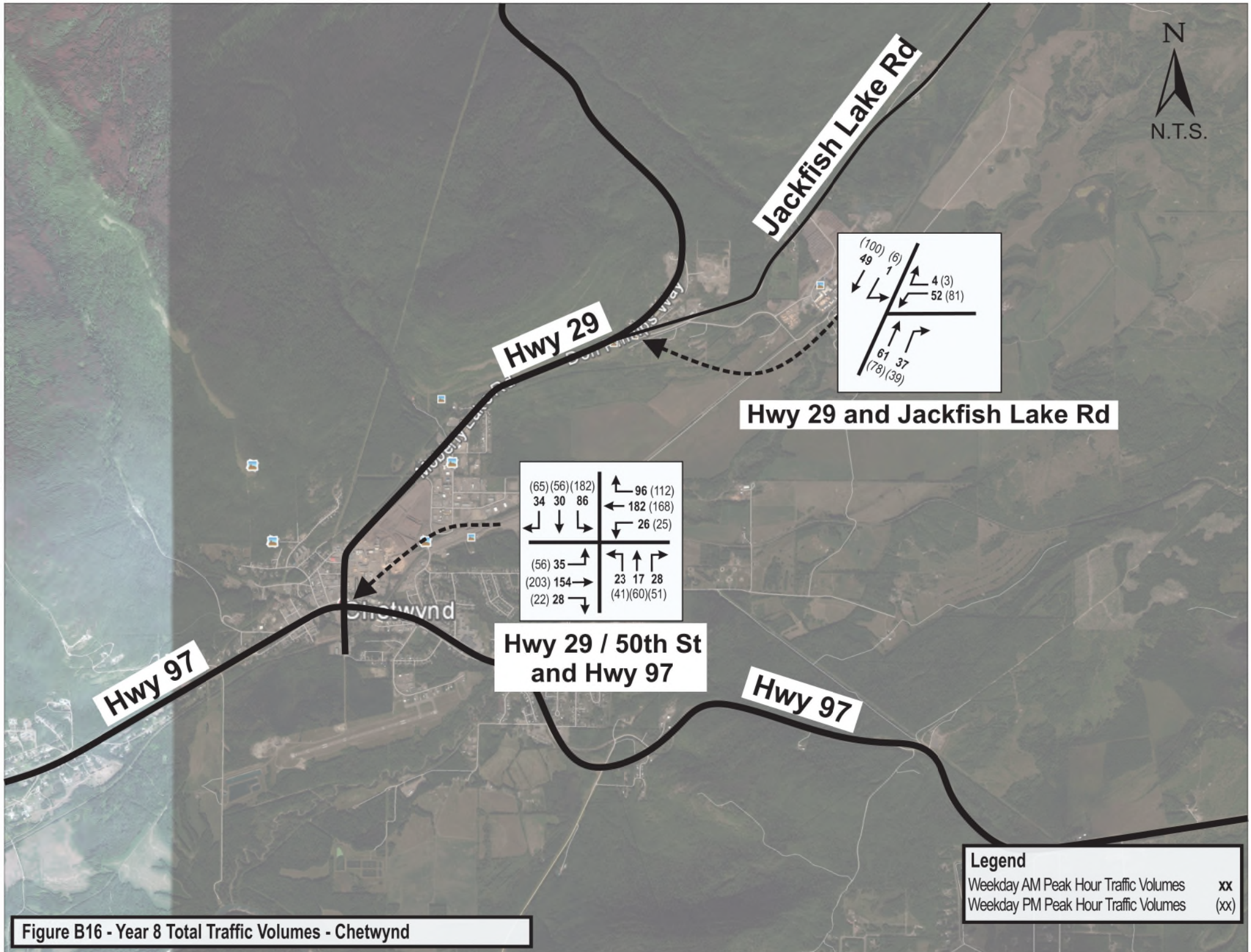
**Hwy 29 / 50th St and Hwy 97**

**Hwy 97**

**Legend**

Weekday AM Peak Hour Traffic Volumes	xx
Weekday PM Peak Hour Traffic Volumes	(xx)

**Figure B15 - Year 8 Background Traffic Volumes - Chetwynd**

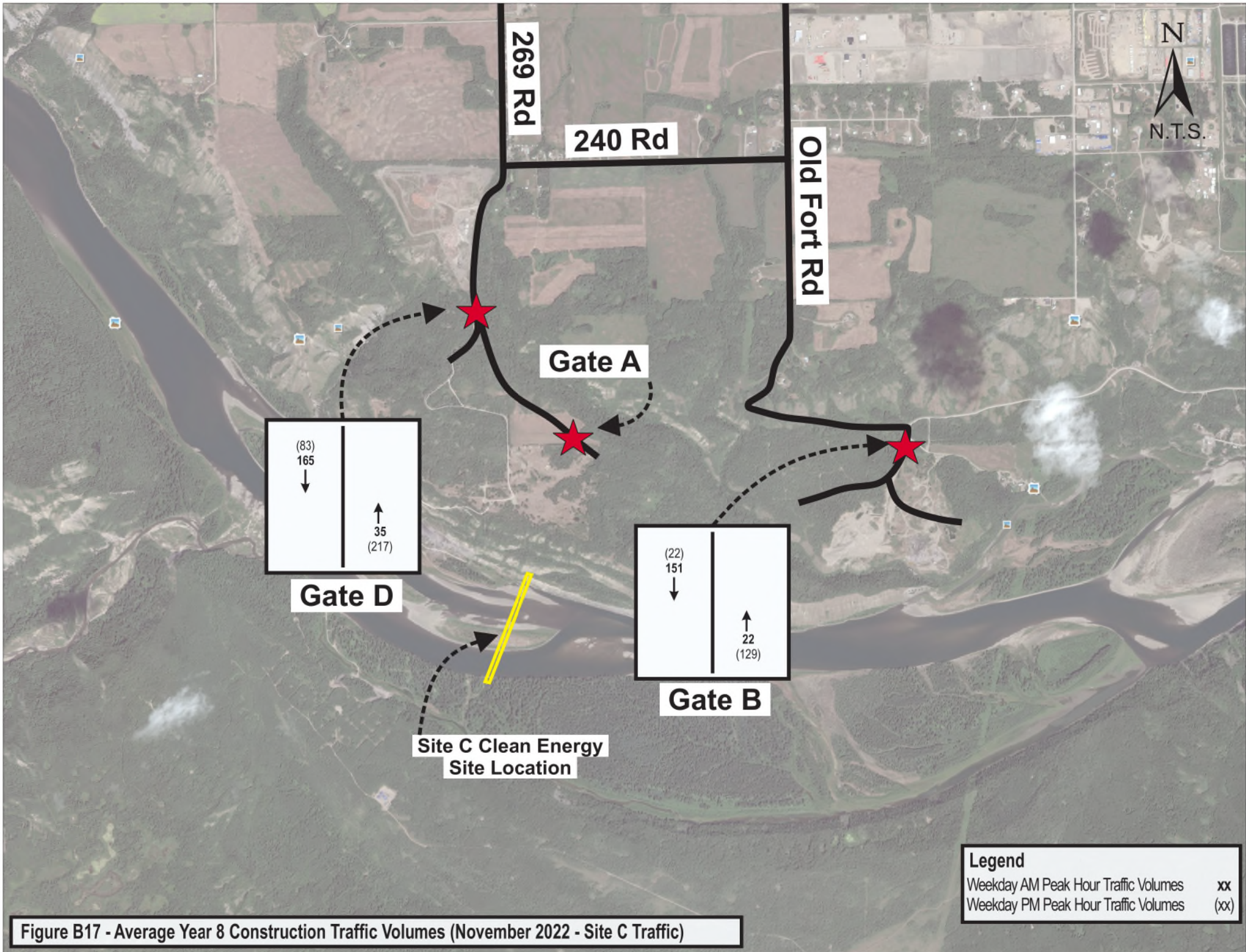


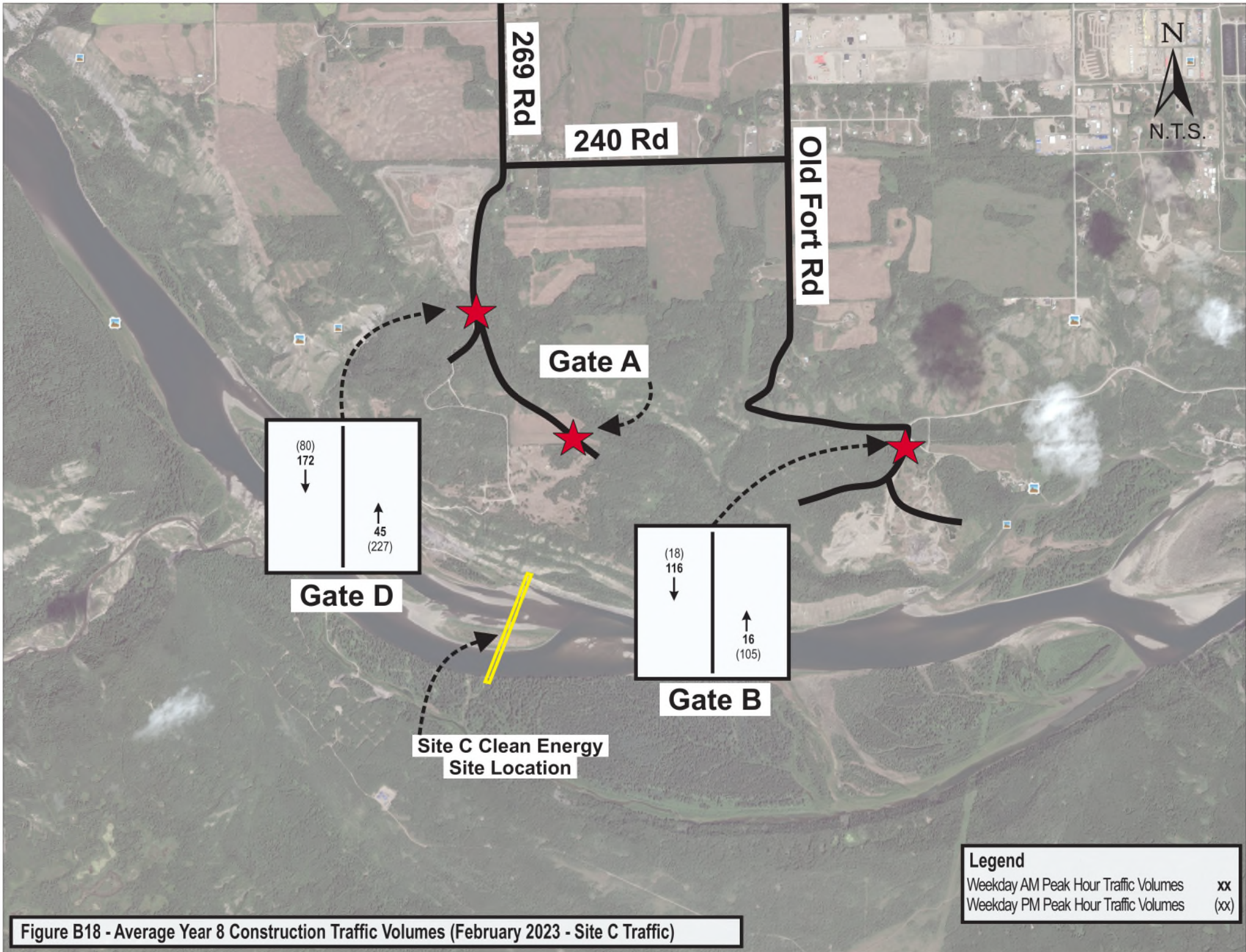
**Legend**

Weekday AM Peak Hour Traffic Volumes	<b>xx</b>
Weekday PM Peak Hour Traffic Volumes	<b>(xx)</b>

**Figure B16 - Year 8 Total Traffic Volumes - Chetwynd**







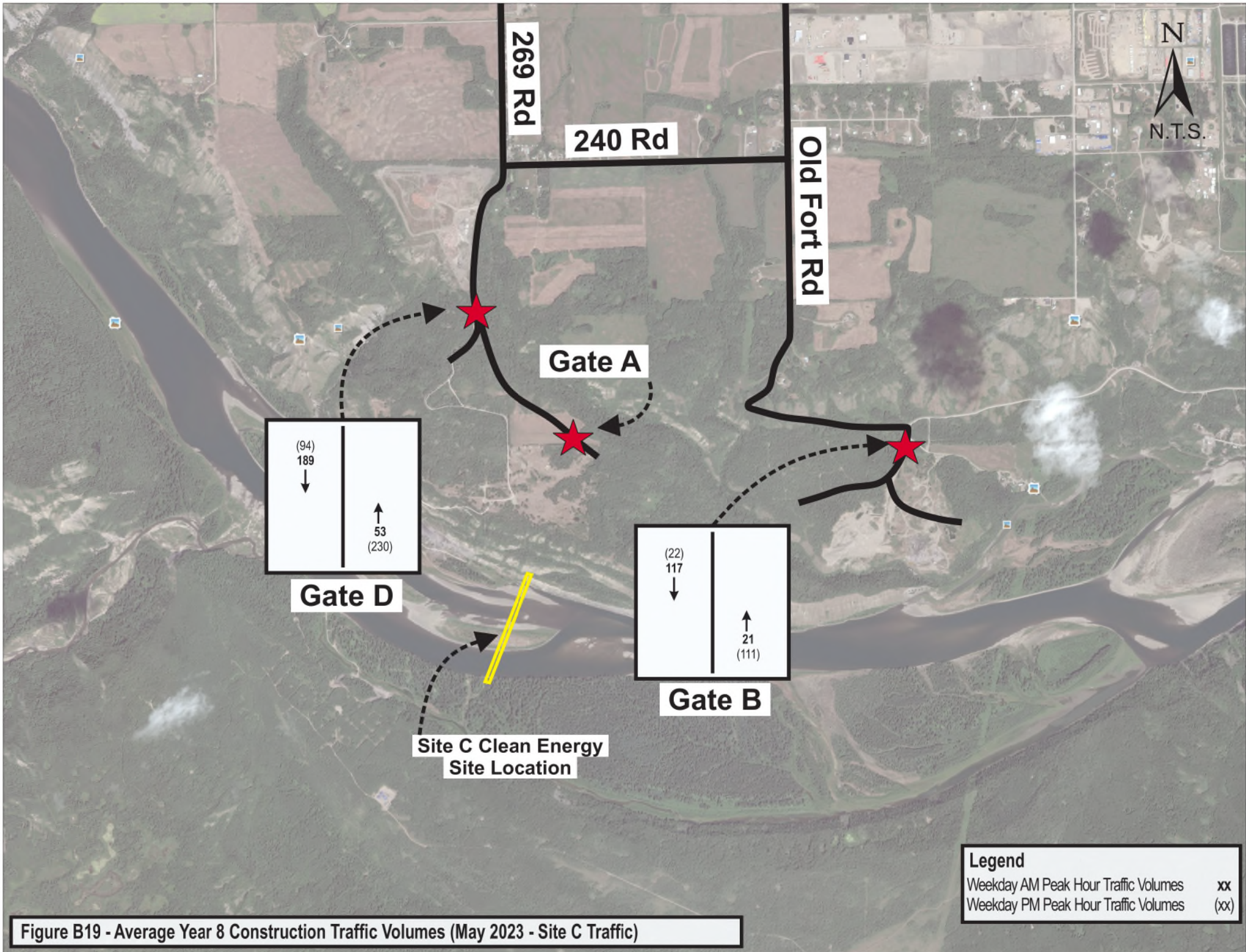
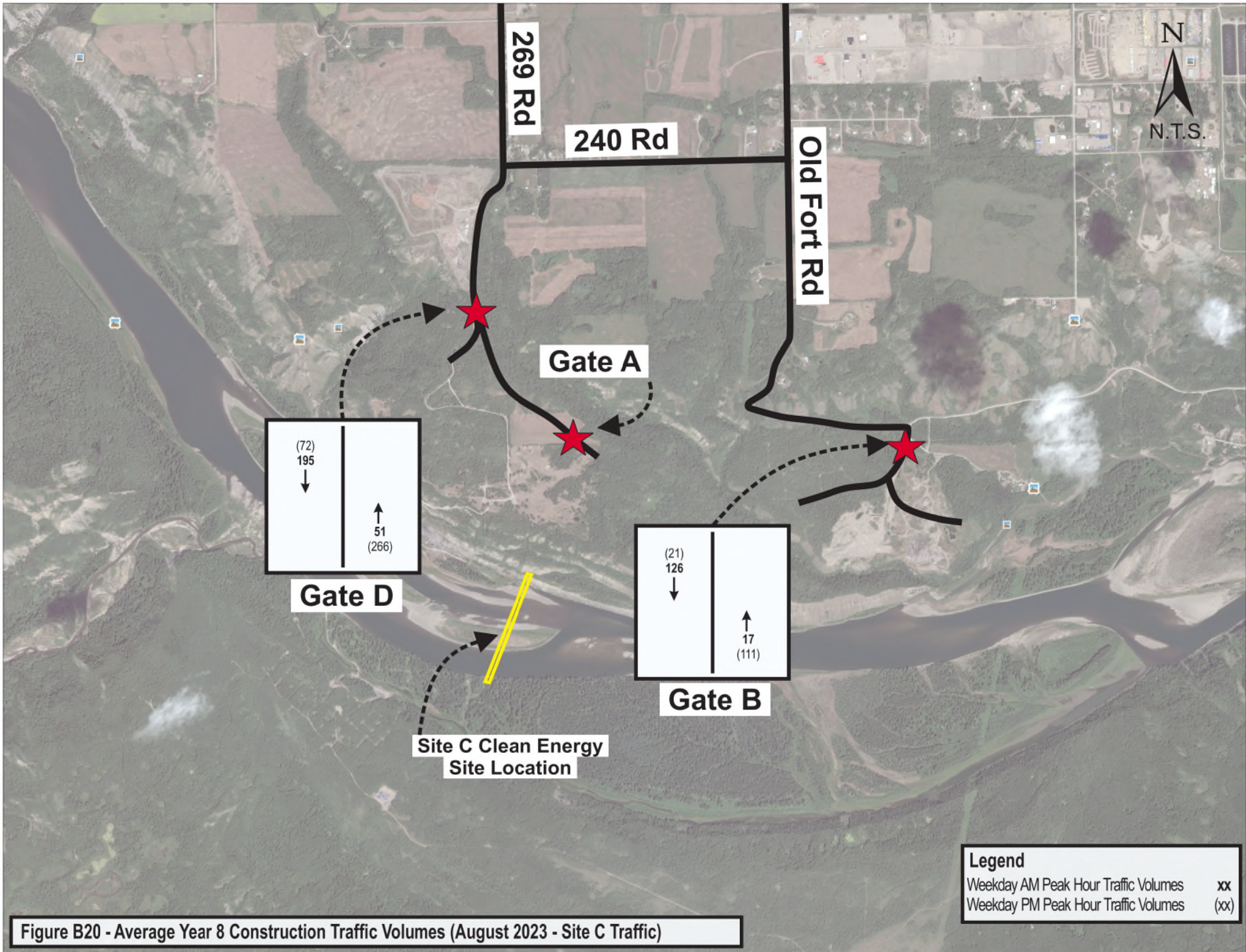


Figure B19 - Average Year 8 Construction Traffic Volumes (May 2023 - Site C Traffic)



**Appendix B. Road Safety Monitoring Program**



2025-02-07

Mr. Ben Rauscher, Project Manager – Community and Social Mitigation Manager

BC Hydro & Power Authority  
Site C Clean Energy Project

**Subject: Site C Clean Energy Project – Fort St. John, BC: Year 7 and 8 Road Safety Monitoring Program – FINAL**

Dear Mr. Rauscher:

WSP Canada Group Limited (WSP) is pleased to provide the following letter report outlining the results and findings for the Year 7 (2022) and Year 8 (2023) Road Safety Monitoring Program, which is part of BC Hydro's overall Construction Traffic Monitoring Program for the Site C Clean Energy Project (the Project). Construction started in July 2015 and is expected to be completed in 2024.

## 1 INTRODUCTION

As part of the Site C Clean Energy Project's Environmental Impact Statement (EIS), BC Hydro developed a Traffic Monitoring and Mitigation Plan (TMMP) that forms the framework for studying the potential effects that the forecasted increase in vehicle traffic during construction on the regional road network may have on traffic operations and road safety.

As such, BC Hydro is committed to providing on-going road safety monitoring efforts at defined intersections in Fort St. John and the Peace River Regional District (PRRD) at regular periods throughout Project construction. A review of the collision statistics at the study intersections are to be undertaken annually, quarterly reviews may be proposed for periods when construction traffic and baseline traffic are both anticipated to be high such as during the peak year of construction.

This letter report summarizes the results of the Year 7 and Year 8 Construction Traffic Monitoring Program, which identifies collision frequency and potential concerns at the study intersections between August 1, 2021, and July 31, 2022 (Year 7) and August 1, 2022, and July 31, 2023 (Year 8).

## 2 METHODOLOGY

To satisfy BC Hydro's road safety monitoring requirements for both Year 7 and Year 8, WSP completed the following work program which is consistent with the work program followed in the previous construction years:

- Confirm study parameters:
  - Construction Year 7 collision review from August 1, 2021, to July 31, 2022;
  - Construction Year 8 collision review from August 1, 2022, to July 31, 2023; and
  - Previous collision history for the pre-construction period from August 1, 2010, to July 31, 2015.
- Year 7 and 8 study intersections in Fort St. John:
  - 85 Avenue and Old Fort Road;
  - Highway 97 and Old Fort Road;
  - Highway 97 and 100 Street;
  - Highway 97 and 85 Avenue; and

- 85 Avenue and 100 Street.

It is noted the intersection of Highway 97 and 269 Road was not in the original TMMP; however, this intersection was analyzed in Year 1 of the Project because of the road works on 240 Road and Old Fort Road, which may have transferred Project traffic to 269 Road. This intersection was not included in the Year 2 through Year 7 analyses. Figure 1 below shows the location of the study area intersections that are part of the collision monitoring program for Construction Years 7 and 8 of the Project in Fort St. John.



Figure 1 | Study Area Intersections Included in the Road Safety Monitoring Program (Image Source: Google Earth).

- Review the claims-based collision data received from the Insurance Corporation of British Columbia (ICBC) for:
- Collision frequency at each intersection including:
  - Total collisions, which is the sum of property damage only (PDO) collisions and severe collisions; and
  - Severe collisions, which are collisions that involve at least one person with an injury or fatal injury.
- Unlike the traffic-volume monitoring program for the Project, the TMMP does not prescribe explicit thresholds at which road safety improvements are required. Instead, the TMMP says that:
 

“Additional mitigation and improvements, with the view to improving road safety, would be implemented by BC Hydro if the road safety performance monitoring at a location reaches a level when BC Hydro, MOTI, the PRRD and/or the City determine that improvements are necessary. This deterioration in safety performance must be due, substantively, to Project traffic. Other road authorities may also, independent of BC Hydro, undertake road upgrades on monitored routes based on their own planning and requirements.”<sup>1</sup>

<sup>1</sup> BC Hydro, *Traffic Monitoring and Mitigation Plan – Fort St. John and North Bank Area Roads*, October 29, 2015, pg. 13



### 3 COLLISION REVIEW

The Years 7 and 8 Dataset consists of claims-based collision data obtained from ICBC for the period from August 1, 2021, to July 31, 2023. People involved in a collision have two years from the date of the collision to report their claim to ICBC. The Years 7 and 8 Dataset was generated on November 24, 2023, and was current as of October 31, 2023. As such, the number of collisions reported in this report from October 31 2021 (two years before the date of the current warehouse data source date) to July 31 2023, may change if a future collision review of the project is prepared, as more people may come forward to submit their claims within their two-year time limit. It has been estimated by ICBC that roughly 75% of people submit their claims to ICBC within three months of the collision.<sup>2</sup> It is expected that most of the collision claims for the period of August 1, 2021, to July 31, 2023, were already made by the date of our collision data report, October 31, 2023.

Collision data was obtained from ICBC for the intersections in Fort St. John noted below:

- Old Fort Road at 85 Avenue;
- Highway 97 at Old Fort Road;
- Highway 97 at 100 Street;
- Highway 97 at 85 Avenue; and
- 85 Avenue at 100 Street.

At each intersection, the following analysis has been undertaken to determine whether construction traffic has had an impact on road safety:

1. A pre-construction collision frequency review was undertaken to determine how closely the Construction Year collision frequency compared to the collision frequency in previous years. This review is described in the subsequent sections of the report.
2. For each intersection, a Construction Period analysis has been undertaken for Years 7 and 8 compared to the pre-construction period using a dashboard developed from the ICBC data, including:
  - a. collision frequency of all collisions
  - b. collision frequency of severe collisions
  - c. collision configuration proportions
  - d. time distribution of collisions on weekdays
  - e. time distribution of collisions by month
3. In the TMMP, it was stated that collision frequency during construction was expected to increase in the order of ten percent over the pre-construction collision frequencies. We have developed our data analysis to show the measured collision data in each year against the benchmark pre-construction + 10% in graphs A (all collisions) and B (severe collisions), with any data above the benchmarks flagged in the report body in **bold text**. Where intersections exceed the 10% threshold and show a change in any of their configuration proportions, time distribution on weekdays or over the year, construction traffic or Winter road conditions may have contributed to increases in collision frequencies may have contributed to a road safety issue at that intersection. Further discussion on this is provided in the next report sections.

#### 3.1 PRE-CONSTRUCTION PERIOD COLLISION REVIEW

**Table 1** shows the collision frequency each year, the total five-year collision frequency, and the average collision frequency at each intersection location in the five-year preconstruction period. This table was generated using the

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<sup>2</sup> Laurel Richl's telephone communication with Paul de Leur, August 2016





data provided by ICBC from the Year 2 Road Safety Review. As noted in the Year 3 Road Safety Monitoring Program report, the Year 2 Dataset is the most up-to-date collision data that is available for the pre-construction period and will be used for subsequent construction frequency reviews. Furthermore, the Year 2 Dataset is considered the final pre-construction period collision frequencies as it is not subject to changes because the period to file a claim with ICBC has expired.

Table 1 | Pre-Construction Period Collision Frequency Final Dataset.

Intersection	2010 - 2011		2011 - 2012		2012 - 2013		2013 - 2014		2014 - 2015		Five Year Collision Frequency (col / 5 year)		Average Collision Frequency (col / year)	
	Severe	Total	Severe	Total	Severe	Total	Severe	Total	Severe	Total	Severe	Total	Severe	Total
Old Fort Road / 85 Avenue	0	0	0	1	0	1	0	0	0	0	0	2	0.0	0.4
Highway 97 / Old Fort Road	4	11	8	16	7	21	7	19	11	29	37	96	7.4	19.2
Highway 97 / 100 Street	5	14	4	20	3	9	4	17	9	28	25	88	5.0	17.6
Highway 97 / 85 Avenue	1	3	0	1	0	5	2	3	3	13	6	25	1.2	5.0
85 Avenue / 100 Street	0	0	1	1	0	1	1	3	1	1	3	6	0.6	1.2

Source: Year 2 Dataset received from ICBC on August 2, 2018

Note: Collision data noted for each year are for collisions that occurred between August 1 to July 31 of the subsequent year. <sup>(08)</sup>

The information shown in Table 1 indicates that collision frequency can vary significantly at the same intersection from year to year. At some locations, the difference in collision frequency could be as much as a factor of three. For example, the total collision frequency at Highway 97 and 100 Street varied from a low of nine collisions per year to a high of 28 collisions per year in the five-year period before the beginning of the Project. Collision frequency variation can be due to several factors including:

- The rare and random nature of collisions;
- Changes in traffic volumes;
- Changes to road construction and maintenance locations; and
- Year to year differences in weather and road conditions.

These variations are why collision data representing a brief period can be less reliable and why it is preferable to have several years of collision data prior to determining whether a location is collision prone.

## 3.2 INTERSECTION CONSTRUCTION PERIOD ANALYSIS

### 3.2.1 85 AVENUE AT OLD FORT ROAD

The intersection analysis of Old Fort Road at 85 Avenue is shown in **Figure 2**. From the analysis, we can make the following observations:

#### A – All collisions annual frequency

- There were two collisions at this intersection in Year 7 and one collision in Year 8.
- The total number of collisions in **both Year 7 and Year 8 exceeded the benchmark** (pre-construction annual average + 10%) of 0.44 collisions per year.
- The annual average collision frequency over all construction years from Year 1 – Year 8 was one collision per year, which exceeds the benchmark (pre-construction annual average + 10%) of 0.44 collisions per year.

#### B – Severe collisions annual frequency



- There were no severe collisions at this intersection in either the pre-construction period or during construction.

#### **C – Collision configuration proportions**

- Prior to construction, collision configuration proportions were 50% single vehicle and 50% conflicted.
- During construction, the collision proportions were 12.5% undetermined and 87.5% single vehicle.
- In Year 7 100% of collisions were single vehicle.
- In Year 8 100% of collisions were undetermined.

#### **D – Number of collisions by time of day on weekdays**

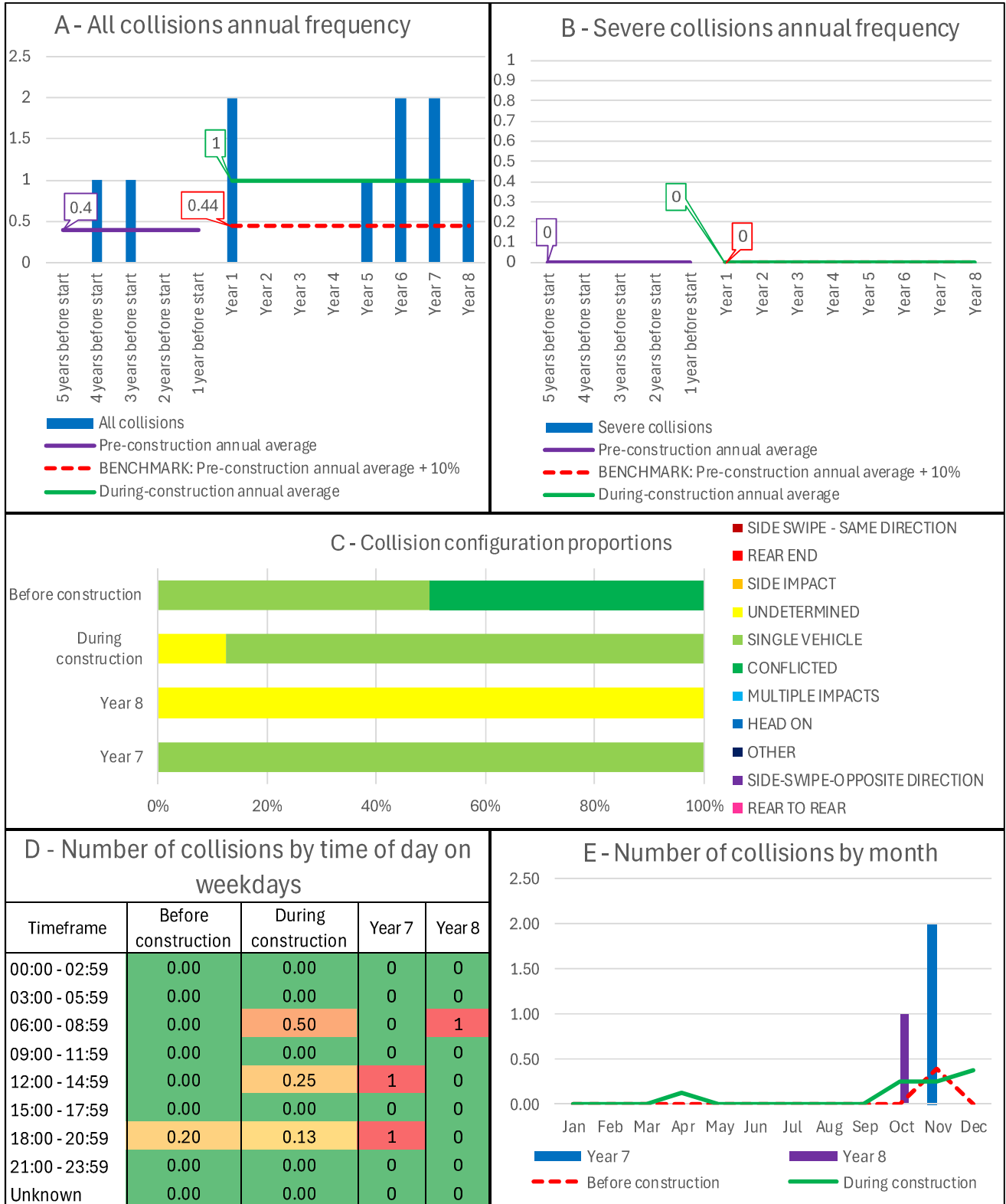
- Before construction, there were on average 0.2 collisions per year between 6:00-8:59 PM, with no other collisions recorded in any other period.
- During construction, there was on average 0.5 collisions per year between 6:00-8:59 AM, with lower peaks of 0.25 collisions per year between 12:00-2:59 PM and 0.13 collisions per year between 6:00-8:59 PM.
- In Year 7, there was one collision between 12:00-2:59 PM and one between 6:00-8:59 PM.
- In Year 8, there was one collision between 6:00-8:59 AM.

#### **E – Number of collisions by month**

- Before construction, there were on average 0.4 collisions per year in November, and no collisions at any other time of year.
- During construction, there were on average 0.13 collisions per year in March, 0.25 collisions per year in each of October and November, and 0.38 collisions per year in December.
- In Year 7 there were two collisions, both in November.
- In Year 8 there was one collision in October.



Figure 2 | Collision analysis at Old Fort Road and 85 Avenue.





**Traffic volume considerations**

**Table 2** below is an extract from the Years 7 and 8 Traffic Monitoring Report, prepared by WSP in January 2025. It shows the total traffic volume entering the intersection during the AM and PM peak hours at Old Fort Road and 85 Avenue each year compared to the background traffic volumes for that year as a percentage. The percentages for each year are calculated by subtracting the background volume from the measured volume for that year, then dividing by the background volume. From the table below we can observe:

- Years 7 and 8 had higher peak hour volumes (>300vph) than other years during construction.
- Years 7 and 8 had higher peak hour volumes compared to the background traffic from each of those years, with about 150% more in Year 7 and 150-180% more in Year 8.
- The higher traffic volumes at this intersection in Years 7 and 8 compared to other years align with the higher number of total collisions at the intersection in Years 7 and 8.

*Table 2 | Year 7 and 8 peak hour traffic comparisons against background at the Old Fort Road and 85 Avenue study intersection.*

Peak Hour	2022	2023	2015	2016	2016	2016	2017	2018	2019	2020	2021	2022	2023
	Background		Y1Q	Y1Q	Y1Q	Y1Q	Y2	Y3	Y4	Y5	Y6	Y7	Y8
			1	2	3	4	May	May	Peak	Peak	May	May	Jun
	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)
<b>AM</b>	126	150	168	119	111	197	285	182	230	217	226	318	378
			28%	-9%	-15%	50%	118%	39%	76%	66%	73%	152%	152%
<b>PM</b>	136	149	209	181	178	187	266	231	297	354	267	338	420
			61%	39%	37%	44%	105%	78%	128%	172%	105%	149%	182%

**Discussion of observations**

The intersection of 85 Avenue and Old Fort Road has a small number of collisions, such that it is difficult to draw meaningful conclusions from the analysis, especially considering the rare and random nature of crashes. For instance, the benchmark of the pre-construction annual average collision frequency + 10% is set at 0.4 total crashes per year, such that even one collision per year would exceed the benchmark and comparing the collision configuration proportions from one year to the next and against the pre-construction period is far less meaningful when there is only about one crash each year.

However, two key patterns can be observed from the analysis nonetheless:

- There were no severe collisions at all during the construction period, which is consistent with the pre-construction period. This is important, as severe collisions are those where people are injured, while the total collisions also include property damage only crashes. As such, no collisions at this intersection during the study period resulted in injuries.
- The time of year pattern with more collisions in October-December months for Years 7 and 8 is consistent with other years and with the pre-construction period, showing that this pattern is likely due to other factors aside from the increased traffic volumes in Years 7 and 8. Several other likely explanations for increased collisions during these months are the change in weather conditions from Fall to Winter resulting in increased ice on the



road in relation to the timing at which drivers install Winter tires on their vehicles, and the change in natural lighting conditions with more travel in the dark.

### 3.2.2 HIGHWAY 97 AT OLD FORT ROAD

The intersection analysis of Highway 97 at Old Fort Road is shown in **Figure 2**. From the analysis, we can make the following observations:

#### **A – All collisions annual frequency**

- There were 11 collisions at this intersection in Year 7 and 16 collisions in Year 8.
- The total number of collisions in both Year 7 and Year 8 was below the benchmark (pre-construction annual average + 10%) of 21.2 collisions per year.
- The annual average collision frequency over all construction years from Year 1 – Year 8 was 13.5 collisions per year, which is below the benchmark (pre-construction annual average + 10%) of 21.2 collisions per year.

#### **B – Severe collisions annual frequency**

- There were three severe collisions at this intersection in Year 7 and five in Year 8.
- The severe collisions in both Years 7 and 8 was below the benchmark of 8.14 severe collisions per year.
- The during-construction average over all years was 4.13 severe collisions per year, which is also below the benchmark of 8.14 collisions per year.

#### **C – Collision configuration proportions**

- Prior to construction, the dominant collision configurations were rear end (48%) and conflicted (25%).
- During construction, the dominant collision configuration proportions were rear end (56%) and single vehicle (15%).
- In Year 7 the dominant collisions configuration proportions were rear end (36%) and undetermined (36%).
- In Year 8 the dominant configuration proportions were rear end (63%) and side impact (19%).

#### **D – Number of collisions by time of day on weekdays**

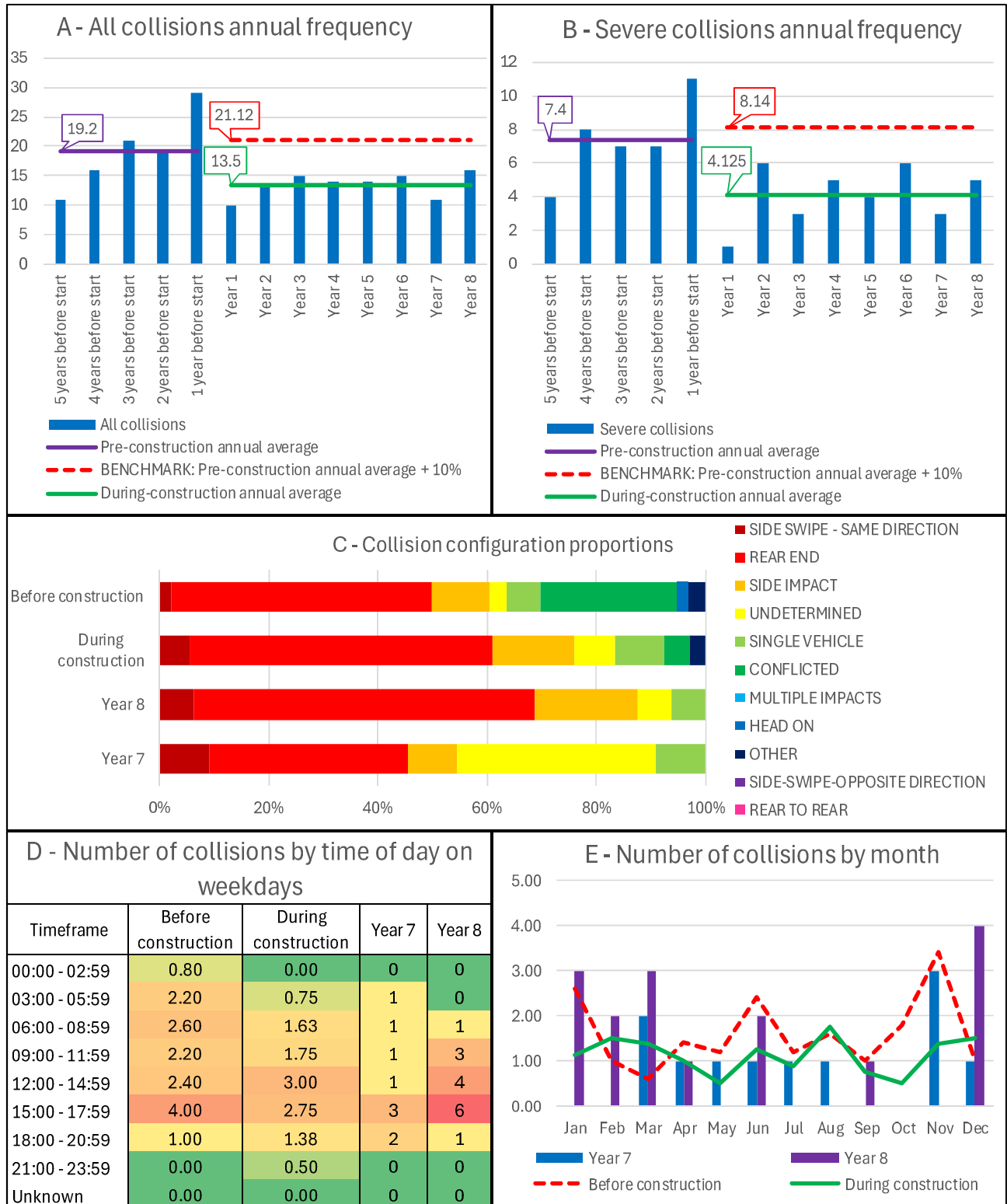
- Before construction, there were consistent collision frequencies per year of around 2.4 collisions per three-hour period between 3:00AM – 2:59PM, with a peak up to 4 collisions per three-hour period between 3:00PM – 5:59PM.
- During construction, lower collision average rates of around 1.5 collisions per three-hour period over the year were observed during daylight hours, with a less pronounced peak of around 3 collisions per three-hour period between 12:00PM – 5:59PM.
- In Year 7, collision patterns over the day reflected the before construction patterns, with a peak of 3 collisions over the year in the 3:00PM-5:59PM period.
- In Year 8, there was a higher peak in the afternoon, with 4 crashes between 12:00PM – 2:59PM and 6 crashes between 3:00PM – 5:59PM over the year.

#### **E – Number of collisions by month**

- Before construction, there were peaks in the annual average collision frequency per month in January (2.6 collisions per year), June (2.4 collisions per year) and November (3.4 collisions per year).
- During construction, there were not obvious peaks at any time of year, with an average monthly collision frequency between 0.5 collisions per month in October and May and 1.75 collisions per month in August.
- In Year 7 there were eleven collisions spread evenly over the year, but with a peak of three collisions in November.
- In Year 8 there were 16 collisions, with most collisions distributed through the months December to March.



Figure 3 | Collision analysis at Highway 97 and Old Fort Road.





### Traffic volume considerations

**Table 3** below is an extract from the Years 7 and 8 Traffic Monitoring Report, prepared by WSP in January 2025. It shows the total traffic volume entering the intersection during the AM and PM peak hours at Highway 97, Old Fort Road and 100 Avenue each year compared to the background traffic volumes for that year as a percentage. The percentages for each year are calculated by subtracting the background volume from the measured volume for that year, then dividing by the background volume. From the table below we can observe:

- Years 7 and 8 had similar peak hour volumes to other years of construction during both the AM and PM peaks.
- Year 7 and particularly Year 8 had higher peak hour volumes in the PM peak compared to the background traffic from each of those years, with 33% more in Year 7 and 30% more in Year 8. The AM peaks were similar to the background volumes.

*Table 3 | Year 7 and 8 peak hour traffic comparisons against background at the Highway 97, Old Fort Road and 100 Avenue study intersection.*

Peak Hour	2022	2023	2015	2016	2016	2016	2017	2018	2019	2020	2021	2022	2023
	Background		Y1Q	Y1Q	Y1Q	Y1Q	Y2	Y3	Y4	Y5	Y6	Y7	Y8
			1	2	3	4	May	May	Peak	Peak	May	May	Jun
	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)
<b>AM</b>	1513	1634	1804	1722	1701	1521	1728	1684	1780	1732	1728	1737	1717
			26%	20%	19%	6%	21%	17%	24%	21%	21%	15%	5%
<b>PM</b>	1706	1841	2056	1857	1941	1958	2233	1805	2083	2130	2185	2275	2400
			27%	15%	20%	21%	38%	12%	29%	32%	35%	33%	30%

### Discussion of observations

The intersection of Highway 97, Old Fort Road and 100 Avenue had markedly less collisions during construction than in the pre-construction period, including in both Year 7 and Year 8. As such, the Site C project had no negative effects on road safety at this intersection.

From the collision configuration proportions, time-of-day and month-of-year timeseries graphs, there were not any noticeable changes in Year 7 patterns compared to the pre-construction period. However, Year 8 showed several changes from pre-construction including:

- An increased proportion of rear-end collisions, from 48% pre-construction to 63% in Year 8. Of the 10 rear-end collisions in Year 8, 8 were during the December to March so Winter conditions may have played a role. The graph in **Figure 5** shows much lower temperatures recorded in Fort St. John in December 2022 than typical. Typically, rear-end crashes do not result in deaths or injuries to the road users involved (unless the crash involves a pedestrian, motorcyclist, or cyclist) as the survivable impact speed for a rear-end crash is 70km/h. Rear-end crashes typically occur at intersections in numerous typical circumstances, such as:
  - When approaching drivers do not notice the traffic signals changing or a queue forming and are not able to stop in time before they collide with the vehicle in front.
  - When the traffic signal changes from green to yellow and approaching drivers make different judgements about whether to brake and stop or continue through the intersection, with the driver in front deciding to stop and the following driver to continue through.

- If there has been a change to the road surface condition on the approach to the intersection such that inadequate surface friction is available under braking, e.g. during wet or wintry weather, from debris on the road, from pavement condition or road maintenance practices, etc.
- From traffic signal phases or phase changes (especially the length of the yellow phase) and driver familiarity with the intersection phasing.
- More collisions than usual in the 3:00PM-5:59PM period, from 4 per year on average in the pre-construction period to 6 in Year 8. The PM peak hour volumes in Year 8 are 30% above background, which could partly explain why more crashes have occurred during the 3:00PM – 5:59PM period than pre-construction.
- More crashes than usual during Year 8 in the months of December (4 collisions) and March (3 collisions) compared to the pre-construction annual average of 1 collision in December and 0.6 collisions in March. This is likely due to more severe Winter conditions.

### 3.2.3 HIGHWAY 97 AND 100 STREET

The intersection analysis of Highway 97 at 100 Street is shown in **Figure 4**. From the analysis, we can make the following observations:

#### **A – All collisions annual frequency**

- There were 10 collisions at this intersection in Year 7 and 14 collisions in Year 8.
- The total number of collisions in both Year 7 and Year 8 was below the benchmark (pre-construction annual average + 10%) of 19.4 collisions per year.
- The annual average collision frequency over all construction years from Year 1 – Year 8 was 16.3 collisions per year, which is below the benchmark (pre-construction annual average + 10%) of 19.4 collisions per year.

#### **B – Severe collisions annual frequency**

- There were three severe collisions at this intersection in Year 7 and four in Year 8.
- The number of severe collisions in both Years 7 and 8 was below the benchmark of 5.5 collisions per year.
- The during-construction average over all years was 6 severe collisions per year, which is above the benchmark of 5.5 collisions per year.

#### **C – Collision configuration proportions**

- Prior to construction, the dominant collision configurations were rear end (38%), side impact (15%) and conflicted (22%).
- During construction, the dominant collision configuration proportions were rear end (39%), side impact (21%), single vehicle (12%) and conflicted (13%). Conflicted collisions are when multiple or differing collision configurations are reported to ICBC.
- In Year 7 the dominant proportions were rear end (30%), side impact (20%) and single vehicle (20%).
- In Year 8 the dominant configuration proportions were rear end (36%), side impact (36%) and conflicted (14%).

#### **D – Number of collisions by time of day on weekdays**

- Before construction, there was a peak of 4 collisions between 6:00AM – 8:59AM, with consistent collision frequencies per year of around 2-3 collisions per three-hour period during daylight hours.
- During construction, collision frequencies were typically between 2.5-3.5 collisions per three-hour period during daylight hours on average over each year.
- In Year 7, collision patterns over the day reflected or were below the before construction patterns.
- In Year 8, there was a higher peak in the afternoon, with 4 collisions between 12:00PM – 2:59PM and 5 collisions between 3:00PM – 5:59PM over the year.

#### **E – Number of collisions by month**





- Before construction, there were peaks in the annual average collision frequency per month in January (1.5 collisions per year), May (1.63 collisions per year), August and December (each 2.2 collisions per year).
- During construction, there were peaks in November (1.9 collisions per month) and December (2.3 collisions per month) with around 0.5-1.7 collisions per month for the remainder of the year.
- In Year 7 there was a peak of 3 collisions in February with other months following pre-construction patterns.
- In Year 8 there was a peak of 2 collisions in April with other months following pre-construction patterns.

**Traffic volume considerations**

**Table 4** below is an extract from the Years 7 and 8 Traffic Monitoring Report, prepared by WSP in January 2025. It shows the total traffic volume entering the intersection during the AM and PM peak hours at Highway 97 and 100 Street each year compared to the background traffic volumes for that year as a percentage. The percentages for each year are calculated by subtracting the background volume from the measured volume for that year, then dividing by the background volume. From the table below we can observe:

- Years 7 and 8 had similar peak hour volumes to other years of construction during both the AM and PM peaks.
- Year 7 had a slightly higher volume in the PM peak compared to the background for Y7, with 23% higher volumes.
- Year 8 volumes were similar to the background during the AM and PM at 2% and 8%, respectively.

*Table 4 | Year 7 and 8 peak hour traffic comparisons against background at the Highway 97 and 100 Street study intersection.*

Peak Hour	2022	2023	2015	2016	2016	2016	2017	2018	2019	2020	2021	2022	2023
	Background		Y1Q1	Y1Q2	Y1Q3	Y1Q4	Y2	Y3	Y4	Y5	Y6	Y7	Y8
			Nov	Feb	Apr	Jul	May	May	Peak	Peak	May	May	Jun
	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)
<b>AM</b>	1506	1624	1766	1692	1629	1739	1739	1675	1677	1602	1538	1630	1662
			24%	18%	14%	22%	22%	17%	17%	12%	8%	8%	2%
<b>PM</b>	1945	2098	2416	2040	2126	2190	2354	1984	2288	2302	2184	2398	2256
			31%	11%	15%	19%	28%	8%	24%	25%	19%	23%	8%

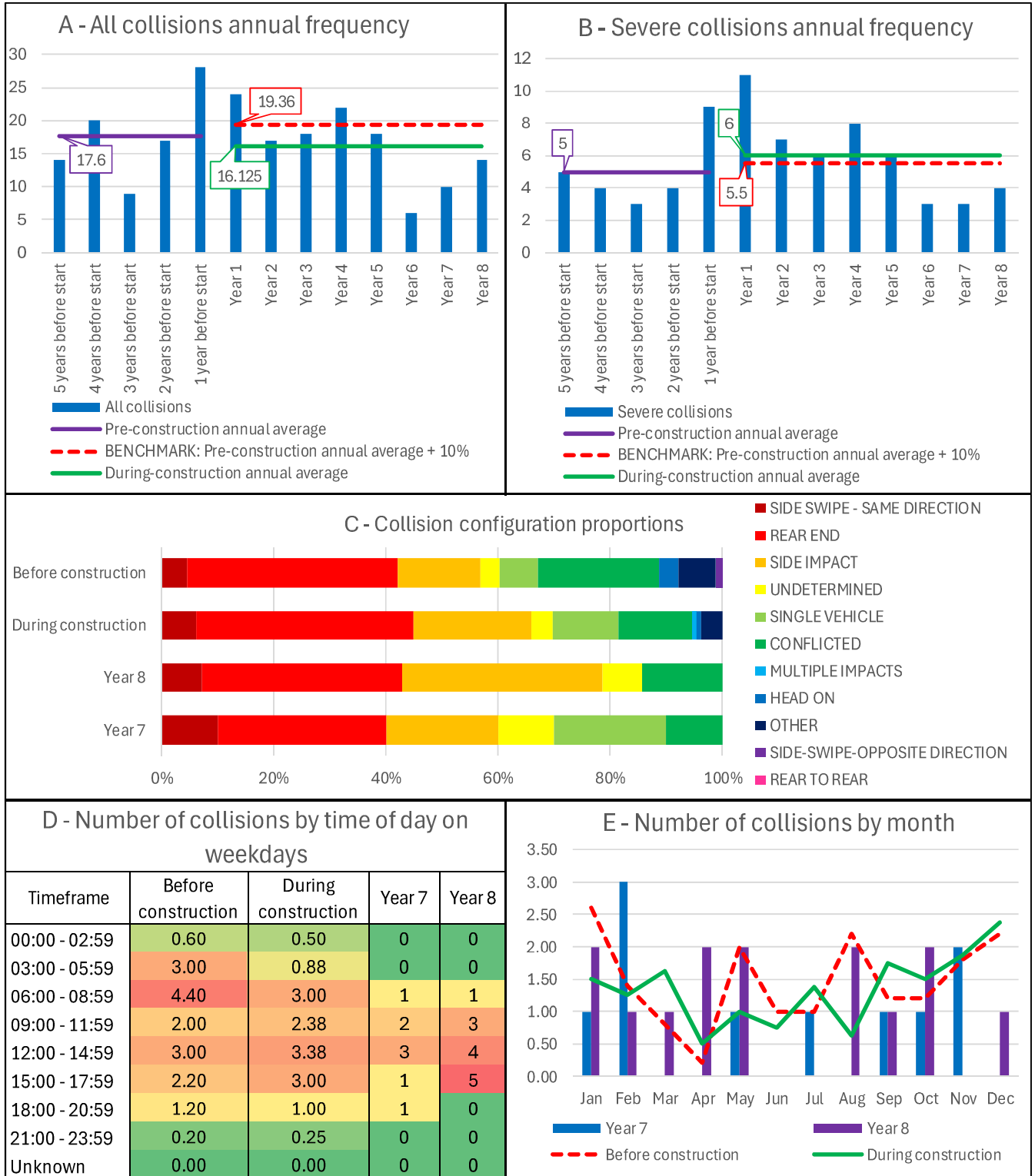
**Discussion of observations**

The intersection of Highway 97 and 100 Street had slightly less total collisions per year (16.3) during construction compared to the benchmark pre-construction average + 10% (19.4), and slightly more severe collisions per year (6) than during pre-construction average + 10% (5.5). While the average annual severe collision frequency is higher during construction than the benchmark, this is not concerning as crashes are rare and random events and the difference between the benchmark and the during-construction average is not sufficiently different to conclude the construction influenced road safety at this intersection.

From the collision configuration proportions and time-of-day timeseries graphs, there were not any noticeable changes in Year 7 patterns compared to the pre-construction period. However, Year 8 had higher collision frequencies in the afternoon than previously, with 4 collisions 12:00PM – 2:59PM while pre-construction had on average 3 collisions per year during this period, and with 5 collisions between 3:00PM – 5:59PM compared to 2.2 pre-construction. Additionally, Year 8 had a greater proportion of side impact collisions than other years.

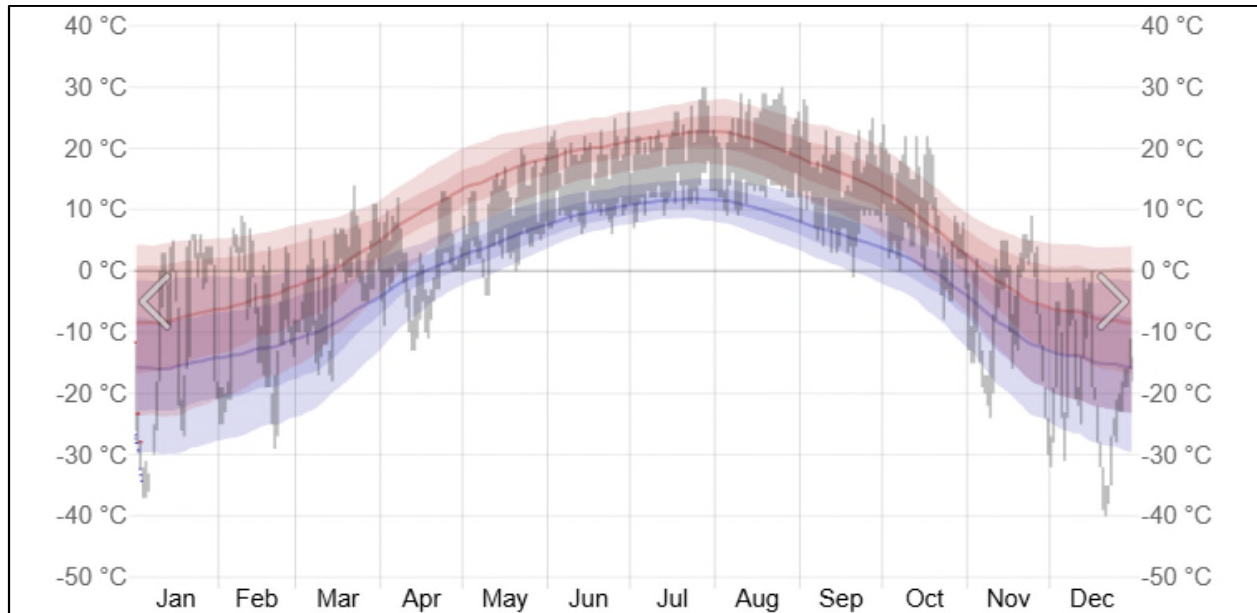


Figure 4 | Collision analysis at Highway 97 and 100 Street.



While the number of collisions per month did not show any major differences comparing the pre-construction period to either the during-construction average or Year 8, Year 7 did have more crashes in February than other years. However, 3 crashes per month compared to the pre-construction average of 1.4 crashes per month in February is also more likely to be due to the rare and random nature of crashes than a particular road safety issue with the Site C project that only arose in February. One other explanation is that February 2022 had longer lingering, or more severe Winter driving conditions compared to other years, which can result in more collisions. **Figure 5** below shows temperatures at Fort St John Airport during 2022, with lower than typical temperatures recorded towards the end of February.

*Figure 5 | Fort St. John Airport temperature 2022 history from Weatherspark<sup>3</sup>, showing a drop in typical temperatures in the second half of February. The daily range of reported temperatures (gray bars) placed over the daily average high (faint red line) and low (faint blue line) temperature, with 25th to 75th and 10th to 90th percentile bands.*



### 3.2.4 HIGHWAY 97 AND 85 AVENUE

The intersection analysis of Highway 97 at 85 Avenue is shown in **Figure 6**. From the analysis, we can make the following observations:

#### **A – All collisions annual frequency**

- There were 8 collisions at this intersection in Year 7 and 5 collisions in Year 8.
- The total number of collisions in Year 8 was below the benchmark (pre-construction annual average + 10%) of 5.5 collisions per year; however, **Year 7 was above the benchmark for all collisions.**
- The annual average collision frequency over all construction years from Year 1 – Year 8 was 4.8 collisions per year, which is below the benchmark (pre-construction annual average + 10%) of 5.5 collisions per year.

#### **B – Severe collisions annual frequency**

- There were five severe collisions at this intersection in Year 7 and one in Year 8.
- The number of severe collisions in Year 8 was below the benchmark of 2.1 severe collisions per year; however, **Year 7 was above the benchmark with five severe collisions.**

<sup>3</sup> <https://weatherspark.com/>



- The during-construction average over all year was 4.13 severe collisions per year, which is also below the benchmark of 8.14 collisions per year.

### **C – Collision configuration proportions**

- Prior to construction, the dominant collision configurations were rear end (40%), side impact (16%), conflicted (20%) and other (20%).
- During construction, the dominant collision configuration proportions were rear end (32%), side impact (24%) and conflicted (18%).
- In Year 7 the dominant collisions configuration proportions were rear end (38%) and side impact (25%).
- In Year 8 the dominant configuration proportions were rear end (40%) side impact – same direction (20%), side impact (20%) and single vehicle (20%).

### **D – Number of collisions by time of day on weekdays**

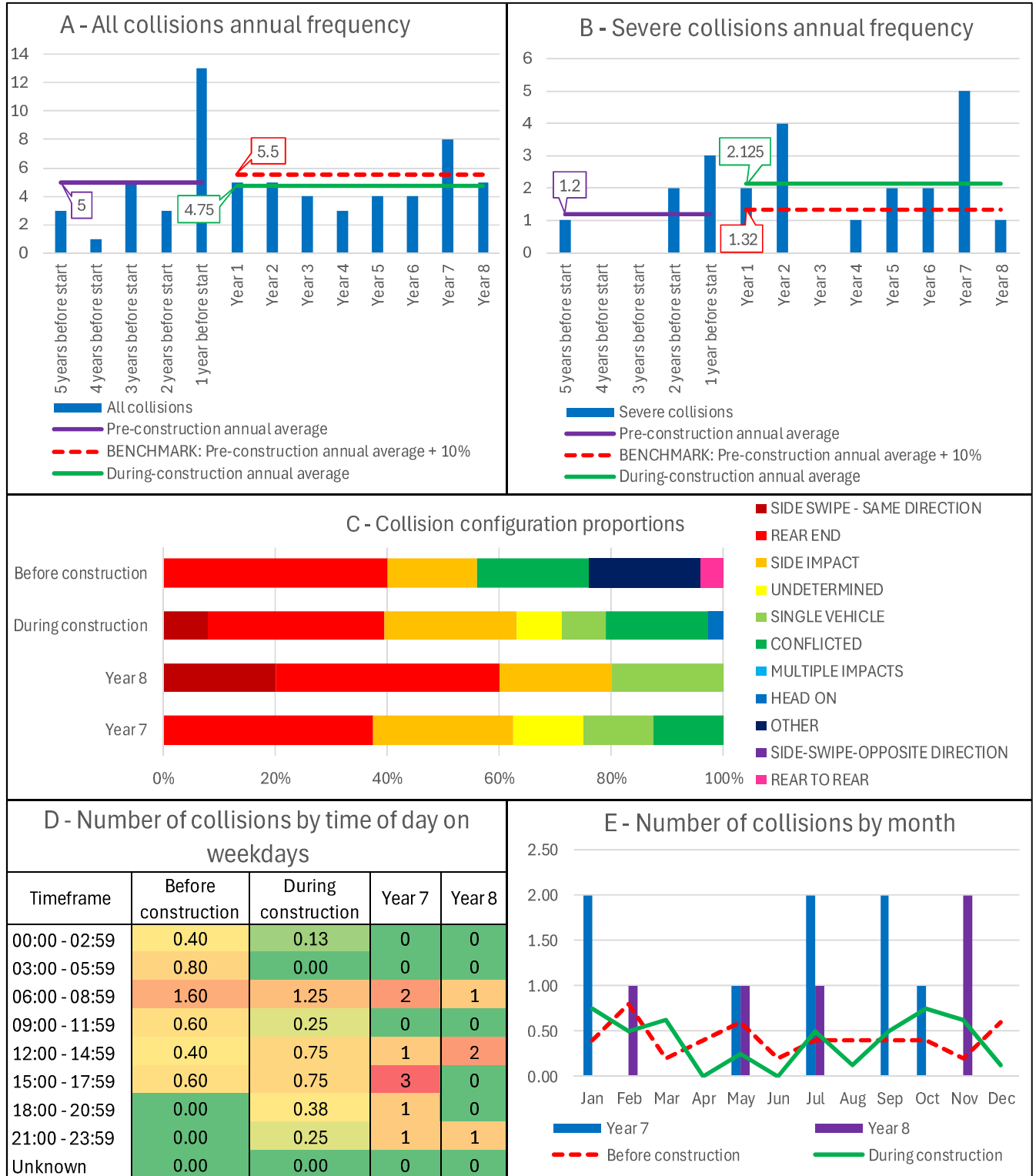
- Before construction, there were consistent collision frequencies per year of around 0.4-0.8 collisions per three-hour period between 12:00AM – 5:59PM, with a spike of 1.6 collisions per three-hour period between 6:00AM – 8:59AM.
- During construction, collision frequencies over three-hour periods were similar in quantity to pre-construction between 0.1-1.25 collisions per three-hour period; however there appears to be a shift in the time of day when collisions occur towards the afternoon and PM peak.
- In Year 7, there was a peak of three collisions per three-hour period for 3:00PM – 5:59PM, which is unusual given the pre-construction collision patterns typically peak in the morning and had a collision frequency of 0.6 collisions per three-hour period during this period.
- In Year 8, collision patterns typically followed the pre-construction patterns with a peak of 2 crashes per three-hour period between 12:00PM – 2:59PM.

### **E – Number of collisions by month**

- Before construction, collisions rates were consistent across the year between 0.2 – 0.8 collisions per month without any notable peaks.
- During construction, there were not obvious peaks at any time of year, with an average monthly collision frequency between 0.1 and 0.8 collisions per month.
- In Year 7 there were higher collision frequencies than typical in January, July, and September at two collisions per month.
- In Year 8 there were higher collision frequencies than typical in November at two collisions per month.



Figure 6 | Collision analysis at Highway 97 and 85 Avenue.





### Traffic volume considerations

**Table 5** below is an extract from the Years 7 and 8 Traffic Monitoring Report, prepared by WSP in January 2025. It shows the total traffic volume entering the intersection during the AM and PM peak hours at Highway 97 and 85 Avenue each year compared to the background traffic volumes for that year as a percentage. The percentages for each year are calculated by subtracting the background volume from the measured volume for that year, then dividing by the background volume. From the table below we can observe:

- Years 7 and 8 had similar peak hour volumes to other years of construction during both the AM and PM peaks.
- Year 7 and particularly Year 8 had higher peak hour volumes in the PM peak compared to the background traffic from each of those years, with 30% more in Year 7 and 25% more in Year 8. The AM peaks were similar to the background volumes.

*Table 5 | Year 7 and 8 peak hour traffic comparisons against background at the Highway 97 and 85 Avenue study intersection.*

Peak Hour	2022	2023	2015	2016	2016	2016	2017	2018	2019	2020	2021	2022	2023
	Background		Y1Q1	Y1Q2	Y1Q3	Y1Q4	Y2	Y3	Y4	Y5	Y6	Y7	Y8
			Nov	Feb	Apr	Jul	May	May	Peak	Peak	May	May	Jun
	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)
<b>AM</b>	1307	1410	1629	1339	1338	1411	1506	1469	1521	1433	1321	1335	1382
			32%	8%	8%	14%	22%	19%	23%	16%	7%	2%	-2%
<b>PM</b>	1342	1447	1779	1527	1530	1815	1903	1530	1848	1776	1640	1740	1802
			40%	20%	20%	43%	49%	20%	45%	40%	29%	30%	25%

### Discussion of observations

For Year 7, it appears there has been a decrease in road safety at the intersection of Highway 97 and 85 Avenue. Year 7 appears to be an anomaly and there may have been other differences in conditions that could have contributed to the increase, such as construction activities on an alternate route which could have increased traffic volumes at the study intersection, or Winter conditions. It also appears to be a temporary condition as the collision frequency returned to more regular conditions in Year 8:

- There was a total of eight collisions in Year 7, which is above the benchmark of the pre-construction average +10% of 5.5 crashes per year.
- There were five severe collisions in Year 7, which is above the benchmark of 1.3 severe collisions per year.
- There was a noticeable shift in the time of day where collisions typically occurred between Year 7 and other Years, with 3 collisions occurring between the hours of 3:00-5:59PM in Year 7, while the pre-construction period had 0.6 collisions per year at this time and the during-construction average annual collisions between 3:00PM – 5:59PM was 0.75 collisions.
- The traffic patterns in **Table 7** align with more collisions occurring during the PM peak hours.

For Year 8, it is unlikely the project had negative road safety impacts at this intersection as the collision frequencies for both all collisions and severe collisions were lower than the pre-construction period. While there are some slight differences in the time of year where collisions per month peaked in Year 8, the peak was two collisions in November, which could also be due to the rare and random nature of crashes rather than a change in how the intersection is operating.

### 3.2.5 85 AVENUE AT 100 STREET

The intersection analysis of 85 Avenue and 100 Street is shown in **Figure 7**. From the analysis, we can make the following observations:

#### **A – All collisions annual frequency**

- There were three collisions at this intersection in Year 7 and two collisions in Year 8.
- The total number of collisions in **both Year 7 and Year 8 exceeded the benchmark** (pre-construction annual average + 10%) of 1.3 collisions per year.
- The annual average collision frequency over all construction years from Year 1 – Year 8 was 1.9 collisions per year, which exceeds the benchmark (pre-construction annual average + 10%) of 1.3 collisions per year.

#### **B – Severe collisions annual frequency**

- There was one severe collision in Year 7 and none in Year 8.
- The total number of **severe collisions in Year 7 exceeded the benchmark** (pre-construction annual average +10%) of 0.66 severe collisions per year.
- The average annual severe collision frequency over all years of construction was 0.4 severe collisions per year, which is below the benchmark rate of 0.66 collisions per year.

#### **C – Collision configuration proportions**

- Prior to construction, the dominant collision configuration proportions were 50% side impact and 3% other.
- During construction, the dominant collision proportions were side impact (33%), undetermined (20%) and single vehicle (27%).
- In Year 7 67% of collisions were side impact and 33% of collisions were single vehicle.
- In Year 8 50% of collisions were side impact and 50% were single vehicle.

#### **D – Number of collisions by time of day on weekdays**

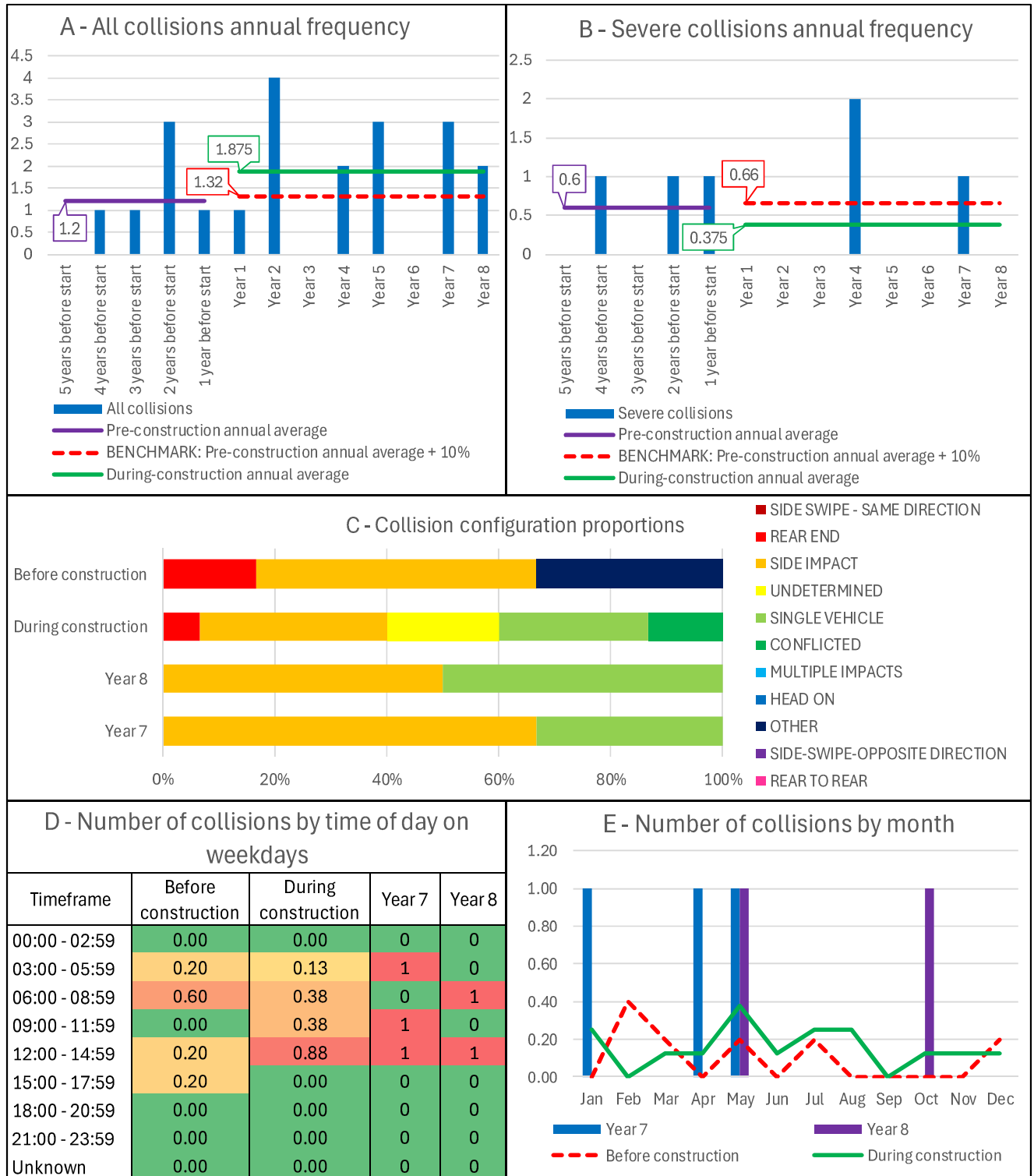
- Before construction, there were around 0.2 collisions per year during daylight hours, with a peak of 0.6 collisions per three-hour period between 6:00AM – 8:59AM.
- During construction, there was on average 0.4 collisions per year between 6:00AM-11:59 AM, with a peak of 0.9 collisions between 12:00PM – 2:59PM.
- In both Year 7 and Year 8, collisions followed the same pattern as the pre-construction and during-construction years, with a small number of collisions in the morning and early afternoon, and no collisions in the later afternoon or evening.

#### **E – Number of collisions by month**

- Before construction, there were on average 0 to 0.4 collisions per month spread across the year, without any obvious peaks.
- During construction, there were on average 0 to 0.4 collisions per month spread across the year, without any obvious peaks.
- In Year 7 there was one collision in each of January, April, and May.
- In Year 8 there was one collision in May and one in October.



Figure 7 | Collision analysis at 85 Avenue and 100 Street.







**Traffic volume considerations**

**Table 6** below is an extract from the Years 7 and 8 Traffic Monitoring Report, prepared by WSP in January 2025. It shows the AM and PM peak hour volumes at 85 Avenue and 100 Street each year compared to the baseline traffic volumes for that year as a percentage. From the table below we can observe:

- Years 7 and 8 had similar peak hour volumes than other years during construction.
- Years 7 and 8 had higher peak hour volumes compared to the background traffic from each of those years, in the order of around 20-50% in both the AM and PM peaks.

*Table 6 | Year 7 and 8 peak hour traffic comparisons against background at the 85 Avenue and 100 Street study intersection.*

Peak Hour	2022	2023	2015	2016	2016	2016	2017	2018	2019	2020	2021	2022	2023
	Background		Y1Q1	Y1Q2	Y1Q3	Y1Q4	Y2	Y3	Y4	Y5	Y6	Y7	Y8
			Nov	Feb	Apr	Jul	May	May	Peak	Peak	May	May	Jun
	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)	(vph)
<b>AM</b>	259	279	350	267	263	253	359	276	325	364	339	382	362
			42%	9%	7%	3%	46%	12%	32%	48%	38%	47%	30%
<b>PM</b>	306	331	329	328	245	282	365	284	346	354	386	399	406
			13%	13%	-16%	-3%	26%	-2%	19%	27%	33%	30%	23%

**Discussion of observations**

The intersection of 85 Avenue and 100 Street has a small number of collisions, such that it is difficult to draw meaningful conclusions from the analysis, especially considering the rare and random nature of crashes. For instance, the benchmark of the pre-construction annual average severe collision frequency + 10% is set at 0.7 collisions per year, such that even one collision per year would exceed the benchmark. Additionally, comparing the collision configuration proportions from one year to the next and against the pre-construction period is far less meaningful when there are only about one or two collisions each year.

Given the low incidence of collisions at this intersection and the consistent patterns in terms of dominant collision configuration types, time of day and month of year when comparing the pre-construction and construction periods, it appears that the Site C project has had no significant effects on road safety at this intersection.



## 4 SUMMARY

**Table 7** below shows the pre-construction and benchmark annual average collision frequencies against the number of collisions in Years 7 and 8 for both total and severe collisions at each of the study intersections. Where collisions in Years 7 or 8 have exceeded the benchmark, these are emphasized in **bold text**. The sections following **Table 7** provide more context as to whether the Site C Project has affected road safety at each of these intersections.

*Table 7 | Comparisons at all study intersections between the safety benchmark and Years 7 and 8 collisions.*

Intersection	Collisions frequencies (per year)							
	Pre-construction average		BENCHMARK (pre-construction average + 10%)		Year 7		Year 8	
	Total	Severe	Total	Severe	Total	Severe	Total	Severe
<b>85 Avenue / Old Fort Road</b>	0.4	0	0.4	0	<b>2</b>	0	<b>1</b>	0
<b>Highway 97 / Old Fort Road</b>	19.2	7.4	21.1	8.1	11	3	16	5
<b>Highway 97 / 100 Street</b>	17.6	5.0	19.4	5.5	10	3	14	4
<b>Highway 97 / 85 Avenue</b>	5.0	1.2	5.5	1.3	<b>8</b>	<b>5</b>	5	1
<b>85 Avenue / 100 Street</b>	1.2	0.6	1.3	0.7	<b>3</b>	<b>1</b>	<b>2</b>	0

### 4.1.1 85 AVENUE AND OLD FORT ROAD

The intersection of 85 Avenue and Old Fort Road has a small number of collisions, such that it is difficult to draw meaningful conclusions from the analysis, especially considering the rare and random nature of crashes. For instance, the benchmark of the pre-construction annual average collision frequency + 10% is set at 0.4 total crashes per year, such that even one collision per year would exceed the benchmark and comparing the collision configuration proportions from one year to the next and against the pre-construction period is far less meaningful when there is only about one crash each year.

However, there were no severe collisions at all during the construction period, which is consistent with the pre-construction period. This is important, as severe collisions are those where people are injured, while the total collisions also include property damage only crashes. As such, no collisions at this intersection during the study period resulted in injuries.

### 4.1.2 HIGHWAY 97 AND OLD FORT ROAD

The intersection of Highway 97, Old Fort Road and 100 Avenue had markedly less collisions during construction than in the pre-construction period, including in both Year 7 and Year 8. As such, the Site C project had no negative effects on road safety at this intersection.

From the collision configuration proportions, time-of-day and month-of-year timeseries graphs, there were not any noticeable changes in Year 7 patterns compared to the pre-construction period. However, Year 8 showed several changes from pre-construction including:

- An increased proportion of rear-end collisions, from 48% pre-construction to 63% in Year 8. Of the 10 rear-end collisions in Year 8, 8 were during the December to March so Winter conditions may have played a role.

Historic weather data shows much lower temperatures recorded in Fort St. John in December 2022 than other years. Typically, rear-end crashes do not result in deaths or injuries to the road users involved (unless the crash involves a pedestrian, motorcyclist, or cyclist) as the survivable impact speed for a rear-end crash is 70km/h.

- More collisions than usual in the 3:00PM-5:59PM period, from 4 per year on average in the pre-construction period to 6 in Year 8. The PM peak hour volumes in Year 8 are 30% above background, which could partly explain why more crashes have occurred during the 3:00PM – 5:59PM period than pre-construction.
- More crashes than usual during Year 8 in the months of December (4 collisions) and March (3 collisions) compared to the pre-construction annual average of 1 collision in December and 0.6 collisions in March. This is likely due to more severe Winter conditions.

#### 4.1.3 HIGHWAY 97 AND 100 STREET

The intersection of Highway 97 and 100 Street had slightly less total collisions per year (16.3) during construction compared to the benchmark pre-construction average + 10% (19.4), and slightly more severe collisions per year (6) than during pre-construction average + 10% (5.5). While the average annual severe collision frequency is higher during construction than the benchmark, this is not concerning as crashes are rare and random events and the difference between the benchmark and the during-construction average is not sufficiently different to conclude the construction influenced road safety at this intersection.

From the collision configuration proportions and time-of-day timeseries graphs, there were not any noticeable changes in Year 7 patterns compared to the pre-construction period. However, Year 8 had higher collision frequencies in the afternoon than previously, with 4 collisions 12:00PM – 2:59PM while pre-construction had on average 3 collisions per year during this period, and with 5 collisions between 3:00PM – 5:59PM compared to 2.2 pre-construction. Additionally, Year 8 had a greater proportion of side impact collisions than other years.

While the number of collisions per month did not show any major differences comparing the pre-construction period to either the during-construction average or Year 8, Year 7 did have more crashes in February than other years. However, 3 crashes per month compared to the pre-construction average of 1.4 crashes per month in February is also more likely to be due to the rare and random nature of crashes than a particular road safety issue with the Site C project that only arose in February. One other explanation is that February 2022 had longer lingering, or more severe Winter driving conditions compared to other years, which can result in more collisions. Historic weather data at Fort St John Airport during 2022 shows lower than typical temperatures recorded towards the end of February.

#### 4.1.4 HIGHWAY 97 AND 85 AVENUE

For Year 7, it appears there has been a decrease in road safety at the intersection of Highway 97 and 85 Avenue. Year 7 appears to be an anomaly and there may have been other differences in conditions that could have contributed to the increase, such as construction activities on an alternate route which could have increased traffic volumes at the study intersection, or Winter conditions. It also appears to be a temporary condition as the collision frequency returned to more regular conditions in Year 8:

- There was a total of eight collisions in Year 7, which is above the benchmark of the pre-construction average +10% of 5.5 crashes per year.
- There were five severe collisions in Year 7, which is above the benchmark of 1.3 severe collisions per year.
- There was a noticeable shift in the time of day where collisions typically occurred between Year 7 and other Years, with 3 collisions occurring between the hours of 3:00-5:59PM in Year 7, while the pre-construction period had 0.6 collisions per year at this time and the during-construction average annual collisions between 3:00PM – 5:59PM was 0.75 collisions.
- The traffic patterns in **Table 7** align with more collisions occurring during the PM peak hours.

For Year 8, it is unlikely the project had negative road safety impacts at this intersection as the collision frequencies for both all collisions and severe collisions were lower than the pre-construction period. While there are some slight



differences in the time of year where collisions per month peaked in Year 8, the peak was two collisions in November, which could also be due to the rare and random nature of crashes rather than a change in how the intersection is operating.

#### 4.1.5 85 AVENUE AND 100 STREET

The intersection of 85 Avenue and 100 Street has a small number of collisions, such that it is difficult to draw meaningful conclusions from the analysis, especially considering the rare and random nature of crashes. For instance, the benchmark of the pre-construction annual average severe collision frequency + 10% is set at 0.7 collisions per year, such that even one collision per year would exceed the benchmark. Additionally, comparing the collision configuration proportions from one year to the next and against the pre-construction period is far less meaningful when there are only about one or two collisions each year.

Given the low incidence of collisions at this intersection and the consistent patterns in terms of dominant collision configuration types, time of day and month of year when comparing the pre-construction and construction periods, it appears that the Site C project has had no significant effects on road safety at this intersection.

## 5 CONCLUSIONS

There were three intersections where the annual collision frequency during Year 7 or Year 8 exceeded the benchmark; however, all three intersections have likely explanations outside of the Site C Project's control as to why the benchmark was exceeded:

- At the intersections of 85 Avenue and Old Fort Road, and 85 Avenue and 100 Street, the benchmark collision frequencies were respectively 0.4 and 1.2 collisions per year. These are low, such that one or two collisions at either intersection in any year would exceed the benchmarks. Given the rare and random nature of collisions, it is unlikely that a benchmark exceedance is reflective of any decrease or improvement in safety at either of these intersections.
- At the intersection of Highway 97 and 85 Avenue the benchmark collision frequencies were exceeded in Year 7, but not in Year 8. Year 7 appears to be an anomaly and there may have been other differences in conditions that could have contributed to the increase, such as construction activities on an alternate route which could have increased traffic volumes at the study intersection, or Winter conditions. It also appears to be a temporary condition as the collision frequency returned to more regular conditions in Year 8.

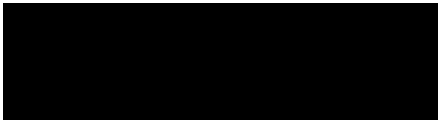
Based on the reasons above for benchmarks being exceeded, we can conclude that the Site C project has not had any negative impacts on the road safety at any of the study intersections in Years 7 and 8 of the construction period. Given the Site C project construction has now finished, we have not made any recommendations for mitigation measures at this intersection.



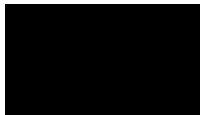
If you have any questions regarding this report, please contact the undersigned.

Yours truly,

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