TRAFFIC IMPACT ASSESSMENT GUIDELINES

Revised February 2021

Table of Contents

1 Introduction

Traffic Impact Assessment (TIA) is a valuable tool for assessing potential impacts of traffic generated by a proposed development to the surrounding transportation system. TIA generally includes a description of the scope and intensity of the proposed project, a summary of the projected impacts and any required improvements to ensure that the roadway facilities can safely accommodate the proposed development. The goal is to ensure that the transportation system will operate safely and efficiently within the design horizon of the study.

A well-prepared TIA helps the developer and permitting agency accomplish the following:

- Forecast the traffic impacts created by a proposed development by developing reasonable future traffic volumes for design purposes;
- Determine if improvements are needed to accommodate background traffic and the traffic from a proposed development;
- Allocate funds more efficiently;
- Relate land use decisions with traffic conditions;
- Evaluate the number, location, and design of access points;
- Update traffic data (projections);
- Provide a basis for determining the developer's responsibility for specific off-site improvements.[1]

Prior to the approval of a subdivision, pre-development planning or development, Alberta Transportation (TRANS) may require the completion of a TIA.

For subdivision and developments within the highway control zones, TRANS is responsible to ensure that the proponent addresses transportation issues including access removals, public road intersection treatments, setbacks, etc. prior to issuing a permit or a waiver.

For developments outside the highway control zones, the municipality is responsible to ensure that the impacts to the highway are addressed prior to issuing their development permits in consultation with TRANS. Municipalities are responsible to identify which proposals could impact the highway and are encouraged to refer subdivision proposals, development applications, and traffic impact assessments to TRANS for technical review and recommendations, and support, prior to the municipality issuing a permit.

Municipalities have autonomy for land use decisions and development approvals and have the ability to undertake improvements and recover the costs of growth from developers through agreements (i.e., development agreements and off-site levies for new or expanded transportation infrastructure).

[1] Stover, V.G. and F.J. Koepke. 2002. *Transportation and Land Development*, 2nd ed. ITE, Washington, D.C.

1.1 Purpose

The purpose of this document is to establish uniform guidelines for conducting TIA's for proposed new developments, the expansion of existing developments, requests to new or modified access to provincial highway network; and to assist developers, municipalities and consultants in better understanding the TRANS' requirements and expectations regarding a TIA.

The Guidelines will be periodically reviewed and updated as required. To provide any comments, input or concerns, please contact:

Elena Yin, P.Eng., (elena.yin@gov.ab.ca), or
(Peter) Doanh Ngo, P.Eng., (peter.d.ngo@gov.ab.ca)

Geotechnical and Utilities Section
Alberta Transportation.
2nd Floor Twin Atria Building
4999 – 98 Avenue NW
Edmonton, AB, T6B 2X3

1.2 When Is a TIA Required?

Any development needs to have adequate infrastructure to support it, whether utilities or transportation. As a result, every proposed development requires an assessment of the adequacy of the site (e.g., compatibility with highway and municipal plans, access location(s), geometry, capacity, traffic control, etc.) and any necessary improvements to safely accommodate the proposed development.

In general, there are two levels of assessment that may be required in support of a development:

- **Comprehensive Report**: used for larger development with significant traffic impacts or at complex location where the recommended improvements require a detailed analysis.

- **Memo Report**: may be used for small development with low traffic impacts at simple location where the recommended improvements can be assessed in a memo format.

Typically, a subdivision, pre-development plan or development that potentially generates high traffic volume requires a comprehensive TIA. This includes but not limited to area structure plans, neighbourhood structure plans, change of zoning resulting increase of traffic, increase in density from previous TIA, special land use scenarios, etc.

If the anticipated traffic impact is low, (e.g., ITE trip rate is used, standard intersection treatment, no oversized vehicle, no capacity issue, traffic signal not warranted, intersection sight distance is adequate, no other operational issue), a memo report may be sufficient.

While the following sections of the guidelines provide general requirements for a comprehensive assessment, the level of analysis required in support of each development proposal may vary. Depending on the complexity of the site, certain sections may not be applicable, while other additional analyses may be required.

1.3 Submission Requirements

A TIA for a complex project should be submitted in two parts. The first submission provides the concept plan for the proposed development, access location(s), basic assumptions and methodology. A meeting with TRANS prior to the first submission to determine the acceptability of the access location(s), assumptions and methodology would be useful and save the proponent from any unnecessary reworks. After the first part has been reviewed, the second part includes the detailed analysis, conclusions and recommendations.

As the TIA is often conceptual in nature and relies on many assumptions (e.g., development type, trip generation, trip distribution, traffic growth rate, development horizons, etc.), its assumptions may need to be verified from time to time when new/additional information becomes available. The acceptance of a TIA should not be viewed as final as subsequent updates to the TIA may be required. The TIA is a technical document that other studies and approvals rely on so it needs to be as accurate as possible. TRANS reserves the right to require additional information or further revisions to the TIA if/when necessary.

A TIA outlines engineering judgements and recommendations; therefore, a TIA (including any interim TIA) must be signed off by a qualified professional transportation engineer, licensed by APEGA to practice in Alberta. **An unsigned TIA is not acceptable and will not be reviewed.**

A TIA finalized for acceptance must have a professional engineer's stamp along with the company's Permit to Practice in Alberta.

1.4 Ethics & Objectivity

Although the TIA preparer and reviewer will sometimes have different objectives and perspectives, all parties involved in the process should adhere to established engineering practices, and conduct all analyses and reviews objectively and professionally.[2]

1.5 Information Disclosure

Although the TIA is typically prepared by a consultant for its client, when it is submitted to TRANS as a technical supporting document for a permit, the TIA is subject to the disclosure and protection provisions of the *Freedom of Information and Protection of Privacy Act* (FOIPP Act). The FOIPP Act allows any person a right of access to records in TRANS' custody or control, subject to limited and specific exceptions as set out in the FOIPP Act.

The consultant or its client may identify those parts of any submission to TRANS that the consultant or its client considers confidential and what harm could reasonably be expected from disclosure. TRANS does not guarantee that this identification will prevent disclosure if disclosure is determined to be required under the FOIPP Act.

[2] Institute of Transportation Engineers. 2010. *Transportation Impact Analyses for Site Development. An ITE Recommended Practice*. Washington, D.C.

2 Process and Format

2.1 Communication

Land use is under municipal jurisdiction; therefore, all TIA correspondence should involve the municipality.

2.2 Compatibility with Highway Plans and Municipality Plans

It is crucial that the developer's plan must be compatible with both municipality plans and highway plans. As municipality plans and highway plans may be developed independently of one another and revised from time to time, it is the developer's responsibility to gather all the relevant and current information in order to make an informed decision on whether to invest their time and money into a project.

2.3 Project Scoping

To avoid any unnecessary work, it is recommended that all applicants contact TRANS prior to beginning of any TIA work to determine the required scope, acceptability of the access location(s), assumptions, methodology and TRANS' expectations and requirements. A scoping meeting with both the municipality and TRANS staff would be helpful to discuss about the proposed development plan, any future highway and municipal plans, existing and proposed access locations, access management, setback requirements, expectations, etc. to determine whether a TIA is required or not, and the scope of the study for the upcoming TIA. The developer and its consultant should discuss whether TRANS and the municipality are prepared to consider a change of use of a particular access and/or a new access.

As a TIA is often based on many assumptions (e.g., traffic growth rate, trip generation, trip distribution/assignment, staging, etc.), to achieve an acceptable TIA while minimizing the number of revisions, all such assumptions should be agreed to by the reviewing parties before conducting the TIA. The reviewer may have a certain preference or limitation in regard to analysis tools; that should be confirmed as well. Refer to Section 4.2 for TRANS' preferred analysis tools.

2.4 Report Format

The report should be presented in a concise, step-by-step approach, and easy to verify and understand. Any assumptions must be explained and supported with sufficient evidence. The suggested study format below will help ensuring consistency among various studies, and help enhancing the efficiency of the report review process. Detailed format can be found in Section 3.5 of the guideline.

Recommended TIA report format:

1) Executive Summary
2) Introduction and Proposed Development Information
3) Future Highway and Municipal Plans
4) Existing Infrastructure Conditions
5) Background Traffic and Projection
6) Development Traffic

7) Post Development Traffic
8) Intersection Treatment Warrants
9) Analyses
10) Conclusions and Recommendations (including the proposed intersection plans)
11) Appendices (scoping and supporting documents, calculations, correspondence, etc.)

3 Report Content

3.1 Executive Summary

The TIA preparer shall include an Executive Summary at the beginning of the TIA report to provide a short synopsis of the key findings, conclusions and recommendations. At a minimum, it shall contain following information:

- Location of the study site with respect to the area roadway network
- Description of the proposed development including types, sizes, land uses, construction phasing, proposed accesses
- Discussion of the principal findings of the analysis including existing traffic conditions, programmed transportation improvement s, amount of site generated traffic, projected traffic volumes.
- Summary of study conclusions including future levels of levels of service with and without proposed development
- Identification of all mitigation measures recommended including a discussion of when to implement the improvements to achieve the best LOS on highway network.

A TIA summary chart should be included in this section of the TIA. A template can be found in the Appendix of the Guidelines.

3.2 Introduction and Proposed Development Information

The introduction of background information is to provide an understanding of the proposed development and its location with respect to the provincial highway system. This portion of the report should provide the following information:

A) History related to the transportation analysis including the applicant, land owner, type of application the analysis is supporting, site history including previous applications and analyses, etc.

B) Overview of the scope of the study including study rational, study goals, scope and methodology.

C) Proposed Development
   1) On site development
      i. Name, location with legal land description of the proposed development
      ii. Land use, intensity, and size of the development
      iii. Access location(s)
      iv. Staging plan (expected dates of completion and full occupancy of the ultimate development and of any interim phases)
      v. Previous site history, including previous applications, TIAs, recommendations, etc.

   2) Study Area
      i. Influence area (typically within 1 km from the first highway access)
      ii. Area of significant traffic impact
      iii. Adjacent land uses and other developments nearby

D) Existing Roadway Network
   1) Highway number, control section and kilometre
   2) Highway service classification
   3) Roadside management classification (functional classification) (https://open.alberta.ca/publications/roadside-management-classification-map)

E) Maps and Plans
   1) Site Location Plan
   2) Site Plan

TIA should include traffic by other proposed developments (as part of the background traffic). It is best practice to have a combined TIA for multiple developments within the study area to see the cumulative effects it will have on the highway.

3.3 Access Management, Highway and Municipal Plans

A TIA is not only an operations assessment, but also a planning exercise. All development plans need to be compatible with the municipality's plans and in compliance with TRANS Access Management Guidelines (Chapter I of Highway Geometric Design Guide) and highway plans. Understanding the existing and future plans within the study area is essential to evaluating the impacts of the development site.

The TIA consultant should identify the nature and timing of any planned transportation system improvements in the approved regional, provincial and area municipal capital programs that are within the study area, and may affect transportation to/from the proposed development. This should include any upgrades to the roadway infrastructure that is expected to occur as well as any changes to the roadway network and any future infrastructure.

The TIA consultant should consult with and refer to any applicable municipal development plans, municipal transportation master plans, area structure plans, highway planning studies, access management strategies, other approved TIAs in the area, etc.

The TIA report should provide the reviewer a full understanding of the study area. It should discuss whether the proposed development is compatible with such municipal and highway plans, and recognize the potential conflicts, impacts and opportunities for incorporating improvements to address the impacts as required.

3.4 Existing Infrastructure Conditions

The purpose of this section is to present the existing roadway system in the area servicing the proposed development. The report should provide a description of the existing transportation system and its condition within the study area, emphasizing the major travel routes to and from the site. It is recommended that a site visit/inspection be conducted as part of any TIA. In addition, TRANS has a number of resources available to assist in the data collection phase of a TIA. Section 3 of this Guidelines outlines some of these resources.

The following is a list of information to be included in a TIA:

A) Existing Highway and Road Network Conditions
   1) Existing lane configurations
   2) Design and posted speed limit of the highway and the intersecting roadway (may need to contact TRANS to confirm the design speed of the highway)
   3) Locations of speed limit changes
   4) Pavement width (lane, shoulder, and median width) and lane markings
   5) Right-of-way width
   6) Horizontal and vertical alignment of highway
   7) Vertical grades of the highway
   8) Sight distance
   9) Longitudinal barrier and end treatments
   10) Hazards in the clear zone
   11) Existing illumination in vicinity (include type of illumination if applicable)
   12) Traffic control type (e.g., two-way or all-way stop control, traffic signals etc.)
   13) Traffic operation signage (e.g., no left-turns, no parking, etc.)
   14) Existing and planed accesses in vicinity i.e., driveways, frontage roads, private roads
   15) Any other modes of transportation (e.g., railway, pedestrians crossing, trail, bicycle lanes, transit routes and stop, etc.)
   16) Any existing operational issues and apparent collision issues

B) Existing Intersection Conditions
   1) Intersection treatment type and configuration (it should be detailed, either a plan or a description with radii, taper lengths & rates, storage lane lengths, etc.)
   2) Horizontal and vertical alignment of the local road
   3) Vertical grades of local/intersecting road
   4) Access spacing from adjacent access locations
   5) Intersection sight distance (for all design vehicles)
   6) Stopping sight distance (for all design vehicles)
   7) Signal timings (if applicable)
   8) Other developments using the intersection

3.5 Traffic Conditions

3.5.1 Background Traffic

This section determines the background traffic volumes that will be used in the analysis of the proposed development. The report should contain information on existing 24-hour traffic volumes and should also provide the existing peak-hour turning movement volumes for the major intersections in the study area. The peak hours shall be determined as any timeframe that will have the greatest impact to the highway system and that will generate the highest volume of traffic to/from the development on a typical day. Timeframe may vary depending on the type of development but typically should be morning peak from 6AM to 9AM, afternoon peak from 3PM to 6PM, weekend peak from 11AM to 2PM. If peak hour in the study area is known to occur at a different time of day or the proposed development have unusual peaking characteristics, other peak periods should be specified in addition to typical peak hours so that the worst traffic scenario can be captured (e.g., restaurants' peak hour happen around meal time, school peak hour occur at morning drop off and afternoon departure times).

The highest traffic volumes for a given maneuver at a major intersection may be higher during a period that is not peak hour for the development. In this case, volumes not identified as the peak hours for development generated traffic would dictate storage lengths or lane needs. The TIA shall still provide an evaluation of the traffic volumes for the intersection's peak hours to ensure the improvements are appropriate to handle the system's traffic. Improvements that meet the highest traffic volume needs should be proposed.

3.5.1.1 Existing Background Traffic

TRANS has Automated Traffic Recorders (ATR) and turning movement counts data available for many highways and intersections located throughout Alberta. Traffic count data is published on department's website: https://www.alberta.ca/highway-traffic-counts.aspx. The counts include AADT at points on the highway and on highway links, raw turning movement count data, and hourly volumes on highway points. The TIA consultant should use the traffic data sources above as the primary basis of existing traffic volumes and shall only conduct new traffic counts when valid traffic data does not already exist. The TIA shall document the data sources and independent data collection methods. The manual traffic count must be a **minimum 12-hour count** (as indicated in Highway Geometric Design Guide, section A4.4) on a typical day, broken into 15-minute intervals, in order to capture sufficient traffic data to determine the AM peak, PM peak, and noon peak.

The objective of the traffic count is to capture the "true demand" of all turning movements for all vehicle classifications, so any congestions and queuing should be estimated and recorded. When measured in the field, the demand flow rate is based on traffic count taken upstream of the queue associated with the subject intersection. This distinction is important for counts during congested periods because the count of vehicles departing from a congested approach will produce a demand flow rate estimate that is lower than the true demand. The traffic count should be taken at times when traffic represents a typical day, not on or near holidays or special events, during times of detours, accidents, or inclement weather that could affect traffic volumes. TRANS typically uses Annual Average Daily Traffic (AADT) and 100th highest AM and PM peak for traffic projection and detailed intersection geometric design. In some instances, depending on the nature of the development (e.g., seasonal), it may be appropriate to use the Annual Summer Daily Traffic (ASDT) in lieu of AADT. The raw manual traffic count data must be factored to the 100th highest AM and PM peak hour traffic to be used in further analysis. For more information about 100th highest hour factoring method, refer to Section A4 of TRANS' Highway Geometric Design Guide.

For traffic signal warrant analysis described in Section 4.3, the raw manual traffic count must be factored to represent the typical day volume before entering into the signal warrant worksheet. Factoring method is listed below:

- Scenario 1: The traffic count was collected on a day in the past.

$$Factor = \frac{\text{AADT in the count year}}{\text{ATR 24hr daily volume on count day}}$$

$$Factored\ count\ for\ current\ year\ horizon = \text{Raw traffic count} \times \text{Factor} \times (1 + \text{growth rate\%} \times \text{number of years})$$

- Scenario 2: The traffic count is collected in the current year (where ATR 24 hr count and AADT for the current year are not available).

$$Factor = \frac{\text{AADT in last year}}{\text{ATR 24hr daily volume on count date in last year}}$$

$$Factored\ count\ for\ current\ year\ horizon = \text{Raw traffic count} \times \text{Factor}$$

When pedestrian demand is present at the studied intersection or where pedestrian traffic accommodation is anticipated, pedestrian counts should also be collected.

3.5.1.2 Projected Background Traffic

The long-term traffic growth on Alberta highways follows more of a linear growth pattern as opposed to exponential or compound growth. As a result, TRANS calculates traffic growth rate as a **non-compounded** average annual growth rate expressed as a percentage of the current (or most recent) traffic volume count. Consultants should estimate traffic growth rate (either by 2-point method or linear regression method) from the historical traffic count data available on TRANS' website or from traffic projection models (if available). The consultant should make the choice of method with the goal of selecting a reasonable growth rate that has a low probability of underestimating future traffic volumes. Traffic growth projects are performed using the following formula:

$$TV_{future} = TV_{existing}\left[1 + \left(n \times \frac{\%}{100}\right)\right]$$
$$TV = traffic\ volume$$
$$n = number\ of\ years$$

As traffic growth rate is dynamic, different growth rates may be used for different development horizons in order to simulate the traffic growth trend. However, justification must be provided. Refer to Section A.4.3 of the *Highway Geometric Design Guide* for 2-point method calculation.

Although traffic growth rate varies for every section of highway, the average annual non-compounded growth rate on the provincial highway network is about 1.5 to 2.0% from year to year. If there are not sufficient traffic count data to determine the traffic growth rate or historical traffic indicates negative or low growth, **for the purpose of the TIA, an average annual non-compounded growth rate of 2% should be used as a lower limit for provincial highways**.

Traffic projections must be prepared for the build year or such other years as may be appropriate due to development staging. The background traffic should be projected to the minimum 20-year horizon (from commencement day), as this represents the average life of most pavement structures. For complex projects, a longer horizon may be required. These traffic projections should be based upon the established annual traffic growth rate for the study area.

For projects within major urban centers, use of a background growth rate may not be appropriate. In these cases, TRANS should be contacted to obtain relevant outputs from the TRANS' EMME macroscopic travel demand models (Calgary, Edmonton, Fort McMurray etc.).

3.5.2 Traffic Generated by Other Developments

Traffic projections generated by other nearby proposed/planned developments should be taken into account. The proponent should contact the municipality for future land use information. When

multiple developers are advancing development proposals that affect the same study area, a joint TIA should be coordinated to review cumulative impact.

3.5.3 Site Generated Traffic

To determine the impact of the proposed development it is necessary to estimate the trip generation of the development and identify how to distribute the generated traffic to the area roadway network. The four steps transportation model should be followed:

1. Trip generation
2. Trip distribution
3. Mode split
4. Trip assignment

The TIA consultant must estimate the trip generation, distribution, mode split and assignment associated with the proposed developments for the commencement day, full build out year, and each horizon year included in the analysis. Rationale for the selection of design/phasing horizons should be provided. For complex projects, a longer projection horizon may be required. For each projection year, a table and/or turning movement diagram should be included illustrating the estimated development traffic by turning movement.

TRANS typically uses trip generation rates from the Institute of Transportation Engineers' (ITE) "Trip Generation Manual". The ITE Trip Generation Handbook provides detailed explanations of the data, cautions in its use and a methodology for collecting additional data. These procedures must be followed for all designs carried out for developments accessing provincial highways.

The TIA should present the trip generation information in an organized manner. Information such as land use and size, ITE code, daily and peak hour trip rates, number of vehicle trips generated should be identified and presented in tabulated form as suggested in Table 1 below.

Table 1 Sample Table for ITE Trip Generation Rates and Trips

Description & ITE Code	Units	Expected Units	ITE Vehicle Trip Generation Rates				Total Generated Trips			
			AM Peak		PM Peak		AM Peak		PM Peak	
			In	Out	In	Out	In	Out	In	Out
Total										

Where a proposed development includes land uses that are not documented in the ITE handbooks, the designer must either:

- Collect data and develop a proposed rate for the particular land use. In this case, TRANS must be consulted to determine the applicability of conducting a rate survey for the specific site and the data must be collected according to ITE guidelines. The data must be statistically sound, be based on appropriately related land uses and the process must be fully documented. Refer to Chapter 5 of the ITE's Transportation Impact Analyses for Site Development for guidelines on conducting a trip generation study. Or

- Provide an analysis justifying the proposed trip generation rate. The analysis must be technically sound, and reflect an appropriate range of variables and their potential range of values.

As a TIA is based on many assumptions, the suggested rates should be conservative with the intent being to ensure that the recommended improvements, which are based on the traffic projections, will likely continue to operate well on the 20-year horizon.

Many land uses not only generate vehicle trips that are all new to the roadway system, but also trips diverted from vehicle trips already passing by on the adjacent or nearby roads. After an estimate of the total traffic into and out of the site has been made, traffic including diverted linked trips, pass-by trips and excluding internal capture trips must be distributed and assigned to the roadway system and to the access points.

Pass-by trips is the portion of the development generated trips taken from the background through traffic, and it is unlikely for a site's pass-by traffic to represent the majority adjacent roadway traffic. For commercial/retail developments, pass-by trips need to be presented as trips attracted from traffic passing the site on an adjacent roadway. Pass-by trips drawn from the background traffic (but cannot exceed the background through traffic) must be included in the turning movements on the site. Refer to ITE Trip Generation Handbook for Pass-by trip rates.

Linked trips are trips with one common point of origin and multiple destinations points. It can occur between different land uses along the travel route or between different land uses within the same development. When trips between multiple land uses make use of the adjacent roadway network, there may be an increase in the number of trips entering and exiting a specific driveway as one driveway may serve two or more separate trips. When trips occur between multiple land uses within the same multiuse development without use of the adjacent roadway network (also know as internally captured trips), there is typically a reduction in the amount of traffic the new development will add to the adjacent roadway. In a case when ITE land use of shopping centers and hotel are chosen, internal capture rates are not applicable, as the ITE trip rates for such land use already reflect the nature of the development.

Trip distribution can be estimated by using methods such as analogy method, gravity model method, surrogate data method, origin-destination method etc. More details on these methods can be found in ITE Transportation Impact Analysis for Site Development. This information should be presented on a map showing the directional distribution of development traffic as percentages for each direction of travel. The TIA consultant must document the trip distribution methodology and the source within the report. The analyst should estimate the directional distribution for each land use component of the proposed project and for each horizon year included in the analysis. In some cases, inbound and outbound trips may have different distributions depending upon applicable operating conditions (e.g., one-way streets, medians etc.). Any differences should be explained in the TIA report. Traffic distributions as percentages for each direction of travel should be displayed on a map.

Mode Split may need to be considered when a development involves other modes of travel. The ITE Trip Generation Manual primarily uses data collected representing mostly auto usage. The report must document any availability of transit service and pedestrian/bike facilities and must summarize data supporting such travel behaviors and mode split assumptions. ITE Trip Generation Handbook provides guidance on how to analyze trips in units of person trips or vehicle trips.

Trip assignment involves assigning the projected development traffic to specific access points and travel routes along the roadway network. The trip assignment process establishes the turning and through movements at each access point, intersection, and roadway segment within the study area. The projected development's peak hour and daily development traffic should be assigned to specific access points and travel routes along the roadway network by multiplying the projected traffic volumes with the percentage of traffic arriving/departing via a particular route after accounting for any applicable trip reduction. A TIA may use different traffic assignment for different development horizons when there is a significant traffic growth expected between horizon years, or when there is a notable change in travel patterns between horizon years due to development phasing or infrastructure improvements. This information should be supplied in graphical and/or tabular format, and included in the development traffic section.

Documentation and rationale showing the breakdown of trips (e.g., pass-by trips, and internal trips) must be provided in the TIA report. ITE rates for these trips should be utilized in the analysis unless data is insufficient in which case a rationale for an alternate rate must be presented. Directional and intersection traffic splits including these trips must be presented in the development traffic intersection turning movement diagrams in the TIA report.

3.5.4 Combined Traffic

Once the development traffic has been identified, the projected background traffic, other developments traffic and site generated traffic should be combined for the determined peak periods, and the combined traffic should be projected to at least the 10-year and 20-year horizons from the commencement day of each development stage. This information should be supplied in graphical and/or tabular format. Heavy vehicle traffic percentage from background and development traffic should both be taken into consideration when calculating the heavy vehicle traffic percentage in the combined traffic.

The peak hour traffic analysis periods must be identified for the proposed development, the highway, and the resultant peak-hour condition to show the combination of site-generated traffic and background traffic, which causes the critical peak period(s). The peak hour will generally correlate to the AM and PM weekday peak periods on the highway. In some cases, depending on development characteristics, analysis of other peak periods such as Saturday afternoon or evening may be necessary.

In some instances, development traffic may occur outside of highway peak hours. Peak periods must be determined as any timeframe that will have the greatest impact to the highway system. Timeframe may vary depending on the type of development. If peak hour in the study area is known to occur at a different time of day or have unusual peaking characteristics, other peak periods should be specified in addition to typical peak hours. Traffic volumes during different peak periods should be compared to identify the worst-case scenario.

The TIA consultant should analyze the worst-case combinations for each intersection or turning movement. If a specific turning movement has a peak time that differs from the others, both cases must be evaluated to determine which will give the lowest level of service or longest queue.

If the proposed development involves heavy truck traffic, the heavy truck traffic volumes in each turning movement should be taken into account in the intersection treatment analysis.

3.5.5 Suggested Traffic Layout

Arranging traffic projections in chronological order and presenting them in tables similar to Table 2 below and turning movement diagrams in a clear and concise manner will assist the department in the review process. Depending on the complexity of the study, more or fewer traffic projections may be required. If the development is being completed in phases, treat each phase as an independent development and project future traffic as if the next phase will not occur.

A) Existing/Background Traffic
    1) AADT, AM Peak and PM Peak

B) Commencement Day (separate by phases)
    1) Projected Background Traffic
        i) AADT, AM Peak and PM Peak
    2) Other Development Traffic
        i) AADT, AM Peak and PM Peak
    3) Anticipated Site Traffic
        i) AADT, AM Peak and PM Peak
            - Site Generated Trips
            - Pass-by &/or Internal Trips
            - Total Trips
    4) Combined (Background + Other + Site) Traffic
        i) AADT, AM Peak and PM Peak

C) 10-Year Horizon (one for every phase of development)
    1) Projected Background Traffic
        i) AADT, AM Peak and PM Peak
    2) Other Development Traffic
        i) AADT, AM Peak and PM Peak
    3) Anticipated Site Traffic
        i) AADT, AM Peak and PM Peak
            - Site Generated Trips
            - Pass-by &/or Internal Trips
            - Total Trips
    4) Combined (Background + Other + Site) Traffic
        i) AADT, AM Peak and PM Peak

D) 20-Year Horizon (one for every phase of development)
    1) Projected Background Traffic
        i) AADT, AM Peak and PM Peak
    2) Other Development Traffic
        i) AADT, AM Peak and PM Peak

3) Anticipated Site Traffic
    i) AADT, AM Peak and PM Peak
        - Site Generated Trips
        - Pass-by &/or Internal Trips
        - Total Trips
4) Combined (Background + Other + Site) Traffic
    i) AADT, AM Peak and PM Peak

Table 2 Sample Table for Traffic Calculation

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
AADT												
AM												
PM												

4 Analyses

4.1 Intersection Treatment Warrants

In general, intersection treatment warrants should follow the current TRANS "Highway Geometric Design Guide" (HGDG) and any related Design Bulletins. The intersection treatment warrant system has been prepared to assist designers in choosing the appropriate intersection treatment based on the main and intersecting road volumes. However, designers still need to carefully review each proposed intersection to ensure all potential problems are addressed.

Both intersection treatment warrants based on annual average daily traffic volume (HGDG, Figure D-7.4) and Left Turn Warrants based on hourly traffic volume (HGDG, Figure D-7.6 and D8.6C) should be used to determine the initial intersection treatment type. A spreadsheet for interpolation of the Harmelink curves used in Figure D-7.6. of the HGDG is available from the department's website (https://open.alberta.ca/publications/traffic-impact-assessment-guideline).

Right turn warrant information for undivided highway and divided highway can be found in Section D7.7 and D8.7 of the HGDG respectively. Subsequent analyses, such as Channelization Warrant, turn bay storage lengths, design vehicle turning template, etc. are required to further define the required intersection treatment.

When highest traffic volumes for a given maneuver may be higher during non peak hour, highest volumes outside of the peak hour would dictate storage lengths or lane needs. Both peak hour and non peak hour cases need to be evaluated.

In order to determine the appropriate turning bay storage lengths, percentage of Heavy Vehicle Traffic (T) volume should be calculated. "T" is defined as the total number of tractor trailer-combinations and single unit trucks plus half of the recreational vehicles and half of the buses.

T = TRTL + SU + 1/2 (RV + BUS) (as per Section B.5.3.1 of the HGDG)

In urban settings, intersection treatments could follow the Highway Geometric Design Guide Urban Supplement (Design Bulletin 17), TAC's Geometric Design Guide for Canadian Roads, and through discussion with TRANS.

4.1.1 Intersection Treatment for Over Dimensional Vehicles

It is important to note that intersection treatment for log haul trucks is very different from the typical intersection treatment shown in Figure D-7.5 of the HGDG. If the intersection is to accommodate log haul trucks, the intersection treatment must be analyzed in accordance with Section D.5.3 of the HGDG. When over dimensional loads are involved, designers should take into consideration some of the guidelines in Design Bulletin 68 where intersection adjustment such as semi-mountable curbs, location/offsetting of road appurtenances, clearance heights, etc. may be required.

4.2 Capacity Analysis

The TIA consultant shall conduct analysis of traffic volumes, facility capacity, and Level of Service for each intersection in the immediate area of the development within the study area. Capacity

analysis must be undertaken for all traffic scenarios as appropriate (such as signalized and unsignalized intersection, roundabouts, weaving, merging, diverging, queueing analysis, intersection traffic controls, etc.) as per the Transportation Research Board's "Highway Capacity Manual" (HCM). TRANS accepts calculations performed using computer software based on the HCM, with the preference of Trafficware's Synchro/SimTraffic for simple intersections, SIDRA for roundabouts, HCS for basic sections and freeways, and VISSIM for complex network of intersections. Analysis parameters should be representative of the site condition (e.g., geometric values, PHF, truck percentage, etc.) Any assumptions should be noted and discussed in the report. Capacity worksheets as well as software outputs must be provided as an appendix to the TIA.

Both intersection treatment warrant and capacity analysis for existing condition and future conditions need to be performed and satisfied. In cases where the proposed development utilizes an existing intersection, it is necessary to first understand how the existing highway and/or intersection would operate without the development. The TIA should include intersection treatment warrant and capacity analysis for the existing intersections, for the commencement day, 10-year and the 20-year horizon (without development traffic).

Impacts should also be evaluated with the combined traffic (background + development) for the commencement day, 10-year and 20-year horizon for each development stage, as the next stages(s) may not go ahead. When improvements are required at certain horizon years, it is required that the TIA consultant determines the year that the improvements are triggered. This can be achieved through interpolation.

Refer to Section A.6.1 of the HGDG for Level of Service (LOS) targets for highway movements (https://www.alberta.ca/highway-geometric-design-guide-table-of-contents.aspx).

The TIA report should summarize capacity analysis results with (but not limited to) the following information for each analysis scenario:

1. Level of service (LOS) by turning movement for each intersection;
2. V/C ratio
3. Delay per movement (seconds); and
4. Queue length (in metres).

TIA must evaluate queue lengths for left and right turn lanes to ensure that queues do not overflow into adjacent through lanes, as well as for through lanes to confirm if the queue will obstruct turn lane entrance or extend back to upstream intersection. All intersection capacity analysis outputs including but not limited to Synchro file, traffic signal warrant sheet, left turn and right turn warrant sheet etc., should be included in the appendix of the TIA report. It also would be beneficial to submit to TRANS upon request with the digital capacity analysis files for review, especially with complex TIAs.

Consider analysis of pedestrian, bicycle, and transit facilities when such services are present or planned for the area, especially if the proposed development will generate bicycle, pedestrian, or transit trips.

4.3 Traffic Control Needs

The TIA should identify, discuss, and describe the need for the recommended traffic control treatments as they relate to the proposed development. This includes identifying the appropriate type and location of the required traffic control (e.g., stop control, traffic signal control) and recommended intersection/interchange type (e.g., roundabout, diamond interchange, other alternative treatment types, etc.). The TIA preparer should consult with TRANS when considering traffic control and intersection type.

TRANS utilizes TAC's "Traffic Signal and Pedestrian Signal Head Warrant Handbook" when determining the warrants for signalized intersections. TRANS follows the 100-point system where collision risk is inherently considered within the Canadian Traffic Signal Warrant Matrix Procedure.

In the traffic signal warrant sheet, the peak hour traffic count table should be filled with the highest 6 hours factored to a typical day traffic count, 3 hours in the morning and 3 hours in the afternoon. The hours do not need to be consecutive. Factoring method is outlined in section 3.5.1.

Traffic signals and speed limit reductions are generally not supported on the provincial highway system in rural areas. Traffic signals are considered an absolute last resort for improving an at-grade intersection. The analysis should consider all other possible alternatives prior to recommending signals and/or speed limit reductions. As per TRANS' Design Bulletin #68 (https://www.alberta.ca/road-geometric-design-design-bulletins.aspx), the TIA consultant should consider all other possible alternatives, including roundabout, prior to recommending signals. If signals are recommended, supporting documentation will be required to demonstrate that all other options have been thoroughly investigated.

In some cases (such as in urban and semi-urban centres) signals may already exist at an intersection. Analysis should be conducted to ensure that the current signal timings and phases are appropriate. If not, new signal timings, turning phases and geometric improvements should be recommended. In cases where multiple signalized intersections are in close proximity of one another (e.g., less than 800m apart), the TIA consultant must consider the impacts of the development on the nearby signals.

In situations where adjacent roadway involves a corridor, or two or more signalized intersections are closely spaced, traffic signal coordination and corridor analysis are required. All warrant calculations and analysis worksheets should be included in the appendix of the TIA.

4.4 Traffic Safety

Safety of all road users (including vulnerable road users where applicable) must be taken into consideration during the preparation of the TIA. The report should identify and make recommendations regarding any geometric and operational issues that may impact safety, as well as any apparent collision issues. When there is significant concern over the development's effect on road safety, a more detailed traffic safety analysis e.g., a stand-alone In-Service-Review may be required.

4.5 Illumination Warrant Analysis

Lighting warrants for rural and semi-urban intersections must be determined based on TAC's "Illumination of Isolated Rural Intersections" and "Guide for the Design of Roadway Lighting". Lighting warrants does not indicate an absolute requirement but rather a trigger for consideration. Recommended illumination type should be stated in the report. For further details, refer to the department's Design Bulletin #35 – New Guidelines for Design of Roadway Lighting (https://www.transportation.alberta.ca/Content/docType233/Production/DB35.pdf).

In some cases, illumination may exist a couple of intersections over. If illumination is required at the studied intersection, infill lighting would be required between illuminated intersections.

All warrant calculations and analysis worksheets should be included in the appendix of the TIA.

4.6 Pedestrian Warrant Analysis

Pedestrian movement accommodation is an important issue for TRANS in the urban and semi-urban areas. Depending on the type of development, and its interaction with the surrounding community, pedestrian movements can become a significant issue. Consequently, improvements to pedestrian facilities may be required. On the other hand, at isolated rural developments, pedestrian movements are not likely an issue. If applicable, the TIA consultant should conduct pedestrian warrant analysis as per TAC's Pedestrian Crossing Control Guide. All warrant calculations and analysis worksheets should be included in the appendix of the TIA.

4.7 Design Vehicle Accommodation

An assessment of design vehicle requirements is a critical phase of the TIA and must not be overlooked. As part of the intersection improvement analysis, it is necessary to ensure that the design vehicle is capable of safely manoeuvring the intersection without interfering with other traffic movements. All standard intersection treatment types (with the exception of Type I) are designed to accommodate both WB-21 and WB-23 design vehicles. Larger design vehicles on High Load Corridor, Long Combination Vehicle routes and log haul trucks need to be considered at the proposed intersection if applicable. HGDG section D-5 has more information on the design vehicle accommodation requirements. When Figure D5i Turning Templates are used, the intersection should be designed to accommodate the medium turning radius of the design vehicle.

Intersection and design vehicle's turning plans should be provided to demonstrate that the design vehicle for the existing and proposed developments using the intersection can safely manoeuvre through the intersection and on the development site with appropriate turning room. The design must also accommodate the storage (for left turns off main road or while waiting on the intersecting road) and refuge requirements (particularly for the space between the lanes on a divided highway).

Intersection sight distance and sight triangles should be reviewed for all vehicles that will be using the study intersection.

4.8 Access Management and Rights-of-Way

TIA report must address improvements to the highway involving removal, relocation or alternation of existing accesses to maintain minimum spacing and ensure highway safety under post-development conditions.

If the location of the existing/proposed intersection is a concern (e.g., insufficient intersection sight distances, intersection on grade/curve, insufficient access spacing, proximity to adjacent intersections and accesses, etc.), the TIA consultant should evaluate access/corridor operations analyses (e.g., weaving analysis) and provide options, such as alternate access, consolidation or relocation of the proposed access, etc., and discuss with TRANS prior to further analyses.

A planning-level intersection layout, indicating the required right-of-way for the proposed development access is required.

4.9 Other Considerations

Other considerations may include impacts on noise and other modes of transportation. Traffic noise assessment and mitigation by the development may be required.

For project involving grade widening, it is necessary to ensure the base and pavement structure can accommodate two future Asphalt Concrete Pavement (ACP) overlays. Refer to Developer Surface Design Checklist in the Appendix for further details.

If a railway is present near or at the studied intersection, railway traffic data must also be obtained. Consideration of rail warning/signage/barrier requirements and potential delays due to the train's presence will be required. Refer to Transport Canada's "*Grade Crossings Standards*" for further details.

Any proposed improvement that does not meet TRANS standards should refer to TRANS Design Exceptions Guideline. It is the TIA consultant's responsibilities to clearly document any items that deviate from the current TRANS standards and provide rationale for the recommended mitigation strategies.

5 Conclusion & Recommendations

The TIA should summarize the findings of the various analyses conducted, including potential issues, and clearly outline the recommendations regarding:

- Required geometric improvements;
- Signalization, roundabout or other control types;
- Operational and safety issues
- Pedestrian mitigation;
- Illumination;
- Right-of-way requirements;
- Access management

Although the TIA is typically conceptual design, it often leads to detailed design which relies on the TIA analyses. As a result, the TIA recommendation should have sufficient details of what the conceptual intersection configuration will look like (e.g., turning bay lengths). A concept plan illustrating the recommended horizontal intersection layout should be provided. For simple intersections, it may be possible to utilize a typical intersection plan from TRANS' HGDG. Complex and non-standard intersections require the completion of an intersection plan.

6 Available Resources

TRANS has numerous resources available to assist the engineering consultant in the completion of a TIA. All inquiries should be directed to the Development and Planning Technologist in the appropriate TRANS district office. Below is a list of the types of information available from the department.

- *Traffic Volume Data on Google Maps* – This information is available at the department website showing all the Automated Traffic Recorder (ATR) locations, Manual Turning Movement Counts (up to the past 10 years) at various highway intersections and current AADT of each highway section throughout Alberta. Manual counts at an intersection are not conducted every year, and may be interpolated information. (http://www.transportation.alberta.ca/mapping/)

- *Traffic Volumes at Points on the Highway* – Available online, the department maintains the AADT records (since 1962) at points along the provincial highway system. This information is published every year. Traffic volumes expressed as Average Annual Daily Traffic (AADT) or Average Summer Daily Traffic (ASDT) are estimated from data collected for TRANS by its contractors. (https://open.alberta.ca/opendata/traffic-volumes-at-points-on-the-highway)

- Traffic data was collected from 374 permanent (ATR) sites on highways throughout the province, as well as turning movement counts at 538 intersections. Combined with historical turning movement counts at intersections, traffic volumes for 6,576 points are determined.

- ATR Monthly Volume Report presents the Monthly Average Daily Traffic (MADT) volumes recorded at TRANS' 374 permanent ATR sites. The report also presents the 30th highest hourly traffic volume, 100th highest hourly traffic volume and 90th percentile hourly traffic volume.

- *Traffic Volumes on Links in the Highway Network* – These reports present statistical information on traffic volumes, vehicle classification and travel on Alberta's Highway Network. These statistics are given as weighted averages over entire highways, control sections and traffic control sections. These statistics are estimated from data collected for TRANS by its contractors. (https://open.alberta.ca/opendata/traffic-volumes-on-links-in-the-highway-network)

- Traffic model outputs from the department's EMME travel models (for projects in the Calgary, Edmonton, and Fort McMurray areas)

- *Existing Intersection Plans* – By contacting the department, some horizontal intersection layouts are available in either hard copy or digital format.

- *Typical Intersection Layouts* – Typical intersection layouts are outlined in TRANS' "Highway Geometric Design Guide".

- *Speed Limit Zones on the Highway* – The department maintains a database of the speed limits along the provincial highway system. If the location of interest is located inside a city, contact the local municipality.

- *Traffic Collision Statistics* - TRANS collects and publishes collision, vehicle registration and licensed driver statistics, which are available through the department's website. Collision statistics provide an overview of the "who", "what", "when", "where", "why" and "how" of traffic collisions that occurred in Alberta on a yearly basis. If interested in a specific intersection or portion of highway, contact the department for further details.

- *Horizontal/Vertical Alignment of Highways* – TRANS maintains database consisting of both hard copy and digital copies of various highway horizontal and vertical alignments. Contact the department to determine if the highway in question has this information available.

- *Video Logs* – TRANS maintains a digital video log of all provincial highways.

Other resources that may prove useful in the completion of TIA are:

- "*Highway Capacity Manual*", Transportation Research Board
- "*Trip Generation Manual*", Institute of Transportation Engineers
- "*Trip Generation Handbook*", Institute of Transportation Engineers
- "*Transportation Impact Analyses for Site Development*", Institute of Transportation Engineers
- "*Highway Geometric Design Guide*" and Design Bulletins, Alberta Transportation
- "*Roadside Design Guide*", Alberta Transportation
- "*Benefit Cost Model and User Guide*", Alberta Transportation
- "*Geometric Design Guide for Canadian Roads*", Transportation Association of Canada
- "*Traffic Signal and Pedestrian Signal Head Warrant Handbook*", Transportation Association of Canada
- "*Pedestrian Crossing Control Guide*", Transportation Association of Canada
- "*Highway Lighting Guide*", Alberta Transportation
- "*Highway Pavement Marking Guide*", Alberta Transportation
- "*Illumination of Isolated Rural Intersections*", Transportation Association of Canada
- "*Grade Crossings Standards*", Transport Canada
- "*Guide for Design of Roadway Lighting*", Transportation Association of Canada

APPENDIX A

TIA Summary Chart

Date		**Consultant**	
Project			

Site Information

Development Type			
Highway No.		**Control Section**	
Legal Land Description			
Posted Speed		**Design Speed**	
Design Vehicle (include turning templates in appendix)			
Sight Distance Available		**Min. Requirement**	
Lane Configuration			
Existing Right of Way Width			

Warrants

		Improvement Required	
	Existing	**Interim**	**Ultimate**
Year			
Left Turn Lane			
Right Turn Lane			
Signal/Roundabout			
Illumination (please specify)			
Pedestrian			

Intersection Treatment

	Existing	**Proposed**
Intersection Treatment Type		
Additional Modifications		
Design Constraints		

Additional Comments

Disclaimer: Please note this chart does not summarize all of the guideline requirements and does not mean the categories not listed here can be excluded from the TIA

APPENDIX C

TRAFFIC IMPACT ASSESSMENT CHECKLIST

1st SUBMISSION

a) Concept plan for proposed development

- ☐ Land use, staging plan, access locations, etc.

b) Other basic assumptions and methodology

- ☐ Trip generation rate, distribution, etc.
- ☐ Methodology

2nd SUBMISSION

- ☐ Reviewed and signed by professional engineer
- ☐ TIA summary sheet

BACKGROUND INFORMATION

a) Information related to the study

b) Study scope, goal, methodology

c) Proposed development

- ☐ On site development
  Land use, intensity, size, access locations, etc.
- ☐ Study area
  Area of significant traffic impact
  Adjacent land uses and other developments

d) Existing roadway network

- ☐ Highway number, control section, and kilometer
- ☐ Highway service classification
- ☐ Roadside management classification

e) Maps and plans

- ☐ Key map
- ☐ Site plan

FUTURE HIGHWAYS AND MUNICIPALITY PLANS

- ☐ AT's highway plan and municipality's plan (e.g. ASP, MDP)
- ☐ Planed transportation system improvements
- ☐ Confirm compatibility

ACCESS MANAGEMENT

- ☐ Compliance with Access Management Guidelines (HGDG Chapter I)

EXISTING INFRASTRUCTURE CONDITIONS

a) Existing highway conditions

- ☐ Lane configuration, markings, pavement width
- ☐ Horizontal and vertical alignment, grades
- ☐ Speed limits
- ☐ Sight distance
- ☐ Longitudinal barrier and end treatments
- ☐ Hazards in the clear zone
- ☐ Right-of-way width
- ☐ Existing and planned accesses in vicinity
- ☐ Existing illumination in vicinity
- ☐ Traffic operation signage (e.g., No Left-Turns, etc.)
- ☐ Any other modes of transportation
- ☐ Any existing issues (e.g., operational, collision)

b) Existing Intersection conditions

- ☐ Intersection treatment type and configuration
- ☐ Horizontal and vertical alignment of the local road
- ☐ Vertical grades of local/Intersection Roadway
- ☐ Access spacing from adjacent access locations
- ☐ Intersection sight distance (for all design vehicles)
- ☐ Traffic control type (e.g., Stop signs, signals, etc.)
- ☐ Existing signal timings (if applicable)
- ☐ Major development currently using intersection

TRAFFIC CONDITIONS

a) Existing Background Traffic

- ☐ Turning movement counts - AADT, AM, PM peaks, other periods (noon, weekend, etc.)
- ☐ Vehicle composition (% vehicle type) on highway and at intersections

b) Projected Background Traffic

- ☐ Annual traffic growth rate
- ☐ Projected AADT, AM Peak, PM Peak, other periods

c) **Traffic Generated by Other Developments**
   - ☐ AADT, AM Peak, PM Peak, other periods

d) **Site Generated Traffic**
   - ☐ Site generated trips, trip assignment
   - ☐ Vehicle composition (% vehicle type)
   - ☐ Pass-by &/or Internal Trips
   - ☐ Total Trips

e) **Combined (Background + Other + Site) Traffic**
   - ☐ AADT, AM Peak, PM Peak and other periods
   - ☐ Vehicle composition (% vehicle type)

f) **Staging Years**
   - ☐ Repeat step b to e for 10-year, 20-year horizon or more for each stage

ANALYSIS

a) **Intersection Treatment Warrants (include trigger year)**
   - ☐ Analysis based on AADT (HGDG Fig. D.7-4)
   - ☐ Left-turn warrant analysis
   - ☐ Right-turn warrant analysis
   - ☐ Turn bay storage lengths
   - ☐ Intersection treatments for specialized vehicles

b) **Capacity Analysis**
   - ☐ Delay per movement (seconds)
   - ☐ Level of service (LOS)
   - ☐ V/C ratio
   - ☐ Queue length

c) **Traffic Control Needs (include trigger year)**
   - ☐ Signalization warrant analysis
   - ☐ Timing optimization for existing signals
   - ☐ Alternative Intersection analysis
   - ☐ Recommended mitigation

d) **Traffic Safety**
   - ☐ Recommended mitigation

e) **Illumination** (**include trigger year)**
   - ☐ Illumination warrant analysis
   - ☐ Recommended mitigation

f) **Pedestrian Movements (If Applicable)**
   - ☐ Pedestrian warrant analysis (include trigger year)
   - ☐ Recommended mitigation

g) **Operational Analysis**
   - ☐ Design vehicle turning movement templates
   - ☐ Recommended mitigation

h) **Access Management and Rights-of-Way**
   - ☐
   - ☐ Recommended mitigation

i) **Other Considerations**
   - ☐ Noise
   - ☐ Asphalt concrete pavement overlays
   - ☐ Railway
   - ☐ Design exception

CONCLUSION & RECOMMENDATION

Summarize findings including issues regarding:
- ☐ Required Intersection Improvements
- ☐ Signalization, roundabout or other control types
- ☐ Pedestrian mitigation
- ☐ Illumination
- ☐ Right-of-way requirements
- ☐ Access management

APPENDIX B

DEVELOPER CHECKLIST – SURFACING DESIGN

- **Pavement Design**

  A pavement design and recommended pavement structure should be provided based on appropriate truck traffic inputs and estimated subgrade strength and in accordance with the department's pavement design manual https://open.alberta.ca/publications/pavement-design-manual-edition-1 and relevant design bulletins (13, 15 and 77) https://www.alberta.ca/design-bulletins.aspx . A 20 year design life is typical although a longer life (e.g. 50 years) design life is typically required where there is constraining infrastructure (e.g. curb and gutter).

- **Truck Traffic**

  Truck traffic is a critical input into the pavement design but is not typically provided in Traffic Impact Assessments. Truck traffic over the pavement design life should be provided by the developer. For pavement design purposes, truck traffic needs to be converted into equivalent single axle loads (ESAL). Guidance on how to convert truck traffic into ESAL is provided in chapter 5 of the department's pavement design manual. Non-standard ESAL loads should be considered where the development is expected to generate heavy truck loads (e.g. logging trucks, oil field development, etc.). Other sources of truck traffic information may include department historical ESAL data and turning movement diagrams https://open.alberta.ca/publications/alberta-highway-historical-esal-report; http://www.transportation.alberta.ca/mapping/

  The pavement design must be reviewed and approved by the department prior to the granting of a development permit.

- **Lateral Drainage**

  The proposed pavement structure must be greater than or equal to the existing roadway structure, to maintain lateral drainage of the existing pavement structure. Existing pavement structure information can be obtained from department as-built cross-sections (do not use the Pavement Management Summary report). To request existing cross-section data, please contact Stephen Kwan at 780-415-1007 or Stephen.Kwan@gov.ab.ca or Jhuma.Saha@gov.ab.ca

  At the time of construction, if the existing pavement structure is found to be deeper than the new pavement structure being provided, the thickness of the new granular base course (GBC) must be increased to maintain lateral drainage (i.e. bottom of new GBC must match or be deeper than bottom of existing GBC).

- **Lane Widths**

  Lane widths for intersection treatments should be in accordance with the relevant intersection treatment drawing and the future design designation of the highway. Intersection treatment drawings are located at https://www.alberta.ca/cb-6-highway-standard-plates-active.aspx

- **Shoulder Widths**

  Minimum shoulder widths are provided in Table C.3 of the department's Highway Geometric Design Guide https://www.alberta.ca/highway-geometric-design-guide-table-of-contents.aspx or in the applicable

intersection treatment drawing. Department standard practice is to provide sufficient shoulder width for two future 80 mm overlays and therefore the minimum widths must be increased to accommodate this. The future design designation of the highway also needs to be accounted for. Actual final shoulder widths will depend on pavement side slope requirements (4:1 or 5:1).

- **Grade Construction**

  New grade should be constructed in accordance with latest department Standard Specifications for Highway Construction, Specification 2.3. Other than the saw cut, cuts to the existing structure should not be vertical (1H:2V, or benched accordingly).

- **Pavement Lift Thicknesses**

  Placement of the GBC should be in accordance with the latest department Standard Specifications for Highway Construction, Specification 3.6. Lift thicknesses for GBC are a minimum of 100 mm and a maximum of 200 mm.

  Placement of the asphalt concrete pavement (ACP) should be in accordance with the latest department Standard Specifications for Highway Construction, Specification 3.50. The top lift of ACP must be benched into the existing ACP for a minimum of 0.5 m. Joints in the wheel paths should be avoided.

- **ACP Mix Type and Grade**

  The ACP mix type and asphalt grade should be as per Design Bulletin #13

  https://open.alberta.ca/publications/13-2003

- **Drawings/Plans**

  A plan view should be provided showing the existing lanes and shoulders, new joint locations and new lanes and shoulders. The limits of construction should be shown in accordance with department location referencing (i.e. highway kilometre chainages).

  A cross-section typical should be provided showing final lane and shoulder widths, existing and new pavement structures, grade sub-cut depth, pavement lift thicknesses, GBC designation and class, ACP mix type and asphalt grade, and top lift ACP benching.

  Reference to highway number, control section, and kilometres should be provided on the plans and is needed for determining existing pavement structure and truck traffic.