

**Traffic Solutions Consulting Ltd.** is a consulting engineering firm which provides specialist consulting services in the following **areas of practices**:

1. **Specialist Advisory Services** - for Government Agencies and Other Consulting Firms
2. **Specialist Owner's Engineer Services** - for several Alberta Transportation Design-Build-Finance-Operate (DBFO) and Design-Build projects in Edmonton and Calgary - in the following areas: Traffic Signalization, Traffic Operations, Freeway Planning & Operations, Interchange Planning & Operations, Construction Traffic Management, and Freeway Guide Signs.
3. **Traffic Signals & Streetlights** – Planning, Design, Contract Administration, Operations, Field Services, Traffic Signal Standards & Specifications, and Inspection
4. **Traffic Safety, Traffic Engineering & Traffic Operations** – Traffic Safety Assessment, Intersection Operation Optimization, Congestion Management, Signal Coordination, Traffic Simulation, Parking Studies, Traffic Forecasting, Railway and Emergency Vehicle Preemption, and Traffic Impact Study
5. **Transportation Engineering & Transportation Planning** – Intersection Design, Design Vehicle Swept Path Analysis, Staging of Intersection and Signal Improvements, Roadway Functional Planning, Long Term Planning, Access Study
6. **Highway, Freeway and Interchange Planning and Operations** – Freeway Operational Analysis, Freeway Planning, Interchange Planning, Interchange Configuration Optimization
7. **Roundabout Planning and Assessments** – Operational Evaluation for 1-lane and 2-lane Roundabouts, Design Parameters for 1-Lane Roundabouts for Various Design Vehicles, Roundabout Network Assessments
8. **Construction Traffic Management** – for Major Road Closures, For Interchange Construction or Rehabilitation, For Major Detour and Traffic Diversion

The Principal of the firm, **Paul Chan, P.Eng, M.Sc.**, has 29 years of experience in traffic signals, traffic operations, traffic engineering, transportation engineering & planning. Our clients include primarily various levels of government (province, municipalities, M.D., counties), and other consulting engineering firms. We also provide our services, to a less extent, to the private sector for clients such as developers and the oil & gas industry.

The **Traffic Solutions** team has directly involved in the successful completion of numerous Transportation Planning, Transportation Engineering, Traffic Engineering, Traffic Signals, and Traffic Operations projects throughout Alberta. We are committed to excel in our fields of specialization. Our primary corporate goal is to provide high quality and cost-effective services to our clients, and to assist our clients in formulating, planning and meeting their immediate, short, medium and long term goals in a safe, high quality, efficient and cost-effective manner.

**1. Specialist Advisory Services:**

Provide specialist advisory services for municipalities and government agencies on a wide range of services including:

- Prepare traffic engineering and traffic operation standards and recommended practices
- Review of development traffic impact assessments
- Develop long term road plans
- Assess timelines for future infrastructure improvements
- Traffic, transportation, and traffic safety related issues
- Intersection / roadway operation review & capacity analysis
- Traffic or intersection safety assessment
- Traffic signal evaluation and warrant assessments
- Access review
- Speed zone review
- Traffic signal coordination / System-wide signal re-time
- Traffic signal management centre / Communications
- Video detection design / assessments
- Traffic simulation
- Preemption – Railway and Emergency Vehicles
- Roundabout assessments

**2. DBFO / Design-Build Owner's Engineer Services:**

Owner's Engineer Team Member in Traffic Signalization, Freeway Planning/Staging, Freeway Operations, Interchange Planning & Operations, Construction Traffic Management for the following Design-Build / DBFO Projects:

- Southeast Anthony Henday Drive DBFO
- Northwest Anthony Henday Drive DBFO
- Anthony Henday Dr/Stony Plain Rd/100 Ave and Anthony Henday Dr/87 Ave Design Build
- Northeast Anthony Henday Drive DBFO
- North East Stoney Trail (NEST) DBFO
- South East Stoney trail (SEST) DBFO

### 3. Traffic Signals:

**Traffic Solutions** has unparalleled experience in Alberta, Saskatchewan (Regina & Moose Jaw) and British Columbia (Abbotsford) in the planning, design, operation and project management of numerous traffic signal projects. We have established expertise in the following areas related to traffic signals

- Plan and design traffic signals and traffic signal systems
- Traffic signal projects tendering and contract administration
- Developed traffic signal quality control and quality assurance programs
- Developed, over the past 18+ years, an highly effective and efficient traffic signal project management program which results in shorter design/tendering period, provides accurate estimates, excellent cost control, allows for flexible project management - a clear, transparent and fair tool for all parties involved
- Prepare signal timings including coordination timings for corridors and systems
- Prepare streetlighting analysis and streetlighting design
- Assess signal warrants
- Carry out signal operation micro-simulation modeling (Synchro/SimTraffic)
- Hands-on field application experience in problem diagnostics for traffic signals and traffic signal design modifications
- Prepared the current version of the traffic signals specifications and standard drawings for Alberta Transportation
- Develop traffic signal specifications, design manuals, and maintenance contracts for municipalities
- Designed traffic signal communication systems in St. Albert, Ft. McMurray, Leduc, Ft. Saskatchewan, Beaumont, and Grande Prairie
- Work with communication companies and traffic control equipment suppliers in shaping the wireless communication strategies.
- Numerous traffic signal installation, upgrading / repair projects in virtually all municipalities / locations in Alberta, for the City of Regina, Regina Bypass Design-Build, and the City of Moose Jaw in Saskatchewan, and for the City of Abbotsford in British Columbia:
  - Abbotsford, Airdrie, Athabasca, Balzac, Banff, Barrhead, Beaumont, Blackfalds, Bonnyville, Calmar, Camrose, Cockrane, Cold Lake, Devon, Drayton Valley, Drumheller, Edmonton, Fort McKay, Fort McMurray, Fort Saskatchewan, Gibbons, Grande Prairie, High Prairie, Hinton, Hobbema, Innisfail, Lac La Biche, Lacombe, Leduc, Lloydminster, Moose Jaw, Morinville, Nisku, Okotoks, Olds, Peace River, Ponoka, Red Deer, Regina, Regina Bypass Design-Build, Rocky Mountain House, Sherwood Park, Slave Lake, Smoky Lake, Spruce Grove, St. Albert, St. Paul, Strathmore, Sylvan Lake, Thorsby, Vegreville, Westlock, Wetaskiwin, Whitecourt, and for Alberta Transportation.
- Total – over 1,000 traffic signal installation / upgrading design and over 16 traffic signal systems

- Provide training for municipalities in various areas in traffic signal, traffic operations and capacity analysis

#### **4. Traffic Safety, Traffic Engineering & Traffic Operations:**

**Traffic Solutions** has extensive experience in several areas of traffic engineering and traffic operations:

- Special accommodation for all pedestrians at traffic signals, including use of features such as Leading Pedestrian Interval, WALK 2 Extension using pedestrian pushbuttons, and GREEN Extension through pedestrian detection using traffic cameras
- Traffic safety assessments
- Intersection collision data analysis
- Intersection collision diagram
- Detailed traffic operation review
- Congestion management
- Signal coordination
- Intersection capacity analysis (HCS, Synchro, CMA, Custom In-House Computer Programs)
- Traffic simulation analysis (SimTraffic)
- Intersection and corridor operation optimization
- Complex Intersection Design & Operations – custom phasing and programming for 5-legged signalized intersection with Railway Crossing (Leduc 50 Ave & 46 St/47 St)
- Complex Signal Phasing Design and Programming – for management of severe queuing situation (reduced the 6 km to 20 km daily queues in the PM Peak Period to a 1 km moving queue) (Fort McMurray Hwy 63 & Taiganova Cr)
- Complex Railway Preemption Exit Program to clear long queue built up while the grade crossing is occupied by crossing trains (clear the long queues at the railway crossing after the railway preemption phase terminates, with queues cleared within 1 to 2 signal cycles) (Planning, for Airport Road corridor at Nisku/Leduc/Edmonton International Airport)
- Roundabout operation evaluation (Sidra Intersection, NCHRP 672, HCM)
- Traffic management study
- Speed study
- License plate survey
- Queue and delay study
- Traffic data collection (MioVision, In-House Count Summary Programs)
- Traffic impact assessments
- Industrial site traffic study
- Traffic calming measures
- Parking demand analysis
- Parking survey

## 5. Pedestrian Accommodation at Signalized Intersections

**Traffic Solutions** has developed novel approaches to accommodate pedestrians of a wide range of walk speeds at signalized intersections:

- Targeted pedestrian user groups include adults, seniors, school children, wheelchair users, blind pedestrians, crutch users, cane users, walker users
- Pedestrian Accommodation Strategies include:
  - More accommodating pedestrian signal timings
  - Utilize pedestrian selectable WALK2 intervals to provide extra WALK times
  - Utilize camera to detect pedestrians to extra GREEN displays concurrent with the pedestrian phase in use
  - Placement of stopline, crosswalk and curb ramp to optimize pedestrian clearance times vs vehicle clearance times
  - Conservative assessment of vehicle clearance intervals – amber and red for through movements and left turn movements to provide safe intersection for both vehicles and pedestrians
  - Assessment of intersection geometry
  - Assessment of signage
  - Advance pedestrian interval
  - Accessible Pedestrian System
  - Countdown Pedestrian Display
  - Responsive signal timings that will not encourage vehicles running lights
  - Adequate signal coordination / traffic progression to discourage speeding and red light violation
  - Channelization for left and right turns
  - Assessment of collision records and collision diagrams
  - Potential use of warning signage
  - Appropriate use of left turn phasing including protected prohibited left turns
  - Sightlines – for both drivers and pedestrians
  - Cone of Vision
  - Stopping Sight Distance
  - Lighting level
  - Placement of curb ramps vs pushbutton locations

## 6. Transportation Planning & Transportation Engineering:

**Traffic Solutions** has been involved in a number of transportation planning projects:

- City-Wide long term transportation study
- Transportation demand forecast modeling
- Traffic forecasting
- Road network study
- Intersection geometry and lane configuration design
- Roadway functional Planning Study
- Roundabout Planning
- Road classification study
- Origin-destination survey
- Design vehicle swept path analysis
- Highway access study
- Development access study
- Pavement markings design
- Parking lot design

## 7. Highway / Freeway and Interchange Planning and Operations:

**Traffic Solutions** has worked on several projects involving complex freeway and interchange planning / operation analysis. This includes the ring road projects in Edmonton and Calgary, and several interchanges along Deerfoot Trail in Calgary:

- Freeway level of service analysis
- Ramp and weaving section analysis (HCS)
- Freeway guide sign design
- Interchange operation analysis (HCS, SimTraffic)
- Interchange evaluation / operation comparison
- Traffic simulation (SimTraffic)
- Ramp terminal operational analysis (HCS)
- Ramp intersection operational analysis (HCS, Synchro, SimTraffic)
- In-house interchange planning critical lane volume analysis program
- Traditional interchange operational assessments – Exhaustive Capacity Analysis for diamond interchange, ParcloA interchange, ParcloB interchange, split diamond interchange, single point tight diamond interchange, cloverleaf interchange
- Unconventional interchange operational assessments - Diverging diamond interchange, roundabout interchange

## 8. Roundabout Planning and Assessments:

**Traffic Solutions** has worked and researched on several areas in roundabouts:

- Report - Applicability of Roundabouts in Alberta Ring Road Projects (prepared for Alberta Transportation DBFO Project)
- Visited roundabout sites in these countries:
  - ❑ Australia (Brisbane, Gold Coast, Cairns)
  - ❑ England (London)
  - ❑ Hong Kong (Kowloon, New Territories, Container Terminal)
  - ❑ The Netherlands (Amsterdam, Utrecht, Rotterdam)
  - ❑ United Arab Emirates (Abu Dhabi, Dubai, Al Ain)
  - ❑ Sweden (Stockholm, Gothenburg)
  - ❑ USA (Carmel, Seattle)
- Researched roundabout sites in various countries:
  - ❑ Australia (Brisbane, Gold Coast, Cairns)
  - ❑ New Zealand (Auckland, Wellington)
  - ❑ England (London, London Orbital Motorway, London Inner Ring Road, Milton Keynes, Birmingham A454 Middleway)
  - ❑ Hong Kong (Tseung Kwan O, Kong Sham and San Sham Ring Roads, Kwai Tsing Container Terminal)
  - ❑ The Netherlands (Amsterdam, Utrecht, Rotterdam, Hague)
  - ❑ France (Bordeaux, Lyon, Lille Loulaix, Nantes, Strasbourg)
  - ❑ United Arab Emirates (Abu Dhabi, Dubai, Al Ain)
  - ❑ Sweden (Stockholm, Gothenburg, Helsingborg)
  - ❑ Norway (Oslo)
  - ❑ USA (Alaska, Carmel)
- Researched the following roundabout issues
  - ❑ 2-lane and 3-lane roundabouts
  - ❑ Turbo roundabouts
  - ❑ Roundabouts in snow countries (winter similar to Alberta)
  - ❑ Trucks accommodation at roundabouts
- Presented Roundabout Applications in various Cities Poster at the 2014 International Roundabout Conference in Seattle
- Roundabout Assessments:
  - ❑ Highway 41 / Hwy 567 / Hwy 797
  - ❑ Leduc 50 Avenue & 46 St/47 St
  - ❑ Leduc Boreal Drive & Hawthorne Way

**9. Construction Staging (CS) & Construction Traffic Management (CTM):****A. Ring Roads Design-Build / DBFO Projects:**

- **CS** and **CTM** for the Southeast Anthony Henday Drive Project in Edmonton
- **CS** and **CTM** for the Northwest Anthony Henday Drive Project in Edmonton
- **CS** and **CTM** for the Northeast Anthony Henday Drive Project in Edmonton
- **CS** and **CTM** for the Southeast Stoney Trail Project (SEST) in Calgary
- **CS** and **CTM** for the Northeast Stoney Trail Project (NEST) in Calgary

**B. Interchange Construction / Bridge Rehabilitation Projects:**

- **CS** for the Calgary Trail & 23<sup>rd</sup> Avenue Project in Edmonton
- **CS** Special Timing Plans at Highway 63 and Confederation Way intersection and at Highway 62 & Thickwood Boulevard intersection
- **CTM** for closure of the 65<sup>th</sup> Avenue & QE2 interchange in Leduc
- **CTM** for closure of the Highway 2A & QE2 interchange in Leduc
- **CTM** for closure of Grant MacEwan Boulevard in Leduc
- **CTM** for major rehabilitation of the overpass structure at the Deerfoot Trail & 16 Avenue interchange (closure of half the eastbound/westbound lanes in year 1/year 2, needed to re-time several signals in major parallel corridors)
- **CTM** for major rehabilitation of the overpass structure (involving closure of two lanes) at the Deerfoot Trail & McKnight Boulevard interchange
- **CTM** for major rehabilitation of the overpass structure (involving closure of two lanes) at the Deerfoot Trail & Memorial Drive interchange

**C. Area-Wide / City-Wide Construction Traffic Management Projects:**

- **CTM** for major road/railway crossing closure in the City of Leduc (Involved re-timing of several signals in the City of Leduc)
- **CTM** for detour plans for major road closure(5 stages) in the downtown of the City of Grande Prairie

**D. Unconventional CTM Projects for Extremely Congested Corridors:**

- **CTM** for major rehabilitation of Deerfoot Trail at the Ivor Strong bridge (reduction from 3 lanes/direction to 2 lanes/direction) (involved re-timing of several interchange signals and along alternative corridors, as well as ITS application and travel time message boards and queue/stop ahead message boards)
- **CS** Special Timing Plans at Highway 63 and Taiganova Crescent as part of the Highway 63 & Highway 686 Parsons Access Interchange construction
- **CTM** for CrossIron Mill at QE2 & Highway 566 Interchange (Special timing plans to accommodate ingress and egress traffic until the secondary key site accesses are constructed at CrossIron Drive & QE2 interchange, and connection to the Metis Trail & Stoney Trail Interchange)



- **CTM** for major road construction along Airport Road from the proposed Factory Outlet Mall to 5<sup>th</sup> St/42<sup>nd</sup> St in Leduc/Nisku (re-timing of several traffic signals in Leduc and Nisku)

**Award - 2017 Minister's Award of Excellence for Construction Innovation**  
- Ivor Strong Bridge ITS Integration and Traffic Management Project

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