Travel Time Reliability Study in Calgary

Briefing Note

The Municipal Development Plan (MDP) and the Calgary Transportation Plan (CTP) both recognized the important role of goods movement in Alberta economy in 2009. As part of the MDP/CTP Monitoring and Reporting Program, the buffer time index was identified as a metric to measure travel time reliability. The same performance measure ***(P.PM1 Travel time reliability on major transportation corridors and primary goods movement routes)*** was used in the 2015-2018 Action Plan, supporting A Prosperous City priority by facilitating goods movement and economic competitiveness.

Day-to-day travel time can be significantly different than the average travel time with unexpected delays due to weather, traffic congestion or and traffic incidents, or a combination of these events. By measuring the travel time reliability on selected goods movement corridors on an annual basis, the effects of network improvements and the impacts of congestion and delay on commercial vehicle movement can be measured and consequently alleviated as required.

Methods

The crowdsourcing technique was applied to measure travel time reliability city-wide. The buffer time index (BTI) was calculated for six major transportation and primary goods movement corridors:

- Barlow Trail (between 114 Ave SE and McCall Way NE);
- Crowchild Trail (between 66 Ave SW and Coulee Rd NW);
- Deerfoot Trail (between 194 Ave SE and Stoney Trail NE);
- Glenmore Trail (between 69 St SW and Glenmore Trail SE);
- Peigan Trail (between Barlow Trail SE and Stoney Tail SE) ; and
- Trans Canada Highway (16th Avenue) (between Stoney Trail NE and Stoney Trail NW).

TomTom Traffic Stats was used to retrieve historical travel time data. The study was conducted for weekdays (24 hours) over five consecutive years from 2012 to 2016, excluding any nonrecurring events such as harsh weather, statutory holidays and work zones.

The buffer time index (based on the FHWA guidelines) **is defined as the extra travel time a traveler would need to budget, compared to the average travel time, to ensure an on-time arrival 95% of the time.** The buffer time index is computed as the difference between the 95th percentile travel time and the average travel time, divided by the average travel time.

$$\boldsymbol{BTI} = \frac{(\boldsymbol{TT}^{95\%} - \boldsymbol{TT}^{avg})}{\boldsymbol{TT}^{avg}}$$

Where:
BTI: buffer time index
TT95%: the 95th percentile travel time (In other words, out of 100 travel times on a given corridor, the 95th longest)
TTavg: the average travel time (Obtained by dividing the sum of observed travel time values by the number of observations)

In order to compute the buffer time index at the aggregate over the six above-mentioned corridors, the weighted average method was applied.

Results

The travel time reliability has improved steadily over the past five years except the year 2013, when winter conditions and flood caused disruption in traffic and thus led to traffic congestion, unreliability and delay. Table 1 summarises the travel time reliability metric (buffer time index) on six selected corridors over a five year period. **Travel time reliability has improved steadily over the past five years, with the lowest value of Buffer Time Index of 53.8% in 2016.** A lower percentage of the buffer time index indicates a higher degree of travel time reliability.

Table 1: Buffer time index at the aggregate level

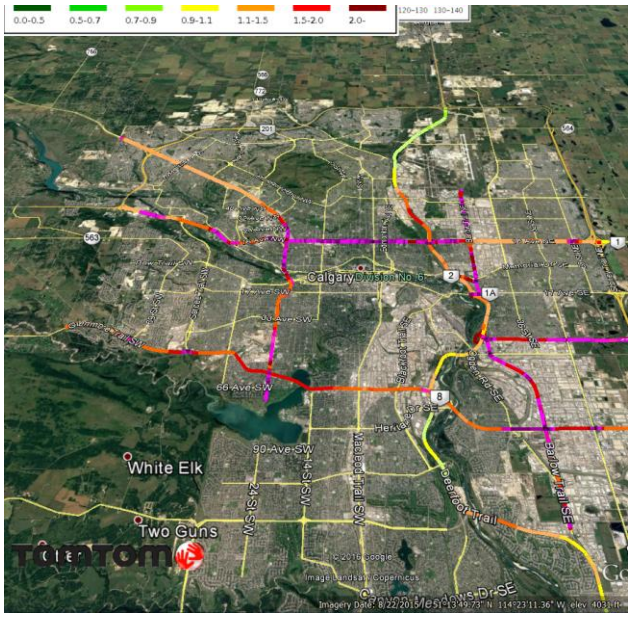
Year	Buffer time index
2012	66.6%
2013	68.6%
2014	60.0%
2015	59.0%
2016	53.8%

Since July 2016, TomTom's source of historical data has substantially been transformed and improved by acquiring vast amount of data from various providers that resulted in a higher degree of accuracy due to higher number of records. Hence, the lower buffer time index of 53.8% in 2016 might be influenced by the nature of data source. Furthermore, a significant improvement in travel time reliability in 2016 might have arisen due to current economic downturn and lower transportation demand.

TomTom Traffic Congestion Index

TomTom Traffic Congestion Index was calculated for the year 2016 for the six above mentioned corridors. The index, derived from the planning time index, and is measured as a ratio of the 95th percentile travel time over free-flow travel time. Figure 1 illustrates different levels of traffic congestion along six selected corridors.

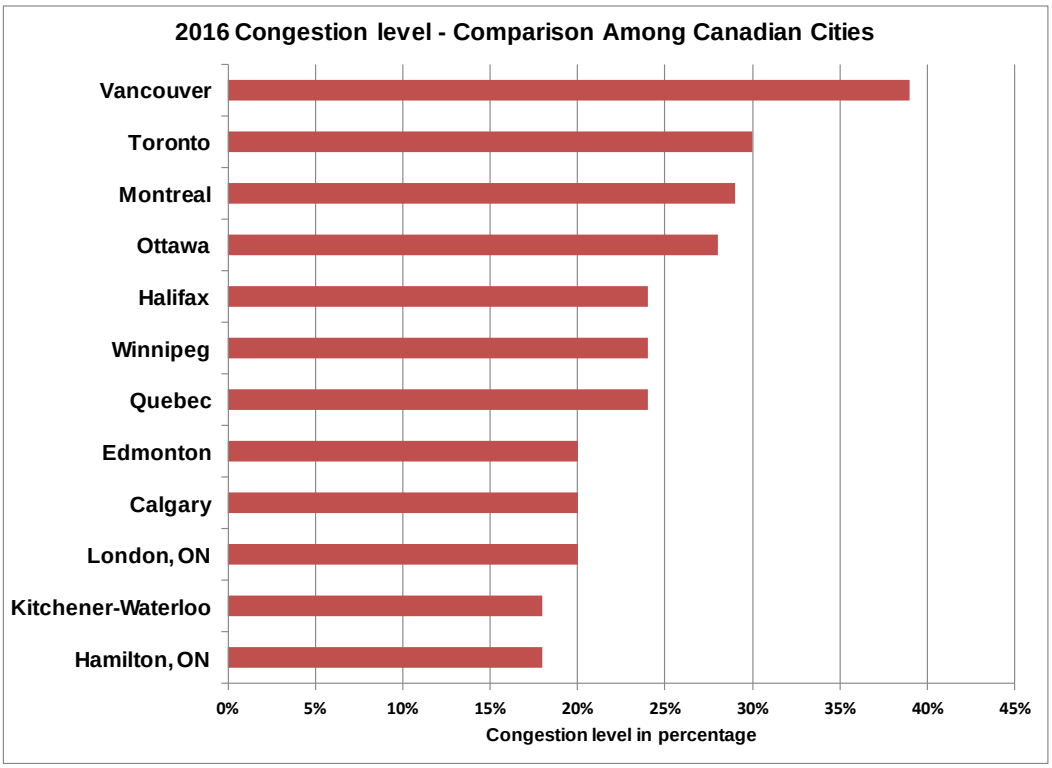
Figure 1: Traffic Congestion Index



Although the travel time reliability in the studied corridors has steadily improved over the past five years, traffic congestion still exists on individual corridors, with a few sections having severe traffic congestion despite a tangible improvement in the buffer time index.

Furthermore, TomTom has provided a full ranking of 390 cities from around the globe based on traffic congestion index in the recent years. Figure 2 compares the TomTom congestion level for twelve large cities in Canada. It should be noted that traffic congestion level in AM and PM peaks may be different from the overall congestion level exhibited here. For instance, the overall congestion level for Calgary is 20%, while the AM peak and PM congestion levels are estimated around 28% and 39% respectively.

Figure 2: Relative TomTom congestion level - Canadian cities



On a global scale, Mexico City is the most congested city in the world with the congestion level of 66%. Bangkok and Jakarta are the second and the third congested cities across the globe with the congestion level of 61% and 58% respectively.

In North America, Los Angeles, San Francisco, and Vancouver are the top three congested cities after Mexico City. The congestion level for these cities is 45%, 39%, and 39% respectively.

In terms of the position of Canadian cities on the international scale for the cities with a population greater than 800,000, Calgary ranks 137 while Vancouver, Toronto, Montreal, and Ottawa are placed at 34, 73, 86, and 91 respectively.

At the local level, the extra travel time that drivers experience every weekday is 21 min per day (79 hours per year) on average in 2016. The highest level of congestion happens on Thursdays.

The TomTom historical congestion level in the city of Calgary shows that the congestion level altered around 20% relatively in a five year time window (2012-2016). Figure (3) exhibits the TomTom congestion index over the five year period of 2012-2016. As the figure shows, compared to 2015, traffic congestion increased by 5% (relatively) in 2016. The most congested day in 2016 was Friday, 23 December according to TomTom Stats.

Figure 3: Congestion level history for Calgary, AB