

George Massey Tunnel Replacement Project

Traffic Forecasting Summary

August 2016

Table of Contents

| | | |
|-----------|--|----------|
| 1. | Introduction | 1 |
| 2. | GMT Traffic Forecasting Approach | 1 |
| | <i>Background – Status of Regional Traffic Modeling</i> | 1 |
| | <i>Growth in Overall Traffic and Congestion Levels</i> | 2 |
| | <i>Growth in Truck Traffic</i> | 2 |
| | <i>Origin-Destination Travel Surveys</i> | 2 |
| | <i>Regional Growth Strategy Population and Employment Growth Forecasts</i> | 2 |
| | <i>Port Mann Bridge Experience</i> | 3 |
| 3. | GMT Project Traffic Forecasts | 4 |
| 4. | Validation and Confirmation of Reasonableness | 5 |
| | <i>Steer Davies Gleave (SDG) Independent Forecast</i> | 5 |
| | <i>CH2MHill Peer Review</i> | 5 |
| | <i>Comparison of Initial Diversion Forecast with Port Mann</i> | 6 |
| | <i>GMT Project Forecast Alignment with Historic Trends and RGS Forecasts</i> | 6 |
| 5. | Sensitivity of Future Traffic Levels to Forecasting Assumptions | 7 |

1. Introduction

This paper describes the research and analysis program to develop and validate the traffic forecasts for the George Massey Tunnel Replacement Project (GMT Project). The GMT Project is being planned to replace the existing George Massey Tunnel with a new tolled bridge, with construction scheduled to start in 2017.

The following GMT Project traffic forecasts have been developed based on an analysis of historical traffic trends, future traffic drivers, and the actual experience of the new Port Mann Bridge (PMB) upon opening and introduction of tolling between 2011 and 2014.

The forecasts are based on an extensive multi-year program of in-depth traffic studies including data collection, traffic modeling, and independent third-party validation. Third-party validation has been undertaken both through an independently-developed forecast by a leading international transportation consulting firm, and through a separate peer review of assumptions and results by a leading transportation engineering firm.

The assumptions and resulting forecasts are also well aligned with the PMB experience through 2014, and are conservative in relation to traffic volume trends at PMB over the past 18 months.

2. GMT Traffic Forecasting Approach

Background – Status of Regional Traffic Modeling

For most of the past decade, the main traffic network modelling tool used in the Lower Mainland has been the Gateway Program (GSAM) EMME2 Model. In recent years, TransLink has begun developing a more sophisticated Regional Transportation Model (RTM) to address some of the limitations of the GSAM Model. Parsons Corporation, a recognized transportation engineering and network traffic modelling consulting firm, has been working with TransLink in the initial use of the RTM to develop traffic forecasts.

Parsons has also been retained by the GMT Project Team, since 2012, to assist in developing traffic forecasts for the GMT Project. Using the RTM, Parsons developed traffic forecasts for the new bridge under an untolled scenario, which were used as the basis for the Environmental Assessment (EA) application. To be conservative, the traffic volumes associated with the untolled scenario were used for the EA, since this scenario represents a higher potential traffic impact than a tolled scenario.

Forecasts have also been developed for the tolled scenario, based on numerous information sources. These include the RTM forecasts, detailed analysis of traffic patterns at GMT and the Alex Fraser Bridge (AFB), regional population and employment trends, and the actual traffic experience at PMB and the Pattullo Bridge.

Growth in Overall Traffic and Congestion Levels

The GMT Project Team has undertaken extensive studies of long-term traffic growth and congestion patterns at GMT, AFB, and other Fraser River crossings.

Because of the heavy congestion at GMT, traffic levels have averaged approximately 80,000 vehicles per day for more than two decades, with AFB absorbing almost all of the increase in cross-river traffic. On a combined basis, traffic growth at GMT and AFB averaged 0.64% annually between 2003 and 2013.

A detailed study of congestion patterns at GMT and AFB determined that peak-direction congestion delays are now similar at both crossings. Accordingly, future growth in cross-river traffic is forecast to result in increased traffic volumes and congestion levels at both crossings.

There is recent strong evidence that traffic and congestion levels are increasing. Average daily traffic at GMT increased by 1.9% between 2014 and 2015, and congestion delays have increased at both GMT and AFB.

Growth in Truck Traffic

Truck traffic growth rates have been forecast separately from auto traffic, based on multiple information sources. These sources include traffic count station data, TransLink screenline surveys, and the *Metro Vancouver Truck Classification and Dangerous Goods Survey* (Transport Canada, 2014).

These sources all indicate that truck traffic has been increasing at a faster rate than traffic in general. For example, the Transport Canada survey measured an average increase of 1.43% annually at GMT between 2008 and 2014.

Origin-Destination Travel Surveys

Detailed surveys of origin-destination travel patterns were performed in 2013 and 2014 by Parsons, for both GMT and AFB traffic, by time of day and day of week. This data has provided essential information for forecasting the shifts in traffic patterns as a result of the GMT Project – in particular in assessing what portion of current GMT traffic will divert to and from AFB (and vice versa), when the Tunnel is replaced with a tolled but uncongested new bridge.

These origin-destination surveys found that almost 60 per cent of daily vehicle trips through GMT are for travel to and from Richmond. In addition, the surveys found that cross-river trips take the Highway 91 corridor, despite the Highway 99 corridor providing a more direct route.

Regional Growth Strategy Population and Employment Growth Forecasts

Metro Vancouver's Regional Growth Strategy (RGS) population and employment forecasts were reviewed, along with other regional and community planning initiatives – including commercial/ industrial economic development opportunities.

Between 2011 and 2041, in the south-of-Fraser primary GMT catchment area, population is forecast to increase at an annual average rate of 1.34%, and employment is forecast to increase at an average rate of 1.64%.

Port Mann Bridge Experience

The GMT Project also performed a detailed analysis of the actual traffic volume impacts, by hour of day and day of week, at the new PMB. Developing a comprehensive understanding of the actual traffic impacts at PMB has been key to developing traffic forecasts for the new tolled bridge.

At PMB, annual average daily traffic (AADT) levels dropped by 13-14%, from 110,000 to 95,000, between 2011 (last full year of no tolls) and 2014 (first year of full tolls).

Traffic impacts at PMB also varied by time of day, and by day of week. Comparing weekdays in 2014 and 2011, traffic levels actually increased during peak periods, while decreasing during mid-day periods and evenings. Weekend traffic levels also decreased for all hours of the day.

More recently (in 2015 and early 2016), traffic levels have increased significantly:

- ▶ In 2015, traffic increased by approximately 5% over 2014 levels.
- ▶ For each of the first four months of 2016, traffic continued to increase, by between 6% and 11% in relation to the same month in 2015.

3. GMT Project Traffic Forecasts

Taking into account all of the information sources, and assuming implementation of tolls consistent with the PMB, the conservatively-developed baseline traffic forecasts for the Project are as follows:

- ▶ **First-Year Traffic Volume** – First-year daily traffic with the new bridge is forecast to be 71,000, representing a 14% first-year loss of traffic. This result is consistent with the actual impact at PMB, reflecting the redistribution of traffic to Pattullo and other crossings.
- ▶ **Future Traffic Growth Rates** – Future traffic levels are projected to increase at an average annual rate of 0.72%, representing the weighted average of:
 - **Auto traffic – 0.65% annual increase.** This forecast is consistent with recent-year trends for combined GMT/AFB traffic. It represents approximately half of the RGS’ population and employment growth rate forecasts for adjacent south-of-the-Fraser communities.
 - **Truck traffic – 1.5% annual increase.** This forecast is consistent with recent-year truck growth trends at GMT, as well as with forecast regional population/employment growth.

As noted in Table 1 below, the baseline forecast does not assume any recovery of lost traffic during the initial years of operation, as occurred at PMB in 2015 and early 2016.

Table 1 – Summary of GMT Traffic Forecasts

| | Baseline Forecast |
|--|----------------------|
| Pre-replacement AADT – Tunnel | 82,500 |
| First-year AADT – new fully tolled bridge | 71,000 (-14%) |
| Early-year AADT recovery of lost traffic | None assumed |
| Future Annual Traffic Growth Rates | |
| • Autos | +0.65% |
| • Trucks | +1.50% |
| • All traffic combined | +0.72% |
| Future AADT Levels | |
| • 2031 | 76,000 |
| • 2045 | 84,000 |

4. Validation and Confirmation of Reasonableness

The reasonableness and conservatism of the GMT Project traffic forecasts has been confirmed through extensive independent study and internal validation.

Steer Davies Gleave (SDG) Independent Forecast

To test the reasonableness of the GMT Project forecasts, Steer Davies Gleave (SDG) was engaged to perform an independent traffic forecast for the new bridge, without knowledge of the GMT Project Team’s forecasts. As summarized in Table 2, SDG’s independently-developed traffic forecasts were moderately higher than the Project Team’s baseline forecasts.

Table 2 – GMT Baseline Forecasts in Comparison to Independent SDG Forecasts

| | Baseline Forecast | Independent Forecast (SDG) |
|---|---------------------------|----------------------------|
| Pre-Replacement AADT | 82,500 (2020/21) | 84,000 (2020) |
| First-year AADT (full toll) | 71,000 (2021/22, -14%) | 75,000 (2021, -11%) |
| Future AADT Growth Rate ¹ | 0.72% | 0.80% |
| Projected AADT Levels | | |
| • 2031 | 76,000 | 81,000 |
| • 2045 | 84,000 | 87,000 |

¹ Blended average of auto and truck growth rates. SDG’s estimated growth rate is based on an econometric traffic demand forecasting model to 2031; traffic growth beyond 2031 is assumed to increase at half the rate of pre-2031 growth.

CH2MHill Peer Review

The Project also engaged consulting engineers from CH2MHill to perform an independent peer review of the GMT Project Team’s traffic forecasting methodology and results.

CH2MHill’s conclusions are that:

- ▶ “the method used by the Massey Project to estimate toll retention appears to be reasonable”
- ▶ “the annual traffic forecasts appear to be quite conservative”

Comparison of Initial Diversion Forecast with Port Mann

As illustrated in Table 3, the baseline forecast of 14% initial traffic diversion is similar to the actual experience at PMB. The projected 14% diversion is also consistent with the GMT Project’s forecast of traffic redistribution between AFB and the new bridge, based on the origin-destination surveys conducted in 2013 and 2014.

Table 3 – GMT Baseline Forecasts, relative to the PMB Experience

| | GMT New Bridge Baseline Forecasts | Port Mann Bridge Experience |
|---------------------------------------|--------------------------------------|---------------------------------|
| Pre-Replacement AADT | 82,500 (2021/22) | 110,000 (2011) |
| First-year AADT with full toll | 71,000 (2021/22) 14% loss | 95,000 (2014) 13-14% loss |

GMT Project Forecast Alignment with Historic Trends and RGS Forecasts

With regard to auto traffic, the forecast auto traffic growth rate of 0.65% annually is consistent with actual 10-year GMT/AFB traffic growth trends. It is also considered conservative in that it is about half of the RGS forecast population growth rates.

With regard to truck traffic, the forecast growth rate of 1.50% annually is not only aligned with actual 2008-14 truck volume trends measured by Transport Canada, but also with regional population and employment forecasts.

Table 4 – GMT Baseline Forecasts in Comparison to Historical Trends and Population/Employment Forecasts

| | Annual Average Growth Rates |
|--|-----------------------------|
| Historic Traffic Trends | |
| • GMT/AFB Traffic Growth, 2003-13 (Traffic Counts) | 0.64% |
| • GMT Truck Traffic Growth, 2008-14 (Transport Canada) | 1.43% |
| RGS Forecast by GMT Catchment Area ¹ | |
| • Population Growth | 1.34% |
| • Employment Growth | 1.64% |
| New Bridge Baseline Forecast Growth | |
| • Auto AADT Growth | 0.65% |
| • Truck AADT Growth | 1.50% |

¹ Annual Growth Rates are for 2011 to 2041, per Metro Vancouver Regional Growth Strategy (RGS). GMT Catchment Area includes Delta, Tsawwassen First Nation, White Rock, and the southern portion of Surrey.

5. Sensitivity of Future Traffic Levels to Forecasting Assumptions

The baseline traffic forecasts for the new bridge were initially developed in 2014, and were considered conservative at the time. SDG's independently-developed projections, prepared in Fall 2015 without knowledge of the Project Team forecasts, predict somewhat higher traffic levels.

Recently, significant increases in traffic levels have been experienced at major Fraser River crossings. For example, AADT at GMT reached approximately 81,000 in 2015, an increase of nearly 2% as compared with 2014 levels. In addition, traffic in the first four months of 2016 at Port Mann was up more than 6% over the first four months of 2015.

Given the increasing traffic trends in the past year, the baseline traffic forecasts are considered to be very conservative, and the risk of traffic levels being substantially lower than the baseline forecasts is assessed as very low.

Table 4 – Sensitivity of Future Traffic Levels to Initial Traffic Loss and Future Growth Rate Assumptions

| | Lower | Conservative (Baseline) | Steer Davies Gleave |
|------------------------------|--------|----------------------------|------------------------|
| Traffic Assumptions: | | | |
| • First-year AADT | 69,000 | 71,000 | 75,000 |
| • Annual auto growth rate | +0.50% | +0.65% | +0.68% |
| • Annual truck growth rate | +1.25% | +1.50% | +1.80% |
| Forecast 2045 Volumes | 79,000 | 84,000 | 87,000 |
| • Vs. 2015 GMT AADT (81,000) | -2,000 | +3,000 | +6,000 |

Note: SDG annual growth rates are to 2031. SDG assumes post-2031 growth rates at 50% of pre-2031 rates.