Executive Summary

Introduction
This report describes the updating and refinement of the 2001 Prince George Transportation System Planning Study prepared by UMA Engineering Ltd. for the City of Prince George and the BC Ministry of Transportation. The objectives of the upgrade were to:

- Refine and recalibrate the traffic forecasting model based on current (2006) data and traffic conditions
- Develop mid-term (2016) and long term (2026) network recommendations to achieve specific operational objectives
- Identify the network improvements required to service a number of planned major developments
- Address specific network issues identified by the staffs of the sponsoring agencies; and
- Undertake High Level Multiple Account Evaluation of the recommended 2026 network elements

Model Upgrade
The City of Prince George Transportation Model was developed by the City, in conjunction with the Ministry of Transportation in 2001. The model was a typical four-stage urban travel demand model based on the EMME software. The model was “state-of-the art” at the time of its development and application but only produced reliable traffic forecasts at the broad corridor level. Development of traffic forecasts for operational analysis required considerable “post-processing” of raw model output data and required considerable professional judgment based on “reasonable” assumptions.

Improvements in the EMME software, improvements in the power, speed and memory of computer technology and the introduction of more sophisticated network analysis procedures developed by the project team have allowed the model to be refined to provide reliable explicit forecasts of traffic movements at intersections. This allowed the rigorous analysis of traffic operations based on raw model output.

Consequently, the model upgrade included:

- Updating the input demographic and network data to a 2006 Base Year,
- Calibrating and validating to PM peak hour intersection traffic counts at 91 intersections and to PM peak hour transit passenger counts on scheduled bus service in the City,
- Expanding the zone system used for traffic assignment,
- Explicitly modelling truck demand based on available truck counts and assigning truck traffic as a separate vehicle class; and
- Applying new procedures in traffic assignment to explicitly synthesise delays and capacities for individual turning movements at intersections and ramp terminals.

Demographic Assumptions
The demographic data used for the 2016 and 2026 traffic forecasts assumed that the study area population would increase from 73,565 in 2006 to 91,289 in 2016 and to 108,224 in 2026. Over the same period, total employment would increase from 41,130 in 2006 to 51,041 in 2016 and to 60,508 in 2026. These demographic totals were distributed among the study area traffic zones based on direction from City staff.
As a result of these demographic assumptions and the validated demand forecasting coefficients used in the model, total PM peak hour person trips is forecast to increase from 40,812 in 2006 to 50,182 in 2016 and to 61,637 in 2026. Total PM peak hour vehicle trips are forecast to increase from 30,045 in 2006 to 37,995 in 2016 and to 47,270 in 2026 while PM peak hour transit passenger trips are forecast to increase from 2,056 in 2006 to 2,466 in 2016 and to 2,694 in 2026.

**Analysis**

A “do-minimum” network was evaluated against forecast 2016 and 2026 demand. The “do-minimum” network comprised the existing 2006 network plus projects regarded as firmly committed and budgeted at that time. Not surprisingly, the analysis showed unsatisfactory operational performance in both 2016 and 2026. In 2026, 8 signalized intersections would be experiencing significant traffic congestion with unacceptable average vehicle delays. The recommended 2026 network addresses all the operational issues identified in the analysis of the “do-nothing” network and addresses all traffic needs arising from the major urban development projects expected to be implemented by 2026.

The recommended network includes 15 major road improvement projects and 8 additional links to access development areas and connect the network together. The recommended network also includes a new transit route to serve the Fraser Bench, University Heights and Ospika South.

The forecast mean network operating speed is 41.7 kph in 2016 and 42.2 kph in 2026 compared with the estimated mean network speed of 41.3 kph in 2006.

**Multiple Accounts Evaluation**

The evaluation of network elements employed the use of a Multiple Account Evaluation methodology, which considered a wide range of factors including agency costs, traveler benefits, community and economic impacts and environmental issues. The analysis made use of the EMME model developed for this study.

For the high-level economic evaluation, a benefit cost ratio was estimated for each proposed network improvement based on a 20-year life cycle. The capital cost was based on estimated unit construction costs and was assigned to Year Zero of the project’s assumed 20-year life. Annual maintenance costs were estimated by factoring construction cost. User benefits were travel time savings at an assumed value of time of $9.1 per non-business person hour, $21.6 per business person hours, and $51.2 per truck hour. Operating costs were assumed at $0.125 per KM for private vehicles and $0.459 per KM for trucks. Maintenance costs, user benefits and vehicle operating costs were projected over the assumed 20-year life cycle and future costs and benefits were discounted to Year Zero based on a social discount rate of 3.5%

The benefit/cost ratios for individual projects comprising the recommended 2026 network range from 0.8 for Boundary Road (Hwy 16 - Domano) and 11.6 for Cranbrook Drive. The capital cost of the above projects is estimated at $359 million. The NPV of the recommended 2026 major road improvements is estimated at $816 million. The overall benefit/cost ratio of the recommended improvements was estimated at 3.4.

**Results**

The final major recommended network improvements are listed in Table ES-1.
Table ES-1 2026 Recommended Network Net Present Value and Benefit/Cost Ratio

<table>
<thead>
<tr>
<th>Element</th>
<th>Scenario</th>
<th>Description</th>
<th>Net Present Value ($M)</th>
<th>Benefit / Cost Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element 1</td>
<td>3611</td>
<td>Lansdowne Extension to Cowart &amp; Upland Realignment</td>
<td>79.0</td>
<td>10.2</td>
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<td>Element 3</td>
<td>3621</td>
<td>Massey Extension, Ospika to Tyner</td>
<td>18.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Element 4</td>
<td>3622</td>
<td>Massey Extension, Tyner to Hwy 16W</td>
<td>34.0</td>
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<td>Element 5</td>
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<td>University Way Extension, Tyner to Hwy 16W</td>
<td>3.6</td>
<td>1.3</td>
</tr>
<tr>
<td>Element 6</td>
<td>3624</td>
<td>Cranbrook Drive, University Way to Massey Extension</td>
<td>31.9</td>
<td>11.6</td>
</tr>
<tr>
<td>Element 7</td>
<td>3631</td>
<td>Ospika Extension, Tyner to Hwy 16W</td>
<td>17.7</td>
<td>2.5</td>
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<tr>
<td>Element 8</td>
<td>3632</td>
<td>Glen Lyon Extension, St Patrick to Domano</td>
<td>5.3</td>
<td>3.7</td>
</tr>
<tr>
<td>Element 11</td>
<td>3643</td>
<td>Rec Place connection to Athlone</td>
<td>11.6</td>
<td>5.9</td>
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<td>Element 12</td>
<td>3651</td>
<td>Hwy 16 six-lane widening, Hwy 97 to Vance/Cowart</td>
<td>28.8</td>
<td>6.7</td>
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<td>Element 13</td>
<td>3671</td>
<td>Boundary Road, Hwy 16W to Domano</td>
<td>-7.7</td>
<td>0.8</td>
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<td>Element 14</td>
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<td>Boundary Road, Domano to Hwy 97S</td>
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<td>Element 15</td>
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<td>Boundary Road, Hwy 97S to Hwy 16E</td>
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<td>Element 16</td>
<td>3681</td>
<td>Blueberry Extension, Hwy 97 to Foothills</td>
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<td>2.8</td>
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<td>Element 20</td>
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<td>Willow Cale Extension to Hwy 97/Railway</td>
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<td>Element 22</td>
<td>3699</td>
<td>Foothills S Extension, 18th Ave to Ferry</td>
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<td>2.5</td>
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</tbody>
</table>

In addition to the major network improvements above, the following additional links would provide access to the identified development areas, and complete the network connections:

- Continental Way Extension to Boundary (Airport Logistics Park)
- Malaspina Extension to Cowart (Fraser Bench)
- Ospika Blvd, Hwy 16W to Boundary Road (Ospika South)
- Glen Lyon, Hwy 16 to St Patrick (Ospika South)
- Westgate Extension to Glen Lyon (Ospika South)
- Southridge, St Lawrence to Glen Lyon (Ospika South)
- St Lawrence, Domano to Hwy 16/Henry (Ospika South)
- Wiebe Extension, Range to Ferry/Rec Place (PGGCC)

All recommended links, and their estimated timing, are shown in Figure ES-8.1

The upgraded of the Prince George Transportation Model is a powerful tool by which to examine transportation demands and priorities within the City resulting from large-scale development projects. However, the model is calibrated and validated to the PM peak hour only. It is recommended that the City of Prince George consider developing and calibrating an AM peak hour model to complement the PM peak hour model. This will allow more comprehensive operational and MAE analysis of network elements. In any event, it is recommended that the EMME model should be updated and revalidated within five years, reflecting updated data collected by the City.