REGION OF WATERLOO

TRANSPORTATION AND ENVIRONMENTAL SERVICES
Rapid Transit

TO: Chair Jim Wideman and Members of the Planning and Works Committee

DATE: February 7, 2012 **FILE CODE:** A02-30/PW

SUBJECT: RECOMMENDED PROCUREMENT AND DELIVERY OPTION FOR STAGE 1 LIGHT RAIL TRANSIT

RECOMMENDATION:

THAT the Regional Municipality of Waterloo take the following actions regarding the procurement of Stage 1 of the light rail transit project, as described in Report No. E-12-011, dated February 7, 2012:

a) approve Design-Build-Finance-Operate-Maintain (DBFOM) as the procurement and delivery option for Stage 1 light rail transit, with a 30-year project term for the long-term Finance and Maintain components, subject to confirmation by the provincial and federal governments that they will maintain their rapid transit funding commitments with the DBFOM option; and

b) direct staff to report back to Council with staff's recommendation for initial and renewable project terms for the Operate component of the procurement and delivery option.

SUMMARY:

Region staff have reviewed a number of procurement and delivery options for the light rail transit (LRT) project, including:

- Design-Bid-Build (DBB);
- Design-Build (DB);
- Design-Build-finance (DBf);
- Design-Build-Operate-Maintain (DBOM);
- Design-Build-Finance-Maintain (DBFM); and
- Design-Build-Finance-Operate-Maintain (DBFOM).

Staff considered and evaluated the risks and benefits associated with the various options. Based on this review, staff have identified public-private Design-Build-Finance-Operate-Maintain (DBFOM) as the recommended procurement and delivery option.

With DBFOM, over the length of the project term, a private company would:

- Design: complete detailed LRT design drawings and plans;
- Build: build LRT;
- Finance: obtain financing to pay its employees and other costs in advance of the Region's installment payments. The Region would withhold part of the construction payment to the private company and pay it in installments when the contract requirements are met by the private company over the project term;
- Operate: manage the day-to-day operations of LRT, including supplying the operators to drive the light rail vehicles, keeping to the Region's service schedule; and
- Maintain: look after LRT repairs and upkeep, including tracks and vehicles.

With DBFOM, the Region would:

- Own the LRT system (rights of way, tracks, vehicles, etc.);
- Set LRT fare prices and service schedules;
- Be responsible for customer service and addressing customer issues;
- Receive the fare revenue, which would offset the cost of the Region's transit system;
- Be responsible for the integration of LRT and the Region's conventional transit system;
- Continue to operate bus service through Grand River Transit. More bus drivers will be needed because of the Region's approved plan to expand the transit network; and
- When the project term ends, assume operations and maintenance, or extend the contract of the current private company, or find a new private company to operate and maintain the LRT system.

The DBFOM option offers the following:

- cost: Over the project term, the DBFOM option would cost less than the other procurement and delivery options. LRT design would consider operations, resulting in better coordination and more efficient operations. The private company would have to deal with competitive pressure and answer to their lenders, so they would be inclined to provide a better value and a lower total project cost ensuring that the project is on time and on budget;
- funding contributions: Use of the DBFOM option would be subject to confirmation by the provincial and federal governments that they will maintain their rapid transit funding commitments with the DBFOM option (currently provincial and federal staff have indicated that use of a DBFOM option would not jeopardize the funding);
- experience: The private sector has more experience than the Region in designing and constructing an LRT system. They also have more experience with operating and maintaining an LRT system at start-up, and with providing trained and certified staff to operate the light rail vehicles;
- incentives: Payments and penalties based on performance would provide incentive for the private sector to complete the project on time and on budget. The payments and penalties would also apply to performance standards for operating and maintaining a high-quality LRT system over the long term. If the private company does not perform to the standards set in the contract, it would not get paid;
- risks: The Region would limit its risk by placing responsibility on the private sector. The Region monitors the service and holds back payments if the private company does not meet the contract performance standards. The DBFOM option would provide better accountability where performance may be related to either maintenance or operation because the same company would be responsible for both. Risks during commissioning, start up and initial operations and maintenance are significant and would be transferred to the private sector. DBFOM would also transfer lifecycle risks such as major vehicle and track maintenance to the private company. The Region would be responsible for those risks that it is best able to manage, such as fare setting and ridership risk; and
- flexibility: The DBFOM option may constrain the choices for LRT integration with Grand River Transit and for who would maintain and/or operate Stage 2 LRT and for general ongoing operation of the LRT. This may be mitigated by carving out separate, short-term operating agreements with the private DBFOM team (5-10 years), such that a new operator can be competitively procured at an appropriate time to operate the system. This would provide some certainty for the private DBFOM team on the length of the operating agreement and would allow the Region to review and implement different operations at shorter intervals. The Region may also retain the right to terminate the operations services under the main DBFOM agreement, and procure a new operator for the system or assume direct responsibility for the operations activities with Regional staff.

Staff recommend a 30-year project term for the long-term Finance and Maintain components of the DBFOM option. Staff propose to further evaluate options for various term lengths for the Operate component of the DBFOM option, to best balance the benefits of DBFOM with operational and expansion flexibility, and will report back to Council on this matter once these evaluations are completed.

REPORT:

1. Introduction

Rapid transit is needed in Waterloo Region because it will move people and shape urban form as the Region continues with tremendous population and employment growth. In June 2011, among other motions related to rapid transit, Council approved the technology, route, stations, staging and funding of Stage 1 of the Region's rapid transit project. Stage 1 includes 19 km of light rail transit (LRT) from Conestoga Mall to Fairview Park Mall and 17 km of adapted bus rapid transit (aBRT) from Fairview Park Mall to the Ainslie Street Terminal.

In June 2011, Council also directed staff to complete an evaluation of project procurement and delivery options, including the role of Infrastructure Ontario, with the goals of maximizing project innovation and quality, leveraging private sector expertise, and managing risks to the Region of Waterloo and our taxpayers. Staff have considered the rapid transit project procurement and delivery options available, and the risks and benefits associated with the various options, within an evaluation framework.

2. Procurement and Delivery Options

Procurement is a process used to buy a product or service. Delivery is how that product or service is built and/or provided. Together, a procurement and delivery option is one way that a product or service can be completed. There can be many different options for purchasing and providing a product or service. A procurement and delivery option can include private sector involvement in any combination of designing, building, financing, operating and maintaining of a project.

The following is not an exhaustive list of available project procurement and delivery options, but rather a list of the most likely options for delivering the rapid transit project. Each of these options could be considered a public private partnership (P3) because each involves a relationship based on a negotiated contract between a public organization and a private company. The Region and the private company would work together to complete the project. The intent of a P3 is to build on the strengths of the public and private sectors, assigning public and private sector roles to provide the best outcome.

In all of these options, the Region would:

- Own the LRT system (rights of way, tracks, vehicles, etc.);
- Set LRT fare prices and service schedules;
- Be responsible for customer service and addressing customer issues;
- Receive the fare revenue, which would offset the cost of the Region's transit system;
- Be responsible for the integration of LRT and the Region's conventional transit system;
- Continue to operate bus service through Grand River Transit. More bus drivers will be needed because of the Region's approved plan to expand the transit network; and
- When the project term ends, assume operations and maintenance, or extend the contract of the current private company, or find a new private company to operate and maintain the LRT system.

Design-Bid-Build (DBB): The Region completes the preliminary and detail design and then tenders the project to the private sector for construction through separate and distinct procurements. The selection of the construction contractor is generally focused on the lowest construction cost. Payment is typically on a monthly progress basis. Only one complete design is generated for the project.

Design-Build (DB): The private sector completes the preliminary and detail design and the construction in an integrated process. Payment is typically on a monthly progress basis. The Region would hold contractors to performance by conducting engineering reviews of contractor-supplied documents, field inspection and compliance reviews during construction.

Design-Build-finance (DBf): A portion of construction payments are withheld until completion of construction, adding short-term financing requirements for the private sector to the DB process, with payments to the private sector based on major milestone payments or substantial completion.

Design-Build-Operate-Maintain (DBOM): This adds an operating and maintenance term to the design-build process, which can be DB or DBf. The contractor operates and maintains all or part of the system during revenue operations. Payment for operation and maintenance is typically on a monthly basis based on performance and availability, with security in the form of performance bonding or a letter of credit, equal to about the annual maintenance fee. The term is typically a relatively short 10 to 15 years. This provides incentive to the private sector to maintain the system in good repair so that they are in a better position to be awarded the next operating and maintenance term. At the same time, this approach reduces the lifecycle cost to the private sector and the Region.

Design-Build-Finance-Maintain (DBFM): A portion of construction payments are withheld and paid during a maintenance term to secure performance. This adds long-term maintenance and long-term financing to the DBf process for the portion of the construction costs that have been withheld. The Region pays the private sector for this withheld payment in installments over the length of the project term, subject to compliance with performance and availability specifications. The term is typically 25 to 30 years to ensure that the lifecycle is covered. The 25-year lifecycle includes major capital refurbishment, including the full rehabilitation of civil infrastructure, vehicles and systems. During the procurement process, the shortlisted bidding construction contractors would each generate complete designs, each meeting the requirements of the Region, but each likely reflecting a different approach or innovation on the project.

Design-Build-Finance-Operate-Maintain (DBFOM): This adds a long-term operation term to the DBFM process. Bundling operations with maintenance reduces the coordination risk between the two, lowering costs.

3. Private Sector Roles

Table 1 summarizes the roles allocated to the private sector by procurement and delivery option. In all of these options, the Region would:

- Own the LRT system (rights of way, tracks, vehicles, etc.);
- Set LRT fare prices and service schedules;
- Be responsible for customer service and addressing customer issues;
- Receive the fare revenue, which would offset the cost of the Region's transit system;
- Be responsible for the integration of LRT and the Region's conventional transit system;
- Continue to operate bus service through Grand River Transit. More bus drivers will be needed because of the Region's approved plan to expand the transit network; and
- When the project term ends, assume operations and maintenance, or extend the contract of

the current private company, or find a new private company to operate and maintain the LRT system.

Table 1: Roles allocated to Private Sector by Procurement and Delivery Option

	DBB	DB	DBOM	DBf	DBFM	DBFOM
Preliminary design		X	X	X	X	X
Detail design		X	X	X	X	X
Design and construction co-ordination		X	X	X	X	X
Construction	X	X	X	X	X	X
Maintenance			X		X	X
Lifecycle (major capital refurbishment)					X	X
Operations			X			X
Operation and maintenance integration			X			X
Short-term financing during construction				X	X	X
Long-term financing					X	X

4. Evaluation Criteria for Procurement and Delivery Options

The evaluation criteria for procurement and delivery options provide conflicting measures that must be balanced to find the best option for the Region. The evaluation criteria include:

- project cost;
- level of funding contributions from senior government;
- the Region's experience to fill the roles that could possibly be allocated to the private sector (does the Region have the experience to perform the roles required for the different options);
- incentives for private sector innovation and performance, including quality of product and service over the lifecycle;
- transfer of appropriate risks from the Region to the private sector that the private sector can best price and mitigate or manage e.g. construction cost overruns. The transfer of risk is also tied to incentives for performance in terms of on-time construction and long-term operational performance, including a consideration of the related performance security upon which the Region can rely; and
- operational and expansion flexibility in the long term.

Appendix A includes a comparison of the pros and cons associated with the procurement and delivery options.

5. Value for Money Assessment

With the assistance of Deloitte, staff undertook an assessment of the procurement and delivery options listed in Section 2, to provide a relative comparison of the value for money (VFM) for each option and of project terms of 15, 25 and 30 years. Appendix B contains a report from Deloitte on the analysis of alternative procurement approaches.

In 2008, the Region held a risk workshop to assess the key risks inherent in the rapid transit project for various delivery options, the potential impact to the Region, and the role that the private sector could play in assuming and/or mitigating the project risks to the Region. Appendix C contains an excerpt, the detailed LRT results, from the RT Initiative Risk Workshop Final Report. The risks identified in Appendix C form the basis for the types of risks considered in the VFM analysis.

The VFM considers the risk-adjusted cost of each option, in comparison to the "baseline" traditional option of DBB. The comparison includes capital, operating and maintenance costs, in net present value. The analysis considers not only the cash flows under each option, but also the risks retained

by the Region. The analysis considers the probability of the risk occurring and the impact that the risk would have on the Region, and assigned a monetary value to each risk.

The VFM analysis demonstrates that the DBFOM option results in the best VFM for the Region, in comparison to the baseline traditional DBB option. This result was driven by the fact that under the DBFOM option, the Region transfers considerable risks to the private sector. Other options provided less VFM for the Region, because these options involved less risk transfer to the private sector.

The Region obtains incremental value as it transfers risk and responsibility to the private sector. Specifically:

- Under the DB option, the Region obtains some incremental value over the baseline DBB, by bundling together design and construction responsibility and transferring these risks to the private sector;
- Under the DBf option, the Region obtains greater value by not only bundling together and transferring design and construction risk to the private sector, but also by securing performance through withholding payment until completion of construction and requiring the private sector to finance a portion of the project (the "f");
- Under the DBOM option, the Region obtains value by bundling together design, construction, and long-term operations and maintenance responsibility and transferring these risks to the private sector;
- Under the DBFM option, the Region obtains incremental value by bundling together design, construction, and long-term maintenance responsibility and securing performance by withholding a portion of payment to the private sector, requiring the private sector to finance a portion of the project over the project term; and
- Under the DBFOM option, the Region obtains the greatest value by bundling together design, construction, and long-term maintenance along with operations responsibility, and securing performance by withholding a portion of payment to the private sector, requiring the private sector to finance a portion of the project over the project term.

Staff also reviewed and evaluated why the VFM assessment for DBFOM resulted in savings over the traditional approach and the most savings of all the options considered. With DBFOM, the cost of financing is higher because the cost of private sector financing is higher than public financing. However, the Region benefits from transferring design, construction, operating and maintenance risks to the private sector. As well, DBFOM introduces efficiencies from integrating the design, construction, operating and maintenance processes, and because of the incentives introduced by the private sector having money at risk based on their performance. The benefits of the risk transfer and efficiencies due to integration are expected to more than offset the higher cost of financing, resulting in VFM savings.

Recent industry observations also show that, on many DBFM and DBFOM projects, competitive pressures as well as innovations introduced by private sector bidders have resulted in private sector bidders coming forward with construction costs that are significantly below the public sector's original cost estimates. For example, in the recent Canada Line, Vancouver DBFOM, the private sector was able to build a longer LRT line than anticipated because of innovations introduced by the private sector. Therefore, there is some evidence that the DBFOM model can provide actual cost savings.

The VFM assessment was prepared by Deloitte using standard industry methodology. Deloitte has confirmed that the results of the VFM assessment are logical, and in line with VFM results for other comparable projects in Canada. The VFM assessment will be re-run, in accordance with standard industry practice, at critical points during the project procurement to re-confirm the results and ensure that the chosen delivery option still provides VFM. These points in time generally include:

- Prior to release of the request for qualifications;
- Prior to release of the request for proposals;
- Immediately prior to bid submission;
- Prior to selecting a preferred bidder; and
- Following financial close of the project.

Although some aspects of the VFM assessment may change over time, for example because of changes in financial markets or updated project information, it is expected that the overall result – indicating that DBFOM provides the best VFM – will remain consistent.

6. Project Term

The VFM analysis considered the optimal length of the project term, which is the term of the contract with the private sector – 15, 25, or 30 years. The analysis indicated that, for the DBFOM option, a 30-year project term is optimal because it allows the Region to best transfer risks related to long-term lifecycle maintenance. In other words, the 30-year term best provides incentive to the private sector to build the system to last, because the private sector takes responsibility for maintaining and operating the system for 30 years.

However, the Region must also consider operational and expansion flexibility in the long term. Staff have identified that the DBFOM option may constrain the choices for LRT integration with Grand River Transit and for who would maintain and/or operate Stage 2 LRT. In addition, the public has raised concerns about the private sector operating the LRT system and providing poor service compared to a system operated by Regional staff, about the Region being able to control operations, about the Region being locked into a long-term operations contract, and about potential service disruptions because of labour issues.

The public concerns are mitigated by the Finance component of the DBFOM option because the private sector would be paid based on its performance. The Region receives the fare revenue and the private sector is paid for its operations and maintenance and its financial investment based on the performance standards in the contract. If the private sector does not perform to the standards set in the contract, it does not get paid. For example, this would provide a strong incentive for the private sector to avoid a lengthy labour/service disruption.

In addition, the above concerns may be mitigated by carving out separate, short-term operating agreements with the private sector (5-10 years), such that a new operator can be competitively procured at an appropriate time to operate the system. For example, Operations could be brought into the DBFOM contract starting with 10 years with 5 years renewable, giving the ability to terminate the Operations contract after 10 years but keeping the option to continue the Operations contract for up to 30 years. The Region may also retain the right to terminate the operations services under the main DBFOM agreement, for example with one year's notice, and procure a new operator for the system. There may be a number of options available to the Region to best balance the benefits of DBFOM, while maintaining operating flexibility. Staff will review and evaluate these further and report back to Council.

7. Recommended Procurement and Delivery Option

Staff recommend DBFOM as the procurement and delivery option for Stage 1 LRT, with a 30-year project term for the long-term Finance and Maintain components, subject to confirmation by the provincial and federal governments that they will maintain their rapid transit funding commitments with the DBFOM option (currently provincial and federal staff have indicated that use of a DBFOM option would not jeopardize the funding). Staff propose to report back to Council with initial and

renewable project terms for the Operate component of the procurement and delivery option, to balance the benefits of DBFOM with operational and expansion flexibility.

During the DBFOM procurement process, the shortlisted DBFOM teams would each generate designs to meet the requirements of the Region, and each provide a DBFOM proposal with a fixed price to design and construct and then operate and maintain the Stage 1 LRT for the project term. The successful DBFOM team would complete the preliminary and detail design and the construction followed by operation and maintenance, in an integrated process. The Region would withhold a portion of construction payments and pay the private sector for this withheld payment in installments over the project term, subject to compliance with performance and availability specifications. A private sector lender would be required to provide short-term financing during construction and long-term financing for withheld payments over the project term. The DBFOM team would be responsible for lifecycle costs (major capital refurbishment) during the project term.

With DBFOM, over the length of the project term, a private company would:

- Design: complete detailed LRT design drawings and plans;
- Build: build LRT;
- Finance: obtain financing to pay its employees and other costs in advance of the Region's installment payments. The Region would withhold part of the construction payment to the private company and pay it in installments when the contract requirements are met by the private company over the project term;
- Operate: manage the day-to-day operations of LRT, including supplying the operators to drive the light rail vehicles, keeping to the Region's service schedule; and
- Maintain: look after LRT repairs and upkeep, including tracks and vehicles.

With DBFOM, the Region would:

- Own the LRT system;
- Set LRT fare prices and service schedules;
- Be responsible for customer service and addressing customer issues;
- Receive the fare revenue, which would offset the cost of the Region's transit system;
- Continue to operate bus service through Grand River Transit. More bus drivers will be needed because of the Region's approved plan to expand the transit network; and
- When the project term ends, assume operations and maintenance, or extend the contract of the current private company, or find a new private company to operate and maintain the LRT system.

The DBFOM option offers the following:

- cost: Over the project term, the DBFOM option would cost less than the other procurement and delivery options. LRT design and construction could proceed at the same time, with significant time savings, better coordination and more efficient construction. The private company would have to deal with competitive pressure and answer to their lenders, so they would be inclined to provide a better value and a lower total project cost ensuring that the project is on time and on budget;
- funding contributions: Use of the DBFOM option would be subject to confirmation by the provincial and federal governments that they will maintain their rapid transit funding commitments with the DBFOM option (currently provincial and federal staff have indicated that use of a DBFOM option would not jeopardize the funding);
- experience: The private sector has more experience than the Region in designing and constructing an LRT system. They also have more experience with operating and

maintaining an LRT system at start-up, and with providing trained and certified staff to operate the light rail vehicles;

- incentives: Payments and penalties based on performance would provide incentive for the private sector to complete the project on time and on budget. The payments and penalties would also apply to performance standards for operating and maintaining a high-quality LRT system over the long term. If the private company does not perform to the standards set in the contract, it would not get paid;
- risks: The Region would limit its risk by placing responsibility on the private sector. The Region monitors the service and holds back payments if the private company does not meet the contract performance standards. The DBFOM option would provide better accountability where performance may be related to either maintenance or operation because the same company would be responsible for both. Risks during commissioning, start up and initial operations and maintenance are significant and would be transferred to the private sector. DBFOM would also transfer lifecycle risks such as major vehicle and track maintenance to the private company. The Region would be responsible for those risks that it is best able to manage, such as fare setting and ridership risk; and
- flexibility: The DBFOM option may constrain the choices for LRT integration with Grand River Transit and for who would maintain and/or operate Stage 2 LRT and for general ongoing operation of the LRT. This may be mitigated by carving out separate, short-term operating agreements with the private DBFOM team (5-10 years), such that a new operator can be competitively procured at an appropriate time to operate the system. This would provide some certainty for the private DBFOM team on the length of the operating agreement and would allow the Region to review and implement different operations at shorter intervals. The Region may also retain the right to terminate the operations services under the main DBFOM agreement, and procure a new operator for the system or assume direct responsibility for the operations activities with Regional staff.

It should be noted that the Region has previously contracted out operations and maintenance to the private sector. The Region has successfully contracted out operations and maintenance of garbage and recycling collection, recycling sorting, and wastewater treatment plants. The Region retains ownership of facilities, sets user rates, establishes service and performance standards, and is responsible for customer service and addressing customer issues.

Appendix D contains questions raised by the public and answers to those questions, with respect to the recommended DBFOM procurement and delivery option for LRT.

8. Next Steps in the Rapid Transit Project

Implementation of the rapid transit project is being done on an aggressive schedule. There are a number of key decision points and major milestones that will have to be met to maintain the schedule. Adherence to the aggressive project schedule is critical because delays to the project schedule have the potential to result in scope creep and increased costs. Staff anticipate that the next steps in the rapid transit project will include:

- February 2012: report on a memorandum of understanding with Infrastructure Ontario;
- February 2012: report on a preferred general engineering consultant;
- March 2012: begin aBRT design;
- May 2012: complete the TPA for Stage 1;
- June 2012: finalize funding agreements with federal and provincial governments;
- June 2012: begin aBRT construction;
- October 2012: issue request for qualifications from potential DBFOM teams;
- February 2013: shortlist qualified DBFOM teams;
- February 2013: complete performance specifications and a draft project agreement;

- March 2013: issue request for proposals from shortlisted DBFOM teams;
- January 2014: evaluate and select preferred DBFOM team;
- May 2014: approve final agreement with the preferred DBFOM team;
- 2014: full implementation of aBRT;
- 2014: begin construction of LRT Stage 1;
- 2014: begin the TPA for LRT Stage 2; and
- 2017: complete construction and begin operation of LRT Stage 1.

CORPORATE STRATEGIC PLAN:

The report supports Focus Area 3.1 of Council's Strategic Focus: Develop an implementation plan for light rail transit including corridor and station area planning.

FINANCIAL IMPLICATIONS:

The capital cost of Stage 1 of the rapid transit project is estimated to be $818 million, in 2014 dollars. The Region's portion of the capital cost is $253 million. On June 15, 2011, Council approved the funding for the Region's portion of the Stage 1 capital costs, subject to annual budget deliberations.

OTHER DEPARTMENT CONSULTATIONS/CONCURRENCE:

This report was prepared with input from Finance, from Planning, Housing and Community Services, from Transportation and Environmental Services, from Corporate Resources and from Human Resources.

ATTACHMENTS:

Appendix A – Comparison of Procurement and Delivery Options
Appendix B – Waterloo Light Rail Transit Project Analysis of Alternative Procurement Approaches
Appendix C – RT Initiative Risk Workshop Final Report – Detailed LRT Results
Appendix D – Questions and Answers Regarding Procurement and Delivery of Light Rail Transit

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APPROVED BY: *Thomas Schmidt*, Commissioner, Transportation and Environmental Services

Appendix A

Comparison of Procurement and Delivery Options

The most likely options for the procurement and delivery of the rapid transit project include:

- Design Bid Build (DBB);
- Design Build (DB);
- Design Build finance (DBf);
- Design Build Operate Maintain (DBOM);
- Design Build Finance Maintain (DBFM); and
- Design Build Finance Operate Maintain (DBFOM).

The procurement and delivery options are compared in a stepwise fashion starting with DBB and ending with DBFOM because each option contains all of the pros and cons of the previous option plus a step of added features.

DB compared to DBB:

Cons:

- The Region has less control over the design process.

Pros:

- The private sector has more experience than the Region in designing and constructing a light rail transit (LRT) system.
- Combines design with construction. Design and construction can proceed at the same time, with significant time savings.
- Coordination efficiencies provide strong incentives for the private sector to design an LRT system that can be constructed efficiently.
- Less risk of implementing a less-than-optimal project.
- Less risk of change orders during construction because of design coordination issues.
- Lower net present value of Regional capital, operating and maintenance costs when the Region's retained risks are included.

DBOM compared to DB:

Cons:

- Choices for who would maintain and/or operate any LRT expansion and choices for LRT integration with Grand River Transit would be impacted by private sector operation and maintenance of the first stage of the LRT system.

Pros:

- Provides for consideration of operations and maintenance costs during design and construction, which can introduce greater opportunities for cost savings through innovation, because the contractor will be responsible for operations and maintenance.
- Under a contract with defined performance standards, helps to ensure better initial construction quality and superior vehicle and system reliability.
- Transfers operations and maintenance risk to a corporate counterpart secured by a letter of credit and/or bonding, each of which is priced based on the annual fee.
- The private sector has more experience than the Region in maintaining and operating an LRT system at start-up.
- Greater experience to provide trained and certified staff to operate vehicles. Particularly for a small LRT system, it can be difficult to draw transit operators because it will be a smaller pool of operators and harder to schedule time off.

DBf compared to DB: All of the pros and cons of DB plus:

Cons:

- Higher capital cost to the Region because of risk transfer security in the form of the cost of private short-term financing during the construction period because the private sector's borrowing costs are higher than the Region's. The costs of short-term private financing may be mitigated by providing milestone payments during construction.

Pros:

- Less risk to the Region in design, procurement and construction because of higher discipline and up-front due diligence because of private sector financial risks. Less risk of ambiguities in the project legal documents that could lead to disagreements at a later stage.
- Full co-ordination and control by the private sector results in less risk of change orders because change orders are difficult to get in public-private partnerships (e.g. requires approval of lender and Region).
- Less risk of construction contractor defaults because, in public-private partnerships, the private sector (project equity sponsor and/or the lender) is responsible to replace the construction contractor.
- Strong incentive for the private sector to complete construction on schedule because of deferment of payment until completion of construction or major milestones.
- Lower net present value of Regional capital, operating and maintenance costs when the Region's retained risks are included.

DBFM compared to DBf: All of the pros and cons of DBf plus:

Cons:

- Highest capital cost to the Region because of the cost of private long-term financing during the term of the project.
- Choices for who would maintain any LRT expansion would be impacted by private sector maintenance of the first stage of the LRT system.
- May cause integration issues between maintenance and operational components.

Pros:

- The financing component gives strength to the contractual obligations; the contractor is less likely to default on their contractual obligations if the project goes poorly.
- Strong incentives for on-time and on-budget delivery, because late delivery results in higher financing costs and erodes private sector returns;
- Liquid performance security in the form of deferred payment;
- Long-term capital providers will monitor private sector performance. The lender is introduced between the equity sponsor (e.g. builder) and the Region and many of the lender's interests are aligned with those of the Region.
- Fixed maintenance costs for the term of the project, which are locked in during the bid process and require the consideration of lifecycle cost efficiencies as part of the design build process.
- The private sector has more experience than the Region in maintaining an LRT system at start-up.
- The longer project term (25 to 30 years) introduces a strong incentive for the private sector to meet maintenance standards through payments and penalties based on system performance and availability and introducing opportunities for innovation, and result in an LRT system in good working condition at the end of the project term.
- Lower net present value of Regional capital, operating and maintenance costs when the Region's retained risks are included.
- During the procurement process, the shortlisted bidding construction contractors would each generate complete designs, each meeting the requirements of the Region, but each likely reflecting a different approach or innovation on the project. This would provide the Region with some flexibility in evaluating the bids, other than lowest cost of construction, because

these innovations would be reflected in the project cost (construction and maintenance costs).

DBFOM compared to DBFM: All of the pros and cons of DBFM plus:

Cons:

- Choices for LRT integration with Grand River Transit and for who would operate any LRT expansion would be impacted by private sector operation of the first stage of the LRT system.

Pros:

- The private sector has more experience than the Region in operating an LRT system at start-up.
- Greater experience to provide trained and certified staff to operate vehicles. Particularly for a small LRT system, it can be difficult to draw transit operators because it will be a smaller pool of operators and harder to schedule time off.
- Strong incentive for the private sector to meet operational service standards through payments and penalties based on system performance and availability.
- Better accountability where performance and availability issues may be related to either maintenance or operation (no integration issues between operations and maintenance).
- Greater long-term asset quality.
- Lowest net present value of Regional capital, operating and maintenance costs when the Region's retained risks are included.
- Design innovations would be reflected in the total project cost (construction, operation and maintenance).

Project term:

The options that include long-term financing (DBFM and DBFOM) have a project term that defines the length of period over which the project is financed by the private sector. The project term could range from 15 to 25 or 30 years. The impacts of the project term include:

- The capital cost to the Region increases with the length of the project term because of the cost of private long-term financing over that term.
- Maintenance risk is reduced with a longer project term. A longer project term of 30 years more than covers one full lifecycle so that significant rehabilitation and replacement occurs within the project term. The 25-year lifecycle includes major capital refurbishment, including the full rehabilitation of civil infrastructure, vehicles and systems.
- A longer finance period results in a lower net present value of Regional capital, operating and maintenance costs when the Region's retained risks are included, principally because of the transfer of lifecycle risks.

Appendix B

Waterloo Light Rail Transit Project
Analysis of Alternative Procurement Approaches

Deloitte.

Waterloo Light Rail Transit Project

Analysis of Alternative Procurement Approaches

January 2012

Background

In June 2003, Regional Council unanimously adopted the Regional Growth Management Strategy (RGMS), a long-term strategic framework that identifies where, when and how future residential and employment growth will be accommodated. The RGMS identified rapid transit as one of the key catalysts to support downtown revitalization and control urban sprawl in the region. Following completion of technical studies and initiation of the Rapid Transit Environmental Assessment, in June of 2009 Regional Council approved light rail transit (LRT) as the preferred technology for a rapid transit system for the Region of Waterloo.

Regional staff carried out a review of 11 rapid transit implementation options, which included study of various technology, route, and phasing alternatives, as well as extensive public input. Staff presented a recommended rapid transit implementation option to Regional Council on June 15, 2011, which included as its first stage 19 km of LRT from Conestoga Mall to Fairview Park Mall and 17 km of adapted bus rapid transit (aBRT) from Fairview Park Mall to the Ainslie Street Terminal. Regional Council approved this implementation option and directed staff to complete an evaluation of project procurement and delivery options, including the role of Infrastructure Ontario (IO), with the goals of maximizing project innovation and quality, leveraging private sector expertise, and managing risks to the Region of Waterloo and taxpayers.

Accordingly, Regional staff have reviewed a spectrum of project procurement and delivery options ("options" or "models") for the LRT project, many of which can be described as public-private partnership approaches. Each option embodies a different allocation of roles and responsibilities between the public and private sectors for delivery of the system. The options being considered are: Design-Bid-Build (DBB), Design-Build (DB), Design-Build-finance (DBf), Design-Build-Operate-Maintain (DBOM), Design-Build-Finance-Maintain (DBFM) and Design-Build-Finance-Operate-Maintain (DBFOM). Staff have considered and evaluated the risks and benefits associated with the various options, and have identified Design-Build-Finance-Operate-Maintain (DBFOM) as the preliminary preferred option. Staff plan to present a report to the Planning and Works Committee recommending DBFOM as the preferred option, in February 2012.

Staff has also determined that implementation of the DBFOM option will require the Region to engage assistance to provide procurement coordination and transaction management services. Staff discussions with IO have confirmed that IO is interested in having a role with respect to the procurement of the Region's LRT project. Pending successful negotiations with IO, staff will bring a report to the Planning and Works Committee in early 2012 for Council approval of a Memorandum of Understanding to engage IO.

The purpose of this report is to provide additional background on public-private partnership approaches to infrastructure development. In particular, this report will focus on the project procurement and delivery options reviewed by the Region, specifically DBFOM, and will illustrate the value that the DBFOM approach is expected to bring to the Region.

Overview of Public-Private Partnership (PPP) and Alternative Financing and Procurement (AFP) Models

The term "public-private partnership" or PPP is a general term used to describe an approach to the procurement and delivery of a public infrastructure project that involves the private sector assuming a major portion of the risks relating to the project and often providing financing for the capital costs of the project. In Ontario, the term "Alternative Financing and Procurement" (AFP) is used to describe a group of specific procurement and delivery models used in the Province of Ontario that are based on PPP concepts, including transfer of risk to the private sector and use of private sector project finance. The AFP models maintain public ownership and control of infrastructure at all times. The specific procurement and delivery models used in the Province of

Ontario's AFP program include DBf, DBFM, and DBFOM.

Regional staff are considering IO as procurement lead. Accordingly, this report will focus primarily on the AFP models implemented by IO.

The AFP approach typically involves a performance-based contract for procuring public infrastructure, where a single private contractor assumes a major share of the responsibility and risks related to the delivery and the performance of the infrastructure. Two key principles of AFP are: (1) to only pay for services upon satisfactory completion of the work, which then requires the private contractor to finance a portion of the capital costs of the project; and (2) to have the private contractor assume long-term responsibility for the maintenance of the project, where suitable.

Within the context of the Region's LRT project, the following attributes should be noted:

- The AFP approach is **not privatization**. The LRT will be **owned and controlled by the Region at all times**.
- The private contractor is required to develop and maintain infrastructure in accordance with a detailed specification issued by the public sector authority, which defines the service level that must be met for payment. The Region will maintain control over how the services are delivered.
- The Region retains control over policy decisions. In the context of the LRT project, the AFP structure contemplated by the Region means that **the Region will set the LRT schedule, route, and fares**.
- The Region, like almost any public authority in Canada, commonly relies on private sector contractors to design, construct, operate and/or maintain infrastructure1. The AFP approach merely bundles many or all of these functions with a single private contractor, under a single long-term contract.
- The AFP approach contemplated by the Region is "availability-based", meaning that the Region pays the private contractor a fixed amount for making the LRT service available for use by passengers in compliance with the service standards set by the Region. **The Region will be entitled to all fare revenue**.

Why AFP?

The AFP model should provide enhanced incentives for the private contractor to complete the LRT project on time and on budget, and to maintain the project to a high standard over the long term. Some of the key characteristics of this model are as follows:

Key Component of AFP	**Attributes**
Fixed Prices and Cost Certainty	• AFP contracts are fixed price contracts where private contractor is responsible for cost overruns. • The Region can use the AFP model to "lock in" its project costs for design and construction, as well as for maintenance and operations for the project term.

1 It is recognized that the Region operates and maintains the bus system. However, the Region does not have experience operating and maintaining a light rail system.

Accountability	• Design, construction, operations and maintenance are contracted to one provider who is responsible for overall delivery of the project throughout its life cycle. • Reduce or eliminate “finger-pointing” between different contractors and the Region.
“Built to Last”	• The private contractor is responsible for long-term asset performance and therefore has incentive to design, construct, and plan based on a “full lifecycle” view of the infrastructure.
Pay for Performance	• The private contractor is paid only upon performance. • Payment from the Region is withheld until completion of the construction or key milestones. • A portion of construction costs (usually at least 25%) is withheld and paid to the private contractor over the length of the operations and maintenance term. • During the term of the project, the private contractor’s payment is contingent on meeting defined performance standards. The withheld construction payment is used to secure performance, as poor performance can result in lower payments and potentially default.
Innovation	• The private contractor is responsible for asset performance over a long-term period and therefore the Region can provide greater latitude for design innovation that considers efficiencies during operations.
Alignment of Incentives	• The portion of construction costs that are withheld introduces a gap between when costs are incurred and re-paid. The private contractor must obtain financing to bridge the gap. This financing is sourced through private capital markets – debt and equity providers. • The private contractor’s liabilities to debt and equity providers help to enhance its commitment to the project. The only way the contractor can get the funds to repay its liabilities is by earning the annual payments through constructing and maintaining the project in accordance with the contractual performance requirements. • The debt and equity funders know that they will only be repaid if the project is successfully constructed and maintained. Therefore, they will conduct extensive “due diligence” on the ability of the contractor to design, construct, and maintain the project and will provide additional, thorough scrutiny of the project. • The interests of the debt and equity providers are aligned with the Region’s – to ensure that a constant level of performance is met over the lifecycle.

Where has the AFP model been used?

The AFP and related PPP models are widely used in Canada, as well as in other jurisdictions such as the United States, United Kingdom, Australia, and continental Europe. A scan of the Canadian market alone shows that in the years 2009-2011, there were 57 AFP or PPP projects in procurement, in infrastructure classes such as hospitals, healthcare, transportation, and justice. This includes the Waterloo Region Consolidated Courthouse (procured by IO using the DBFM model under the AFP program), currently under construction.

AFP and related PPP models have also been successfully implemented in the transit sector. The chart below provides selected examples of North American and global use of this model.

Project Name and Jurisdiction	Procurement Model	Result
Canada Line (British Columbia)	Design-Build-Finance-Operate-Maintain	• The system was completed and put into service in late 2009, three months ahead of due date. It has been acclaimed as a resounding success.
Hudson-Bergen Light Rail Transit Line	Design-Build-Operate-Maintain	• The construction was completed on schedule. • System has been in service for approximately 15 years, meeting or exceeding contractual performance targets each year.
Denver Eagle Light Rail	Design-Build-Finance-Operate-Maintain	• A private sector contractor was selected in summer 2010 and the project is currently under construction.
Air Rail Link (Toronto)	Design-Build-Finance – AFP program	• A private sector contractor was selected and construction will begin in early 2012.
Evergreen Line (British Columbia)	Design-Build-Finance	• Project is currently in procurement with three internationally-qualified bidders.
Ottawa Light Rail Transit	Design-Build-Finance-Maintain – AFP program	• Project is currently in procurement with three internationally-qualified bidders.
United Kingdom – Numerous projects	Design-Build-Finance-Maintain and Design-Build-Finance-Operate-Maintain	• Examples of projects that have been completed and are in operation include Nottingham Light Rail Phase 1 and Phase 2, Docklands Light Rail, and Manchester Metrolink.
Australia – Gold Coast Light Rail	Design-Build-Finance-Operate-Maintain	• A private sector contractor was selected in fall 2010 and the project is currently under construction.

Approach to Selection of Project Delivery Model

As directed by Council, Regional staff have closely examined several different project procurement and delivery options ("options", or "delivery models"), including AFP models, other PPP models that are not part of the Province's AFP program, as well as traditional procurement options that are not considered to be AFP or PPP approaches. These options were set out in the staff report to Council dated December 6th:

Option	Type of Option
Design-Bid-Build (DBB)	Traditional procurement
Design-Build (DB)	Variant of traditional procurement
Design-Build-Finance (DBf)	Part of AFP program
Design-Build-Operate-Maintain (DBOM)	Type of PPP – not used in AFP program
Design-Build-Finance-Maintain (DBFM)	Part of AFP program
Design-Build-Finance-Operate-Maintain (DBFOM)	Part of AFP program

The table below summarizes these delivery models by demarcating which risks and responsibilities are transferred to the private contractor, under each option.

	DBB	DB	DBOM	DBf	DBFM	DBFOM
Preliminary design		X	X	X	X	X
Detail design		X	X	X	X	X
Design and construction co-ordination		X	X	X	X	X
Construction	X	X	X	X	X	X
Maintenance			X		X	X
Lifecycle (major capital refurbishment)					X	X
Operations			X			X
Operation and maintenance integration			X			X
Short-term financing during construction				X	X	X
Long-term financing					X	X

The December 6th Council report identified DBFOM as the preliminary preferred delivery model, based on comparative analysis of several criteria including: project cost, senior government funding, Region experience, incentives for innovation and performance, transfer of appropriate risks, and flexibility. The table below summarizes the analysis that supports the recommendation of the DBFOM delivery model. In short, the DBFOM delivery model would allow the Region to transfer design, construction, maintenance and operations risks to a single private sector contractor, place strong incentives on the contractor to complete construction on time and ensure that construction is on schedule and on budget, ensure that the system performs according to the contractual standards, benefit from private sector LRT experience, and potentially realize cost savings through innovations and competitive procurement tension. The DBFOM delivery model is part of IO's AFP program and therefore could be procured with IO under the AFP program.

Criteria	Advantages of DBFOM Delivery Model
Cost	• Integration of design and construction allows LRT design and construction to proceed at the same time, with significant time savings. • Despite the spread in the cost to privately finance the withheld construction costs as compared to public financing costs, competitive pressure and up-front due diligence by lenders would compel the private sector to optimize management and produce design, construction, operations and maintenance innovations, resulting in better value and a lower total project cost (construction, operation and maintenance). • Recent industry observations also show that, on many DBFM and DBFOM projects, competitive pressures as well as innovations introduced by private sector bidders have resulted in private sector bidders coming forward with construction costs that are significantly below the public sector's original cost estimates.
Funding Contributions	• Use of the DBFOM option will be subject to confirmation by the provincial and federal governments that they will maintain their rapid transit funding commitments with the DBFOM option. This should not be an issue as both governments have enacted polices to use AFP.
Experience	• The private sector has experience in designing and constructing an LRT system, in operating and maintaining an LRT system at start-up, and in providing trained and certified staff to operate the light rail vehicles. The Region has no experience in these areas.
Incentives	• Coordination efficiencies provide strong incentives for the private sector to design an LRT system that can be constructed, maintained and operated efficiently over the project term. This provides the private sector with significant opportunities to innovate in order to reduce costs and improve service quality. • Payments and penalties based on LRT system performance and availability would provide a strong incentive for the private sector to complete construction on schedule and to meet availability and operational service standards after construction, with greater long-term asset quality (i.e. the re-payment of the withheld portion of the construction costs that are privately financed are at risk if performance standards are not met). • By taking on financial risks, the equity sponsor and lender would have interests aligned with the Region's in monitoring contractor performance and protecting their investment.
Risk Transfer	• The DBFOM option with a 30-year term results in the lowest net present value of Regional capital, operating and

	maintenance costs when the value of the Region's retained risks are included (the DBFOM option provides the highest amount of risk transfer). • The private financing component would give strength to secure compliance with the contractual obligations with less risk of contractor default because this private capital is at risk for poor performance. • The DBFOM option would provide better accountability where performance and availability issues may be related to either maintenance or operation (no integration issues exist between operations and maintenance). It would transfer lifecycle risks to the private sector. The Region would retain those risks that it is best positioned to manage and mitigate, such as fare setting and ridership risk.
Flexibility	• The DBFOM option may constrain the choices for LRT integration with Grand River Transit and for who would maintain and/or operate Stage 2 LRT.
Cost Certainty	• The DBFOM not only provides certainty of design and construction costs; it also provides a fixed price schedule for annual maintenance, major periodic refurbishments, and operational costs over the operating term. For example, this also includes the consumption of energy needed to operate and maintain the LRT.
Lifecycle Performance Certainty	• The DBFOM contract will set performance standards for the system for the entire project term, assuring service quality over this period. • The DBFOM contract will also set a standard for system condition at the end of the project term, ensuring the system is "handed back" to the Region in good condition.

Operation of the LRT system

The recommended DBFOM delivery model results in the private contractor taking responsibility for operation of the LRT system, including supplying the crews that drive the light rail vehicles, training crews, and operating the vehicle control center. Requiring the private contractor to take responsibility of operations has the following advantages:

- The Region retains full control over setting the performance schedule (frequency of trains and operating hours), and route. The private contractor operates the trains according to the schedule set by the Region.
- The Region retains the rights to set fares and to all fare box revenue.
- Increased accountability and reduced "finger-pointing" – any deficiencies in performance standards are clearly the responsibility of the private contractor who not only designed and constructed the LRT, but is responsible for both operations and maintenance. When operations and maintenance are split between the Region and the private contractor, it may be unclear as to who is responsible for issues such as delays or wear and tear on vehicles, track, and train control systems.

- A well-qualified private contractor should have significant experience and expertise in light rail operations. Relative to this, the Region has no experience in operating a light rail system.

- Greatly streamlines and simplifies the commissioning and operational handover process. The private contractor is fully responsible for the system's on-time readiness to commence revenue service.

Requiring the private contractor to design, build, finance, maintain and operate Stage 1 of the LRT system does not significantly impact the future expansion of the system. However, the Region should ensure that only one operator runs the future integrated (Stage 1 + Stage 2) system.

Issue	Approach
Design, construction, financing, and maintenance of a future Stage 2	• Other transit systems around the world have retained a private contractor responsible for the DBFM of a Stage 1, and a separate private contractor responsible for the DBFM of Stage 2. • Therefore, while there are legal and commercial complexities, it should be possible to competitively procure the design, construction, financing and maintenance of a future Stage 2. • Stage 1 contractor can also be retained to DBFM Stage 2 based on a negotiated price – with Region in a strong negotiation position, based on threat of initiating an open procurement.
Operation of a future Stage 2	• It is usually not practical to have multiple operators on a single LRT system. When the system is expanded, typically there should only be a single operator on the integrated, expanded system • Therefore, the Region should ensure that only one operator runs the future integrated (Stage 1 + Stage 2) system.

This single-operator issue has been dealt with on many other DBFOM transit projects in the world. Typically, flexibility to accommodate future expansion under a DBFOM model has been obtained through one or more of the following approaches:

- Carving out separate, short-term operating agreements with a private contractor (5-10 years), such that a new operator can be competitively procured at an appropriate time to operate the expanded system;

- Retaining the right to terminate the operations services under the main DBFOM agreement at any time, and procure a new operator for the expanded system; and

- Requiring the private contractor to "pre-price" future Stage 2 services as part of its original bid, based on unit costs and indexed prices.

In summary, there are a variety of proven approaches to mitigating the system expansion risks associated with DBFOM. The Region, in collaboration with commercial, legal, and financial

advisors as well as IO, can develop contractual conditions that allow it to obtain the advantages of operation by a private contractor without losing significant flexibility for future system expansion.

Value for Money Analysis

The Region's analysis of project procurement and delivery models was also supported by a preliminary Value for Money (VFM) assessment of each option.

A VFM assessment is a comparison of the estimated total costs of delivering an infrastructure project using a public-private partnership project delivery model, as opposed to a "traditional" procurement method such as design-bid-build. The VFM assesses whether the procuring authority is using the procurement and project delivery method that provides taxpayers with the best overall value solution.

A key feature of a VFM assessment is that it considers not only estimated total cash outflows for a project, but also includes an adjustment for risks retained by the procuring authority under each project delivery option. The adjustment for risks retained is an expected value of future costs associated with project risks that are borne by the procuring authority under each option, based on historical data. An example would be lifecycle costs – the analysis considers that over a 30-year maintenance term, there is a reasonable probability that certain systems or civil works will require earlier-than-expected, or more-costly-than-expected, replacement or refurbishment.

Therefore, the VFM assessment brings together an analysis of project costs and project risks, for each project delivery option, compared against a baseline traditional procurement method (DBB).

Methodology

The Region has undertaken a preliminary VFM ("PVFM") assessment for each project delivery model. The PVFM assessment was carried out by the Region's external financial advisors, using standard industry methodology. Staff from the Region provided input into the PVFM assessment as required and were fully briefed as to the assumptions, methodology, and process utilized in developing the PVFM. The PVFM assessment was prepared by Deloitte.

The PVFM was developed based on preliminary cost estimates for construction, maintenance, and operations. Where required, assumptions were made regarding costs and timing for major capital replacement (lifecycle maintenance), private sector financing costs, and project capital structure (e.g. how much private financing would be required, and the timing and nature of public sector capital contributions). These assumptions were developed based on experience, observations and best practices from other LRT projects in North America.

Project risks were assessed based on an inventory of risks ("risk matrix") relevant for an LRT project, including risks relating to approvals, site conditions, design and technology, procurement, financing, construction, operations, maintenance, lifecycle maintenance, and contracting. Risks were considered in terms of their probability of occurring, their magnitude or severity if they occur, the project costs impacted by the risk, and who bears the risk (Region or private sector) under each project delivery model. The risk analysis for this project has been underway since 2008, and has included a risk workshop involving the Region, the Region's advisors, and third-party transit experts from across North America.

The preliminary cost estimates and private sector financing assumptions were used to create cash flow projections for each of the project delivery models, which estimated the net present cost to the Region of each model over a 33-year period (3 years construction plus 30 years

operations). For the purposes of the PVFM analysis, and consistent with industry methodology, design, construction, maintenance, and operations costs were assumed to be the same across all options, with the exception that a 5% to 10% risk premium was added to the design and construction costs for the DBf, DBOM, DBFM, and DBFOM options. As well, financing costs varied depending on whether each option included short term and/or long-term private financing. The resulting cash flows were discounted at a rate equal to the Region's estimated cost of borrowing. The risk matrix was used to adjust the discounted cash flows for risks retained by the Region under each model. The risk-adjusted cash flows for each model were compared against the baseline traditional procurement method (DBB), to assess whether the model provided any savings over the traditional model. Any such savings, in comparison to the estimated cost of the traditional approach, indicate that a given project delivery model provides "value for money".

As noted, the PVFM analysis at this stage is preliminary in nature. As the project progresses and further information becomes available, the PVFM analysis will be continually updated to ensure that the selected project delivery model continues to provide value to the Region.

Results

The results of the PVFM developed for the Region's LRT project supports the selection of DBFOM as the preliminary preferred project delivery option. The PVFM indicates that DBFOM provides the Region with the best risk-adjusted value. The DBFOM model provides the Region with estimated savings of approximately 18%, when compared with the "baseline" design-bid-build model. The Region's financial advisor has confirmed that the results of the PVFM assessment are logical, and in line with VFM results for other comparable projects in Canada.

The summary results are set out below.

	DB	DBf	DBOM	DBFM	DBFOM
Estimated Savings (%) compared to Design-Bid-Build option	**5%**	**9%**	**10%**	**16%**	**18%**
Risks Retained by Region ($Million) over 30-year period of comparison	728	597	622	318	274

Analysis of Results

The following observations were drawn from the PVFM analysis and provide background and explanation for the results.

- **Bundling Design and Construction:** Under all of the project delivery models studied, the Region obtains some incremental value over the baseline DBB, by "bundling" together design and construction responsibility and transferring these risks to the private sector. Bundling together different functions and delegating them to a single private sector counterparty creates value because it increases accountability and transfers all risks associated with the interface between the bundled functions. For example, bundling design and construction together transfers the risks relating to design errors that lead to construction cost increases. Therefore, the PVFM risk assessment for project delivery models that include bundling of design and construction (all models) demonstrated that the Region obtained value by transferring design and construction risks.

- **Withholding Payment Until Construction is Complete.** Another way in which the Region can obtain value is by withholding payment until completion and requiring the private sector to finance a portion of the project (short-term financing, abbreviated as “f”). In other words, under this model, the Region does not pay until the system is complete. This creates very strong incentives for on-time completion, and also provides a strong third-party oversight factor as lenders who finance the project carry out extensive due diligence and monitoring to ensure that completion, which triggers the funds for their repayment, is assured. Therefore, the PVFM risk assessment for project delivery models that withhold payment until completion (DBf) reflects these incentives to complete on time and the diligence brought by third parties, through reduced design and construction risks borne by the Region.

- **Bundling Design and Construction with Maintenance:** Under project delivery models such as DBOM, DBFM, and DBFOM, the Region bundles together design, construction, and long-term maintenance responsibility and transfers these roles to a single private sector counterparty. The private sector is responsible for the full lifecycle performance of the system (vehicles, systems, track, and civil works) and should have strong incentives to design and construct the system to perform at an optimal level over the length of the contractual term. The PVFM risk assessment for these project delivery models reflects transfer of maintenance and lifecycle risks to the private sector.

- **Long-Term Capital Repayment:** Under the DBFM and DBFOM models, the Region withholds some payment during construction (long-term financing, abbreviated as “F”), requiring the private sector to finance a portion of the capital costs of the project. These costs are repaid by the Region in installments over the operations and maintenance term of the project (“capital payment”), contingent on the proper performance of the system. This results in the private sector having capital at risk over the full lifecycle of the project, providing even stronger incentives to design and construct the system for optimal performance over the long term. As well, third-party lenders will provide diligence and oversight until capital is fully repaid, resulting in strong third-party oversight throughout the operations and maintenance term. For example, lenders will monitor asset condition and adherence to lifecycle maintenance plans, because their capital is at risk if performance standards are not met. Therefore, the PVFM risk assessment for these project delivery models reflects not only transfer of maintenance and lifecycle risks to the private sector, but securing of performance through long-term private capital.

- The DBOM option lacks the full maintenance and lifecycle maintenance risk transfer benefits associated with the DBFM and DBFOM options, because under the DBOM option there is no private capital at risk during the maintenance term – therefore less due diligence and third-party oversight on lifecycle planning and deferred maintenance, risk transfer is less secured because there is no “skin in the game” during maintenance, and hand-back becomes a significant risk due to lack of liquid security at this critical point.The DBOM option provides less value than the long-term private capital options (DBFM and DBFOM).

- **Integration of Operations and Maintenance:** The DBFOM model provides incremental risk transfer benefits over the DBFM model because the private sector bears operational risks. As well, the private sector both operates and maintains the system, and therefore the Region is not exposed to risks relating to the interface between operations and maintenance. The DBOM model also integrates operations and maintenance.

The PVFM analysis also considered the optimal length of the term of any contract with a private sector (“Project Term”) – 15, 25, or 30 years. The analysis indicated that, for the DBFOM option, a 30-year Project Term is optimal because it allows the Region to best transfer risks related to long-term lifecycle maintenance. In other words, the 30-year term provides the best incentive for

the private sector to build the system to last, because the private sector will take responsibility for maintaining and operating the system for 30 years.

Updating the VFM

The VFM assessment will be re-run, in accordance with standard industry practice, at critical points during the project procurement in order to re-confirm the results and ensure that the chosen delivery option still provides value for money. This approach ensures that the project only proceeds under the chosen delivery option if value is obtained. These points in time generally include:

- Prior to release of the Request for Qualifications;
- Prior to release of the Request for Proposals;
- Immediately prior to bid submission;
- Prior to selecting a preferred bidder; and
- Following financial close of the project.

Although some aspects of the VFM assessment may change over time, for example due to changes in financial markets or updated project information, it is expected that the overall result – indicating that DBFOM provides the best value for money – will remain consistent.

Conclusions

As directed by Council, Regional staff have examined a wide range of project procurement and delivery models for the LRT project, including traditional models, AFP models, and other PPP-type models. Based on this analysis, the DBFOM model is the optimal model for the Region's LRT project. Among other things, the DBFOM model: transfers the most risk to the private contractor; allows the most scope for innovation; leverages the private sector's comparatively greater expertise in LRT operations; encourages better asset quality through a full lifecycle approach to design, construction and maintenance; and results in an alignment of interests between the Region and private sector project finance providers. As well, the form of DBFOM model which is commonly implemented in Canada would maintain full public ownership and control of the LRT system at all times. The PVFM assessment carried out by the Region's financial advisors supports this analysis and demonstrates that the expected value to the Region from the DBFOM model outweighs additional costs associated with private financing.

Appendix C

RT Initiative Risk Workshop Final Report – Detailed LRT Results

Risk Assessment – Results for Option 1

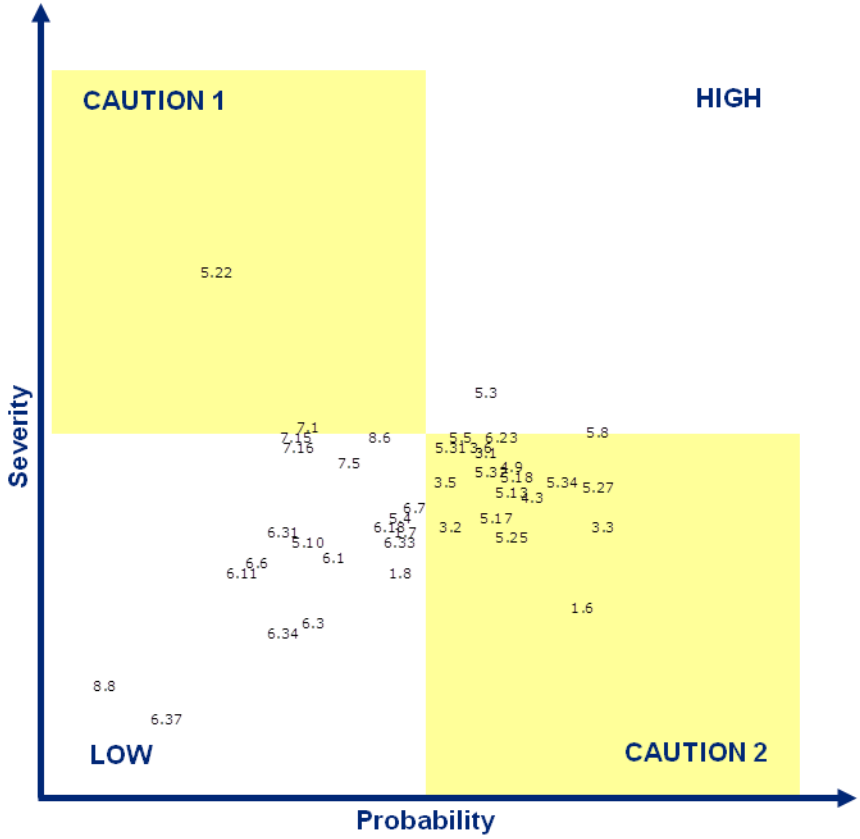
Traditional Delivery – Design, Bid, Build

CAUTION 1
- 5.22 Construction Contractor Default
- 7.1 Lifecycle Maintenance Performance

HIGH
- 5.3 Vehicle Procurement Process
- 5.8 Construction Delays

LOW
- 1.7 Station Area Planning
- 1.8 Parking Policy
- 5.4 Scope changes
- 5.10 Failure to Build to Design or Quality Level
- 6.1 Fare Setting Policies
- 6.6 Service Integration and Planning
- 6.7 Ridership
- 6.11 Crewing, Dispatching and Cleaning
- 6.18 General Strike
- 6.3 Public Satisfaction
- 6.31 Business Operations
- 6.33 Unanticipated Operating Costs
- 6.34 Marketing
- 6.37 Operation of the Vehicle/Rail/Communications/Catenary
- 7.5 LC Maintenance Costs
- 7.15 Track Maintenance
- 7.16 Vehicle Maintenance
- 8.6 Project Management Team Experience
- 8.8 Default of Operating Contractor

CAUTION 2
- 1.6 Injurious Affection
- 3.1 Land Acquisition
- 3.2 Agency Approvals
- 3.3 Utility Relocations
- 3.5 Geotechnical
- 3.6 Site Environmental Conditions
- 4.3 Change in Design Specifications
- 4.9 Infrastructure Design
- 5.5 Vehicle Delivery
- 5.13 Construction Cost
- 5.17 Resource Availability
- 5.18 Labour Availability
- 5.25 Scope Changes
- 5.27 Design Co-Ordination/Completion
- 5.31 Time Risk
- 5.32 Inflation Risk
- 5.34 Utility Relocation
- 6.23 Utility and Fuel Price Inflation



Summary:
High Risk – 2
Caution – 20
Low Risk - 19

Risk Assessment –
Results for Option 2

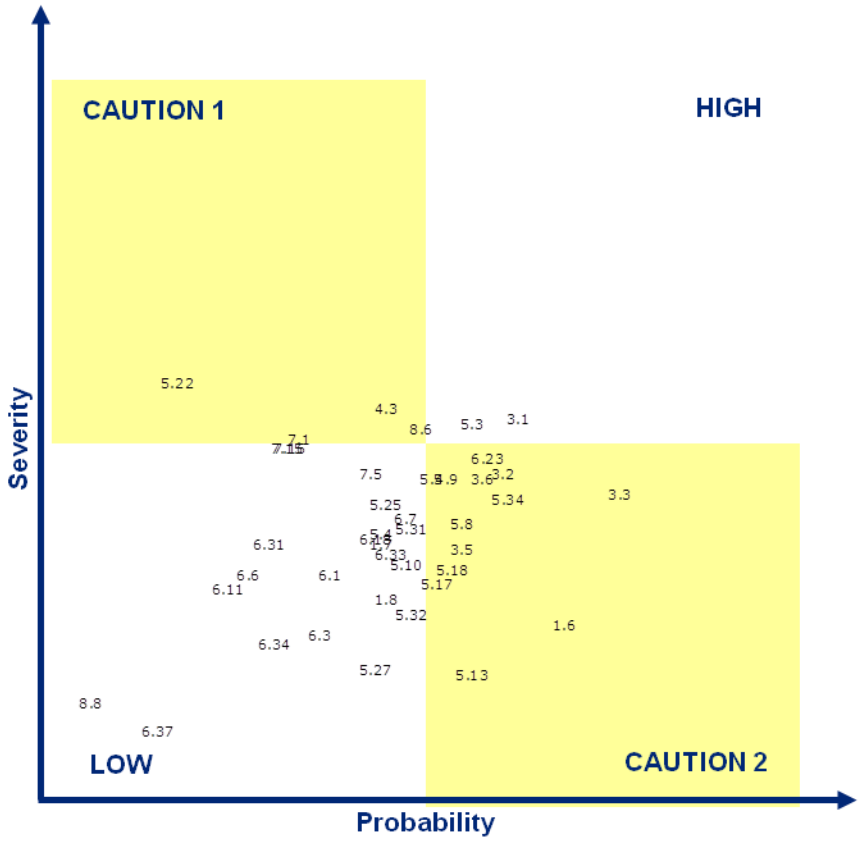
Design Build

CAUTION 1
- 4.3 Change in Design Specifications
- 5.22 Construction Contractor Default
- 7.1 Lifecycle Maintenance Performance
- 8.6 Project Management Team Experience

HIGH
- 3.1 Land Acquisition
- 5.3 Vehicle Procurement Process

LOW
- 1.7 Station Area Planning
- 1.8 Parking Policy
- 5.4 Scope changes
- 5.10 Failure to Build to Design or Quality
- 5.25 Scope Changes
- 5.27 Design Co-Ordination
- 5.31 Time Risk
- 5.32 Inflation Risk
- 6.1 Fare Setting Policies
- 6.6 Service Integration and Planning
- 6.7 Ridership
- 6.11 Crewing, Dispatching and Cleaning
- 6.18 General Strike
- 6.3 Public Satisfaction
- 6.31 Business Operations
- 6.33 Unanticipated Operating Costs
- 6.34 Marketing
- 6.37 Operation of the Vehicle/Rail/Communications/Catenary
- 7.5 Lifecycle Maintenance Costs
- 7.15 Track Maintenance
- 7.16 Vehicle Maintenance
- 8.8 Default of Operating Contractor

CAUTION 2
- 1.6 Injurious Affection
- 3.2 Agency Approvals
- 3.3 Utility Relocations
- 3.5 Geotechnical
- 3.6 Site Environmental Conditions
- 4.9 Infrastructure Design
- 5.5 Vehicle Delivery
- 5.8 Construction Delays
- 5.13 Construction Cost
- 5.17 Resource Availability
- 5.18 Labour Availability
- 5.34 Utility Relocation
- 6.23 Utility and Fuel Price Inflation



Summary: High Risk – 2
Caution – 17
Low Risk – 22

Risk Assessment –
Results for Option 3

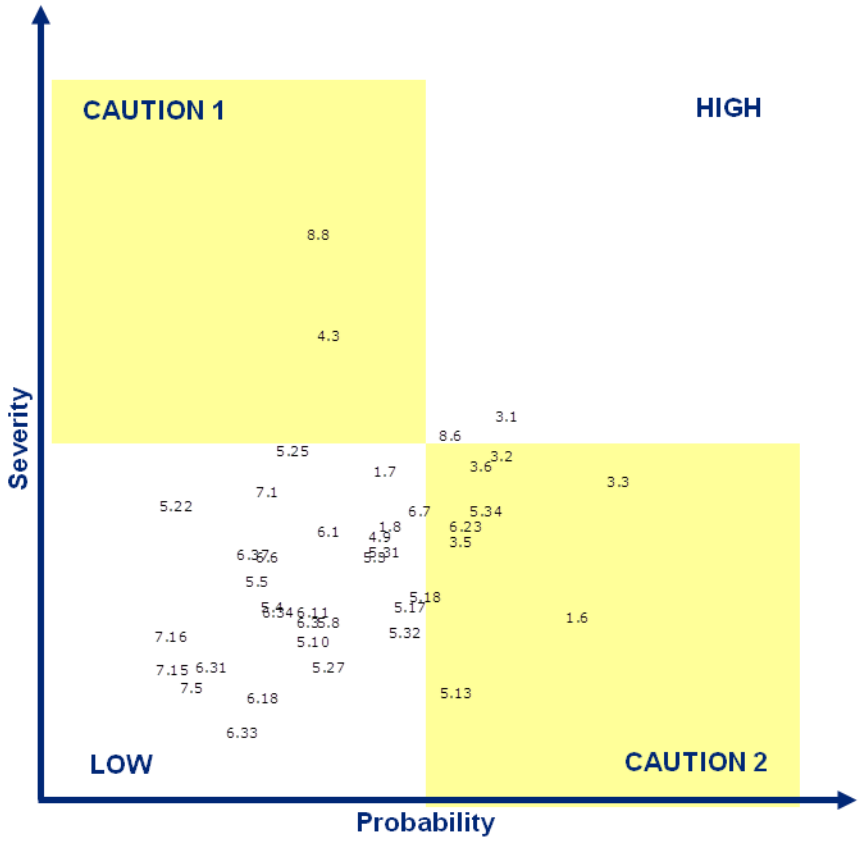
Design Build Operate Maintain (DBOM)

CAUTION 1
- 4.3 Change in Design Specifications
- 8.8 Default of Operating Contractor

HIGH
- 3.1 Land Acquisition
- 8.6 Project Management Team Experience

LOW
- 1.7 Station Area Planning
- 1.8 Parking Policy
- 4.9 Infrastructure Design
- 5.3 Vehicle Procurement Process
- 5.4 Scope changes
- 5.5 Vehicle Delivery
- 5.8 Construction Delays
- 5.10 Failure to Build to Design or Quality
- 5.17 Resource Availability
- 5.22 Construction Contractor Default
- 5.25 Scope Changes
- 5.27 Design Co-Ordination
- 5.31 Time Risk
- 5.32 Inflation Risk
- 6.1 Fare Setting Policies
- 6.6 Service Integration and Planning
- 6.7 Ridership
- 6.11 Crewing, Dispatching and Cleaning
- 6.18 General Strike
- 6.3 Public Satisfaction
- 6.31 Business Operations
- 6.33 Unanticipated Operating Costs
- 6.34 Marketing
- 6.37 Operation of the Vehicle/Rail/Communications/Catenary
- 7.1 Lifecycle Maintenance Performance
- 7.5 Lifecycle Maintenance Costs
- 7.15 Track Maintenance
- 7.16 Vehicle Maintenance

CAUTION 2
- 1.6 Injurious Affection
- 3.2 Agency Approvals
- 3.3 Utility Relocations
- 3.5 Geotechnical
- 3.6 Site Environmental Conditions
- 5.13 Construction Cost
- 5.18 Labour Availability
- 5.34 Utility Relocation
- 6.23 Utility and Fuel Price Inflation



Summary:
High Risk – 2
Caution – 11
Low Risk – 28

Risk Assessment –
Results for Option 4

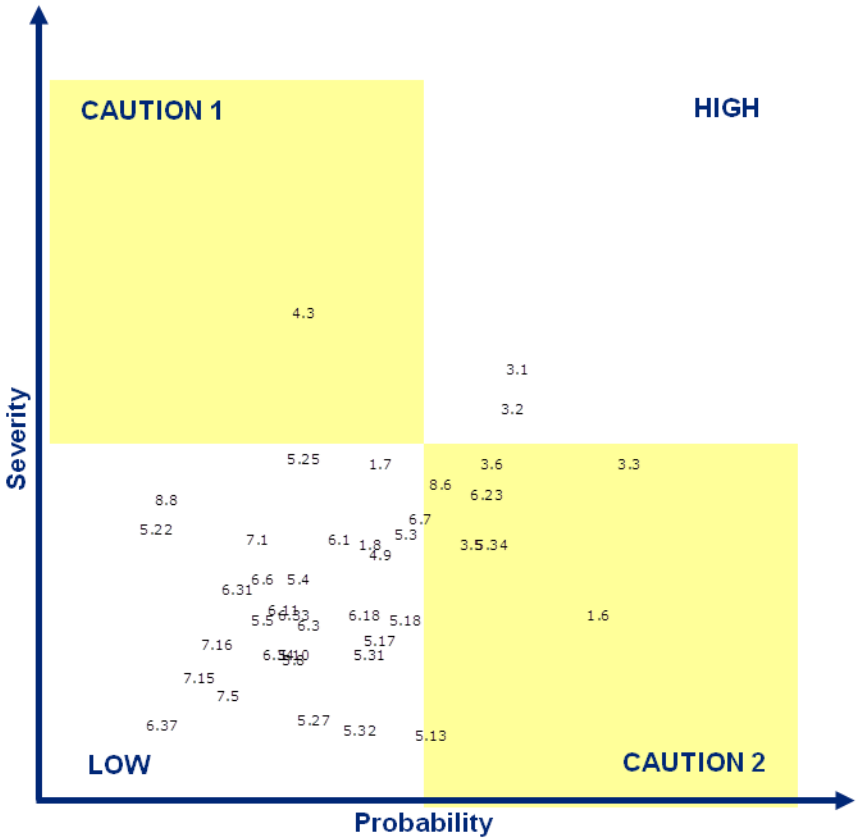
Design Build Finance Maintain (DBFM)

CAUTION 1
4.3 Change in Design Specifications

HIGH
3.1 Land Acquisition
3.2 Agency Approvals

LOW
1.7 Station Area Planning
1.8 Parking Policy
4.9 Infrastructure Design
5.3 Vehicle Procurement Process
5.4 Scope changes
5.5 Vehicle Delivery
5.8 Construction Delays
5.10 Failure to Build to Design or Quality
5.13 Construction Cost
5.17 Resource Availability
5.18 Labour Availability
5.22 Construction Contractor Default
5.25 Scope Changes
5.27 Design Co-Ordination
5.31 Time Risk
5.32 Inflation Risk
6.1 Fare Setting Policies
6.6 Service Integration and Planning
6.7 Ridership
6.11 Crewing, Dispatching and Cleaning
6.18 General Strike
6.3 Public Satisfaction
6.31 Business Operations
6.33 Unanticipated Operating Costs
6.34 Marketing
6.37 Operation of the Vehicle/Rail/Communications/Catenary
7.1 Lifecycle Maintenance Performance
7.5 Lifecycle Maintenance Costs
7.15 Track Maintenance
7.16 Vehicle Maintenance
8.8 Default of Operating Contractor

CAUTION 2
1.6 Injurious Affection
3.3 Utility Relocations
3.5 Geotechnical
3.6 Site Environmental Conditions
5.34 Utility Relocation
6.23 Utility and Fuel Price Inflation
8.6 Project Management Team Experience



Summary:
High Risk – 2
Caution – 8
Low Risk – 31

Risk Assessment –
Results for Option 5

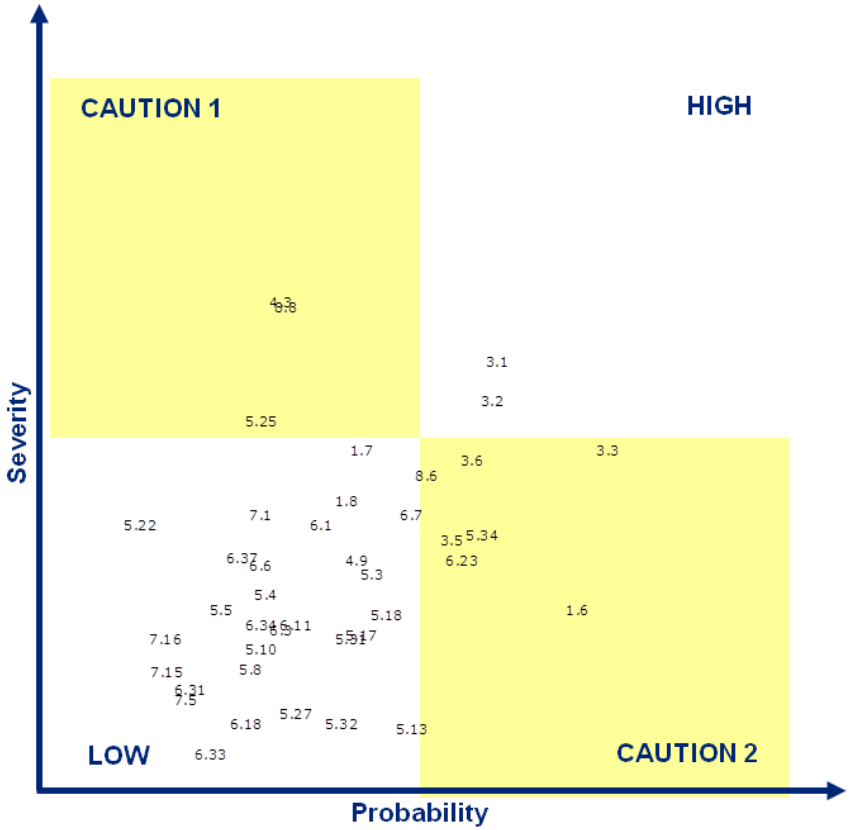
Design Build Finance Maintain Operate(DBFMO)

CAUTION 1
- 4.3 Change in Design Specifications
- 5.25 Scope Changes
- 8.8 Default of Operating Contractor

HIGH
- 3.1 Land Acquisition
- 3.2 Agency Approvals

LOW
- 1.7 Station Area Planning
- 1.8 Parking Policy
- 4.9 Infrastructure Design
- 5.3 Vehicle Procurement Process
- 5.4 Scope changes
- 5.5 Vehicle Delivery
- 5.8 Construction Delays
- 5.10 Failure to Build to Design or Quality
- 5.13 Construction Cost
- 5.17 Resource Availability
- 5.18 Labour Availability
- 5.22 Construction Contractor Default
- 5.27 Design Co-Ordination
- 5.31 Time Risk
- 5.32 Inflation Risk
- 6.1 Fare Setting Policies
- 6.6 Service Integration and Planning
- 6.7 Ridership
- 6.11 Crewing, Dispatching and Cleaning
- 6.18 General Strike
- 6.3 Public Satisfaction
- 6.31 Business Operations
- 6.33 Unanticipated Operating Costs
- 6.34 Marketing
- 6.37 Operation of the Vehicle/Rail/Communications/Catenary
- 7.1 Lifecycle Maintenance Performance
- 7.5 Lifecycle Maintenance Costs
- 7.15 Track Maintenance
- 7.16 Vehicle Maintenance
- 8.8 Default of Operating Contractor

CAUTION 2
- 1.6 Injurious Affection
- 3.3 Utility Relocations
- 3.5 Geotechnical
- 3.6 Site Environmental Conditions
- 5.34 Utility Relocation
- 6.23 Utility and Fuel Price Inflation
- 8.6 Project Management Team Experience



Summary:
High Risk – 2
Caution – 10
Low Risk – 29

Appendix D

Questions and Answers
Regarding Procurement and Delivery of Light Rail Transit

Q: What is a P3?
A: P3 stands for public private partnership. The relationship is based on a negotiated contract between a public organization and a private company. They work together to complete projects. The intent of a P3 is to build on the strengths of the public and private sectors. Each project is different, therefore public and private sector roles adjust to provide the best outcome.

Q: What is a 'procurement and delivery' option?
A: Procurement is a process used to buy a product or service. Delivery is how that product or service is built and/or provided. Together, a 'procurement and delivery' option is one way that a product or service can be completed. There can be many different options for purchasing and providing a product or service. A 'procurement and delivery' option can include private sector involvement in any combination of designing, building, financing, operating and maintaining of a project.

Q: What does the Region of Waterloo's preliminary preferred 'procurement and delivery' option, DBFOM, mean?
A: DBFOM is one way that the rapid transit project can be purchased, constructed, financed and eventually operated and maintained. As noted above, this is a P3 approach that is a relationship between the public and private sector. DBFOM means:

Design = the private company would complete detailed design drawings and plans of the route.

Build = the private company would build the rapid transit system.

Finance = the private company would have to obtain financing to pay its employees and other costs in advance of the Region's instalment payments. The Region would withhold part of the construction payment to the private company and pay it in instalments when the contract requirements are met by the private company over the term of the project.

Operate = the private company would manage the day-to-day operations of the light rail transit (LRT) system.

Maintain = the private company would look after the repairs and upkeep of the LRT system, including tracks and vehicles.

Q: Why is DBFOM the Region's preliminary preferred 'procurement and delivery' option?
A: DBFOM would provide the following benefits:

Cost: LRT design and construction can proceed at the same time, with significant time savings, better coordination and more efficient construction. The private company would have to deal with competitive pressure and answer to their lenders, so they would be inclined to provide a better value and a lower total project cost ensuring that the project is on time and on budget.

Experience: The private sector has more experience than the Region with designing and constructing an LRT system. They also have more experience with operating and maintaining an LRT system at start-up, and with providing trained and certified staff to

operate the light rail vehicles.

Incentives: With DBFOM, payments and penalties based on performance would provide incentive for the private sector to complete the project on time and on budget. The payments and penalties would also apply to performance standards for operating and maintaining a high-quality LRT system over the long term. If the private sector does not perform to the standards set in the contract, it does not get paid.

Risks: With DBFOM, the Region limits its risk by placing responsibility on the private sector. The Region monitors the service and holds back payments if the private sector does not meet the contract performance standards.

DBFOM would provide better accountability where performance may be related to either maintenance or operation because the same company is responsible for both. DBFOM would also transfer lifecycle risks such as major vehicle and track maintenance to the private sector. The Region would be responsible for those risks that it is best able to manage, such as fare setting and ridership risk.

Q: What would be the Region's role(s) with the DBFOM procurement model?
A:

- Own the LRT system (rights of way, tracks, vehicles, etc.);
- Set LRT fare prices and service schedules;
- Be responsible for customer service and addressing customer issues;
- Receive the fare revenue, which would offset the cost of the Region's transit system;
- Be responsible for the integration of LRT and the Region's conventional transit system;
- Continue to operate bus service through Grand River Transit. More bus drivers will be needed because of the Region's approved plan to expand the transit network; and
- When the project term ends, assume operations and maintenance, or extend the contract of the current private company, or find a new private company to operate and maintain the LRT system.

Q: With DBFOM, who would be in charge of setting the fare price and scheduling of the LRT?
A: The Region of Waterloo would set the ticket price and establish the schedule of the LRT.

Q: With DBFOM, who would get the money from the fares?
A: The Region of Waterloo would receive the fare revenue, which would offset the cost of the Region's transit system.

Q: With DBFOM, would it cost more for a private company to look after the LRT?
A: Over the project term, it would cost less than the other 'procurement and delivery' options.

Q: With DBFOM, what happens after thirty years?
A: After thirty years or the length of the project term, the contract with the private company would end. The Region of Waterloo could assume operations and maintenance, or extend the contract of the current private company, or find a new private company to operate and maintain the LRT system.

Q: With DBFOM, who would drive the trains and buses?
A: The private company would supply the operators to drive the LRT trains, keeping to the Region's service schedule. Grand River Transit operators would drive the buses. More bus drivers will be needed because of the Region's approved plan to expand the transit network.

Q: Has the Region contracted out operations and maintenance to the private sector before?

A: The Region has successfully contracted out operations and maintenance of garbage and recycling collection, recycling sorting, and wastewater treatment plants. The Region retains ownership of facilities, sets user rates, and is responsible for customer service and addressing customer issues.

Q. How can the Region avoid getting "locked into" a long term operating contract that may not be meeting the Region's interests?

A. Changing the operations portion of the DBFOM to separate, short-term operating agreements with the private DBFOM team (5-10 years), such that a new operator can be competitively procured at an appropriate time to operate the system would allow the Region to change the operations agreement whenever the agreement comes up for renewal. This would provide some certainty for the private DBFOM team on the length of the operating agreement and would allow the Region to review and implement different operations at shorter intervals. The Region may also retain the right to terminate the operations services under the main DBFOM agreement, and procure a new operator for the system or assume direct responsibility for the operations activities with Regional staff.

There may be a number of options available to the Region to best balance the benefits of DBFOM, while maintaining operating flexibility. Staff will review and evaluate these further and report back to Council

Q. Is what is being proposed the same as what the Province has done with 407?

A. The DBFOM modeling proposed is not at all like the 407. The 407 deal included a 99-year lease agreement, unlimited control over the highway and its tolls and a restriction under which the government may not build any nearby freeways which might potentially compete with 407 ETR. For the LRT project, unlike the 407, the Region retains the following roles:

- Own the LRT system (rights of way, tracks, vehicles, etc.);
- Set LRT fare prices and service schedules;
- Be responsible for customer service and addressing customer issues;
- Receive the fare revenue, which would offset the cost of the Region's transit system;
- Be responsible for the integration of LRT and the Region's conventional transit system;
- Continue to operate bus service through Grand River Transit. More bus drivers will be needed because of the Region's approved plan to expand the transit network; and
- When the project term ends, assume operations and maintenance, or extend the contract of the current private company, or find a new private company to operate and maintain the LRT system.

Q. How can we avoid service disruptions, caused by a lengthy transit strike, like we've seen recently in York?

A. There are a number of ways that this type of service disruption could be avoided. The Region could either take on the risk of setting labour rates directly or allow labour rates to be a flow through cost in the contract. The Region could also set an opening baseline wage rate based on current market conditions that would be used by each DBFOM team. This would mitigate the possibility that initial wage rates are artificially low resulting in attempts to catch up in the future. The F portion of the DBFOM model would also help to mitigate potential future disruptions because the DBFOM team would not be paid for operations and maintenance during a dispute but would also lose payments required under the financing agreement. This would be a substantial loss for the DBFOM team and they would want to avoid it by setting appropriate beginning wage rates and negotiating future wage rates in good faith. Staff will be further reviewing options as the final contract is developed.