Rapid Transit
Environmental Assessment

Public Consultation Centre
Phase 2, Step 1
Short List of Technology and Route Design Alternatives

INFORMATION HANDOUT

January 9, 10, 11, 2007
4 p.m. to 8 p.m.

Region of Waterloo

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This Information Handout contains the following information:

The *Public Input Guide* is also available as a separate attachment to provide the Region with your feedback.

Executive Summary – Short List of Technology and Route Design Alternatives

Waterloo Region continues to be one of the fastest growing communities in Canada with expected population growth from 500,000 to 729,000 over the next 25 years. The Region is planning now for the challenges and opportunities associated with rapid employment and population growth. Both the Regional Growth Management Strategy and the Province's Growth Plan for the Greater Golden Horseshoe identify rapid transit as a key element to help manage future growth and associated transportation needs.

The Region of Waterloo is currently carrying out an Individual Environmental Assessment for the development of a rapid transit system. Phase 1 determined that the Rapid Transit Initiative is the preferred transportation strategy for Waterloo Region.

Phase 2 brings us to the evaluation and short-listing of 10 technologies and their associated route designs. Using criteria developed for the Terms of Reference and approved by the Minister of the Environment (see Page 8), and using public input from a workshop held on Sept. 21, 2006, the Region developed more detailed measures to help evaluate the technology and route design alternatives (see Page 9 and 10).

The Project Team is preparing to recommend that Bus Rapid Transit and Light Rail Transit technologies operating on a Mix of On/Off Road route designs form the short list for future evaluation and for developing route and station locations. The Mix of On/Off Road route design would allow rapid transit to operate at road level either in dedicated on-road conditions, or dedicated off-road conditions along the entire route length. These route design/technology alternatives were selected because:

- They support the Region's redevelopment and intensification objectives
- They optimize the use of existing off-road routes and serve major destinations using on-road routes
- They are compatible with existing and planned built neighbourhoods

The selected technology and route design alternatives work together to provide the best fit for a rapid transit system in Waterloo Region. They represent systems that have been developed and have flourished in cities across North America and Europe. These systems have the potential to encourage a more compact urban form, complement pedestrian-friendly urban design, support street-level development around stations, reduce the growth of traffic congestion and associated air quality concerns and bring many other benefits to our community.

Other technology and route design alternatives were evaluated but failed one or more of the three evaluation criteria and therefore are not expected to be able to meet the future needs of our community or the objectives of the Regional Growth Management Strategy and the Province's Growth Plan for the Greater Golden Horseshoe.

1. Background

Waterloo Region is one of the fastest growing communities in Canada. With a population of 500,000, and expected growth to 729,000 within the next 25 years, the Region is planning now for the challenges and opportunities associated with rapid population and employment growth.

In 2003, Region of Waterloo 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 sets out strong and innovative goals for managing growth in urban areas and townships of the Region. It also identifies rapid transit as a key element that will help shape the future of the community.

Rapid transit is also a significant part of the Province's Growth Plan for the Greater Golden Horseshoe. The Plan designates the Cities of Cambridge, Kitchener and Waterloo as Urban Growth Centres (UGCs), where much of the anticipated future population and employment growth will be directed. It also calls for the development of a rapid transit system to connect the UGCs to the larger provincial transportation network.

Building and widening roads alone is not a practical or affordable solution to meet the anticipated demands on our transportation systems. A rapid transit service linking Cambridge, Kitchener and Waterloo with enhanced conventional transit services (Grand River Transit) throughout the Region will benefit the entire community.

By providing greater transportation choice and attracting more riders, rapid transit will help address existing congestion and aid in preventing even greater levels of congestion in the future. In addition, rapid transit will help focus residential and commercial development along its route and around rapid transit stations. This will help the Region achieve Provincial and Regional targets for increased reurbanization and the protection of agricultural and sensitive environmental areas against urban population and expansion pressure.

2. Purpose of this Public Consultation Centre

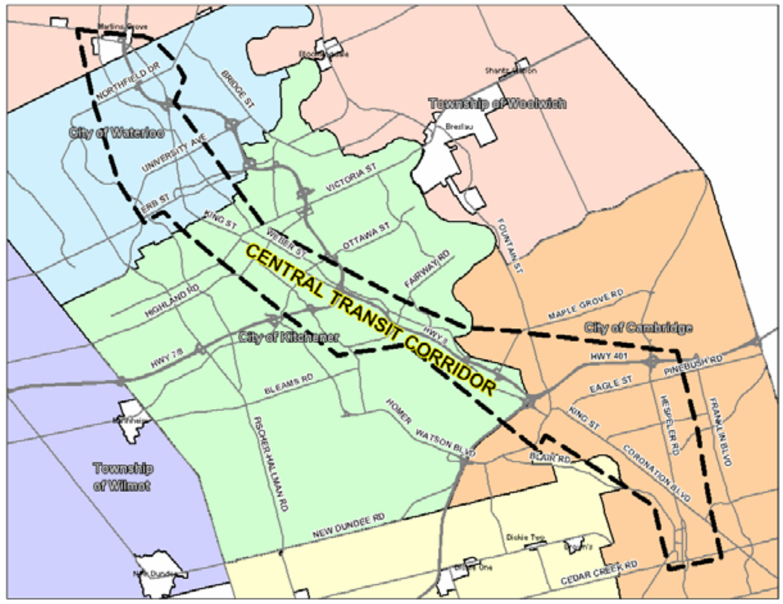
1. **Provide information to the community about the Phase 2 evaluation process, and how public input was used to develop the process; and**
2. **Get public input on the results of the evaluation – the short list of route design and technology alternatives that are being recommended for more in-depth evaluation.**

The Region of Waterloo is carrying out an Individual Environmental Assessment (EA) for the development of a rapid transit system in the Region's Central Transit Corridor (see Exhibit 1) that extends from Cambridge through Kitchener to Waterloo.

In July 2006, Regional Council approved Phase 1 of the Environmental Assessment and selected the Rapid Transit Initiative as the preferred transportation strategy for Waterloo Region. The Region is now moving forward with Phase 2 to select the rapid transit technology, route and station locations.

Public input is an essential and ongoing component of the Rapid Transit Environmental Assessment. Phase 2 began with a Public Information Session and Workshop on Sept. 21, 2006 to discuss potential rapid transit destinations, routes and station locations, as well as those characteristics of rapid transit the public feels are most important.

Exhibit 1: EA Study Area – Central Transit Corridor



Public input received to date has been used to help develop the evaluation measures for the 10 rapid transit technologies and four route designs under consideration, to determine which should move forward in the Environmental Assessment process for additional study.

Public input, along with the approved evaluation criteria from the Environmental Assessment's Terms of Reference, will be used to recommend to Regional Council those technology and route design alternatives that will be studied further. The purpose of this step in the Phase 2 evaluation is to ensure the short-listed route design and technology alternatives are appropriate for our community and can be reasonably accommodated within the physical and environmental landscape created by roadways, rivers, bridges, and urban development.

3. What is the Rapid Transit Initiative?

The Region of Waterloo is proposing to develop a rapid transit system within the Central Transit Corridor (the EA Study Area shown in Exhibit 1) identified in the Regional Growth Management Strategy. The EA is part of a larger Rapid Transit Initiative that will also include improvements to the Region's conventional transit system (Grand River Transit) and improvements to our overall transportation networks.

Definition of Rapid Transit:

Rapid transit is defined as a public transportation system operating for its entire length primarily on a dedicated right-of-way or transit lane. The definition includes systems operating at road level, and systems operating on elevated or underground facilities. Rapid transit involves new forms of transit service designed to improve travel time, reliability, passenger comfort and convenience in order to be more competitive with car travel.

4. What is an Individual Environmental Assessment?

An Individual Environmental Assessment is a process used in Ontario to determine the potential impacts a project may have on the social, economic, cultural and natural environment so that the best possible decisions can be made for such projects. In July 2005, the Ontario Minister of the

Environment approved the Terms of Reference for this Rapid Transit Environmental Assessment. The Terms of Reference provide the Region with binding approval on what must be addressed in its Environmental Assessment. This project is being carried out in accordance with the *Ontario Environmental Assessment Act* and will be coordinated within the requirements of the *Canadian Environmental Assessment Act*.

To view a copy of the Terms of Reference, please visit the Region's website at www.region.waterloo.on.ca/transitea.

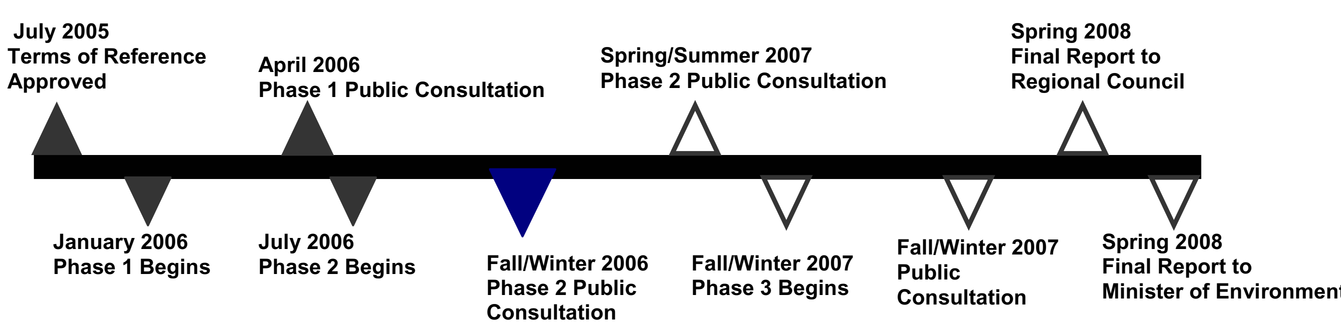
The Region of Waterloo Rapid Transit Environmental Assessment is a three-phase process that will help Regional Council and the community select the rapid transit technology, routes and station locations that will help meet the Region's future transportation needs while shaping the future of our community.

Phase 1: The evaluation and selection of a preferred transportation system strategy (The Rapid Transit Initiative was selected as the Preferred Transportation Strategy at the July 12, 2006 Regional Council meeting)

Phase 2: Evaluation of alternative route designs and technologies and the identification of a preferred rapid transit system including station and route locations

Phase 3: Preliminary design of the recommended rapid transit system (technology, route design and station locations)

ENVIRONMENTAL ASSESSMENT PRELIMINARY TIMELINE



Completed

Current Status

Future Activities

The purpose of Phase 2 is to evaluate rapid transit route designs, technologies, routes and station locations in consultation with the community, and select a Preferred Rapid Transit System that best meets the goals set out in the Regional Growth Management Strategy. All comments and information collected during Phase 2 will be considered in developing a Preferred Rapid Transit System.

Phase 2 will be completed in three steps with public consultation throughout each step and consideration by Regional Council at the conclusion of each step:

▼ **PHASE 2, STEP 1: SCREENING OF ALTERNATIVE TECHNOLOGIES AND ROUTE DESIGNS**

The Region has identified a wide range of route designs and associated rapid transit technologies to be evaluated. Two route design and technology alternatives are recommended to be short-listed using the evaluation criteria approved in the Terms of Reference and evaluation measures based on public input. Those technologies and route designs that did not make the short list will be eliminated from further consideration. The short list is now being brought to the community for input and Regional Council for consideration before proceeding to Phase 2, Step 2.

▽ **PHASE 2, STEP 2: EVALUATION AND RANKING OF REASONABLE TECHNOLOGIES, ROUTE AND STATION LOCATIONS**

For the purposes of the Environmental Assessment, the Central Transit Corridor has been designated as the Study Area (Please see **Exhibit 1**). During Step 2, the short-listed route design and technologies will be used to develop and rank specific station and route locations within each of the seven sections of the study area.

▽ **PHASE 2, STEP 3: EVALUATION OF RAPID TRANSIT SYSTEM ALTERNATIVES AND SELECTION OF PREFERRED SYSTEM**

The results of Step 2 will be a series of rankings for each technology, route and station alternatives within each of the seven sections of the Study Area. The purpose of Step 3 is to identify the combinations of these alternatives that could create a reasonable Rapid Transit System, and evaluate these combinations to identify a Preferred Rapid Transit System for the entire Central Transit Corridor.

5. The Evaluation Process

This phase of the EA (Phase 2, Step 1) includes the screening of rapid transit route design and technology alternatives to determine which are appropriate for implementation in Waterloo Region. The Terms of Reference groups 10 rapid transit technologies under four different route designs for evaluation during the Environmental Assessment.

What are the Route Designs and Technologies?

The term “route design” refers to the physical structure(s) of the transit route within the urban environment, i.e. tunnels, at-grade, elevated guideways, etc., inherently associated with each technology. The route design choice reflects the degree of interaction between the rapid transit system, other traffic and pedestrians, and the surrounding land uses. The route design is an important element of a rapid transit system because where the system operates will have a significant impact on its ability to meet urban design, intensification and reurbanization objectives.

There are four different route designs in which rapid transit technologies can operate:

Dedicated On-Road – Rapid transit operates at road level within the road right-of-way in dedicated lanes along the entire route length.
Dedicated Off-Road – Rapid transit operates at road level within a dedicated right-of-way that is separate from the road network along the entire route length.
Mix of On/Off Road – Rapid transit operates at road level using both on-road and off-road route designs.
Grade-Separated – Rapid transit operates within a dedicated right-of-way either above or below ground level.

Each type of rapid transit technology and route design has characteristics that make it suitable for different communities and transportation needs. These characteristics, summarized in **Appendix A,** vary according to the type of route design, equipment, and technology that are chosen.

Typical capital and operating cost ranges for the technologies are also included for comparison purposes. These costs will vary based on factors such as route designs and locations, route lengths, system capacity and station locations. More detailed cost estimates will be provided for those rapid transit technologies that are short-listed and carried forward to Phase 2, Step 2 of the Environmental Assessment process.

How was Public Input used in the Phase 2, Step 1 Evaluation Process?

The Rapid Transit Environmental Assessment Terms of Reference, approved by the Minister of the Environment, defines three evaluation criteria. These are mandatory requirements that are considered crucial for the successful implementation of a rapid transit system in Waterloo Region. The criteria can summarized as follows:

- **Regional Growth Management Strategy (RGMS) Reurbanization Objectives**: Is the route design consistent with municipal urban design, intensification and reurbanization objectives?
- **Service Quality:** Are there proven applications of the technology in comparable settings?
- **Threshold Capacity:** Is the capacity of the technology appropriate for the expected demand?

Phase 2, Step 1 began Sept. 21, 2006 with a Public Information Session and Workshop that brought together 140 community members from across the Region. Working in small groups, participants talked about which destinations in the Region they thought should be served by rapid transit as well as possible rapid transit routes and station locations. They also discussed the characteristics of a rapid transit system that were most important to them.

Using the input from the community about which characteristics of a rapid transit system are most important to them, the Region's consultants developed a set of evaluation measures to help answer the questions raised by the three evaluation criteria.

The table below illustrates how the public input was used to create evaluation measures for Phase 2, Step 1. A summary of the evaluation results is shown in **Appendix D**:

Evaluation Criteria	Public Input	Evaluation Measures	Description of Considerations
Regional Growth Management Strategy (RGMS) Reurbanization Objectives **Is the route design consistent with municipal urban design, intensification and reurbanization objectives?** The rapid transit route design and technology alternative should support Provincial growth plan and Regional land use and economic development goals through fostering intensification and reurbanization in built up areas and transit-oriented development near potential rapid transit stations.	**System Flexibility**	Is the route design and technology alternative adaptable to the physical landscape and environmental characteristics that would be encountered within Waterloo Region? Can it easily accommodate future expansion of the system to meet demand? Can it be integrated with other urban transit systems?	▪ Fitting a new rapid transit system into an existing urban area may require some adjustment to existing conditions ▪ Integration with local bus service ▪ Route design influences the ability of a rapid transit system to readily expand
	Environmental Impacts	Is the route design and technology alternative detrimental to the natural and socio-economic environments? Issues such as air quality, noise and vibration and visual intrusion are considered.	▪ Air quality, noise and vibration are largely technology dependent. The impacts may be influenced by route design ▪ Visual intrusion is impacted by route design
	Land Use Compatibility	Is the route design and technology alternative compatible with established residential neighbourhoods, commercial districts and existing sensitive land use like built heritage and cultural landscape features? Can the route design and technology influence intensification and complement planned mixed-use development areas within the urban cores?	▪ The compatibility of route designs and technologies on surrounding land uses may need to be investigated on a case-by-case basis to ascertain compatibility ▪ Technology, route design and placement of stations may influence development patterns
	Operating Constraints	Can the route design and technology alternative be scaled to physically fit within the urban environment and areas designated for intensification?	▪ Route design has impacts on the urban landscape and the degree of fit with existing and planned land uses especially in the cores
	Urban Design Objectives	Is the route design and technology alternative consistent with municipal urban design guidelines?	▪ Unique urban design guidelines may be developed for various communities ▪ The RGMS envisions a vibrant, street-level, pedestrian-oriented urban design concept within the central areas.

Evaluation Criteria	Public Input	Evaluation Measures	▪ Description of Considerations
Service Quality **Are there proven applications of the method in comparable settings?** The route design and technology alternative should have demonstrated success in providing proven reliable service in similar conditions, including operations in climates similar to Ontario.	**System Compatibility**	Can the route design and technology alternative facilitate integration of rapid transit services with other public transport systems and provide ease of transfer between alternative urban modes?	▪ System compatibility is influenced by technology, route design and fixed facilities design
	System Accessibility	Is the route design and technology alternative easily accessible for all passengers including the disabled in terms of proximity to stations, station configuration (barrier free access) and spacing of stations?	▪ System accessibility is influenced by technology/fixed facilities and freedom of passenger movement around stations
	Service Frequency	Is the route design and technology alternative adaptable to accommodate fluctuations in demands to ensure fast, reliable service?	▪ Service frequency is influenced by a combination of technology and route design in attaining reliable service
	User Experience	Will the route design and technology alternative provide a positive experience for patrons in terms of ride quality, station accessibility and ability to provide improved customer service?	▪ The ability to provide improved customer service is influenced by a combination of technology , route design and fixed facility design
	Safety and Security	Are safety and security risks to transit patrons and other modes (including automobile traffic and pedestrians) acceptable?	▪ Safety and security is influenced by the degree of separation of technology and route design from other modes and risks to transit users
Threshold Capacity **Is the capacity of the technology appropriate for the expected transit demand?** The technology should be of sufficient capacity to accommodate the forecast ridership demand in a cost-effective manner.	**Ridership/ Capacity**	Is the technology capacity appropriate relative to near and longer term projected ridership demands?	▪ Capacity is influenced by a combination of technology and route design
	Speed	Does the frequency of the vehicles and acceleration/operating speeds between stations support ridership forecast and station spacing?	▪ Acceleration, operating speed and station spacing are influenced by the combined properties of technology and route design. Route designs that are separate from roadways support increased operating speeds
	Cost-effectiveness	Are the capital, operating and maintenance expenditures costs of the order of magnitude relative to industry benchmarks?	▪ Capital, operating and maintenance costs are determined by route design and technology

6. Evaluation Results for Technology and Route Design Alternatives

Each route design and technology alternative was evaluated against the three evaluation criteria and the 13 measures developed to help with the assessment of each criterion. For the assessment of each technology, inherently linked to a specific route design(s), failure in one measure means that the technology cannot fully meet the criterion and therefore fails that criterion. Failure in one criterion resulted in a “FAIL” for the technology and elimination from further consideration as it is not expected to be able to meet the future needs of our community. Route designs were assessed using a “preferred” rating based on how well they responded to each measure.

ROUTE DESIGN EVALUATION RESULTS:

Appendix B summarizes the evaluation of the route designs. The **Mix of On/Off Road** option was the only route design to receive a PREFERRED rating for all 13 measures. The following is a summary of the reasons why it is the preferred route design:

- It supports redevelopment and intensification objectives
- It optimizes use of existing off-road routes and on-road routes to serve major destinations
- It is compatible with existing and planned built neighbourhoods
- It provides the opportunity to reduce rapid transit infrastructure cost by using existing corridors

TECHNOLOGY EVALUATION RESULTS:

Appendix C summarizes the evaluation of the technologies. **Bus Rapid Transit (BRT)** and **Light Rail Transit (LRT)** were the only technologies to receive PASS ratings for all three criteria. The advantages of these technologies are outlined in **Exhibit 2**. More detailed evaluation summaries are provided for each of the 10 technologies in **Appendix D**.

CONCLUSION:

The Project Team is preparing to recommend that Bus Rapid Transit and Light Rail Transit operating on a Mix of On/Off Road route design form the short list.

The selected technology and route design alternatives work together to provide the best fit for a rapid transit system in Waterloo Region. They represent systems that have been developed and have flourished in cities across North America and Europe. These systems have the potential to encourage a more compact urban form, complement pedestrian-friendly urban design, support street-level development around stations, reduce the growth of traffic congestion and associated air quality concerns and bring many other benefits to our community.

There are many different types of BRT and LRT technologies, and the two short-listed rapid transit technology and route design alternatives offer a wide variety of options in the development of an integrated transit system for Waterloo Region. An important goal of the Rapid Transit Environmental Assessment is to choose the appropriate technology and rapid transit station and route locations that will help encourage intensification and transit oriented development, develop and attract new ridership, and improve mobility and regional connectivity.

7. Next Steps

Once the Public Consultation Centres for Phase 2, Step 1 have been completed, and public input has been considered, the Region's Project Team will recommend a short list of technologies to the Region's Planning and Works Committee and Council for consideration. Following this, the technology and route design alternatives on the short list will move forward to Phase 2, Step 2 for more in-depth evaluation and additional public consultation.

Exhibit 2:

Bus Rapid Transit (BRT)

- Technology is adaptable to a range of operations (e.g. on-street or separate right-of-way)
- Can be expanded and integrated with existing and planned alternative modes of transportation such as feeder bus systems, park and ride and pedestrian walkways
- Modern technologies powered by alternative fuels may address concerns about environmental impacts
- Low floor accessibility addresses some accessibility concerns
- Technology is proven in Canada
- Capital and operating costs are low to moderate, future demands can be met at an affordable cost
- Attractive, reliable system adaptable to a variety of operating environments and passenger capacities
- Operating speeds of up to 80 km/h may suit suburban services, average speeds of 25 km/h appropriate for downtown areas, transit malls or arterial roads
- Station spacing can provide convenient pedestrian access and be compatible with existing land uses
- Fosters compact, multi-use development around stations, though not as widely as Light Rail Transit (LRT)
- Can be easily integrated with street level development and pedestrian systems

Light Rail Transit (LRT)

- Technology is adaptable to a range of operations (e.g. on-street or separate right-of-way)
- Can be expanded and integrated with existing and planned alternative modes of transportation such as feeder bus systems, park and ride and pedestrian walkways
- Modern, electric-powered vehicles are clean and have low noise levels
- Street level system is fully accessible
- Technology is proven in Canada
- Capital and operating costs are moderate, future demands can be met at an affordable cost
- Permanent track alignment and stations can provide the catalyst for urban redevelopment with opportunities to integrate stations with new higher density development
- Vehicles can be operated as single vehicles or in trains to accommodate fluctuating demand
- Attractive, reliable system adaptable to a variety of operating environments and passenger capacities
- Operating speeds of up to 80 km/h may suit suburban services, average speeds of 25 km/h appropriate for downtown areas, transit malls or arterial roads.
- Station spacing can provide convenient pedestrian access and be compatible with existing land uses
- Widely recognized as fostering compact multi-use development around stations
- Can be easily integrated with street level development and pedestrian systems

For more information on the evaluation process and results and a summary of the public input, please visit the rapid transit website at www.region.waterloo.on.ca/transitea and click on the Environmental Assessment/Phases/Phase 2 tabs.

APPENDIX A – Characteristics of Rapid Transit Technologies

Route Design Option	**Dedicated On-Road** (separate bus/rail lane) **Dedicated Off-Road** (transitway/rail line) **Mix of On and Off Road**		**Dedicated Off-Road** (separate rail line)		**Grade Separated** (either above or below ground)					
Technology	**Bus Rapid Transit (BRT)**	**Light Rail Transit (LRT)**	**Commuter Rail (CRT)**	**Diesel Multiple Units (DMUs)**	**Aerobus**	**Automated Guideway Transit (AGT)**	**Magnetic Levitation (MAGLEV)**	**Monorail**	**Personal Rapid Transit (PRT)**	**Subway**
										
Description	▪ Uses large rubber-tired buses ▪ Runs in either dedicated bus lanes where regular traffic is prohibited or separate roadways called transitways	▪ Uses steel wheeled vehicles ▪ Runs on steel rails embedded in the road surface or on a separate rail line ▪ Can range from streetcars, trams comprised of multiple vehicles to light weight rail vehicles	▪ Uses traditional passenger rail cars (i.e. single or bi-level cars) pulled by a locomotive ▪ Operates on existing freight or passenger rail lines (e.g. CN or CP) serving urban areas	▪ A form of Light Rail Transit that can operate only on its own rail line, not on an urban roadway ▪ Vehicles operate in one to three car trains	▪ Suspended from an overhead guideway ▪ Propelled by electric motors ▪ Can operate as a single car (module), often combined with up to 12 others ▪ Used to span difficult terrain such as ski lifts	▪ Runs on an overhead guideway ▪ Uses driverless, steel-wheeled train vehicles running on rail tracks ▪ Must be separated from road traffic	▪ Runs on an overhead guideway ▪ Uses magnetic forces to hover above the track and propel it along the guideway ▪ Can travel at very high speeds of up to 500km/h	▪ Runs on an overhead guideway ▪ Rubber-tired vehicle straddle the guideway along a single beam, rail or tube ▪ Typically operates as a shuttle service at tourist attractions	▪ Runs on an automated guideway ▪ Small vehicles that carry four to eight people ▪ No active systems in operation	▪ Provides frequent, high capacity rail- based services within urban areas ▪ Typically uses steel-wheeled vehicles on steel tracks powered by electricity ▪ Can run below or at-grade in a separate rail line
Power Source/ Propulsion	Mainly diesel engines but can also use alternative fuels like natural gas, propane, hybrid diesel-electric	Self-propelled, overhead electric wire and electric motor; also, hybrid diesel-electric	Diesel or diesel-electric locomotives pull trains of 5 or more cars	Self-propelled units with diesel engines or hybrid diesel-electric motors	Self-propelled units with electric motors	Self-propelled units with electric motors or pulled by cables	Magnetic forces generated by electricity allow vehicles to hover above track	Self-propelled units with electric motors and power supply attached to guideway	Self-propelled units with electric motors	Self-propelled units with electric motors
Typical Station Spacing	400 m to 2 km	500 m to 4 km	4 km to 10 km	4 km to 10 km	1 to 4 km	800 m to 2 km	4 km to 10 km	800 m to 2 km	500 m to 1 km	500 m to 2 km
Typical Application	Urban/Suburban	Urban/Suburban	Inter-Urban	Suburban/Inter-Urban	Suburban/Inter-Urban	Urban/Suburban	Inter-Urban	Urban – Theme parks	Urban/Suburban	Urban/Suburban
Vehicles seated capacity	40 standard 69 articulated 85 double articulated	65-85	100-150	45 – 90	80	30-75	100-150	40-190	2-8	60-80
Typical Frequency of Service	Less than 10 minutes	Less than 10 Minutes	15 minutes	15 minutes	No Regular Schedule	Less than 10 Minutes	30 minutes	15 minutes	No Regular Schedule	Less than 10 Minutes
Passengers per hour per direction	Exclusive right-of-way up to 12,000, arterial up to 5,000	Exclusive right-of-way up to 20,000, arterial up to 9,000	Exclusive right-of-way up to 10,000	Exclusive right-of-way up to 10,000	Exclusive right-of-way up to 5,000	Exclusive right-of-way up to 5,000	Exclusive right-of-way up to 10,000	4,000 to 30,000	2,700 to 7,200	Exclusive right-of-way 10,000 to 30,000
Typical Capital Infrastructure Cost (per km)	$0.5 – 22 M (higher end cost is for a separate transitway)	$20 – 35 M	$5 – 15 M (Existing Rail Corridor)	$12 - 35M (Existing Rail Corridor)	$40 – 60 M (estimate)	$50 - 100 M	$100 M	$75 - 125 M	$10 M (estimate)	$100-160 M (subway) $30 – 50 M (at grade)
Typical Vehicle costs	$0.5 - 1.2 M	$3 - 5 M	$2.5 - 4.5 M	$3 - 5 M	$3 - 5 M	$0.8 - 2.7 M	$20 M	$6 - 10 M	unknown	$2.5 - 3.5 M
Canadian Examples	Ottawa York Region – Viva Vancouver Calgary Halifax Mississauga	Ottawa (in design) Calgary Edmonton	Toronto Montreal Vancouver	Ottawa – O-Train	Niagara Falls	Toronto – Pearson Airport Scarborough – SRT	None	None	None	Toronto Montreal

Appendix B - ROUTE DESIGN EVALUATION SUMMARY

The advantages and disadvantages of the preferred and alternative route designs are summarized as follows:

Dedicated On-Road Route Design (BRT, LRT) – NOT PREFERRED

Advantages

- Supports redevelopment and intensification objectives
- Low to moderate capital cost
- Quick to implement
- Compatible with existing and planned built neighbourhoods

Disadvantages

- May be insufficient capacity in central corridor road network
- May appear less permanent and potentially limit redevelopment and intensification around stations
- Rapid transit service may deteriorate as traffic congestion increases in some parts of the study area

Dedicated Off-Road Route Design (BRT, Commuter Rail, LRT, DMU) – NOT PREFERRED

Advantages

- Low cost but only on existing off-road corridors
- Rapid transit service is not affected by road traffic
- Safety and security to patrons and other transportation modes is enhanced by physical separation of rapid transit

Disadvantages

- Separated corridors may not be located in areas that support reurbanization and intensification
- Separated corridors will not allow for integration with existing on-street/at-grade urban environment destinations
- May be incompatible with existing and planned neighbourhoods and urban design objectives
- High cost for developing new corridors that may limit expansion opportunities

Mix of On/Off Road Route Design (BRT, LRT) – PREFERRED

Advantages

- Supports redevelopment and intensification objectives where routes are in proximity to areas planned for reurbanization
- Optimizes use of existing off-road routes and on-road routes to serve destinations
- Compatible with existing and planned built neighbourhoods
- Provides opportunity to reduce rapid transit infrastructure by using existing corridors

Disadvantages

- Rapid transit service may be influenced by road traffic where road traffic and congestion influence the on-road portion of the route

Grade Separated Route Design (Aerobus, AGT, Maglev, Monorail, PRT, Subway) – NOT PREFERRED

Advantages

- Supports redevelopment and intensification objectives where routes are in proximity to areas planned for reurbanization
- Rapid transit service is removed from road traffic
- Visible as superior service

Disadvantages

- Would be incompatible with existing and planned neighbourhoods and street-level urban design objectives
- Promotes higher density development associated with large downtown areas (e.g. Toronto, Vancouver) which may be incompatible with areas designed for intensification
- System expansion is relatively difficult and expensive
- High infrastructure cost

APPENDIX C

RAPID TRANSIT ROUTE DESIGN AND TECHNOLOGY SCREENING - EVALUATION SUMMARY

	Route Design	Dedicated On-Road (separate bus/rail lane) Dedicated Off-Road (transitway/rail line) Mix of On and Off Road		Dedicated Off-Road (separate rail line)		Grade Separated (either above or below ground)					
	Technology Options	Bus Rapid Transit (BRT)	Light Rail Transit (LRT)	Commuter Rail (CRT)	Diesel Multiple Units (DMUs)	Aerobus	Automated Guideway Transit (AGT)	Magnetic Levitation (MAGLEV)	Monorail	Personal Rapid Transit (PRT)	Subway
Criteria from Terms of Reference	**Evaluation Measures**										
RGMS Reurbanization	System Flexibility	PASS	PASS	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	Environmental Impacts	PASS	PASS	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
	Land Use Compatibility	PASS	PASS	FAIL	FAIL	FAIL	PASS	FAIL	PASS	FAIL	FAIL
	Operating Constraints	PASS	PASS	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	PASS	FAIL
	Urban Design Objectives	PASS	PASS	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
Overall Grade for Criterion #1		PASS	PASS	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
Service Quality	System Compatibility	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	FAIL	PASS
	System Accessibility	PASS	PASS	FAIL	FAIL	FAIL	PASS	FAIL	PASS	FAIL	PASS
	Service Frequency	PASS	PASS	FAIL	FAIL	FAIL	PASS	PASS	PASS	FAIL	PASS
	User Experience	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	FAIL	PASS
	Safety and Security	PASS	PASS	FAIL	FAIL	FAIL	PASS	PASS	PASS	FAIL	PASS
Overall Grade for Criterion #2		PASS	PASS	FAIL	FAIL	FAIL	PASS	FAIL	PASS	FAIL	PASS
Threshold Capacity	Ridership/Capacity	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	FAIL	FAIL
	Speed	PASS	PASS	FAIL	FAIL	FAIL	PASS	FAIL	PASS	FAIL	FAIL
	Cost Effectiveness	PASS	PASS	PASS	PASS	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
Overall Grade for Criterion #3		PASS	PASS	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
Results of Overall Screening		PASS	PASS	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL

(Filled circle) **PASS** (Empty circle) **FAIL**

See Pages 10 & 11 of the Information Handout for a description of the evaluation measures

Rapid Transit Environmental Assessment

RAPID TRANSIT TECHNOLOGY EVALUATIONS

WHAT IS BUS RAPID TRANSIT?

Bus Rapid Transit (BRT) uses rubber tired buses operating in special designated lanes (diamond lanes) or separate roadways (called transitways) to provide improved service compared to regular transit.

BRT Evaluation - PASS

RGMS Reurbanization **PASS**	System Flexibility	**PASS** – Adapts to a range of operations including on-road bus lanes and dedicated rights-of-way
	Environmental Impacts	**PASS** – Minimal vibration and visual intrusion, alternative fuels can reduce emissions
	Land Use Compatibility	**PASS** - Can influence land use intensification, but is viewed as less permanent infrastructure than rail based technologies
	Operating Constraints	**PASS** – Simple station designs consistent with the urban environment
	Urban Design	**PASS** – Compatible with and encourages street-level urban revitalization, can be integrated with and connect communities and high activity nodes
Service Quality **PASS**	System Compatibility	**PASS** – Easily integrated with other local and inter-city transit services
	System Accessibility	**PASS** – Street-level stations accessible to all, 400 metres to two kilometres apart
	Service Frequency	**PASS** – Increasing bus size and frequency can accommodate changes in demand
	User Experience	**PASS** – Enhanced modern buses provide comfortable ride, low-floor access and real-time on-board stop information. Some internal noise and instability for diesel buses
	Safety and Security	**PASS** – Fenced and secure right-of-way, grade separated walkways at stations, diesel buses are audible which will alert pedestrians
Threshold Capacity **PASS**	Ridership/Capacity	**PASS** – On-road lanes up to 5,000 passengers per hour, Peak: 12,000 passengers per hour, will meet current and future needs
	Speed	**PASS** – Speed: 20 to 35 kilometres per hour, Frequency: five to 20 minutes
	Cost Effectiveness	**PASS** - Capital cost per km = $0.5-22M, Vehicle Cost = $0.5-1.2M (articulated), shorter life expectancy of 13 years

RAPID TRANSIT TECHNOLOGY EVALUATIONS

WHAT IS LIGHT RAIL TRANSIT?

Light Rail Transit (LRT) is an electrically powered urban rail system with single cars or short trains operating on an exclusive right-of-way at ground level.

LRT Evaluation - PASS

RGMS Reurbanization **PASS**	System Flexibility	**PASS** – Adapts to a range of operations including on-road transit lanes to dedicated rail rights-of-way
	Environmental Impacts	**PASS** – Electrically powered, minimal noise and air quality impacts, on sharp curves steel wheels may cause noise
	Land Use Compatibility	**PASS** – Has been shown to positively influence land use intensification, compatible with higher density land uses
	Operating Constraints	**PASS** – Fully compatible with downtown and suburban development when constructed on-street or in rail rights-of-way
	Urban Design	**PASS** – Compatible with and encourages street-level urban revitalization, can be integrated with and connect communities and high activity nodes
Service Quality **PASS**	System Compatibility	**PASS** – Provides convenient connections with local/inter-city bus services at stations
	System Accessibility	**PASS** – Street-level stations accessible to all, 400 metres to four kilometres apart
	Service Frequency	**PASS** – Increasing train length and frequency can accommodate changes in demand
	User Experience	**PASS** – Electrical power provides fast acceleration, smooth ride, stability and low internal noise for passengers. Vehicles equipped with low-floor access real-time on-board passenger information, ample seating and wide aisles
	Safety and Security	**PASS** – Segregated right-of-way can be clearly identified, vehicles are quiet requiring audible traffic signals to alert pedestrians
Threshold Capacity **PASS**	Ridership/Capacity	**PASS** – On-road lanes up to 9,000 passengers per hour, Peak: 20,000 passengers per hour, will meet current and future needs
	Speed	**PASS** – Speed: 25 to 50 kilometres per hour, Frequency: five minutes during peak times, 15 to 30 minutes off-peak
	Cost Effectiveness	**PASS** - Capital cost per km = $20-35M, Vehicle Cost = $3-5M, life expectancy of 25+ years

RAPID TRANSIT TECHNOLOGY EVALUATIONS

WHAT IS COMMUTER RAIL TRANSIT?

Commuter Rail Transit (CRT) is a long distance transit mode using locomotives to haul passenger cars in railway right-of-way, sometimes shared with freight trains.

CRT Evaluation - FAIL

RGMS Reurbanization **FAIL**	**System Flexibility**	**FAIL** – Limited to operating in a dedicated off-road freight railway right-of-way
	Environmental Impacts	**FAIL** – Diesel trains create significant noise and emissions. Diesel-electric hybrids lessen this somewhat. Rail corridor must be fenced, which will separate neighbourhoods
	Land Use Compatibility	**FAIL** – Rail corridors typically separated from existing development. Most suburban stations still auto oriented
	Operating Constraints	**FAIL** – Dedicated rail corridor and large stations (75 to 275 metres) do not fit with certain urban environments
	Urban Design	**FAIL** – Does not contribute to active/vibrant urban streets and separates communities with a fenced rail corridor
Service Quality **FAIL**	**System Compatibility**	**PASS** – Integration with other transit modes through inter-modal stations
	System Accessibility	**FAIL** – Stations are barrier-free, but high speed requires longer station spacing (four to 10 kilometres apart) reducing accessibility in study area
	Service Frequency	**FAIL** – Operates on fixed schedule and train length, and does not adapt well to varying demands
	User Experience	**PASS** - Comfortable ride, low-floor access and real-time on-board stop information. Attractive, weather protected stations with amenities
	Safety and Security	**FAIL** – Dedicated rail corridor requires secured access. Pedestrian crossing must be grade-separated which is not practical in downtown areas
Threshold Capacity **FAIL**	**Ridership/Capacity**	**PASS** – Smaller train length than is usual will meet current and future demands
	Speed	**FAIL** – Slow acceleration and high speeds of CRT do not support close station spacing needed in downtowns
	Cost Effectiveness	**PASS** - Capital cost per km = $5-15M, Vehicle Cost = $2.5-4.5M, capital cost with existing rail corridor is low

RAPID TRANSIT TECHNOLOGY EVALUATIONS

Rapid Transit Environmental Assessment

WHAT ARE DIESEL MULTIPLE UNITS?

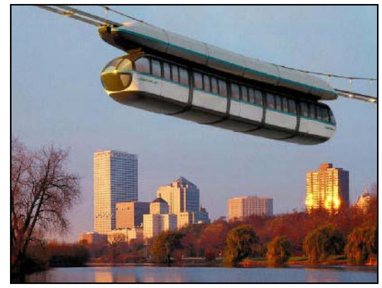
Diesel Multiple Units (DMUs) are self-propelled diesel powered vehicles operating in a railway right-of-way.

DMU Evaluation - FAIL

RGMS Reurbanization **FAIL**	System Flexibility	**FAIL** – Mainly limited to operating in a dedicated freight railway right-of-way
	Environmental Impacts	**FAIL** – Diesel trains create significant noise and emissions. Diesel-electric hybrids lessen this somewhat. Rail corridor must be fenced, which will separate neighbourhoods
	Land Use Compatibility	**FAIL** - Rail corridors typically separated from existing development, intensification around stations is limited
	Operating Constraints	**FAIL** – Cannot fit within some urban environments (e.g. downtown) unless a rail corridor exists
	Urban Design	**FAIL** – Does not contribute to active/vibrant urban streets and separates communities with a fenced rail corridor
Service Quality **FAIL**	System Compatibility	**PASS** – Integration with other transit modes through inter-modal stations
	System Accessibility	**FAIL** – Stations are barrier-free but station spacing is longer (1 kilometre or more) which limits accessibility within study area
	Service Frequency	**FAIL** – Operates on fixed schedule and vehicle length, and does not adapt well to varying demands
	User Experience	**PASS** - Comfortable ride, low-floor access and real-time on-board stop information. Attractive, weather protected stations with amenities
	Safety and Security	**FAIL** – Dedicated rail corridor requires secured access. Pedestrian crossing must be grade-separated which is not practical in downtown areas
Threshold Capacity **FAIL**	Ridership/Capacity	**PASS** – Up to 10,000 passengers per hour, which meets current and future needs
	Speed	**FAIL** – Slow acceleration and high speeds of DMUs do not support close station spacing needed in downtowns to support ridership growth
	Cost Effectiveness	**PASS** - Capital cost per km = $12-35M, Vehicle Cost = $3-5M, capital cost with existing rail corridor is moderate

WHAT IS AEROBUS?

Aerobus passengers are transported in a carrier suspended from an aerial cable system.



Aerobus Evaluation - FAIL

RGMS Reurbanization **FAIL**	System Flexibility	**FAIL** – Not adaptable to a range of operations including on-road and off-road route designs
	Environmental Impacts	**FAIL** – High towers are visually intrusive in both urban and suburban environments
	Land Use Compatibility	**FAIL** – Aerial technologies have not been shown to encourage land use intensification or support mixed-use development
	Operating Constraints	**FAIL** – Aerial systems are supported by high towers with large bases which do not fit well with the urban environment. Stations are usually spaced far apart
	Urban Design	**FAIL** – Visually intrusive, large towers are inconsistent with street-level urban revitalization obejctives
Service Quality **FAIL**	System Compatibility	**PASS** – Integration with other transit modes through inter-modal stations
	System Accessibility	**FAIL** – Longer station spacing (four kilometres) decreases accessibility within some areas of the study area
	Service Frequency	**FAIL** – Fixed schedule and vehicle configuration is less adaptable to changing demands
	User Experience	**PASS** – Large comfortable vehicles and high quality stations
	Safety and Security	**FAIL** – Elevated route design makes pedestrian and emergency access difficult
Threshold Capacity **FAIL**	Ridership/Capacity	**PASS** – Accommodates up to 5,000 passengers per hour, which meets current and future needs
	Speed	**FAIL** – Speed: 25 to 40 kilometres per hour, Frequency: 15 to 30 minutes – would reduce accessibility and fail to encourage ridership growth
	Cost Effectiveness	**FAIL** - Capital cost per km = $40-60M, Vehicle Cost = $3-5M, capital cost is high due to added structure costs of high towers

RAPID TRANSIT
TECHNOLOGY EVALUATIONS

WHAT IS AUTOMATED GUIDEWAY TRANSIT?

Automated Guideway Transit (AGT) systems are fully automated driverless trains operating in an exclusive right-of-way, typically on an elevated guideway or underground.

AGT Evaluation - FAIL

RGMS Reurbanization **FAIL**	System Flexibility	**FAIL** – Not adaptable to a range of operations including on-road and off-road route designs
	Environmental Impacts	**FAIL** – Elevated guideway is visually intrusive in both urban and suburban environments
	Land Use Compatibility	**PASS** – Compatible with higher density development and can positively influence land use intensification around stations
	Operating Constraints	**FAIL** – Elevated guideway best suited to large dense urban cores (1 million or more people) with tall buildings
	Urban Design	**FAIL** – Visually intrusive elevated guideway is inconsistent with street-level urban revitalization objectives
Service Quality **PASS**	System Compatibility	**PASS** – Integration with other transit modes through inter-modal stations
	System Accessibility	**PASS** – Stations are barrier-free and station spacing is short enough to allow good accessibility within study area
	Service Frequency	**PASS** – Increasing train length and frequency can accommodate changes in demand
	User Experience	**PASS** - Comfortable ride, low-floor access and real-time on-board stop information. Electrical power provides fast acceleration, smooth ride, stability and low internal noise
	Safety and Security	**PASS** – Elevated guideway eliminates conflicts with vehicular traffic and allows pedestrian access via stairs, escalators and elevators from ground level
Threshold Capacity **FAIL**	Ridership/Capacity	**PASS** – Average: 4,000 to 5,000 passengers per hour, which will meet current and future needs
	Speed	**PASS** – Speed: 30 to 40 kilometres per hour, Frequency: three to 10 minutes, will encourage ridership growth
	Cost Effectiveness	**FAIL** - Capital cost per km = $50-100M, Vehicle Cost = $0.8-2.7M, capital cost is high due to elevated structures and stations

Rapid Transit Environmental Assessment

RAPID TRANSIT TECHNOLOGY EVALUATIONS

WHAT IS MAGNETIC LEVITATION?

Magnetic Levitation (MAGLEV) keeps vehicles vertically separated from its running surface by magnetic force.

MAGLEV Evaluation - FAIL

RGMS Reurbanization **FAIL**	System Flexibility	**FAIL** – Not adaptable to a range of operations including on-road and off-road route designs
	Environmental Impacts	**FAIL** – Large elevated structures and tracks are visually intrusive, vehicle consume a large amount of electrical energy
	Land Use Compatibility	**FAIL** – Large elevated structures are incompatible with existing neighbourhoods and built heritage areas
	Operating Constraints	**FAIL** – Large elevated guideway not suitable for urban areas with moderate to lower development scale
	Urban Design	**FAIL** – Visually intrusive elevated guideway is inconsistent with street-level urban revitalization objectives
Service Quality **FAIL**	System Compatibility	**PASS** – Integration with other transit modes through inter-modal stations
	System Accessibility	**FAIL** – High speed requires longer station spacing (four to 10 kilometres) reducing accessibility within the study area
	Service Frequency	**PASS** –High demand periods are accommodated by providing more frequent service
	User Experience	**PASS** - Comfortable ride, low-floor access and real-time on-board stop information. Electrical power provides fast acceleration, smooth ride, stability and low internal noise
	Safety and Security	**PASS** – Elevated guideway eliminates conflicts with vehicular traffic and allows pedestrian access via stairs, escalators and elevators from ground level
Threshold Capacity **FAIL**	Ridership/Capacity	**PASS** – Accommodates up to 10,000 passengers per hour which will meet current and future needs
	Speed	**FAIL** – Speed: 100 kilometres per hour, Frequency: 15 to 30 minutes, does not encourage ridership growth
	Cost Effectiveness	**FAIL** - Capital cost per km = $50-100M, Vehicle Cost = $20M, capital cost is high due to elevated structures and stations

RAPID TRANSIT TECHNOLOGY EVALUATIONS

WHAT IS MONORAIL?

Monorail uses vehicles that straddle or are suspended from a single elevated supporting guideway beam.

Monorail Evaluation - FAIL

RGMS Reurbanization **FAIL**	System Flexibility	**FAIL** – Not adaptable to a range of operations including on-road and off-road route designs
	Environmental Impacts	**FAIL** – Elevated guideway is visually intrusive in both urban and suburban environments
	Land Use Compatibility	**PASS** – Compatible with built and planned higher density development and can positively influence land use intensification
	Operating Constraints	**FAIL** – Large elevated guideway not suitable for urban areas with lower development scale, best suited for heavily populated areas (one million or more)
	Urban Design	**FAIL** – Visually intrusive elevated guideway and stations are inconsistent with street-level urban revitalization objectives
Service Quality **PASS**	System Compatibility	**PASS** – Integration with other transit modes through inter-modal stations
	System Accessibility	**PASS** – Stations are barrier-free and station spacing is short enough to allow good accessibility within study area
	Service Frequency	**PASS** – High demand periods are accommodated by providing more frequent service
	User Experience	**PASS** - Comfortable ride, low-floor access and real-time on-board stop information. Electrical power provides fast acceleration, smooth ride, stability and low internal noise
	Safety and Security	**PASS** – Elevated guideway eliminates conflicts with vehicular traffic and allows pedestrian access via stairs, escalators and elevators from ground level
Threshold Capacity **FAIL**	Ridership/Capacity	**PASS** – Average: 1,500 to 2,000 passengers per hour, Peak: 6,500 passengers per hour, which will meet current and future needs
	Speed	**PASS** – Speed: 25 to 80 kilometres per hour, Frequency: five to 20 minutes
	Cost Effectiveness	**FAIL** - Capital cost per km = $75-125M, Vehicle Cost = $6-10M, capital cost is high due to elevated structures and stations

Rapid Transit
Environmental Assessment

RAPID TRANSIT TECHNOLOGY EVALUATIONS

WHAT IS PERSONAL RAPID TRANSIT?

Personal Rapid Transit (PRT) is a concept for small computer controlled units providing point-to-point service on an extensive guideway system. There are no PRT systems currently in operation.

PRT Evaluation - FAIL

RGMS Reurbanization **FAIL**	System Flexibility	**FAIL** – Not adaptable to a range of operations including on-road and off-road route designs
	Environmental Impacts	**FAIL** – Elevated guideway is visually intrusive in both urban and suburban environments
	Land Use Compatibility	**FAIL** – The spread out grid of elevated structures is unlikely to encourage station area development and land use intensification
	Operating Constraints	**PASS** – Could be suitable for some areas (i.e. downtowns) where an expansive grid of elevated guideway could fit within a number of constrained routes
	Urban Design	**FAIL** – Point-to-point nature of guideway network is inconsistent with street-level urban revitalization objectives
Service Quality **FAIL**	System Compatibility	**FAIL** – With no set schedule, integration and transfer time with local bus system is unpredictable
	System Accessibility	**FAIL** – Vehicles may not provide barrier-free access
	Service Frequency	**FAIL** – No system-wide applications in service to assess its effectiveness to accommodate fluctuations in demand and provide fast, reliable service
	User Experience	**FAIL** – No system-wide applications in service and test vehicles may not provide barrier-free access to ground level
	Safety and Security	**FAIL** – Elevated grid with many vehicle access points makes emergency and pedestrian access more difficult
Threshold Capacity **FAIL**	Ridership/Capacity	**FAIL** – No installations to provide operating experience, prototypes have limited capacity
	Speed	**FAIL** – No installations to provide operating experience, prototype operating speed is 50 to 80 kilometres per hour
	Cost Effectiveness	**FAIL** – No installations to provide system-wide costs

RAPID TRANSIT TECHNOLOGY EVALUATIONS

WHAT IS SUBWAY?

Subways, or underground heavy rail systems, are usually constructed below grade. High capacity rail cars operate in trains of two or more cars on steel rails.

Subway Evaluation - FAIL

RGMS Reurbanization **FAIL**	System Flexibility	**FAIL** – Not adaptable to a range of operations including on-road and off-road route designs
	Environmental Impacts	**FAIL** – Steel wheels on rails create noise, vibration is significant for heritage buildings
	Land Use Compatibility	**FAIL** – Not considered compatible with existing residential areas and sensitive land uses such as built heritage areas
	Operating Constraints	**FAIL** – Best suited for heavily populated urban areas with large, dense cores (one million or more people)
	Urban Design	**FAIL** – Underground routes stations inconsistent street-level urban revitalization objectives
Service Quality **PASS**	System Compatibility	**PASS** – Underground stations facilitate transfer to local bus system through elevator/escalator integration
	System Accessibility	**PASS** – Station spacing is short enough to allow good accessibility within downtowns
	Service Frequency	**PASS** – High demand periods are accommodated by increasing frequency of service
	User Experience	**PASS** – Average ride quality, large cars with ample seating, attractive stations with passenger amenities
	Safety and Security	**PASS** – Eliminates conflict with traffic, allows pedestrian access via stairs, escalators, elevators
Threshold Capacity **FAIL**	Ridership/Capacity	**FAIL** – Far exceeds capacity requirements of near and longer term demands
	Speed	**FAIL** – Speed: 30 to 60 kilometres per hour, Frequency: three minutes, greatly exceed anticipated ridership
	Cost Effectiveness	**FAIL** - Capital cost per km = $100-160M, Vehicle Cost = $2.5-3.5M, capital cost is very high with wide right-of-way, especially around stations

Rapid Transit
Environmental Assessment

Public Consultation Centre
Phase 2, Step 1
Short List of Technology and Route Design Alternatives

PUBLIC INPUT PACKAGE

Attachment to
INFORMATION HANDOUT

Region of Waterloo

Provide Your Input!

The Region of Waterloo requests input from the public on the questions offered on the attached Comment Sheet. All comments and information collected during Phase 2 will be considered during the selection of a Preferred Rapid Transit System. This Public Input Package is an attachment to the **Public Information Handout**, which contains detailed information about Region of Waterloo's Rapid Transit Environmental Assessment and the Phase 2 Public Consultation Centre.

What Happens Next?

The project team will review all input received during the public consultation process. During this review, the project team may also contact and respond to agencies, stakeholders and individuals wishing to discuss any aspect of the Phase 2 evaluation and comment on Rapid Transit technologies, routes and station locations.

At the conclusion of this Public Consultation process, the Project Team will present a recommended short list of rapid transit technologies to Regional Council for consideration.

Following this, the short list of technology and route design alternatives will be studied further during the next steps of Phase 2 with additional opportunities for public consultation. (Please see the Environmental Assessment Preliminary Timeline on Page 5 of the Public Information Handout).

How Do I Stay Informed?

Public consultation is a critical and ongoing part of the Environmental Assessment Process. The approved Terms of Reference, Phase 1 Report, Phase 2 evaluation results and a summary of public input is available on the Region's website at www.region.waterloo.on.ca/transitea along with other information related to the EA. The website will be updated regularly with information and notice of future public consultation events. If you would like to have your name added to the project mailing list, please go to the website and use the Sign Up feature, or provide your name, postal address, e-mail address and any group affiliation to:

Rapid Transit Environmental Assessment
Region of Waterloo
150 Frederick Street, 8th Floor
Kitchener, ON N2G 4J3
Phone: 519-575-4757, ext. 3242
Fax: 575-4449
e-mail: rtinfo@region.waterloo.on.ca

Yanick Cyr, P. Eng., CFM
Project Director

COMMENT SHEET
Rapid Transit Environmental Assessment (EA)
Phase 2

Please complete and hand in this Comment Sheet in the Comment Box so your views can be considered during the assessment of a preferred rapid transit system for Waterloo Region. If you wish to prepare your comments later, please mail, fax or e-mail your comments no later than **January 26, 2007** to:

Rapid Transit Environmental Assessment
150 Frederick Street
Kitchener, ON N2G 4J3
Phone: 519-575-4757, ext. 3242
Fax: 575-4449
E-mail: rtinfo@region.waterloo.on.ca

1. The Rapid Transit Project Team is proposing that Bus Rapid Transit and Light Rail Transit operating at road level using a mix of on-road and off-road dedicated right of ways be short-listed for further evaluation in the next step of Phase 2 of the EA. Do you agree that these technology and route design alternatives be short-listed for further evaluation in the next step? Why or why not?

2. Was the format and content of the information presented at this Public Consultation Centre informative and useful to you?

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3. How would you like to be kept informed about the progress of the Rapid Transit Environmental Assessment? Please check those methods you prefer most.

☐ E-Mail ☐ Website ☐ Direct Mail/Newsletter ☐ Media ads ☐ News stories

☐ Other ____

4. How did you hear about this Public Consultation Centre? Please check all.

☐ E-Mail ☐ Rapid Transit Newsletter ☐ Newspaper ad ☐ TV ad

☐ Website ☐ News story ☐ Other (please specify) ___________________

Other Comments:

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Phase 2
Public Input Package

Your Name:____

Mailing Address:____

Postal Code: ____

Phone Number:____

E-mail: ____

Please fill in all contact information, including e-mail, if you would like to be added to the Rapid Transit Contact List and receive notification of project updates and upcoming events and meetings. You can also sign up on-line at www.region.waterloo.on.ca/transitea.

Thank you for your input.

COLLECTION NOTICE: All comments and information received from the public, stakeholder groups and agencies regarding the EA project are being collected to assist the Region in meeting the requirements of the OEAA and CEAS. Under the *Freedom of Information and Protection of Privacy Act* and the *Environmental Assessment Act*, unless otherwise stated in the submission, any personal information such as name, address, telephone number and property location included in the submission from the public will become part of the public record files for this matter and can be released, if requested, to any person.