



Public Workshop  
**Phase 2, Step 2**  
Preliminary Routes and Station Locations

# BACKGROUND INFORMATION



Region of Waterloo

## The Rapid Transit Initiative and Growth Management

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 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 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.

### What is 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. By operating separately from traffic, rapid transit is a more efficient and effective way to travel in the Region. Experiences in other communities have proven that rapid transit encourages commuters to choose transit over private vehicles. The Region of Waterloo is currently carrying out an Environmental Assessment for the development of a rapid transit system from north Waterloo to south Cambridge.

Rapid transit is an integral part of the Region's Growth Management Strategy, and is expected to be reflected in the Regional Transportation Master Plan (RTMP). The RTMP is currently being updated to create a long-term sustainable community transportation vision for Waterloo Region that will include future planning for rapid and conventional transit, roads, pedestrians and cyclists.

### What is an Environmental Assessment?

An 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. The Terms of Reference provide binding approval on what must be addressed in the EA. In July 2005, the Ontario Minister of the Environment approved the Terms of Reference for this Rapid Transit Environmental Assessment. To view a copy, please visit the Region's website at [www.region.waterloo.on.ca/transitea](http://www.region.waterloo.on.ca/transitea).

## Rapid Transit Environmental Assessment Phase 1:

Phase 1 of the Rapid Transit Environmental Assessment evaluated the Rapid Transit Initiative and Alternative Transportation Strategies for Waterloo Region. Regional Council approved the Rapid Transit Initiative as the preferred transportation strategy for Waterloo Region on July 12, 2006.

The Rapid Transit Initiative and three alternative transportation strategies were evaluated:

### Baseline Alternative (or do nothing)

- Mainly suburban growth with little reurbanization of the built up areas of the three urban centres and the townships
- Minimal transportation system improvements including little change to the conventional transit system except for express bus service, some roadway expansion limited to suburban areas where growth will occur
- Transportation Demand Management (TDM) policies and programs (e.g. promoting cycling and walking) will be implemented to limit the growth of single occupant vehicle traffic

### Road Improvement and Expansion Alternative

- Mainly suburban growth with little reurbanization of the built up areas of the three urban centres and the township
- Significant transportation system improvements including widening of existing roads and expanding new roads into the undeveloped greenfields areas where most growth will occur, no road expansion in the Central Transit Corridor (CTC)
- Minimal expansion of conventional transit service except for express bus service in the CTC

### Improved Conventional Transit Alternative

- A mix of targeted greenfield development and some land use intensification in particular in the CTC
- Moderate transportation system improvements with emphasis on improving bus service throughout the three urban centres and the townships, new express bus service will be implemented within the CTC with operational improvements and bus priority targeted to enhance transit service levels
- Some suburban expansion will have targeted roadway enhancements and added road capacity
- Transportation Demand Management (TDM) policies and programs (e.g. promoting cycling and walking) will be implemented to limit the growth of single occupant vehicle traffic

The Rapid Transit Initiative and the three alternative transportation strategies were evaluated using 15 criteria related to the RGMS. The Rapid Transit Initiative was found to:

- Best achieve the goals of the RGMS and the Provincial growth plan
- Support the Region's reurbanization objectives, downtown revitalization and innovative urban design
- Increase transportation choice and transit ridership
- Provide a safe mode of transportation and promote active and healthy lifestyles
- Use the least amount of land and minimize the impact on air quality

The Improved Conventional Transit alternative was **not** chosen because:

- Ridership growth is limited over the longer term by slower and longer travel times related to lower density development and congested roads; and
- It results in higher emission levels, more land consumption and pressure on the countryside line.

The Baseline and Road Improvement and Expansion alternatives were **not** chosen because:

- There is limited ability to stimulate intensification to meet the requirements of the Province's Places to Grow Proposed Growth Plan;
- They are not consistent with Regional Growth Management Strategy goals and do not conform with Provincial Policy Statement and Places to Grow Proposed Growth Plan for the Greater Golden Horseshoe; and
- They would have significant negative impacts on the natural and social environments over the long term.

## Phase 2:

Phase 2 of the Environmental Assessment began in July 2006. The purpose of Phase 2 is to evaluate and rank 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 RGMS. It is a three-step process:

*Step 1:* Screening of alternative technologies and route designs

*Step 2:* Evaluation and ranking of reasonable technologies, route and station locations

*Step 3:* Evaluation of rapid transit system alternatives and selection of a preferred system

### Step 1:

Step 1 evaluated 10 technologies and their associated route designs. To view detail of the characteristics of the technologies that were considered, please see **Appendix A**. The consultant team used three criteria and measures developed in consultation with the public:

| Evaluation Criteria  | Public Input  | Evaluation Measures   | Description of Considerations  |
|--|---|---|--|
| <p><b>Regional Growth Management Strategy (RGMS) Reurbanization Objectives</b></p> <p><b>Is the route design consistent with municipal urban design, intensification and reurbanization objectives?</b></p> <p>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.</p> | <p><b>System Flexibility</b></p> <p><b>Environmental Impacts</b></p> <p><b>Land Use Compatibility</b></p> <p><b>Operating Constraints</b></p> <p><b>Urban Design Objectives</b></p> | <p>Is the route design and technology alternative adaptable to the physical landscape and environmental characteristics that would be encountered in Waterloo Region? Can it easily accommodate future expansion of the system to meet demand? Can it be integrated with other urban transit systems?</p> <p>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.</p> <p>Is the route design and technology alternative compatible with established residential neighbourhoods, commercial districts and existing sensitive land use like built heritage and cultural landscapes? Can it influence intensification and complement planned mixed-use development areas within the urban cores?</p> <p>Can the route design and technology alternative be scaled to physically fit within the urban environment and areas designated for intensification?</p> <p>Is the route design and technology alternative consistent with municipal urban design guidelines?</p> | <ul style="list-style-type: none"> <li>▪ Fitting a new rapid transit system into an existing urban area may require some adjustment to existing conditions</li> <li>▪ Integration with local bus service</li> <li>▪ Route design influences the ability of a rapid transit system to readily expand</li> <li>▪ Air quality, noise and vibration are largely technology dependent. The impacts may be influenced by route design</li> <li>▪ Visual intrusion is impacted by route design</li> <li>▪ 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</li> <li>▪ Technology, route design and placement of stations may influence development patterns</li> <li>▪ Route design has impacts on the urban landscape and the degree of fit with existing and planned land uses especially in the cores</li> <li>▪ Unique urban design guidelines may be developed for various communities</li> <li>▪ The RGMS envisions a vibrant, street-level, pedestrian-oriented urban design concept within the central areas.</li> </ul> |

| Evaluation Criteria  | Public Input  | Evaluation Measures   | Description of Considerations   |
|--|---|---|---|
| <p><b>Service Quality</b></p> <p><b>Are there proven applications of the method in comparable settings?</b></p> <p>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.</p> | <p><b>System Compatibility</b></p> <p><b>System Accessibility</b></p> <p><b>Service Frequency</b></p> <p><b>User Experience</b></p> <p><b>Safety and Security</b></p> | <p>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?</p> <p>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?</p> <p>Is the route design and technology alternative adaptable to accommodate fluctuations in demands to ensure fast, reliable service?</p> <p>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?</p> <p>Are safety and security risks to transit patrons and other modes (including automobile traffic and pedestrians) acceptable?</p> | <ul style="list-style-type: none"> <li>▪ System compatibility is influenced by technology, route design and fixed facilities design</li> <li>▪ System accessibility is influenced by technology/fixed facilities and freedom of passenger movement around stations</li> <li>▪ Service frequency is influenced by a combination of technology and route design in attaining reliable service</li> <li>▪ The ability to provide improved customer service is influenced by a combination of technology, route design and fixed facility design</li> <li>▪ Safety and security is influenced by the degree of separation of technology and route design from other modes and risks to transit users</li> </ul> |
| <p><b>Threshold Capacity</b></p> <p><b>Is the capacity of the technology appropriate for the expected transit demand?</b></p> <p>The technology should be of sufficient capacity to accommodate the forecast ridership demand in a cost-effective manner.</p>  | <p><b>Ridership/ Capacity</b></p> <p><b>Speed</b></p> <p><b>Cost-effectiveness</b></p>  | <p>Is the technology capacity appropriate relative to near and longer term projected ridership demands?</p> <p>Does the frequency of the vehicles and acceleration/operating speeds between stations support ridership forecast and station spacing?</p> <p>Are the capital, operating and maintenance expenditures costs of the order of magnitude relative to industry benchmarks?</p>  | <ul style="list-style-type: none"> <li>▪ Capacity is influenced by a combination of technology and route design</li> <li>▪ 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</li> <li>▪ Capital, operating and maintenance costs are determined by route design and technology</li> </ul>  |

Regional Council approved Bus Rapid Transit (BRT) and Light Rail Transit (LRT) operating both on and off road as the short list of technologies for further evaluation on Feb. 28, 2007.

These route design/technology alternatives were selected because:

- They support the Region's reurbanization and intensification objectives and offer the best potential to encourage a more compact urban form with pedestrian friendly urban design and street-level development around stations
- They optimize the use of existing off-road routes and on-road routes to serve major destinations
- They are compatible with existing and planned neighbourhoods
- They will best reduce the growth of traffic congestions and associated air quality concerns

The selected technology and route design alternatives work together to provide the best fit for a rapid transit system in Waterloo Region. 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.

The other technology and route design alternatives that were evaluated 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. To view the summary of Route Design and Technology Evaluation Results, see **Appendix B**.

## Step 2:

At the Sept. 21, 2006 Public Workshop, we asked participants what possible destinations rapid transit should serve and where stations should be located in order to get people where they want to go. The Region's consultants reviewed input from the public in consultation with the Local Municipalities to develop preliminary route and station location alternatives for each of the seven segments of the study area:

- Uptown to North Waterloo
- Uptown Waterloo to Downtown Kitchener
- Downtown Kitchener to South Kitchener (Fairview Park Mall)
- South Kitchener to Cambridge (Preston)
- Preston Towne Centre to the Delta
- Hespeler Road
- The Delta to South Cambridge

The Region's consultant team then assessed suggested routes and station locations based on the following considerations:

- Do the proposed routes offer a relatively direct connection to the proposed stations in order to improve travel times?
- Do the proposed routes and stations minimize potential disruption to environmentally sensitive areas and mature neighbourhoods?
- Do the potential corridors have a reasonable right-of-way width to accommodate either Bus Rapid Transit or Light Rail Transit?
- Is there reurbanization potential around the station areas?
- Are there constraints such as mature neighbourhoods or environmentally sensitive areas that would restrict station development opportunities?

## Next Steps:

The consultant team will use public input collected at workshops held on March 20, 21 and 22, 2007, as well as 21 criteria from the Rapid Transit Environmental Assessment Terms of Reference to rank the alternative routes and station locations. The criteria can be summarized as follows: (For additional information on the evaluation process and criteria, please consult the Rapid Transit Environmental Assessment Terms of Reference.)

|                                   |   |  |
|-----------------------------------|---|--|
| <b>Transportation</b>             | <b>Ridership potential</b>                      | Potential number of riders and the percentage share of all trips made  |
|                                   | <b>System reliability/speed</b>                 | Ability of alternate technologies to provide on-time performance and consistency of travel time  |
|                                   | <b>System performance</b>                       | Rapid transit speed, average travel time and vehicle-kilometres of travel within the study area  |
|                                   | <b>Property requirements</b>                    | Number of hectares and the cost of the land that may need to be purchased  |
|                                   | <b>Travel time competitiveness with auto</b>    | Estimated future travel times and trip length for transit versus auto  |
|                                   | <b>Roadway network</b>                          | Forecast change in traffic volumes on the rapid transit route and nearby roads   |
| <b>Socio/Cultural Environment</b> | <b>Ability to serve residential uses</b>        | Number of existing and potential residents and affordable housing units within 600 metres (10-minute walk) of all proposed stations along the route              |
|                                   | <b>Ability to serve institutional uses</b>      | Number of existing and potential institutional uses (schools, universities, etc.) and projected users within 600 metres of all proposed stations along the route |
|                                   | <b>Vibration</b>                                | Number of existing and potential buildings within 50 metres of the route   |
|                                   | <b>Noise</b>                                    | Potential impact on noise-sensitive lands  |
|                                   | <b>Contribution to cultural environment</b>     | Total number of existing and potential cultural attractions within 600 metres of all proposed stations along the route   |
|                                   | <b>Contribution to recreational environment</b> | Total number of existing and potential recreation uses within 600 metres of all proposed stations along the route  |
|                                   | <b>Contribution to public health</b>            | Average percentage of transit trips that include cycling or walking to transit stations and the number of auto trips converted to transit trips                  |
|                                   | <b>Contribution to built heritage</b>           | Total number of designated heritage properties and buildings within 600 metres of all proposed stations along the route  |

|                            |  |  |
|----------------------------|--|--|
| <b>Natural Environment</b> | <b>Ecological impact</b>                             | Potential impact of noise, light and vibration on important natural heritage features along the route                                    |
|                            | <b>Water quality</b>                                 | Potential impact of required salting or similar deicing compounds  |
|                            | <b>Air quality</b>                                   | Overall potential impact of harmful emissions, as well as potential benefits of reduced auto use (i.e. reduces greenhouse gas emissions) |
|                            | <b>Mineral Aggregate Resources</b>                   | Potential impact on area mining or quarry operations   |
| <b>Economic Impact</b>     | <b>Ability to serve concentrations of employment</b> | Number of existing and potential employment opportunities within 600 metres of all proposed stations along the route                     |
|                            | <b>Ability to serve retailers</b>                    | Existing and potential retail space and customer-bases within 600 metres of all proposed stations along the route                        |
|                            | <b>Cost</b>  | Estimated capital cost, and operations and maintenance cost associated with technology and route options                                 |

Once the evaluation is complete, the Region's Rapid Transit Project Team will present a series of ranked route and station location alternatives to the public for additional input at a Public Consultation Centre later this spring.

**Step 3:**

The best combination of routes and station locations throughout the study area will then be determined in order to make up the best overall rapid transit system for Waterloo Region. The results will be brought before Regional Council for consideration.

**For more information on the Rapid Transit Initiative or the Rapid Transit Environmental Assessment, visit the Region's website at [www.region.waterloo.on.ca/transitea](http://www.region.waterloo.on.ca/transitea). You can also contact the Rapid Transit Infoline at (519) 575-4757, ext. 3242 or [rtinfo@region.waterloo.on.ca](mailto:rtinfo@region.waterloo.on.ca).**

**Yanick Cyr, P.Eng., CFM  
Project Director, Rapid Transit Initiative**

# APPENDIX A – Characteristics of Rapid Transit Technologies Reviewed During Phase 2, Step 1

| Route Design Option                                 | Dedicated On-Road (separate bus/rail lane)<br>Dedicated Off-Road (transitway/rail line)<br>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   |
|   |    |    |    |    |   |    |    |   |    |   |
| <b>Description</b>                                  | <ul style="list-style-type: none"> <li>Uses large rubber-tired buses</li> <li>Runs in either dedicated bus lanes where regular traffic is prohibited or separate roadways called transitways</li> </ul> | <ul style="list-style-type: none"> <li>Uses steel wheeled vehicles</li> <li>Runs on steel rails embedded in the road surface or on a separate rail line</li> <li>Can range from streetcars, trams comprised of multiple vehicles to light weight rail vehicles</li> </ul> | <ul style="list-style-type: none"> <li>Uses traditional passenger rail cars (i.e. single or bi-level cars) pulled by a locomotive</li> <li>Operates on existing freight or passenger rail lines (e.g. CN or CP) serving urban areas</li> </ul> | <ul style="list-style-type: none"> <li>A form of Light Rail Transit that can operate only on its own rail line, not on an urban roadway</li> <li>Vehicles operate in one to three car trains</li> </ul> | <ul style="list-style-type: none"> <li>Suspended from an overhead guideway</li> <li>Propelled by electric motors</li> <li>Can operate as a single car (module), often combined with up to 12 others</li> <li>Used to span difficult terrain such as ski lifts</li> </ul> | <ul style="list-style-type: none"> <li>Runs on an overhead guideway</li> <li>Uses driverless, steel-wheeled train vehicles running on rail tracks</li> <li>Must be separated from road traffic</li> </ul> | <ul style="list-style-type: none"> <li>Runs on an overhead guideway</li> <li>Uses magnetic forces to hover above the track and propel it along the guideway</li> <li>Can travel at very high speeds of up to 500km/h</li> </ul> | <ul style="list-style-type: none"> <li>Runs on an overhead guideway</li> <li>Rubber-tired vehicle straddle the guideway along a single beam, rail or tube</li> <li>Typically operates as a shuttle service at tourist attractions</li> </ul> | <ul style="list-style-type: none"> <li>Runs on an automated guideway</li> <li>Small vehicles that carry four to eight people</li> <li>No active systems in operation</li> </ul> | <ul style="list-style-type: none"> <li>Provides frequent, high capacity rail-based services within urban areas</li> <li>Typically uses steel-wheeled vehicles on steel tracks powered by electricity</li> <li>Can run below or at-grade in a separate rail line</li> </ul> |
| <b>Power Source/ Propulsion</b>                     | 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  |
| <b>Typical Station Spacing</b>                      | 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  |
| <b>Typical Application</b>                          | Urban/Suburban  | Urban/Suburban  | Inter-Urban  | Suburban/Inter-Urban  | Suburban/Inter-Urban   | Urban/Suburban  | Inter-Urban   | Urban – Theme parks  | Urban/Suburban  | Urban/Suburban   |
| <b>Vehicles seated capacity</b>                     | 40 standard<br>69 articulated<br>85 double articulated  | 65-85   | 100-150  | 45 – 90   | 80   | 30-75   | 100-150   | 40-190   | 2-8   | 60-80  |
| <b>Typical Frequency of Service</b>                 | 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   |
| <b>Passengers per hour per direction</b>            | 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  |
| <b>Typical Capital Infrastructure Cost (per km)</b> | \$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)<br>\$30 – 50 M (at grade)   |
| <b>Typical Vehicle costs</b>                        | \$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  |
| <b>Canadian Examples</b>                            | Ottawa<br>York Region – Viva<br>Vancouver<br>Calgary<br>Halifax<br>Mississauga  | Ottawa (in design)<br>Calgary<br>Edmonton   | Toronto<br>Montreal<br>Vancouver   | Ottawa – O-Train  | Niagara Falls  | Toronto – Pearson Airport<br>Scarborough – SRT  | None  | None   | None  | Toronto<br>Montreal  |

RAPID TRANSIT ROUTE DESIGN AND TECHNOLOGY SCREENING - EVALUATION SUMMARY

| Criteria from Terms of Reference      | Route Design            | Dedicated On-Road (separate bus/rail lane)<br>Dedicated Off-Road (transitway/rail line)<br>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 |
| <b>Evaluation Measures</b>            |                         |   |                          |   |                              |  |                                  |                              |          |                              |        |
| <b>RGMS Reurbanization</b>            | System Flexibility      | ●   | ●                        | ○                                       | ○                            | ○  | ○                                | ○                            | ○        | ○                            | ○      |
|                                       | Environmental Impacts   | ●   | ●                        | ○                                       | ○                            | ○  | ○                                | ○                            | ○        | ○                            | ○      |
|                                       | Land Use Compatibility  | ●   | ●                        | ○                                       | ○                            | ○  | ●                                | ○                            | ●        | ○                            | ○      |
|                                       | Operating Constraints   | ●   | ●                        | ○                                       | ○                            | ●  | ○                                | ○                            | ○        | ●                            | ○      |
|                                       | Urban Design Objectives | ●   | ●                        | ○                                       | ○                            | ○  | ○                                | ○                            | ○        | ○                            | ○      |
| <b>Overall Grade for Criterion #1</b> |                         | ●   | ●                        | ○                                       | ○                            | ○  | ○                                | ○                            | ○        | ○                            | ○      |
| <b>Service Quality</b>                | System Compatibility    | ●   | ●                        | ●                                       | ●                            | ●  | ●                                | ●                            | ●        | ○                            | ●      |
|                                       | System Accessibility    | ●   | ●                        | ○                                       | ○                            | ●  | ●                                | ○                            | ●        | ○                            | ●      |
|                                       | Service Frequency       | ●   | ●                        | ○                                       | ○                            | ○  | ●                                | ●                            | ●        | ○                            | ●      |
|                                       | User Experience         | ●   | ●                        | ●                                       | ●                            | ●  | ●                                | ●                            | ●        | ○                            | ●      |
|                                       | Safety and Security     | ●   | ●                        | ○                                       | ○                            | ○  | ●                                | ●                            | ●        | ○                            | ●      |
| <b>Overall Grade for Criterion #2</b> |                         | ●   | ●                        | ○                                       | ○                            | ○  | ●                                | ○                            | ●        | ○                            | ●      |
| <b>Threshold Capacity</b>             | Ridership/Capacity      | ●   | ●                        | ●                                       | ●                            | ●  | ●                                | ●                            | ●        | ○                            | ○      |
|                                       | Speed                   | ●   | ●                        | ○                                       | ○                            | ●  | ●                                | ○                            | ●        | ○                            | ○      |
|                                       | Cost Effectiveness      | ●   | ●                        | ●                                       | ●                            | ○  | ○                                | ○                            | ○        | ○                            | ○      |
| <b>Overall Grade for Criterion #3</b> |                         | ●   | ●                        | ○                                       | ○                            | ○  | ○                                | ○                            | ○        | ○                            | ○      |
| <b>Results of Overall Screening</b>   |                         | ●   | ●                        | ○                                       | ○                            | ○  | ○                                | ○                            | ○        | ○                            | ○      |



PASS



FAIL