steer davies gleave

Hurontario-Main LRT (HMLRT)

-Educational Workshop

Alan Jones, Director, Steer Davies Gleave

City of Mississauga

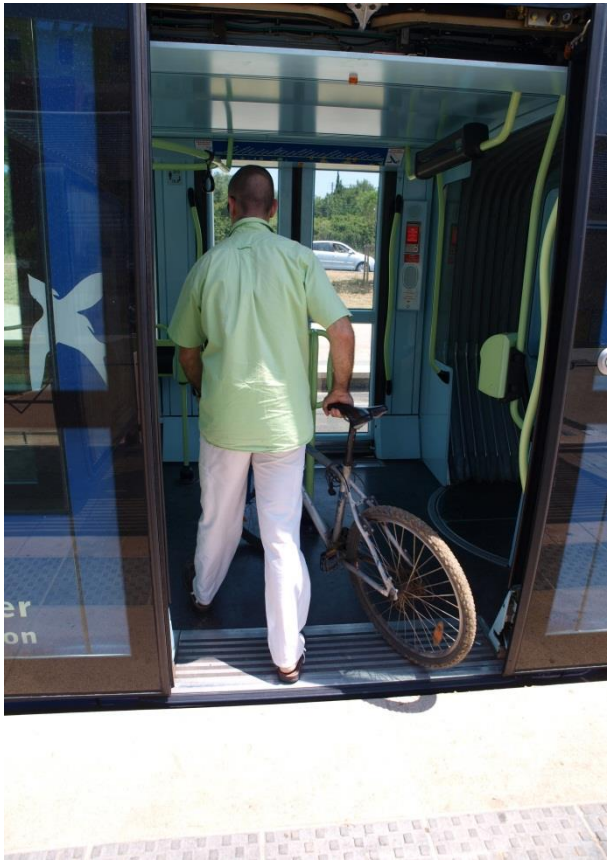
March 4th, 2015

MISSISSAUGA

WHAT IS URBAN STYLE LRT ?

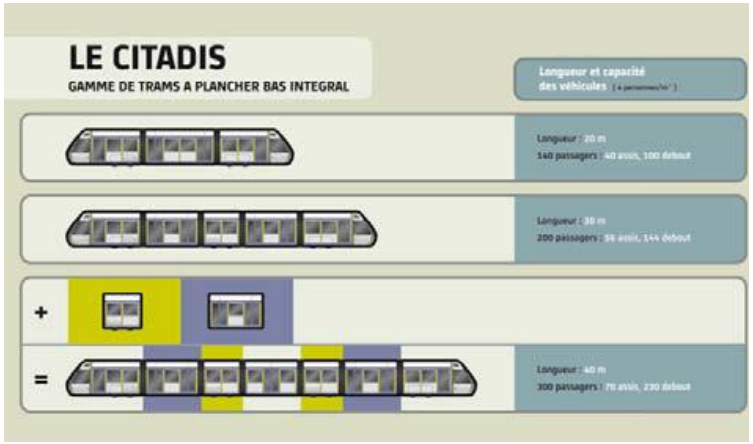
Urban Style LRT- Key Components

Low floor level boarding- Access for All

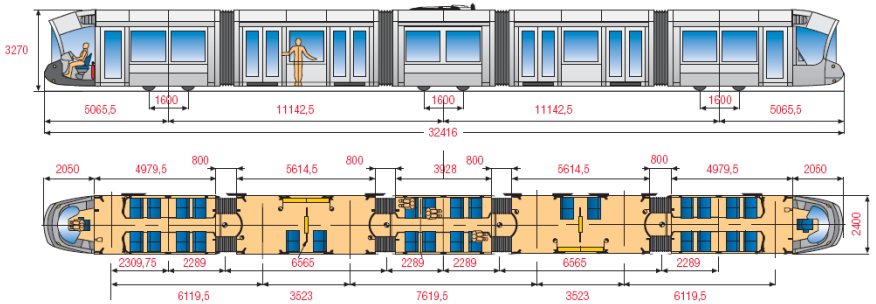


Light Rail Vehicles- modular design, 200+ passengers

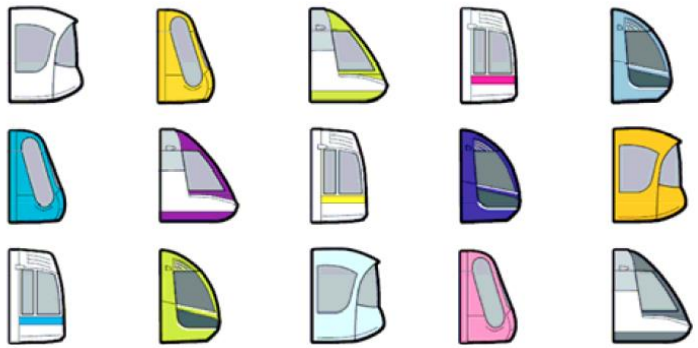
Light Rail Vehicle Options & Examples



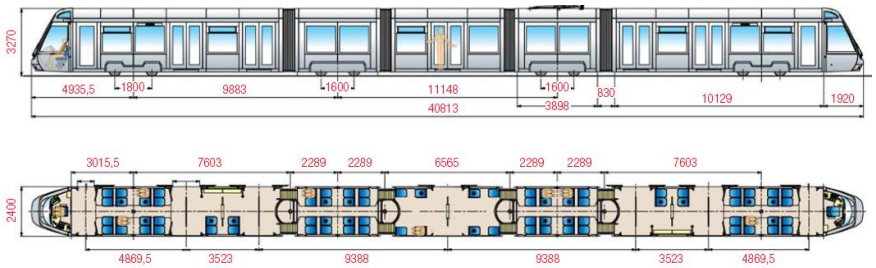
Vehicle Arrangement Options



- Lyon, France – 32.4m long (full low floor access)
- 56 seated, 145 standing – 201 passengers total (4 passengers/m^2)



Vehicle Cab Options



- Dublin, Ireland – 40.8m long (partial low floor with full low floor access)
- 80 seated, 230 standing – 310 passengers total (5 passengers/m^2)

* Images & information supplied courtesy of Alstom

Light Rail Vehicles- can be coupled to increase capacity

LRT on exclusive right of way- speed & reliability

A Complete Street Design Approach

LRT- as part of an integrated transit network

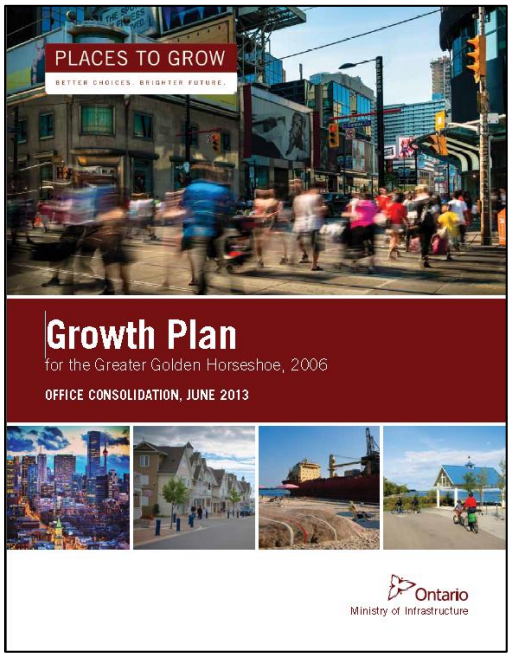
New LRT and New TOD Development

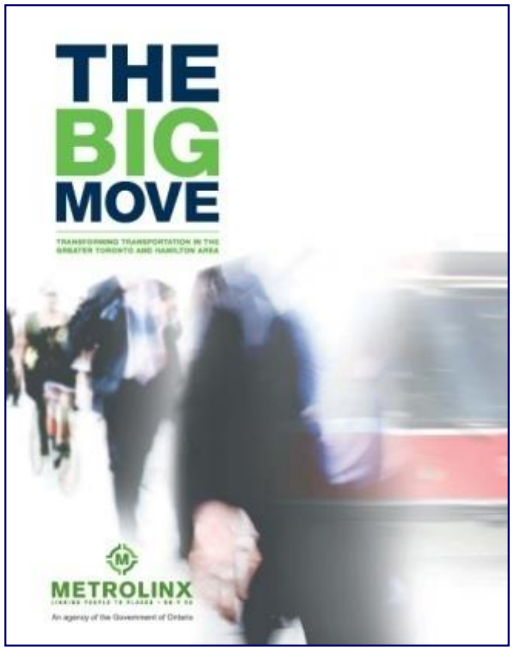
Designed to operate in all weather conditions

METROLINX

Metrolinx Transit Planning Process

- Complementary to Ontario Places to Grow
  - Urban Growth Centres, Mobility Hubs, Intensification Corridors, Transit Corridors
- Big Move- Review & prioritisation of transit projects
- Benefit case assessment (BCA) of projects
- **Multiple Account Evaluation** approach
  - Transportation
  - Financial
  - Environment
  - Economic development
  - Socio-community
- Hurontario Main LRT in Top 15 Priority Project List
- BCA examined BRT & LRT options

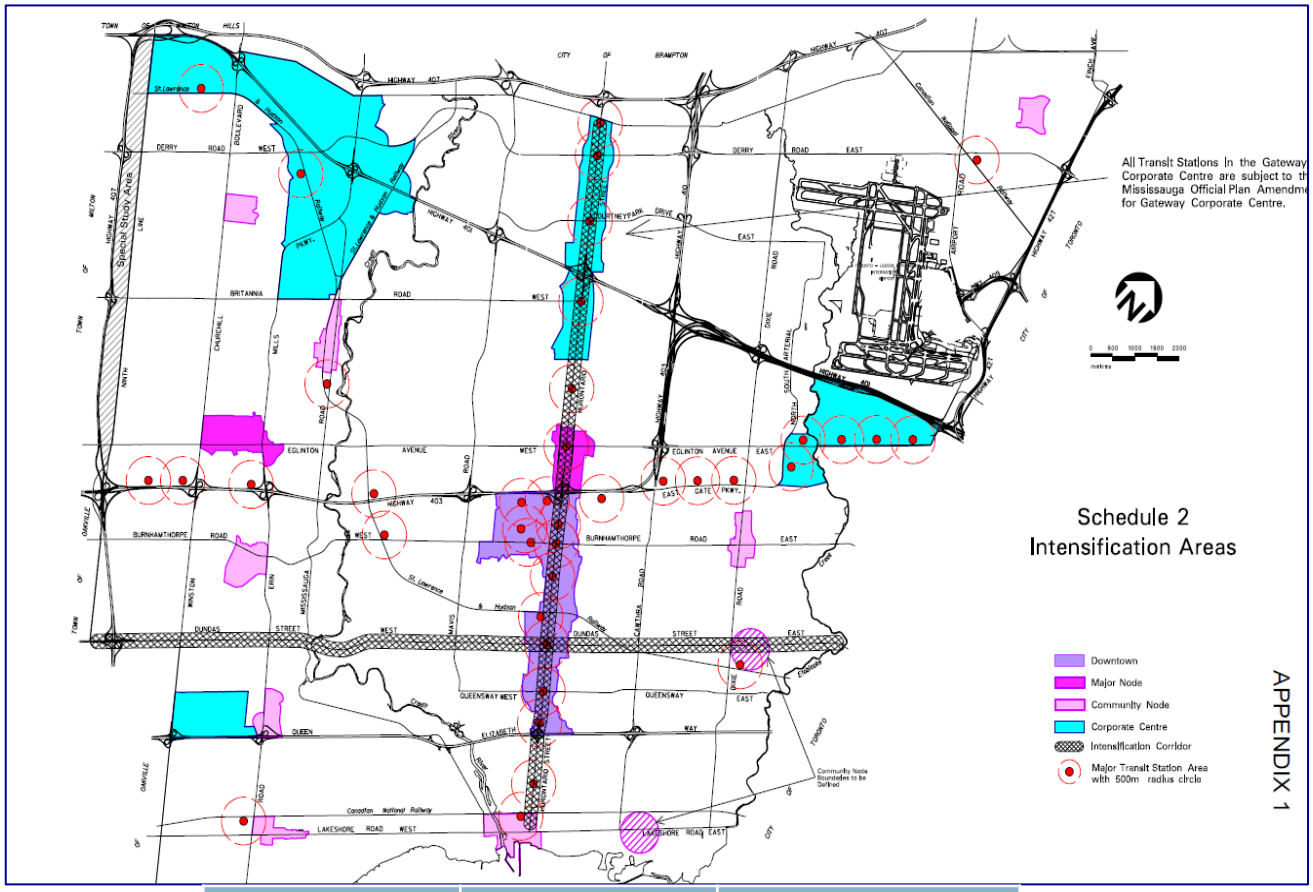




MISSISSAUGA


Our Vision
for the Future
Mississauga will inspire the world as a dynamic and beautiful global city for creativity and innovation, with vibrant, safe and connected communities; where we celebrate the rich diversity of our cultures, our historic villages, Lake Ontario and the Credit River valley.
A place where people choose to be.
move
belong
connect
prosper
green
strategicplan
Our Future Mississauga
move
developing a transit-oriented city
Direction Our Future Mississauga is a city where people can get around without an automobile, and where transit will directly influence and shape the form of the city. Transit will be a desirable choice that connects people to destinations, and will underpin an environmentally responsible, inclusive, vibrant and successful city.
Principle Mississauga is a city that values clean air and healthy lifestyles through the promotion of transit as a preferred, affordable and accessible choice.
Strategic Goals
Develop Environmental Responsibility – to contribute to environmental responsibility by reducing private automobile use and developing compact mixed-use development.
Connect our City – to contribute to a vibrant, successful city by connecting communities within Mississauga and within the Greater Golden Horseshoe to support a 24-hour city.
Build a Reliable and Convenient System – to make transit a faster and more affordable alternative to the automobile, one that is frequent, clean, safe, reliable and convenient, with a transit stop within walking distance of every home and an intricate web of higher order transit.
Increase Transportation Capacity – to add capacity to the transportation system through strategic investments in transit, additional lines in the street network and active mobility choices.
Direct Growth – to direct growth by supporting transit-oriented development policies and deliberate civic actions.

Mississauga's Future Land Use: A focus on Intensification

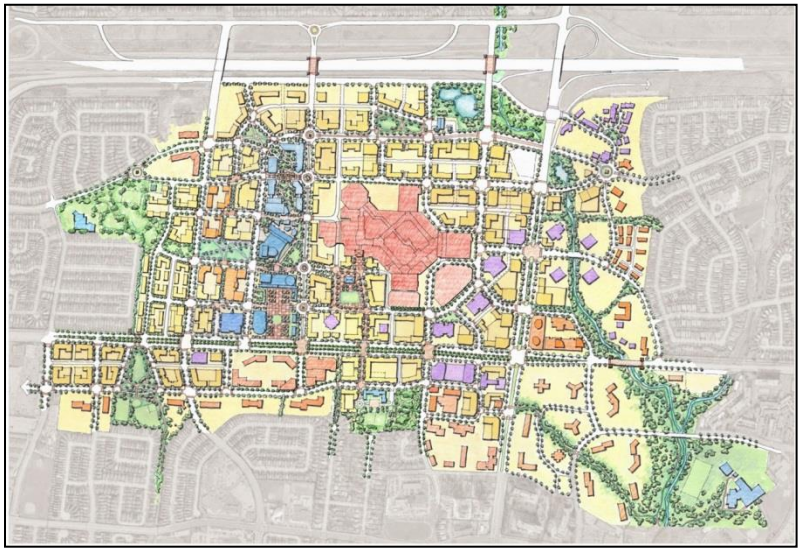


	Population	Employment
2011	743,000	448,000
2031	829,000	527,000
2041	878,000	552,000

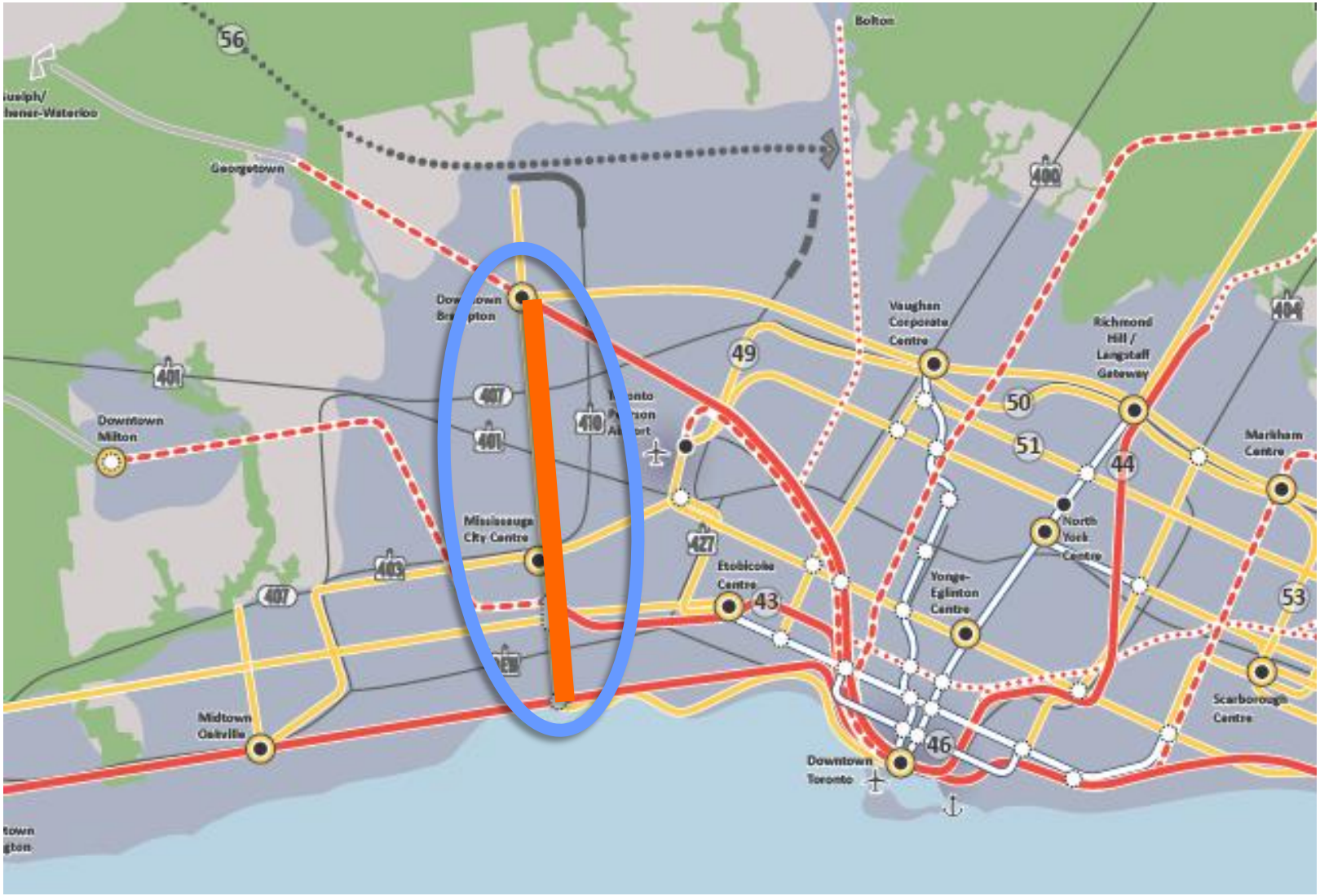
Downtown21 Master Plan

- ***Creating an Urban Place in the Heart of Mississauga***

- Designated Urban Growth Centre
- Already a focus of major growth- condo development, Sheridan etc
- And the focus for future development



Hurontario Main LRT: Regional Context



Transit Choices

Transit Choice- Key Factors

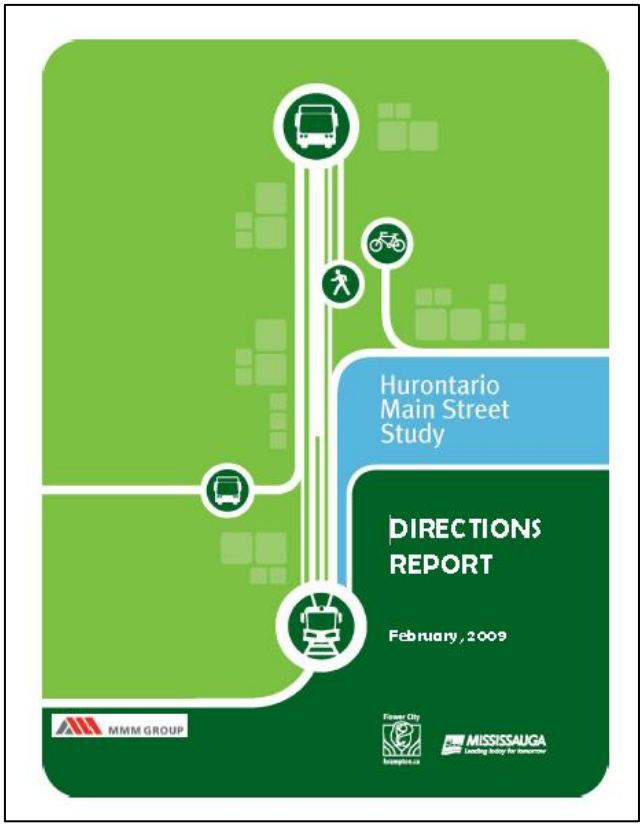
- Land Use- population & employment density- now/future
- Wider city-shaping objectives
- Use hierarchy- pedestrian/cycle/transit/auto
- Think Network !
- Transit Corridor- route length, stop spacing
- Type of operation- local, express, regional
- Right of Way, Technology, Type of Service
- Transit Choices- local bus, express bus, BRT, LRT, Subway
- Comfort, accessibility, available seat, journey length/time
- Capital cost
- Operating cost

Hurontario Main Corridor- Earlier Transit Assessments

- **Hurontario Main Street Directions Report (2009)**
  - Screened out subway, automated guided transit and monorail
  - BRT and LRT options recommended for further assessment
- **Hurontario Main Street Corridor Master Plan (2010)**
  - Alternative A: LRT entire route
  - Alternative B: LRT Port Credit-Downtown Mississauga, BRT to Brampton
  - Alternative C: BRT entire route
- **Metrolinx Benefit Cost Assessment (2010)**
  - Option 1: LRT Port Credit to Downtown Brampton
  - Option 2: BRT Port Credit to Downtown Brampton
  - Option 3: LRT Port Credit to Mississauga City Centre, BRT Mississauga City centre to Downtown Brampton

Backgrounder- Directions Report (2009)

- Review of Hurontario Main Street Corridor
- Consistent with Places to Grow
- Reviewed Land Use and potential for growth
- Focus on Character Areas
- Review of Transit Technologies
- Subway, Automated Guided Transit and Monorail screened out:
  - Capacity requirements
  - Cost considerations
  - Suitability for the Built Environment
  - Effect on surrounding land use to support the 'Main Street' concept
- BRT and LRT taken forward for further study



Transit Ridership- Comparative Assessment

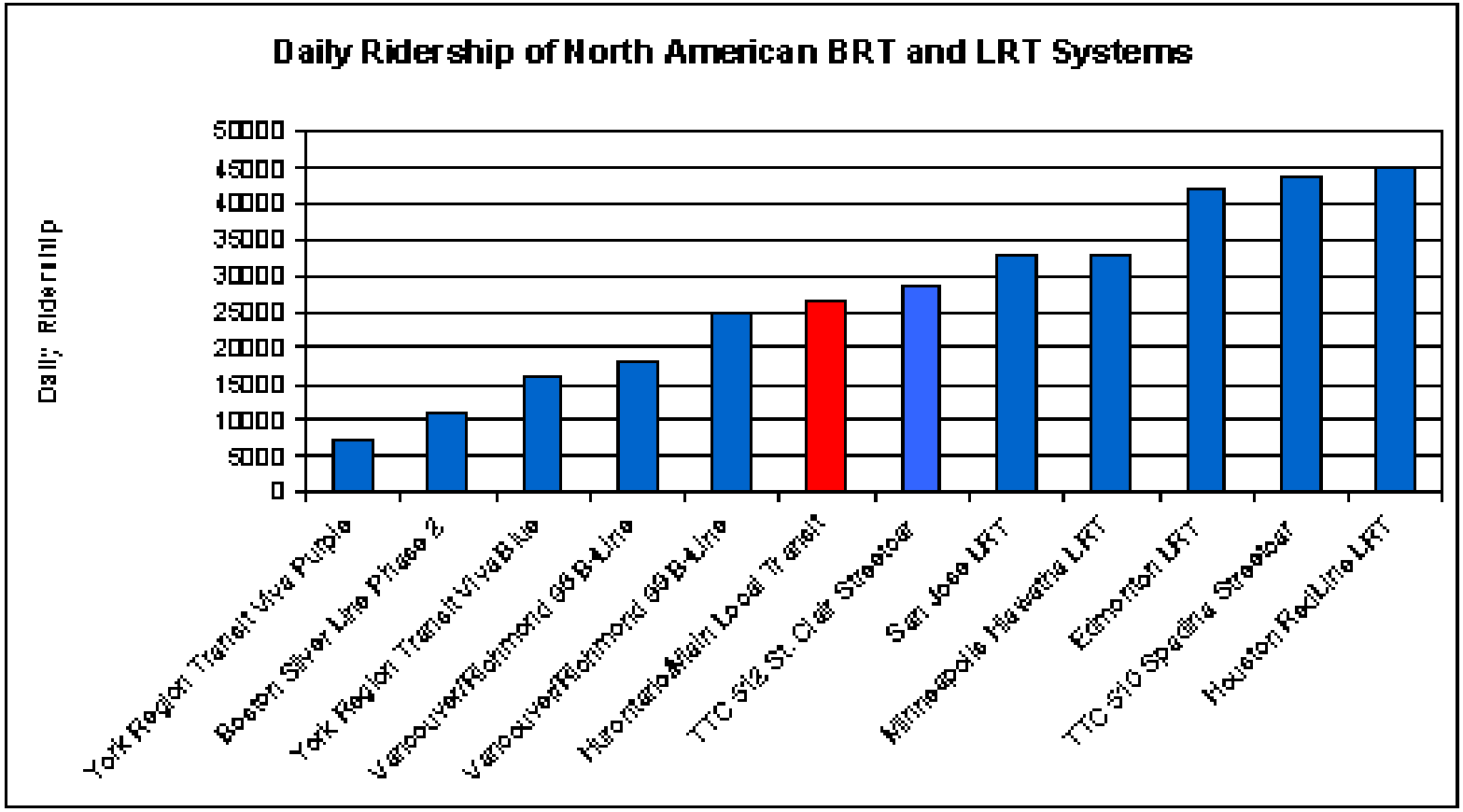
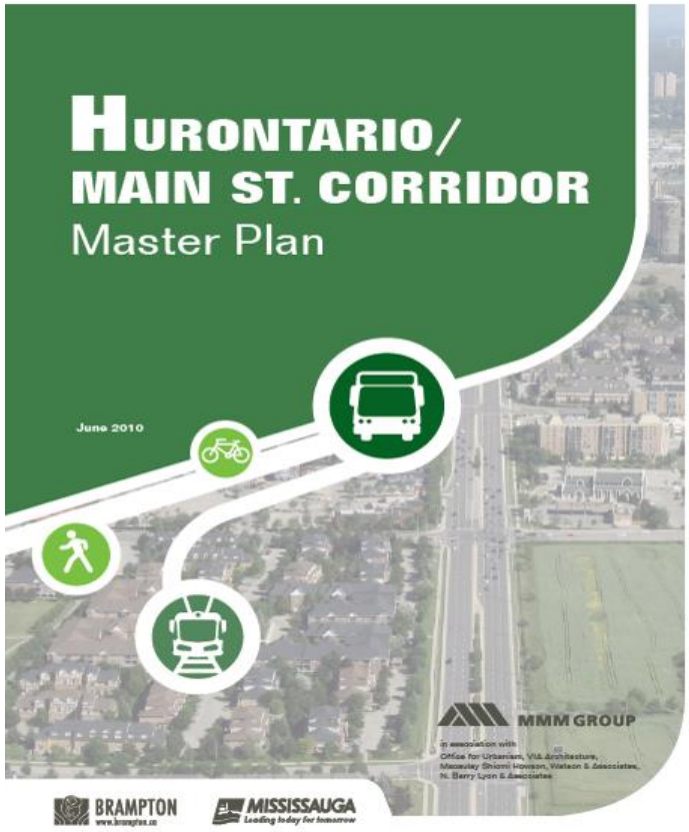


Figure 35: Daily Ridership of Selected North American BRT and LRT Systems

Source: Hurontario Main Street Directions Report,(2009)

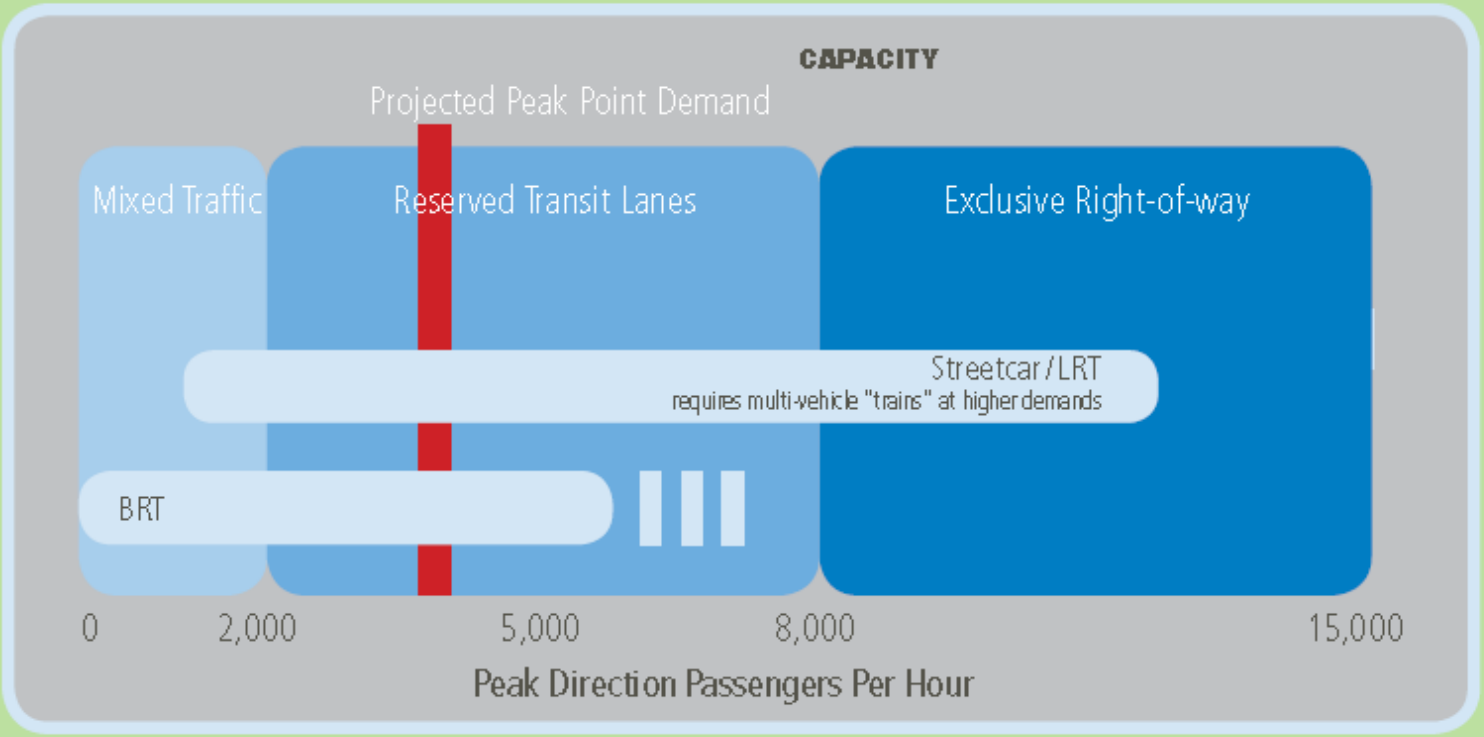
Backgrounder- Corridor Master Plan

- Master Plan – an integrated approach to transit, land use and enhanced urban design
- Vision: to create “a beautiful street”
- Extensive public engagement including 3 PIC’s – 2008, 2009, 2010
- Assessed alternatives:
  - LRT preferred technical solution
  - LRT most popular public option



Transit Choices- System Capacity by Transit type

Figure 3.6.2:
Rapid Transit Capacity by Technology and Running Way Type



Source: Hurontario Main Street Corridor Master Plan

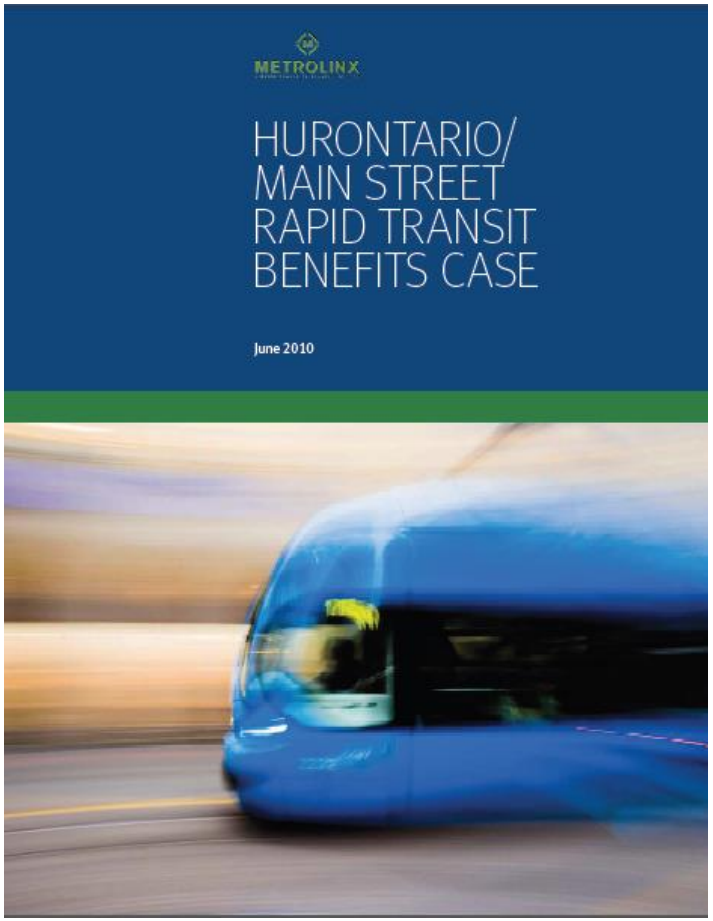
Hurontario Main Street Corridor Master Plan Assessment

- Considerations
  - Demand profile
  - Social & Environmental Benefits
  - City Shaping/Transit Oriented Development
- Environmental Assessment, covering:
  - Natural environment
  - Environmental Policy fit
  - Social/Land Use
  - Transportation
  - Economic Impacts
- Overall Conclusion:

Master Plan EA	Base Case	LRT	LRT/BRT	BRT
	4th	1st	2nd	3rd

The Hurontario/Main Street Rapid Transit BCA

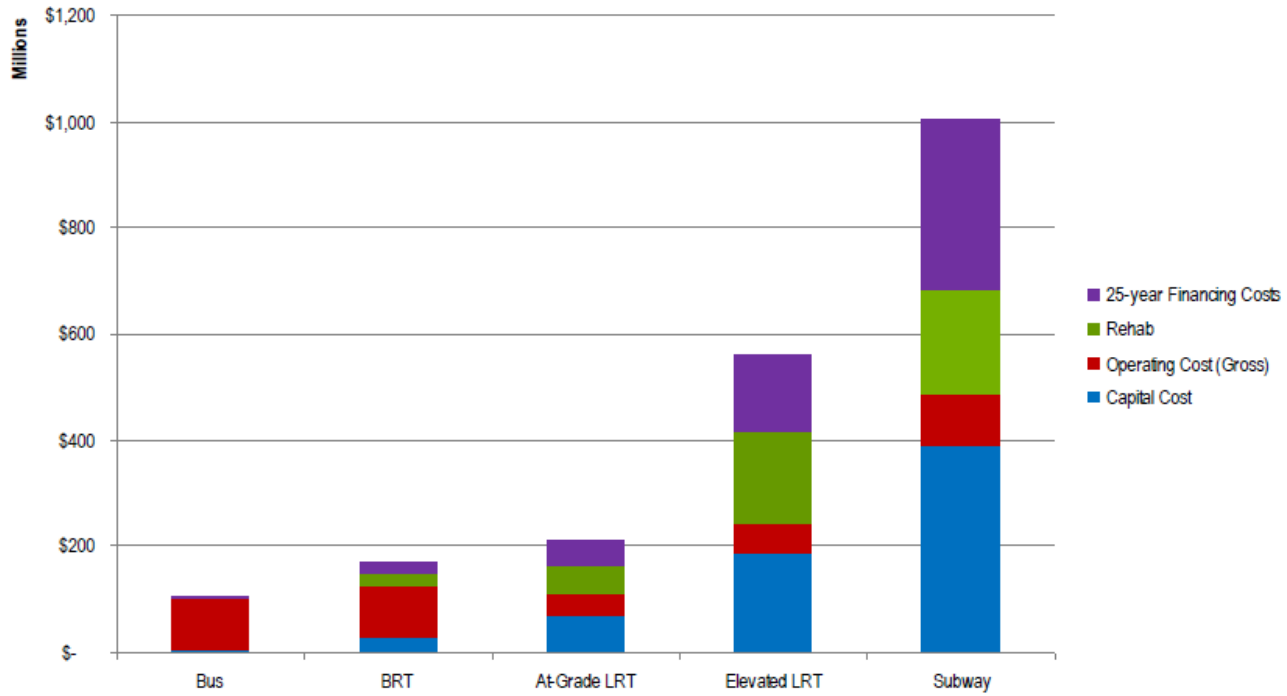
- Three options examined
  - Bus Rapid Transit (BRT)
  - Light Rail Transit (LRT)
  - BRT + LRT Combination
- Port Credit- Brampton route- no Box in Downtown Mississauga
- High level, comparative assessment
- LRT highest costs, but highest benefits
- BRT lower costs and benefits, but insufficient capacity
- Combined option had mixed results
- LRT option selected for further study



Metrolinx: Transit Investment Strategy Advisory Panel

- Independent review of Metrolinx Investment Strategy in 2013
- Examined capital and operating costs by mode

Graph 1: Transit Mode 50-Year Costs: 25-Year Capital Financing on a Per Kilometre Basis (does not include fare box revenue)



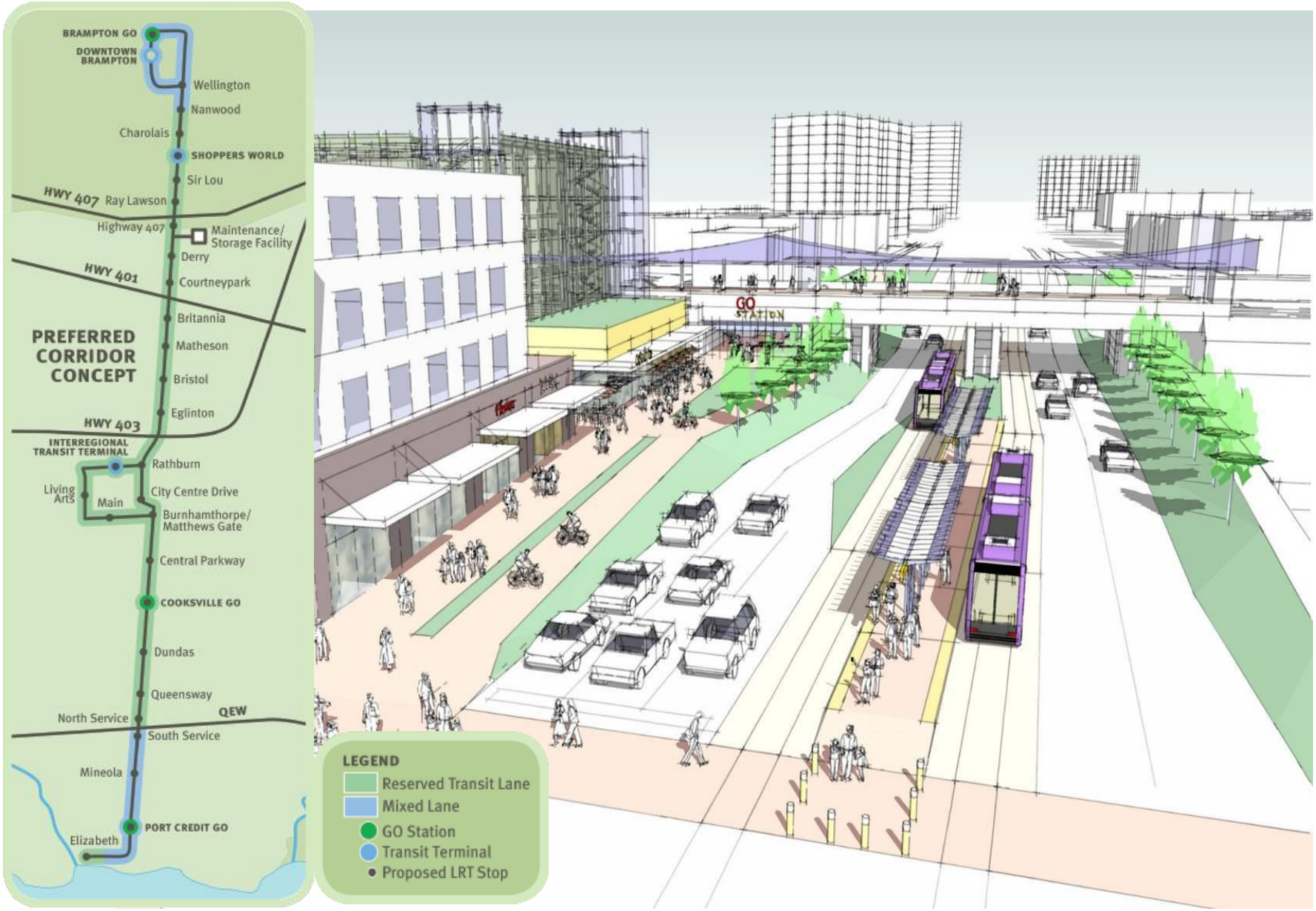
Created for the Panel by Metrolinx

The Master Plan Vision

- Easy, reliable, frequent, comfortable and convenient light rail transit service is provided throughout the Corridor, with effective connections to other links in the inter-regional transit network

- Hurontario/Main Street is a beautiful street, with attractive "places" along the Corridor featuring expanded mobility, vibrant economic activity, and liveable, connected, mixed-use neighbourhoods, integrated with the transportation infrastructure

- The Regional Urban System and the planned urban structure of each city are recognized and reinforced, and accordingly, mixed use, compact, intensified Transit Oriented Development is present along the Corridor….


BRAMPTON GO
DOWNTOWN BRAMPTON
Wellington
Nanwood
Charolais
SHOPPERS WORLD
Sir Lou
HWY 407
Ray Lawson
Highway 407
Maintenance/ Storage Facility
Derry
HWY 401
Courtneypark
Britannia
PREFERRED CORRIDOR CONCEPT
Matheson
Bristol
Eglinton
HWY 403
INTERREGIONAL TRANSIT TERMINAL
Rathburn
Living Arts
Main
City Centre Drive
Burnhamthorpe/ Matthews Gate
Central Parkway
COOKSVILLE GO
Dundas
Queensway
North Service
QEW
South Service
Mineola
PORT CREDIT GO
Elizabeth
GO STATION
LEGEND
Reserved Transit Lane
Mixed Lane
GO Station
Transit Terminal
Proposed LRT Stop

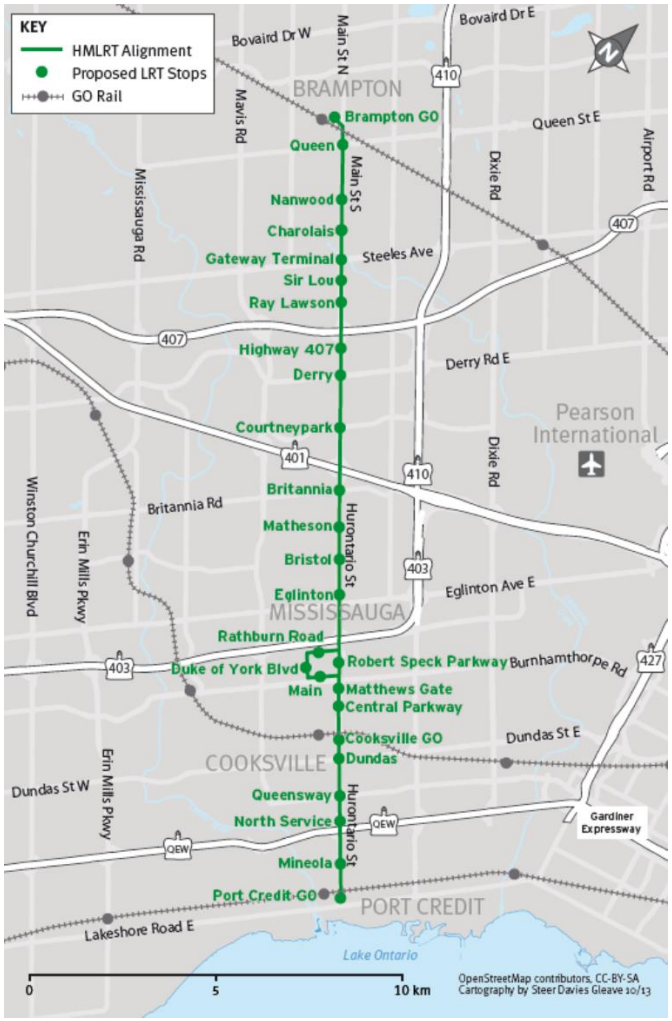
PRELIMINARY DESIGN & ENGINEERING

HMLRT- Planning, Design & Engineering

- A comprehensive 2+ year development program
- Detailed LRT alignment/stop designs
- Complete Street designs
- Capital Cost estimates
- Ultimate Transit Network Plan
- HMLRT Operations Plan, and operating costs
- HMLRT System Design Guide
- Ridership forecasts
- Traffic Assessments
- HMLRT Business Case
- Multiple Account Evaluation
- Public Information Centres
- Environmental assessment and TPAP approval

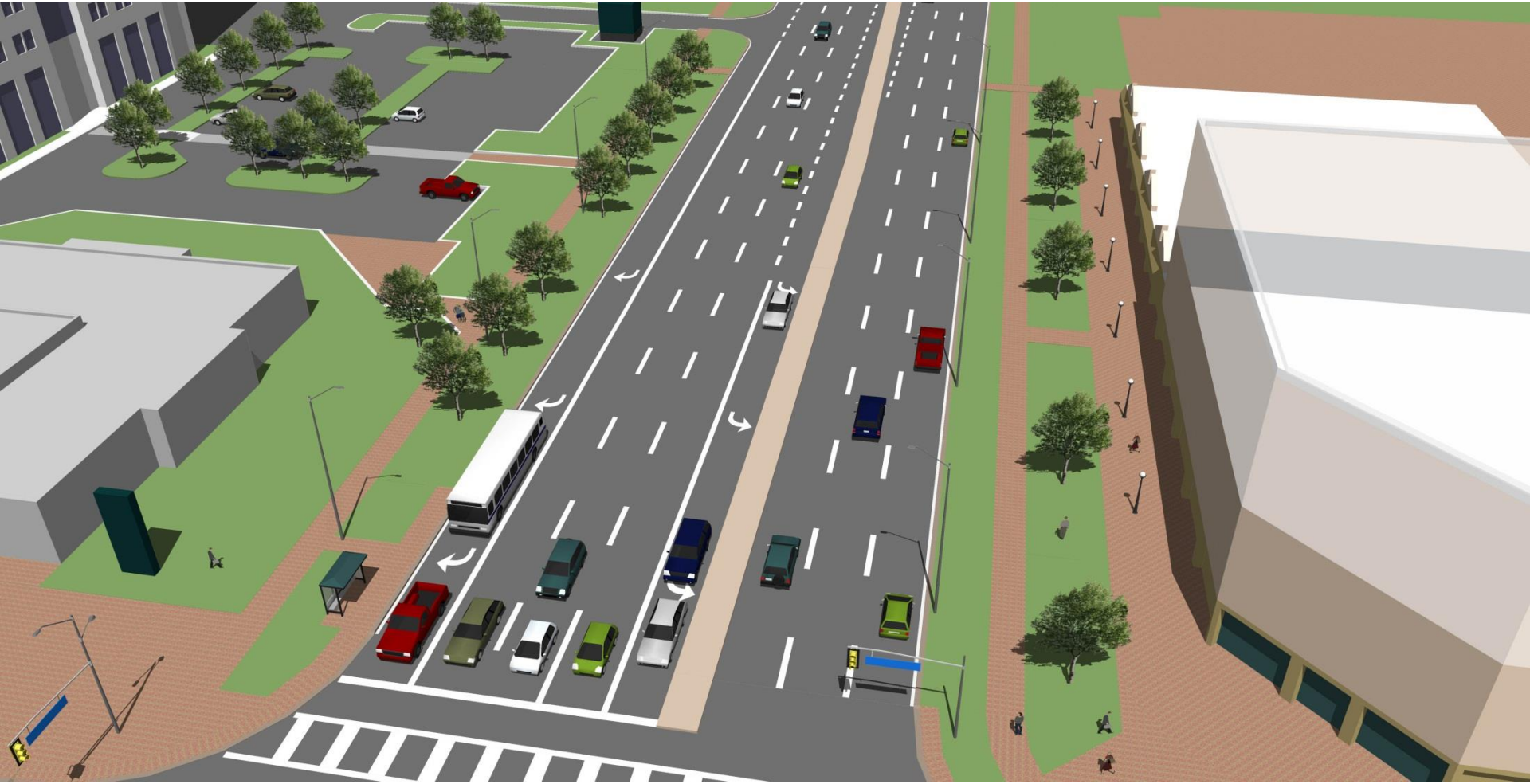
HMLRT Project Context

- **Project context**
  - 23km light rail transit system with 26 stops
  - 2 overlapping loop services
  - 5-min headway during peak period
  - End to end journey time 46min
  - Average operating speed 28kph
- **Route Alignment**
  - At grade double track alignment
  - Mostly segregated running with traffic signal priority
- **Stops and Platform Length**
  - Serving neighbourhoods and key destinations
  - Integrated with GO, Transitway, Express and local transit
  - 900m average stop spacing
  - 90m long platforms (up to 3 x 30m LRVs)



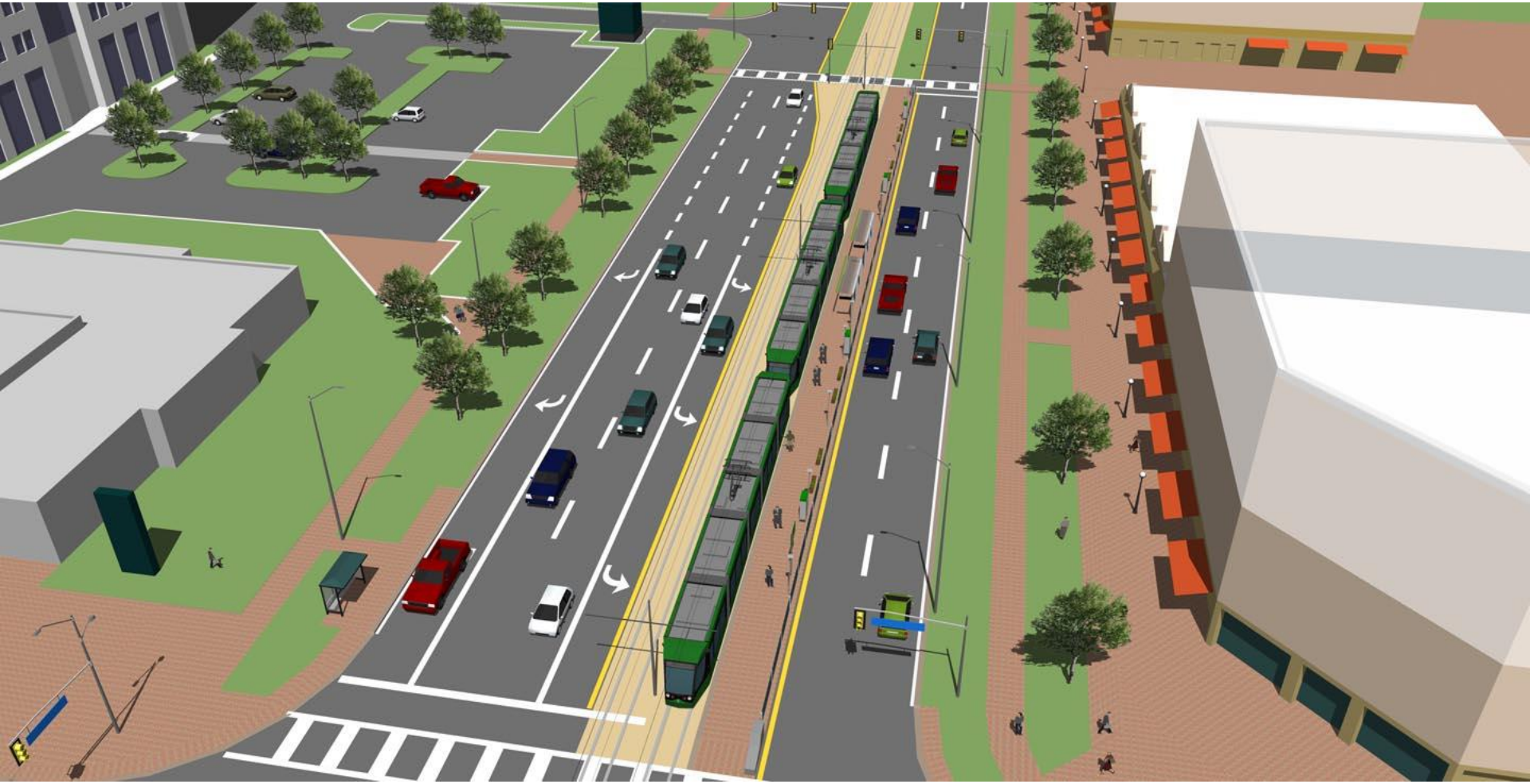
Developing a Complete Street- Existing Condition

- Traffic-dominated, low density development



Developing a Complete Street- Introducing LRT

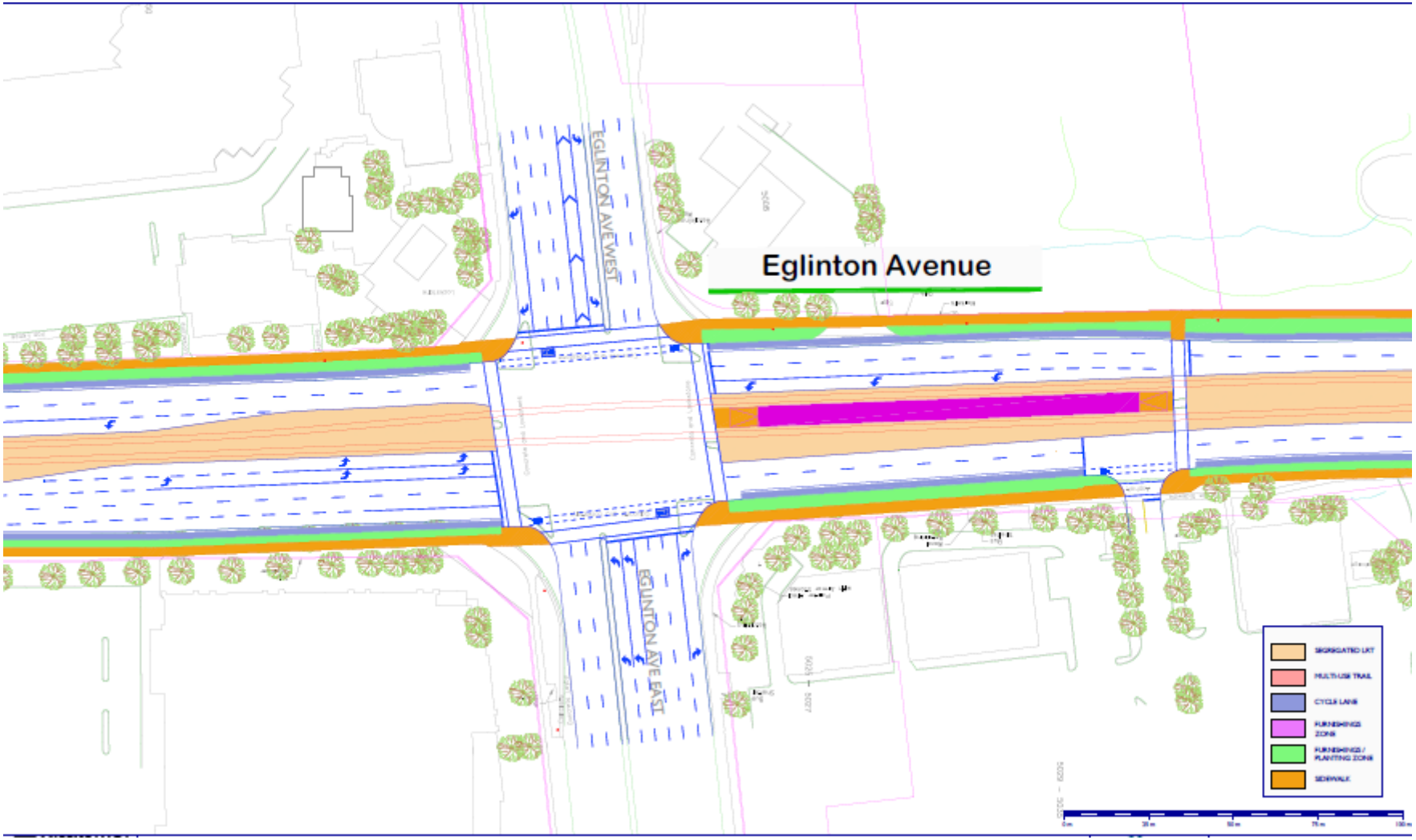
- Re-allocating road space for segregated LRT



Developing a Complete Street- The Complete Package

- Segregated LRT, higher people-capacity corridor
- Wider footways, cycle facilities, landscaping/trees, mixed TOD

Eglinton Avenue- Urban Style LRT and Complete Street



Mobility Hubs - Connecting HMLRT GO RER +TOD

Ridership Forecasting & Traffic Assessment

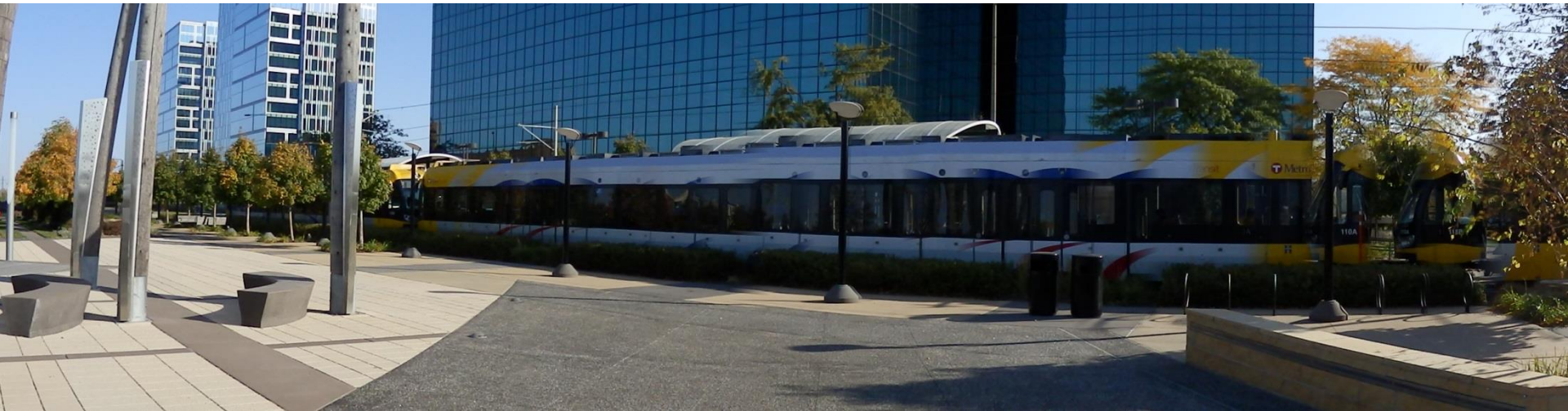
- Computer Model of transit and auto network demand
- Covers whole GTHA
- Detailed land use zoning
- 3 hr a.m. peak (0600-0900)

- Traffic Impact Analysis
- Detailed Junction/Signals
- HMLRT and traffic signal control
- Pedestrian Access

HMLRT BUSINESS CASE & MAE

HMLRT Business Case Context: Meeting Strategic Policy

- A key driver of City-Building aspirations and a showcase opportunity
- Supporting Provincial Growth Plan, Urban Growth Centres and Mobility Hubs
- Supporting Metrolinx vision encapsulated in the Big Move
- Supports Strategic Vision – Transit is a key Pillar
- Support investment in and synergies with GO Rail (RER) and Mississauga TransitWay



Business Case Requirements – Metrolinx Approach

- Approach used for HMLRT Business Case is consistent with Metrolinx Big Move/Next Wave requirements

Business Case – Metrolinx Approach

- Metrolinx Approach: "Three Pillars"

Criteria	Indicator	BCA
A High Quality of Life		
Building Communities	Change in the density of population + employment projected for the area.	
Transit Ridership	Total Weekday Boardings Forecasted	
Social Need	Youth/Seniors/Low Income population within 500m of an RT corridor or 2km of a GO station	
Regional Connectivity / Destinations	Number of connections to other RT services/mobility hubs/post-secondary institutions/hospitals	
A Thriving, Sustainable and Protected Environment		
GHG Emissions reduction	Tonnes saved annually based on VKT	✓
New Transit Riders	Projected total NEW weekday boardings	
A Strong, Prosperous and Competitive Economy		
Economic Impacts	Direct and Indirect Wages and GDP benefits (post-construction) over the first 30 years of operation (PV $M)	✓
Capital Cost per Rider	Capital Cost per New Rider	
Operating Revenue / Cost Ratio	Net New Operating Revenue / Cost Ratio	
Benefit-Cost Ratio	Transportation User Benefits (travel time, safety, operating savings based on Vehicle Kilometres Travelled (VKT) Capital cost Estimated incremental operating cost	✓

Developing the HMLRT Business Case- Multiple Account Evaluation

- **The Evaluation Accounts**
  - Transportation
  - Economy
  - Environment
  - Social
  - Deliverability

- **Additional Criteria**
  - Reliability Benefits
  - Health Benefits
  - Urban Realm Benefits

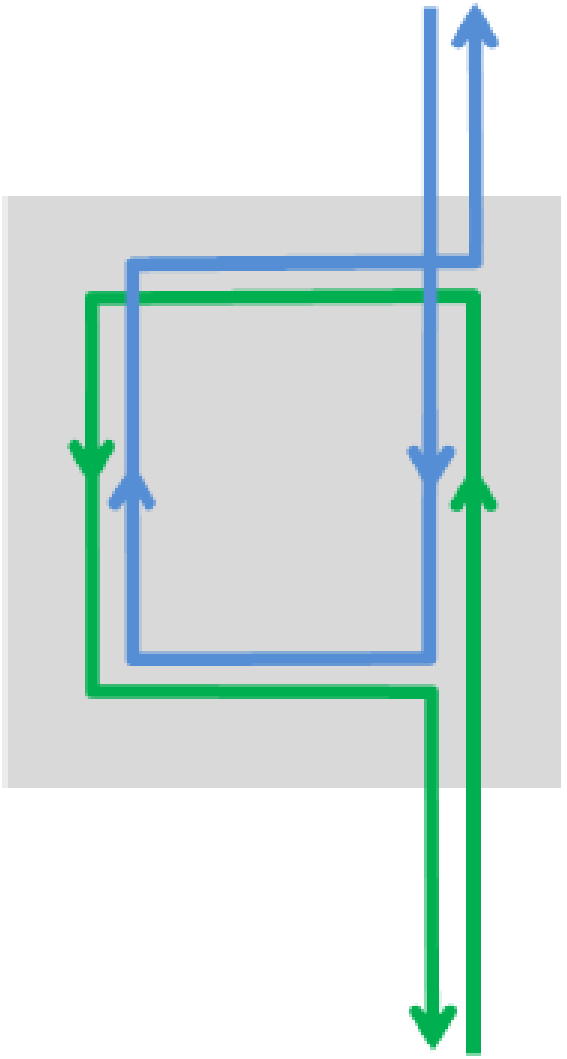
Business Case: Key Inputs

- Capital costs
  - $1.5 billion (2014 prices)
- Operating Costs
- Ridership & revenue forecasts
- wider evaluation (MAE)
- “with LRT” is compared against Business As Usual (BAU) in 2031
- Economic performance one major component of MAE
- Benefit to Cost Ratio is key measure: 1:1 = “break even”
- No BCR threshold for Metrolinx projects

HMLRT Operations

Preliminary HMLRT System Operating Plan:

- Brampton – Square One and return
- Port Credit – Square One and return
- Transfer required for trips between north and south of Square One
- Run times assume Medium-High priority
- 46 mins Brampton – Port Credit
- 26 stops
- 5 min/10 min peak/off peak headway
- Bus network adjusted (principally removal of Hurontario-Main bus routes MiWay 19/103 and Brampton Transit 2/502 south of Brampton downtown)



Ridership Forecasts

	BCA	Master Plan	HMLRT
2031 AM peak boardings	23,400	38,800	24,300
Annualization factor used	900	935	1,420
2031 Annual boardings	21m	36.3m	34.5m

- Cost assumptions and values unchanged from the Master Plan :
  - Transit fares, tolls, auto operating costs and value of time held constant 2006 to 2031
  - Parking charge of $5 levied in HMLRT corridor in 2031 (compared with no charges in 2006, apart from 3 zones)
- Current annualization factor based on observed transit ridership in corridor

MAE -Transportation User and Financial

Account/Criteria	Assessment
Transportation User Account	
Transit User Benefits – *Time savings, reliability and quality* (PV $m)	$1,140m
Auto User Benefits (PV $m)	-$141m
Auto Operating Cost Savings (PV $m)	$229m
Auto Safety Benefits (PV $m)	$21m
Incremental Transit Ridership (m trips per annum in 2031)	3.1m
Integration with other transportation modes	✓✓
Financial Account	
Capital and Renewal Costs (PV $m)	$1,340m
Incremental Operating and Maintenance Costs (PV $m)	$135m
Incremental Revenues (PV $m)	-$279m
Incremental Operating Subsidy ($m in 2031)	-1.2m
Net Benefits (PV $m)	-$163m
Benefit:Cost Ratio	1.14 : 1
Incremental Revenue:Operating Cost Ratio	1.2 : 1

MAE- Environment and Economic Development

Account/Criteria	Assessment	
Environmental Account		
Transit mode share: HMLRT corridor in 2031 AM peak	Increased from 26% to 52% (+26%)	
Change in Annual Network Wide Vehicle Kilometres Travelled in 2031	-14.5 million vehicle-kms	
GHG Emissions	3,999 tonnes in 2031, $4.3m PV	
CAC Emissions (Tonnes in 2031)	CO: -21 tonnes, NOx: 5.6 tonnes, SO2: 78 kg	
Economic Development Account		
Total Direct and Regional Economic Impacts	*During Construction*	*Long Term p.a.*
Employment (person years)	7,300	251
Wages ($2012m)	281	9.7
GDP ($2012m)	621	21.4
Movement of Goods	x	
Development Potential/ Land Value Uplift ($m)	$200m-420m	

MAE- Social & Community/Deliverability

Account/Criteria	Assessment
Social and Community Account	
Accessibility - catchment within 800m of LRT in 2031	Population: 117,000 Employment: 70,000
Health – quality of life and healthcare c	$54m PV
Safety and Security	-
Urban Realm	$51m PV
Land Use Shaping	✓✓✓
Road Network	×
Deliverability Account	
Impacts During Construction	×
Constructability	✓✓
Funding	Not currently available
Procurement	Not currently available
Stakeholders	Not currently available
Governance	Not currently available
Risk Management	Not currently available

BCR comparisons (normalised to current methodology)

$m, 2009PV	MasterPlan October 2010	Metrolinx BCA June 2010	TPAP BCA
Capital Costs	610	1,020	1,340
Operating costs	-70	180	130
Fare Revenue	-60	-100	-280
Healthcare	n/a	n/a	-50
Total costs	**480**	**1,100**	**1,140**
Transit Time	*n/a*	*550*	*1,140*
Auto Time	*n/a*	*600*	*-140*
Total Travel Time	450	1,150	1,000
Auto Ownership	150	570	230
Safety/Emissions	20	60	30
Urban Realm	n/a	n/a	50
Total benefits	**620**	**1,780**	**1,310**
Benefit/Cost Ratio	**1.29:1**	**1.62:1**	**1.14:1**

HMLRT and Land Use Intensification- the TOD Test

- **Central Case:** 2031 land use forecasts 829,000 population and 527,000 employment
- **TOD Case:** with alternative 2031 land use distribution tested to understand how the ridership and case for HMLRT
- The HMLRT corridor has a 4-8% increase in population and employment, resulting in 5% higher ridership on HMLRT.
- A BCR analysis only has been undertaken for this test, resulting in an improved BCR of 1.80:1.

BCR comparisons (normalised to current methodology)

$m, 2009PV	MasterPlan October 2010	Metrolinx BCA June 2010	TPAP BCA	TPAP with TOD land use BCA
Capital Costs	610	1,020	1,340	1,340
Operating costs	-70	180	130	130
Fare Revenue	-60	-100	-280	-420
Healthcare	n/a	n/a	-50	-100
Total costs	**480**	**1,100**	**1,140**	**950**
Transit Time	*n/a*	*550*	*1,140*	*1,170*
Auto Time	*n/a*	*600*	*-140*	*-140*
Total Travel Time	450	1,150	1,000	1,030
Auto Ownership	150	570	230	570
Safety/Emissions	20	60	30	70
Urban Realm	n/a	n/a	50	50
Total benefits	**620**	**1,780**	**1,310**	**1,720**
Benefit/Cost Ratio	**1.29:1**	**1.62:1**	**1.14:1**	**1.80:1**

CONCLUSIONS

The Case for HMLRT: Conclusions

- HMLRT will be a City-Shaper- supporting wider City Growth Objectives
- Future-proofed HMLRT journey speed and reliability
- Ability to add capacity over time with 90m platforms
- PDE program has produced detailed HMLRT designs
- Comprehensive Ridership modelling
- TPAP approval secured
- Business Case and MAE are positive
- Central Case: BCR - 1.14:1
- TOD Test: Supporting Growth Objectives -BCR 1.80:1
- 2041 Growth needs to be addressed

HMLRT- High Capacity Transit

HMLRT- Part of an Integrated Transit Network

HMLRT- Urban Living

HMLRT- A City-Shaper

Hurontario Main Light Rail Transit

steer davies gleave

Thank You

Alan Jones

Alan.jones@sdgworld.net