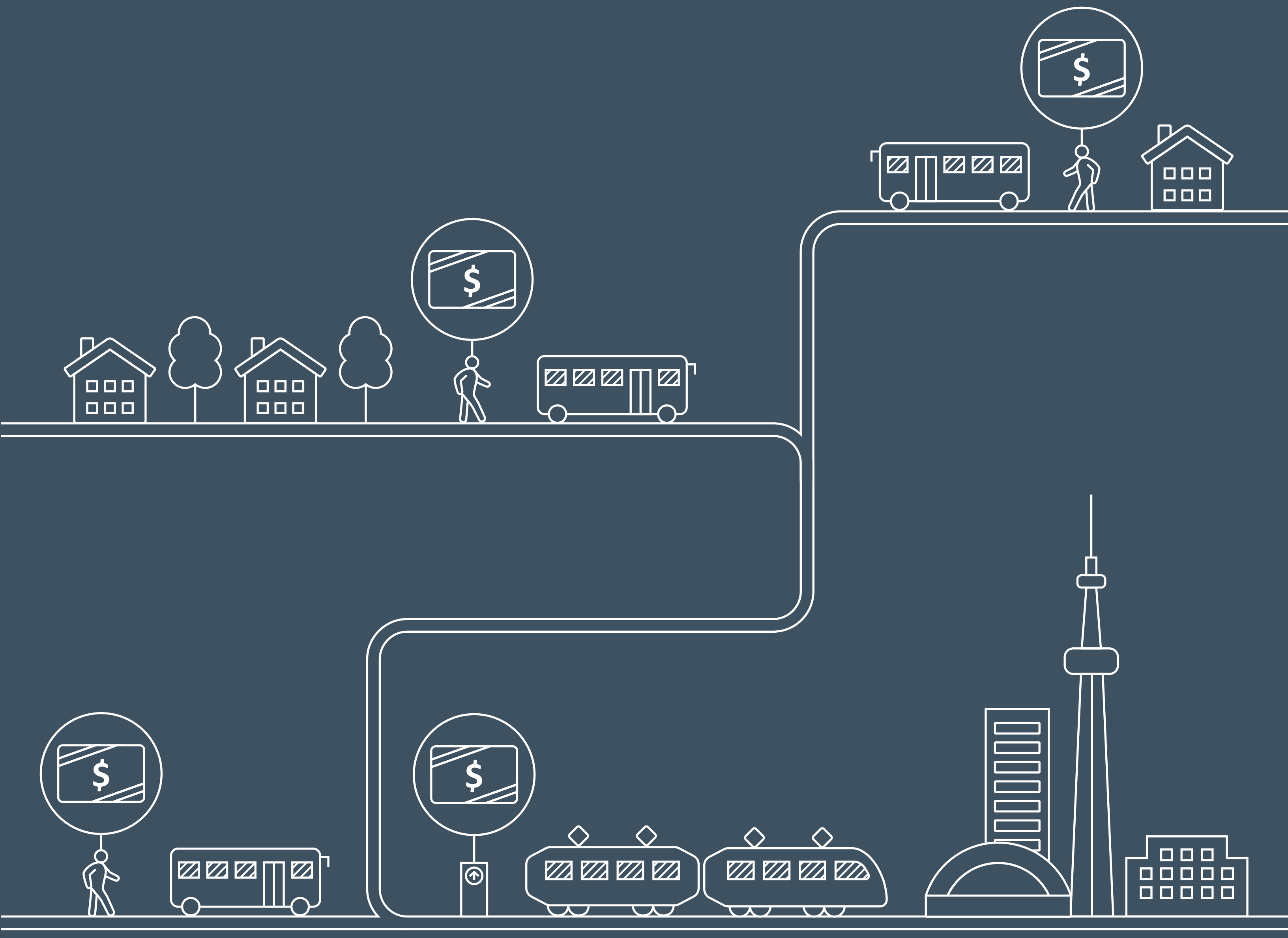
steer davies gleave

GTHA Fare Integration
Draft Preliminary Business Case

Draft Report for Discussion
September 2017



DISCLAIMER

This Preliminary Business Case report provides an assessment of the case for Fare Integration in the Greater Toronto and Hamilton Area. The work has been undertaken to determine the overall potential for Fare Integration as well as the varying performance for a range of potential Fare Structures. This work has been conducted for Metrolinx using best available information and modelling tools in conjunction with stakeholder engagement with the region's transit agencies. The analysis included in this report is intended to support decision makers in reviewing and assessing the merits of different fare structures. This work has been completed with a number of working assumptions to develop design and analysis tools that are appropriate for this preliminary Business Case. Assumptions used in this work should be revisited and further defined in future stages of analysis and are only indicative at this stage. Pricing tests used in this analysis are intended for modelling and comparative analysis only, and should not be considered as potential fares without further study and analysis.

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Glossary

BCA	Business Case Analysis
BCR	Benefit Cost Ratio
FBD	Fare by Distance
GHG	Greenhouse Gas Emissions
GO RER	GO Regional Express Rail
GTHA	Greater Toronto and Hamilton Area
LRT	Light Rail Transit
LUM	Limited Use Media
MSP	Municipal Service Provider
MTO	Ministry of Transportation Ontario
NPV	Net Present Value
OD	Origin Destination
PnR	Park and Ride
POP	Proof of Payment
RT	Rapid Transit
TAC	Technical Advisory Committee
TDM	Transport Demand Management
TTC	Toronto Transit Commission
TYSSE	Toronto York Spadina Subway Extension
VKT	Vehicle Kilometers Travelled
YRT	York Region Transit

0 Executive Summary

Preface

Steer Davies Gleave is pleased to submit this draft for discussion of the “Preliminary Business Case for Fare Integration in the Greater Toronto and Hamilton Area”. This Business Case has been prepared to provide technical input that supports Metrolinx in the development of a Fare Integration Strategy for the Greater Toronto and Hamilton Area (GTHA). This report contains work completed from 2015 to 2017 that included engagement with Metrolinx and the region's municipal transit service providers through a “Technical Advisory Committee” (TAC). The findings in this report are presented as a draft for discussion and have not been endorsed as formal recommendations by Metrolinx or members of the TAC.

Background

The GTHA is undergoing rapid growth: by 2041 it is expected the region will be home to nearly 10 million people. This growth will occur in existing and new employment and activity centres, which will increase travel within and between the GTHA’s municipalities. In response to this growth, significant investment in public transit services and infrastructure is underway:

- New Light Rail Transit (LRT) systems in Hamilton, Mississauga, and Toronto;
- The Toronto York Spadina Subway Extension (TYSSE), connecting York Region and Toronto;
- Development and implementation of the PRESTO fare card system; and
- The GO Regional Express Rail (GO RER) Program, which will transform the existing GO rail system from a commuter-oriented network to the backbone of the regional transit network

Preliminary Business Cases are developed to provide insight and evidence that supports decision making. This Business Case is not intended to serve as a detailed implementation strategy or design plan for potential fare structures. It is focused on providing a review of best available evidence to advance the Fare Integration project. It should be considered along with other decision making inputs as the strategy for Fare Integration is developed.

Transit services in the GTHA are provided by multiple service providers including two service providers directly administered by Metrolinx (GO Transit and UP Express) and nine municipal service providers (MSPs) (shown in Figure E.1). This has led to 11 different sets of fare policies, and a composite fare structure on the regional scale that is inconsistent and fragmented. Currently, seven of the MSPs in the "905" (the area outside of the city of Toronto) have implemented a significant degree of fare integration, including permitting unlimited cross-boundary travel between their respective service areas without additional fare and honouring transfers between agencies. Planned investments in transport are intended to allow seamless access to employment, education, and recreation across the GTHA; however, under the existing fragmented fare structure, customers face fare barriers that limit their ability to use transit, even when it is the best choice for their trip. While the existing fare structure offers a degree of integration between MSPs in the 905 area, the existing structure does not offer GTHA wide integration. Fare challenges are outlined in Table E.1.The existing fragmented regional fare structure has created three traveller-specific fare barriers, illustrated and named in Figure E.2, which have implications across all three of these challenges.

FIGURE E.1: GTHA MUNICIPAL SERVICE PROVIDERS

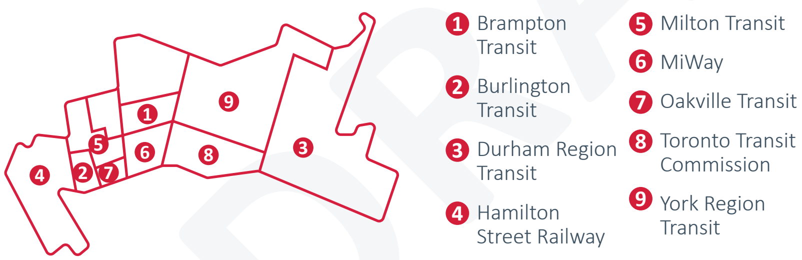
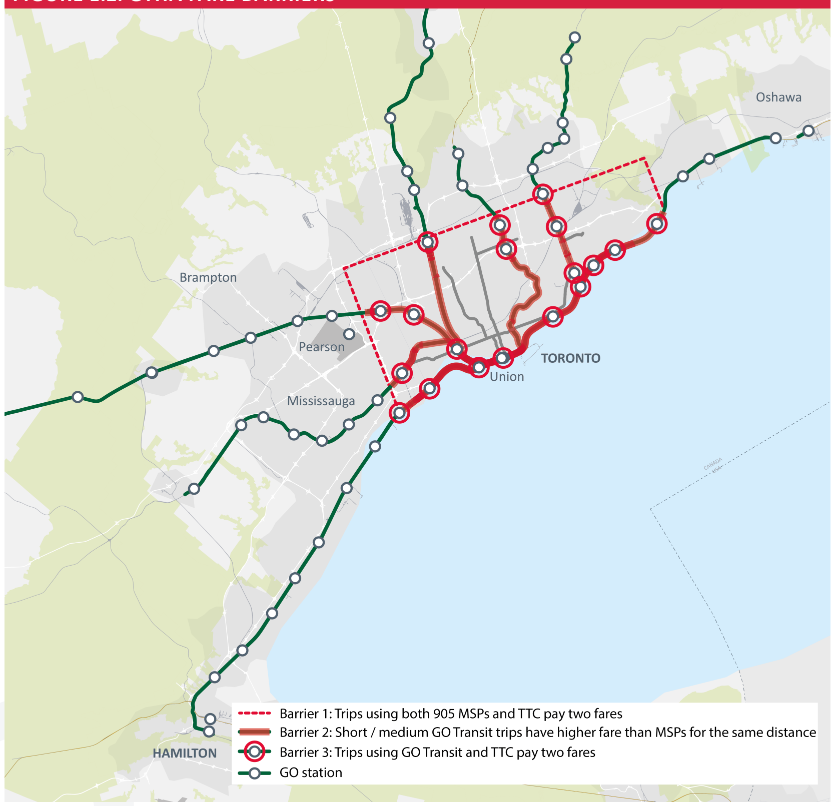


TABLE E.1: GTHA FARE CHALLENGES

Challenge	Existing Issues	Existing Strengths
Cost	The fare for a transit service does not reflect the value of a trip and discourages transit use, for example: a customer travelling between Toronto and York Region may need to pay two fares, even if their trip is short.	Trips between operators in the 905 can use one fare as opposed to the double fares for TTC-905 and TTC-GO Rail trips
Complexity	The complexity of understanding multiple rules may discourage travellers from using transit for trips with multiple service providers.	The flat fare between 905 agencies is simple for cross boundary 905 trips.
Captivity	Concessions and fare products may only apply to one service provider, which may discourage travellers from using transit for trips that involve multiple service providers.	There is growing consistency between concession and product categories across the GTHA.

FIGURE E.2: GTHA FARE BARRIERS



The development of a "Transformational" integrated fare structure has been proposed to remove fare barriers to allow seamless access to the future transit network. The long term transformational fare strategy guiding vision, developed by Metrolinx and the nine MSPs, is:

Vision: The GTHA Regional Fare Integration Strategy will increase customer mobility and transit ridership while supporting the financial sustainability of GTHA's transit services. This strategy will remove barriers and enable transit in the GTHA to be perceived and experienced as one network composed of multiple systems/service providers.

Developing an integrated fare structure was one of ten key strategies in The Big Move, the Regional Transportation Plan for the GTHA adopted in 2008, and was included in the 2014 and 2016 mandate letters from the Premier to the Minister of Transportation. The GTHA Fare Integration Study, shown in Figure E.3, is a multi stage study that aims to identify a preferred long term transformational structure (Stages 1-3) as well as an incremental delivery strategy referred to as the Implementation Strategy (Stage 4). This document summarizes work conducted for Stage 2, which focused on understanding the case for Fare Integration in the GTHA and identifying key considerations for the continued development of an integrated fare structure.

FIGURE E.3: GTHA FARE INTEGRATION STUDY

Stage 1

What types of fare structure best meet the vision, goals, and objectives for fare integration? (2015)

- Reviewed different approaches to differentiating fares and how they may apply to the GTHA
- Output: conclusion that GTHA fares could be differentiated by distance (flat, zones, or measured distance) and that fares could be differentiated by service type

Stage 2

What should the fare structure for the GTHA be? (2016-2017)

- Evaluate different approaches to varying fares by service and distance identified in Stage 1 to determine the base fare structure for the GTHA
- Output: evidence and insight to support decision makers in selecting a transformational fare structure

Stage 3

How should the GTHA fare structure be refined to meet customer, service provider, and regional needs? (2017 - ongoing)

- Provides further scoping on structure performance and requirements for technology, customer experience, service planning, decision making, and other approaches such as structure refinement (example: time of day pricing, products, and concession)
- Output: working papers providing further detail on the preferred fare structure

Stage 4

How should the GTHA fare structure be implemented and managed? (2017 - ongoing)

- Identifies an "Implementation Strategy" to a series of progressive changes incremental changes and improvements that will lead to a transformational structure
- Output: a detailed 'fit for GTHA' strategy for delivering and operating the new fare structure

Evaluating Potential Fare Structures

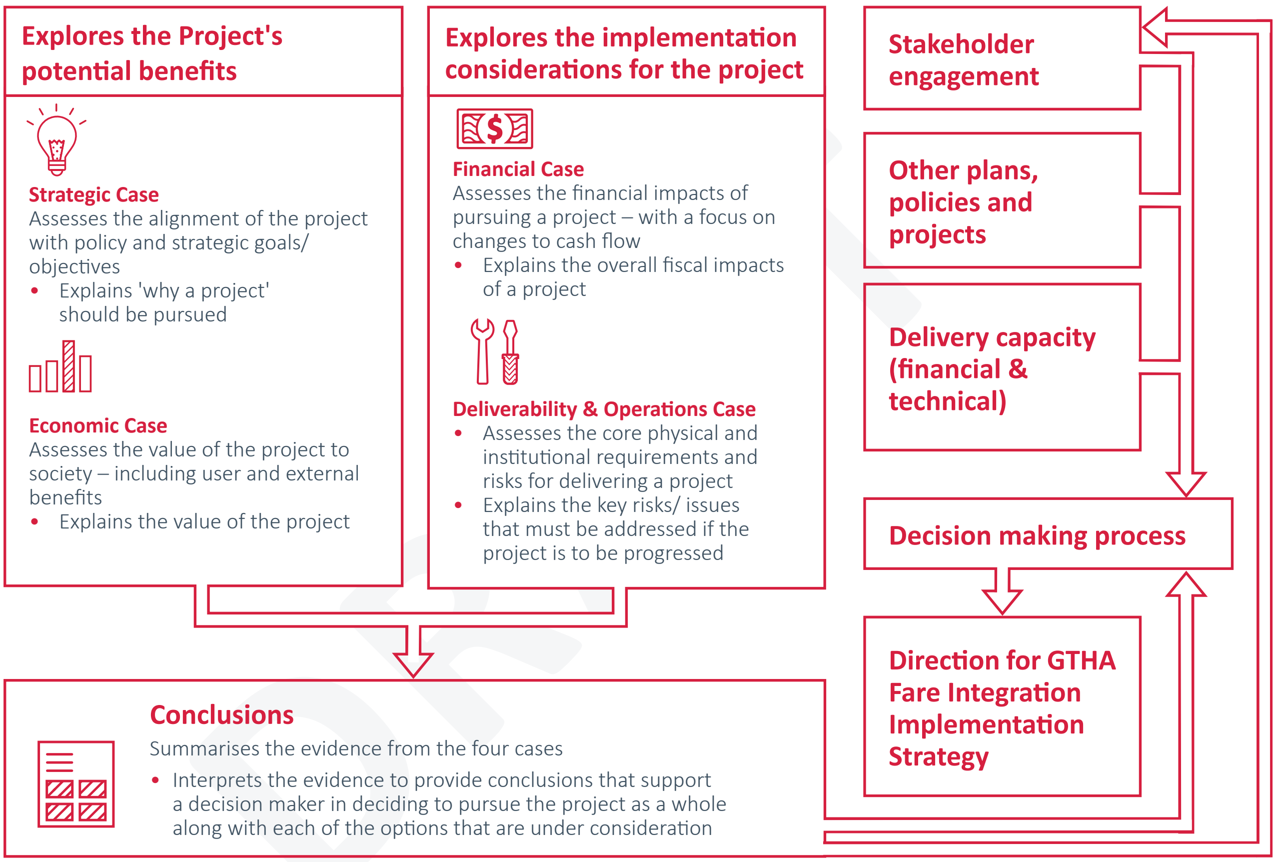
Metrolinx's "four chapter" Business Case approach was used to evaluate and identify potential fare concepts. Business Cases are a systematic approach to collect and review evidence regarding the potential performance of transport plans, policies, and projects. This document contains the Preliminary Business Cases for Fare Integration as a draft for discussion. A preliminary Business Case is intended to determine the value of pursuing a project based on its high-level potential – with detailed design work being carried out on a preferred alternative in future Business Cases. Business Cases are intended to support decision makers and are one of many inputs into the decision-making process, including: stakeholder input, other projects/policies, and delivery capacity. The Business Case structure is shown in Figure E.4 along with its role in decision making.

Fare Structure Concepts

This study was set out to identify a transformational fare structure for the GTHA. At a high level, alternative fare structure concepts are based on exploring the question 'what is an appropriate fare for different trips to achieve ridership, revenue, and broader transit objectives?'. The performance of a new fare structure is shaped by the prices used within the structure. A fare structure may perform well with one set of pricing assumptions and perform poorly with another set. In general, the pricing assumptions used in a fare structure impact the level of revenue collected. Two revenue scenarios are used to explore how the benefits and Business Case for Fare Integration vary under different assumptions for the total revenue generated from customers using transit:

- Revenue Neutral – the total revenue generated under Fare Integration equals the status quo revenue, which allows analysis to focus on the impact of Fare Integration alone; and
- Revenue Investment – an additional investment of 5% of total revenue is made, lowering the overall fare revenue requirements from customers, which indicates how investment may augment Fare Integration.

FIGURE E.4: BUSINESS CASE STRUCTURE

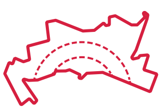


The Revenue Investment scenario assumed that additional investment in transit would be made available to strategically invest in travel markets and service providers that would either augment the benefits of the fare concepts or mitigate impacts. A benchmarking analysis for 5% revenue investment in the status quo structure was conducted for the revenue investment scenarios.

Throughout 2015-2016 a set of five potential fare structure concepts were developed. These concepts represent different approaches to addressing fare barriers by changing how fares are set for trips based on service type used (defined in Table E.2) and distance travelled (defined in Figure E.5). Each concept was developed following fare structure design principles and a review of impacts across a variety of dimensions, including: ridership development, feasibility, and social equity considerations.

Figure E.5: Approaches to Distance

Flat
All trips within a service type have the same fare



Zone
Fare varies based on crossing 'geographic zones'; higher fares are collected from trips that cross a larger number of zones. Fares over the same distances may not be consistent, depending on the arrangement of zones.

Fare by Distance (FBD)
Fares vary based on the distance travelled for each trip. As customers travel further, their fare increases based on how fares are measured – including straight line (crow fly) or network distances.

TABLE E.2: ASSUMED SERVICE STRUCTURE

Service Type	Stop spacing	Route Length	Typical speed	Right of way
Local	<750m	<20km	Low (10-25 km/h)	Generally in mixed traffic; occasional separation
Rapid Transit (RT)	500 m – 2.5 km	<25 km	Medium (20-45 km/h)	>90% Separate
Regional	>2 km	>20 km	High (>45 km/h)	Separate (rail) Mixed traffic (highway coach)

Distinguishing between service types does not necessarily mean different fares would always be charged, only that structures could be designed with differentiated fares under some or all contexts if desired. The assumed service structure was a starting point for analysis, grouping forms of transit service that provide customers with broadly comparable speed, stop spacing and travel time reliability—factors understood to shape perception of value for the trip taken. Future studies will refine the service structure further, including the role of bus rapid transit, other kinds of express bus services, and para-transit.

Five fare structure concepts (shown in Table E.3) were developed by varying fares by service and distance:

- **Concept 1 – Modified Status Quo:** This concept directly addresses the three barriers by discoutning double fares between TTC and 905 MSPs, discounting double fares between all GTHA MSPs and GO Transit, and implementing distance fares on GO Transit (including a reduced short distance fare);
- **Concept 1b – Modified Status Quo with Additional Fare by Distance:** This concept applies transfer discounts like Concept 1, but also applies a fare by distance structure to all rapid transit;
- **Concept 2 – Zones:** This concept uses geographic zones to set fares across the region – as travellers pass through more zones their fares increase;
- **Concept 3 – Hybrid:** This concept applies fare by distance to rapid transit and regional rail and a common flat fare to all local services in the region – when transfer region-wide flat fare to all local services- when rapid transit to regional there is no transfer fare;

- **Concept 4 – Fare by Distance:** This concept removes all transfer fares and applies distances based fares to all services –- there are many approaches to FBD and this concept assumes per km rates (slopes) allowing for a decrease in fares for shorter trips and an increase for longer trips.

The specific changes these concepts make to the fare structure are shown in Table E.3 along with their estimated base capital and operating costs.

Depending on the number of iterations of interim fare measures implemented and if the number of fare policy rules increase from the current situation then at the time of implementation the costs could exceed those in this Business Case.

TABLE E.3: FARE STRUCTURE CONCEPTS

	Status Quo	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD
Local Fare	Flat fare by MSP	Flat fare by MSP	Flat fare by MSP	Zones	GTHA Wide-Flat fare	FBD
RT Fare	Flat fare by MSP	Flat fare by MSP	FBD	Zones	FBD	FBD
Regional	FBD	FBD	FBD	FBD	FBD	FBD
MSP-MSP	905-905 – free 905-TTC – pay both fares	905-905 – free 905-TTC – Discounted Second Fare	905-905 – free 905-TTC – Discounted Second Fare	N/A	N/A	N/A
Local -RT	905-TTC –pay both fares	905-905 – free 905-TTC – Discounted Second Fare	905-905 – free 905-TTC – Discounted Second Fare	Free	Free	Continuous
Local – regional	905-GO – co-fare GO-TTC – pay both fares	Discounted Local Fare	Discounted Local Fare	Continuous	Free	Continuous
RT-Regional	905-GO – co-fare GO-TTC – pay both fares	Discounted RT Fare	Continuous	Continuous	Continuous	Continuous
Capital Cost (million $)	N/A	$50-$150	$150-$250	$150-$250	$150-$250	$150-$250
Annual Transit Operating Cost Increase (million $)	N/A	$4.0-$7.6	$5.2-$8.5	$5.4-$6.7	$7.5-$9.4	$6.7-$8.1

Change from Status Quo

Capital costs (provided by PRESTO for this study in 2016) include the cost of new software and fare equipment, and transit operating costs represent the annual increase in costs to provide services based on increased demand. All cost estimates included in this study are ‘conservative’ due to the level of uncertainty involved in preliminary studies. Future studies will conduct a more detailed analysis of operating impacts and requirements, which will provide a higher level of certainty on costs.

Strategic Case

Overview

The Strategic Case assesses how each concept supports policy objectives and the project vision. This assessment focused on each concept’s ability to attract ridership to transit and realize the benefits of increased transit use by enabling seamless travel across the network. Three strategic outcomes were identified to further understand how each concept contributes to the vision:

- Fare integration will address fare barriers to allow customers to make use of the GTHA’s complete transit network (directly grow ridership in markets where the existing structure suppresses demand);
- Fare integration will provide an improved user experience for customers across the GTHA that attracts and retains customers and encourages them to use services provided by multiple agencies (attracting and retaining customers by providing a more streamlined experience for trips using multiple service providers or service types); and
- Fare Integration will support the long-term development of transit services in the GTHA, improving the overall service offering in the region (improve the fare structure’s role in planning and delivering transit).

The results of this analysis are summarized in Table E.4.

TABLE E.4: STRATEGIC CASE SUMMARY

	Strategic benefit: Increased ridership	Outcome 1: Address barriers to grow transit demand	Outcome 2: Attract and retain ridership through improved user experience	Outcome 3: Improve fare structure's role in long term transit development
Concept 1 Modified status quo	Low Performance Concept 1 has limited tools to support ridership growth 2031 Annual Ridership Gain • Revenue Neutral: 2,500 • Revenue Investment: 40,400	Moderate Performance **Barrier 1** – Cross Boundary: Low Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance	Moderate Performance The overall fare structure has no significant changes from the status quo. Fares for trips on one MSP within their service area remain simple to understand.	Low Performance Limited adaptability/ flexibility and ability to support seamless network design because only discounted transfer fares and flat fares can be adjusted.
Concept 1b Modified status quo with FBD	Low Performance Concept 1b has limited tools to support ridership growth and has ridership losses due to long distance FBD fare on RT in Toronto 2031 Annual Ridership Gain • Revenue Neutral: 15.800 • Revenue Investment: 42,800	Moderate Performance **Barrier 1** – Cross Boundary: Low Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance	Low Performance The use of base fares and distance rates for RT/regional, unique flat fares for local, and discounted transfer fares for TTC/905 trips leads to a more complicated and less customer friendly structure.	Moderate Performance Moderate adaptability due to ability to change discounted transfer fares, flat fare, and FBD rates to manage demand. Overall low potential to support seamless network design.
Concept 2 Zones	Moderate-high Performance Concept 2 can grow demand in most markets, including short distance, but has a high risk of reducing ridership for long distance trips in Toronto if zone fares are too high. Additionally, this concept can create new fare boundaries and sets fares inconsistently. 2031 Annual Ridership Gain • Revenue Neutral: 25,300 • Revenue Investment: 51,900	High Performance **Barrier 1** – Cross Boundary: High Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance	High Performance The use of a single fare structure improves overall usability of the GTHA's transit network. Zones are simply communicated compared to the status quo; however they require some understanding of GTHA geography.	Low Performance Zones cannot readily be adapted once implemented, which means that the zonal add-fare is the only way to adjust fares overtime. Moderate potential to support seamless network design.
Concept 3 Hybrid	Moderate-High Performance Concept 3 can grow demand in most markets (except short distance) but under revenue-neutral scenarios has the highest losses of existing transit trips due to the need to increase long distance fares to cover the full cost of removed co-fares and double fares. 2031 Annual Ridership Gain • Revenue Neutral: 14,300 • Revenue Investment: 49,800	High Performance **Barrier 1** – Cross Boundary: High Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance	Moderate Performance The structure is simpler than the status quo, however the use of different fare structures on local compared to RT/ regional retains some complexity.	Moderate Performance Moderate adaptability due to ability to change region wide flat fare, and FBD rates to manage demand. High potential to support seamless network design.
Concept 4	High Performance Concept 4 can grow demand in most markets, including short distance, but has a high risk of reducing ridership for long distance trips in Toronto if FBD fares are too high 2031 Annual Ridership Gain • Revenue Neutral: 19,800 • Revenue Investment: 60,200	High Performance **Barrier 1** – Cross Boundary: High Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance.	High Performance The use of a single fare structure improves overall usability of the GTHA's transit network. However, FBD is more complicated than flat fares and must be carefully communicated and marketed.	High Performance The concept can adjust base and distance fares to support demand distribution and emergent needs. High potential to support seamless network design.

A strategic review of the high-level performance of the fare structure concepts compared to a direct investment in the status quo fare structure shows that stronger strategic benefits are realized by the fare structure concepts. The fare structure concepts can realize higher ridership gains (25,600 for investment in status quo compared to 40,400-60,200 for fare structure concepts) and reduction in auto trips because they offer strategic investment and changes to specific markets that currently face fare barriers, whereas a direct investment into the status quo structure may lower fares for travellers without seeing a corresponding significant increase in ridership.

Strategic Case Conclusions

The key Strategic Case conclusions for each concept are:

- Concept 1 – the combination of co-fares and flat fares has limited long term ridership growth potential and flexibility to evolve along with the GTHA transit network – elements should be considered for use in incremental solutions;
- Concept 1b – the use of co-fares and FBD on RT does not offer significant benefits compared to Concepts 1 and 3 – this concept has limited strategic potential;
- Concept 2 – zones have high potential ridership benefits, but they require new geographic boundaries that are complicated to adapt to, and recreate the existing barrier 1 issues across the region – therefore the concept has limited strategic potential;
- Concept 3 – the hybrid model has limitations due to the use of FBD together with flat fares (which limits overall flexibility), and the increase in long distance fares due to the complete removal of double fares between 905/TTC and 905/GO (all trips only pay one fare) – and
- Concept 4 – FBD on all service types has the highest overall ridership potential, a consistent user experience, and a high degree of flexibility – this concept could be used as the basis for future analysis leading to a transformative fare structure given that potential impacts on long distance transit travel markets are mitigated.

Economic Case

The Economic Case uses standardized economic appraisal techniques to determine the economic value of fare integration. While the Strategic Case outlines the overall fit of each concept with the vision for Fare Integration, the Economic Case estimates the economic value of each concept's approach to realizing the vision. Economic Appraisal is focused on identifying the value to society of a proposed project, program, or policy. The appraisal process used for this study compares direct user benefits, benefits from changes in travel mode, and costs. The Fare Integration economic appraisal follows a set logic:

- **Costs –** Costs are incurred to implement, operate, and maintain Fare Integration (including operating and capital costs for all stakeholders); and
- **Economic Benefits from Changing Travel Patterns –** As more travellers use transit and switch from the automobile there are further benefits to society associated with reduced vehicle kilometers travelled (VKT) – including a reduction in congestion, emissions, and car accidents.

Economic Appraisal was conducted for revenue neutrality and revenue investment – the results of the analysis are outlined in Tables E.5 and E.6. The results of the appraisal include:

- Summary of costs and benefits (direct customer benefits and changing travel behaviour benefits) associated with each concept;
- NPV – a summation of costs and benefits; and
- BCR – total benefits divided by total costs.

A positive NPV or a BCR greater than 1 indicates that the concept offers more economic benefits than the costs required to implement it. BCRs reflect the relative quantity of benefits and costs while NPV reflects the overall magnitude of benefits realized by a project minus its costs.

Economic Case Conclusions

The appraisal of the five concepts indicates that Fare Integration offers significant economic benefit across all concepts. Across both scenarios, Concept 3 has the strongest performance.

TABLE E.5: REVENUE NEUTRAL ECONOMIC APPRAISAL

Over 60 Year Appraisal	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD
Benefits (2015 million $)	**$1,970**	**$680**	**$1,250**	**$2,380**	**$1,570**
Emission Reductions (2015 million $)	$20	$10	$10	$30	$20
Collision Reductions (2015 million $)	$170	$60	$110	$210	$140
Auto Operating Cost Reductions (2015 million $)	$1,330	$470	$850	$1,620	$1,070
Decongestion (2015 million $)	$450	$140	$280	$520	$340
Costs (Low) (2015 million $)	**$90**	**$180**	**$180**	**$210**	**$200**
Costs (High) (2015 million $)	**$160**	**$250**	**$250**	**$280**	**$270**
Capital/Set Up (Low) (2015 million $)	$40	$110	$110	$110	$110
Capital/Set Up (High) (2015 million $)	$110	$180	$180	$180	$180
Operating Costs (transit) (2015 million $)	$50	$70	$70	$100	$90
NPV High (2015 million $)	**$1,880**	**$500**	**$1,070**	**$2,170**	**$1,370**
NPV Low (2015 million $)	**$1,810**	**$430**	**$1,000**	**$2,100**	**$1,300**
BCR High	**21.9**	**3.8**	**6.9**	**11.3**	**7.9**
BCR Low	**12.3**	**2.7**	**5.0**	**8.5**	**5.8**

TABLE E.6: REVENUE INVESTMENT ECONOMIC APPRAISAL

Over 60 Year Appraisal	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD	Investment in Status Quo
Benefits (2015 million $)	**$3,740**	**$2,740**	**$2,900**	**$3,940**	**$2,650**	**$1,400**
Emission Reductions (2015 million $)	$40	$30	$30	$40	$30	$20
Collision Reductions (2015 million $)	$330	$240	$250	$340	$230	$120
Auto Operating Cost Reductions (2015 million $)	$2,570	$1,910	$2,000	$2,700	$1,820	$980
Decongestion (2015 million $)	$800	$560	$620	$860	$570	$280
Costs (Low) (2015 million $)	**$230**	**$290**	**$240**	**$210**	**$220**	**$70**
Costs (High) (2015 million $)	**$300**	**$360**	**$310**	**$280**	**$290**	**$70**
Capital/Set Up (Low) (2015 million $)	$40	$110	$110	$110	$110	–
Capital/Set Up (High) (2015 million $)	$110	$180	$180	$180	$180	–
Operating Costs (transit) (2015 million $)	$190	$180	$130	$100	$110	$70
NPV low capital cost (2015 million $)	**$3,510**	**$2,450**	**$2,660**	**$3,730**	**$2,430**	**$1,330**
NPV high capital cost (2015 million $)	**$3,440**	**$2,380**	**$2,590**	**$3,660**	**$2,360**	**$1,330**
BCR low	**16.3**	**9.4**	**12.1**	**18.8**	**12.0**	**20**
BCR high	**12.5**	**7.6**	**9.4**	**14.1**	**9.1**	**20**

This analysis has noted the following general conclusions:

- Significant economic benefits are derived by removing fare barriers by using fare structure concepts either by modifying the status or pursuing a more transformational structure;
- Beyond addressing fare barriers, there is economic value in using the structure to align fares with the distance of the trip taken – the total user and societal benefits of concepts with a form of FBD are positive; and
- A large portion of automobile travel reduction benefits come from shift from park and ride trips to using transit for the whole trip– highlighting the importance of exploring paid parking to also encourage a shift from automobile for transit access.

Financial Case

Overview

The Financial Case uses a basic financial appraisal to identify the overall costs and revenue impacts of the two Fare Integration scenarios for each concept. Future Business Case work must conduct a more thorough financial analysis as a specific fare structure is developed, including a review of: alternative revenue allocation systems, a wider range of investment scenarios, and different approaches to procuring or financing Fare Integration.

Table E.7 shows the financial appraisal.

Financial Case Conclusions

Overall, the concepts carry a similar range of financial performance, $2.5 to $3 billion for revenue investment and $60 to $400 million for revenue neutral in nominal terms.Future analysis should be conducted to expand upon this preliminary financial appraisal. Four key areas for further inquiry are: variable investment scenarios, managing financial risks, cost refinement (including refined operating and capital cost estimates), and revenue allocation and decision making structure.

TABLE E.7: FINANCIAL APPRAISAL SUMMARY

	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD
Revenue neutral – Over 60 Year Appraisal					
Capital/Set up (low) (million $)	$40	$120	$120	$120	$120
Capital/Set up (high) (million $)	$120	$200	$200	$200	$200
Operating Costs (transit) (million $)	$80	$110	$100	$150	$130
Required revenue investment (million $)	$30	$90	$-160	$-120	$-110
Total Financial Impact (million $) (Low)	**$-150**	**$ -320**	**$ -60**	**$-150**	**$-140**
Total Financial Impact (million $) (High)	**$-230**	**$ -400**	**$-140**	**$-230**	**$-220**
Example discounted annual costs 2041					
Operating Costs (transit) (million $)	$1.7	$2.1	$2.0	$2.9	$2.7
Required revenue investment (million $)	$1.0	-$2.2	-$5.7	-$3.4	-$3.6
Revenue investment – Over 60 Year Appraisal					
Capital/Set up (low) (million $)	$40	$120	$120	$120	$120
Capital/Set up (high) (million $)	$120	$200	$200	$200	$200
Operating Costs (transit) (million $)	$280	$270	$200	$150	$160
Required revenue investment (million $)	$2,260	$2,200	$ 2,090	$ 2,250	$ 2,510
Total Financial Impact (million $) (Low)	**$-2,580**	**$-2,590**	**$-2,410**	**$-2,520**	**$-2,790**
Total Financial Impact (million $) (High)	**$-2,660**	**$-2,670**	**$-2,490**	**$-2,600**	**$-2,870**
Example discounted annual costs 2041					
Operating Costs (transit) (million $)	$8.0	$7.6	$5.7	$4.0	$4.3
Required revenue investment (million $)	$54.4	$52.6	$49.6	$54.1	$61.7

Note: a negative value for 'required revenue investment' indicated the concept generates additional revenue, which is a financial benefit to the project.

Deliverability and Operations Case

The Deliverability and Operations Case is a summary of key risks, deliverability requirements, and considerations for delivering Fare Integration in the GTHA. This chapter can be used to frame issues and establish whether they are a fatal flaw that limits a concept's viability, or an issue that must be mitigated in future stages of analysis. This case is concerned with risks associated with pursuing a transformational fare structure.

A detailed treatment of delivering fare structure changes will be considered in the Implementation Strategy. The output of the deliverability and operations is a conclusion on:

- Whether each concept is deliverable or not; and
- The core requirements, issues, and risks that must be considered when implementing the concept.

In this section, risk is discussed based on both the likelihood of an issue impacting the concept's ability to realize its strategic, economic, or financial performance as well as the expected degree of impact. Impacts could include higher costs to deliver, longer delivery periods, or lower benefits. A three-level scale is used, commensurate with the high-level nature of this review: minimal, moderate, and high, based on how the risk may impact concept performance and/or delivery.

A review of each concept's risks is shown in Table E.8.

Deliverability and Operations Case Conclusions

The Deliverability and Operations Case has concluded that all options are broadly deliverable with specific conclusions:

- **Concept 1** – low risk due to limited changes to existing technology and governance;
- **Concept 1b, 3, and 4** – moderate risk due to changes in technology, uncertainty in pricing, and potential governance impacts; and
- **Concept 2** – high risk due to the required governance reform, and the complexity of revising zone structures after they have been established.

Social Equity is a key deliverability issue that must be addressed as a fare structure is developed. This study has not developed a comprehensive social equity strategy, but has recommended that an appropriate approach to social equity issues be implemented in concert with fare structure changes. To date, many of the GTHA's municipalities have either implemented or are considering implementing programs that provide targeted support for low-income travellers. How these programs address cross-boundary travel, and potential inconsistencies between them are an important consideration for further study.

TABLE E.8: DELIVERABILITY AND OPERATIONS CASE SUMMARY

Consideration	Overall risk	Delivery and Planning		Transit Operations		Customers	
	Level of risk	Policy	Technology	Operations	Infrastructure	Understandability	Pricing
Concept 1 Modified status quo	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate
Concept 1b Modified status quo with FBD	Moderate	Moderate	Moderate	Minimal	Moderate	Moderate	Moderate
Concept 2 Zones	High	High	Moderate-high	Moderate	Moderate	Moderate	Moderate
Concept 3 Hybrid	Moderate	Moderate	Moderate	Minimal	Moderate	Moderate	Moderate
Concept 4 FBD	Moderate	Moderate – High	Moderate-high	Moderate	Moderate	Moderate	Moderate

While modifications to the status quo that retain a flat fare for all trips on each MSP (Concept 1) would be unlikely to necessitate significant change to this equity programming, concepts that make greater use of fare by distance (Concepts 1b, 2, 3 and 4) will require careful consideration to ensure any undesired impacts on social equity are either avoided or mitigated. A key consideration for fare by distance for low income travellers is the balance the particular implementation of a fare structure and pricing regime strikes between a decrease in fares for short trips and the increase in fare for medium and long distance trips. Potential equity measures include:

- Equity focused fare caps or loyalty programs (example: low income travellers have a fare that caps after a shorter distance travelled than general customers);
- Equity focused programming that provides discounted passes for travellers through a centralized program; and
- Additional fare structure optimization, including peak and off peak pricing.

Business Case Findings

Evaluation Summary

This Business Case assessed five fare structure concepts to determine key design features that should be used to develop the transformational fare structure. The key advantages and challenges for each concept are shown in Table E.9 and the general Business Case findings for each concept are shown in Table E.10.

TABLE E.9: OVERALL CONCEPT PERFORMANCE

	Key opportunities/ Advantages	Key challenges/ Impediments
Concept 1 Modified status quo	• Simple to implement with minimal changes from existing fare structure • Minimal ridership risk for internal travel markets • Minimal impact to MSP operations and revenues for internal trips	• For revenue neutrality, it requires an increase in all trip fares to compensate for revenue lost from customers paying two fares • Discounted transfer fares for cross boundary trips do not accurately reflect the variety of trips taken and have the lowest overall ridership growth potential
Concept 1b Modified status quo with FBD	• Limited overall strengths; however, the use of FBD on RT can lead to lower and more appropriate discounted transfer fares and overall fares for short and medium cross boundary trips	• Complex to manage FBD and discounted transfer fares, which may be difficult for users to understand • The combination of discounted transfer fares and FBD does not offer significant benefits above the use of a single co-fare • If FBD fares are too high, long distance ridership that currently has a flat fare will decrease
Concept 2 Zones	• High ridership growth potential • Relatively simple for customers to understand with a consistent user experience for all trips/services • Encourages demand in most markets, including short/medium distance trips	• If zone fares are too high, long distance ridership that currently has a flat fare will decrease • Zones are inconsistent – some short trips are more expensive than longer trips based on fare boundary rather than trip taken, effectively recreating geographic barriers • Highest implementation risk due to decision making structure changes
Concept 3 Hybrid	• Free transfers between local and RT and local and FBD encourages use of the multi modal network • Integrated RT/Regional FBD pricing encourages use of GO Rail and RT as one network • Strongest economic performance driven by reduced auto travel across the GTHA	• The complete elimination of co-fares and double-fares leads to higher revenue burden being placed on long distance trips – this impact is greatly reduced with revenue investment • If FBD fares are too high, long distance ridership that currently has a flat fare will decrease • Flat fares on local may be an incentive to use slower or lower capacity services when there is competition between local and RT/regional
Concept 4 FBD	• Consistent fare experience for all trips and service types • High ridership growth potential • Encourages demand in most markets, including short/medium distance trips	• If FBD fares are too high, long distance ridership that currently has a flat fare will decrease • Requires a delivery plan that limits impacts to transit operations (example: potential customer flow impacts on buses) • Requires significant change management to ensure customers understand and make best use of system

TABLE E.10: BUSINESS CASE SUMMARY

	Strategic Case – does the concept realize the transformative vision?	Economic Case – what is the value to society of pursuing the concept?	Financial Case – what is the concept's preliminary financial impact?	Deliverability and Operations Case – can the concept be implemented/ operated?
Concept 1 Modified status quo	• Low alignment with transformative vision – due to limited flexibility to set fares to meet market and customer needs • Consider key lessons in the development of implementation plan	Strong economic performance – NPV of $1.8 to $3.7 billion 2015 dollars	• Revenue Neutral Financial Impact:-$150 million • Revenue Investment Financial Impact: -$2.7 billion	• Low deliverability risk due to minor changes
Concept 1b Modified status quo with FBD	• Low alignment with transformative vision – more flexible than Concept 1 due to use of FBD, but overall it is a more complex structure • The concept is unlikely to be an effective transformational or incremental structure	Moderate economic performance – NPV of $0.5 to $2.5 billion 2015 dollars	• Revenue Neutral Financial Impact:-$320 million • Revenue Investment Financial Impact: -$2.8 billion	• Moderate risk due to uncertainty for local-RT trips • If a software solution cannot be developed, costs could increase significantly
Concept 2 Zones	• Moderate alignment with transformative vision; however the concept has limited potential to evolve over time due to the complexity of modifying zones. • The concept is unlikely to be an effective transformational or incremental structure	Strong economic performance – NPV of $1.1 to $2.7 billion 2015 dollars	• Revenue Neutral Financial Impact:-$60 million • Revenue Investment Financial Impact: -$2.6 billion	• Contingent on governance reform and establishing zones – high risk
Concept 3 Hybrid	• Moderate alignment with transformative vision – due to the creation of a more seamless and user friendly structure • Consider key lessons in the development of implementation plan	Strongest economic performance – NPV of $2.2 to $3.4 billion 2015 dollars	• Revenue Neutral Financial Impact:-$150 million • Revenue Investment Financial Impact: -$2.7 billion	• Moderate risk due to uncertainty for local-RT trips • If a software solution cannot be developed, costs could increase significantly
Concept 4 FBD	• Strongest alignment with vision – due to provision of a seamless region wide fare structure that is flexible enough to adapt fares to meet most customer and market needs • Consider in the development of transformational structure	Strongest economic performance – NPV of $1.4 to $2.4 billion 2015 dollars	• Revenue Neutral Financial Impact:-$140 million • Revenue Investment Financial Impact: -$3.0 billion	• Moderate-high risk due to implementation of FBD on local and RT due to large shift in software, infrastructure, and operations

Developing a Transformational Fare Structure

Concept 4 achieved the strongest strategic performance, positive economic performance, and is deemed deliverable based on preliminary analysis. It is therefore considered as a starting point for the development of the transformative structure from a strategic perspective – including a more detailed design and review of the concepts costs, impacts to operations, and benefits. FBD concepts (Concepts 4 and 3) have the strongest economic performance across both revenue scenarios. As a result, its strengths should be considered when developing the long term transformational structure. The difference in economic performance between the options should be considered during the development of a transformational vision, including the use of an initial flat fare for services that use FBD.

The transformative structure should draw on the strongest elements of FBD concepts (concepts 4 and 3), and manage key weakness or issues to develop a new structure. Key transformative design considerations include:

TABLE E.11: KEY DESIGN CONSIDERATIONS FOR CONTINUED STRUCTURE DEVELOPMENT

1	**Consider FBD on additional services to achieve strategic goals**	The transformational fare structure should consider a fare that is aligned with the value of the trip taken by using a base fare for boarding transit and a distance based fare that is calculated based on distance travelled on each service that uses FBD. This approach allows for flexibility to meet market needs, grow demand in markets that currently face fare barriers, and create a consistent overall structure.
2	**Manage FBD pricing to ensure the network remains accessible**	The transformational fare structure should consider strategic pricing when implementing FBD. Distance based fares must be managed carefully and implemented in a way that mitigates potential ridership losses from long distance markets that currently have a flat fare. FBD design should focus on adaptable fares that support integrated service planning across geographic or jurisdictional barriers.
3	**Allow for flat fares where effective**	The transformational fare structure may consider the use flat fares (either as part of an FBD pricing approach as an initial flat fare or cap or for a service type) where they are effective based on a more detailed analysis of service impacts and the development of a revised service structure.
4	**Develop the new fare structure with a focus on customer experience and service integration**	The transformational fare structure should consider the benefits of a seamless and unified customer experience across the region's services and service providers during its development. Structure design should focus on adaptable fares that support integrated service planning across geographic or jurisdictional barriers.
5	**Align fare structure design and implementation with the RTP and future network expansion**	The transformational fare structure should be pursued when it can realize its full potential benefits – this includes aligning its implementation with RER, increased cross boundary demand, and development of expanded RT networks.
6	**Phase fare structure delivery across the GTHA's travel markets**	The transformational structure should be pursued in phases across the GTHA's travel markets based on their potential to realize strategic and economic benefits in a manner that will be defined in the Implementation Strategy

From a strategic and deliverability perspective, Concept 4 also had key issues that limited or negatively impacted its performance. Future studies should address:

- Outstanding deliverability issues – including detailed design of customer experience, specific fare payment systems, and tools to manage tap on/tap off impacts;
- Optimal pricing structures that yield required revenue but do not discourage transit use for long distance trips that currently have a flat fare; and
- Refined service structure and tools to optimize the fare structure (including time of day pricing, products, and concessions) and an approach to decision making/fare setting – including the degree of centralization required to implement the structure.

The benefits of the transformational structure are realized over the long term as the transit network evolves, including the expansion of GO Rail via the RER Program and development of new RT services. Thus, the transformative structure should be implemented over the long term when it can realize the full extent of its benefits.

Developing an Incremental Fare Structure
Incremental changes can be developed as a first step towards achieving the transformational vision. The benefits of these changes can be realized within the existing transit network or with near term improvements. These changes would address urgent issues, and lay the foundations for the future structure. The development of the Implementation Strategy should explore the fare structure concepts to identify key issues that can be resolved incrementally that will improve the seamlessness of the transit network and safeguard for the longer term transformational vision. This includes considering:

- Appropriate short/medium distance regional fares that will expand travel opportunities and attract demand to GO Rail and the future GO Rail as the RER Program is implemented Track network;
- Products and concession harmonization across services and operators;
- Customer experience changes that promote a harmonized approach to providing fare information across the GTHA;

- Pay parking as a tool for demand and revenue management; and
- Alignment between incremental changes with significant transit investments, including: RER, TYSSE, New LRTs, changes to the PRESTO system, and other transit improvements.

Next Steps

The outputs of this Business Case will be used in the next two phases of the study:

- **Phase 3 Fare structure refinement –** continued development of the transformational structure's performance standards and requirements for technology, customer experience, service planning, decision making, and other approaches to structure refinement (example: time of day pricing, products, and concession); and
- **Phase 4 Implementation Strategy –** Fare Structure Implementation and Management – development of an overall strategy to deliver improvements to the existing fare structure leading to the long term transformational vision.

Key focus areas for these phases should include:

- Detailed review of agency impacts – while this study accounted for the overall financial and strategic impacts to the region and travel markets, future studies should revisit this analysis and identify refined estimates for agency specific impacts;
- Approaches to social equity – this study identified that Fare Integration can realize social equity benefits and impacts, which should be studied in greater detail as part of fare structure delivery planning- including a consideration of fare caps, initial flat fares, a range of products/passes, and potential use of steps instead of per km rates where FBD is used;
- Optimal pricing structures that yield required revenue but do not discourage transit use for long distance trips that currently have a flat fare – including a consideration of fare caps, initial flat fares, a range of products/passes, and potential use of steps instead of per km rates where FBD is used; and
- Refined service structure and tools to optimize the fare structure (including time of day pricing, products, and concessions).

1 Introduction

This report has been completed by Steer Davies Gleave for Metrolinx based on work completed between 2015 and 2017. To support this work, a TAC was convened with representation from the region's transit agencies.

This work has been summarized as a draft for the "Preliminary Business Case for Fare Integration". It has been prepared to support decision makers and stakeholders in reviewing potential transformative fare structures for the region and understanding their strengths, weaknesses, and potential impacts. The findings in this report are presented as a draft for discussion and have not been endorsed as formal recommendations by Metrolinx or members of the TAC.

1.1 Background

The GTHA is rapidly growing. Historically, growth has been focused into key regional urban cores; however, recent growth has also led to more dispersed development across a growing number of activity and employment centres. By 2041 it is expected the region will be home to nearly 10 million people. This growth is expected to lead to increased travel within and between municipalities.

To support this growth, multiple investments in the region's transportation network have been planned for implementation over the next ten years to create a more connected and accessible region. These include:

- New Light Rail Transit (LRT) systems in Hamilton, Mississauga, and Toronto;
- The Toronto York Spadina Subway Extension (TYSSE), connecting York Region and Toronto;
- Development and implementation of the PRESTO fare card system; and
- The GO Regional Express Rail (GO RER) Program, which will transform the existing GO rail system from a commuter-oriented network to the backbone of the regional transit network

A key consideration for maximizing the benefits of these investments is ensuring that travellers are able to seamlessly access the entire GTHA transit network, regardless of service provider. This will lead to increased ridership and improved accessibility for underserved areas.

Transit services in the GTHA are currently provided by multiple service providers, including two service providers directly administered by Metrolinx (GO Transit and UP Express) and nine Municipal Service Providers (MSPs). This has led to 11 different sets of fare policies, and a composite fare structure on the regional scale that is inconsistent and fragmented. This also leads to barriers to transit use – such as paying two fares for one trip that crosses a municipal boundary – that in turn may limit the overall usability of transit in the region and the overall benefit of major transit investments.

Fare Integration has been proposed as a means of enabling seamless travel across the existing and future transit network. Developing an integrated fare structure was one of ten key strategies in The Big Move, the Regional Transportation Plan for the GTHA adopted in 2008, and was included in the 2014 and 2016 mandate letters from the Premier to the Minister of Transportation.

1.2 Study Approach

1.2.1 Study Scope

Metrolinx launched a series of studies to work towards a “Fare and Service Integration Strategy”. A new transit fare structure will directly impact every transit trip taken in the GTHA because it will determine the fare a customer pays. In turn, this will shape customer decisions about using transit and overall transit ridership and use of services. As a result, fare structure development is a complex process. In order to manage this complexity, a staged analysis (shown in Figure 1.1) has been followed.

This preliminary Business Case summarizes work completed from January to April 2017 to identify a high potential transformative fare structure for the GTHA as noted in Stage 2 of Figure 1.1. This transformative vision is intended to provide direction for further study and structure development, and will be refined in Stage 3.

This structure will be developed to realize the greatest level of benefits from future levels of service and infrastructure by providing travellers with a structure that allows flexible access to all transit services regardless of operator/agency, and is convenient for different types of trips and is consistent across the region.

An Implementation Strategy (Stage 4 – Figure 1.1), which identifies and evaluates potential incremental changes is also under review and development, with an anticipated completion in December 2017. The "Implementation Strategy" will provide guidance on how to prioritize and enact incremental changes that improve the seamlessness of the GTHA's fare structure.

FIGURE 1.1: STAGES OF FARE INTEGRATION ANALYSIS

Stage 1	**What types of fare structure best meet the vision, goals, and objectives for fare integration? (2015)** • Reviewed different approaches to differentiating fares and how they may apply to the GTHA • Output: conclusion that GTHA fares could be differentiated by distance (flat, zones, or measured distance) and that fares could be differentiated by service type
Stage 2	**What should the fare structure for the GTHA be? (2016-2017)** • Evaluate different approaches to varying fares by service and distance identified in Stage 1 to determine the base fare structure for the GTHA • Output: evidence and insight to support decision makers in selecting a transformational fare structure
Stage 3	**How should the GTHA fare structure be refined to meet customer, service provider, and regional needs? (2017 - ongoing)** • Provides further scoping on structure performance and requirements for technology, customer experience, service planning, decision making, and other approaches such as structure refinement (example: time of day pricing, products, and concession) • Output: working papers providing further detail on the preferred fare structure
Stage 4	**How should the GTHA fare structure be implemented and managed? (2017 - ongoing)** • Identifies an "Implementation Strategy" to a series of progressive changes incremental changes and improvements that will lead to a transformational structure • Output: a detailed 'fit for GTHA' strategy for delivering and operating the new fare structure

1.2.2 Developing an Integrated Fare Structure

This study explores different ways to price trips in order to determine a direction for the overarching fare structure. A fare structure can be thought of the set of rules and parameters that allow the features of a trip to be translated into a fare. Trip features commonly considered by fare structures include the length of the trip, what types of transit services are used, whether transfers occur between different vehicles or different service providers, whether a stopover occurred and what time the trip was taken at.

As the latter considerations can be applied in a variety of permutations across all kinds of potential fare structures, initial work focused on determining:

- The extent to which fares should reflect distance travelled; and
- The extent to which fares should reflect the types of service used for a trip.

This stage has taken a GTHA wide perspective to develop and evaluate potential fare structures. Future stages will address specific impacts on individual jurisdictions, which are a key consideration for designing and implementing the final fare structure.

Particular impacts for consideration include potential changes to revenue, revenue allocation systems, and approaches to make decisions within an integrated fare structure. These issues will be addressed in future stages of the study before a proposed fare structure is considered for implementation.

1.2.3 Fare Structure Analysis

This report uses the Metrolinx four chapter Business Case guide to determine a preferred direction for the transformational integrated fare structure.

Business Case Analysis (BCA) is an approach to inform decision making that allows a complex problem to be analyzed from multiple perspectives (as noted in Figure 1.2). The goal of BCA is to ensure that decision makers can be confident that a robust appraisal of project benefits, costs, and impacts has been undertaken. The analysis itself is not intended to make the decision, but to support decision makers in understanding the trade offs of potential projects.

FIGURE 1.2: BUSINESS CASE STRUCTURE

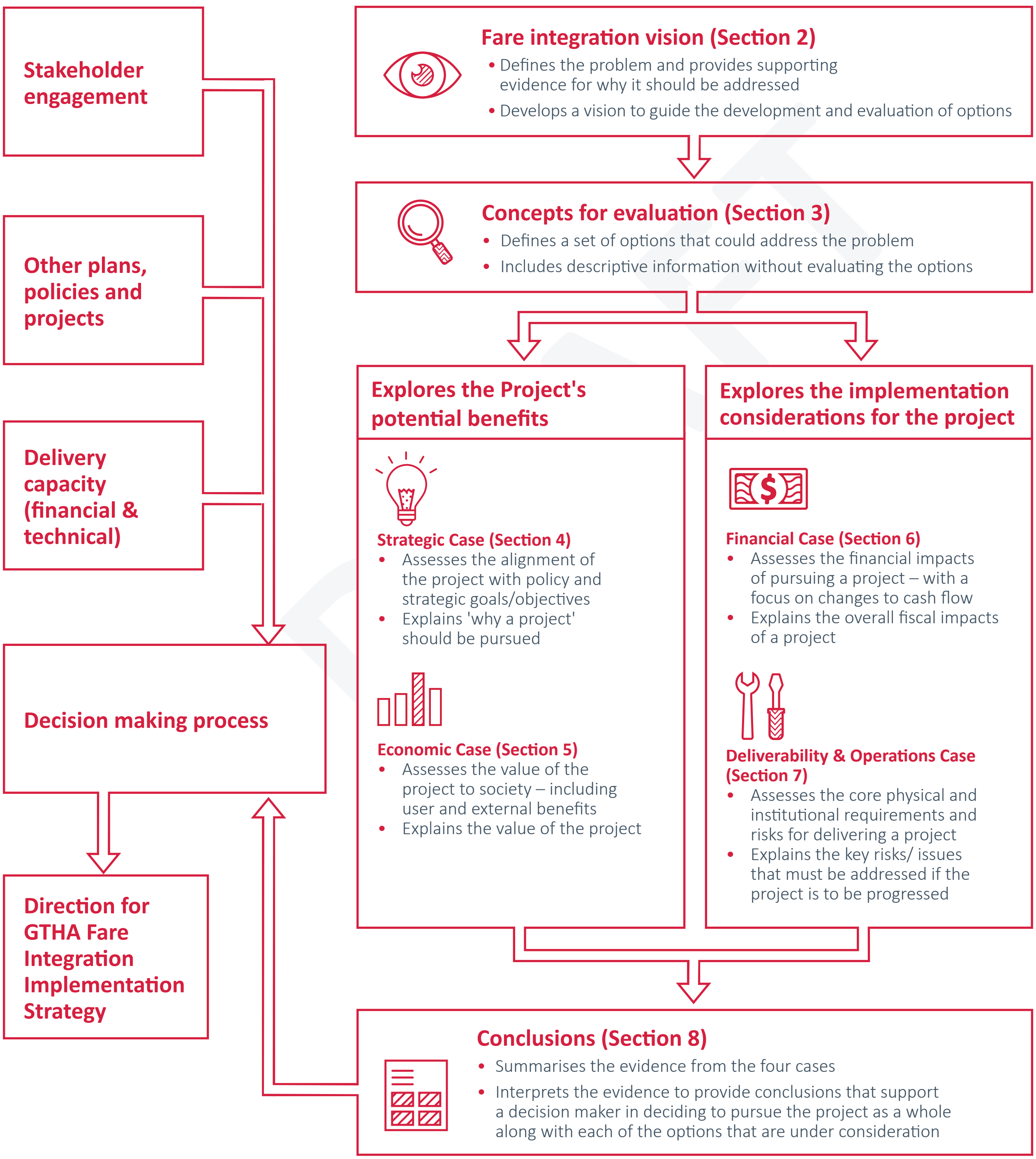


FIGURE 1.3: BUSINESS CASE STRUCTURE

The Business Case uses 3 types of costs:

Base costs which are an estimate of the cost of the new Fare Structure if the entire system was procured today are used to scope the concepts in section 3.

Economic costs which are used to understand the economic value of the fare structure to society in section 5.

Financial costs which are used to understand the financial cash flow impacts of the fare structure in section 6.

Base Costs

Derived from cost estimated for the expected cost to provide a new fare structure including capital and operating costs

Economic costs (real terms – Section 5)

Fare structures require capital and operating costs to be paid throughout the project lifecycle. Economic costs reflect the real price of these costs based on the year they are incurred and a social discount rate.

The social discount rate reflects a general 'time preference' for money – money today is seen as more valuable than money in the future so over time costs and benefits are discounted.

Financial costs (nominal terms – Section 6)

Fare structures require capital and operating costs to be paid throughout the project lifecycle. Financial costs reflect the actual price in the year they are required.

Because the purchasing power of money declines over time, cost estimates need to be adjusted throughout the lifecycle to reflect the increase in money required to procure them compared to if they were produced in the base year.

Inflation reflects the general increase in prices for goods and services overtime.

Real inflation reflects the increase in prices for goods and services above the general increase in prices – for example, HSR fleet may increase in price faster than other goods and services.

Nominal values, used in the financial case, reflect the expected cost of a good or service in the year of expenditure base on both general and real inflation.

Real values, used in the economic case, reflect the value of the good or service based on real inflation without general inflation.

This Business Case should be considered as one of multiple decision making inputs, as shown in Figure 1.2. The analysis conducted for this Business Case was focused on the potential strengths and weaknesses of potential fare structure 'concepts' (discussed in Section 3) that represent unique approaches to implement an integrated fare structure.

The cost of Fare Integration at a regional level (including capital costs for software/devices, increased transit operating costs, and changes to fare structure operating costs) have been included in this Business Case. These costs are reprented in three ways based on the requirements of a Business Case: base costs (representing estimated cost in 2015), real value in the economic case (representing the real value of the cost in 2015$ based on the year it is incurred), and nominal value (representing the total cash flow required to provide the fare system based on the year the money is spent) in the financial case. These costs are further described in Figure 1.3.

Business Cases support decision makers in understanding complex problems and should be reviewed alongside stakeholder engagement as part of a robust decision making process. The technical approach used for this project made use of best available data, information, and tools. However, it is subject to uncertainty due to exogenous changes in travel demand and services that are outside of the scope of this study. Business Cases should be reviewed and updated as necessary as changes in transport demand and provision of transport service occur.

The analysis conducted to develop this Business Case included:

- Engaging and collecting input from MSPs;
- Reviewing international best practices;
- Conducting qualitative analysis; and
- Developing and applying a fit for purpose ridership model to understand how different structures lead to changes in demand and revenue.

1.3 Stakeholder Collaboration

All work completed in this study was conducted collaboratively with Metrolinx and a TAC. The TAC brought together MSPs and other organizations involved with transport delivery. The TAC included the following members:

- Brampton Transit
- Burlington Transit
- City of Toronto
- Durham Region Transit
- Hamilton Street Railway
- GO Transit
- Milton Transit
- Ministry of Transportation (MTO)
- MiWay
- Oakville Transit
- PRESTO
- Toronto Transit Commission
- York Region Transit

The TAC's role was to provide input into the study's approach and findings. At this stage, neither Metrolinx or the TAC have endorsed this Business Case and its findings.

1.4 GTHA Fare Structure Model

A fit for purpose travel choice model was developed to understand how changes to fares will impact transit ridership and automobile demand in the GTHA. This model draws upon the 2011 Transportation Tomorrow Survey and the GGHM v3.0 model to ensure as much consistency as possible between fares analysis and other analytic exercises undertaken in the region.

The model can forecast demand in 2011 and 2031 based on an assumed transport network, demand patterns, and costs of travel (including in vehicle travel times, fares, transfer penalties, waiting times, and access times). Model runs conducted in this project vary the fare portion of a journey's cost to determine how different travellers and travel markets will respond to a new fare structure. This allows travellers to change mode between a range of available transport and automobile options based on the new price of transit trips. Outputs from the model include changes to ridership, user benefits/impacts, and automobile vehicle kilometres travelled.

The model was designed to provide reliable inputs at a level of detail commensurate with the requirements of the preliminary Business Case. As a result, some factors were not explicitly considered in the model:

- The model was designed to be conservative in its forecasts of new potential ridership by not including induced demand (example: a lower fare creating new trips not being made today by any mode) – induced demand should be considered in future analysis.
- Due to technical limitations in source data, the model does not include trips on active modes (tavellers will not switch to active modes from transit or auto, or switch from active mods to transit or auto) – this results in generally conservative results for both ridership growth and VKT-related benefits. Therefore the relationship between active modes and transit fares should be studied further in future studies, particularly if significant changes in fares for short transit trips are to be included in a new fare strategy.

- Due to limitations with how the source data considers individual trips, stopovers (and thus the differential impacts of directional vs. time-based transfers) could not be directly analyzed with this model. This is a key area of public and agency interest, and stopover policy needs to be a consideration in developing a final fare structure. If a future fare structure were to include additional cost for transfers under some or all circumstances, additional analysis should develop fit for purpose tools for the impact of time vs. directionality on a transfer policy.
- Based on agency feedback and direction, average fares have been used to model demand – the fares in this model reflect a range of products, cash fares, and concessions based on their usage. Future studies should explore a product choice model as the specific range of products/concessions is explored further.

1.5 Report Structure

The remainder of this document is composed of:

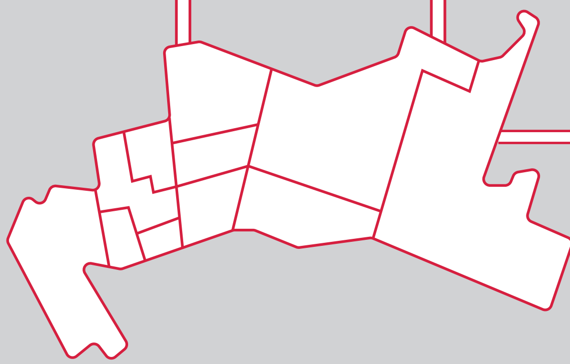
- **Section 2 Fare Integration Problem and Vision** – a summary of the key issues to be addressed by Fare Integration and the vision, goals, and objectives that potential structures are evaluated against
- **Section 3 Fare Structure Concepts** –a summary of the concepts developed to meet the vision and goals for Fare Integration
- **Section 4 Strategic Case** – an evaluation of each concept against the vision, goals, and objectives for fare integration
- **Section 5 Economic Case** – an economic appraisal of each fare concept to determine value to customers and society as a whole
- **Section 6 Financial Case** – a financial appraisal of each concept to determine the expected financial impact of fare integration
- **Section 7 Deliverability and Operations Case** – a review of key issues and considerations to deliver and operate an integrated fare structure
- **Section 8 Conclusions** – a summary of the key findings from the BCA

GTHA FACTS & FIGURES

6.6M
Population

60%
Employment Rate

1.1M
Households



The GTHA is the most populous metropolitan area in Canada. The GTHA is defined as the central city of Toronto, and the five regional municipalities that surround it: Hamilton, Durham, Halton, Peel, and York

Presto card
contactless smart card fare payment system

$12,000
is spent, on average, on transport by households each year

78% of the GTHA population use a car or a van to commute to work

2

Fare Integration Vision

2.1 Overview

Chapter 2 provides a summary of the vision for Fare Integration and the key issues and challenges it should address. The problem and vision development process utilizes numerous approaches to understand the challenges Fare Integration must approach:

- Analysis of global best practices;
- Assessment of pertinent GTHA policy;
- Review of previous Fare and Service Integration work programs; and
- Collaboration with project stakeholders from GTHA transit agencies, Metrolinx, and MTO.

A high level summary of the project's problem and vision is provided in Figures 2.1 and 2.2.

This vision was used to guide the development and analysis of potential fare structure concepts and will continue to be used in Stage 3 (Structure Refinement) and Stage 4 (Implementation Strategy) discussed in Figure 1.1.

The remainder of this section includes:

- **Context** – a discussion of travel in the GTHA, and the existing approach to fares.
- **Problem and Vision Definition** – a review of the existing fare structure to develop a problem and vision statements that guide the design of the Fare Integration Strategy.
- **Fare Structure Barriers, Strategic Outcomes, and Evaluation** – a summary of the role of the Fare Structure within the broader Fare Integration Strategy.

FIGURE 2.1: PROBLEM OVERVIEW

What are the challeges and opportunities with the existing approach to fares in the GTHA?

Challenge 1 – Cost
Some customers pay a fare that does not represent the value of the trip they take – when the fare is much higher, demand is suppressed.

Challenge 2 – Complexity
The region wide fare system is complex – each agency has unique rules that lead to a user experience that is not seamless. The complexity of the fare structure may discourage travellers from choosing transit.

Challenge 3 – Captivity
Products and concessions vary across the region, which may make some users captive to one agency and discourage use of another agency's service, even when more convenient.

Opportunity 1
Change fares to support cross boundary transit ridership growth on existing and new services.

Opportunity 2
Change fares structure to seamlessly integrate GO RER as part of the broader GTHA transit network.

Problem

The GTHA is undergoing rapid growth towards a larger population that lives and works across multiple urban centres around the region. Significant investment in new transit services and infrastructure has been planned to support the growth of the region. However, the existing fare structure has barriers that discourage transit use in specific markets today and will limit the ability of future transit investments to create a seamless GTHA wide transport network.

What role does fare structure play in the problem?
The current fare structure suppresses demand on the existing and future transit services based on three barriers.

Barrier 1
Cross boundary travellers that use 905 MSPs and the TTC pay the full fare for both service providers and must use multiple rules /fare systems.

Barrier 2
Travellers taking short/medium distance trips on GO pay fares that are significantly higher than other services.

Barrier 3
Customers that use the TTC and GO rail pay the full fare for both service providers and must use multiple rules /fare systems.

FIGURE 2.2: VISION OVERVIEW

What goals should be considered when designing and developing a new fare strategy that realises this vision?

Value
The fare strategy will reflect the value of the trip taken and maintain the financial sustainability of transit services.

Simplicity
The fare strategy will simplify customer experience and agency fare management/ operations, attracting travellers to transit services throughout the GTHA.

Consistency
The fare strategy will create a common fare structure with consistent definitions and rules across the GTHA

Vision

The GTHA Regional Fare Integration Strategy will increase customer mobility and transit ridership while supporting the financial sustainability of GTHA's transit services. This strategy will remove barriers and enable transit in the GTHA to be perceived and experienced as one network composed of multiple systems/service providers.

As part of the overall strategy, what strategic benefits can the fare structure realize to support this vision?

Fare integration will address fare barriers to allow customers to make use of the GTHA's complete transit network.

Addressing the travel barriers will increase cross boundary, short/medium distance GO RER, and TTC/GO RER travel.

Fare integration will provide an improved user experience for customers across the GTHA

An improved customer experience will attract and retain ridership when the new fare structure is implemented.

Fare integration will support the long term development of transit services in the GTHA.

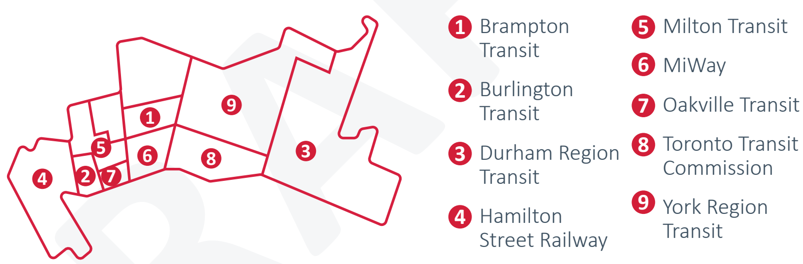
A more flexible fare structure can improve planning of first mile/last mile and cross boundary services, and collect data to optimize demand and service planning.

2.2. Context

2.2.1 GTHA Fares Background

The GTHA transit network is composed of multiple service providers and types of service. GO Transit provides service across the region through its rail and bus services, while MSPs provide services aligned with the needs of customers within specific lower and upper tier municipalities. The region's MSPs are are shown in Figure 2.3.

FIGURE 2.3: GTHA MUNICIPAL SERVICE PROVIDERS



The current GTHA fare structure is composed of multiple rule sets, policies, and objectives that are set and delivered largely on an MSP/ Municipality basis. Key considerations for the structure include:

- All MSP services use a flat fare within their respective service area (the only MSP not to follow this approach, York Region Transit, discontinued fare zones that subdivided their service area in mid-2017);
- GO Transit fares use a a form of distance fares where the price of travel increases with distance travelled – these fares are often more expensive for short trips than an equivalent trip using an MSP;
- Trips between 905 MSPs/Toronto Transit Commission (TTC) are not integrated and require customers to pay two fares;
- Trips between TTC and GO Transit are not integrated and require customers to pay two fares;
- 905 MSPs have reciprocal agreements to accept each other’s transfers, allowing for seamless use of multiple agencies under one fare; and
- Concessions and products vary by service provider and municipality.

To assist in the analysis and interpretation of the Business Case, the GTHA's transit travel has been broken into seven travel markets for all analysis included in this Business Case. Demand from 2011 along with forecast demand for 2031, which increases due to population/employment growth and the provision of new services, across each of these markets is shown in Table 2.1. Forecasts were conducted with a built for purpose model base that draws upon the Greater Golden Horseshoe Model, Transportation Tomorrow Survey, and economic/demographic forecasts. The average fares in Table 2.1 are average fares that take into account concessions, passes, and products.

TABLE 2.1: GTHA TRAVEL MARKET SUMMARY

	2011 Trips	Forecast 2031 Trips	% Change in Demand (2011 to 2031)	Average Fare ($)	Average Distance (km)
Downtown Toronto	83,400	122,400	47%	$2.00	2.40
Rest of Toronto	603,400	867,000	44%	$1.90	8.90
Rest of Toronto to/from Downtown Toronto	546,200	632,000	16%	$2.00	12.00
Within 905 MSP	239,000	493,200	106%	$2.00	6.20
905s to/from Downtown Toronto	247,400	334,700	35%	$4.90	35.80
905s to/from Rest of Toronto	139,800	279,800	100%	$4.30	24.00
Between 905 MSPs	32,900	78,300	138%	$3.40	20.20
Total	1,892,100	2,807,400	48%	$2.60	13.90

2.3. Problem and Vision Definition

This sub section explores key opportunities, challenges, and issues related to the GTHA's fare structure to define a central problem for the fare strategy. This problem statement is used to inform the vision, design, and evaluation of the Integrated Fare Strategy as a whole, and is applied specifically to the Integrated Fare Structure for this phase of the study.

2.3.1 Key Opportunities for an Integrated Fare Strategy

The growth and regional transportation plans for the GTHA call for an integrated transit system that supports trips within communities and across the region as part of a plan that will lead to the development of a vibrant region composed of multiple urban centres. Increased transit use is a means to limit the negative impacts of increased travel, which may otherwise use the auto mode – including congestion, criteria air contaminant and greenhouse gas emissions (GHGs), and the social cost of accidents related to high levels of auto travel.

Transit investments aim to expand the GTHA's service offer by increasing bus service and providing new rapid transit (RT) and regional rail projects. These investments will form the backbone of a seamless transit network that is competitive with other transport modes, including the automobile.

Transit fares directly influence how accessible transit is, and therefore impact transit's ability to support goals for regional development. Fares may either encourage or discourage a traveller from using transit for some or all of their trips. If a fare strategy, including the overall structure, is not aligned with broader goals for investment in transit and ridership development, the overall potential of transit is constrained and ridership is suppressed.

Two key drivers have been identified as rationale for the development of a new GTHA wide fare structure and strategy:

- Increased cross boundary travel demand on existing and new services; and
- The GO RER program will expand the role, capacity and function of the GO rail network to serve multiple types of trips and travellers and provide a seamless transit network across the GTHA.

Fare Integration is a key component to ensuring significant investments in cross boundary service and the GO RER network yield a transit network that is competitive with other modes.

OPPORTUNITY 1 INCREASED CROSS BOUNDARY TRAVEL

The majority of transit demand in the GTHA in 2011 and 2031 is within individual municipalities (75% in 2031). Under the status quo fare structure, cross boundary transit use will see a significant increase; however, the majority of cross boundary travel is still auto reliant (85% auto mode share). As cross boundary travel demand increases, investment in transit can direct this increase in demand to transit services. New cross boundary services, for example, the Toronto York Spadina Subway Extension (TYSSE), have been developed to provide high quality services for increasing cross boundary travel.

The existing approach to fares in the GTHA also limits the planning and delivery of cross boundary services. Some MSPs may operate into Toronto with closed door services[1], which limits the viability of these services. A new fare strategy is an opportunity to develop a fare structure that supports development of an integrated network of services without regard to jurisdictional boundaries.

OPPORTUNITY 2 DEVELOPMENT OF THE GO RER NETWORK

The GTHA's transit network is undergoing rapid transformation to support growth and development goals. The GO Regional Express Rail (RER) Program is a $16 billion investment in expanding GO infrastructure, enabling the doubling of peak period GO train service and quadrupling of off-peak service by 2024-25. All seven corridors will see service improvements, with five corridors seeing electric trains running every 15 minutes or better in both directions throughout the day. GO RER will provide new mobility across the region for trips within and between municipalities and transform the GO network from a service that currently serves long distance commuter markets, to one that also serves shorter distance local trips. To ensure optimal use of this investment, GO requires strong integration with MSP transit networks. Fare integration presents an opportunity to ensure GO RER is an accessible transit system that is seamlessly connected to the broader GTHA transit network.

1. Closed Door services refer to bus routes that cross into another municipality but do not have permission to collect new passengers.

TABLE 2.2: ALIGNMENT OF FARE INTEGRATION WITH PLANS AND POLICIES

Plan/ policy	Alignment with vision
Big Move	S5 – customer first transit service • Region wide transit standards • Phased out closed door policies • Enhanced customer service S6 – region wide fare system • Single unified fare structure • Stronger partnerships for coordinated and integrated service • Connections between major services • Common fare media • Encourage cross boundary travel
Metrolinx Five Year Strategy	O2 – advance integrated transit fares • Convenience, seamless connections, improved experience
Ministry of Transportation	• Aligned with goals in Growth Plan, including improved connectivity between mobility hubs
Brampton Official Plan	• Calls for fare and service integration as part of transit optimization
Burlington Official Plan	• Encourages service and fare integration
Durham Official Plan	• Action 18 – cooperate in promotion of inter-regional transit • Action 19 – work with GO, TTC, YRT to introduce measures to make transit better for long distance commuters
Halton Official Plan	• Inter-agency transit strategy required
Mississauga Official Plan	• Plan stresses need to connect Brampton, Halton, Toronto, GO transit services to improve mobility • Includes for rapid transit integration
Oakville Official Plan	• Integration between agencies stressed as a priority
Toronto Official Plan	• Calls for integrated services and fares
York Official Plan	• Connected services and services that cross borders – aligned with notion of a seamless transport network

FARE INTEGRATION ALIGNMENT WITH PLANS AND POLICIES

In addition to these two key drivers, Fare Integration is a key consideration in regional, municipal and agency plans, as identified in Table 2.2.

2.3.2 GTHA Fare Structure Challenges

The current approach to transit fares in the GTHA is unlikely to realize the potential for transit discussed in Section 2 due to three key challenges: cost, complexity, and captivity.

COST

Cost can limit the use of transit when customers must pay a transit fare that is higher than the value of the transit trip taken. If the cost of a trip is significantly higher than the perceived value of the trip the customer may choose to not use transit, or may be priced out of taking the trip entirely, even when transit is the most convenient travel option. For example, customers that must pay two fares when using multiple agencies may discourage transit use because transit becomes too expensive relative to other modes.

COMPLEXITY

Complex fare systems that require customers to use multiple rules (based on the services or service providers used), may be difficult to understand and therefore suppress demand. As cross boundary travel increases, transit customers must understand and make use of multiple rule sets, pricing approaches, and products, which may impede transit use.

Each service provider has its own fare rules with unique concessions and products, although there is some degree of standardization – for example, a customer eligible for a concession or product in one jurisdiction may not be eligible for the same product in another jurisdiction.

As a result of this complexity, customers may not understand how to pay or what to pay for transit when using multiple service providers, which in turn may suppress demand.

CAPTIVITY

Captivity decreases transit use when a customer does not use transit for some or all of their trip because their product, pass, or concession is only applicable to one service provider.

These customers will modify their transit use based on the products they have available, for example:

- A customer with a monthly pass for one MSP may use transit for internal trips, but will not want to pay twice for cross boundary travel using the TTC and a 905 MSP;
- A customer with an monthly pass for one MSP may not be willing to pay an additional fare to make use of both GO Transit services and the MSP; or
- A customer who receives a concession under one MSP rule set and not another (example, low income or student passes) may be "captive" to a single MSP and forgo transit trips on other service providers, even when they provide a more convenient option.

2.3.3 Problem and Vision Statements

An overall problem statement was developed to guide the development of the GTHA Fare Integration Strategy with respect to three challenges (cost, complexity, captivity) and the two key drivers (supporting integrated cross boundary travel and optimizing the use of the GO RER network):

Problem Statement: The GTHA is undergoing rapid growth towards a larger population that lives and works across multiple urban centres around the region. Significant investment in new transit services and infrastructure has been planned to support the growth of the region.

However, the existing approach to fares discourages transit use in specific markets and limits the potential of transit service and future investments to create a seamless GTHA wide transport network. As a result travellers may opt for a different mode of travel – even when transit services are convenient for travel needs.

The vision for the Fare Integration Strategy provides an aspirational direction that addresses the problem statement by developing a seamless, integrated fare structure. Over the course of this project, key project stakeholders, including service providers, had the opportunity to contribute to the development of the vision for Fare Integration. This feedback was considered along with a thorough review of work to date and guiding policy/planning documents.

The results of the feedback and analysis stressed:

- Barrier free travel for transit customers;
- Increased mobility and ridership;
- One seamless transit network; and
- Sufficient revenue for financial sustainability.

Based on the review, consultation, and analysis, the vision has been set out as an aspirational statement for the outcomes that the Fare Integration Strategy should achieve:

Vision: The GTHA Regional Fare Integration Strategy will increase customer mobility and transit ridership while supporting the financial sustainability of GTHA's transit services. This strategy will remove barriers and enable transit in the GTHA to be perceived and experienced as one network composed of multiple systems/service providers.

2.3.4 Goals

Goals were developed based on the vision to clarify key considerations for how a fare strategy should be planned and developed. Three goals have been developed based on the vision's aspiration of barrier free travel across a complete network composed of multiple service providers.

The goals are shown in Figure 2.3.

Figure 2.4: Fare Integration Goals

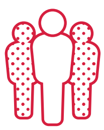
Simplicity
The fare strategy will simplify customer experience and agency fare management/ operations, attracting travellers to transit services throughout the GTHA.

Value
The fare strategy will reflect the value of the trip taken and maintain the financial sustainability of transit services.

Consistency

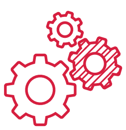
The fare strategy will create a common fare structure with consistent definitions and rules across the GTHA.

Figure 2.5: Three Perspectives Approach



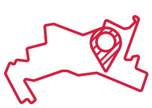
Customer Experience

Represents transit customer perspectives, needs, and concerns



Service Provision

Represents goals/ objectives of transit service providers, including agency operating requirements and policies



GTHA Mobility and Development

Reflects mobility, growth, and development goals and policies for the GTHA

2.3.5 Objectives

Objectives for the Fare Integration Strategy, have been developed to set out performance/impact targets that the new fare strategy must meet in order for it to achieve its goals.

An objective development framework (Figure 2.5) that uses three perspectives (customers, service providers, regional development) was employed to capture the complexity that the fare strategy must consider. The development of objectives included stakeholder engagement as well as a review of GTHA policy and global fare frameworks/strategies in order to ensure the process was robust and fit for the GTHA context.

The objectives (summarized in Table 2.3) were generated to ensure a complete and rigorous set of objectives appeared under each perspective. This has led to similar objectives occurring across the three perspectives. Objectives were developed during 2016 as part of the preliminary stages of this study. TAC participants and Metrolinx staff were engaged through a series of workshops to develop objectives for the overall Fare Integration Strategy. These workshops took an iterative approach where objectives were refined as 'building blocks' of the overall goals for the strategy.

TABLE 2.3: FARE INTEGRATION STUDY OBJECTIVES

	Customer	Service Provider	GTHA Mobility and Development
Simplicity	C1 Enables travellers to perceive the GTHA's various transit options as one network	S1 Adaptable to changes in agency service provision, operations, and infrastructure	G1 Provides a flexible fare system that is practical to implement
	C2 Delivers a fare structure that is readily understood by customers	S2 Has manageable requirements for implementing, maintaining and revising/enhancing the fare strategy over its lifecycle	G2 Supports transit planning and management across the GTHA including integrated transit services and data collection
	C3 Convenient and suitable for different trip and traveller types	S3 Allows for use of fare data for monitoring and service planning	G3 Creates a readily understandable fare system
Value	C4 Creates fares that travellers perceive as reflecting the value for service received	S4 Supports competitive services, ridership development, and service development and promotion policies/preferences/ guidelines	G4 Supports transit ridership development within services and across the GTHA
	C5 Promotes equity by fair pricing of trips.	S5 Provides value for money on investment in fare infrastructure/assets and related operating costs.	G5 Generates revenue in support of cost recovery plans across the GTHA.
	C6 Provides the customer a user friendly point of purchase experience	S6 Generates revenue required to meet cost recovery plans and minimizes fare underpayment and avoidance	G6 Support strategic policy for the GTHA, including economic growth, built form, social inclusion, and environmental sustainability.
Consistency	C7 Allows for common fare concessions and products that meet a range of traveller needs	S7 Allows service providers to adapt to meet changing customer needs	G7 Supports consistent fare media and products across the GTHA
	C8 Creates standardized fare payment and transaction experience for travellers using one fare medium	S8 Enables seamless transfer between agencies through the implementation and use of common fare media	G8 Implements a common approach to fare management that enables regional planning/ investment
	C9 Provides easy fare payment for trips involving multiple services and/or modes.	S9 Distributes demand efficiently throughout the network and supports the roles of differing service types	G9 Supports future service developments

2.4 Fare Structure Barriers, Strategic Outcomes, and Evaluation

The problem, vision, goals, and objectives set out in Section 2.3 were developed for the overall fare strategy. This phase of the strategy development study is focused on the fare structure, which plays a critical role in addressing the problem and realizing the vision, but is a single component of the overall fare strategy, as noted in Table 2.4.

TABLE 2.4: FARE STRATEGY COMPONENTS

Fare structure	• Define base service structure • Determine the role of distance in pricing (flat, zones, measured distance) • Set out rules for pricing transfers between services and service providers
Fare pricing and planning	• Define products and concessions to manage revenue/ridership and strategic objectives within the structure • Define rules for time of day or specific service pricing to improve structure performance against objectives • Scope potential approaches to fare collection , ticketing, marketing, and customer experience design
Fare implementation and management policies	• Determine the extent to which harmonization/centralization required and set out rules for revenue collection/allocation • Design and develop a product/ticket distribution network • Design and implement fare collection , ticketing, marketing, and customer experience

The evaluation and development of the Integrated Fare Structure has therefore been tailored to address specific issues that can be directly addressed by the fare structure.

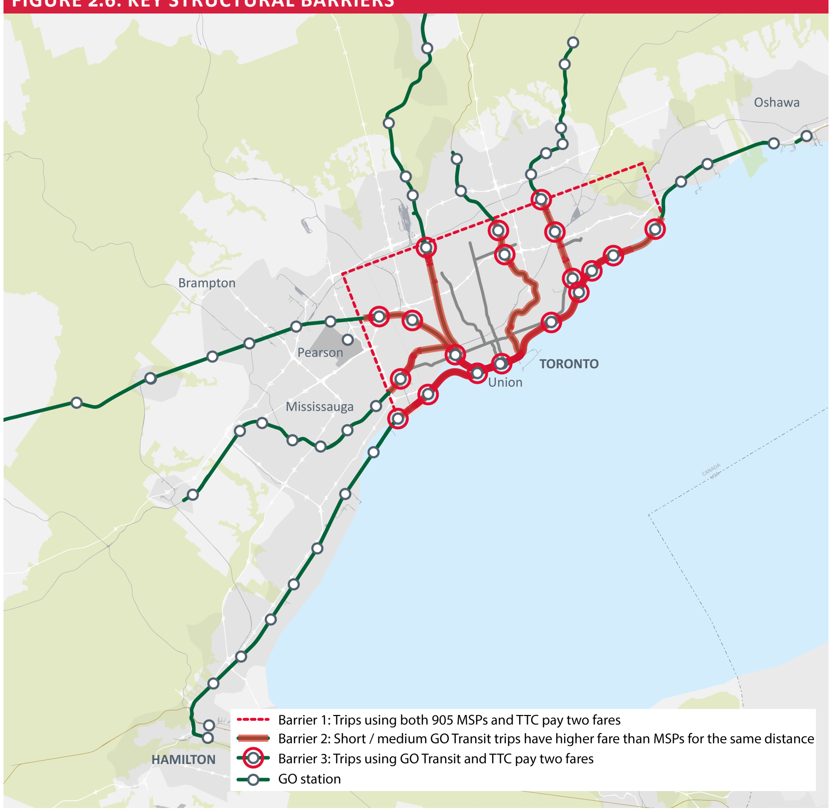
This sub section sets out the specific issues, barriers, and opportunities that the Fare Structure can address. Future stages of the study will expand analysis to aid in the development of the overarching Fare Integration Strategy.

2.4.1 Barriers

Barriers are specific issues that suppress demand by discouraging transit use. These barriers have cost, complexity, and captivity components. Three structural barriers (illustrated in Figure 2.5) have been identified that the new fare structure must address in order to further the Fare Integration Strategy:

- **Barrier 1** – Customers travelling across boundaries with 905 MSPs and the TTC pay two fares TTC (associated with opportunity 1);
- **Barrier 2** – High Cost of Short/Medium Distance GO Transit Fares (associated with opportunity 2); and
- **Barrier 3** – Customers travelling with GO Transit and TTC pay two fares (associated with opportunity 2).

FIGURE 2.6: KEY STRUCTURAL BARRIERS



BARRIER 1

Cross boundary travellers that use 905 MSPs and the TTC pay the full fare for both service providers and must use multiple rules /fare systems

Short/medium transit trips between 905 and the non-downtown portions of Toronto pay two fares, resulting in a total fare significantly higher than other short/medium distance travel in the region. This higher fare is seen as a key barrier that suppresses the use of transit on existing and future cross boundary services, for example new bus services or connections with the Toronto York Spadina Subway Extension. (TYSSE)

Figure 2.6 illustrates a comparison of passenger kilometers travelled on transit for cross boundary travel as a proportion of total GTHA transit use with the revenue collected from these trips as a proportion of total transit revenue in the GTHA. An analysis of Figure 2.6 notes:

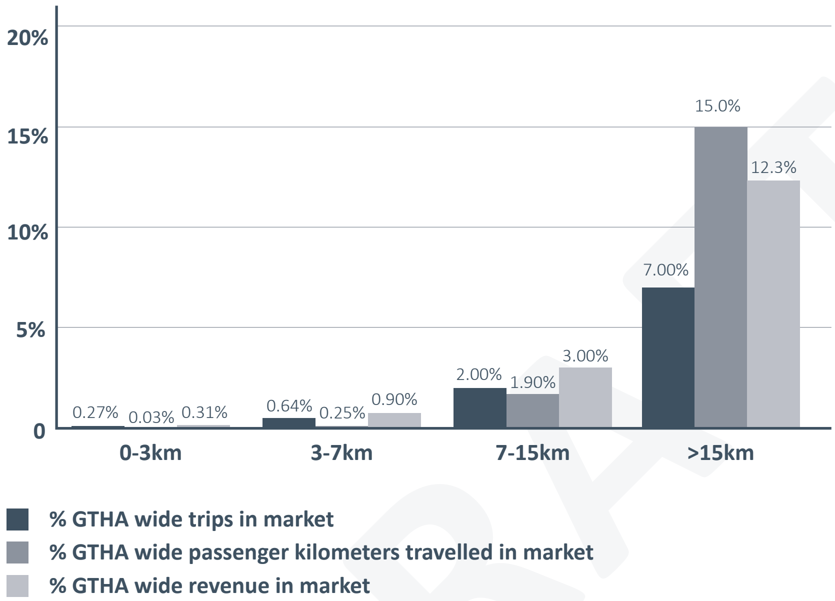
- Short distance trips (0-3 km) between the 905MSPs and TTC contribute up to ten times as much revenue compared to the amount of distance travelled while medium distance trips (3-7 km) have a revenue burden nearly four times as great as the proportion of service uses, indicating that these markets are overpriced; and
- Paying two fares may under-price the longest distance trips using 905 MSPs and the TTC (for example: a trip from York Region to Union Station using YRT buses); and
- The average fare paid for short/medium travel across the boundary is much higher than other trips in the region.

As cross boundary travel increases, the high average fare and revenue burden for short trips is expected to continue to suppress transit usage in this market.

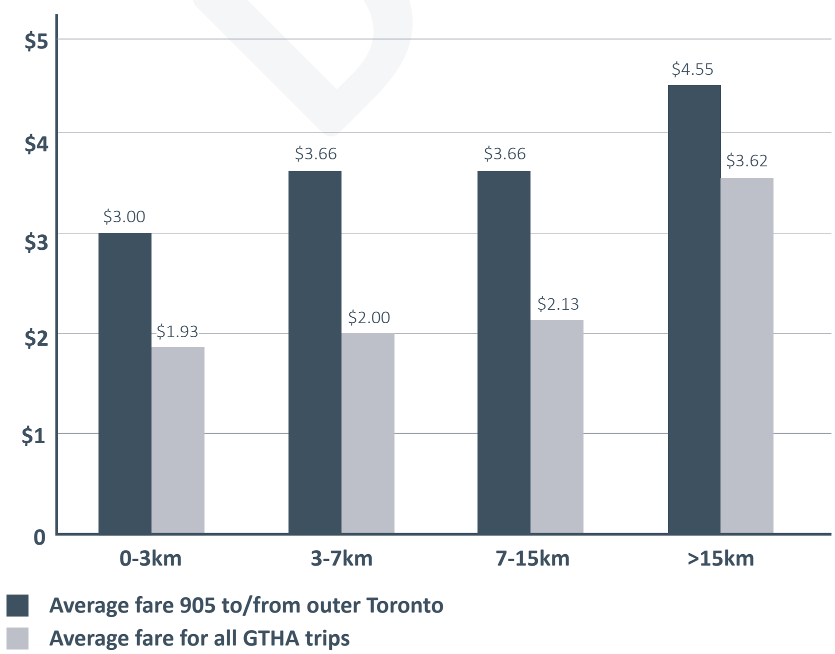
The desired outcome for addressing this barrier through fare structure improvements would be a 'fair' fare that reflects the trip taken – decreasing the fare for short trips and improving accessibility of transit.

FIGURE 2.7: TTC AND 905 MSP DOUBLE FARE

TTC DOUBLE FARE



905 MSP DOUBLE FARE



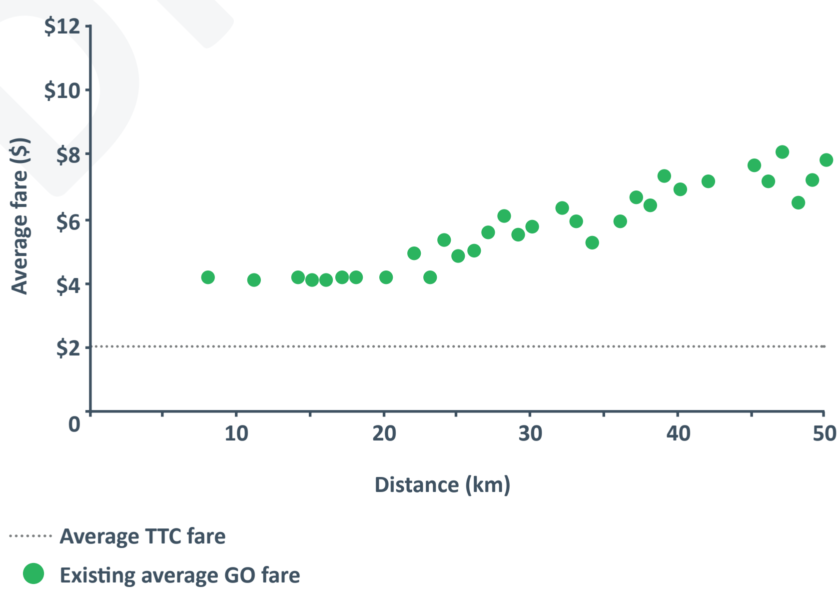
BARRIER 2

Travellers taking short/medium distance trips on GO pay fares that are significantly higher than other services

The existing average fare for short/medium distance GO Transit trips is much higher than other transit modes, as shown in Figure 2.7. These higher fares discourage travellers from making use of the existing GO Transit network for short distance trips, especially where multiple services compete.

GO RER is intended to reorient expanded GO rail services to serve a variety of trip types across the GTHA, including short and medium distance travel. Under the existing fare structure, travellers may choose another transport mode due to the high fares, reducing the overall potential of GO RER.

FIGURE 2.8: GO TRANSIT AND MSP AVERAGE FARES



BARRIER 3

Customers that use the TTC and GO rail pay the full fare for both service providers and must use multiple rules /fare systems.

Trips that use both TTC and GO Transit must pay two fares, which is a financial disincentive to using GO Transit as part of a complete network.

Paying two fares discourages travellers from using the most efficient set of services for certain trips. For example, a customer travelling to the downtown core transferring from a bus at Dundas West Station may choose GO Rail or the TTC subway network. For some trips, the GO Rail network may offer a competitive travel time. However, the need to pay both the TTC Fare and the GO Rail fare discourages combined use of these services.

Demand for a second type of trip is suppressed – trips between 905 Municipalities and Toronto that could be conveniently served by using a combination of GO Transit and the TTC, or a combination of GO Transit, the TTC, and a 905 MSP. These trips may opt to use the automobile for some or all of their trip rather than pay a 905-GO Transit co-fare and an additional full TTC fare in Toronto.

2.4.2 Fare Structure Strategic Benefits

The Integrated Fare Structure's overall strategic benefit is its ability to grow ridership by adjusting fares. A set of outcomes that are required to achieve these benefits was defined to evaluate potential structures:

- Fare integration will address fare barriers to allow customers to make use of the GTHA's complete transit network (directly grow ridership in markets where the existing structure suppresses demand);
- Fare integration will provide an improved user experience for customers across the GTHA that attracts and retains customers and encourages them to use services provided by multiple agencies (attracting and retaining customers by providing a more streamlined experience for trips using multiple service providers or service types); and
- Fare integration will support the long term development of transit services in the GTHA, improving the overall service offer in the region (improve the fare structure's role in planning and delivering transit).

2.4.3 Fare Structure Evaluation

This Business Case has been set out to understand the performance of different fare structures as part of a Fare Integration Strategy. Table 2.5 provides a summary of the four chapters of the Business Case, how they evaluate the fare structures, and how the objectives relate to this analysis.

2.4.4 Key Fare Structure Considerations

In addition to the strategic outcomes, goals, and objectives, this study also considers a set of key issues related to the transit fare structure:

- How do different approaches to including distance in fares generate benefits?
- How do different fare structures impact fare equity, including transit accessibility for low income or marginalized communities?
- What are the different network impacts that fare structures generate – including impacts on service/capacity requirements, and impacts on operations?

TABLE 2.5: EVALUATION APPROACH

Case	Case description	Related objectives
Strategic Case	Assesses the alignment of potential fare integration concepts against the strategic benefits and outcomes of the project • Fare integration will address fare barriers to allow customers to make use of the GTHA's complete transit network (directly grow ridership in markets where the existing structure suppresses demand); • Fare integration will provide an improved user experience for customers across the GTHA that attracts and retains customers and encourages them to make use of the new fare prices (attracting and retaining customers by providing a more streamlined experience for trips using multiple service providers or service types); and • Fare integration will support the long term development of transit services in the GTHA, improving the overall service offer in the region (improve the fare structure's role in planning and delivering transit).	C1 – C1 S1 S3 S4 S7 S8 S9 G1 G3 G4 G7 G8 G9
Economic Case	Assesses the economic value for investment of fare integration based on user and societal benefits.	S6 G6
Financial Case	Assesses the financial impacts of fare integration at a regional level.	S6 G5
Deliverability and Operations Case	Notes key deliverability and operations issues related to fare integration, including key risks and key delivery requirements.	S2 G1

3 Concepts for Evaluation

3.1 Overview

This chapter provides an overview of the concepts that have been proposed as potential paths towards a transformational integrated fare structure. This overview includes:

- A summary of the fare structure development process;
- A discussion of reference cases and approaches to revenue used for fare structure analysis; and
- A description of each concept included in this Business Case.

3.2 Alternative Fare Structure Concepts and Revenue Scenarios

Fare Integration is a complex change that requires careful management throughout the delivery process. It can be delivered over time as a program composed of multiple targeted projects that make meaningful progress towards achieving a transformational vision. The benefits of these integration projects can be realized within the existing transit network or as near term network improvements are delivered. Each project should address urgent issues and lay the foundation for the future fare structure that is aligned with the future transit network.
This process should be defined in an Implementation Strategy.

The development of the "Implementation Strategy" should draw from the strong performing elements of the concepts to identify key issues that can be resolved incrementally that will improve the seamlessness of the transit network while safeguarding for the longer term transformational vision. This includes considering:

- Opportunities for discounted transfer fares for TTC/GO Transit and TTC/905 trips that replace the current payment of two full fares;
- Appropriate short/medium distance regional fares that will expand travel opportunities and attract demand to GO Rail and the future RER network;
- Products and concession harmonization across services and operators;
- Customer experience changes that promote a harmonized approach to providing fare information across the GTHA;

- Pay parking as a tool for demand and revenue management; and
- Alignment between incremental changes with significant transit investments, including: RER, TYSSE, New LRTs, changes to the PRESTO system, and other transit improvements.

3.2.1 Alternative Fare Structures

This Business Case considered a set of alternative fare structures, referred to as concepts, which represent different approaches to setting fares based on services used and the type of trip taken. The concepts included in this study can be seen as 'hypotheses' or 'tests' of different types of fare structures to understand which structural elements are aligned with the vision for fare integration, generate economic benefits for customers and society, are financially viable, and can be delivered or operated.

Each concept included in this study represents a different method for setting fares and therefore distributing revenue burden. These concepts are not intended to be fully-realized options and will require significant further development if pursued as part of a new regional fare structure.

3.2.2 Revenue Scenarios

Different revenue Scenarios are used to explore how the benefits and Business Case for fare integration vary under different assumptions for the total revenue generated from customers using transit. Two scenarios have been used in this study:

- **Revenue Neutral** – the total revenue generated under Fare Integration equals the status quo revenue, which allows analysis to focus on the impact of Fare Integration alone; and
- **Revenue Investment** – an additional investment of 5% of total revenue is made, lowering the overall revenue requirements from customers, which indicates how fare revenue investment may augment Fare Integration.

These scenarios are intended to provide a broader view of the behaviour of the fare structure concepts under different revenue requirements to support the selection of a preferred structure, but are not proposed as scenarios to be used within the final fare strategy. Further work is required to set out an optimal strategy once a preferred structure is selected.

3.3 Fare Structure Development

3.3.1 Development Approach

Fare structure concepts were developed between January-August 2016 based on exploratory modelling, international research, and stakeholder engagement. Each concept was developed to provide a unique approach to setting fares in the region by changing:

- The role of service types in setting fares;
- The role of distance in setting fares; and
- The role of transfer fees for transfers between agencies and service types.

These three design considerations are the key focus of this Business Case and are the key drivers of performance under the strategic and economic cases.

The Integrated Fare Structure will be part of a broader fare strategy that includes plans to optimize and deliver/operate fares in the GTHA. A set of broader fare strategy issues have been included in concept scoping to address the basic functionality of each concept as part of the strategy.

These issues include:

- Implementations and management requirements;
- Changes to technology;
- Changes to fare media;
- Changes to customer experience; and
- Infrastructure impacts.

These items are all shaped or affected by the fare structure that is selected; however, their specific design is directly addressed as part of further development of the overall strategy for fare integration (such as technology procurement/design, design of customer information tools and materials, or development of an overall management structure). These issues will be addressed in subsequent phases of the study. This phase of the study focuses on outlining basic assumptions to be tested and refined in this future work.

Concept scoping includes a set of incremental costs associated directly with the fare structure:

- Capital costs (new technology, software); and
- Operating costs (increased transit operating costs).

3.3.2 Service Structure

Service structures define how fares may vary based upon the type of transit service that is used. A representative three tier service typology was developed based on grouping transit modes in the GTHA based on shared typical performance under service parameters. Table 3.1 summarizes the specific characteristics of the three service types used in the structure.

TABLE 3.1: REPRESENTATIVE SERVICE STRUCTURE

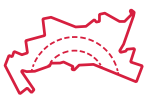
Service Type	Stop spacing	Route Length	Typical speed	Right of way
Local	<750m	<20km	Low (10-25 km/h)	Generally in mixed traffic; occasional separation
Rapid Transit (RT)	500 m – 2.5 km	<25 km	Medium (20-45 km/h)	>90% Separate
Regional	>2 km	>20 km	High (>45 km/h)	Separate (rail) Mixed traffic (highway coach)

This service structure gives a consistent basis to set fares and interpret impacts; however it has limitations:

- Bus rapid transit (BRT) implementations sometimes include a single bus running for part of its route with frequent stops in mixed traffic routes and partially with limited stops on separated rights of way - these services may not fit well into one of the categories used in this study and will need to be reviewed in future work;
- As services evolve they may shift from one category to another – example high quality bus routes upgrading to full BRT or LRT, which may have implications for how the service is used;
- Paratransit services do not have a natural alignment with any category, and are expected to be integrated into the fare structure in future phases of analysis prior to final design; and

Figure 3.1: Approaches to Setting Fares by Distance

Flat
All trips within a service type have the same fare



Zone
Fare varies based on crossing 'geographic zones'; higher fares are collected from trips that cross a larger number of zones. Fares over the same distances may not be consistent, depending on the arrangement of zones.

Fare by Distance (FBD)
Fares vary based on the distance travelled for each trip. As customers travel further, their fare increases based on how fares are measured – including straight line (crow fly) or network distances. FBD can be implemented using a range of techniques and may apply to some or all services. The fare formula may include a minimum base fare, one or more flat segments applied to various distance ranges, one or more slopes (different per-km rates) applied to various distance ranges, or may round fares charged into "steps" rather than slopes.

- The service structure used in this report was developed to support analysis, in practice additional service types (for express, rural, or demand responsive transit) may need to be added to the structure to develop fares that best serve the GTHA's communities and diverse travel markets.

Future stages of study, including the optimization of a preferred fare structure in phase 3, may expand the service structure. A key consideration for implementing a successful fare structure is ensuring each service in the GTHA can be represented within a service type.

3.3.3 The Role of Distance in Setting Fares

In addition to differentiating fares by service, concepts were also developed to differentiate fares by trip distance. Each approach to differentiation by distance reflects a unique way to set fare by trip type, as discussed in Figure 3.1. Figure 3.2 illustrates jurisdictions where zones and Fare by Distance have been applied.

HOW ARE ZONE FARES IMPLEMENTED AND COMMUNICATED?

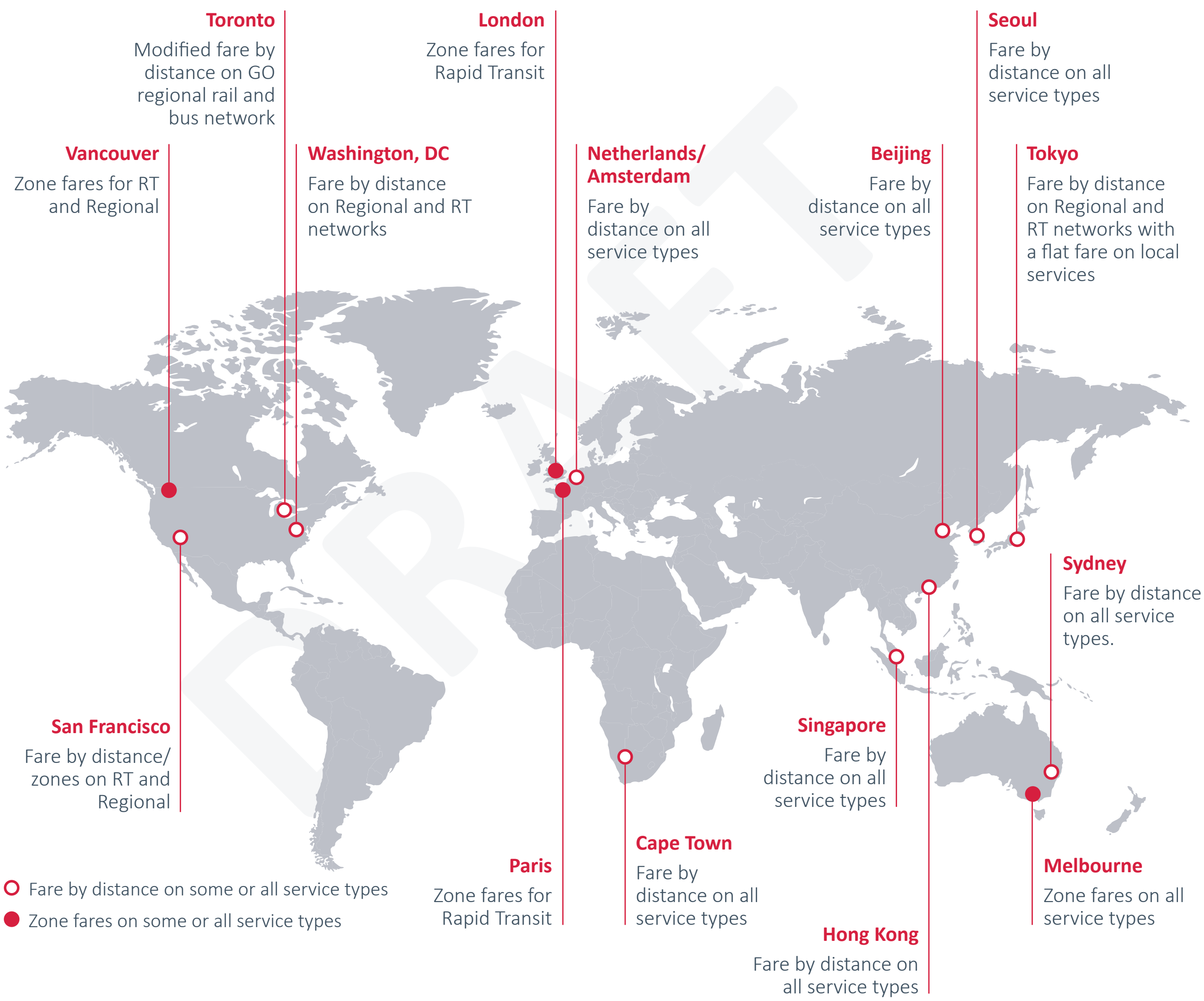
The transit service area is divided into geographic fixed zones. Zone fares use a simple equation to calculate fares based on the number of zones a traveller passes through. This equation is composed of a base fare (a fee for boarding transit) and a zonal add fare (a fare calculated based on the number of zones involved in the trip).

Fare=Base Fare+(number of zones x zone add fare)

The base fare is time bound – customers only pay it once within a set time window. Base fares are intended to represent the fixed costs of providing a transit service, while zone fares represent the increased costs of providing longer distance trips and the added value of long distance travel to the customer.

Zones may be radial (circular zones that expand around a central location), hexagonal, or grid based. This study assumes the use of radial zones because the provision of grid or hexagonal zones will require a large number of zones to effectively cover the region. This would resemble fare by distance in practice.

FIGURE 3.2: GLOBAL EXPERIENCE WITH FARE BY DISTANCE AND ZONE FARES

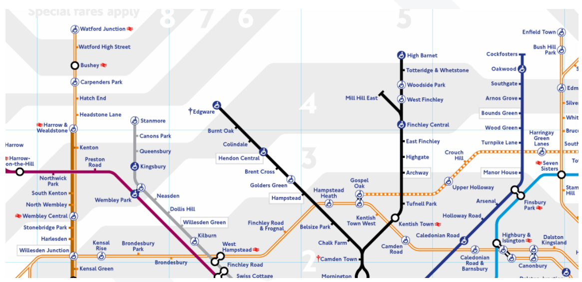


Zones are typically communicated through the use of a zone map, which indicates the customer's origin and shows a set of zones. An example of a fare map is shown in Table 3.2.

TABLE 3.2: EXAMPLE OF ZONE AND FARE BY DISTANCE COMMUNICATION TOOLS

Example

Zone maps – Transport for London
Transport for London is the transport authority for London. They are responsible for public transport, including rail, buses, and subways/metros throughout the Greater London Area. Fares are determined using a set of circular zones. Passing through more than one zone will increase the fare the passenger pays. Fare maps are a common tool used to illustrate fares to customers.
image source: www.tfl.gov.uk



Fare Tables – Washington Metrorail
Washington Metrorail uses distance based fares for its rapid transit services. Each station has a station to station fare table, similar to the ones available online. This process provides customers at each station complete knowledge of their fare.
Image source: www.wmata.com – station fare calculator

Arriving here	Lines Served	Peak Fare	Off-Peak Fare	Senior Disabled Medicare Fare	Miles	Time
Addison Road-Seat Pleasant	S,B	$4.05	$3.15	$2.00	9.22	32
Anacostia	G	$2.65	$2.15	$1.30	4.60	20
Archives-Navy Memorial-Penn Quarter	G,Y	$2.15	$1.75	$1.05	1.78	12
Arlington Cemetery	B	$2.30	$1.85	$1.15	3.49	18
Ballston-MU	O,S	$2.95	$2.35	$1.45	5.42	24
Benning Road	S,B	$3.35	$2.35	$1.65	6.78	26

HOW IS FARE BY DISTANCE (FBD) IMPLEMENTED AND COMMUNICATED?

FBD is based on the length of travel and the services used, without reference to geography or service provider – similar to a taxi or on demand transport service. While GO Transit's existing fare structure is a form of FBD that incorporates aspects of a zone system, a more conventional FBD concept such as the ones considered in this Business Case would be a new approach to fares for the GTHA. Examples of FBD from other jurisdictions are shown in Table 3.3.

Calculation of FBD fares uses a similar approach to zone fares. Fares include a time bound base fare (boarding fee that represents the fixed costs of providing transit services) and a variable amount representing distance travelled on each service type. The distance fare is set by multiplying a rate per distance travelled by the distance travelled.

$$\textit{Fare} = \textit{Base Fare} + \textit{Distance Fare}_{\textit{Regional}} + \textit{Distance Fare}_{\textit{RT}} + \textit{Distance Fare}_{\textit{Local}}$$

For this study, when FBD is used on Local services, it uses a 'crow fly' or straight line distance between the travellers origin and destination. Rapid Transit and Regional services use the track distance. Future studies may use a range of pricing approaches for services that use FBD.

Fare by distance is communicated using two tools:

- Fare maps, which show station to station costs for RT/regional or price ranges overlaid on a map for surface routes; or
- Fare tables, which demonstrate the fare a customer will pay for a set trip (shown below).

Fare by distance is commonly applied using two approaches:

- Steps – where distance travelled is rounded such that fares increase based on set increments (example: trips 0-10km may be $3.00, trips 10-20km may be $4.00); or
- Slopes – where fares increase based on distance rates (example: $0.10 cents per km for trips 0-10km, $0.07 per km for every km between 10-20 km).

This study has assumed the use of slopes for concept scoping; however, in practice a step based approach may be used instead.

TABLE 3.3: FARE BY DISTANCE CASE STUDIES

	City	Tap on/tap off on all services?	How are fares set?	Other considerations
	**Sydney**	Yes	• SIngle base fare and distance rate by service type	• Implementation reviews did not note customer dissatisfaction with the new system • Transfers include a $2.00 discount between services
	**Amsterdam**	Yes	• Common base fare, each operator can set its distance rates	• Period products available for 1 hour, and days (1,2,3)
	**Seoul**	Yes	• Multiple operators with common base fare and distance rate by service type	• Customers may tap off ahead of their stop to manage crowding and alighting • Penalty for failure to tap off – double base fare on next trip, no transfer discount • Fares are continuous without transfer fees
	**Beijing**	Yes	• Multiple operators with common base fare and distance rate by service type	• Multiple door boarding/ alighting allieviates crowding or dwell time issues

3.3.4 Approach to Transfers Between Service Types and Service Providers

The concept development process included a review of how to price two types of transfers:

- Transfers between MSPs – for example, transferring between a TTC route to a YRT route; and
- Transfers between service types – for example, transferring between a rapid transit line and a local bus route.

Phase 3 will consider key issues for transfers including direction vs. time based transfers along with a suitable timeframe for transfers.

For this study transfers were assumed to be priced in one of two ways:

- Discounted Transfer Fares – a discount on the combined fare for using two services (example: the existing 905 MSP to GO Transit co-fare), which allows customers to pay a full fare for one part of a multiple leg trip and a reduced fare for an additional leg; or
- Continuous fares – for systems that use distance, fares may be set as a single fare that combines fares based on distance travelled on each service, with no fare directly associated with the transfer.

3.3.5 Implementation and Management Requirements

Implementation and management requirements include determining the decision making model for setting fares, funding sources for costs and investment, and the approach to revenue allocation.

This stage of the study has not designed a decision making structure or revenue allocation framework for the fare structures or identified specific funding sources. Rather, it has outlined the type of decision making structure and revenue allocation considerations required for each concept.

DECISION MAKING

Decision making structures outline how decisions for fare structure implementation and management are made. Revenue allocation determines how revenue will be distributed between agencies in the region.

This stage of the study notes that there is a spectrum of decision making changes with two distinct ends:

- **De-centralized** – concepts do not require a central body to set fares and manage revenue, which is effectively similar to the status quo; and
- **Centralized** – concepts require a central body to set fares and manage revenue.

A detailed decision making process will be required regardless of which fare structure concept is advanced for further study. This process should be an inclusive process that considers the long term vision and the progressive steps required to achieve it.

FARE SETTING

Most integrated fare structures assessed could accommodate different prices set by each service provider if desired, with the trade off of reduced seamlessness and simplicity for customers, and increased complexity for the fare collection infrastructure. For example, unlimited cross-boundary travel in the 905 area is provided today even though the flat fare charged by the first MSP may be slightly different than the flat fare the second MSP would normally charge.

For the purpose of this stage of the study, an assumed management approach for fare setting was made for each concept, recognizing that alternatives would be possible.

REVENUE ALLOCATION

Revenue allocation is required for multi service provider trips. These trips include trips that use a co-fare, a discounted double fare, and trips using multiple service providers that derive fares by distance travelled (zones or FBD). Multiple approaches to revenue allocation will be explored further in future studies and broadly fall into two categories: transaction based and dispersal based.

Transaction based approaches allocate revenue to each service provider based on their role in the trip. Under this approach, an agency receives a portion of the revenue from a specific trip, as defined by overarching rules. For example:

- In a discount model, the second agency would get the discounted second fare and the first agency would get the first fare;
- Under a distance model the agencies would split the transaction's base fare and retain the revenue associated with the distance travelled on that service.

Under a dispersal model, all fares would be collected centrally with revenue dispersed to agencies in a set timeframe based on a set of rules for allocating revenue.

These rules may be similar to the transaction approach outlined above, or be based on broader policy goals and considerations.

The model used for revenue allocation will be developed in future stages of analysis. Due to the nature of the concepts included in this study, all of them are assumed to require a form of revenue allocation.

3.3.6 Technology Changes

Technology changes have been scoped for this study to determine the overall deliverability of each concept (reviewed in Chapter 7) and to estimate the costs for delivering a new fare structure. Specific technologies have not been identified in this study. The focus of this scoping exercise is on identifying the key software and hardware changes required to deliver the concepts.

SOFTWARE

Software is used to calculate fares and charge customers the correct fare based on a number of considerations, including the products they use, the concessions that apply to them, and the type of trip they are taking.

Software broadly fits into two approaches:

- **Stored value approach** – where customers use a fare media with a set value (example: a PRESTO Card) that has value deducted on each leg of the trip; and
- **Account based approach** – where customers use their fare media as a credential (including: PRESTO, debit, credit, mobile payment) that is used by a central system to calculate the total fare of a trip.

The stored value approach can be used on concepts that use flat fares for local and RT; however, when RT uses a distance based approach (zones or FBD) the logic of calculating trips becomes more complicated. While stored value approaches have been successfully used in other jurisdictions with FBD, such as the Netherlands, an account based technology is assumed to be used in all fare by distance and zone concepts, which will simplify application.

HARDWARE

Hardware includes requirements for new devices at stations and on vehicle devices to allow customers to pay for their trip. Concepts that use measured distance are assumed to require two changes:

- New devices on buses/streetcars to accommodate distance based or zone based fares including additional readers if tap on/tap off is required; and
- Upgrading existing fare gates at RT stations to allow for customers to tap off at stations.

Emerging technological solutions may limit tap-off requirements for fare structures that rely on origin/destination information, but these were not assumed for this analysis.

3.3.7 Payment and Ticketing Technology

This study assumes different payment options will be available depending on the type of fare structure. Payment is broken down into three types of payment:

- Paying with cash on vehicle or at station;
- Paying with PRESTO or credit/debit/mobile payment through either a stored value or open payment system; or
- Paying with a pre purchased ticket, product, or Limited Use Media (LUM).

Regardless of the media used, fare enforcement for the fare concepts is assumed to be based on proof of payment (POP). Customers who pay cash must receive a POP ticket, while those who use cards (PRESTO, credit, debit) can have their ticket inspected by scanning the card. Products/LUM can also be inspected to ensure the customer has the proper ticket. A specific fare enforcement strategy has not been developed as part of this study.

CASH

Cash fares are currently available throughout the GTHA. Cash fares are simple to use for flat fares, but are more complicated to apply for distance based structures and discounted transfer structures.

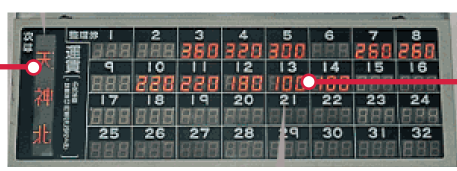
For zones or fare by distance specific ticketing machines are required. In practice, these devices are handled in two ways (shown in Table 3.5):

- **Pay on exit** – customers receive a ticket upon boarding noting their origin and reconcile the full fare for zones or distance when they exit; or
- **Pre-purchase** – customers select the number of zones or note their origin and destination when boarding.

In practice, the use of cash for vehicle based payment is complex. Current trends in zone or distance based fares see cash fares being replaced by pre-purchased products or the use of mobile ticketing for customers who do not use a PRESTO, credit, or debit card. In these instances, the distribution network of tickets or LUMs must be highly accessible to ensure transit is also accessible. The role of cash in the broader fare strategy must be clarified as the study progresses.

Cash fares can be used for discounted transfer trips between two flat fare services, assuming that the customer purchases the ticket in advance. For trips involving a flat fare and a fare by distance, typically customers can pay for the first flat fare using cash on a local service, but must 'upgrade' their ticket upon exiting the FBD service (example – RT station) to cover the additional charge.

TABLE 3.4: CASH FARES FOR FBD ON BUSES

	Approach to distance fares	Considerations for GTHA
Pay on exit (Fukoaka)	• Ticketing upon boarding at the rear of bus- customers pay for ticket upon exiting the vehicle • Fare display at front of bus communicates fares based on stops travelled – the screen updates upon arrival at each stop and a fare is displayed based on the boarding site • Fare increments are consistent for all routes based on set distances travelled **(Source: http://www.nishitetsu.jp/en/bus/)** The name of the next stop is displayed  Your boarding ticket section number is displayed, your fare is displayed below it	• Would require large investment in bus equipment and fundamental changes in how buses are operated (back of bus boarding, front alighting) • May be a future option for Local fares, but has limited applicability in the near to medium term.
Pre-purchase (Sydney)	• Customers may purchase a single use ticket upon boarding the bus • Distance fares are based on three distance bands	• Easier to implement than measured distance, but requires set distance bands or virtual zones

PRESTO/CREDIT/DEBIT

As discussed previously, the concepts used in this BCA were scoped to use one of two general types of technology to facilitate payment – either stored value (deduct the payment from the PRESTO or bill the credit/debit directly) or open payment (calculate the fare on a central server and bill later).

PRESTO is currently examining a timeline and specification for open payment and account based technology in the GTHA. Fare Integration should be developed in sync with this technology to realize cost and labour savings. Fare cards (PRESTO) or open payment (debit/credit) are typically the major medium used for distance and zone based fares.

PRODUCTS, TICKETS, OR LIMITED USE MEDIA

Product design is a key element of future stages of this study. Concepts have been scoped based on the types of products they can use, but specific products have not been developed.

Products in the GTHA currently include period passes (example: a one week or one month pass) and loyalty programs (fares decrease as more trips are taken or more distance is travelled).

Fare concepts can also make use of additional products including caps. After a certain total distance is travelled within a set period (day, week, month) fares will no longer increase and will hit a cap. Unique caps may be set for different user types (example: low income, students, seniors).

LUMs or disposable fare media may be used in flat fare, zone or FBD oriented structures. These media can be used to store period passes, or may be used as tickets for specific trips (example: 2 zone trip, 8 km trip) or as a disposable stored value card (example: a $20 dollar disposable media could be used for a number of zone or FBD priced trips).

All concepts will require a strategy for distributing LUMs, products, and tickets across the GTHA. This study has not developed a strategy for distributing products, future work should establish the size of vendor network required along with the types of products and tickets that should be offered.

3.3.8 Changes to Customer Payment Experience

A key of consideration for customer payment is the number stages required to complete a fare transaction.

Transactions include using fare validators to tap onto the transit service and tap off of the service, depending on the fare structures.

Structures that use flat fares may only require customers to tap on, while structures that require the origin and the destination may also require a tap off to indicate where the customer has tapped off. Tap on/tap off (or check in/check out) solutions have been developed in numerous jurisdictions, including Sydney, the Netherlands, and Seoul. If tap off is used on local (buses or streetcars) a solution must be developed to minimize potential impacts on customer flow or dwell time, including allowing customers to tap off before reaching their stop, using front door boarding and back door alighting, or providing validators at bus stops on select busy routes.

3.3.9 Infrastructure

Infrastructure changes are assumed to be minimal. Currently, TTC RT and Local services are connected at free body transfers (areas where customers can move off of a surface vehicle and to a subway platform without interacting with a fare line), where additional payment is not required. Structures that require a tap on or tap/off solution on RT may impact these stations. Two approaches to provide tap off functionality have been explored at a high level fit for this study:

- The provision of a new fare line at free body transfers, which carry significant costs and may impact passenger flow (this approach has not been assumed for the fare structure concepts in this report); or
- The development of a software solution that requires customers to tap off of buses/streetcars when exiting the bus/streetcar to enter an RT station or to tap on to buses/streetcars when exiting an RT station to ride the bus/streetcar. (this software solution is the assumed approach for fare structure concepts)

Local to RT transfers at subway stations with free body transfers require customers to tap on to local vehicles at stations for trips that start on RT and end on Local. For trips that start on Local and end on RT, customers will tap off of vehicles at stations. If customers fail to tap off, a software solution can infer.

A customer's route and fare based on the combination of station (either tap on or tap off) and/or the local route used to access a station.

Tap on/tap off on local at stations or a software solution are assumed feasible and would mitigate potentially expensive renovations at subway stations to add fare gates in areas that currently act as free body transfers. Concept scoping notes where it is assumed that a software/tap on and off solution is required to mitigate infrastructure changes at free body transfers.

3.3.10 Concept Costing

Technology and Infrastructure Costs

Capital cost estimates were provided by PRESTO in 2016 and reflect the incremental costs above planned device and software spending to accommodate the fare structures. Estimates including a high and low cost (reflecting uncertainty) for all works associated with developing the fare structure's software and procuring all new devices. Depending on the number of iterations of interim fare measures implemented and if the number of fare policy rules increase from the current situation then at the time of implementation the costs could exceed those in this Business Case.

Fare Integration capital costs are directly shaped by how the fare structure is implemented – including efforts required to transition from the existing structure. Two key factors for consideration are:

- Degree of Streamlined implementation- if several iterations are required to develop and then design over interim fare structure changes costs may increase significantly; and
- Degree of Harmonization- if the fare structure involves multiple rule sets then the cost to deliver may also increase.

TRANSIT OPERATING COSTS

Transit operating costs reflect the incremental costs to transit agencies to provide capacity for increased ridership. Costs were estimated based on consultation with MSPs along with a high level review of unit costs to provide transit service. Increased transit operating costs are estimated based on changes in demand that are exceed 5% of baseline demand in the peak period.

FARE STRUCTURE OPERATING COSTS

Fare Integration operating costs include the incremental costs of providing services that support the fare structure. They include:

- Change management;
- Customer service costs (example: call centres);
- Fare medium and ticket distribution network;
- Advertising and marketing the new fare structure; and
- Structure enforcement costs.

These costs are largely shaped by the particular strategy used for fare integration, as opposed to the structure, which is the key focus of this stage of the study. International experience suggests that moving towards an integrated fare structure may reduce overall operating costs due to new efficiencies (example: moving from a large set of rules to a simpler set of rules). Additionally, the increased costs are structure dependent but also must consider the ultimate decision making and revenue allocation solutions used for the new structure. This study has assumed that the increased costs of operation will eventually be counterbalanced by efficiencies, leading to an overall operating cost neutral structure. International experience suggests cost savings are possible under fare integration, so the assumption of cost neutrality is conservative. The financial and economic cases provide further commentary on the impact of operating costs. This assumption should be re-examined in future study stages as a preferred structure is developed.

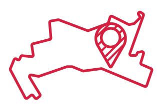
3.3.11 Design Principles

Previous work completed in the “Greater Toronto and Hamilton Area Fare Integration Stage 2 Report” outlined the key considerations for designing fare structure concepts in the GTHA. This report proposed a set of five design principles to be used in the development of fare structure concepts that are outlined in Figure 3.3.

FIGURE 3.3: DESIGN PRINCIPLES

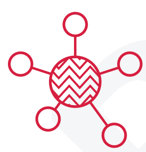
1. Continuity

- Not all service types are available for every trip – sometimes customers may use a higher order service for shorter travel
- To avoid penalizing customers who may only have the choice of a higher order service , fares should be comparable between service types that are used for the same purposes (example: short distance travel)



2. Align fares with how services are used

- Fare structures should be set up considering the types of trips taken on each service and what is convenient for passengers
- Key considerations such as average distance travelled on each service type should be used to test different fare structures



3. Connected network

- Travel in the GTHA is reliant on seamless transfers between service types
- Therefore trips that require the use of more than one service types should have fares comparable to a trip that only used the highest order service type to travel the same distance

4. Generalized cost

- Due to service availability, some trips must use a lower order service for long distance travel
- These trips should generally have a lower fare to offset increased travel time and use of a service type that isn't fit for purpose

5. Gradual Increment

- Fares should encourage customers to use the services that best meet their travel needs
- Therefore fares that vary by distance should escalate as gradually and consistently as possible, without large or sudden jumps that may encourage customers to use a less convenient station or service

3.4 Alternative Fare Structure Concepts

3.4.1 Overview

A set of five fare structure concepts was developed based on variations in applying different approaches to setting fare by distance to each service type. These five concepts are:

- **Concept** (1) – Modified status quo
- **Concept** (1b) – Modified status quo with additional fare by distance (FBD)
- **Concept** (2) – Zones
- **Concept** (3) – Hybrid flat fare/fare by distance
- **Concept** (4) – Fare by distance (FBD)

Table 3.5 illustrates how fares are set for each structure based on distance travelled. Subsequent subsections provide expanded details on the scoping assumptions used for each concept.

TABLE 3.5: FARE INTEGRATION CONCEPTS

	Status Quo	Concept (1) Modified status quo	Concept (1b) Modified status quo with FBD	Concept (2) Zones	Concept (3) Hybrid	Concept (4) FBD
Local Fare	Flat fare by MSP	Flat fare by MSP	Flat fare by MSP	Zones	GTHA Wide-Flat fare	FBD
RT Fare	Flat fare by MSP	Flat fare by MSP	FBD	Zones	FBD	FBD
Regional	FBD	FBD	FBD	FBD	FBD	FBD
MSP-MSP	905-905 – free 905-TTC – pay both fares	905-905 – free 905-TTC – Discounted double fare	905-905 – free 905-TTC – Discounted double fare	N/A	N/A	N/A
Local -RT	905-TTC –pay both fares	905-905 – free 905-TTC – Discounted double fare	905-905 – free 905-TTC – Discounted double fare	Free	Free	Continuous
Local – regional	905-GO – co-fare GO-TTC – pay both fares	Discounted Local fare	Discounted Local fare	Continuous	Free	Continuous
RT-Regional	905-GO – co-fare GO-TTC – pay both fares	Discounted RT fare	Continuous	Continuous	Continuous	Continuous

Change from Status Quo

Concept 1

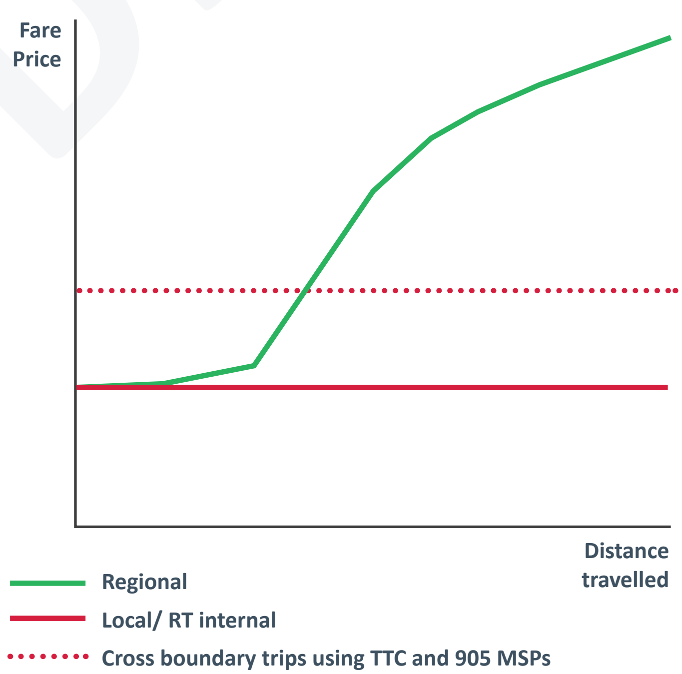
3.4.2 Modified Status Quo

Concept 1 has been designed to address significant fare issues without changing the underlying fare structure. It has three major changes:

- GO Transit fares are amended to use a more conventional FBD system rather than the current implementation using zones, and to provide a short distance fare that is comparable to Local/RT fares – fares are communicated as station to station fares (similar to today);
- Customers travelling between GO Transit and TTC pay a discounted transfer fare instead of two fares– when customers use TTC and GO the TTC fare is lower than the full TTC Fare; and
- Customers travelling between TTC and 905 MSPs pay a discounted second fare instead of paying two fares.

Concept 1's scoping is outlined in Figure 3.4.

FIGURE 3.4: CONCEPT 1 OVERVIEW



CONCEPT 1: MODIFIED STATUS QUO

Assumed Management Approach	• Can be implemented within a de-centralized governance model • Revenue allocation is required for discounted transfer fares			
Costs	**Capital :** $50 million (low) to $150 million (high) **Transit Operations:** $4.0-$7.6 million/year			
Example	Similar to existing GTHA Fare Structure			
Assumed Customer Experience	• Unique rules (products, concessions, fares) for each operator			
Approach to barriers	• Replaces double fares (TTC-905, TTC-GO) with discounted transfer fares • Regional fares are reduced for short/medium trips			
	Local	**RT**	**Regional**	**Transfers**
	Flat		**FBD**	**Discounted transfers**
How are fares set?	• Fares are flat within an MSP's service area and apply for local and RT fares • Flat fares may be raised or lowered by MSPs		• Fares use a base fare and distance fare to align with local/RT fares for short/ medium, while minimizing change from status quo for long distance trips • Cost per km can vary based on total distance travelled	• Discounted transfers apply to trips using 905 MSPs and the TTC or the TTC/905 MSPs and GO Transit • Discounts can be raised/lowered • Trips using multiple 905 agencies only pay one fare
What technology changes are required	• No changes required		• Requires software changes to rebase regional fares	• Requires software changes to allow for discounts
What payment media can be used?	• Cash, smart cards, open payment, mobile payment, and products/ tickets/LUMs			• Smart cards, open payment, mobile payment, and products/ tickets
How do customers pay for transit?	• Tap on or purchase upon boarding	• Tap on/off using fare gates or other ticket validators on RT and Regional • Tickets may be purchased at station entrance, including the addition of transfer fare		• Customers must tap on to each new service they use • A transfer ticket or product may be purchased in advance of the trip
How are fares communicated?	• Same as status quo			
Are there any infrastructure issues?	• No infrastructure requirements			

Concept 1b

3.4.3 Modified Status Quo With FBD

Concept 1B expands upon Concept 1 by changing RT to fare by distance. This allows for fares for customers crossing the 905/Toronto boundary and travelling to the downtown core on RT to reflect the length of these trips. Key considerations for this structure include:

- GO Transit and RT fares are comparable for short and medium trips – all fares are communicated as station to station fares; and
- Co-fares are used to transfer between TTC and GO Transit and between the TTC and 905 MSPs.

Concept 1b's scoping is outlined in Figure 3.5.

FIGURE 3.5: CONCEPT 1B OVERVIEW

CONCEPT 1B: MODIFIED STATUS QUO WITH FBD

Assumed Management Approach	• Can be implemented within a de-centralized governance model without central fare setting • Revenue allocation is required for discounted transfer fares			
Costs	**Capital :** $150 million (low) to $250 million (high) **Transit Operations:** $5.2-$8.5 million/year			
Assumed customer experience	• Unique rules (products, concessions, fares) for each operator			
Approach to barriers	• Replaces double fares (TTC-905, TTC-GO) with lower discounted transfer fares • Regional fares are reduced for short/medium trips			
	Local	**RT**	**Regional**	**Transfers**
	Flat	**FBD**		**Discounted transfers**
How are fares set?	• Fares are flat within an MSP's service area and apply for local and RT fares • Flat fares may be raised or lowered by MSPs	• Fares are set by MSPs and include a base fare and a distance fare • Base fare is typically the local flat fare • Cost per km can vary based on total distance travelled	• Fares use a base fare (local flat fare) and distance fare to align with local/RT fares for short/medium, while minimizing change from status quo for long distance trips • Cost per km can vary based on total distance travelled	• discounted transfer fares apply to trips using 905 MSPs and the TTC or the TTC/905 MSPs and GO Transit • Discounts can be raised/lowered • Trips using multiple 905 agencies only pay one fare
What technology changes are required	• No changes required	• Requires software changes to rebase RT fares and tap off functionality on fare gates	• Requires software changes to rebase regional fares	• Requires software change to allow for continuous fares • Requires a software solution to manage free body transfers
What payment media can be used?	• Cash (local, used to purchase tickets on RT/regional), Smart cards, open payment, mobile payment, and products/ tickets/LUMs			• Smart cards, open payment, mobile payment, and products/ tickets/LUMs
How do customers pay for transit?	• Tap on or purchase upon boarding	• Tap on/off using fare gates or other ticket validators on RT and Regional • Tickets may be purchased at station entrance, including the addition of discounted transfer fares		• Customers must always tap on to each new service they use and tap off of local services if boarding RT at a free body transfer • A transfer ticket or product may be purchased in advance of the trip
How are fares communicated?	• Same as status quo	• Fare tables or maps at stations • Online tool or calculator		
Are there any infrastructure issues?	• This concept uses a software solution and tap on/tap off to avoid new infrastructure at RT stations that use free body transfers to avoid significant construction and infrastructure changes			

Concept 2

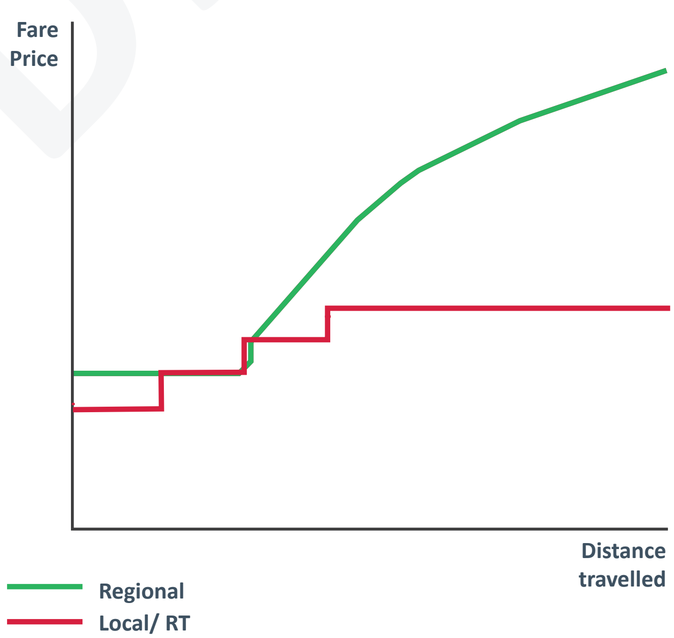
3.4.4 Zones

Concept 2 rebuilds the fare structure to use zones for local/RT trips. Regional trips would use a FBD approach with station to station fares. The key considerations for this structure are:

- Customers must tap on to and tap off of every service they use;
- Radial zones have been assumed with a radius of 7.5 km – smaller zones may be used, however as zone size decreases the concept becomes more similar to pure FBD;
- Customers pay a base fare plus additional 'add fares' depending on the number of zones they travel through;
- Transfers between local/RT are always free – customers only pay for the number of zones they travel through; and
- Trips involving both regional and RT use 'continuous fares', which equal the regional fare plus an add fare for the number of RT zones travelled through.

Concept 2's scoping is outlined in Figure 3.6.

FIGURE 3.6: CONCEPT 2 OVERVIEW



CONCEPT 2: ZONES

Assumed Management Approach	• Requires a centralized governance model to set zones and zone fares • Revenue allocation is required for trips that use more than one MSP			
Costs	**Capital :** $150 million (low) to $250 million (high**)** **Transit Operations:** $5.4-$7.6 million/year			
Example	Berlin, Germany			
Assumed customer experience	• Common rules and experience for all customers across all operators/services			
Approach to barriers	• Existing double fare barriers (TTC-905, TTC-GO) are replaced with new zones that have a zone increment as opposed to a double fare • Regional fares are reduced for short/medium trips			
	Local	**RT**	**Regional**	**Transfers**
	Zones		**FBD**	**Continuous**
How are fares set?	• Common radial zones are set centrally to cover the region– this study assumes 7.5 km zones (80% of local trips are less than this distance) • Fares include a boarding fee plus zone fees that must be set and managed centrally		• Fares use a base fare and distance fare to align with local/RT fares for short/medium, while minimizing change from status quo for long distance trips • Cost per km can vary based on total distance travelled	• Transfer fees are not included in this concept • Customers pay a boarding fee plus additional zone fees (RT/Local) or distance fees (regional)
What technology changes are required	• New devices on all buses/street cars to allow tap on/off and distance tracking	• Requires software changes to use FBD and tap off functionality on fare gates	• Requires software changes to rebase regional fares	• Requires software changes to calculate a single continuous fare based on where customers taps on/off • Requires a software solution to manage free body transfers
What payment media can be used?	• Cash (local, used to purchase tickets on RT/regional), Smart cards, open payment, mobile payment, and products/ tickets/LUMs			
How do customers pay for transit?	• Tap on/tap off • Cash may be used to purchase a multi zone ticket on vehicle		• Tap on/off using fare gates or other ticket validators on RT and Regional • Tickets may be purchased at station entrance	• Customers must tap on to each new service they use • A transfer ticket or product may be purchased in advance
How are fares communicated?	• Fare tables or maps provided on vehicle, at stops, and at stations • Online tool or calculator			
Are there any infrastructure issues?	• This concept uses a software solution and tap on/tap off to avoid new infrastructure at RT stations that use free body transfers to avoid significant construction and infrastructure changes			

Concept 3

3.4.5 Hybrid

Concept 3 institutes a single, region wide, flat fare for all local services. RT and Regional use a comparable FBD approach. Under this approach, all co-fares and double fares are removed. Customers do not pay for transfers (example: local-regional or local-RT trips only pay for the higher order mode's fare).

Concept 3's scoping is outlined in Figure 3.7.

FIGURE 3.7: CONCEPT 3 OVERVIEW

CONCEPT 3: HYBRID

Assumed Management Approach	• Requires increased centralization compared to the status quo to set distance rates and common local flat fare; however, could be delivered with a decentralized model similar to Concept 1b with unique flat fares for each agency, but with free transfers between service providers and services • Revenue allocation is required for trips that use more than one MSP
Costs	**Capital :** $150 million (low) to $250 million (high**)** **Transit Operations:** $7.5-$9.4 million/year
Example	Tokyo, Japan
Assumed customer experience	• Common rules and experience for all customers across all operators, with varying experience between local and RT/Regional
Approach to barriers	• Existing double fares are replaced with free transfers (TTC-905, TTC-GO) • Reduces short/medium distance regional fares

	Local	RT	Regional	Transfers
	Flat	FBD		Continuous
How are fares set?	• Fares are flat across the entire GTHA • Flat fares may be raised or lowered centrally	• Fares use a base fare (local flat fare) and distance fare to align with Local fares for short/medium, while minimizing change from status quo for long distance trips (regional) • RT fares may be lower than regional fares for longer distance travel • Cost per km can vary based on total distance travelled and is adjusted centrally		• Local/RT and local/ regional trips only pay the RT or regional fares • Trips using RT and regional pay a continuous fare based on the distance travelled on both services
What technology changes are required	• No changes required	• Requires software changes to rebase RT fares and tap off functionality on fare gates	• Requires software changes to rebase regional fares	• Requires software change to allow for continuous fares • Requires a software solution to manage free body transfers
What payment media can be used?	• Cash (local on vehicle, used to purchase tickets on RT/regional),Smart cards, open payment, mobile payment, and products/ tickets/LUMs			• Smart cards, open payment, mobile payment, and products/ tickets/LUMs
How do customers pay for transit?	• Tap on or purchase upon boarding	• Tap on/off using fare gates or other ticket validators on RT and Regional • Tickets may be purchased at station entrance, including the addition of transfer co-fare		• Customers must always tap on to each new service they use and tap off of local services if boarding RT at a free body transfer • A transfer ticket or product may be purchased in advance
How are fares communicated?	• Fare tables or maps provided on vehicle, at stops, and at stations • Online tool or calculator			
Are there any infrastructure issues?	• This concept uses a software solution and tap on/tap off to avoid new infrastructure at RT stations that use free body transfers to avoid significant construction and infrastructure changes			

Concept 4

3.4.6 Fare by Distance

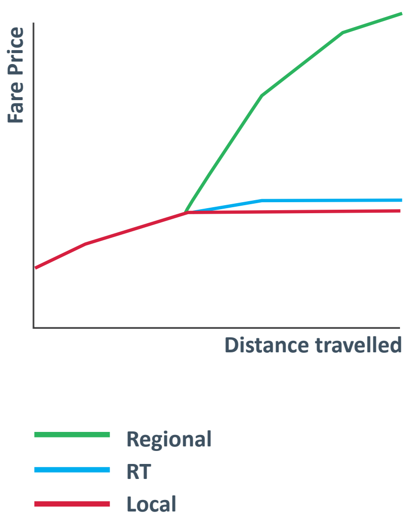
Concept 4 proposes a fare structure that uses fare by distance on all services in the GTHA. For the purposes of this analysis, Concept 4 has assumed the use of per km rates (slopes) that vary by service as shown in Figure 3.8. Key design considerations for the assumed Concept 4 include:

- Customers must tap on to and tap off of every service they use;
- Fares are calculated based on a base fare and distance fares;
- A single base fare is used for all services – this fare is paid once per chain of trips (similar to a time based transfer);
- Distance fares are set by multiplying the distance travelled (km) on a service by its distance rate ($/km);
- Slopes change over distance – for local and RT services, the slope decreases to lessen impact on long distance travelers while for Regional the slopes are set to approximate the existing GO structure; and
- There are no additional fares or fees for transferring services – fares are based solely on cumulative distance travelled on each service type.

In practice, FBD could vary from the assumptions used in this Business Case and include:

- An initial flat fare to minimize price changes and complexity for travelers (example: allowing travel up to 7-10 km on the base fare alone, before additional fare based on distance is applied);
- “Steps” that round fare impacts instead of directly applying per-distance rates (example: fares increase by 50 cents every 5km increment or part thereof, as opposed to 1 cent every 100 m); and
- Flat fares on some services to support ridership development (similar to Concept 3)

FIGURE 3.8: CONCEPT 4 OVERVIEW



CONCEPT 4: FARE BY DISTANCE

Assumed Management Approach	• Concept as assessed can be delivered with some centralization (mandating FBD) or complete centralization (mandating FBD and setting the fares used for all trips) • Revenue allocation is required for trips that use more than one MSP
Costs	**Capital :** $150 million (low) to $250 million (high) **Transit Operations:** $5.2-$8.5 million/year
Example	Sydney, Australia
Assumed customer experience	• Common rules and experience for all customers across all operators/services

	Local	RT	Regional	Transfers
	FBD			Continuous
How are fares set?	• Fares use a base fare and distance fare for all trips • Shorter distance trips may have a lower fare, while longer trips may have a higher fare • Each service can have unique distance fares • Cost per km can vary based on total distance travelled and could be set by individual MSPs or by a central process			• Transfers do not add additional fees – fares use a continuous fare based on the distance travelled on the three service types
What technology changes are required	• New devices on all buses/street cars to allow tap on/off and distance tracking	• Requires software changes to rebase RT fares and tap off functionality on fare gates	• Requires software changes to rebase regional fares	• Requires software change to allow for continuous fares • Requires a software solution to manage free body transfers
What payment media can be used?	• Cash (Used to purchase tickets),Smart cards, open payment, mobile payment, and products/ tickets/LUMs			• Smart cards, open payment, mobile payment, and products/ tickets/LUMs
How do customers pay for transit?	• Tap on/Tap off • Cash fare can be used on vehicle, however a specific solution has not been developed for this study	• Tap on/off using fare gates or other ticket validators on RT and Regional • Tickets may be purchased at station entrance,		• Customers must always tap on to each new service they use and tap off of local services if boarding RT at a free body transfer • A transfer ticket or product may be purchased in advance
How are fares communicated?	• Fare tables or maps provided on vehicle, at stops, and at stations • Online tool or calculator			
Are there any infrastructure issues?	• This concept uses a software solution and tap on/tap off to avoid new infrastructure at RT stations that use free body transfers to avoid significant construction and infrastructure changes			

FIGURE 3.9: RANGE OF FARE INTEGRATION RESULTS

3.4.8 Achieving the Revenue Investment and Revenue Neutrality Scenarios

As shown in Figure 3.9 each concept can achieve a variety of ridership and revenue changes based on the pricing adopted within the structure. In order to evaluate the concepts, a ‘reference case’ has been set out for each concept for both scenarios: revenue neutral (target of 0% revenue change) and revenue investment (-5% revenue change, with investment applied strategically based on each concept's approach to reducing barriers). A reference case is a set of pricing put into each concept that is tailored to:

- Reach the revenue target of the scenario;
- Minimize losses of existing ridership in all markets;
- Support the design principles for the study; and
- Maximize strategic and economic benefits.

Reference cases do not represent an actual or optimized pricing strategy that will be used for the fare structures. They are used solely for evaluation and comparison to understand the potential performance of difference fare structure concepts. Table 3.7 shows sample fares for each reference case. Note – these fares are ‘average’ fares that reflect an average fare paid based on the mix of products and concessions available to customers. These fares are illustrative and are not proposed as prices for the final fare structure. These are used to support modelling and analysis and to provide a like-for-like comparison between concepts.

Tables 3.8 and 3.9 outline the demand and revenue impacts of revenue neutral and revenue investment (allowing revenue losses of up to 5%) scenarios used in this project as estimated by a built for purpose demand model. These tables also include a comparator or benchmarking analysis for direct investment of 5% revenue into the status quo fare structure described in Chapter 2. Note – over time traveller behaviour will adapt to the new fare structure, which will lead to changes in ridership and revenue impacts as shown in Table 3.5. Long term effects may increase the revenue from the base revenue objective for each scenario.

TABLE 3.6: SAMPLE FARES USED IN REFERENCE CASES (AVERAGE FARE)

				Concept 1 Modified status quo		Concept 1b Modified status quo with FBD		Concept 2 Zones		Concept 3 Hybrid		Concept 4 FBD	
Sample origin	**Sample destination**	**Services used**	**Distance (km)**	**N**	**I**	**N**	**I**	**N**	**I**	**N**	**I**	**N**	**I**
Liberty Village	Bay & King	TTC Streetcar	4	$2.19	$2.09	$2.00	$2.02	$1.90	$1.90	$2.06	$1.92	$2.00	$1.81
Pickering Power Plant	Pickering Town Centre	DRT Buse	6	$2.08	$1.98	$1.90	$1.92	$1.90	$1.90	$2.06	$1.92	$1.84	$1.72
Thornhill	Yonge & Sheppard	YRT and TTC Subway	7	$4.15	$3.64	$3.58	$2.15	$1.90	$1.90	$2.06	$1.92	$2.41	$2.03
Yonge & Lawrence	Yonge & King	TTC Subway	9	$2.19	$2.09	$2.08	$2.10	$1.90	$1.90	$2.34	$2.19	$2.35	$2.10
Kipling	Union Station	TTC Subway	14	$2.19	$2.09	$2.27	$2.29	$2.65	$2.43	$3.02	$2.84	$2.61	$2.48
Hamilton	Burlington	HRT or BT Bus	15	$1.78	$1.69	$1.63	$1.64	$2.65	$2.43	$2.06	$1.92	$2.46	$2.25
Markham	Yonge & Dundas	YRT and TTC	23	$3.18	$2.79	$2.98	$1.88	$3.18	$2.66	$2.42	$2.28	$2.76	$2.62
Markham	Yonge & Dundas	GO Transit and TTC	23	$5.55	$4.65	$5.77	$5.79	$5.67	$5.63	$5.21	$4.92	$4.82	$4.43
Oakville	Yonge & Eglinton	GO Transit, TTC	41	$7.24	$6.34	$6.93	$6.95	$6.83	$6.78	$6.32	$5.97	$6.72	$6.55
Oshawa	Yonge & King	GO Transit	52	$7.98	$7.08	$7.81	$7.83	$7.71	$7.67	$7.19	$6.79	$8.52	$8.24

N Revenue neutral

I Revenue investment

TABLE 3.7: SHORT TERM REFERENCE CASE RIDERSHIP/REVENUE IMPACTS

	Revenue Neutral		Revenue Investment	
	Ridership change	Revenue change	Ridership change	Revenue change
Concept 1 Modified status quo	0.00%	0.00%	1.02%	-5.04%
Concept 1b Modified status quo with FBD	0.34%	-0.37%	1.07%	-4.67%
Concept 2 Zones	0.60%	0.01%	1.34%	-4.74%
Concept 3 Hybrid	0.25%	0.23%	1.22%	-4.82%
Concept 4 FBD	0.45%	0.00%	1.55%	-5.66%
Investment in status quo	N/A	N/A	0.9%	5.2%

TABLE 3.8: LONG TERM REFERENCE CASE RIDERSHIP/REVENUE IMPACTS

	Revenue Neutral		Revenue Investment	
	Ridership change	Revenue change	Ridership change	Revenue change
Concept 1 Modified status quo	0.09%	-0.07%	1.44%	-4.50%
Concept 1b Modified status quo with FBD	0.56%	-0.16%	1.53%	-4.35%
Concept 2 Zones	0.90%	0.41%	1.85%	-4.10%
Concept 3 Hybrid	0.51%	0.25%	1.77%	-4.48%
Concept 4 FBD	0.71%	0.30%	2.15%	-5.10%
Investment in status quo	N/A	N/A	1.2%	-

4

Strategic Case

4.1 Overview

4.1.1 Chapter Purpose

The Strategic Case is a review of each of the concepts to determine the extent to which they achieve the strategic benefit of Fare Integration. The remainder of this chapter includes a summary of concept performance against the strategic outcomes discussed in Chapter 2. The final section of this chapter includes an overall summary of each concept's performance, insights, and conclusions.

4.2 Strategic Evaluation

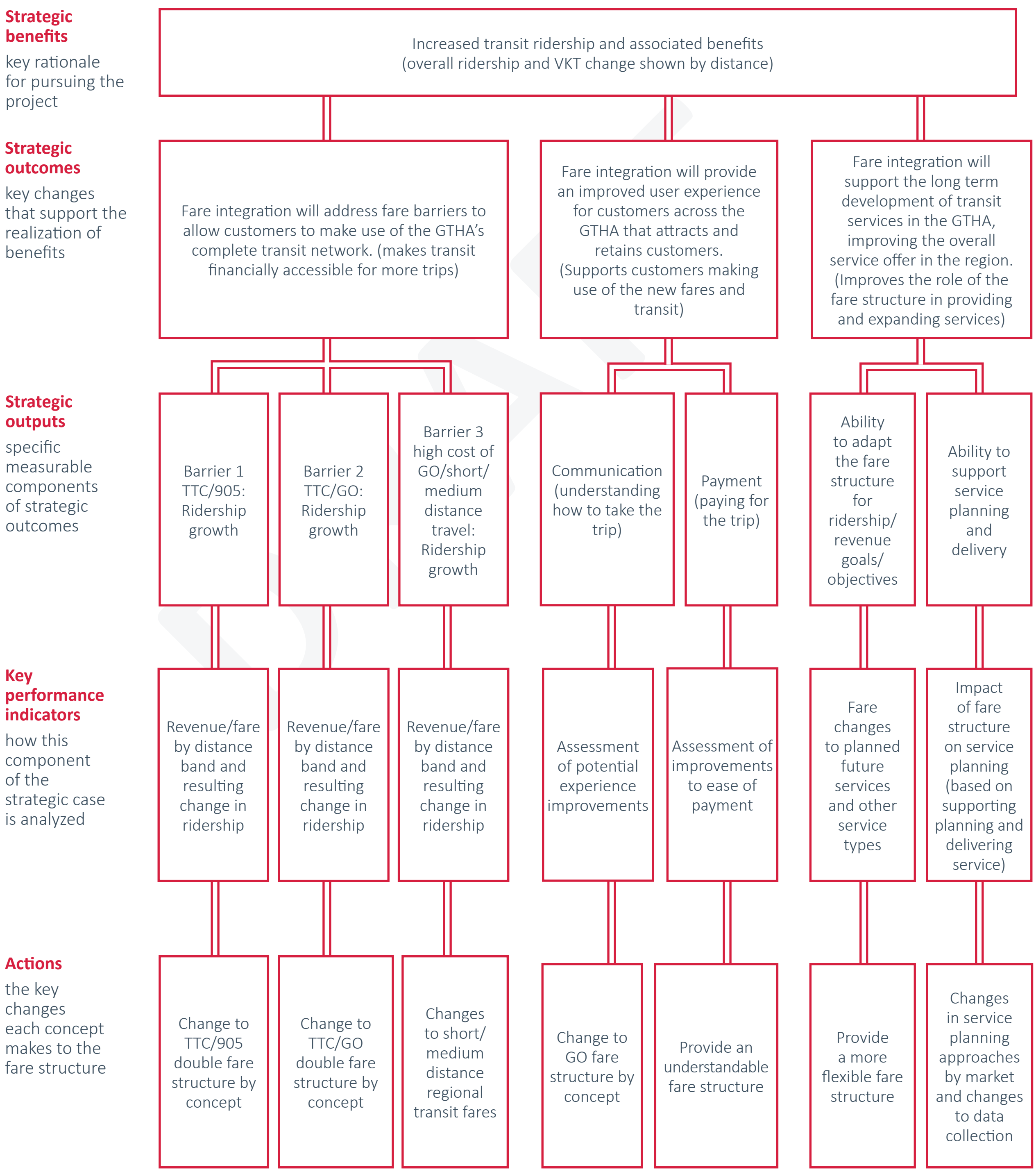
This evaluation uses a strategic logic framework to understand the strategic case for each concept. This evaluation structure (outlined in Figure 4.1) identifies the overall key benefit of fare integration and analyzes the three key strategic outcomes that enable this benefit.

This analysis notes the potential of each concept to realize these benefits and discusses how the concepts are able to achieve and maintain the benefits post implementation. Potential risks and challenges for delivering the concepts are outlined in Chapter 7 – Deliverability and Operations Case.

The evaluation includes:

- **Key strategic benefit** – increased transit ridership and reduced auto travel by developing a seamless fare structure;
- **Outcome 1: Address Fare Barriers to Grow Transit Demand** – Fare integration will address fare barriers to allow customers to make use of the GTHA's complete transit network;
- **Outcome 2: Attract and Retain Ridership through Improved User Experience** – Fare integration will provide an improved user experience for customers across the GTHA that attracts and retains customers;
- **Outcome 3: Improve the Fare Structure's Role in Long Term Transit Development** – Fare integration will support the long term development of transit services in the GTHA, improving the overall service offering in the region.

FIGURE 4.1: STRATEGIC CASE LOGIC FRAMEWORK



4.3 Strategic Benefit: Increased Transit Ridership

4.3.1 Overview

The key benefit of the fare structure is its ability to support seamless travel across the different travel markets in the GTHA, leading to increased ridership and a reduction in auto travel.

4.3.2 Analysis: Fare Integration Overall Ridership Impacts

This analysis considers the change in transport ridership across the markets and different distance bands, as well as the corresponding benefits associated with ridership change measured by the reduction in automobile ridership.

Figure 4.2 (A and B) summarizes the ridership growth potential of the concepts by market and Figure 4.3 (A and B) summarizes the ridership growth potential by trip length. Table 4.2 provides an overview of key ridership and market development issues for each concept.

Strategic ridership benefits of the options based on reduction in automobile vehicle kilometers travelled (VKT) and are shown in Table 4.1A and 4.1B. This table includes a benchmarking analysis of direct investment into the "Status Quo" fare structure as defined in Chapter 2. This analysis is intended for comparison purposes to highlight the varying effects of revenue investment in new structures (concepts 1-4) compared to the existing structure.

Each kilometre of automobile travel removed from the transport network leads to strategic benefits, including reduction in GHGs and accidents leading to death or injury. These benefits are estimated based on:

- An average GHG emission rate of 220 g/km for automobile; and
- An average of 350 accidents leading to injuries/deaths per billion automobile kilometres travelled in Ontario.

TABLE 4.1A: STRATEGIC BENEFITS OF INCREASED RIDERSHIP (REVENUE NEUTRAL)

	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD
Increase in daily ridership (2031)	2,500	15,800	25,300	14,300	19,800
Life cycle automobile km travelled reduction from auto only trips switching to transit (million km)	3,700	500	2,100	3,400	2,900
Life cycle automobile km travelled reduction from park & ride trips switching to transit (million km)	3,800	2,300	2,700	5,900	3,600
Total reduction (million km)	7,500	2,800	4,800	9,300	6,500
Reduction in GHG emissions (tonnes)	1,655,400	624,500	1,045,300	2,026,800	1,430,900
Reduction in accident resulting in death or injury[1]	2,600	1,000	1,700	3,200	2,300

TABLE 4.1B: STRATEGIC BENEFITS OF INCREASED RIDERSHIP (REVENUE INVESTMENT)

	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD	Direct Investment in Status Quo
Increase in daily ridership (2031)	40,400	42,800	51,900	49,800	60,200	25,600
Life cycle automobile km travelled reduction from auto only trips switching to transit (million km)	12,100	7,100	9,500	9,700	7,600	2,500
Life cycle automobile km travelled reduction from park & ride trips switching to transit (million km)	4,500	5,200	3,400	6,400	4,200	3,800
Total reduction (million km)	16,600	12,300	12,900	16,100	11,800	6,300
Reduction in GHG emissions (tonnes)	3,653,200	2,703,700	2,840,200	3,534,400	2,585,000	1,386,000
Reduction in accident resulting in death or injury[1]	5,800	4,300	4,500	5,600	4,100	2,200

1. Accident reductions were calculated based on the accident frequency per passenger km travelled in Ontario

FIGURE 4.2A: CHANGE IN DEMAND BY MARKET (2031) REVENUE NEUTRAL

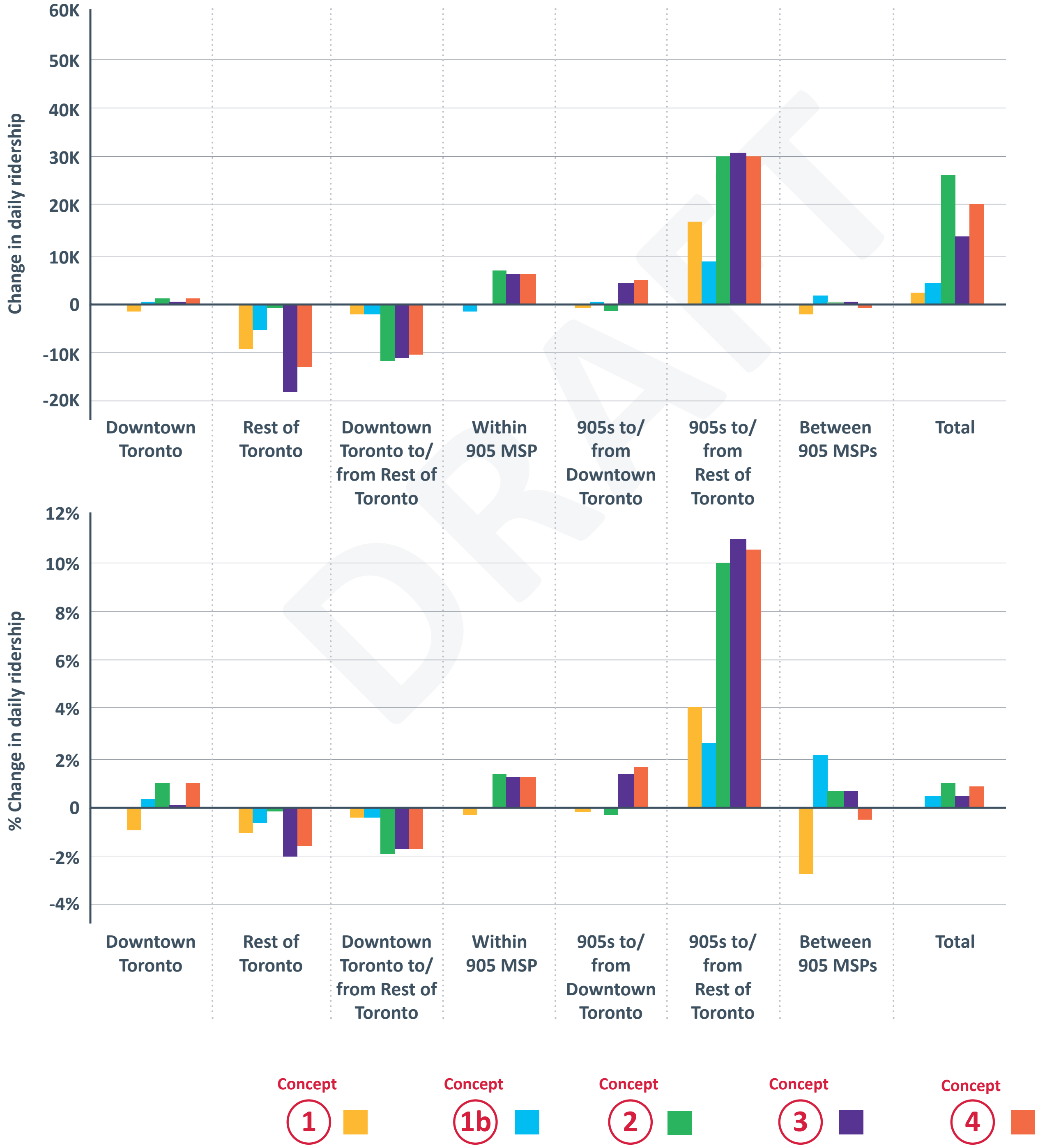


FIGURE 4.2B: CHANGE IN DEMAND BY MARKET (2031) REVENUE INVESTMENT

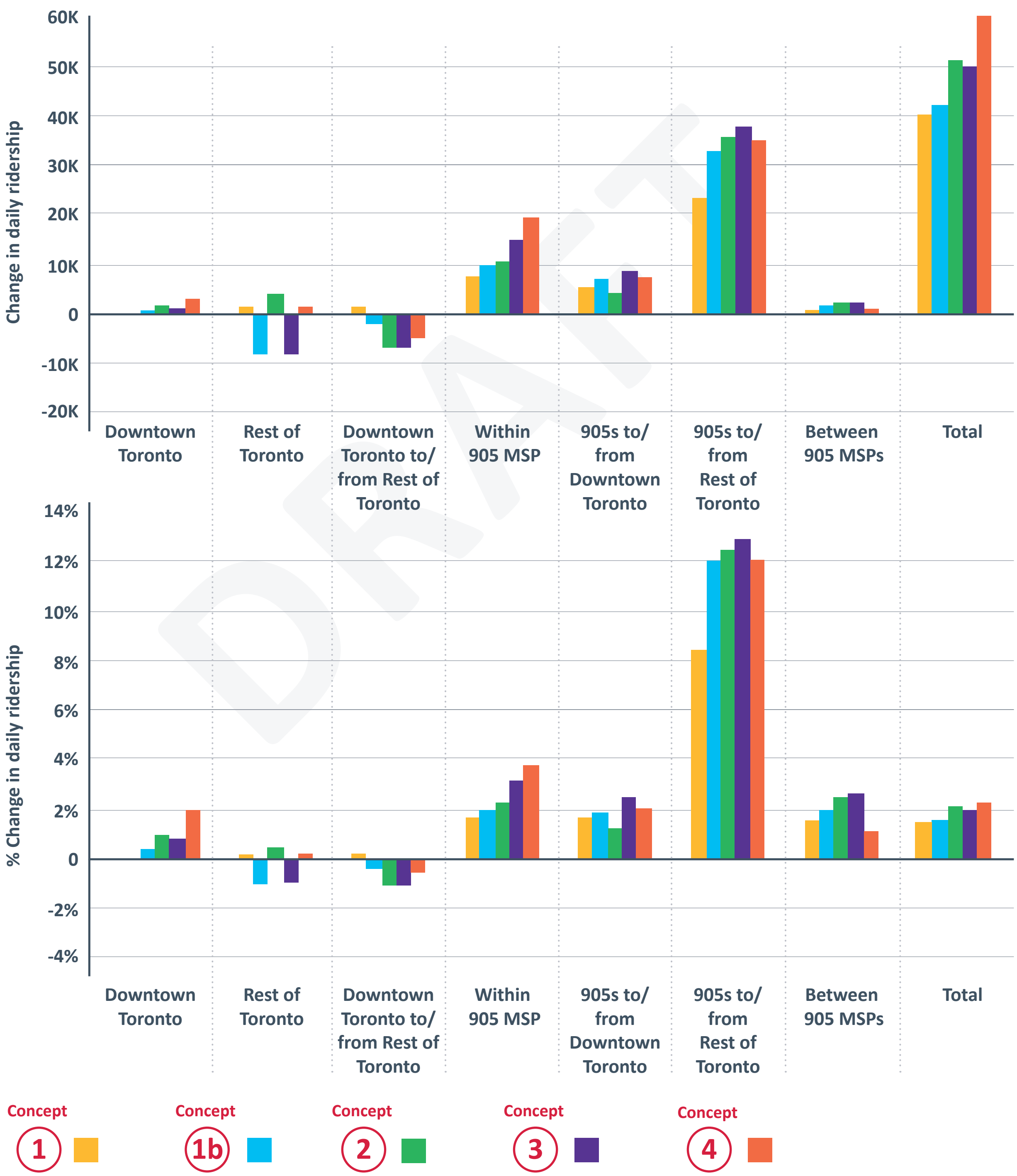


FIGURE 4.3A: CHANGE IN DEMAND BY DISTANCE TRAVELLED (2031) REVENUE NEUTRAL

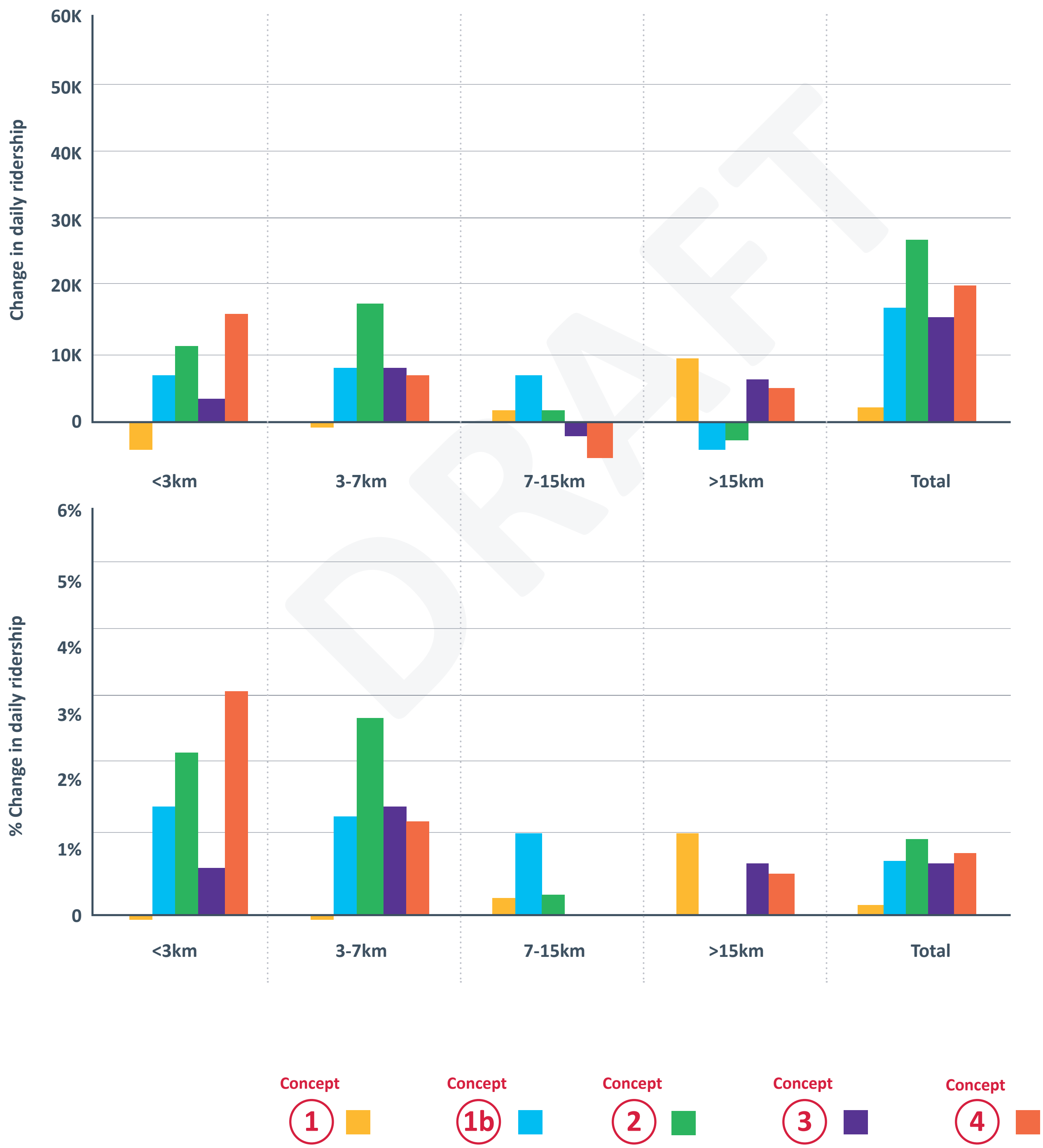


FIGURE 4.3B: CHANGE IN DEMAND BY DISTANCE TRAVELLED (2031) REVENUE INVESTMENT

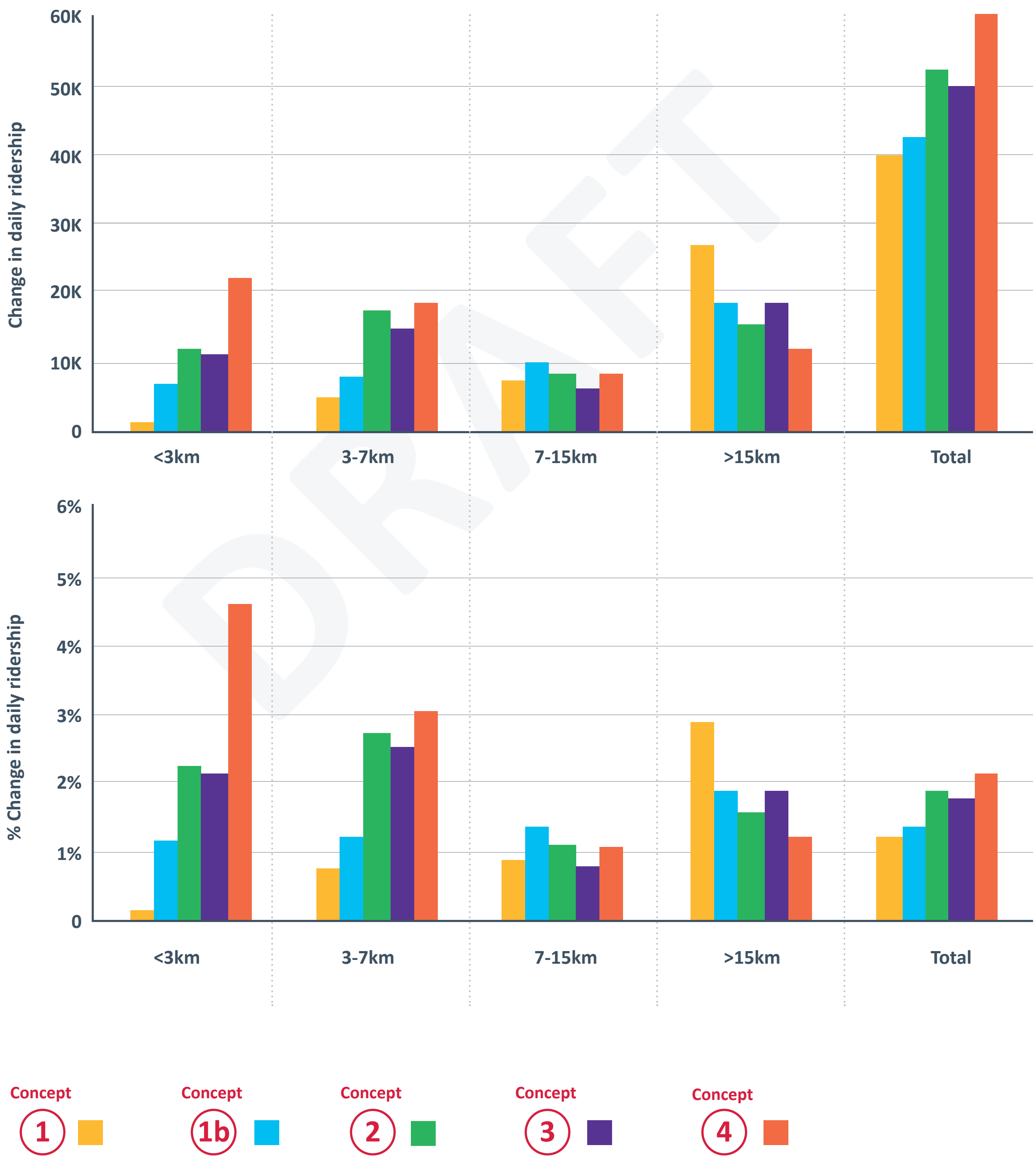


TABLE 4.2: KEY RIDERSHIP DEVELOPMENT CONSIDERATIONS

	Key issues & opportunities	How does performance vary between revenue neutral and revenue invetment
Concept 1 Modified status quo	• Lowest overall ridership growth potential due to minimal structural changes	• Revenue neutral requires an increase to all flat fares in the GTHA, which has minor impacts across the markets • Revenue investment allows for existing flat fares to be retained with a greater transfer discount than revenue neutral
Concept 1b Modified status quo with FBD	• If the FBD rate is too high for RT, long distance transit travel in Toronto may be reduced	• Revenue investment can mitigate ridership losses by allowing a lower long distance fare for FBD on RT
Concept 2 Zones	• Customers in short distance markets have a lower fare, which increases demand in short distance markets • Trips between Downtown and the Rest of Toronto would see higher fares because of zones, while trips within in the Rest of Toronto trips see an overall growth because many long east-west trips would fit under a single zone	• Revenue investment can decrease incremental zone fares • The major difference between scenarios is that lower incremental fares reduce the loss of ridership in longer distance markets, which is why revenue investment has a larger overall gain in transit trips (1.9% vs.0.9%)
Concept 3 Hybrid	• Long distance trips in Toronto (to downtown or across the rest of Toronto) see an increase in fares, which can impact ridership • Concept 3's long distance trip losses are the highest, especially under revenue neutral, because the concept's free transfers between local/RT, local/regional, and local/local require a shifted revenue burden to regional and RT FBD	• Revenue investment can decrease FBD fares leading to higher trip growth • The major difference between scenarios is that lower FBD fares mitigate the loss of ridership in longer distance markets, which is why revenue investment has a larger overall gain in transit trips (1.8% vs. 0.5%)
Concept 4 FBD	• Customers in short distance markets have a lower fare, which increases demand • All longer distance trips that currently use a flat fare will see a higher fare, which can suppress demand if the fare is too high	• Revenue investment can decrease FBD fares leading to higher trip growth • The major difference between scenarios is that lower FBD fares mitigate the loss of ridership in longer distance markets, which is why revenue investment has a larger overall gain in transit trips (2.1%% vs. 0.7%)

4.3.3 Flat Fare Considerations for Ridership Development

While they are simple to implement and understand, flat fares price all trips equally, which presents two key strategic issues:

- They can suppress ridership over short distances; and
- They can reduce revenue potential from long distance trips that could be priced higher.

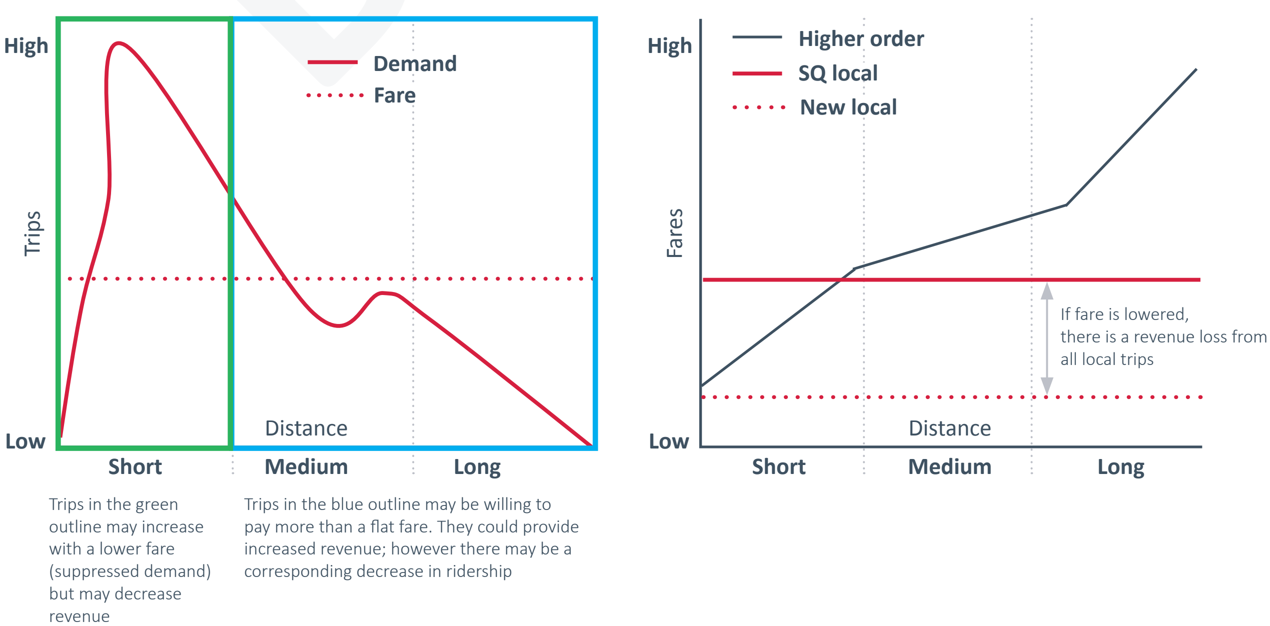
Additionally, when flat fares are used in conjunction with FBD, as in concepts 1b and 3, they constrain the potential of FBD.

As a result, flat fares have limited ability to grow ridership or revenue. This dynamic is illustrated in Figure 4.4.

4.3.4 Fare by Distance Considerations for Ridership Development

Fare by distance is generally considered to have the highest potential to grow ridership – however, there are significant risks for long distance ridership that currently has a single flat fare. Additionally, this potential comes with significant complexity and implementation challenges, which are discussed in Chapter 7. These issues are considered manageable based on international practice, but require a specific strategy in the GTHA to ensure FBD is implemented to realize its full potential while mitigating risks.

FIGURE 4.4 FLAT FARE CONSIDERATIONS

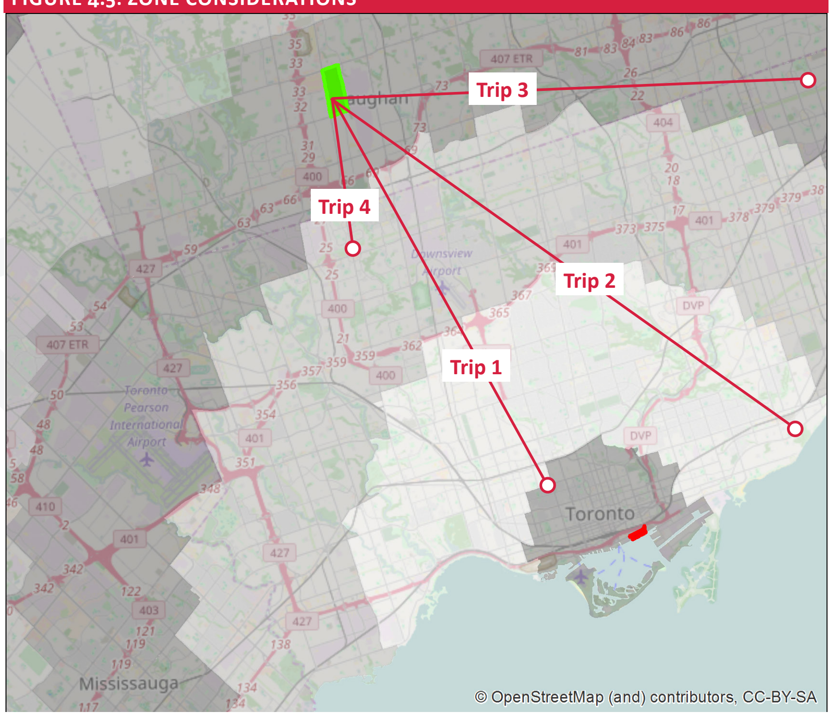


Trip	Number of zones	Length
1 (radial)	4	24km
2 (outer)	3	26km
3 (circumferential)	1	28km
4 (radial)	2	6km

4.3.5 Zone Fare Considerations for Ridership Development

A key consideration for ridership development is Concept 2's zone structure, which allows trips around a zone (circumferential trips) or through the outside of a zone (outer trips) to pay a lower fare than trips that pass directly through the middle of a zone. As a result, some longer trips will have a single zone fare that is lower than the status quo fare. Other short trips may have a high fare for crossing a zone boundary. As a result, Concept 2's ridership development is considered to further the issues associated with the current fare structure – instead of using municipal boundaries, new geographic boundaries are used to price trips. (which may be as arbitrary as municipal boundaries) These issues are illustrated in Figure 4.5.

FIGURE 4.5: ZONE CONSIDERATIONS



4.3.6 Direct Investment in Status Quo versus Transformational Fare Structure

As noted in Table 4.2B, direct investment in the existing fare structure has a smaller benefit than investment in the fare structure concepts. For example, direct investment in the existing fare structure can produce up to 25,600 new trips while investment in a new fare structure can lead to 40,400 to 60,200 new trips. The increase in ridership associated with the new fare structures is a 160% to 235% greater increase than just investing in the status quo.

The fare structure concepts can realize higher ridership gains and reduction in auto trips because they offer strategic investment and changes to specific markets that currently face fare barriers, allowing for significant changes in fares. Direct investment into the status quo reduces fares for existing passengers, but the decrease across markets with barriers is not substantial enough to lead to significant ridership increases.

4.3.7 Key Insights

The review of market growth for each concept noted the following key insights:

- Distance based fares (1b, 2, 3, and 4) can discourage ridership in long distance markets that currently benefit from a flat fare and must therefore be carefully managed;
- Concept 3 has the highest FBD related potential ridership loss because its RT FBD rates must account for the loss of revenue from paying a single fare instead of two fares or a co-fare, whereas Concept 1B has a discounted transfer and FBD, and Concepts 2 and 4 charge continuous fares across all services used in a the trip;
- Under revenue neutral, Concept 3 has the highest VKT performance while Concept 1 has the highest under revenue investment because it does not lose long distance transit ridership in Toronto – even though it has the least potential to grow region wide ridership;
- It is expected that careful management of long distance fares under zone or FBD concepts could increase their overall VKT reductions and ridership;
- Revenue investment does not offer significant increases in ridership compared to revenue neutrality, rather it mitigates potential ridership losses that offset ridership growth; and
- Concepts 2 and 4 have the highest potential to increase ridership in short and medium distance markets as well as in total across the GTHA – the result is also highlighted in Figure 3.8, where for a given revenue change, these concepts typically have the highest ridership.

4.4 Strategic Outcome 1: Address Fare Barriers to Grow Transit Demand

4.4.1 Overview

This outcome identifies the extent to which each concept can address the key fare barriers as part of their overall approach to ridership growth. Concepts that can unlock suppressed demand at each of the three barriers have higher strategic performance than those that have limited ridership growth against the barriers. This analysis is focused on the three barriers identified in Chapter 2:

- **Barrier 1** – with MSPs between Toronto and the 905 area pay two fares;
- **Barrier 2** – High Cost of Short/Medium Distance GO Transit Fares ; and
- **Barrier 3** – Customers travelling with GO Transit and TTC pay two fares

4.4.2 Barrier 1 – with MSPs Between Toronto and the 905 Area Pay Two FaresPay Two Fares

As discussed in Chapter 2, this barrier occurs when customers must pay a double fare for trips using both TTC and 905 MSP services. Paying two fares suppresses short and medium trips because it is significantly higher than other short/medium fares in the region. Three general approaches are used to address this barrier:

- **Discounted Second Fare (Concepts 1 and 1b)** – which are lower than the existing need to pay two fares, and aim to encourage more short/medium distance travel;
- **Free Cross Boundary Transfers (Concept 3)** – which are set out to encourage more multimodal travel across borders;
- **Continuous fares (Concepts 2 and 4)** – which aim to accurately price each leg of a trip based on distance travelled, regardless of service used.

Figure 4.6 shows the percent change and total change in demand for the five concepts across the revenue neutral and revenue investment scenarios. Table 4.3 provides a summary of key considerations for each concept against this barrier.

KEY INSIGHTS

This analysis indicated that:

- The use of discounted transfers (Concepts 1 and 1b) can grow long distance demand more effectively than it can grow short distance demand as even a reduced second fare charges customers a higher fare for short travel than internal trips;
- Free transfers between local and regional (Concept 3) can significantly increase cross boundary demand – however, this increases the RT/Regional FBD rate to compensate for lost revenue;
- The role of pay parking may impact the cross boundary trip growth;
- Zones (Concept 2) and FBD (Concept 4) can achieve similar growth to the free transfer (Concept 3) by pricing trips based on distance travelled, allowing for a lower increase in long distance RT fares than Concept 3; and
- Revenue investment does not offer significant growth opportunities for this market – even with greater discounts for second fares or lower distance rates; and
- Revenue investment mitigates the impact of spreading the cost of removing the second fare to other markets (for example, high long distance fares).

From this analysis, the following conclusions are drawn:

- Free Cross Boundary transfers (Concept 3) have the highest overall growth potential – however, their performance may be impacted by pay parking assumptions and they require significant revenue investment or a policy that shifts cross boundary revenue burden to other markets; and
- Zone/Distance fares (Concept 2 or 4) can yield a similar result as Concept 3 under both scenarios with lower increases to long distance RT/Regional fares in other markets.

FIGURE 4.6A: BARRIER 1 – CUSTOMERS TRAVELLING WITH 905 MSPS AND THE TTC PAY TWO FARES (REVENUE NEUTRAL)

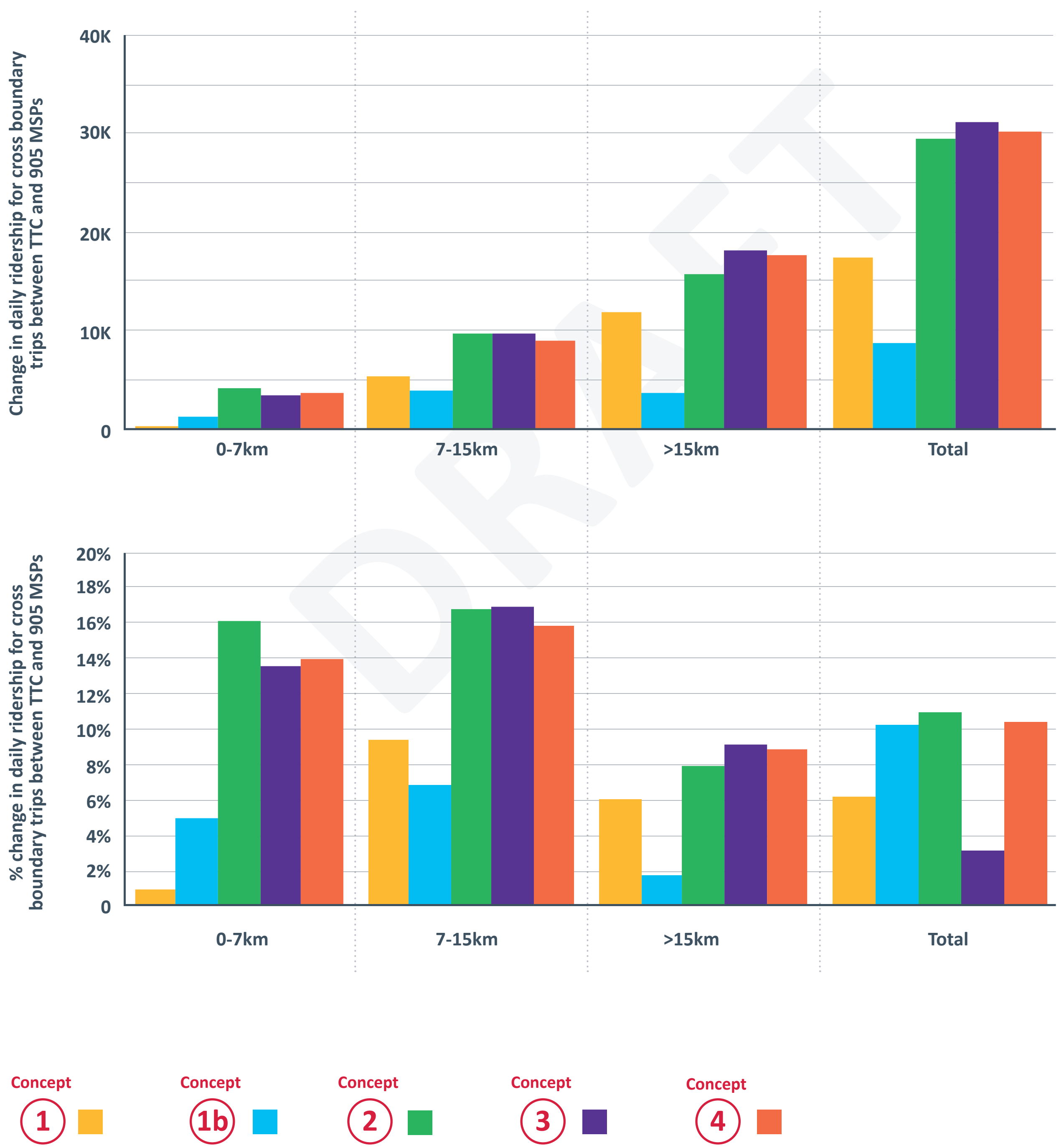


FIGURE 4.6B: BARRIER 1 – CUSTOMERS TRAVELLING WITH 905 MSPS AND THE TTC PAY TWO FARES (REVENUE INVESTMENT)

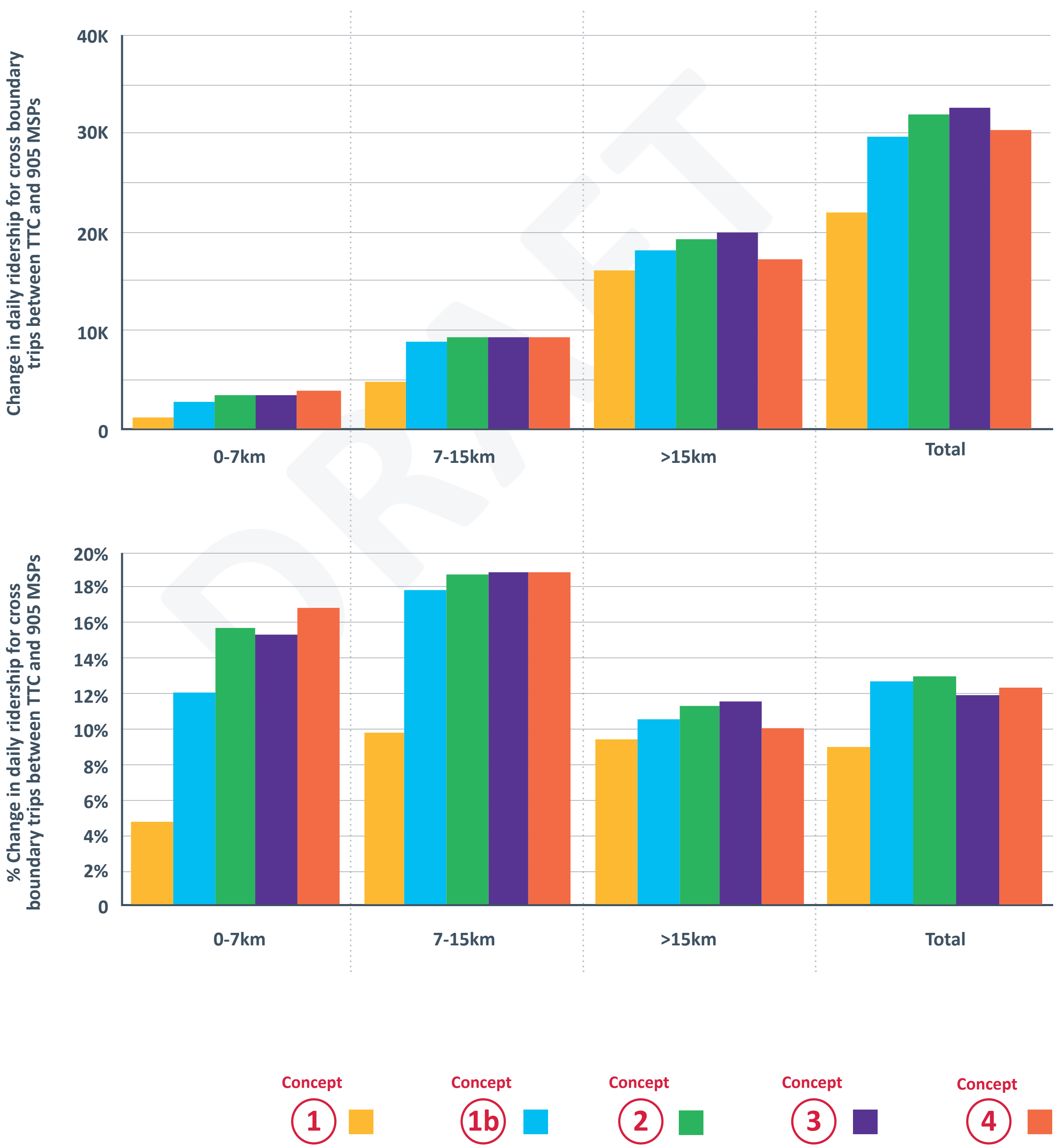


TABLE 4.3: BARRIER 1 – CUSTOMERS TRAVELLING WITH 905 MSPS AND THE TTC PAY TWO FARES

	Key issues & opportunities	How does performance vary between revenue neutral and revenue investment
Concept 1 Modified status quo	• Discounted second fares have moderate potential to grow demand compared to the other concepts • Discounted transfer fares may be too costly for short distance trips and may under-price the longest trips	• Revenue neutral requires all markets pay an increase in order to replace the double fares with Discounted transfer fares • Revenue investment allows for existing flat fares to be retained with a greater transfer discount than revenue neutral, which allows for stronger cross boundary travel growth
Concept 1b Modified status quo with FBD	• The combination of discounted second fares and FBD on RT is difficult to price appropriately, which results in lower growth than the other concepts	• Revenue neutral requires all RT and regional trips pay an increase in order to replace the second fare with a discounted transfer fare • Revenue investment can mitigate ridership losses by allowing a lower long distance fare for FBD on RT
Concept 2 Zones	• Zones have high potential for cross boundary market growth by allowing for lower short and medium cross boundary fares	• Revenue neutral increases long distance RT trips in order to replace revenue lost from removed double fares and co-fares • Revenue investment can decrease zone fares leading to an increase trip growth in cross boundary markets of 20%
Concept 3 Hybrid	• Concept 3 has high potential for cross boundary market growth by providing customers with a region-wide flat fare for local trips, and a fare that includes a combination of RT/regional when local is used in conjunction with RT, regional, or both • The free transfer may underprice some longer distance trips that have longer feeder leg on local service	• Revenue neutral increases long distance RT trips in order to replace revenue lost from removed double fares and co-fares – this increase is higher than Concepts 1b, 2, and 4 as it must cover revenue from the free transfers, as compared to the other concepts which use a co-fare or distance/zones to charge for feeder trips • Revenue investment can decrease FBD fares leading to an increase trip growth in cross boundary markets of 20%
Concept 4 FBD	• FBD has high potential for cross boundary market growth by setting fares by the distance travelled – this offers strong ridership growth for all cross boundary markets and markets that require payment of two fares or co-fares	• Revenue neutral increases long distance RT trips in order to replace revenue lost from removed double fares and co-fares • Revenue investment can decrease FBD fares leading to an increase trip growth in cross boundary markets of 13%

4.4.3 Barrier 2 – High Cost of Short/Medium Distance GO Transit Fares

The current fare structure limits short distance demand on GO Rail Transit, particularly the rail network, because short distance GO fares are much higher than MSP fares. The shortest distance trips on the existing GO Transit Rail network are between 3-5km. As the GO RER network is developed, additional stations will be added which will grow the number of potential trips of this length and shorter.

A common FBD approach was used for all concepts for regional transit, including GO RER, Rail, and Bus, based on the following considerations:

- Aligning the base fare for regional with the local or RT flat/base fare and keeping the fare consistent with these modes for the first 7km of a trip;
- Applying the same distance increments, where possible, between all concepts for short and medium distance trips;
- Longer distance fares on regional vary between concepts, but generally have minor overall impacts on ridership; and
- A similar distance fare was used between the revenue neutral and revenue investment scenarios, which led to only marginal differences between the resulting demand growth.

Demand growth for GO Rail trips is shown in Figure 4.7.

KEY INSIGHTS

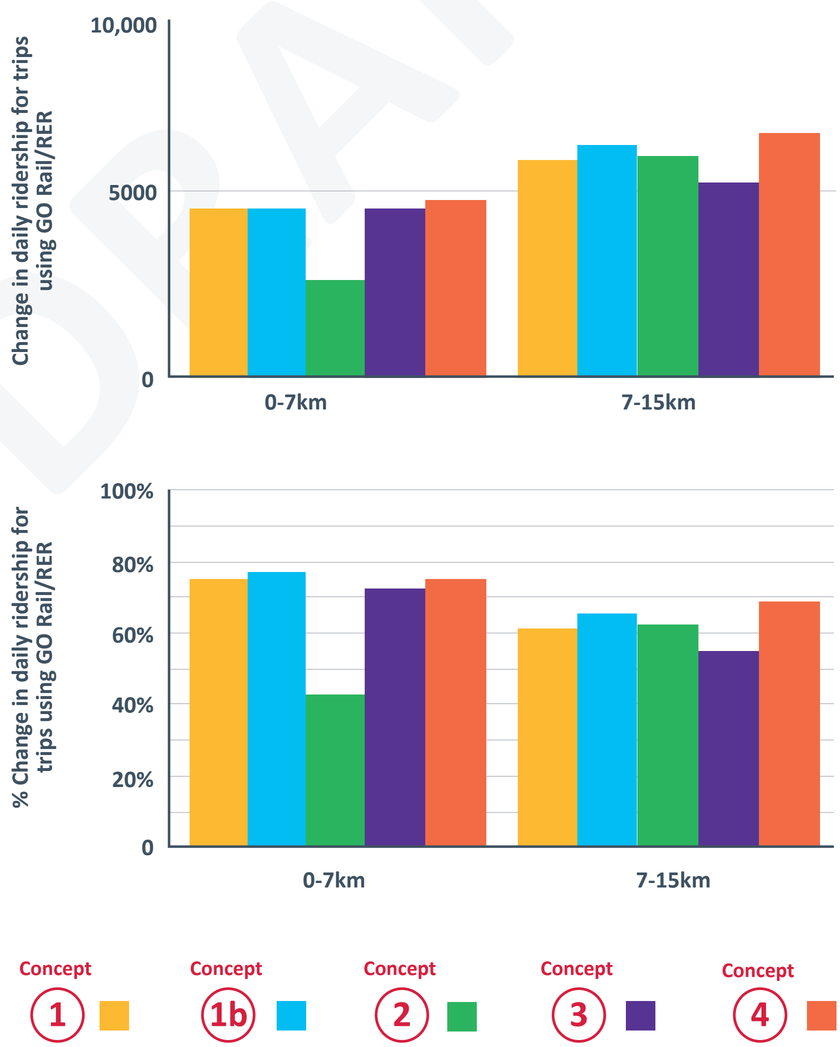
This analysis indicated that:

- An FBD approach to regional services combined with reduced pricing for short/medium trips relative to the status quo significantly increases their accessibility for this market;
- Overall performance between concepts 1, 1b, and 4 is consistent;
- Due to the stop spacing involved with GO RER, it is not expected that additional ridership can be generated using concepts 2 and 4 with cheaper short distance fares;
- Concept 2's performance is lower due to the base two zone local/ RT fare used for GO – aligning GO fares with zones would result in a similar level of demand; and

- Concept 3's performance is slightly lower for medium distance trips because its fares must be moderately higher than other concepts due to the need to replace revenue lost shifting to free transfers – even under revenue investment.

The key conclusion from this analysis is that a FBD based approach for regional fares should be pursued to address this barrier, pending further investigation of an optimal pricing that should be developed with respect to regional customer preferences and the relationship between regional and local/RT fares for short/medium distance trips.

FIGURE 4.7: CHANGE IN GO RAIL RIDERSHIP FOR SHORT AND MEDIUM TRIPS



4.4.4 Barrier 3 – Customers Travelling with GO Transit and the TTC Pay Two Fares

The third fare barrier, the requirement to pay two fares when using TTC and GO, suppresses demand that may use GO RER as part of a complete network. Each concept uses one of three approaches to address this barrier:

- Discounted Transfer Fares (Concepts 1 and 1b) – which replace the TTC fare with a discounted fare to represent the value of the feeder trip;
- Free transfers (Concept 3 for local/regional) – which only charge customers the regional fare;
- Continuous fares (Concepts 2 and 4; Concepts 1b and 3 for regional/RT) – which capture the cost of each leg of the trip.

This analysis considers changes in multimodal demand for multi leg trips using regional for at least one leg in order to identify how each approach performs. Two types of trips can be generated through addressing this barrier:

- Increased demand for use of regional as part of a trip by trips that currently use transit for an entire trip; and
- Increased demand for transit as part of trips that use auto or park and ride to access RT because paying a full local or RT fare flat is too expensive as a first last/mile connection.

Both trip types would increase through demand at Union Station, including connections between GO Transit and the TTC. Multimodal regional demand using the regional network is shaped by the fare for the regional trip, as well as the fare for other services. For example, if a structure replaces the need to pay two fares for multi modal regional trips but simultaneously lowers the fare for a competitive service, the demand increase on the multimodal regional trip may be lower than an alternative structure with a lower discount, but a higher fare for the competitive trip.

The role of paid parking in encouraging or discouraging multimodal regional travel requires further investigation. Figure 4.8 shows the change in demand by concept and revenue scenario for multimodal regional trips.

KEY INSIGHTS

The analysis of Barrier 3 indicates:

- Each fare concept has the ability to significantly increase multimodal regional trips;
- Free transfers (Concept 3) have the highest potential to increase ridership, however they also increase costs of longer distance RT/ regional trips to recoup revenue, with the most pronounced effect under a revenue neutral scenario;
- Discounted Transfer Fares and distance fares have a similar potential to increase multimodal trips – discounted transfers act as a 'flat fare' for use of local or RT services, while a distance fare or continuous fare used in concepts 2 and 4 charges the customer for the exact value of their first/last mile trip; and
- Revenue neutrality and revenue investment performance vary based on the fares used for competitive services (example local-RT) compared to multimodal regional trips.

The key conclusions from this analysis are:

- discounted transfers can be used to grow multimodal demand if paired with rebased FBD fares for regional services;
- Distance based fares can achieve a similar increase in ridership but provide fares that are based on the trip taken, rather than a flat fare that is the same for all trips; and
- Free transfers are an effective tool for growing demand, but require costs to be covered by other travellers.

Therefore, these findings suggest that co-fares would be suitable as an incremental measure, while in the long term distance or continuous fares be explored in conjunction with paid parking to encourage use of the multimodal transit network.

FIGURE 4.8A: BARRIER 3 – CUSTOMERS TRAVELLING WITH GO TRANSIT AND THE TTC PAY TWO FARES (REVENUE NEUTRAL)

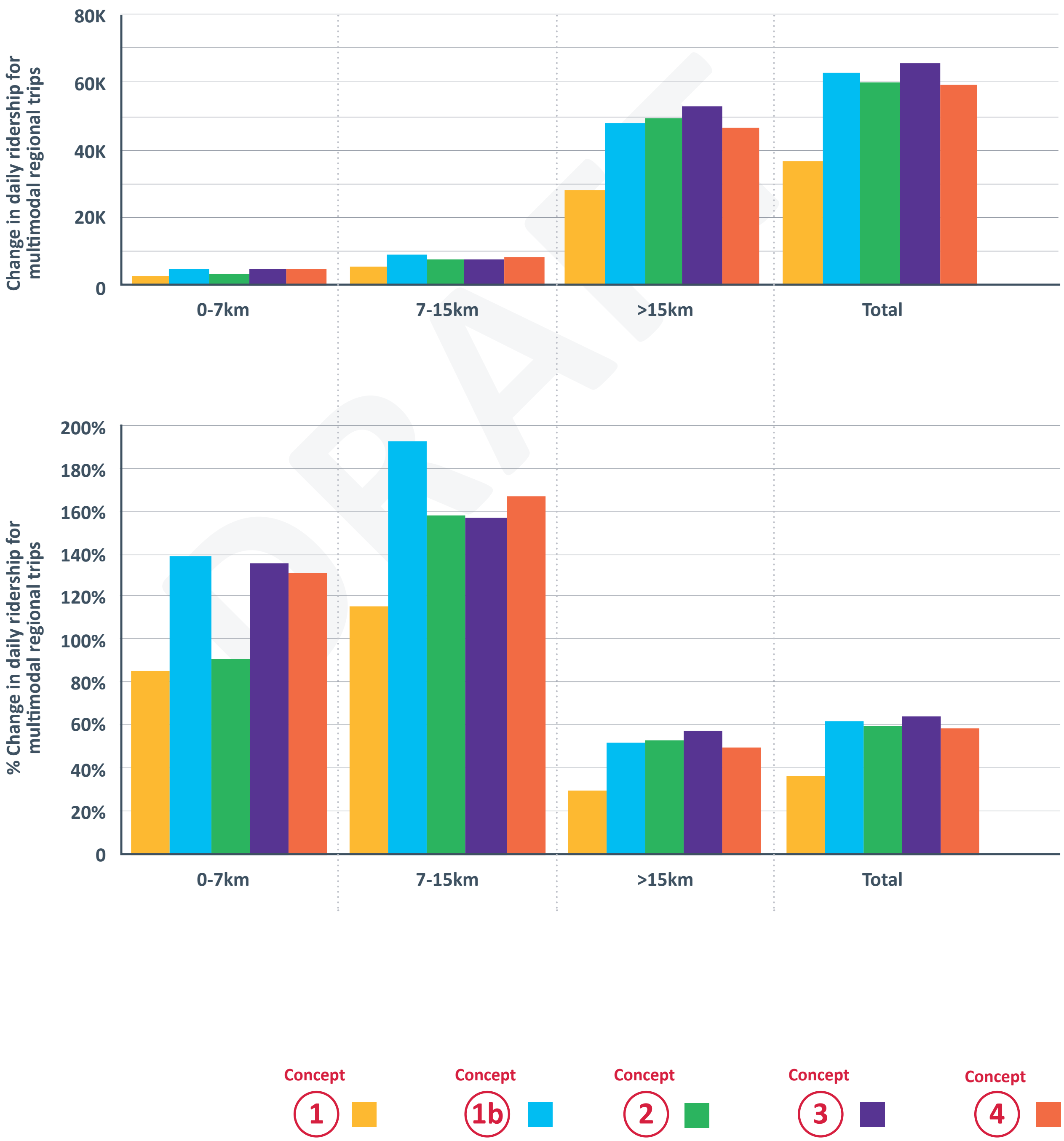
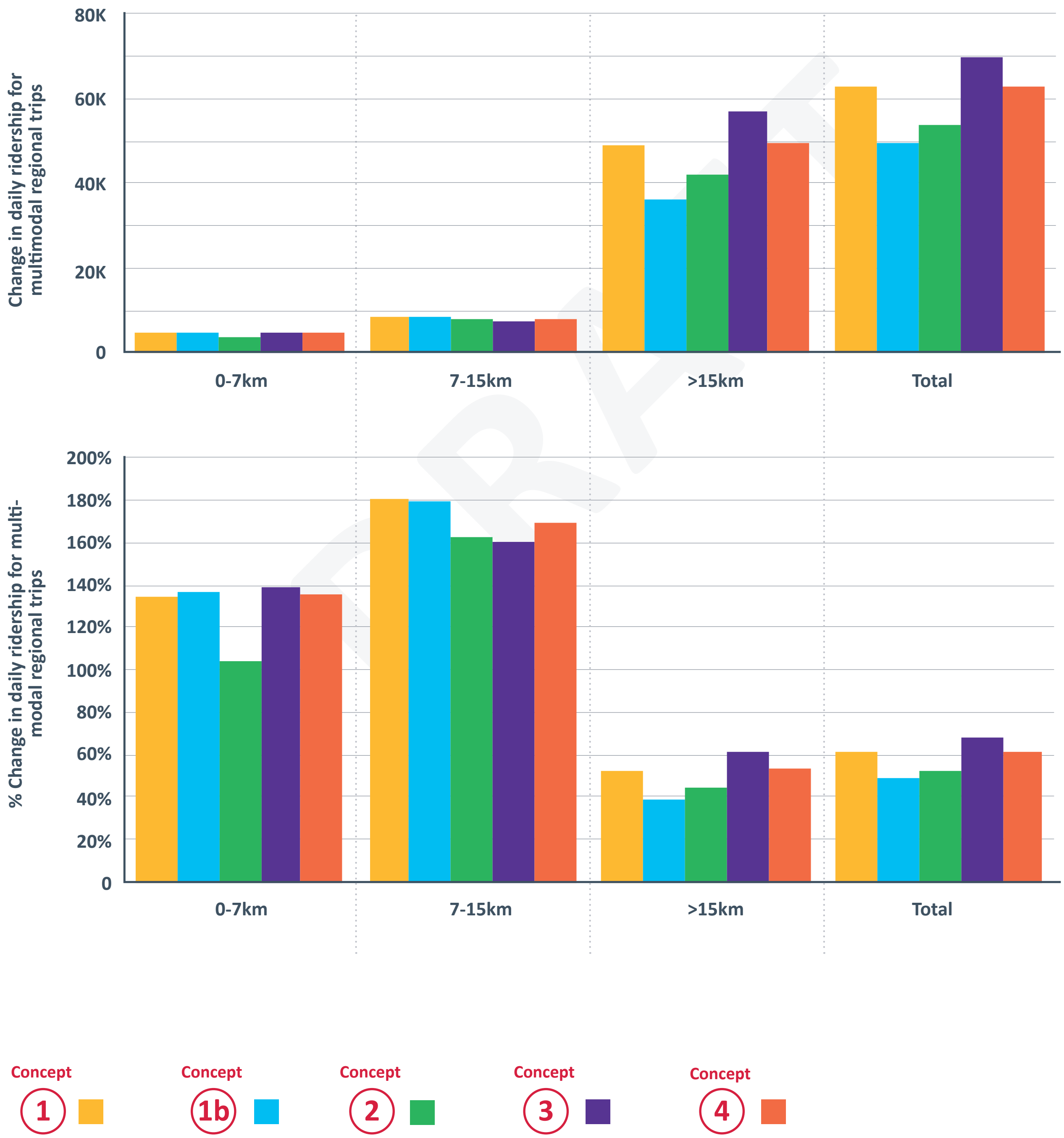


FIGURE 4.8B: BARRIER 3 – CUSTOMERS TRAVELLING WITH GO TRANSIT AND THE TTC PAY TWO FARES (REVENUE INVESTMENT)



4.5 Strategic Outcome 2: Attract and Retain Ridership through an Improved User Experience

4.5.1 Overview

This outcome is an analysis of the potential for each fare concept to improve the user or customer experience related to the fare concept to improve the user or customer experience related to the fare structure. This includes:

- Readily understanding how to pay for transit fares; and
- The complexity of paying for transit.

This analysis is focused on the long term benefit of each structure once they have been implemented. This outcome assesses the qualitative potential of each concept to improve user experience as a key pre condition for achieving each concept's potential ridership.

Customer types include purpose or type of traveller (commute, recreational/errands, student, visitor/tourism) and their frequency of travel frequency (infrequent, frequent). Time of travel is a key consideration for the fare structure. In this analysis it is assumed that the same fare structure will be applied all day. Future stages of the study will address the role of time of day pricing and fare structure impacts by time of day. Additional trip characteristics, such as trip length, are addressed under other sub sections of the Strategic Case.

Short term risk associated with the extent of change, change management, and learning a new structure is addressed in the Deliverability and Operations Case.

4.5.2 Fare Structure Understandability

This review is intended to assess the understandability of the concepts by customers and also note any key impacts or challenges associated with the structure. Two key issues for consideration are how the new structure impacts understandability of internal and cross boundary trips, and the specific impacts the structure may have on different customer types.

This evaluation considers benefits to travellers based on standardizing fare structure and experience for all trips in region, regardless of services or service providers used.

Table 4.4 provides a review of understandability by internal and cross boundary travellers. This table assesses usability based on the ease of communicating the structure and how standardized it is between services and service providers. For example, a structure that requires multiple boarding and alighting habits is more confusing than one which is standardized.

Table 4.5 summarizes key considerations by customer type. This analysis notes key benefits or negative impacts based on traveller type.

TABLE 4.4: FARE STRUCTURE UNDERSTANDABILITY ISSUES/BENEFITS

	Benefits and impacts for travellers within a municipality	Benefits and impacts for cross boundary travellers
Concept 1 Modified status quo	• No change	• Revenue neutral requires all markets pay an increase in order to replace the second fare with a discounted transfer fare • Revenue investment allows for existing flat fares to be retained with a greater discount than revenue neutral, which allows for stronger cross boundary travel growth
Concept 1b Modified status quo with FBD	• Moderate negative impact – requires inconsistent boarding/alighting and payment experience – local/RT trips require tap off but no other trips do, leading to a less consistent structure • FBD require significant changes; however, international experience suggests limited long term impact for usability and understandability on RT	• Negative Performance – the overall structure is more complicated to understand for cross boundary trips • 905 to 905 multi service provider trips are free while 905 to TTC, 905 to GO Transit, and TTC to GO Transit trips have a discounted transfer fare. • Local-RT trips require tap off (if boarding RT from Local), while no other services require a tap off.
Concept 2 Zones	• Neutral – zones require significant changes; however, international experience suggests limited long term impact for usability and understandability • Concept 2 standardizes customer experience across all services with tap on/tap off leading to a consistent structure	• High Positive Performance – A zone structure is more understandable due to consistent application of fare increases, compared to the variable structure in use today • All transfers, regardless of the service providers used, are consistent (tap on/tap off), fares are continuous between services and second fares or co-fares are not used
Concept 3 Hybrid	• Moderate Negative Impact – requires inconsistent boarding/alighting and payment experience – Local trips that transfer require a tap off, but trips that only use Local do not, leading to a less consistent customer experience • FBD require significant changes; however, international experience suggests limited long term impact for usability and understandability on RT	• Moderate Positive Performance fares are continuous between services; however, local to local transfers are just tap on, while regional and RT are tap on tap off leading to some inconsistency. • Despite this inconsistency, the continuous fares offer a slight improvement.
Concept 4 FBD	• Neutral – FBD require significant changes; however, international experience suggests limited long term impact for usability and understandability for RT • Concept 4 standardizes customer experience across all services with tap on/tap off leading to a consistent structure	• Positive Performance– FBD offers a consistent experience for all trips. • All transfers, regardless of the service providers used, are consistent (tap on/tap off), fares are continuous between services

TABLE 4.5: FARE CONCEPT BENEFITS/ISSUES BY TRAVELLER TYPE

	Commuters (to work or school)	Regular user (non-commute)	Infrequent	Visitor
Concept 1 Modified status quo	• Flat fares are currently used for the majority of commute trips in the region – no benefit or impact	• Flat fares are currently used for the majority of recreational trips in the region – no benefit or impact	• Flat fares are simple for infrequent travellers, however discounted transfer fares may be a disincentive to cross boundary or multi service trips	• Multiple rules and fare structures may complicate travel for visitors
Concept 1b Modified status quo with FBD	• FBD is readily understood by commuters who travel a similar route each day	• FBD fares for RT/ regional can be readily understood by frequent travellers	• Combination of discounted transfer fares and FBD may be difficult for cross boundary trips • Each service type has different rules which may increase complexity for internal trips	• Multiple rules and fare structures may complicate travel for visitors
Concept 2 Zones	• Zones are readily understood by commuters who travel a similar route each day	• Zones are likely to be understood by frequent travellers • Cross boundary trips are more simple due to removal of co-fare	• Zones may be communicated to infrequent travellers who are familiar with the GTHA	• One approach to fares (tap on/off) across all services and providers is simple • However, zones may require knowledge of GTHA geography, which may increase complexity for visitors
Concept 3 Hybrid	• FBD is readily understood by commuters who travel a similar route each day	• FBD Station to station fares for RT/regional can be readily understood by frequent travellers • Cross boundary trips are more simple due to removal of double fares	• FBD Station to station fares for RT/regional can be readily understood by infrequent travellers with appropriate station information and materials • Tap off for free body transfers complicates the structure if required	• A common approach to Local fares may simplify overall fare structure, but tap on/off requirement at free body transfers may complicate the structure if required
Concept 4 FBD	• FBD is readily understood by commuters who travel a similar route each day	• FBD makes cross boundary more simple due to removal of co-fare • FBD requires a consistent tap on/tap off and continuous fares across all services may make recreational multi service trips more seamless	• FBD on all services will require customers to look up a fare in advance, which will require appropriate materials/readily available information	• One approach to fares (tap on/off, distance) across all services and providers is simplest for visitors to understand • FBD on all services will require customers to look up a fare in advance, which will require appropriate materials/readily available information

KEY INSIGHTS

This review was conducted at a high level to understand how each concept may benefit or impact customers based on usability. Key considerations from the analysis include:

- Concepts 2 and 4 use one fare structure across the region, which can provide a consistent user experience for all trips across the region;
- Concepts 1, 1b, and 3 make use of multiple fare structures, which only partially address the complexity barrier – but may be simple for trips within an MSP; and
- Over the long term, the fare structure must balance the need for regional consistency/simplicity with the need for simplicity for trips that are within one municipality.

This analysis was based on international experience and evidence, but did not review proposed communication tools or conduct market research. As a result, this strategic analysis is used to draw general conclusions to aid in the development of the preferred fare structure, but is not used to recommend concepts based on their customer experience improvements – as these are more dependent on the specific customer experience program designed for the fare stucture, rather than the structure itself.

Overall, customer experience must be revisited throughout the development of the fare structure and should be developed using focus groups, market research, and user design principles.

This phase of the study concludes that the future fare structure should seek to standardize customer experience where possible and implement a structure that has consistent rules and payment (boarding and alighting) requirements across services and trip types. These features could be built into any of the concepts as they are refined.

4.6 Strategic Outcome 3: Improve the Fare Structure's Role in Long Term Transit Development

4.6.1 Overview

This outcome represents the potential for an Integrated Fare Structure to improve the role of the fare structure in integrated transit planning. Concepts that perform well against this outcome will support effective planning, delivery, and use of the transit network, which in turn supports how transit services can be used to grow ridership as discussed in Section 4.3 or to achieve greater ridership and utilization of transit in the long run.

Fare structures can support transit delivery and service provision in two key ways:

- **Adaptability to changing needs or emergent opportunities** – allowing fares to be adapted overtime as service needs evolve and change;
- **Flexibility to support demand management** – using fares to encourage use of particular services; and
- **Ability to support integrated service planning across the GTHA** – creating a fare structure that allows services to be planned based on desire for travel (independent of geographic boundaries) and using structure data to optimize demand management and planning (active role for fare structure).

4.6.2 Adaptability to Changing Needs and Emergent Opportunities

Adaptability is defined as the fare structure's ability to be modified to respond to:

- Changes in customer expectations for service (for example, on demand service);
- Changing revenue requirements – such as increasing revenue to accommodate service expansion; and
- Changes to key drivers for transport service (example: changes in background economic conditions or demographics that increase or decrease demand for travel in certain markets).

Types of adaptations include:

- Changing fares (raising or lowering) or providing new products; and
- Changing services – including frequency and locations served by transit.

Adaptability issues are discussed in Table 4.6. A key consideration for adaptability is balancing flexibility with complexity. Pricing considers a range of issues, including ability to change fares to meet revenue targets or grow demand in different markets.

Key Insights

The key driver of adaptability performance is the ability to modify fares over time based on evolving service needs.

Overall, Concept 4 has the greatest adaptability because its base fare and the distance component of fares can be adjusted for a variety of issues or opportunities. Other structures have limited means to adjust their fares:

- Concept 1 – can only adjust fares by raising/lowering flat fares or discounted transfer fare, which has lower overall adaptability;
- Concept 1b/3 – can only adapt regional/RT fares (local is still flat) in a way that is constrained by the local flat fare; and
- Concept 2 – zones are difficult to adapt overtime and also provide the potential to create new fare barriers, greatly reducing their usability.

4.6.3 Flexibility to Support Demand Management and Planning

This analysis is focused on the potential for each structure to support demand distribution based on service type. A core consideration for this analysis is how each concept can set fares for services with respect to one another and therefore encourage use of different service types.

TABLE 4.6: ADAPTABILITY ANALYSIS

	Pricing adaptability	Service adaptability
Concept 1 Modified status quo	• Fares can be set for individual MSPs, retaining agency flexibility • Low performance-flat fare can be raised or lowered, but cannot be adjusted for specific services or markets • Concept 1 can only adjust discounted transfer fares or flat fares, which provides some adaptability for the cross boundary market • Flat fares cannot be directly aligned with fares used on new on demand mobility choices (example: FBD)	• Separate fare rules may impede overall service integration unless open door rules can be set up • Different flat fares may be applied to new services, but there is limited flexibility to tailor fares to service characteristics • De-centralized fares allow for fare decisions to be made internally by each agency and set fares based on specific agency needs
Concept 1b Modified status quo with FBD	• Fares can be set for individual MSPs, retaining agency flexibility • Improved flexibility – can modify discounted transfer fares or FBD rates on RT to respond to market specific issues, but the use of flat fares for local trips means the concept does not have a means to provide lower fares for short distance trips • Flat fares cannot be directly aligned with fares used on new on demand mobility choices (example: FBD) • While RT uses FBD, the use of flat on local limits the overall range of fares that could be used to integrate new services	• Separate fare rules may impede overall service integration unless open door rules can be set up • Use of FBD on RT provides more adaptability to price services based on emergent service specific needs (example: raising revenue for higher operating cost services) • De-centralized fares allow for fare decisions to be made internally by each agency and set fares based on specific agency needs
Concept 2 Zones	• Limited flexibility – zones are difficult to 'redraw' once established, so the only way the concept can adjust pricing is by re-pricing zone fees, which has limited ability to grow demand or revenue compared to a pure FBD approach • Zones may be aligned with new on demand mobility (a one zone fare for first/last mile connections) but are less flexible than FBD	• Unified fare rules support service integration and zones will influence service planning and delivery over the long term • Use of zones on local and RT provides more adaptability to price services based on emergent service specific needs (example: raising revenue for higher operating cost services) • Different zone fares may be applied to new services, which improves flexibility compared to Concept 1 • Centralized fares are less adaptable to meet specific agency revenue goals
Concept 3 Hybrid	• Overall improved flexibility for RT and Regional – including ability to manage revenue and ridership on these service types by adjusting distance rates • Limited flexibility for local – flat fare can be raised or lowered for all trips at once, but not for specific trips or markets • Flat fares cannot be directly aligned with fares used on new on demand mobility choices (example: FBD) • While RT uses FBD, the use of flat on local limits the overall range of fares that could be used to integrate new services	• Unified fare rules support service integration • Use of FBD on RT provides more adaptability to price services based on emergent service specific needs (example: raising revenue for higher operating cost services) • Centralized fares, if implemented, are less adaptable to meet specific agency revenue goals
Concept 4 FBD	• If implemented in a decentralized model, fares can be set by individual agencies • Highest flexibility – prices can be changed to respond to specific market needs, including short, medium, and long distance markets • Base fares and distance rates can be adjusted for a variety of situations (including growing revenue or ridership from particular distance markets)	• Fares can be adjusted for each service type as needed to reach revenue targets • New service types can readily be integrated into the structure with unique distance fares (example: on demand transit) • Unified fare rules may support service integration • Can be delivered in a centralized or de-centralized manner – which can be modified over time

This criterion accesses the ability of a concept to distribute demand to the service that is most convenient for the customer when an origin destination (OD) pair is served by multiple routes with different services. These issues are explored for existing services in Table 4.8 and Figure 4.9.

Figure 4.9 outlines shift in demand between service types based on distance travelled. Overall, each concept has the potential to encourage higher use of regional for short and medium distance trips (issue 5), which is a key consideration for short/medium-distance GO ridership. Distance based concepts have the highest potential to support GO Regional ridership as they can align the fares of RT/RER, allowing for the services to be positioned complementarily.

A review of concept impacts on future services is provided in Table 4.8.

KEY INSIGHTS

Overall, Concepts 2 and 4 offer the greatest benefit by allowing for a more flexible fare structure that can manage demand distribution between service types by modifying all service prices based on distance travelled.

4.6.4 Integrated Service Planning and Design

The ability of fares to support the development of a seamless and integrated network of services is a key strategic issue. Fare structures can support integrated service planning by: providing a seamless fare structure that is aligned with customer demand for travel, and improving data collection and management.

TABLE 4.7: CONCEPTS AND DEMAND DISTRIBUTION

	How does the concept use pricing to allocate demand?
Concept 1 Modified status quo	• Limited ability to manage demand • May use discounted transfer fares to change fares for combined local/regional and RT/regional trips or change 905/TTC discounted transfer fare to shift demand between GO Transit and 905/TTC • If 905/TTC fares (including discounted transfer fares) are much cheaper than GO Transit, then passengers may use local/RT if available (Example travelling from Richmond Hill to Downtown Toronto) instead of GO Rail
Concept 1b Modified status quo with FBD	• Similar to Concept 1, but can use FBD on RT to align fares between regional and RT • This can be used to encourage use of regional for select origin destination pairs
Concept 2 Zones	• Strong ability to manage demand – may price local, RT, and regional trips to have competitive fares for all markets and distances travelled • Zone fares must be carefully managed or they may price customers off of transit or off of RT and onto a slower local route
Concept 3 Hybrid	• Same as 1b – however, without discounted transfer fares, there is less flexibility for differences in price between Regional and RT • Combined local RT and local Regional trips do not pay any co-fares, and only pay the cost of RT or regional • For some OD pairs (example 905 to downtown Toronto), the regional trip may have more distance on regional service than a local/RT has on the RT service and will therefore be more expensive, thus limiting ability to distribute demand onto GO Transit • Distance fares must be carefully managed or they may price customers off of transit or off of RT and onto a slower local route
Concept 4 FBD	• Strongest ability to manage demand – can set prices for each service based on distance travelled with different or the same distance rates for each service type • This is particularly valuable when an OD pair has multiple routes using different combinations of services • Distance fares must be carefully managed or they may price customers off of transit

FIGURE 4.9A: DEMAND DISTRIBUTION BY SERVICE AND DISTANCE (REVENUE NEUTRAL)

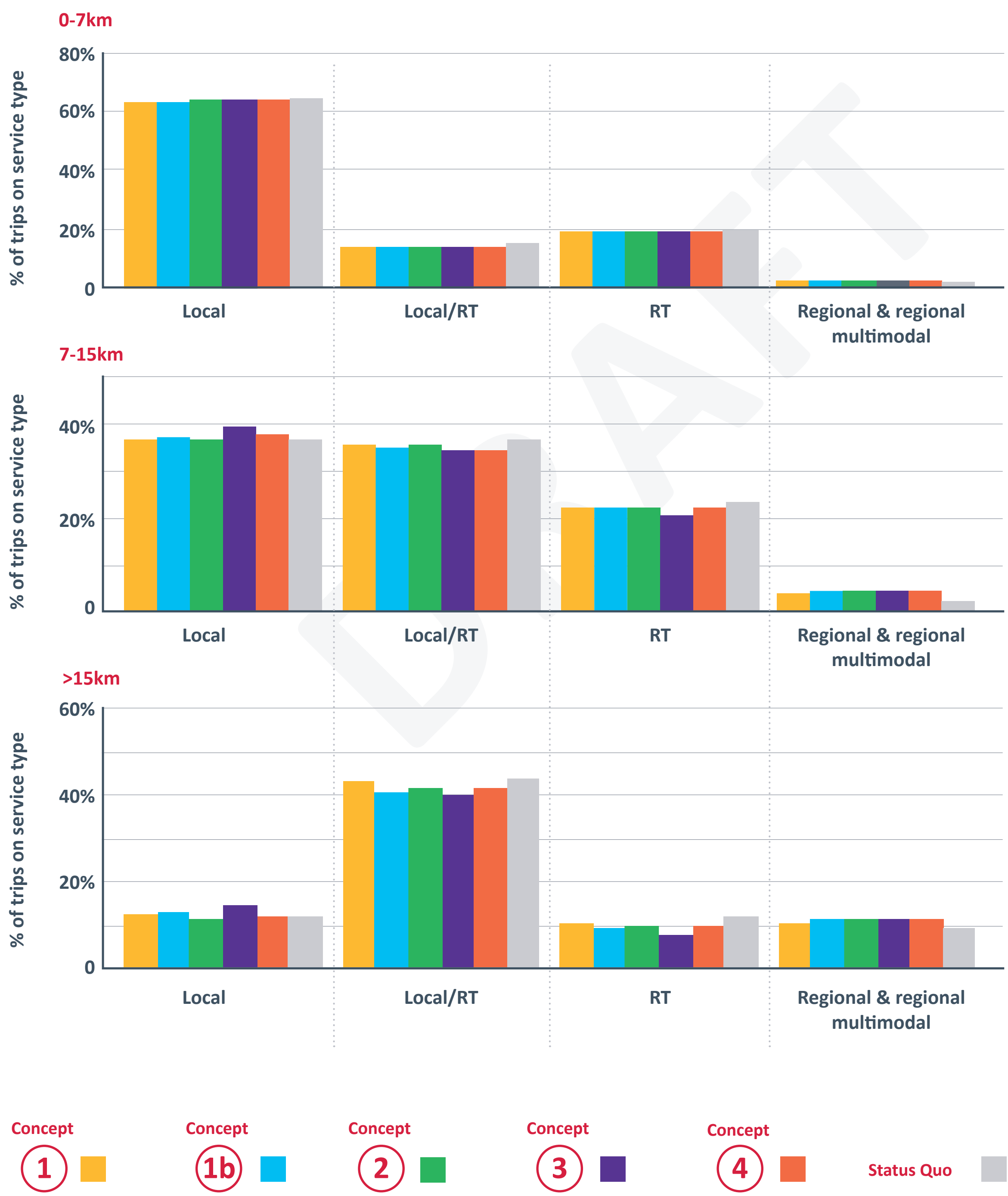


FIGURE 4.9B: DEMAND DISTRIBUTION BY SERVICE AND DISTANCE (REVENUE INVESTMENT)

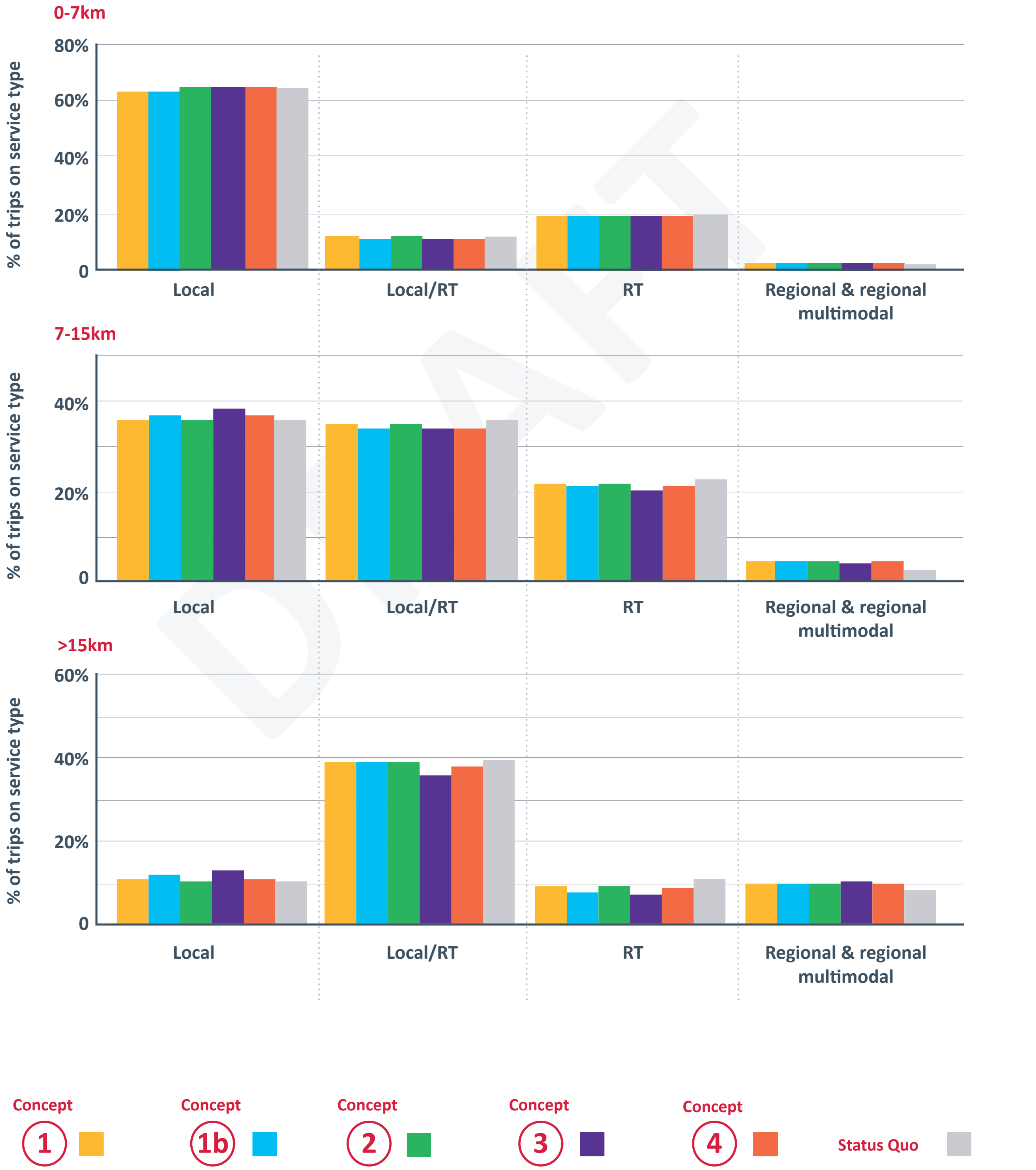


TABLE 4.8: CONCEPTS IMPACTS ON FUTURE SERVICES

<table>
<tr><th>Project</th><th>Regional Express Rail</th><th>Toronto-York Spadina Subway Extension</th><th>New LRTs (Eglinton Crosstown LRT, Finch West LRT, Sheppard East LRT, Hurontario LRT, Hamilton LRT)</th><th>New local transit</th></tr>
<tr><td>Concept 1 Modified status quo</td><td>• RER fares must be kept comparable to RT fares – RT fares are flat, which limits flexibility for RER fares over distance Co-fares instead of double fares may improve ridership in Toronto.</td><td>• Discounted transfer fares may improve ridership/use of the system compared to existing double fares</td><td>• Minimal change from status quo</td><td rowspan="2">• Minimal flexibility to adapt fares for new services – flat fares may be raised or lowered as local service changes</td></tr>
<tr><td>Concept 1b Modified status quo with FBD</td><td>• Similar to 1, except RT uses FBD, which allows for higher RER fares for medium trips. However if RT/RER fares are too high compared to local then demand will shift to local service.</td><td>• Lower Discounted transfer fares compared to 1 may improve ridership/use of the system; however FBD may impact medium/long ridership</td><td rowspan="4">• Distance based fares may increase fare for longest distance trips on these services, which in turn may impact ridership.</td></tr>
<tr><td>Concept 2 Zones</td><td>• Allows for some alignment between local/RT and RER fares while encouraging multimodal travel with the removal of co-fares/double fares</td><td rowspan="3">• Seamless connections between all other services and the subway expansion may lead to improved ridership
• Distance based fares may increase fare for longest distance trips on these services, which in turn may impact ridership.</td><td>• Moderate flexibility to adapt fares for new services – zone add fares may be adapted as new services are added</td></tr>
<tr><td>Concept 3 Hybrid</td><td>• Same as 1b except encourages greater use of RER due to removed co-fares/double fares and their replacement with free transfers</td><td>• Minimal flexibility to adapt fares for new services – flat fares may be raised or lowered as local service changes</td></tr>
<tr><td>Concept 4 FBD</td><td>• Allows for direct alignment between local/RT and RER fares and does not use co-fares/double fares</td><td>• High flexibility to adapt fares over time based on base fare and distance based component of Local fares</td></tr>
</table>

SEAMLESS SERVICE PLANNING AND DESIGN

Under the existing structure, service planning may be limited based on jurisdictional or geographic boundaries. With the development of RER and new RT, such as TYSSE, the ideal service for customers may require agencies to provide service that spans geographic areas and jurisdictions. An example of a service planning issue related to fare structure is that services that cross boundaries may operate with a "closed door" policy, meaning they cannot accept customers outside their home service area, which decreases the cost effectiveness, ridership potential, and overall viability of services.

This analysis is focused on the extent to which the fare structure allows for or hinders seamless service planning across jurisdictional borders. Analysis is presented in Table 4.9.

DATA COLLECTION TO SUPPORT SERVICE PLANNING

An additional benefit of Fare Integration is the ability to expand the types of data collected by the fare structure. Data can be used to:

- Optimize services dynamically based on a more robust understanding of time and location of customer travel;
- Support long range planning forecasting (model development, needs/opportunities identification); and
- Improve product and concession development based on richer utilization data.

Four types of data can be collected: time of travel, fare paid, origin of travel, and destination. The existing fare structure can collect data by service type:

- Local services – time of tap on;
- RT – time/location of tap on;
- Regional – time/location of tap on and location or origin.

KEY INSIGHTS

Seamless network design is limited when jurisdictional or geographic boundaries are used to set fares. These fare barriers may impact short and long term service planning and delivery. As a result Concepts 1 and 1b have the lowest potential to support seamless network design without additional policies or rules.

TABLE 4.9: FARE STRUCTURE SUPPORT FOR SEAMLESS SERVICE PLANNING

	Key considerations for seamless transport planning
Concept 1 Modified status quo	• Overall limited ability to provide a more seamless network design compared to the status quo • Flat fares by jurisdiction requires partnerships and new policies to allow for agencies to operate "open door" services in multiple jurisdictions • A high transfer fare may limit the use of cross boundary services
Concept 1b Modified status quo with FBD	• Overall limited ability to provide a more seamless network design compared to the status quo • Flat fares by jurisdiction requires partnerships and new policies to allow for agencies to operate "open door" services in multiple jurisdictions • A high transfer fare may limit the use of cross boundary services
Concept 2 Zones	• Overall moderate ability to support seamless network design • Jurisdictional boundaries are replaced with geographic zones, allowing for integrated and seamless cross boundary service planning • Zone fares may impact network design by connecting local services to near stations within a zone or by providing fewer 'cross boundary zones' – this issue must be addressed to provide a seamless network
Concept 3 Hybrid	• Overall strong ability to support seamless network design • A single flat fare for the region replaces all jurisdictional boundaries for local service, allowing for integrated and seamless cross boundary service planning
Concept 4 FBD	• Overall strong ability to support seamless network design • Jurisdictional boundaries are removed and all fares are based on distance travelled, allowing for integrated and seamless cross boundary service planning

TABLE 4.10: WHAT DATA CAN BE COLLECTED FROM THE CONCEPTS?

	Local	RT	Regional	Overall Performance
Concept 1 Modified status quo	Time of tap on	Time and complete OD data (if tap off is used at station exit)	Time and complete OD data	Minimal change from status quo
Concept 1b Modified status quo with FBD	Time of tap on Local/RT only –complete OD/ time data	Time and complete OD data	Time and complete OD data	Moderate improvement
Concept 2 Zones	Time and complete OD data			Significant improvement
Concept 3 Hybrid	Time of tap on Local/RT only –complete OD/ time data	Time and complete OD data	Time and complete OD data	Moderate improvement
Concept 4 FBD	Time and complete OD data			Significant improvement

Concept 2 has moderate potential because zone boundaries may limit the amount of cross boundary services provided and the type of feeder connections available to customers.

Concepts 3 and 4 have high potential to support the development of an integrated network by removing geographic or jurisdictional boundaries.

Data collection is supported by structures that use tap on/tap off (Concept 2 and 4) on all services, while Concepts 1b and 3 provide some improvements.

4.7 Summary of Strategic Benefits and Issues

Table 4.11 provides a summary of the strategic benefits and issues identified in this review.

4.8 Strategic Case Conclusions

4.8.1 Key Findings

The Strategic Case is set out to assess each concept's potential contributions to the transformative vision for Fare Integration. This analysis is useful for identifying the key elements of each structure that are aligned with the vision. Elements that are strongly aligned with the vision can be used as part of the transformative structure, while those that have lower performance may be considered for the transitional structure. Table 4.8 provides a summary of which concepts can be used as a direction for the transformative and transitional structures.

TABLE 4.11: STRATEGIC REVIEW OF FARE INTEGRATION CONCEPTS

	Strategic benefit: Increased ridership	Outcome 1: Address barriers to grow transit demand	Outcome 2: Attract and retain ridership through improved user experience	Outcome 3: Improve fare structure's role in long term transit development
Concept 1 Modified status quo	Low Performance Concept 1 has limited tools to support ridership growth 2031 Annual Ridership Gain • Revenue Neutral: 2,500 • Revenue Investment: 40,400	Moderate Performance **Barrier 1** – Cross Boundary: Low Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance	Moderate Performance The overall fare structure has no significant changes from the status quo. Fares for trips on one MSP within their service area remain simple to understand.	Low Performance Limited adaptability/ flexibility and ability to support seamless network design because only discounted transfer fares and flat fares can be adjusted.
Concept 1b Modified status quo with FBD	Low Performance Concept 1b has limited tools to support ridership growth and has ridership losses due to long distance FBD fare on RT in Toronto 2031 Annual Ridership Gain • Revenue Neutral: 15.800 • Revenue Investment: 42,800	Moderate Performance **Barrier 1** – Cross Boundary: Low Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance	Low Performance The use of base fares and distance rates for RT/regional, unique flat fares for local, and discounted transfer fares for TTC/905 trips leads to a more complicated and less customer friendly structure.	Moderate Performance Moderate adaptability due to ability to change discounted transfer fares, flat fare, and FBD rates to manage demand. Overall low potential to support seamless network design.
Concept 2 Zones	Moderate-high Performance Concept 2 can grow demand in most markets, including short distance, but has a high risk of reducing ridership for long distance trips in Toronto if zone fares are too high. Additionally, this concept can create new fare boundaries and sets fares inconsistently. 2031 Annual Ridership Gain • Revenue Neutral: 25,300 • Revenue Investment: 51,900	High Performance **Barrier 1** – Cross Boundary: High Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance	High Performance The use of a single fare structure improves overall usability of the GTHA's transit network. Zones are simply communicated compared to the status quo; however they require some understanding of GTHA geography.	Low Performance Zones cannot readily be adapted once implemented, which means that the zonal add-fare is the only way to adjust fares overtime. Moderate potential to support seamless network design.
Concept 3 Hybrid	Moderate-High Performance Concept 3 can grow demand in most markets (except short distance) but under revenue-neutral scenarios has the highest losses of existing transit trips due to the need to increase long distance fares to cover the full cost of removed co-fares and double fares. 2031 Annual Ridership Gain • Revenue Neutral: 14,300 • Revenue Investment: 49,800	High Performance **Barrier 1** – Cross Boundary: High Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance	Moderate Performance The structure is simpler than the status quo, however the use of different fare structures on local compared to RT/ regional retains some complexity.	Moderate Performance Moderate adaptability due to ability to change region wide flat fare, and FBD rates to manage demand. High potential to support seamless network design.
Concept 4	High Performance Concept 4 can grow demand in most markets, including short distance, but has a high risk of reducing ridership for long distance trips in Toronto if FBD fares are too high 2031 Annual Ridership Gain • Revenue Neutral: 19,800 • Revenue Investment: 60,200	High Performance **Barrier 1** – Cross Boundary: High Performance **Barrier 2** – Regional Short/Medium: High Performance **Barrier 3** – Regional Multimodal: High Performance.	High Performance The use of a single fare structure improves overall usability of the GTHA's transit network. However, FBD is more complicated than flat fares and must be carefully communicated and marketed.	High Performance The concept can adjust base and distance fares to support demand distribution and emergent needs. High potential to support seamless network design.

The key conclusions for each concept are:

- Concept 1 – the combination of co-fares and flat fares has limited long term ridership growth potential and flexibility to evolve along with the GTHA transit network – it should be considered as the foundation for incremental solutions;
- Concept 1b – the use of co-fares and FBD on RT does not offer significant benefits compared to concepts 1 and 3 – this concept has limited strategic potential;
- Concept 2 – zones have high potential ridership benefits, but they require new geographic boundaries that are complicated to adapt, and recreate the existing barrier 1 issues across the region – therefore the concept has limited strategic potential;
- Concept 3 – the hybrid model has limitations due to the use of FBD together with flat fares (which limits overall flexibility), and the increase in long distance fares due to the complete removal of double fares between 905/TTC and 905/GO (all trips only pay one fare) – this concept should be analysed further as a possible incremental solution
- Concept 4 – FBD on all service types has the highest overall ridership potential, a consistent user experience, and a high degree of flexibility – this concept could be used as the basis for future analysis leading to a transformative fare structure given that potential impacts on long distance transit travel markets are mitigated.

The key Strategic Case conclusions for pursuing the transformative vision are:

- A fare structure that combines a base fare and distance based fare allows for the greatest flexibility to meet market needs, grow demand in markets that currently face fare barriers, and create a consistent overall structure;
- The transformative structure should be pursued when it can realize its full potential benefits – this includes aligning its implementation with RER, increased cross boundary demand, and development of expanded RT networks;
- Distance based fares must be managed carefully and implemented in a way that mitigates potential ridership losses from long distance markets that currently have a flat fare; and
- The final fare structure may have some use of flat fares where appropriate based on a refined service structure.

4.8.2 Future Consideration

This strategic case noted a set of key considerations for future study:

- Further investigating equity concerns and designing a product strategy and/or overall fare equity program as part of the structure;
- Determining the role of parking fees at transit stations to incentivize multimodal trips as an integral part of the fare structure;
- Exploring the application of concepts to a broader range of service types, including para-transit, rural services, and first/last mile connections;
- assessing potential incremental measures that will address barriers, improve customer experience, and support service planning/ deliver;
- Investigating fare structure optimization tools to mitigate the impact of FBD on longer distance markets that currently use a flat fare; and
- Studying optimal pricing strategies for each market based on distance travelled.

TABLE 4.12: STRATEGIC CASE FINDINGS

Suggested Role in Fare Strategy Based on Strategic Performance	Potential Concept	Findings
Consider for transformational structure	Concept 4	Of the five concepts, Concept 4 is seen to have the strongest overall performance towards the transformative vision for fare integration: • The use of FBD has the highest potential to grow demand in short distance and cross boundary markets, while also aligning revenue with travel in longer distance markets; • Concept 4 has the highest flexibility and adaptability – it can be adjusted to match the existing network's infrastructure and travel patterns, but can also be adapted as new services are added; and • Concept 4 creates a consistent set of rules that simplify the system from a customer and regional perspective. However, FBD requires significant changes and acceptance of ridership risks that must be managed during implementation and operation. Further study should identify how to manage these risks.
Consider concept elements as part of the "Implementation Strategy"	Concept 1 Concept 3	Concepts 1 and 3 all offer strategic benefits towards the vision, but do not reach the full transformative vision: • Concept 1 does not have full flexibility to grow demand in short distance and cross boundary markets; and • Concept 3 is unable to accurately price long distance cross boundary trips (feeder leg is always free, which leads to revenue burden being passed more heavily to all long distance travel), or offer benefits to short distance travellers.
De-prioritize for further consideration	Concept 1B Concept 2	Concept 1b is more complicated than Concept 1 due to the use of discounted transfer fares for 905/TTC and TTC/GO transit trips and FBD on RT – this complexity allows for some improvements compared to Concept 1 but the use of co-fares and FBD on RT for cross boundary trips offers little overall benefit. Concept 2 has potential to improve the fare structure in the region and offers strong performance against a number of objectives. • However, the use of radial zones creates new equity issues (long trips in one zone have lower fares than long trips across multiple zones). If smaller zones are used, the structure is a form of FBD. Such structures can be explored as refinements to FBD. • Additionally, this structure will likely have the same implementation timeline as Concept 4, but will realize lower benefits and will have limited ability to be upgraded to Concept 4. • The Strategic Case concludes that Concept 2 has limited potential as a transitional or transformative structure.

5 Economic Case

5.1 Overview

5.1.1 Chapter Purpose

The Economic Case uses standardized economic appraisal techniques to determine the economic value of Fare Integration. While the Strategic Case outlines the overall fit of each concept with the vision for Fare Integration, the Economic Case estimates the economic value of each concept's approach to realizing the vision. Economic value is estimated by monetizing the costs and benefits of Fare Integration in real terms. Unlike the Financial Case, which deals with revenue and cash flows, the Economic Case assesses the perceived value of costs and benefits to travellers and society as a whole. Economic Case analysis is conducted to:

- Understand the value to society of achieving the vision, goals, objectives for each concept;
- Allow for comparability across projects; and
- See how costs compare to benefits.

The output of the Economic Case is a summary of economic performance that can be used to understand benefits to users and to society of each Fare Integration concept.

5.1.2 Chapter Structure

The Economic Case chapter includes four sub sections: approach, assumptions, economic appraisal, and Economic Case summary.

5.2 Approach

Economic Appraisal is focused on identifying the value to society of a proposed project, program, or policy. The appraisal process used for this study compares, benefits from changes in travel mode and costs to deliver new fare structures. These factors, and their relationship, are defined in Figure 5.1. The Fare Integration economic appraisal follows a set logic:

- Costs are incurred to implement, operate, and maintain Fare Integration (including operating and capital costs for all stakeholders);

- Fare Integration can change the fare paid and therefore the 'generalized cost' (which includes all monetary and non-monetary costs associated with a journey) of transit trips, which leads to potential changes in travel behaviour and a reduction in auto costs for those who switch from auto to transit; and
- As more travellers use transit and switch from the automobile there are further benefits to society associated with reduced vehicle km travelled (VKT) – including a reduction in congestion, emissions, and car accidents.

FIGURE 5.1: ECONOMIC APPRAISAL OVERVIEW

5.3 Assumptions

Table 5.1 shows the assumptions used in this appraisal process, which are standard evaluation parameters used by Metrolinx and the Ministry of Transportation of Ontario (MTO).

TABLE 5.1: ECONOMIC APPRAISAL ASSUMPTIONS

Factor	Assumption
Social Discount Rate	3.5% per year
Real Inflation Rate	1% per year on call capital costs until 2031
Base Currency	$2015
Terms of analysis	Conducted in real terms
Vehicle Operating Cost (VOC)	$0.63 for every km reduction in automobile travel
Collision Cost	$0.08/km
Environmental benefits (GHG emissions)	$0.01 for every km reduction in automobile travel
Decongestion benefit	$0.30 for every km reduction in automobile travel
Evaluation Period	60 years from 2031

5.4 Economic Appraisal

This sub section outlines the results of the Economic Appraisal for the five concepts. It considers costs, direct transit customer benefits, and benefits from changing from automobile to transit – including changes in auto operating costs, emissions, congestion, and auto accidents.

The appraisal process has been conducted over a two year (2029-2031) construction and 60 year operating period beginning in 2031, which is consistent with other major transit investment projects. Analysis begins in 2031, which was selected as the initial year due to available modelling tools and the need to represent a future transport network within the appraisal.

5.4.1 Costs

In the Economic Case, costs reflect the investment required to deliver fare integration. They include all costs outlined in Chapter 3:

- Capital costs for technology, infrastructure, and software updates; and
- Operating costs of the fare structure on an annual basis and increased agency operating costs for transit service.

Operating costs do not include costs associated with:

- Change management;
- Customer service costs (example: call centres);
- Fare medium and ticket distribution network;
- Advertising and marketing the new fare structure; and
- Structure enforcement costs.

As discussed in Chapter 3, these costs will be further explored in future stages of analysis.

All costs have been estimated in 2015$. Economic Appraisal applies a 1% annual real inflation rate on all costs until 2031, at which point the inflation rate remains static. A 3.5% social discount rate is applied across the entire lifecycle of the project.

Under the revenue investment scenario, the additional revenue invested is included as an increase in operating costs. An additional revenue stream is seen as a ‘decrease’ in operating costs as this increase in revenue offsets required subsidy. An indicative cost schedule has been set out based on providing Fare Integration in 2031:

- Capital costs are spent between 2029 and 2030, with the assumption that a two year development period will be required; and
- Operating/Maintenance costs are applied over the 60 year lifecycle of the project beginning in 2031.

High and low capital costs have been estimated to reflect uncertainty in the costs of Fare Integration. Both sets of costs are included in the appraisal.

5.4.3 Benefits from Changing Travel Mode

Benefits from changing travel patterns represent benefits generated due to customers:

- Switching from automobile for their whole trip; or
- Switching from using auto/Park and Ride (PnR) and instead using transit for their whole trip.

These benefits represent reductions in GHGs, traffic accidents, automobile operating costs, and overall congestion. These benefits are based on the estimated changes in auto vehicle kilometers travelled, which are assessed using the demand model developed for this study, by estimating shift in modes at an origin/destination pair level.

Similar to user benefits, some origin destination pairs may see a dis-benefit due to an increase in auto use; however, across the concepts the overall change in VKT across the region leads to a benefit.

5.4.4 Economic Appraisal

The Economic Appraisal was completed for the five concepts using two scenarios – revenue neutrality and revenue investment. The results of the appraisal include:

- Summary of costs and benefits (direct customer benefits and changing travel behaviour benefits) associated with each concept;
- Net Present Value (NPV) – a summation of costs and benefits; and
- Benefit Cost Ratio (BCR) – total benefits divided by total costs.

A positive NPV or a BCR greater than 1 indicates that the concept offers more economic benefits than the costs required to implement it. BCRs reflect the relative quantity of benefits and costs while NPV reflects the overall magnitude of benefits realized by a project minus its costs. The results of the appraisal are shown in Table 5.2 (revenue neutral) and Table 5.3 (revenue investment).

The revenue investment table includes a comparison to the "status quo" structure (as described in chapter 2) with a 5% reduction to all fares without a structural change. This analysis is included for comparative purposes to contrast the value of pursuing a new structure versus the value of investing in the existing structure.

TABLE 5.2: ECONOMIC APPRAISAL SUMMARY (REVENUE NEUTRAL)

Over 60 Year Appraisal	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD
Benefits (2015 million $)	**$1,970**	**$680**	**$1,250**	**$2,380**	**$1,570**
Emission Reductions (2015 million $)	$20	$10	$10	$30	$20
Collision Reductions (2015 million $)	$170	$60	$110	$210	$140
Auto Operating Cost Reductions (2015 million $)	$1,330	$470	$850	$1,620	$1,070
Decongestion (2015 million $)	$450	$140	$280	$520	$340
Costs (Low) (2015 million $)	**$90**	**$180**	**$180**	**$210**	**$200**
Costs (High) (2015 million $)	**$160**	**$250**	**$250**	**$280**	**$270**
Capital/Set Up (Low) (2015 million $)	$40	$110	$110	$110	$110
Capital/Set Up (High) (2015 million $)	$110	$180	$180	$180	$180
Operating Costs (transit) (2015 million $)	$50	$70	$70	$100	$90
NPV High (2015 million $)	**$1,880**	**$500**	**$1,070**	**$2,170**	**$1,370**
NPV Low (2015 million $)	**$1,810**	**$430**	**$1,000**	**$2,100**	**$1,300**
BCR High	**21.9**	**3.8**	**6.9**	**11.3**	**7.9**
BCR Low	**12.3**	**2.7**	**5.0**	**8.5**	**5.8**

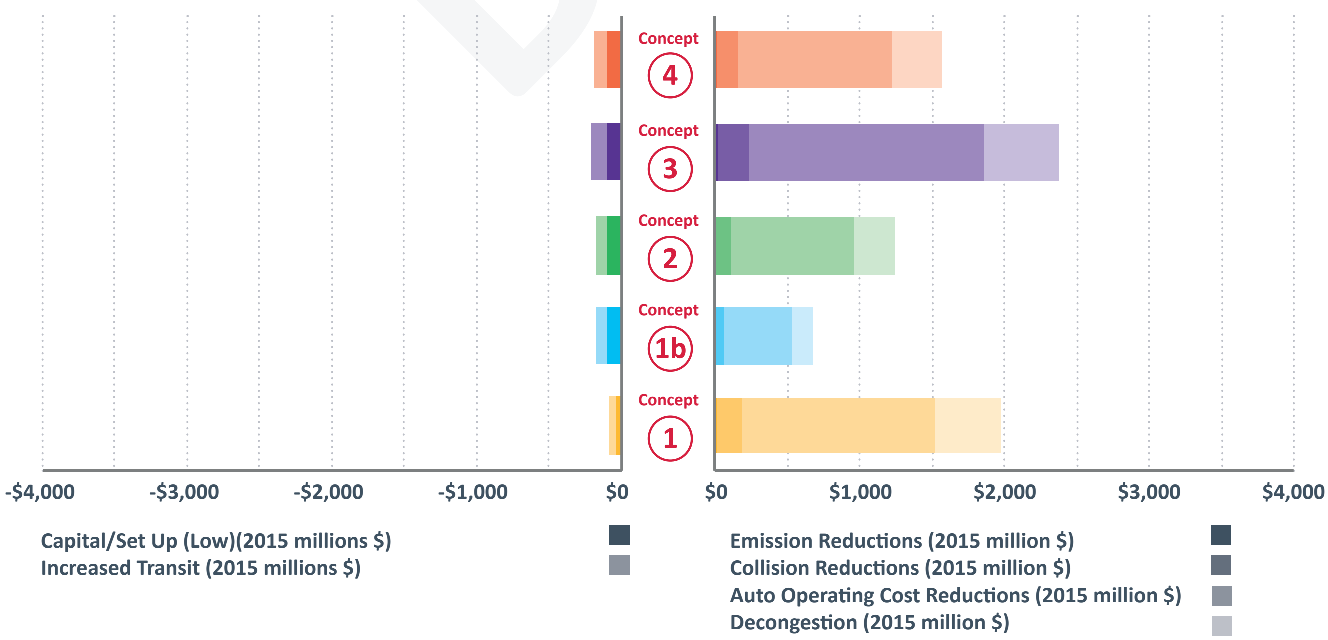
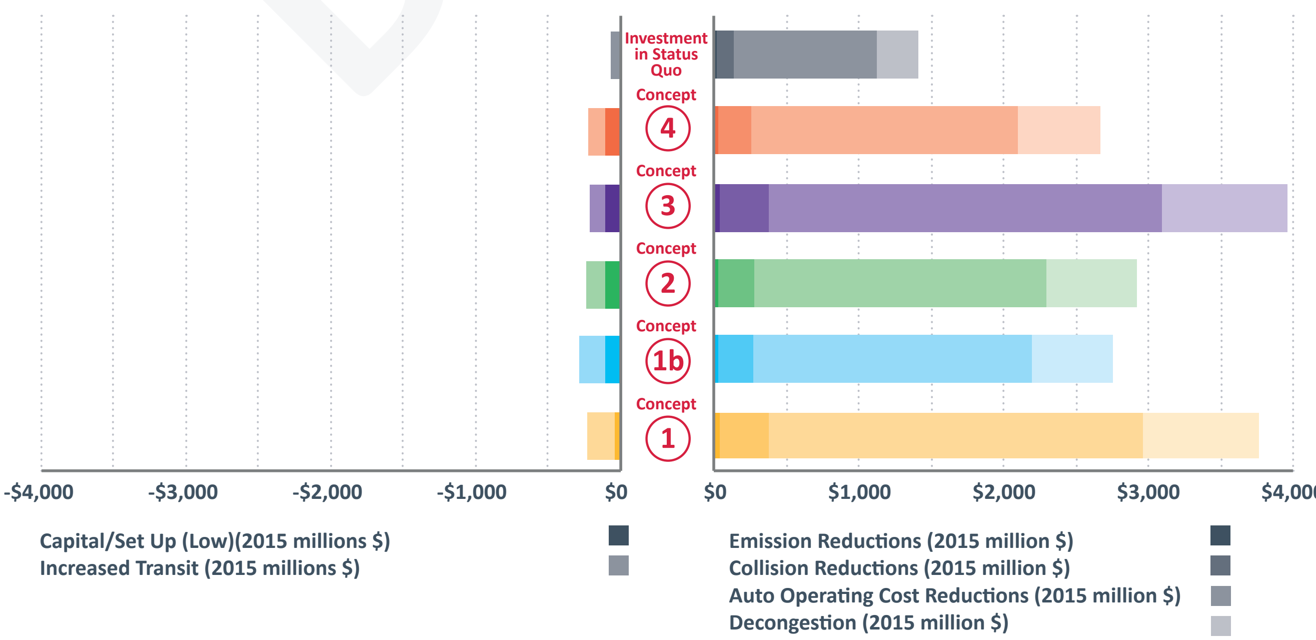


TABLE 5.3: ECONOMIC APPRAISAL SUMMARY (REVENUE INVESTMENT)

Over 60 Year Appraisal	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD	Investment in Status Quo
Benefits (2015 million $)	**$3,740**	**$2,740**	**$2,900**	**$3,940**	**$2,650**	**$1,400**
Emission Reductions (2015 million $)	$40	$30	$30	$40	$30	$20
Collision Reductions (2015 million $)	$330	$240	$250	$340	$230	$120
Auto Operating Cost Reductions (2015 million $)	$2,570	$1,910	$2,000	$2,700	$1,820	$980
Decongestion (2015 million $)	$800	$560	$620	$860	$570	$280
Costs (Low) (2015 million $)	**$230**	**$290**	**$240**	**$210**	**$220**	**$70**
Costs (High) (2015 million $)	**$300**	**$360**	**$310**	**$280**	**$290**	**$70**
Capital/Set Up (Low) (2015 million $)	$40	$110	$110	$110	$110	–
Capital/Set Up (High) (2015 million $)	$110	$180	$180	$180	$180	–
Operating Costs (transit) (2015 million $)	$190	$180	$130	$100	$110	$70
NPV low capital cost (2015 million $)	**$3,510**	**$2,450**	**$2,660**	**$3,730**	**$2,430**	**$1,330**
NPV high capital cost (2015 million $)	**$3,440**	**$2,380**	**$2,590**	**$3,660**	**$2,360**	**$1,330**
BCR low	**16.3**	**9.4**	**12.1**	**18.8**	**12.0**	**20**
BCR high	**12.5**	**7.6**	**9.4**	**14.1**	**9.1**	**20**



5.4.5 Sensitivity Tests

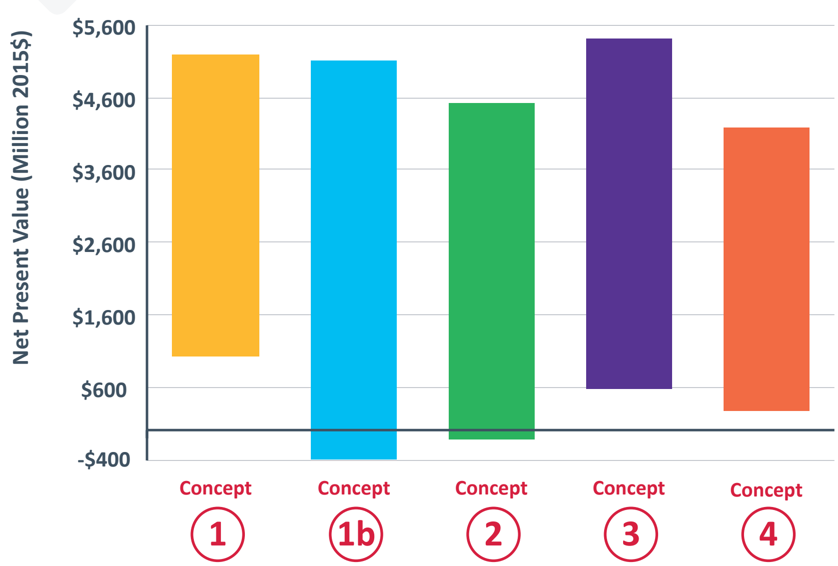
BCA uses sensitivity tests to understand how economic performance varies based on changes to analysis assumptions. A range of sensitivity tests were conducted based on changes to the Fare Integration Demand Model's assumptions for how customers respond to changes in fare.

Two sensitivity tests were conducted:

- **Conservative Test**– travellers are less likely to switch to transit due to a decrease in fares, which leads to lower increases in ridership and user benefits; and
- **Optimistic Test** –travellers are more likely to take advantage of a fare decrease, which leads to an greater increases in ridership and associated benefits.

As discussed in Chapter 3, high and low costs were used in this study to reflect the uncertainty of implementation costs. The range of NPVs for each concept is shown for the two scenarios in Figure 5.3. With the exception of Concepts 1b and 2, all concepts have a positive NPV (and therefore BCR>1) across both scenarios and all sensitivity tests.

FIGURE 5.3: ECONOMIC SENSITIVITY TESTS



5.5 Economic Case Interpretation and Summary

5.5.1 Concept Performance

The economic benefits and costs for each option were estimated to compare the relative performance of each concept. Overall it was determined that all concepts can attain positive economic performance (as noted by positive NPVs and BCRs > 1) across both scenarios, indicating that each concept represents good economic value for money.

A detailed review of each concept's performance is presented in Table 5.4. The key findings for each concept are noted below.

CONCEPT 1

Overall performance is greater than Concepts 2 and 4 due to a comparable level of benefits with lower costs. Benefits are derived by lowering short distance GO Fares and by replacing the full second fare with a new discounted transfer fares.

CONCEPT 1B

The benefits of replacing the need to pay two full fares with discounted transfer fares are similar to Concept 1; however the use of discounted transfer fares with FBD leads to higher fares for a number of longer distance trips compared to Concept 1, which counteract the benefits of a lower short distance cross boundary fare.

CONCEPT 2

The benefits of zones are comparable to the benefits of replacing second fares with discounted transfer fares in Concept 1. The greatest benefits are accrued by short distance trips and short/medium cross boundary trips. However, some dis-benefits are generated for long distance trips where fares increase due to zones.

CONCEPT 3

Concept 3 realizes the greatest benefits in both scenarios. These benefits are realized by offering substantial reductions in the cost of travel for both multimodal and short distance GO Rail/RER, which leads to a significant decrease in PnR and long distance auto trips. Fewer trips under Concept 3 have a fare increase (due to the initial flat fare on both regional and rapid transit), which also limits potential dis-benefits to some short to medium trips.

CONCEPT 4

Concept 4 has strong economic performance driven by reduced short distance fares and a reduction in multimodal and cross boundary travel. It varies from Concept 3 because FBD on local creates greater user benefits, but also reduces benefits from shift from auto/PnR to transit because travellers must pay for the distance they travel on a local feeder route, whereas in Concept 3 their feeder route would be free. This concept has lower performance under revenue investment compared to the other concepts as many trips have a fare increase, whereas other options do not increase the fares for as many trips (such as Concept 1 or 3).

INVESTMENT IN THE STATUS QUO

This additional test demonstrates that direct investment in the status quo yields less value society (lower emission, collision, and decongestion benefits). While this investment has a positive NPV and BCR greater than one, its performance is lower than the fare structure concepts, which focus their investment on specific markets (related to the fare barriers from chapters 2 and 4). This preliminary analysis would suggest there is greater economic value in developing a new structure to address barriers than providing a direct investment into the status quo.

5.5.3 Key Lessons from the Economic Case

The appraisal of the five concepts indicates that Fare Integration offers significant economic benefit. This analysis has noted the following general conclusions:

- Key economic benefits are derived by removing the fare barriers 1 and 3 (payment of two fares) either in part (concepts 1 and 1b) or entirely (concepts 2,3, and 4);
- Reducing GO Rail/RER (all concepts) fares for short distance trips also generates significant economic benefits;
- There is economic value in using FBD to align fares with the distance of the trip taken – this allows for a decrease in auto VKT, which in turn reduces congestion, accidents, emissions, and costs to travellers;

TABLE 5.4: ECONOMIC CASE CONCEPT ANALYSIS

	Finding
Concept 1 Modified status quo	• **Overall result:** Strong economic performance – could be implemented immediately to begin to accrue benefits prior to 2031 with an ability to transition to other structures at a future date. • **Costs:** costs are lower than other concepts because limited changes are required to deliver the new discounted transfer fares. • **Direct Transit Customer Benefits:** benefits are realized for short distance GO RER passengers as well as for passengers that have now use discounted transfer fares instead of a double fare to transfer between 905 MSPs and the TTC and GO Transit and the TTC. • **Benefits from Changing Travel Patterns:** benefits are realized due to an increase in overall cross boundary travel on transit because fares are cheaper with discounted transfer fares instead of double fares
Concept 1b Modified status quo with FBD	• **Overall result:** relatively weaker economic performance • **Costs:** costs are higher than Concept 1 due to the increased hardware and software requirements for FBD. • **Direct Transit Customer Benefits:** benefits are realized for short distance GO RER passengers as well as for passengers that have now use discounted transfer fares instead of a double fare to transfer between 905 MSPs and the TTC and GO Transit and the TTC with additional benefit for travellers who can access a lower GO Rail/RER fare; however the longest distance cross boundary local-RT trips have a discounted transfer fares and FBD, which limits the overall benefits to transit customers. • **Benefits from Changing Travel Patterns:** benefits are realized due to an increase in overall cross boundary travel on transit because fares are cheaper with discounted transfer fares instead of double fares – these benefits are lower than Concept 1 because the combined impact of FBD and discounted transfer fares results in a higher long distance fare than Concept 1.
Concept 2 Zones	• **Overall result:** Strong economic performance • **Costs:** costs are higher than Concept 1 due to the increased hardware and software requirements for Zone Fares. • **Direct Transit Customer Benefits:** benefits are realized for short distance GO RER passengers as well as for passengers that have a reduced fare due to free transfers/continuous fares for longer distance trips on multiple service types and for shorter distance trips that have a lower base fare than the status quo. Some dis-benefits are incurred for longer distance multi zone trips; however there is a strong net customer benefit overall. • **Benefits from Changing Travel Patterns:** benefits are realized where Zone Fares reduce cost of travel – in particular, these benefits are incurred largely for circumferential trips and trips that currently have a double fare that is removed under a zone fare system.
Concept 3 Hybrid	• **Overall result:** Strongest benefits and NPV in both scenarios • **Costs:** costs are higher than Concept 1 due to the increased hardware and software requirements for FBD • **Direct Transit Customer Benefits:** benefits are realized for short distance GO RER passengers as well as for passengers that have a reduced fare due to free transfers/continuous fares for longer distance trips on multiple service type. Long distance RT travellers see a dis-benefit due to increase in fare; however there is a strong net customer benefit overall. • **Benefits from Changing Travel Patterns:** benefits are realized by free transfers between local/higher order leading to long distance auto trips and long distance PnR trips switching to transit. PnR benefits are higher than other options because a feature of this concept is free transfers between service types.
Concept 4 FBD	• **Overall result:** Strong economic performance with variation between revenue investment (lower performance) and revenue neutral (stronger performance) • **Costs:** costs are higher than Concept 1 due to the increased hardware and software requirements for FBD • **Direct Transit Customer Benefits:** benefits are realized for short distance GO RER passengers as well as for passengers that have a reduced short/medium distance fare on local or RT. Benefits are also realized where continuous fares for multiservice or multiple MSP trips are lower than existing double fares or co-fares. However, long distance local or RT trips see a dis-benefit. This concept has a net positive benefit for customers. • **Benefits from Changing Travel Patterns:** benefits are realized for lowering the cost of travel for cross boundary trips by removing transfer double fares and lowering short distance fares, which triggers mode shift to transit. Overall benefits are lower than other concepts because feeder trips on local retain a fare based on distance travelled, while concepts 2 and 3 have free transfers.

- Additionally, allowing a flat fare for a greater range of trips within a fare by distance approach (example: Concept 3) can also support ridership development and economic development for short to medium distance trips;
- A large portion of automobile travel reduction benefits come from shift from PnR trips to using transit for the whole trip– highlighting the importance of exploring paid parking as a means to also encourage a shift from PnR to use of transit for the entire trip; and
- Future analysis should explore a range of revenue scenarios to identify an optimal scenario for Fare Integration.

REMOVING NEED TO PAY TWO FARES

Significant benefits are achieved by addressing 905/TTC and TTC/GO travel barriers by replacing the two fare system with discounted transfer fares or free transfers. As an incremental solution, benefits may be realized by moving to a co-fare oriented system, while a more transformational solution would be to remove double fares entirely and replace them with distance based fares.

REDUCING GO RAIL/RER FARES

As discussed in the Strategic Case, the reduction of GO Rail/RER fares for short distance trips is a key method for increasing ridership. This increased ridership contributes to the overall user benefits of each Fare Integration concept.

ECONOMIC VALUE OF FARE BY DISTANCE

Adoption of FBD on RT/Regional is an effective strategy for rebalancing value of fares based on the value of the trip. FBD can replace transfer fares as a means to achieve economic benefit without having boundary based fare increments. Under FBD, all trips of a certain length, whether crossing a border or not, pay the same. However, FBD can also discourage transit use in Toronto's medium/long distance markets and can generate dis-benefits to trips between 905/GO that have a long distance local leg. These trips may pay more under FBD than they would under the existing co-fare.

PARK AND RIDE BENEFITS

Under a revenue neutral scenario, the majority of Concept 3's benefits come from reduction in PnR trips, which switch to transit for the entire trip. All other concepts have a form of transfer fee (Concept 1/1b use discounted transfer fares and Concept 2 uses zones, and Concept 4 uses a distance rate for the connecting leg) when using local transit to access RT or regional. Future analysis should explore this issue further – either through the use of parking fees or by adapting these concepts to decrease the fare of feeder trips.

SCENARIO ANALYSIS

This review indicated that benefits did not directly scale with investment in revenue. Future analysis should explore a range of investment scenarios to determine if there is an optimal revenue investment point that realizes a proportional increase in benefits compared to increase in costs.

IMPACT OF FARE OPERATING COSTS

Given the high NPVs and BCRs across the range of fare structure concepts, it is unlikely that fare structure operating costs will have a significant impact on the economic viability of the concepts. If costs increase over the life cyle of the project, the impact on the overall economic performance of each concept will be marginal. International experience suggests potential cost savings as structures are harmonized (moving to fewer sets of rules), which will lead to cost savings.

6

Financial Case

6.1 Overview

6.1.1 Chapter Purpose

The Financial Case uses a basic financial appraisal to identify the overall costs and revenue impacts of the two Fare Integration scenarios.

This analysis is intended to identify the financial impacts of each structure under a revenue neutral scenario and a direct investment scenario (where up to 5% of total revenue in 2031 will be reinvested into the fare structure, allowing for lower fares).

Because this is a preliminary Business Case, this analysis has not considered additional procurement costs or costs of alternative financing mechanisms. Future BCA work must conduct a more thorough financial analysis as a specific fare structure is developed, including a review of:

- Alternative revenue allocation systems;
- A wider range of investment scenarios; and
- Different approaches to procuring or financing Fare Integration.

6.1.2 Chapter Structure

The Financial Case chapter includes three sub sections:

- Approach and Assumptions used in the analysis;
- Financial Appraisal; and
- Economic Case Summary.

6.2 Approach and Assumptions

Financial Appraisal is focused on identifying the overall cash flow for Fare Integration. It is based on the following considerations:

- Costs required for developing the fare structure (Capital, PRESTO Operating Costs, Transit Operating Costs); and
- Revenue losses (increased operating costs) or revenue gains (financial benefits).

Analysis is conducted in *nominal terms* with the following rates:

- Financial Discount rate of 2.50%/year;
- Nominal Inflation rate of 2.00%/year;
- Real Inflation Rate of 1.00%/year on capital cost spend between 2015-2031.

The appraisal period used for this model spans 2029-2031:

- Capital costs are spent between 2029 and 2030, with the assumption that a two year development period will be required; and
- Operating/Maintenance costs are applied over the 60 year lifecycle of the project beginning in 2031.

6.3 Financial Appraisal

6.3.1 Overview

Total Financial Impact is the key output of this analysis and represents the sum of all costs and changes in revenue.

The overall appraisal result for the five concepts across both the revenue neutral and revenue investment scenarios are shown in Table 6.1.

6.3.2 Analysis

The preliminary analysis indicates that for the revenue neutral scenario, all concepts will require direct investment given their negative Total Financial Impacts:

- For revenue neutral scenarios, moderate investment over the 60 year period of the project (ranging from $70 million to over $400 million dollars) is required to cover capital and operating costs, with some costs recovered for concepts 2,3, and 4 by increased revenues over time; and
- For revenue investment scenarios, significant investment is required over the 60 year period of the project (ranging from $2.5 to $3.0 billion dollars).

TABLE 6.1: FINANCIAL APPRAISAL RESULTS

	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD
Revenue neutral – Over 60 Year Appraisal					
Capital/Set up (low) (million $)	$40	$120	$120	$120	$120
Capital/Set up (high) (million $)	$120	$200	$200	$200	$200
Operating Costs (transit) (million $)	$80	$110	$100	$150	$130
Required revenue investment (million $)	$30	$90	$-160	$-120	$-110
Total Financial Impact (million $) (Low)	**$-150**	**$ -320**	**$ -60**	**$-150**	**$-140**
Total Financial Impact (million $) (High)	**$-230**	**$ -400**	**$-140**	**$-230**	**$-220**
Example discounted annual costs 2041					
Operating Costs (transit) (million $)	$1.7	$2.1	$2.0	$2.9	$2.7
Required revenue investment (million $)	$1.0	-$2.2	-$5.7	-$3.4	-$3.6
Revenue investment – Over 60 Year Appraisal					
Capital/Set up (low) (million $)	$40	$120	$120	$120	$120
Capital/Set up (high) (million $)	$120	$200	$200	$200	$200
Operating Costs (transit) (million $)	$280	$270	$200	$150	$160
Required revenue investment (million $)	$2,260	$2,200	$ 2,090	$ 2,250	$ 2,510
Total Financial Impact (million $) (Low)	**$-2,580**	**$-2,590**	**$-2,410**	**$-2,520**	**$-2,790**
Total Financial Impact (million $) (High)	**$-2,660**	**$-2,670**	**$-2,490**	**$-2,600**	**$-2,870**
Example discounted annual costs 2041					
Operating Costs (transit) (million $)	$8.0	$7.6	$5.7	$4.0	$4.3
Required revenue investment (million $)	$54.4	$52.6	$49.6	$54.1	$61.7

Note: a negative value for 'required revenue investment' indicated the concept generates additional revenue, which is a financial benefit to the project.

6.3.3 Sensitivity Tests

The Financial Case uses sensitivity tests to understand how financial performance may vary due to variations in cost and revenue. A range of sensitivity tests were conducted based on changes to the Fare Integration Demand Model's assumptions for how customers respond to changes in fare. As discussed in Chapter 3, high and low costs were used in this study to reflect the uncertainty of implementation costs. Two sensitivity tests were conducted to reflect variation in revenue:

- **Conservative Test** – travellers are less likely to switch to transit due to a decrease in fares, which leads to lower increases in ridership and revenue; and
- **Optimistic Test** –travellers are more likely to take advantage of a fare decrease, which leads to a greater increase in ridership and revenue.

Revenue neutral and revenue investment sensitivity tests are shown in Figure 6.1. Figure 6.1 suggests that the Total Financial Impact ranges from-$800 (conservative case) to $550 million (optimistic case) dollars. For revenue investment, the range of Total Financial Impact is-$3.5 (optimistic case) to-$6 billion (conservative case) dollars. This range in financial impacts highlights a key risk for fare integration and the sensitivity of financial performance to customer behaviour. Future studies should explore the range of marketing and Transport Demand Management (TDM) measures required to mitigate these financial risks by shifting traveller behaviour towards the base and optimistic cases.

FIGURE 6.1: FINANCIAL SENSITIVITY TESTS

6.4 Financial Case Summary

6.4.1 Key Lessons from the Financial Case

The financial analysis suggests the following findings:

- Overall, the concepts carry a similar range of financial performance;
- The revenue investment scenario's financial performance requires an investment of between $1.8-$6 billion dollars (in nominal terms) over 60 years, which is a significant investment that should be weighed against the economic and strategic performance of each concept in the Scenario; and
- A revenue neutral scenario's performance ranges from cost neutral (with potential financial gains that could then be reinvested back into the fare structure to maintain revenue neutrality) to a cost of nearly $800 million – this scenario could be implemented with moderate direct investment from over the 60 year life cycle.

6.4.2 Future Analysis

Future analysis should be conducted to expand upon this preliminary financial appraisal. Four key areas for further inquiry are:

- Variable investment scenarios;
- Managing financial risks;
- Cost refinement; and
- Revenue allocation and Decision making structure.

VARIABLE INVESTMENT SCENARIOS

This financial review was limited in that it assumed that revenue investment would be used for the full 60 year cycle, which incurs significant costs. Future analysis should explore different investment values (example: 2% instead of 5%) as well as investments that change overtime (example – approach revenue neutrality after 5 years of operations).

MANAGING FINANCIAL RISKS

The range in performance as noted in the sensitivity test highlights the need for risk management to ensure the structures can generate revenue as estimated in the base analysis or optimistic case. Future analysis should explore the crucial importance of pairing fare structure changes with TDM and marketing initiatives to realize a level of revenue similar to the optimistic targets included in this BCA.

COST REFINEMENT

A further review of operating and capital costs should be undertaken to identify potential cost savings that may reduce the financial impact of Fare Integration. A revised analysis of costs should identify potential synergies with other major investments along with efficiencies (example – reducing cost of delivering due to standardizing structure design/software) that can reduce overall costs.

Revenue allocation and decision making

Revenue allocation and decision making approaches will shape the total level of costs incurred for the project as well as the costs incurred by different stakeholders. Future studies should explore a range of approaches to determine how they will impact the financial costs associated with fare integration.

Impact of Fare Operating Costs

Future studies will identify any impacts to the costs required to operate the fare stature. Operating cost changes can have a significant impact on the overall performance of the revenue neutral scenario. If there are cost savings, these scenarios may have an overall positive financial impact. Cost increases may impact the overall financial delivery of each concept; however it is not expected that cost increases will be significant for an overall integrated structure. Given the level of revenue investment required for the investment scenario, cost changes are unlikely to impact the overall financial performance of any concept.

7

Deliverability and Operations Case

7.1 Overview

7.1.1 Chapter Purpose

The Deliverability and Operations Case is a summary of key risks, deliverability requirements, and considerations for delivering Fare Integration in the GTHA. This chapter can be used to frame issues and establish whether they are a fatal flaw that limits a concept's viability, or an issue that must be mitigated in future stages of analysis. This case is concerned with risks associated with pursuing a transformational fare structure. A detailed treatment of delivering fare structure changes will be considered in the "Implementation Strategy" (Phase 4).

The output of the deliverability and operations is a conclusion on:

- Whether each concept is deliverable or not; and
- The core requirements, issues, and risks that must be considered when implementing the concept.

7.1.2 Analysis Approach

This chapter of the Business Case is focused on clarifying deliverability requirements and identifying key delivery risks that must be addressed as fare integration is progressed. If risks are deemed too great to be managed, concepts can be frames as undeliverable.

In this section, risk is discussed based on both the likelihood of an issue impacting the concept's ability to realize its strategic, economic, or financial performance as well as the expected degree of impact. Impacts could include higher costs to deliver, longer delivery periods, or lower benefits. A three level scale is used, commensurate with the high level nature of this review:

- **Minimal Risk** – the issue is unlikely to impact the concept's overall deliverability or performance;
- **Moderate Risk** – the issue has a medium likelihood of having minor to medium impact on the deliverability of the option, however it is expected that the issue can be mitigated; and
- **High Risk** – the issue is expected to have significant impacts to the delivery and benefits of the concept that are difficult to mitigate.

Some issues may not directly impact performance, but are related to higher level policies, such as social equity conditions or requirements for success in the GTHA transit environment. These requirements are not used to evaluate the concepts, but instead to indicate key considerations for further development.

7.1.3 Chapter Structure

This chapter is composed of four additional sub sections:

- Delivery and Planning;
- Transit Operations;
- Customer Impacts; and
- Deliverability Case Summary.

7.2 Delivery and Planning Issues and Risks

7.2.1 Overview

Delivery and planning issues reflect key considerations for designing, implementing, and managing the fare structure. Two overall sets of risks were reviewed to complete this section of the Business Case:

- Policy risks; and
- Technology risks.

7.2.2 Policy Issues and Risks

Policy risks consider the extent of policy change required to deliver the concepts. Each concept will require a degree of policy reform to be successful implemented. Policy reform would be required to determine which agencies are responsible for:

- Centralization of pricing (including products and concessions) and service structures;
- Revenue allocation; and
- Management;
- Funding and Revenue Burden.

Risks are summarized in Table 7.1. If a structure requires significant changes to the decision making structure, it has higher risk due to the complexity of implementing reforms. Concepts that can exist under existing decision making structures have the lowest risk.

CENTRALIZATION

Policy changes introduce risk based on the extent of decision making changes required to ensure the fare structure can function in the GTHA and the ability to make timely, effective decisions. If a structure requires significant changes to the decision making structure, it has higher risk due to the complexity of implementing reforms. Concepts that can exist under existing decision making structures have the lowest risk. The key risk driver at this stage is the extent of policy change required to set pricing and products.

REVENUE ALLOCATION

Revenue allocation is required for all concepts due to the use of co-fares (1 and 1b) and continuous fares (2, 3, and 4). A level of risk has not been identified at this stage as revenue allocation applies to all cross boundary trips, regardless of concept, and a specific solution has not been scoped.

MANAGEMENT

Management includes a set of key issues that must be addressed in future stages of analysis:

- Change management and harmonization approach;
- Revenue control;
- Marketing, customer engagement, and customer support;
- Product/ticketing distribution network; and
- Role of cash fares.

Specific solutions for these issues have not been explored at this stage of the study as they are informed more by the overall strategy selected than the base fare structure. A general consideration for future development is the role of cash fares and pre-purchased tickets within the structure, these factors have a significant impact on the need for ticket distribution and fare enforcement. These risks may escalate delivery costs and operating costs depending on the distribution and enforcement strategy required to deliver the structure and overall strategy.

FUNDING AND REVENUE BURDEN

Funding is an additional core requirement for each structure. A funding program has not been established or outlined and should be considered in future stages of analysis.

A key consideration for funding is the extent of revenue burden or portion of operating costs that should be recovered from the fare box. This study used two scenarios to explore different funding models – revenue neutral only provides funding for capital and operations, while revenue investment allows for direct investment in fares.

A second key consideration for funding is the impact of fare integration on individual agency finances. At this stage of the study specific financial impacts or expected financial impacts have not been estimated or analyzed. Therefore, specific risks have not been clarified.

Risks are more strongly associated with the overall funding for transit and the revenue allocation approach used. Future stages should investigate a set of funding approaches. including different levels of investment and investment that varies over time.

TABLE 7.1: POLICY RISK REVIEW

Consideration	Level of risk	Risk drivers
Concept 1 Modified status quo	Minimal	• Centralization: Can be implemented within existing policy model with some changes to allow for discounted transfer fares • Revenue allocation: requires revenue allocation for discounted transfer fares • Management: low level of change
Concept 1b Modified status quo with FBD	Moderate	• Centralization: Requires FBD fares on RT and discounted transfer fares, which may require some decision making structure change if not achieved voluntarily • Revenue allocation: requires revenue allocation for discounted transfer fares • Management: moderate level of change
Concept 2 Zones	High	• Centralization: setting a new zone structure requires significant engagement, planning, and decision making structure changes – this increases the risk of successful delivery of an optimal structure • Revenue allocation: requires revenue allocation for all trips • Management: high level of change and new operational functions
Concept 3 Hybrid	Moderate	• Centralization: Requires FBD fares on RT and discounted transfer fares, which may require some decision making structure change if not achieved voluntarily (with moderate changes to implement a common base fare) • Revenue allocation: requires revenue allocation for all multi MSP trips • Management: high level of change
Concept 4 FBD	Moderate (decentralized) High (centralized)	• Centralization: FBD can be implemented with minor decision making structure change (requirement of FBD, MSPs set rates) or significant decision making structure reform and centralization (standard FBD rates across region) • Revenue allocation: requires revenue allocation for all multi MSP trips or for all trips if revenue collection and allocation is centralized • Management: high level of change, including new operational impacts

7.2.3 Technology and Ticketing Issues and Risks

Technology and ticketing risks include issues associated with delivering the structure's hardware and software changes across the region.

Risks for devices include:

- Procurement risks – cost and development timeline; and
- Operational reliability risks – change management and ensuring a functional platform during implementation.

In general, concepts that require new devices incur higher risks due to the procurement required and the need to manage the transition from old technology to new technology.

Concepts 1b, 2, 3, and 4 have an added issue: the need for a technology change management strategy as new devices are installed throughout the network. This strategy should balance a timely delivery of new technology against minimizing customer impacts. Key considerations include:

- Staging by agency or service type;
- Aligning delivery with major investments, such as RER or planned PRESTO device changes; and
- Realizing economics of scale when purchasing devices.

TABLE 7.2: TECHNOLOGY RISK REVIEW

Consideration	Level of risk	Risk drivers
Concept 1 Modified status quo	Minimal	• Can be implemented with existing technology
Concept 1b Modified status quo with FBD	Moderate	• Requires tap on/off devices on buses, tap on/off functional gates on all new RT and a software/ tap on/tap off solution for free body transfers
Concept 2 Zones	High	• Requires new devices on surface transit, new fare gates, tap on/off functional gates on all new RT , and a software/tap on/ tap off solution for free body transfers
Concept 3 Hybrid	Moderate	• Requires tap on/off devices on buses, tap on/ off functional gates on all RT, and software/ tap on/tap off solution for free body transfers
Concept 4 FBD	Minimal (decentralized) Moderate (centralized)	• Requires new devices on surface transit and tap on/off functional gates on all RT

7.2.4 Potential Delivery and Planning Benefits

A key consideration for future development is the potential for cost savings and decreased fare structure operating costs due to centralization. Centralization has the potential to realize economies of scale, and is often cited as a key benefit of fare integration. Future studies should explore potential cost saving benefits or improved efficiencies of consistency.

7.2.5 Service Structure Risks and Issues

The service structure used in this study is to be expanded and refined in future stages of analysis. As a deliverability requirement, the service structure should explore the role of other service types, including paratransit, rural services, express services, first/last mile services, and on demand or dynamic services.

7.3 Transit Operations Issues and Risks

7.3.1 Overview

Transit operation risks represent risks to service provision associated with delivering an integrated fare structure. These risks and issues fit into three general categories:

- Impact to service operations (including demand changes, dwell time and passenger flows);
- Potential infrastructure impacts (including impacts to free body transfers); and
- Agency finance and funding.

7.3.2 Operational Issues and Risks

The key operational issues for transit provision include:

- Changes in demand on certain services, which produces crowding, and changes to required capacity; and
- Fare structure impacts on station and surface transit operations.

DEMAND, CROWDING, AND CAPACITY

As noted in Chapter 3, the revenue investment scenario highlights that an integrated fare structure can increase demand above business as usual service levels.

Modelling tools available for this stage of the study are 'strategic' and do not reflect line loading or demand on specific routes. Costs included in this study aim to capture a conservative estimate for service level impacts. As the study progresses these costs should be tested and revisited, in particular with respect to crowded routes, such as TTC's Line 1 or services with physical capacity constraints.

An additional area for consideration is potential cost savings associated with integrating service planning and leveraging new data collected from Fare Integration.

STATION AND SURFACE IMPACTS

An identified concern for Concepts 1b, 2, 3, and 4 4 is the use of tap on and tap off on buses and stations. This risk occurs at free body transfers for Concepts 1b and 3, and on all vehicles and stations for Concepts 2 and 4.

For surface vehicles, there is a concern that tap on/tap off may impact the time it takes customers to alight from a bus (creating a queue), which in turn may delay dwell times at stops and overall route runtimes. FBD on local routes (buses and street cars) has been implemented on many high volume systems, including bus lines in Seoul and Sydney. Key considerations to manage potential dwell time issues are:

- Customer education campaigns in the months leading up to the launch of the new fare structure;
- Understanding the costs of fare enforcement and customer support;
- Allowing customers to tap off prior to their stop to avoid queues;
- Use of an account based system, which only reads the card without writing, greatly decreasing tap transaction time;
- Examining the role of a transition period to allow customer habits to adjust to the new structure;
- Exploring fixed boarding/alighting doors on busy routes (Example: board on front to guarantee tap, tap off and exit from back); and
- On the busiest routes, explore potential for tap on off devices at the stop.

Further investigation of industry experience and analysis is required to identify the magnitude of potential delay and queue issues related to tap on/tap off. International experience suggests that solutions can be developed based on the type of vehicles used on the route, the magnitude of demand the route experiences, and the built form of the area surrounding the route. Additionally, new technologies should be explored that allow customers to use mobile apps or sensors to allow for a 'tap on and walk off' approach, mitigating the need for tap off.

Station flow issues are deemed to be minor, given the wide spread use of tap on/off on some of the world's busiest metro systems, including Tokyo and Shanghai. If passenger flow issues become a significant issue, the use of open gate tap off should be explored, wherein fare gates are open and close if an invalid ticket is used or a customer attempts to leave without checking out.

Based on this review, Concepts 1, 1b, and 3 are given a minimal risk rating, while 2 and 4 are assigned moderate risks.

7.3.3 Infrastructure Issues

Infrastructure risks are focused on the potential impact to free body transfers of Fare Integration. As discussed in chapter 3, this study assumes a software solution or a tap on/tap off solution can be used for all concepts that use FBD on RT. Logic based fare solutions have been implemented in other jurisdictions with complex transit networks and it is expected that these solutions may be used in the GTHA.

If these solutions cannot be implemented the expected impact for Concepts 1b and 3 will include the need to renovate multiple RT stations to include fare gates at all free body transfers. This risk could greatly increase the capital costs, which would have minor impact on the economic case, given the high level of benefits, but would increase the required investment under the financial case.

Concept 1 is the only concept that does not require a change at free body transfers, so has not received a risk score. All other concepts are considered to have minimal risk based on the growing use of tap on/tap off in other jurisdictions, such as the Netherlands or Sydney, Australia.

7.4 Customer Risks and Issues

7.4.1 Overview

Customer risks and issues reflect changes to the customer experience that may impact potential ridership increases.

These issues include:

- Understandability;
- Pricing impacts;
- Payment; and
- Equity impacts.

7.4.2 Understandability

As discussed in Chapters 3 and 4, all concepts are deemed to be understandable due to their widespread use in jurisdictions around the world. If a fare structure is not well understood, its ability to attract and retain ridership may be impeded. Potential issues to manage include:

- **Understanding fares:** zone fares, discounted transfer fares, and FBD require unique education tools to ensure customers can make use of the new fare integrated fare structure. A careful marketing campaign should be planned and sequenced within the delivery of an integrated fare structure to ensure customers make the best use of the new system and learn how it improves their user experience.
- **Tap on Tap Off:** The need for customers to learn a new habit for boarding and alighting transit and forgetting to tap off. This may increase demands on customer service to reconcile the trip taken and fares charged. Enforcement measures, such as design changes to promote tap off on buses or at fare lines and penalties for not tapping off should be included in future stages of analysis.

Table 7.3 providers an overview of understandability risks.

Based on these issues, Concept 1 is scored minimal risk, as only cross boundary trips and GO transit require customers to understand a new fare. The remaining concepts are scored as moderate risk because they impact a larger share of transit trips in the region.

TABLE 7.3: UNDERSTANDABILITY RISKS

Consideration	Level of risk	Risk drivers
Concept 1 Modified status quo	Minimal	• Minimal changes – the need to pay two fares is replaced with discounted transfer fares (905/TTC, TTC/GO Transit) • Requires marketing efforts focused on new discounted transfer fares
Concept 1b Modified status quo with FBD	Moderate	• Moderate change due to the addition of FBD on rapid transit • FBD can be readily communicated using fare maps and tables – marketing and customer engagement/support will be required • FBD requires a new communication program using station to station fare maps or tables, as well as marketing and customer engagement to support initial uptake of the structure
Concept 2 Zones	Moderate	• Significant change – replaces existing MSP centric fare structure with radial zones across the region, streamlines regional fares to use station to station pricing • Fares are more complex and trip specific, however in the long term, international experience notes that customers can adapt with minimal ridership risk • Risk can be managed by providing dedicated communication tools on vehicles, at stations, and online • Zone structures require communication tools and programming to ensure customers understand their fares
Concept 3 Hybrid	Moderate	• Moderate change – due to addition of FBD on rapid transit and new common flat fare • FBD requires a new communication program using station to station fare maps or tables, as well as marketing and customer engagement to support initial uptake of the structure
Concept 4 FBD	Moderate	• Significant change due to shift to FBD on all services • Moderate based on international experience – FBD can be implemented with a dedicated communication program and approach to customer engagement • Fares are more complex and trip specific, however in the long term, international experience notes that customers can adapt with minimal ridership risk • Risk can be managed by providing dedicated communication tools on vehicles, at stations, and online

7.4.3 Pricing impacts

A discussed in chapter 4, the price used in the fare structure can have significant impacts on the overall ridership of transit in the GTHA. Managing pricing impacts is a key deliverability concern for the fare structure, including setting the revenue burden for each trip. Key risks are based on fare increases that impact ridership for specific markets. This risk was modelled as part of the economic and financial case sensitivity tests, which assess the impact of a more negative response to pricing changes. All concepts are given scores of moderate risk, as noted in Table 7.4.

TABLE 7.4: PRICING RISKS

Consideration	Level of risk	Risk drivers
Concept 1 Modified status quo	Moderate	• Requires flat fares to be raised to achieve revenue neutrality, which impacts most travellers in all markets
Concept 1b Modified status quo with FBD	Moderate	• FBD may increase fares on long distance RT trips in markets that have been built on flat fares
Concept 2 Zones	Moderate	• Zones may increase fares for long distance RT trips in markets that have been built on co-fares or flat fares (example: GO-Local trips in the 905 area)
Concept 3 Hybrid	Moderate	• FBD may increase fares on long distance RT trips in markets that have been built on co-fares or flat fares
Concept 4 FBD	Moderate	• FBD may increase fares on long distance RT trips in markets that have been built on co-fares or flat fares

7.4.4 Payment

This analysis outlines key deliverability considerations for payment options. Detailed product/concession design will be addressed in future stages of the study. A summary of how each concept can make use of these types of payment is shown in Table 7.5.

Key payment deliverability considerations include:

- All concepts can provide products tailored to their structure and customer needs;
- While passes are possible on all concepts, they can create captivity unless they are tailored to specific markets or trips, whereas caps or loyalty programs are service provider agnostic;
- Concepts 2,3, and 4 can provide standardized products that are based on trips taken – not on agencies used;
- The role of cash for local services needs to be analyzed and explored if a Concept 4 (FBD) or Concept 2 (Zones) is pursued;
- Concept 1 can retain the existing products with minimal changes, however they will difficult to standardize across the region;
- Concept 1b may use period passes for Local fares, however a loyalty program or cap system is more suitable given the use of FBD on RT;
- Concept 2 can use period passes based on number of zones or a loyalty/cap program;
- Concept 3, like Concept 1b, is best aligned with a loyalty or cap program; and
- Concept 4 is best aligned with caps and loyalty programs.

TABLE 7.5: PAYMENT OPTIONS FOR FARE INTEGRATION CONCEPTS

	Cash	PRESTO/open payment	Products
Concept 1 Modified status quo	• Usable on all trips with POP required when local is used for first leg	Usable on all trips	• Period passes(Local/RT) • Loyalty program/caps (Regional)
Concept 1b Modified status quo with FBD	• Usable on all trips with POP required when local is used for first leg	Usable on all trips	• Period pass (Local) • Loyalty program/caps (Regional/RT)
Concept 2 Zones	• A pre-purchased ticket/ LUM is required • Can be delivered on local with special equipment	Usable on all trips	• Period passes(Local/RT) • Loyalty program/caps (Regional/RT)
Concept 3 Hybrid	• Usable on all trips with POP required when local is used for first leg	Usable on all trips	• Period pass (Local) • Loyalty program/caps (Regional/RT)
Concept 4 FBD	• A pre-purchased ticket/ LUM is required • Can be delivered on local with special equipment	Usable on all trips	• Loyalty program/caps

7.4.5 Social Equity

Alignment with social equity goals and objectives is a key requirement for the future fare structure. The base fare structure needs to be complemented by additional programs, products, or concessions to ensure transit services are accessible.

A preliminary equity analysis was conducted to determine how each structure will change the fare paid by the lowest income travellers.

Changes in fares for revenue neutral and revenue investment are shown for all concepts in Table 7.6. Across the concepts and revenue neutral and investment scenarios, the fare structure concepts offer the potential to decrease the fare paid for low income travellers. This is the fare paid before products, concessions, or social equity programs are applied.

TABLE 7.6: CHANGE IN AVERAGE FARE FOR LOW INCOME TRAVELLERS

Revenue neutral Distance	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD
0 to 3 km	$0.08	$-0.08	$-0.16	$-0.07	$-0.14
3 to 7 km	$.05	$-0.09	$-0.22	$-0.05	$-0.03
7-15 km	$0.01	$-0.03	$0.08	$0.13	$0.21
15-30 km	$0.00	$0.27	$0.52	$0.51	$0.50
30- 50 km	$-0.20	$0.53	$-0.10	$0.11	$0.18
50 + km	$-0.30	$-0.04	$-0.25	$-0.44	$-0.44

Revenue investment Distance	Concept 1 Modified status quo	Concept 1b Modified status quo with FBD	Concept 2 Zones	Concept 3 Hybrid	Concept 4 FBD
0 to 3 km	$-0.02	$-0.08	$-0.16	$-0.14	$-0.32
3 to 7 km	$-0.05	$-0.11	$-0.23	$-0.19	$-0.25
7-15 km	$-0.09	$-0.09	$-0.04	$-0.03	$-0.02
15-30 km	$-0.15	$0.09	$0.21	$0.35	$0.32
30- 50 km	$-0.46	$-0.13	$-0.43	$-0.04	$0.04
50 + km	$-0.76	$-0.50	$-0.53	$-0.91	$-0.35

In general, the benefits of fare integration for low income travellers are:

- Reduced fares for short distance trips (Concepts 2 (zones) and 4 (FBD);
- Reduced fares for multi service trips, in particular long distance trips using GO Transit and other MSPs; and
- Reduced fares for short and medium distance GO Transit trips – greatly expanding the accessibility of these services.

Overall, the amount of revenue invested has the potential to lower fares for each concept, which in turn provides a lower fare for low income travellers.

To date, many of the GTHA's municipalities have either implemented or are considering implementing programs that provide targeted support for low-income travellers. How these programs address cross-boundary travel, and potential inconsistencies between them are an important consideration for further study.

While modifications to the status quo that retain a flat fare for all trips on each MSP (Concept 1) would be unlikely to necessitate significant change to this equity programming, concepts that make greater use of fare by distance (Concepts 1b, 2, 3 and 4) will require careful consideration to ensure any undesired impacts on social equity are either avoided or mitigated. A key consideration for fare by distance for low income travellers is the balance the particular implementation of a fare structure and pricing regime strikes between a decrease in fares for short trips and the increase in fare for medium and long distance trips. Potential equity measures include:

- Equity focused fare caps or loyalty programs (example: low income travellers have a fare that caps after a shorter distance travelled than general customers);
- Equity focused programming that provides discounted passes for travellers through a centralized program; and
- Additional fare structure optimization, including peak and off peak pricing.

Equity concerns are a key consideration for future study. Future work should seek to mitigate the impact of Fare Integration on low income travellers along with other marginalized communities in the GTHA through dedicated programming, products, and concessions.

7.5 Deliverability Case Summary

The Deliverability and Operations Case presented a high level review of key risks and issues associated with the Fare Integration concepts. Based on this review it is noted that all concepts are deemed deliverable – although risks vary between concepts (discussed in Table 7.7):

- Concept 1 – low risk due to limited changes to existing technology and decision making structure;
- Concepts 1b, 3, and 4 – moderate risk due changes to technology, uncertainty in pricing, and potential decision making structure impacts; and
- Concept 2 – high risk due to the required decision making structure reform, and the complexity of revising zone structures after they have been established.

Future studies will need to identify potential decision making structures and technical solutions based on the preferred transformative fare structure. This deliverability plan should consider:

- Incremental changes that address urgent fare barriers while creating progress to a longer term vision;
- Policy for centralization, revenue allocation, funding, implementation, and management;
- Technology and infrastructure requirements;
- Degree of service impacts and required management; and
- Customer engagement campaigns and customer support programs to maximize use of structure.

TABLE 7.7: DELIVERABILITY AND OPERATIONS CASE SUMMARY

Consideration	Overall risk	Delivery and Planning		Transit Operations		Customers	
	Level of risk	Policy	Technology	Operations	Infrastructure	Understandability	Pricing
Concept 1 Modified status quo	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate
Concept 1b Modified status quo with FBD	Moderate	Moderate	Moderate	Minimal	Moderate	Moderate	Moderate
Concept 2 Zones	High	High	Moderate-high	Moderate	Moderate	Moderate	Moderate
Concept 3 Hybrid	Moderate	Moderate	Moderate	Minimal	Moderate	Moderate	Moderate
Concept 4 FBD	Moderate	Moderate – High	Moderate-high	Moderate	Moderate	Moderate	Moderate

8

Findings

8.1 Overview

This chapter summarizes the overall Business Case for each concept along with a proposed direction for future development and analysis.

8.2 Business Case Summary

8.2.1 Concept Performance

Key strengths and weaknesses for each concept are summarized in Table 8.1, while Table 8.3 summarizes the four cases for each concept. Table 8.2 provides further context by noting the key issues that shape overall performance across each of the cases.

STRATEGIC CASE

Concept 4 offers the strongest performance towards the transformational strategic vision, but must be managed to ensure that long distance trips are not overly priced. For a revenue neutral scenario, long distance fares must cover the cost of reduced short distance fares and the loss of double fares and co-fares for short trips (where the new FBD fare is less than the status quo co-fare or double fare). Concepts 2 and 3 offered similar levels of ridership development; however, based on the evaluation theydid not offer the same range of strategic benefits across the full strategic case.

Concept 2 has lower strategic potential because zones recreate barrier 1 and price some short trips higher than long distance trips based on new zone barriers. Additionally, zones are seen to be less flexible and adaptable in the long run.

Concept 3 offers strong ridership growth potential and is a high performer across the three strategic outcomes. However, it requires that all medium and long distance regional and RT trips pay a higher fare than other concepts for the revenue neutral scenario in order to make up for the total loss of revenue from paying two fares/co-fares, which hare removed. Additionally the use of flat fares on local limits the overall flexibility of FBD on RT and regional to ensure that customers do not choose to use competitive local routes with lower fares.

ECONOMIC CASE

Each concept demonstrated overall value for money – further optimization work could be completed on any of the concepts to improve overall performance. Concept 3 had the strongest overall economic perormance and should be considered during structure optimization.

FINANCIAL CASE

Each concept demonstrated that a revenue neutral configuration can be implemented with some direct investment into capital costs and operating costs. The financial case also estimated the range of financial impacts for 5% revenue investment.

Costs to deliver the new fare structure are heavily shaped by how the structure is delivered and how uniform the rule sets are. Costs will require further refinement during the structure refinement process. Future analysis should consider potential operating cost savings from pursuing a more harmonized structure.

TABLE 8.1: CONCEPT OVERALL STRENGTHS AND WEAKNESSES

	Key opportunities/ Advantages	Key challenges/ Impediments
Concept 1 Modified status quo	• Simple to implement with minimal changes from existing fare structure • Minimal ridership risk for internal travel markets • Minimal impact to MSP operations and revenues for internal trips	• For revenue neutrality, it requires an increase in all trip fares to compensate for revenue lost from customers paying two fares • Discounted transfer fares for cross boundary trips do not accurately reflect the variety of trips taken and have the lowest overall ridership growth potential
Concept 1b Modified status quo with FBD	• Limited overall strengths; however, the use of FBD on RT can lead to lower and more appropriate discounted transfer fares and overall fares for short and medium cross boundary trips	• Complex to manage FBD and discounted transfer fares, which may be difficult for users to understand • The combination of discounted transfer fares and FBD does not offer significant benefits above the use of a single co-fare • If FBD fares are too high, long distance ridership that currently has a flat fare will decrease
Concept 2 Zones	• High ridership growth potential • Simple for customers to understand with a consistent user experience for all trips/services • Encourages demand in most markets, including short/medium distance trips	• If zone fares are too high, long distance ridership that currently has a flat fare will decrease • Zones are inconsistent – some short trips are more expensive than longer trips based on fare boundary rather than trip taken, effectively recreating geographic barriers • Highest implementation risk due to decision making structure changes
Concept 3 Hybrid	• Free transfers between local and RT and local and FBD encourages use of the multi modal network • Integrated RT/Regional FBD pricing encourages use of RER/RT as one network	• The complete elimination of co-fares and double-fares leads to higher revenue burden being placed on long distance trips – this impact is greatly reduced with revenue investment • If FBD fares are too high, long distance ridership that currently has a flat fare will decrease • Flat fares on local may be an incentive to use slower or lower capacity services when there is competition between local and RT/regional
Concept 4 FBD	• Consistent fare experience for all trips and service types • High ridership growth potential • Encourages demand in most markets, including short/medium distance trips	• If FBD fares are too high, long distance ridership that currently has a flat fare will decrease • Requires a delivery plan that limits impacts to transit operations (example: potential customer flow impacts on buses) • Requires significant change management to ensure customers understand and make best use of system

TABLE 8.2: BUSINESS CASE SUMMARY

	Strategic Case – does the concept realize the transformative vision?	Economic Case – what is the value to society of pursuing the concept?	Financial Case – what is the concept's preliminary financial impact?	Deliverability and Operations Case – can the concept be implemented/ operated?
Concept 1 Modified status quo	• Low alignment with transformative vision – due to limited flexibility to set fares to meet market and customer needs • Consider key lessons in the development of implementation plan	Strong economic performance – NPV of $1.8 to $3.7 billion 2015 dollars	• Revenue Neutral Financial Impact:-$150 million • Revenue Investment Financial Impact: -$2.7 billion	• Low deliverability risk due to minor changes
Concept 1b Modified status quo with FBD	• Low alignment with transformative vision – more flexible than Concept 1 due to use of FBD, but overall it is a more complex structure • The concept is unlikely to be an effective transformational or incremental structure	Moderate economic performance – NPV of $0.5 to $2.5 billion 2015 dollars	• Revenue Neutral Financial Impact:-$320 million • Revenue Investment Financial Impact: -$2.8 billion	• Moderate risk due to uncertainty for local-RT trips • If a software solution cannot be developed, costs could increase significantly
Concept 2 Zones	• Moderate alignment with transformative vision; however the concept has limited potential to evolve over time due to the complexity of modifying zones. • The concept is unlikely to be an effective transformational or incremental structure	Strong economic performance – NPV of $1.1 to $2.7 billion 2015 dollars	• Revenue Neutral Financial Impact:-$60 million • Revenue Investment Financial Impact: -$2.6 billion	• Contingent on governance reform and establishing zones – high risk
Concept 3 Hybrid	• Moderate alignment with transformative vision – due to the creation of a more seamless and user friendly structure • Consider key lessons in the development of implementation plan	Strongest economic performance – NPV of $2.2 to $3.4 billion 2015 dollars	• Revenue Neutral Financial Impact:-$150 million • Revenue Investment Financial Impact: -$2.7 billion	• Moderate risk due to uncertainty for local-RT trips • If a software solution cannot be developed, costs could increase significantly
Concept 4 FBD	• Strongest alignment with vision – due to provision of a seamless region wide fare structure that is flexible enough to adapt fares to meet most customer and market needs • Consider in the development of transformational structure	Strongest economic performance – NPV of $1.4 to $2.4 billion 2015 dollars	• Revenue Neutral Financial Impact:-$140 million • Revenue Investment Financial Impact: -$3.0 billion	• Moderate-high risk due to implementation of FBD on local and RT due to large shift in software, infrastructure, and operations

DELIVERABILITY AND OPERATIONS CASE

Each concept is widely deliverable with Concept 1 having the lowest risks and Concept 2 having the highest. Concepts 3, 1b, and 4 are seen to have moderate risks that are manageable and should be addressed in future stages of development.

TABLE 8.3: WHAT DRIVES BUSINESS CASE PERFORMANCE?

Case	High Performing Elements	Implication
Strategic Case	• Positive performance was attained by structures that were more 'flexible' – meaning they offered more ways to set fares and price trips • This allowed the structure to support a wider range of customer types and markets • Positive performance was all driven by the extent to which the concept could provide a far structure with fewer variations in rules	• The fare structure should maximize flexibility and then be refined to ensure it is usable and simplified for customers
Economic Case	• Providing fare reductions for long distance multimodal trips or medium distance PnR legs of transit trips – concepts that offer the best 'fare' for these trips increase their overall economic benefit • Example: Concepts with cheaper feeder legs had stronger overall auto reduction (VKT) benefits	• Transitioning long trips from PnR to full transit, or auto to transit gives a large user and VKT benefit – however many distance structures also can discourage long distance transit use due to FBD • The new fare structure should optimize VKT benefits and manage potential ridership losses due to fare increases
Financial Case	• Strong financial performance is realized by attracting transit users to a higher revenue mode than they currently use	• Higher revenue is obtained from auto-transit shift as well as shifts where users move to a new mode that is more valuable than their current choice, but has been made more affordable by the fare structure
Deliverability and Operations Case	• Risks are determined based on the extent of changes to infrastructure, technology, governance, and transit operations	• With the exception of Concept 2, evidence suggests each concept is deliverable within low-moderate risk • The selected concept will require extensive work to manage risks given the scale of change required to deliver a transformative concept

8.3 Key Insights from Business Case

The Business Case review identified a set of key considerations for developing both the transitional and transformational fare structure. These considerations should be supplemented by continued stakeholder engagement to set out the design and development of both structures.

8.3.1 Transformational Structure

The transformational structure provides a long term vision for how fares could be structured in the GTHA. This structure has the greatest ridership growth potential, addresses the key fare barriers, improves user experience, and supports transit planning in the GTHA. The benefits of the transformational structure are realized over the long term as the transit network evolves, including the development of RER and new RT services.

As a result, the transformative structure should be implemented over the long term when it can realize the full extent of its benefits.

Concept 4 achieved the strongest strategic performance, positive economic performance, and is deemed deliverable (pending further study and analysis). It is therefore considered as a starting point for the development of the transformative structure from a strategic perspective.

Concept 3 also applies FBD and had the strongest economic performance of the concepts across both revenue scenarios. The difference in economic performance between the concepts should be considered during the development of a transformational vision, including the use of an initial flat fare for services that use FBD.

Concept 4 also had key issues that limited or negatively impacted its performance. The transformative structure should draw on the strongest elements of Concept 4, and manage its key weakness or issues to develop a new structure.

The findings outlined throughout this Business Case have been synthesized into a set of design features (shown in Figure 8,4) for consideration as the Fare Integration project progresses.

TABLE 8.4: KEY DESIGN CONSIDERATIONS FOR CONTINUED STRUCTURE DEVELOPMENT

1	**Consider FBD on additional services to achieve strategic goals**	The transformational fare structure should consider a fare that is aligned with the value of the trip taken by using a base fare for boarding transit and a distance based fare that is calculated based on distance travelled on each service that uses FBD. This approach allows for flexibility to meet market needs, grow demand in markets that currently face fare barriers, and create a consistent overall structure.
2	**Manage FBD pricing to ensure the network remains accessible**	The transformational fare structure should consider strategic pricing when implementing FBD. Distance based fares must be managed carefully and implemented in a way that mitigates potential ridership losses from long distance markets that currently have a flat fare. FBD design should focus on adaptable fares that support integrated service planning across geographic or jurisdictional barriers.
3	**Allow for flat fares where effective**	The transformational fare structure may consider the use flat fares (either as part of an FBD pricing approach as an initial flat fare or cap or for a service type) where they are effective based on a more detailed analysis of service impacts and the development of a revised service structure.
4	**Develop the new fare structure with a focus on customer experience and service integration**	The transformational fare structure should consider the benefits of a seamless and unified customer experience across the region's services and service providers during its development. Structure design should focus on adaptable fares that support integrated service planning across geographic or jurisdictional barriers.
5	**Align fare structure design and implementation with the RTP and future network expansion**	The transformational fare structure should be pursued when it can realize its full potential benefits – this includes aligning its implementation with RER, increased cross boundary demand, and development of expanded RT networks.
6	**Phase fare structure delivery across the GTHA's travel markets**	The transformational structure should be pursued in phases across the GTHA's travel markets based on their potential to realize strategic and economic benefits in a manner that will be defined in the Implementation Strategy

The Business Case also identified key issues for consideration when developing the transformative structure:

- Managing the implementation of FBD, especially on longer distance trips in Toronto, to minimize potential ridership losses and impacts;
- Designing a payment, boarding, and alighting solution that is aligned with the needs of customers and operators;
- Exploring approaches to social equity, concessions, and products that will ensure transit is accessible and convenient under a new fare structure;
- Conducting further analysis on pricing tools that will ensure the structure meets the needs of customers (example: fare caps, initial flat fares, a range of products/passes, and potential use of steps instead of per km rates);

- Identifying an expanded service structure with clear fare recommendations for all service types, including those that may not use FBD; and
- Exploring potential decision making structure models that vary by degree of centralization.

A summary of the key benefits and opportunities to consider during structure development by customer, operator, and regional perspectives is outlined in Table 8.5.

TABLE 8.5: KEY BENEFITS AND ISSUES FOR THE INTEGRATED FARE STRUCTURE

	Benefits of proposed direction	Issues to consider during structure development
Customers	• A consistent fare structure allows customers to use multiple services across the region without having to know local rules or point of purchase processes • Fares are more aligned with the type of trip taken – this means relief from cost barriers (including sudden increases in price or paying two full fares for one trip) and ability to use transit for more trips • Standardized user experience and products that are based on trips taken – not on agencies used	• Managing potential loss of ridership due to increased long distance fares through products, concessions, and other structure optimizations • Managing equity impacts where fare changes occur • Delivering a simple communication system and marketing campaign to encourage use of new fare structure • The use of grace periods to ensure customers learn the structure
Operators	• The use of a more variable fare structure allows greater flexibility to manage demand/revenue targets • A tap on/tap off system allows for origin, destination, and time of day travel data to be collected • The fare structure offers an ability to manage distribution of demand between service types	• The new structure will have incremental costs to implement, maintain, and operate that must be estimated and funded – responsibility for these costs is a key policy consideration • Setting up long distance fares that balance revenue and ridership goals • The extent to which the new structure will impact crowding and congestion on transit service • Tap on/tap off on local buses must be implemented and managed carefully to minimize potential impacts
Region	• The integrated fare structure delivers strong economic benefits to travellers and society as a whole • The use of a consistent region wide structure provides improved ability to collect transport data and manage the transport network • The structure allows fares to be set tactically, which can grow ridership for markets that currently face fare barriers – expanding the role of transit in the region	• The new structure requires investment in capital/operating costs to deliver – these costs should be explored and managed carefully • The new structure may require direct revenue investment to mitigate potential ridership impacts • The structure can be implemented with moderate to major decision making structure changes, which must be explored to identify potential risks/opportunities

8.3.2 Considerations for the Implementation Strategy

Incremental changes can be developed as a first step towards achieving the transformational vision. The benefits of these changes can be realized within the existing transit network or with near term improvements. It addresses urgent issues and lays foundations for the future structure.

The development of the "Implementation Strategy" should explore the performance of Concepts 1 and 3 to identify key issues that can be resolved incrementally that will improve the seamlessness of the transit network and safeguard for the longer term transformational vision. This includes considering:

- Ideal discounted transfer fares for TTC/GO Transit and TTC/905 trips that replace the current paying two full fares;
- Appropriate short/medium distance regional fares that will attract demand to GO RER and expand travel opportunities;
- The roll of pay parking in demand and revenue management; and
- How to align incremental changes with with significant transit investments, including: RER, TYSSE, New LRTs, changes to the PRESTO system, and other transit improvements.

8.4 Next Steps

This preliminary Business Case provided a summary of the performance of five potential fare concepts. These concepts were reviewed to identify key considerations of the development of a transformational fare structure along with a transitional structure that progresses towards the final vision. Key findings from this Business Case to consider in the continued development of an Integrated Fare Structure include:

- There are strategic and economic benefits that can be realized when the transformational structure uses a base fare plus distance fare model on a range of services, including a more seamless fare structure that grows demand across the GTHA's travel markets; a seamless and more equitable transit fare structure that grows demand across the GTHA’s travel markets;
- The transformational structure should be pursued in phases across the GTHA’s travel markets based on their potential to realize strategic and economic benefits in a manner that will be defined in the "Implementation Strategy"; and

- The "Implementation Strategy" should draw upon Concepts 1 to address immediate fare barriers and lay the foundations for a transformational structure.

This study concludes the second phase of a four phase process. Future studies should address:

- Outstanding deliverability issues – including detailed design of customer experience, specific fare payment systems, and tools to manage tap on/tap off impacts;
- Detailed review of agency impacts – while this study accounted for the overall financial and strategic impacts to the region and travel markets, future studies should revisit this analysis and identify refined estimates for agency specific impacts;
- Revised costs should be developed as more detailed scoping work on the future fare structure is completed- depending on the number of iterations of interim fare measures implemented and if the number of fare policy rules increase from the current situation then at the time of implementation the costs could exceed those in Business Case;
- Approaches to social equity – this study identified that fare integration can realize social equity benefits and impacts, which should be studied in greater detail as part of fare structure delivery planning – including the consideration of;
- Optimal pricing structures that yield required revenue but do not discourage transit use for long distance trips that currently have a flat fare; and
- Refined service structure and tools to optimize the fare structure (including time of day pricing, products, and concessions).

These issues will be explored in the next two phases of the study:

- **Phase 3 Fare structure refinement** – continued development of the transformational structure's performance standards and requirements for technology, customer experience, service planning, decision making, and other approaches to structure refinement (example: time of day pricing, products, and concession); and
- **Phase 4 Implementation Strategy – Fare Structure Implementation and Management** – development of an overall strategy to deliver improvements to the existing fare structure leading to the long term transformational vision.