City of Hamilton
GENERAL ISSUES COMMITTEE

Meeting #:	20-002(c)
Date:	January 24, 2020
Time:	9:30 a.m.
Location:	Council Chambers, Hamilton City Hall
	71 Main Street West

Stephanie Paparella, Legislative Coordinator (905) 546-2424 ext. 3993

Pages

1. APPROVAL OF AGENDA

2. DECLARATIONS OF INTEREST

3. APPROVAL OF MINUTES OF PREVIOUS MEETING

4. COMMUNICATIONS

5. CONSENT ITEMS

6. STAFF PRESENTATIONS

7. DISCUSSION ITEMS

8. MOTIONS

9. NOTICES OF MOTION

10. PRIVATE & CONFIDENTIAL

11. ADJOURNMENT

Hamilton

Transit

2020 OPERATING BUDGET

JANUARY 24, 2020

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Public Works Department
TRANSIT DIVISION

PRESENTATION OUTLINE

- **TRANSIT, YOUR FIRST CHOICE.**

- **2019 HIGHLIGHTS**

- **10 YEAR LOCAL TRANSIT STRATEGY**

- **2020 BUDGET**
  - **CONVENTIONAL**
  - **SPECIALIZED**

- **(RE)ENVISION**

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TRANSIT STRATEGIC DIRECTION

TRANSIT DIVISION STRATEGIC DIRECTION

Hamilton

TRANSIT, YOUR FIRST CHOICE.

OUR PURPOSE
We provide customer-focused service that is safe, reliable, and inclusive.

GOALS

1 To consistently provide a customer experience that meets or exceeds the expectations of our current customer base while building a reputation that attracts new customers.

2 To maintain a transit service and infrastructure that keeps our system in a state of good repair.

3 To take ownership of a system that increases modal split through growth within current conditions and expansion to accommodate future needs.

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Hamilton

2019 HIGHLIGHTS

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CONVENTIONAL TRANSIT - 2019 HIGHLIGHTS

we provided
21,659,637
rides

we travelled close to
17,000,000
vehicle kms

we collected
$45,272,399
in revenue

revenue/cost ratio:
45.3%

267 buses
51% CNG Buses

2,018,950
bus check calls

39,772
SMS

Mountain Climber on **7** mountain accesses

2,294
bus stops

maintain **688** shelters

80 newly constructed or replaced landing pads
26 shelter pad re-pours

2 rehabilitated bus loops

5

CONVENTIONAL TRANSIT - COMPARISONS

In comparison to other cities in the GTHA, Hamilton ranks:

#1 lowest average fare

#1 in cost per revenue hour

#3 in rides per capita

#3 in revenue/ cost ratio

*within the Transit Urban Boundary
SOURCE: Canadian Urban Transit Association (CUTA)

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SPECIALIZED TRANSIT – 2019 HIGHLIGHTS

2019 Highlights

Cost Per Trip

$26.71

↓ **3.5%** below budget

Lowest Cost Per Trip (GTHA)

#1

Trips Delivered

844,007

↑ **9%** more than 2018

Trips Delivered (GTHA)

#2

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PUBLIC TRANSIT INFRASTRUCTURE FUND (PTIF)
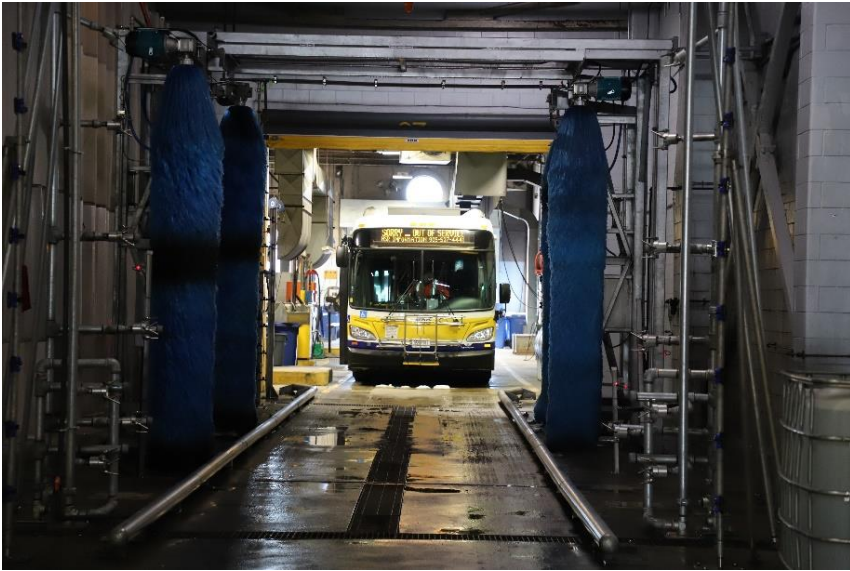
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PTIF IMPLEMENTATION UPDATE

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PTIF IMPLEMENTATION UPDATE

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PTIF IMPLEMENTATION UPDATE

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STRATEGIC PLAN PRIORITIES

OUR PRIORITIES

COMMUNITY ENGAGEMENT & PARTICIPATION
Hamilton has an open, transparent and accessible approach to City government that engages with and empowers all citizens to be involved in their community.

ECONOMIC PROSPERITY & GROWTH
Hamilton has a prosperous and diverse local economy where people have opportunities to grow and develop.

HEALTHY & SAFE COMMUNITIES
Hamilton is a safe and supportive city where people are active, healthy, and have a high quality of life.

CLEAN & GREEN
Hamilton is environmentally sustainable with a healthy balance of natural and urban spaces.

BUILT ENVIRONMENT & INFRASTRUCTURE
Hamilton is supported by state of the art infrastructure, transportation options, buildings and public spaces that create a dynamic City.

CULTURE & DIVERSITY
Hamilton is a thriving, vibrant place for arts, culture, and heritage where diversity and inclusivity are embraced and celebrated.

OUR PEOPLE & PERFORMANCE
Hamiltonians have a high level of trust and confidence in their City government.

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OUR PEOPLE SURVEY – ACTION PLAN

PERSONAL RECOGNITION
Recognize Staff in Bus Beat
Division-Wide

PSYCHOLOGICAL WELL-BEING
Employee Suggestions
linked to OPS
Division-Wide

IMPROVE INTERNAL COMMUNICATIONS
Communication
Division-Wide

Transit Leadership Team meeting update to keep staff informed.

PHYSICAL SAFETY
Green Belt Project on
Collision Reduction
Operations
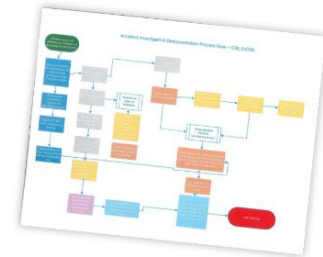
CONSISTENT POLICIES & PROCEDURES
Process Documentation
Customer Experience
and Innovation
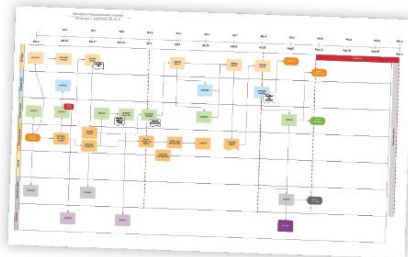
MANAGING CHANGE
Trickle Down "Directionomics"
Planning and Infrastructure

After Transit Leadership Team meetings, share relevant information and provide updates from across the Division.

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OUR PEOPLE SURVEY – ACTION PLAN

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10 YEAR LOCAL TRANSIT STRATEGY

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10 YEAR LOCAL TRANSIT STRATEGY

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10 YEAR TRANSIT STRATEGY: BLAST ASSUMPTIONS

Hamilton Long Term Rapid Transit System "B.L.A.S.T" (Conceptual Only)

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10 YEAR TRANSIT STRATEGY – TIME LAPSE VIDEO
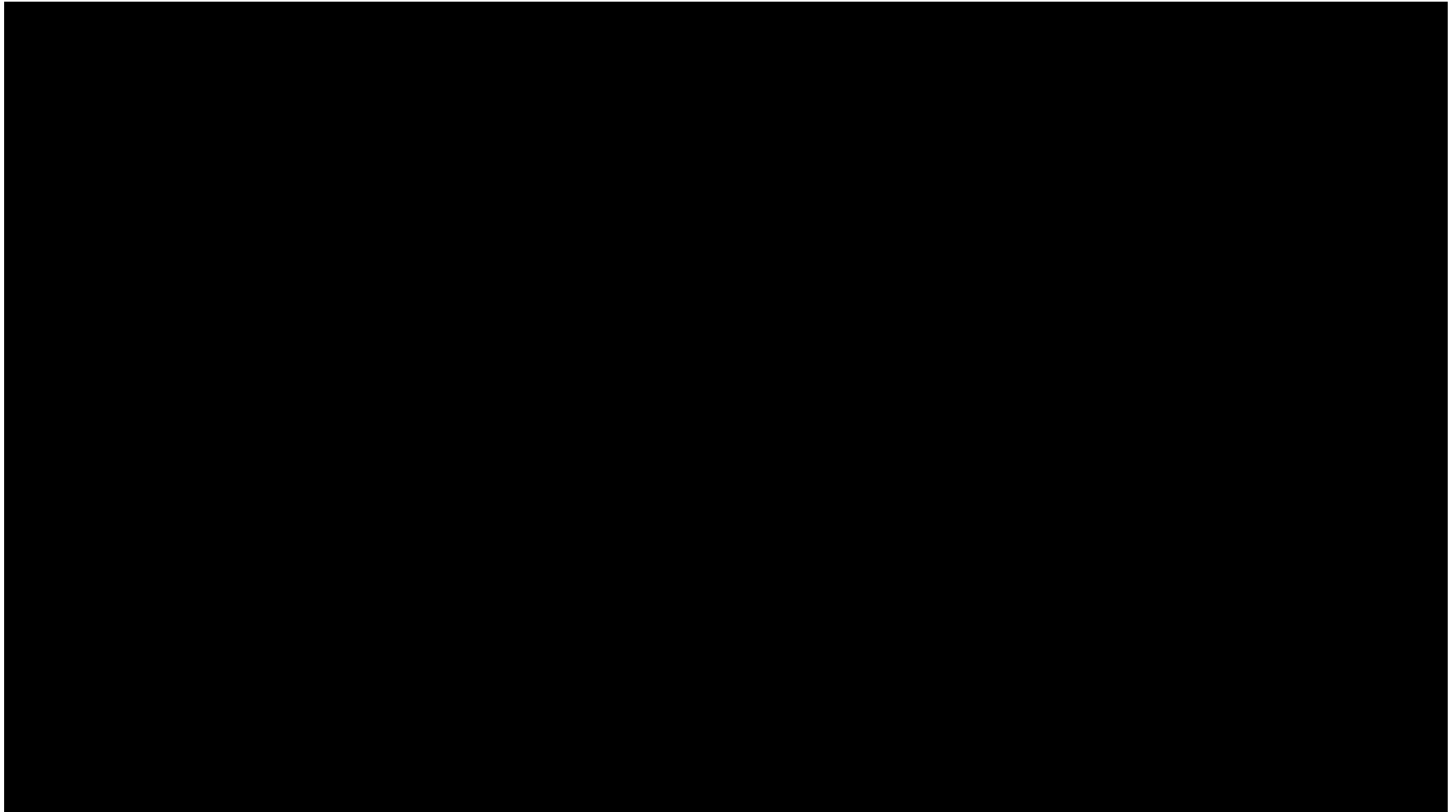
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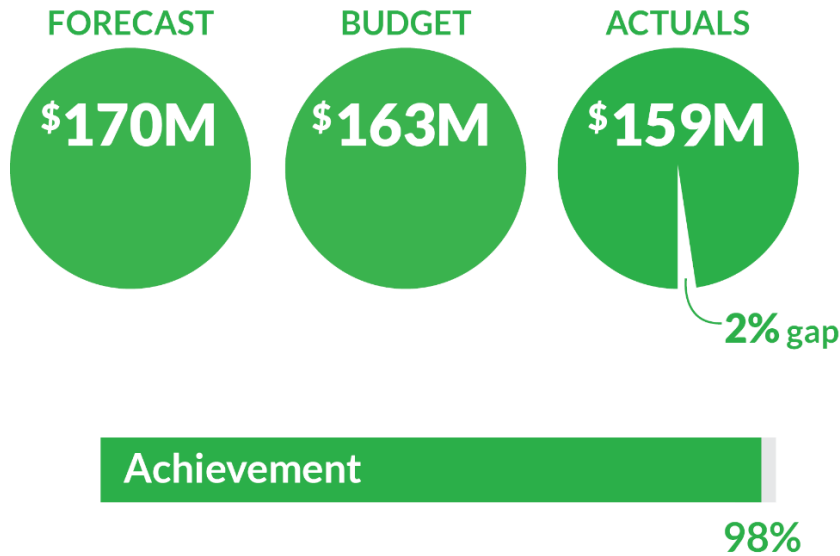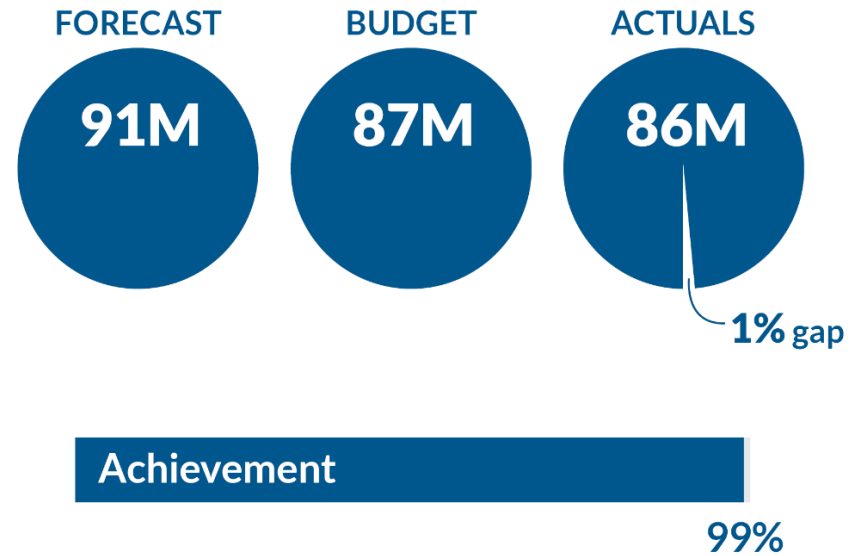
10 YEAR TRANSIT STRATEGY: RECALCULATION

2019

	BUDGETED	ACTUALS	
REVENUE	$43,625,324	$45,272,399	⬆
RIDERSHIP	21,065,409	21,659,637	⬆

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10 YEAR TRANSIT STRATEGY: RECALCULATION

Recalculated #'s
2020-2025 FORECAST

$322M   REVENUE

141M   RIDERSHIP

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10 YEAR TRANSIT STRATEGY: UPDATED CAPITAL

Conceptual rendering of the Maintenance and Storage Facility from the north-west.

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TRENDS AND ISSUES 2020 - 2023

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TRENDS AND ISSUES

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MOUNTAIN TRANSIT CENTRE – OVER CAPACITY

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TRENDS AND ISSUES - ELECTRIC BUSES

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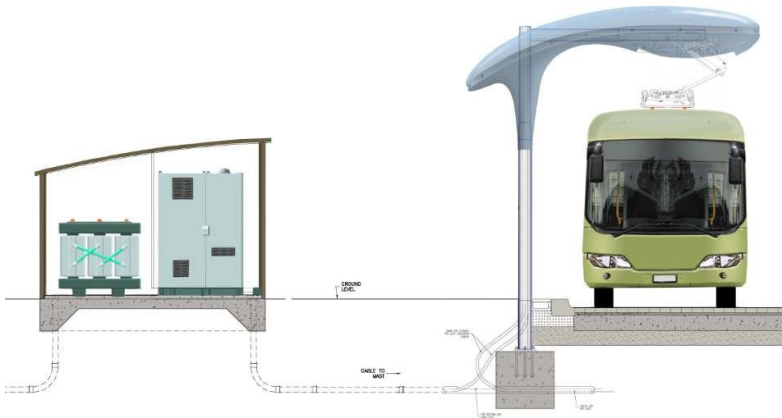
TRENDS AND ISSUES

ATTENDANCE

is showing improvement, remains a focus area.

New process for claiming Short Term Disability - note in 4 days will also assist.

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CUSTOMER EXPECTATIONS

we are in the customer service business.

Needs and wants are changing, real time info, more frequent service, reliability of service.

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SPECIALIZED TRANSIT – TRENDS AND ISSUES

GROWTH IN RIDERSHIP ON SPECIALIZED TRANSIT

Since 2013, on average, the trend has been approximately **10% year to year** (actuals to actuals).

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2020 BUDGET

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YEAR FIVE CONVENTIONAL BUDGET

(000's)	2019 Restated Net	2020 Preliminary Gross	2020 Preliminary Net	$ Net Change	% Net Change
Transit	$74,299	$141,440	$81,396	**$7,097**	**9.6%**
Amendments – January 17, 2020 Budget GIC: Reduction to Fuel Assumptions (diesel & unleaded)				($115)	
Total Transit Net Levy Less Amendments				$6,982	9.4%
Major Drivers					
Attributable to DARTS Increase				$2,664	3.6%
Employee Related				$1,396	1.9%
PRESTO Agreement				$875	1.2%
Annual 10 Year Strategy (Net)				$688	0.9%
Transit Fleet Reserve (year 8 of 8 loss of OBRP funding)				$628	0.8%
Insurance Premiums (direct charges)				$424	0.6%

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YEAR FIVE CONVENTIONAL BUDGET

Y5

13 additional buses

35 FTE

Approximately **46,000** service hours

Fare increase **$0.05** effective September 1, 2020

Total Cost of **$4,239,000** annualized over two years

2020 - $688k (net of fare revenue)

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SPECIALIZED TRANSIT BUDGET

Cost Per Trip

$27.59

Forecasted Trips

885,000

Total increase

$2,664,130

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10 YEAR TRANSIT STRATEGY: SERVICE ENHANCEMENTS

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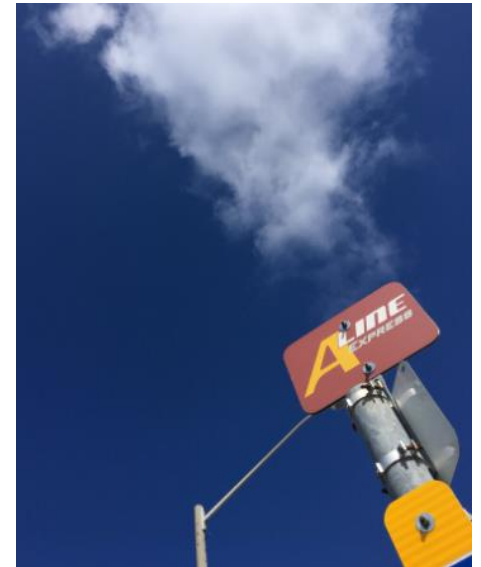
YEAR FIVE ENHANCEMENTS – ROUTE 44 RYMAL

IMPROVED PEAK AND EVENING FREQUENCY

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YEAR FIVE ENHANCEMENTS – ROUTE 20 A LINE

IMPROVED PEAK FREQUENCY AND EVENING SPAN

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YEAR FIVE ENHANCEMENTS – STONEY CREEK MOUNTAIN
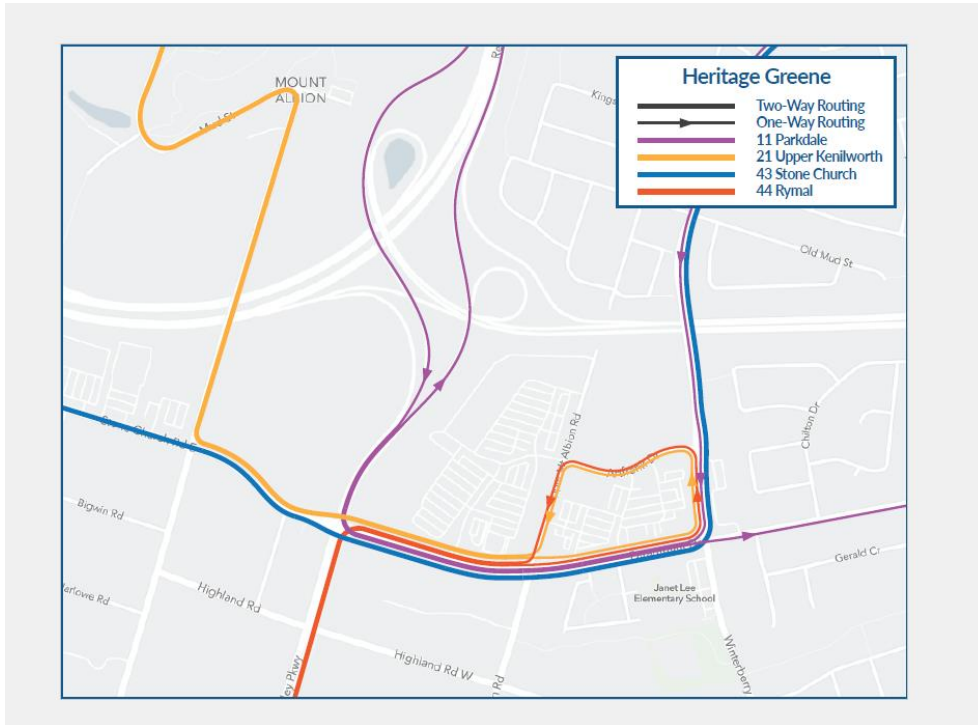
ROUTING CHANGE AND IMPROVED CONNECTIVITY

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(RE)ENVISION THE HSR

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TRANSIT STRATEGIC DIRECTION - VIDEO

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MY HSR CAMPAIGN

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SURVEY RESPONSE RATE

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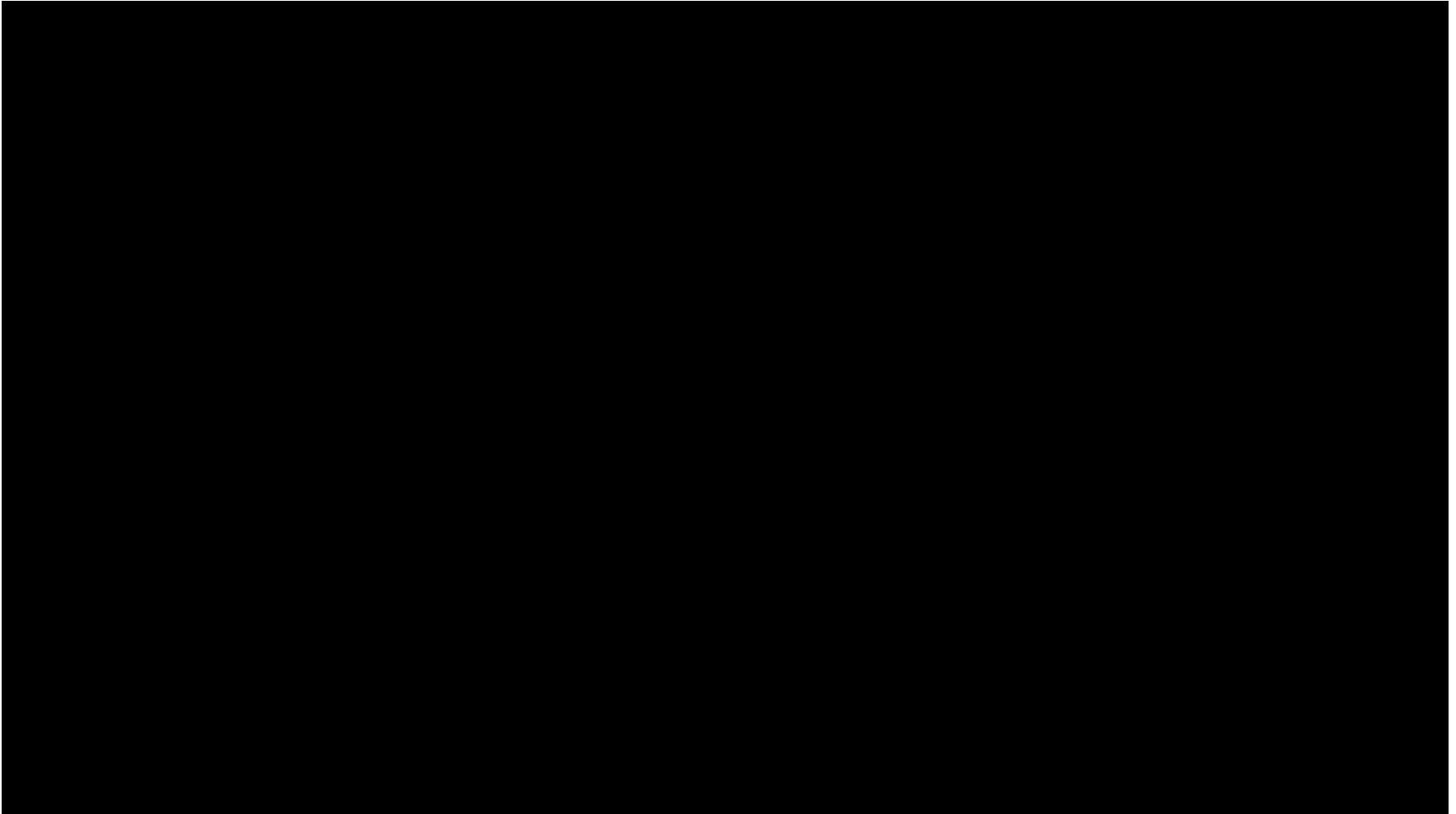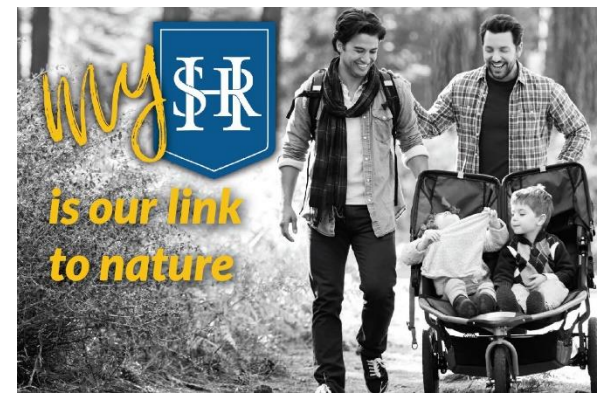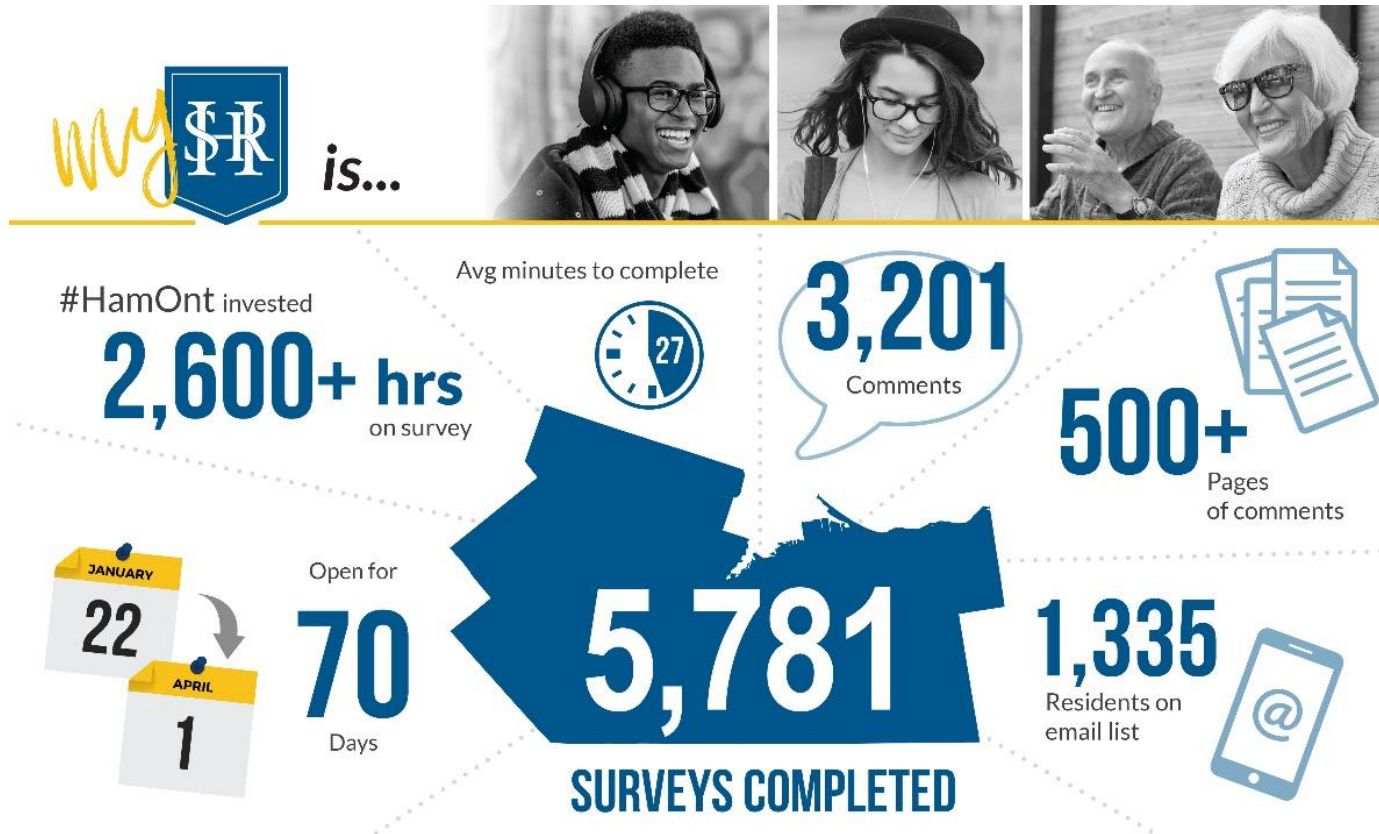
SURVEY RESPONSE RATES

Participation by Ward

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WHAT WE'VE LEARNED SO FAR – CURRENT CUSTOMERS

Current customers told us to concentrate on the following things which were rated with the highest importance and lowest satisfaction:

- On-time service reliability

- Waiting times at transfer and connection points

- Frequency of service on weekends and holidays

- Bus crowdedness

- Weather protection at bus stops

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WHAT WE'VE LEARNED SO FAR – POTENTIAL NEW CUSTOMERS

Potential new customers had very similar views, but rated the following with higher importance compared to current customers:

- Reduce # of transfers required

- Reduce total trip time (similar to using a car)

- Increase connectivity to other modes of transportation

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The dominant driver of customer satisfaction and drawing new customers that build transit ridership is:

FREQUENT RELIABLE SERVICE

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ENGAGING IN OUR COMMUNITY

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ENGAGING IN OUR COMMUNITY

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ENGAGING IN OUR COMMUNITY

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(RE)ENVISION TIMELINE

WINTER 2018 & SPRING 2019

Survey current and potential customers

FALL & WINTER 2019

Consult and engage in communities

SPRING 2020

Report on research and design principles

SUMMER 2020

Propose new network design

FALL 2020

Propose financial strategy and budget

JUNE 2021

Launch new network for customers

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INFORMATION REPORT

TO:	Mayor and Members General Issues Committee
COMMITTEE DATE:	January 24, 2020
SUBJECT/REPORT NO:	(Re)envision the HSR Updates (PW20005) (City Wide)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Jay Adams (905) 546-2424 Ext. 6242
SUBMITTED BY: SIGNATURE:	Debbie Dalle Vedove Director, Transit Public Works Department

COUNCIL DIRECTION

N/A

INFORMATION

In 2019 (January-April), the Transit Division (HSR) conducted a comprehensive survey of its customers and Hamilton residents across the city (considered as potential new customers, from the perspective of transit ridership). The goal of the research was to measure our customers' perceived quality of transit service as it exists today in Hamilton, and to understand what current and potential customers desire from the service in the future. This information will enable us to focus our improvement efforts on the key drivers of customer satisfaction, and to look for new ways to increase our ridership to meet the objectives of our 10-Year Transit Strategy.

Figure 1: The Quality Loop Model

SUBJECT: (Re)envision the HSR Updates (PW20005) (City Wide) – Page 2 of 9

The survey was administered and analysed by researchers within McMaster University's Department of Civil Engineering and the McMaster Institute for Transportation and Logistics (MITL). The Principle Investigator was Dr. Moataz Mohamed, Assistant Professor of Smart Systems and Transportation.

A comprehensive marketing campaign was undertaken to ensure broad awareness of the survey across all wards of the city. The response rate to the survey was tremendous, with 5,781 responses to the survey, which took on average 27 minutes to complete. This underscores a tremendous dedication on behalf of HSR customers and Hamilton residents to provide their feedback in support of the development of transit in their communities. Responses were statistically representative across various demographic profiles and locations in the city.
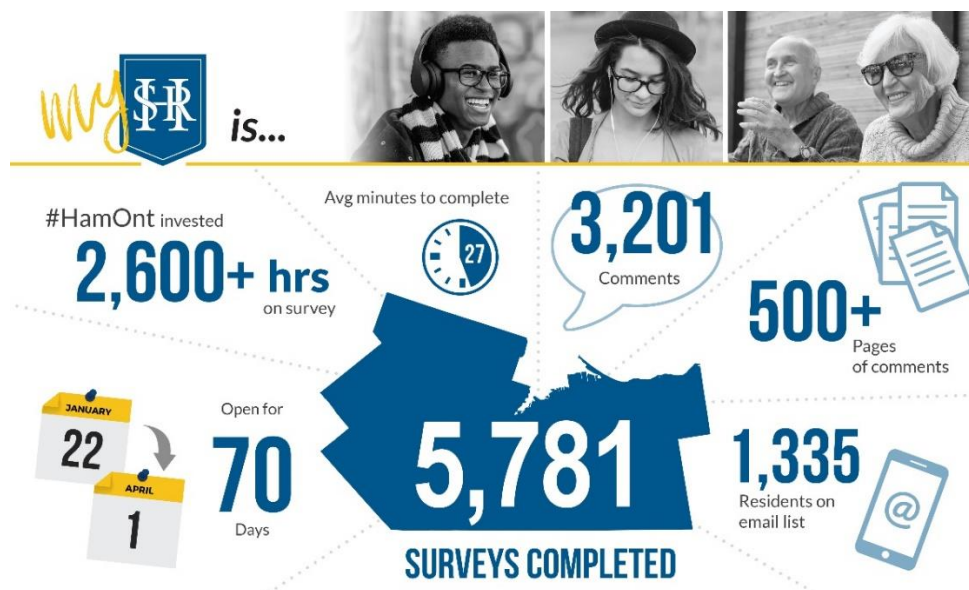
Figure 2: Response rate to survey.

The analysis of these survey results is now complete, with the following highlights being shared in this report as staff begin the next phases of the *(Re)envision the HSR* project. These phases include a robust analysis of the transit network's health and performance against our target service quality metrics. Staff will also be continuing public engagement activities across the city, to add further context to the survey results and to explore the beneficial and adverse impacts of proposed network reconfigurations for our customers.

This project will culminate in a further report and recommendations that would come forward to Council beginning in spring 2020. Approved recommendations would then become part of a workplan, with implementation of a potentially reconfigured network targeted for summer 2021. Where opportunities exist to implement improvements earlier, the Division would seek to fast-track those opportunities for the benefit of customers.
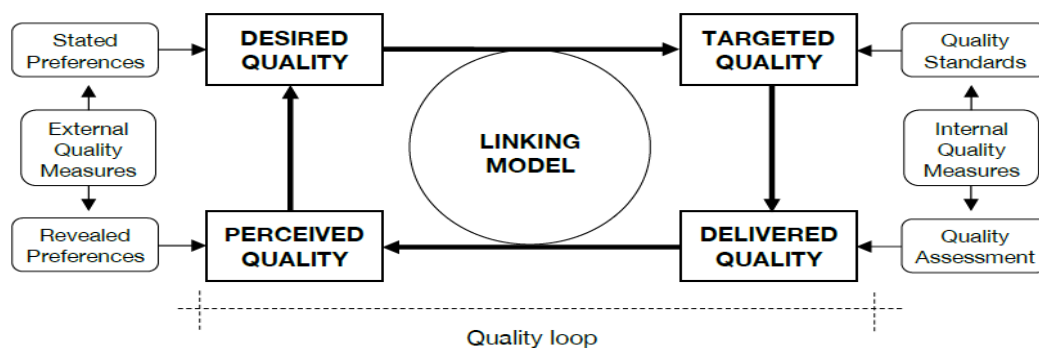

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OUR Mission: To provide high quality cost conscious public services that contribute to a healthy, safe and prosperous community, in a sustainable manner.
OUR Culture: Collective Ownership, Steadfast Integrity, Courageous Change, Sensational Service, Engaged Empowered Employees.

INFORM
Providing updates on the project
for major milestones

WINTER 2019
Survey our current
and potential
customers

SPRING/SUMMER 2019
Consult, deliberate and
collaborate with Hamilton's
many communities

FALL 2019/WINTER 2020
Design and reconfigure
our network

SPRING 2020
Provide
recommendations
to Council

Figure 3: Project timeline

SURVEY METHODOLOGY

Participants in the survey were asked to provide information regarding:
- Socioeconomics and demographics
- Travel behaviour and mobility options (including their primary mode of travel and their frequency of travel on transit)
- Perceived and desired quality of HSR service:
  - by customers, related to perceived quality (e.g. satisfaction) of the criteria with respect to HSR service
  - by all survey respondents, related to the importance of the criteria in choosing transit as a mode of travel

Stated preferences:
  - 'Unlabelled' choices were presented to compare various models of HSR service adjusting for variables such as fare price, time spent on bus, walking distance, transfers and provision of real-time info
  - 'Labelled' choices were presented to compare HSR service to car and ride-share modes of travel, using the same variable factors
- Attitudinal and behavioural orientations

GENERAL SATISFACTION

The survey highlighted that overall satisfaction with the service is relatively high, but there is definite room for improvement. Approximately 56% of respondents reported positive levels of satisfaction (score = 7 to 10), while 26% of respondents reported neutral satisfaction (5 or 6) and 17% reported being relatively unsatisfied (1 to 4).

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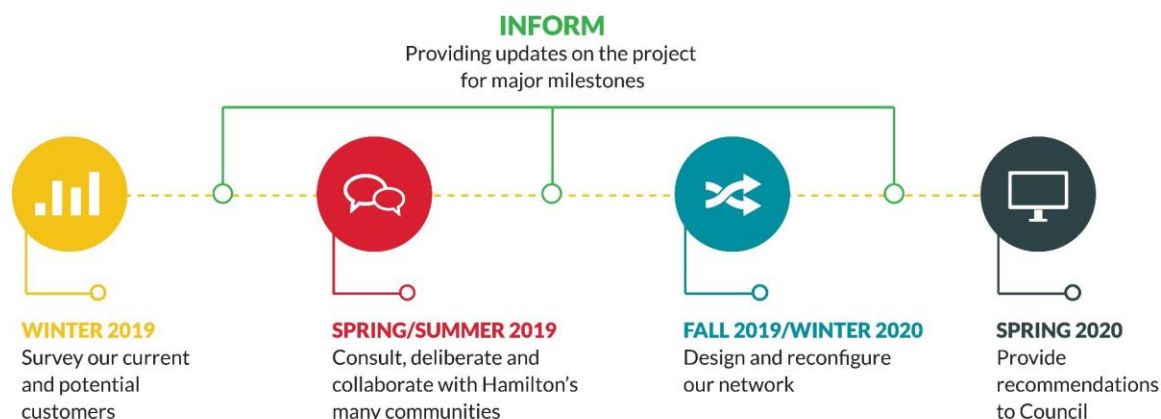
Overall Satisfaction
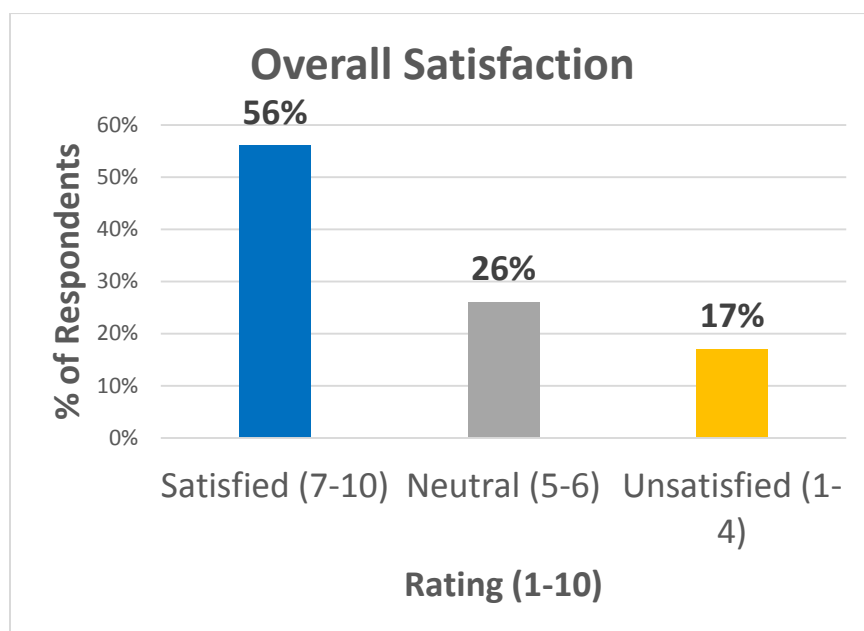
Figure 4: Results of overall satisfaction rating

DRIVERS OF SATISFACTION

In conducting the survey, the HSR had two related but distinct motivations:
1. Retain existing riders on transit by understanding what drivers of satisfaction are not currently meeting customers' expectations; and
2. Attract new ridership by understanding what would motivate potential customers to choose transit as one of their transportation choices in the future.

In order to understand the current customer experience, we need to determine what factors are most important to customers, and then measure how well we're performing against the desired quality that customers expect from the service. In order to understand what may motivate new customers to choose transit, we need to understand what is important to potential customers, and then work toward establishing and communicating those benefits within our service delivery model.

Factors that are performing well today, but which are not critical to driving satisfaction may be areas in which the HSR is sufficiently meeting expectations or possibly over-servicing. Conversely, factors that are performing poorly today and that are critically important to making transit a preferred choice are areas where the service needs to focus to improve performance to retain and attract customers.

This relationship can be viewed within the following Importance / Performance Analysis (IPA) framework:
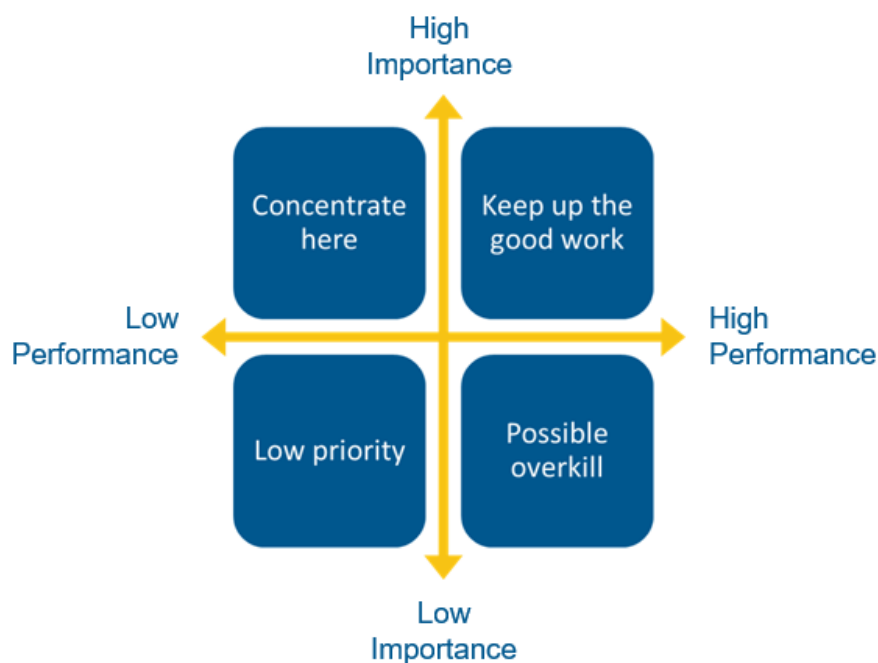
Figure 5: Importance / Performance Analysis (IPA) framework.

Applying this framework to the survey, current customers were asked to rate the level of performance (e.g. satisfaction) with 29 factors shown to impact perceived quality of transit service, based on studies done in other jurisdictions. Additionally, all survey participants were asked to rate the level of importance of 30 factors shown to motivate choice of transit over other transportation modes.

Plotting these factors on the IPA framework, the dominant drivers of customer dissatisfaction with HSR service includes:
- Service reliability
- Weather protection at bus stops
- Waiting times at transfer / connection points
- Frequency of service on weekends and holidays
- Bus crowdedness
- (Cleanliness of bus stops and comfort amenities at stops / shelters were on the borderline)

These are all areas of critical importance to evaluate for improvements as part of the (Re)envision project, if we're to achieve positive ridership growth.

Current customers were also asked to rate their satisfaction with the routes they commonly ride. Shorter and more local routes typically were rated with higher levels of satisfaction. The five routes with the highest levels of <u>dissatisfaction</u> all run on the

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SUBJECT: (Re)envision the HSR Updates (PW20005) (City Wide) – Page 6 of 9

mountain and travel longer distances. Route #44 had the highest level of dissatisfaction, followed (in order) by routes #41, #20, #27 and #43.

WILLINGNESS TO PAY (WTP)

An additional focus of the survey was to research which quality assessment and choice statistical models are most appropriate to predict future ridership strength for the HSR. These models focus on a "willingness to pay" context, that assesses the relative value that a person associates with a specific factor of service (e.g. frequency, total trip time, walking time, etc.), by measuring that factor against fare price as a baseline. Using this approach, it is possible to associate the impact of adjusting various attributes, by quantifying a corelated monetary cost in the form of a fare increase or decrease, that would be tolerated by customers if that attribute were adjusted.

The results of this aspect of the research will enable the division to improve ridership prediction estimates based on the evolving factors of service delivery over time. They will also enable better identification of market segments more likely to be motivated to choose transit as a form of transportation, in order to focus our efforts on increasing ridership.

Regarding these choice scenarios (choosing between different transit options), the general model shows that:
- Hamiltonians in general prefer shorter journey and walking times, lower fares, and higher service frequencies (i.e. shorter headways);
- Hamiltonians appreciate on-board real-time information more than at-stop real-time information, and both are more preferred to no real-time provision at all; and
- Hamiltonians express a high preference for direct trips (i.e. zero transfers) over multiple transfer trips.

ATTITUDINAL AND BEHAVIOURAL ORIENTATIONS

The survey assessed respondents' perspectives related to pro- and anti-transit attitudes, perceived behavioural control, social norms, car-reliance, ride-hailing preferences and behavioural intentions.

These assessments have a significant bearing on the way residents choose to travel and are considered key influential factors for transportation mode choice. The results indicate a good perception associated with using transit from respondents. Transit is not perceived as "old fashioned," nor do respondents believe transit is only for those who are less fortunate. Most notably, there is a willingness to use transit for current and potential customers if the service is significantly improved. That said, there is a predominant car-reliant attitude indicated in the results as well.

SUBJECT: (Re)envision the HSR Updates (PW20005) (City Wide) – Page 7 of 9

Together, these indicators would demonstrate meaningful positive attitudes toward transit adoption that are conditional on service quality improvements. They would also emphasize the importance of a targeted focus on market segments who are more likely to consider transit as a transportation mode, versus attempting a one-size-fits-all approach to marketing transit to all Hamilton residents.

Further information on the methodology and customer insights gathered from the survey are summarized in Appendix "A" to Report PW20005.

ONGOING PUBLIC CONSULTATION ACTIVITIES

The survey results provided a network-wide perspective from customers and non-customers. As the HSR continues its consultation activities, our goal is shifting to understanding more localized impacts of transit service within neighbourhoods, business areas, employers and institutions. This phase of consultation will include visiting areas of the city that currently have limited or no transit service today, to understand what needs may be emerging for future requirements and growth opportunities.

Staff are presently building relationships with many stakeholders across the city, including:
- School boards
- Post-secondary educational institutions
- Hospitals
- Social service providers and networks
- Business improvement areas (BIAs), business parks and chambers of commerce
- Major employers
- Hamilton International Airport
- Hamilton Port Authority
- Organizations working for the environment and sustainability

In some areas of the city, there are limited public spaces available, to support this outreach and engagement. Staff have undertaken two major initiatives to support improving our capacity to meet and engage with as many residents as possible.

1) The (Re)envision team has been working with the Chief Digital Officer and Manager of Community Initiatives to introduce a new digital engagement platform for the (Re)envision project, that will support a modern and innovative way to engage customers and Hamilton's residents.

   This new digital tool will help staff gather deeper knowledge and insights from HSR customers about their experiences and ideas. It will also help inform future corporate public engagement strategies and efforts. The HSR is excited to be the first City Division to explore use this new tool which can be accessed at hamilton.ca/myhsr.

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On this website, interested residents can:
- Share ideas, take part in mapping exercises, and discuss HSR's routes and service.
- Find out when the (Re)envision team will be in their community.
- Learn about upcoming HSR projects and announcements.
- Sign-up to receive newsletter updates about the (Re)envision project.
- Connect with the (Re)envision Team for questions and answers about our plans to reconfigure the network.

2) As we continue to grow ridership, connecting with Hamilton residents in their own communities is crucial. One of the recommendations in the City of Hamilton's Public Engagement Policy, made by the Hamilton Engagement Committee and endorsed by Council in April 2015, was the creation of a mobile 'one stop' engagement bus.

To support such an innovation, the HSR is taking our public engagement activities on the road. The (Re)envision team will be travelling across all wards throughout the city on our new consultation bus, to meet with residents to find out what we could do to make transit their first choice in transportation.

Quick facts about the consultation bus:
- A retired HSR bus (from 2004) has been given a second life, allowing for a return on investment beyond it's expected 12-year lifespan.
- Rechargeable battery cells and solar panels enable the bus to operate as a mobile board room without the ignition running, minimizing our carbon footprint.
- In-house staff completed the majority of the work, with HSR Maintenance staff doing body repairs, revitalization and interior design / construction.
- The refurbishments are expected to enable up to 5 years of additional usage for the consultation bus. (The bus will be used solely for public events and will not run in service.)
- Enthusiastic students from Mohawk College's Architectural Design program helped to design the interior layout using high-tech 3D scanners. The students focused on ensuring accessibility, adaptability and functionality – and they received course credit for their work on the bus.
- On-board touch screen displays enable participants to explore the HSR's website, route design tools, trip planners and the HSR's digital engagement space.
- The consultation bus is outfitted with features like Wi-Fi and colour destination signs, giving HSR staff the ability to test new features and technology, for future possible use in-service.
- The bus is wrapped with an attractive and inviting design, creating a mobile billboard that promotes in-person and digital engagement opportunities.

OUR Vision: To be the best place to raise a child and age successfully.
OUR Mission: To provide high quality cost conscious public services that contribute to a healthy, safe and prosperous community, in a sustainable manner.
OUR Culture: Collective Ownership, Steadfast Integrity, Courageous Change, Sensational Service, Engaged Empowered Employees.

- Security features have been installed to protect the on-board equipment from theft and unauthorized access.
- Future enhancements may be added, to increase the quality of the experience that the community can have while engaging with the HSR and the City on important initiatives.
- The bus tour details will be listed on the (Re)envision engagement website, hamilton.ca/myhsr.

Figure 6: Consultation Bus at the Our Future Hamilton event on November 4, 2019.

APPENDICES AND SCHEDULES ATTACHED

Appendix "A" to Report PW20005 – Service Quality and Consumers' Preferences for Hamilton Street Railway (HSR) Executive Summary

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Service Quality and Consumers Preferences for Hamilton Street Railway (HSR)

Executive Summary

October 2019

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Service Quality and Consumers Preferences for Hamilton Street Railway (HSR)

Executive Summary

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EXECUTIVE SUMMARY

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Executive Summary

This executive summary is developed as part of a research project titled: *A Systematic Assessment and Optimization of Hamilton Street Railway (HSR) Network*. The project seeks to achieve two overarching objectives, and this report addresses the first objective:

> *To arrive at an understanding of the perceived and desired quality of HSR service from the point of view of a wide range of Hamilton residents, including both those who use transit regularly or not at all.*

This executive summary provides a non-technical summary of the technical report "*Service Quality and Consumers Preferences for Hamilton Street Railway (HSR).*" The summary follows the structure of the report, and the findings are summarized in seven sections.

It should be noted that the views expressed in this document are those of the authors and do not necessarily reflect the views of the City of Hamilton.

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1. HSR Public Survey

HSR Public Survey is aimed at benchmarking the quality of HSR service based on user preferences and expectations. The survey is intended for those who currently use HSR service or may in the future. The McMaster Research Ethics Board (MREB) approved the survey on July 18th, 2018. Two waves of data collection have been completed. In September 2018, the first wave was collected by the research team at McMaster. In April 2019, the second wave of data collection was completed by the HSR team.

The survey is structured into five main sections, including socioeconomic and demographics, travel behaviour and mobility options, HSR perceived and desired quality, stated preferences experiment, and attitudinal and behavioural orientations.

1.1. Socioeconomic and Demographic Characteristics

The importance of socio-economic and demographic (SED) characteristics cannot be overemphasized in influencing the travel behaviour of individuals. The segmentation of the population based on SED characteristics offers policy/decision-makers useful insights to understand their customers and to address their needs effectively. The survey collected a comprehensive list of SED measures such as age, household size, employment status, among other variables.

1.2. Travel Behaviour and Mobility Options

Studying Hamiltonians' travel behaviour as well as available travel modes is essential for HSR transit planners and decision-makers. The survey adopts a revealed preference approach to observe their actual travel behaviour in real-life conditions. The survey collected a wide range of travel behaviour attributes such as the number of trips, door to door travel time, the primary mode of transport, and other variables.

1.3. HSR Perceived and Desired Quality Aspects

Transit service evaluation is essential for efficient transit service. However, the most challenging part of the evaluation process is to define the evaluation criteria as there is no consensus on an evaluation index for all transit agencies. Therefore, thoughtful selection of the evaluation criteria based on a comprehensive literature review was conducted. The survey collected data on the levels of satisfaction and importance associated with various quality aspects. The data could be seen in two folds. First, 29 satisfaction measures provide an indication of the perceived quality from HSR, which is collected from current HSR customers only. Second, 30 importance measures show the desired HSR quality and were collected from both current and potential customers.

1.4. Stated Preference Experiments

Another dimension to assess customers' preferences is applied through the Stated Choice Experiments. It could be seen as creating a bundle of scenarios, and each user chooses an alternative that best describes their preferences. Stated preference experiment is a potent statistical tool to capture preferences, predict future choices, and estimate the willingness to pay for service improvements.

Two sets of experiments were designed; unlabelled and labelled. The unlabeled stated choice scenarios asked respondents to choose between three bus transit alternatives, as shown in Figure 1-1. The aim is to measure the independent influence of each service

attribute on customers' choices. And to estimate the willingness to pay for service improvements.

While, the labelled stated choice scenario asked respondents, to choose between HSR bus service, auto-driver, and ridesharing alternatives, as shown in Figure 1-2. It is aimed at measuring preferences, willingness to pay for service improvements relative to other modes, and the independent influence of each attribute on mode choice.

Scenario 1 of 8: Bus Transit Choices for One-Way Trip

Trip & Service Attributes	Option - A	Option - B	Option - C
Bus Fare (one-way trip)	$ 3.00	$ 4.50	$ 6.00
Time Spent Travelling on Bus (one-way trip)	30 min	30 min	20 min
A Bus Departs from My Stop (at the start/end and transfer stops)	every 15 min	every 5 min	every 15 min
Walking Time to/from Bus Stop (includes walking time between transfer stops)	10 min	5 min	5 min
Number of Transfers Between Buses (during one-way trip)	1 Transfer	0 Transfer	2 Transfers
Real-time Trip Information (e.g. about delays)	None	At Stop	On Board
To Complete My Regular One-Way Trip, I Would Choose	●	●	●

Scenario 4 of 8: Bus, Auto driver, and Ridesharing Alternatives for One-Way Trip

Trip & Service Attributes	HSR	Auto Driver	Ridesharing (Taxi, Uber, Lyft)
Trip Cost - Fare/operation (one-way trip)	$ 3.00	$ 7.50	$ 20.00
Parking Cost	–	$ 0	–
Time Spent Travelling on Bus/Car (one-way trip)	20 min	40 min	30 min
Walking Time (to/from bus stop or parking)	2.5 min	0 min	–
Reliability (On-time Performance)	5 mins Late	–	–
Freedom & Flexibility	Bus Departs every 15 mins	At your disposal	On demand
Access to Real-time Trip Information	At Stop	Mobile device GPS & Radio	Mobile App
To Complete My Regular One-Way Trip, I Would Choose	●	●	●

Figure 1-1: Example of the unlabelled stated choice scenarios

Figure 1-2 Example of the labelled stated choice scenarios

1.5. Attitudinal and Behavioural Orientations

Many social psychology studies indicate that psychological factors play a pivotal role in the mode-choice decision-making process, and their inclusion improves the predictions of transit quality assessment models. This survey adopts, among others, the Theory of Planned Behaviour (TPB), which was developed by (Ajzen, 1991), in developing the attitudinal and behavioural statements.

In total, the survey introduced 31 statements, arranged in various groups, including attitudes, perceived behavioural control, social norm, car-reliant, ride-hailing, pro- and anti-transit attitude, and behavioural intention.

1.6. Sample Information Data

This survey collected a sample of 5781 respondents, 979 responses in September 2018 and 4802 responses in April 2019. Table 1-1 depicts the distribution of the sample associated with different socioeconomic and demographic characteristics. The sample is statistically representative of the population of Hamilton. Form a geographical perspective, the survey represented all wards in Hamilton, with some minor under representation of four wards; Upper Stony Creek, Lower Stony Creek, Ancaster, and Flambrough as illustrated in Figure 1-3 and Table 1-2.

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Table 1-1: Distribution of the sample into different socio-economic groups

Category	Sub-Category	Respondents (%)	Current Customers* (%)	Potential Customers* (%)	Population (%) Hamilton CMA
Total	Total	5627 (100%)	2213 (100%)	3414 (100%)	747545 (100%)
Gender	Male	2222 (39.50%)	783 (35.38%)	1439 (42.15%)	48.90%
	Female	3233 (57.45%)	1349 (60.96%)	1884 (55.18%)	51.10%
	Self-Identity	43 (0.76%)	20 (0.90%)	23 (0.67%)	—
	Prefer not to answer	129 (2.29%)	61 (2.76%)	68 (1.99%)	—
Frequency of use HSR	Daily	2254 (40.05%)	1777 (80.30%)	477 (13.97%)	10.54%
	Weekly	1086 (19.30%)	383 (17.31%)	703 (20.59%)	—
	Monthly	641 (11.40%)	43 (1.94%)	598 (17.52%)	—
	Annually	678 (12.05%)	7 (0.32%)	671 (19.65%)	—
	Never	968 (17.20%)	3 (0.14%)	965 (28.27%)	—
Age	15 to 19 years	398 (7.07%)	243 (10.98%)	155 (4.54%)	5.98%
	20 to 29 years	1267 (22.52%)	688 (31.09%)	579 (16.96%)	13.49%
	30 to 39 years	1101 (19.58%)	441 (19.93%)	660 (19.33%)	12.50%
	40 to 49 years	908 (16.136%)	297 (13.42%)	611 (17.90%)	12.87%
	50 to 59 years	951 (16.90%)	312 (14.10%)	639 (18.72%)	15.27%
	60 to 69 years	707 (12.56%)	171 (7.73%)	536 (15.70%)	11.81%
	70 to 79 years	270 (4.80%)	55 (2.49%)	215 (6.30%)	6.92%
	80 years and over	25 (0.44%)	6 (0.27%)	19 (0.56%)	4.91%
Employment Status	Full-time	2666 (47.38%)	939 (42.43%)	1727 (50.59%)	35.21%
	Part-time	568 (10.10%)	290 (13.10%)	278 (8.14%)	31.24%
	Self-employed	240 (4.27%)	63 (2.85%)	177 (5.18%)	10.46%
	Student (with a job)	508 (9.03%)	311 (14.05%)	197 (5.77%)	—
	Student	430 (7.64%)	259 (11.70%)	171 (5.01%)	—
	Homemaker	150 (2.66%)	59 (2.67%)	91 (2.67%)	—
	Retired	780 (13.86%)	160 (7.23%)	620 (18.16%)	—
	Not working	285 (5.06%)	132 (5.96%)	153 (4.48%)	—
Educational Status	Uni. certificate, above bachelor	1254 (22.28%)	364 (16.45%)	890 (26.07%)	7.475%
	University certificate	1275 (22.66%)	452 (20.42%)	823 (24.11%)	15.55%
	College diploma	1387 (24.65%)	558 (25.21%)	829 (24.28%)	22.867%
	Apprenticeship or trades certificate	295 (5.24%)	110 (4.97%)	185 (5.42%)	6.50%
	High school diploma	1047 (18.61%)	530 (23.95%)	517 (15.14%)	27.846%
	High school (In progress)	234 (4.16%)	134 (6.06%)	100 (2.93%)	—
	No certificate	135 (2.40%)	65 (2.94%)	70 (2.05%)	17.80%
Driving license	Yes	4174 (74.20%)	1216 (54.95%)	2958 (86.64%)	—
	No	1453 (25.80%)	997 (45.05%)	456 (13.36%)	—
Vehicle ownership	0	1198 (21.29%)	851 (38.45%)	347 (10.16%)	—
	1	2273 (40.40%)	895 (40.44%)	1378 (40.36%)	—
	2	1647 (29.27%)	360 (16.27%)	1287 (37.70%)	—
	3 or more	509 (9.04%)	107 (4.84%)	402 (11.78%)	—
Income**	Under $10,000	130 (4.42%)	72 (3.25%)	58 (1.70%)	14.40%
	$10,000 to $19,999	234 (7.96%)	137 (6.19%)	97 (2.84%)	17.58%
	$20,000 to $29,999	303 (10.31%)	165 (7.46%)	138 (4.04%)	14.49%
	$30,000 to $39,999	281 (9.56%)	130 (5.87%)	151 (4.42%)	11.53%
	$40,000 to $49,999	279 (9.50%)	110 (4.97%)	169 (4.95%)	10.15%
	$50,000 to $59,999	287 (9.77%)	102 (4.61%)	185 (5.42%)	7.90%
	$60,000 to $69,999	287 (9.77%)	83 (3.75%)	204 (5.98%)	6.05%
	$70,000 to $79,999	216 (7.35%)	43 (1.94%)	173 (5.07%)	4.45%
	$80,000 to $89,999	212 (7.22%)	44 (1.99%)	168 (4.92%)	3.44%
	$90,000 to $99,999	189 (6.43%)	39 (1.76%)	150 (4.39%)	2.99%
	$100,000 to $149,999	360 (12.25%)	88 (3.89%)	272 (7.97%)	4.81%
	$150,000 and over	160 (5.45%)	17 (0.77%)	143 (4.19%)	2.15%
Dwelling type	Single-detached house	2354 (41.83%)	667 (30.14%)	1687 (49.41%)	—
	Townhouse/Semi-detached	627 (11.14%)	246 (11.12%)	381 (11.16%)	—
	Apartment or Condo	1082 (19.23%)	557 (25.17%)	525 (15.38%)	—
	On-campus accommodation	16 (0.28%)	5 (0.23%)	11 (0.32%)	—
	Other	63 (1.12%)	29 (1.31%)	34 (1.00%)	—
	Missing	1485 (26.40)	709 (32.04%)	776 (22.73%)	—

*Self-reported by respondents based on using HSR as their primary mode of travel or not.

** Prefer not answer and missing data are not reported.

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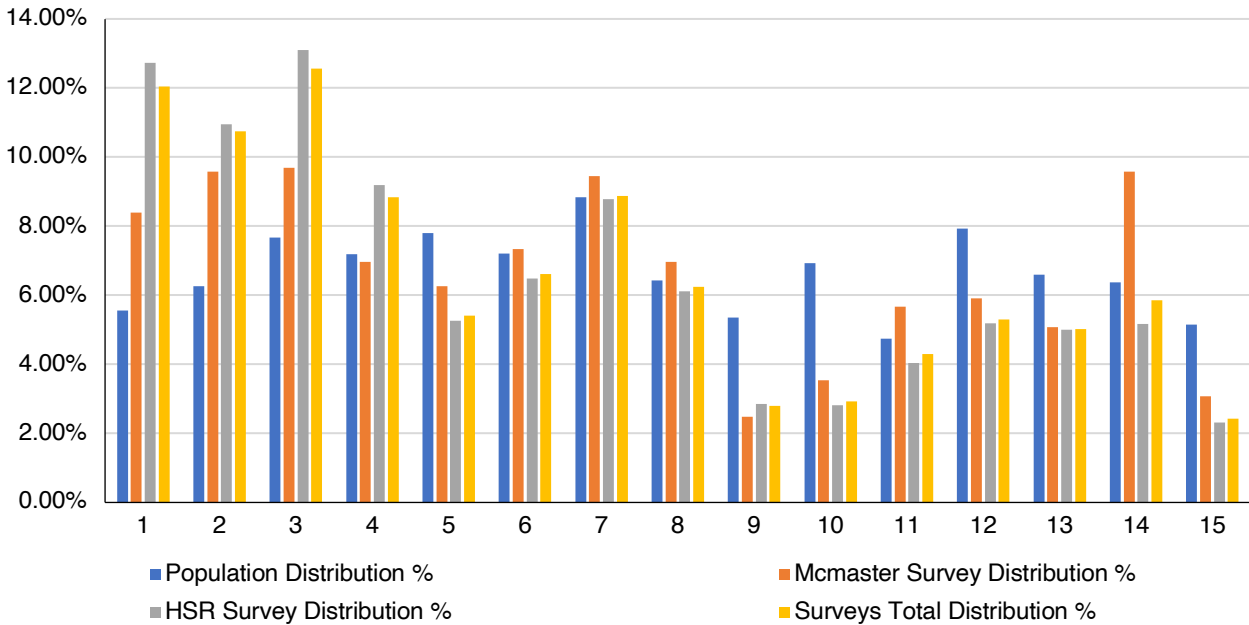
Figure 1-3: Distribution of the sample over Hamilton's wards

Table 1-2: Survey Distribution over Hamilton's Wards

Ward Number	Population	%	McMaster Survey	Distribution per Ward %	HSR Survey	HSR Survey Distribution per ward %	Total Respondents	Total Distribution Per ward %
1	29,845	5.56%	71	8.39%	583	12.73%	654	12.05%
2	33,605	6.26%	81	9.57%	502	10.96%	583	10.74%
3	41,205	7.67%	82	9.69%	600	13.10%	682	12.57%
4	38,590	7.19%	59	6.97%	421	9.19%	480	8.84%
5	41,855	7.80%	53	6.26%	241	5.26%	294	5.42%
6	38,655	7.20%	62	7.33%	297	6.48%	359	6.62%
7	47,455	8.84%	80	9.46%	402	8.78%	482	8.88%
8	34,485	6.42%	59	6.97%	280	6.11%	339	6.25%
9	28,760	5.36%	21	2.48%	131	2.86%	152	2.80%
10	37,220	6.93%	30	3.55%	129	2.82%	159	2.93%
11	25,415	4.73%	48	5.67%	185	4.04%	233	4.29%
12	42,560	7.93%	50	5.91%	238	5.20%	288	5.31%
13	35,365	6.59%	43	5.08%	229	5.00%	272	5.01%
14	34,230	6.38%	81	9.57%	237	5.17%	318	5.86%
15	27,675	5.15%	26	3.07%	106	2.31%	132	2.43%
City of Hamilton	**536,920**		**846**	**100.00%**	**4581**	**100.00%**	**5427**	**100.00%**

Figure 1-4 illustrates the distribution of the sample with respect to the frequency of using HSR service. Approximately 40% of participants are daily users, while 17% of participants have never used the HSR service. In addition, and based on self-reported data of the primary mode of travel, the sample could be classified into two categories; current customers (n= 2,213) and potential customers (n= 3,414). The categorization of current and potential customers was based on a self-reported answer by survey participants. That said, the two categories are not mutually exclusive, for example customers who ride HSR for a small portion of their daily trip, most likely categorize themselves as potential customers. This explains the variation on the numbers reported in the text and in Figure 1-4.

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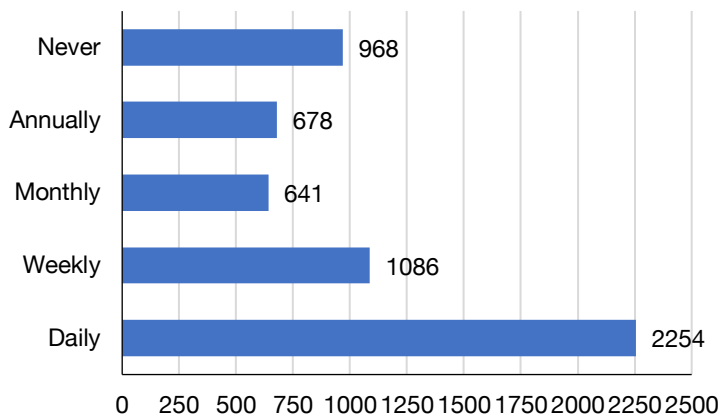
Figure 1-4: Distribution of the frequency of using HSR across the sample

2.   HSR Perceived Service Quality (Current Users)

The overall satisfaction with HSR was collected on a scale ranging from 1 (Strongly Unsatisfied) to 10 (Strongly Satisfied). The data was collected from participants who use HSR as their primary mode of travel. The results of this question are presented in Figure 2-1. Approximately 56% of the respondents reported positive levels of satisfaction (7 to 10). While 26% of respondents reported neutral satisfaction (5 to 6), and 17% of respondents reported being relatively unsatisfied (1 to 4).
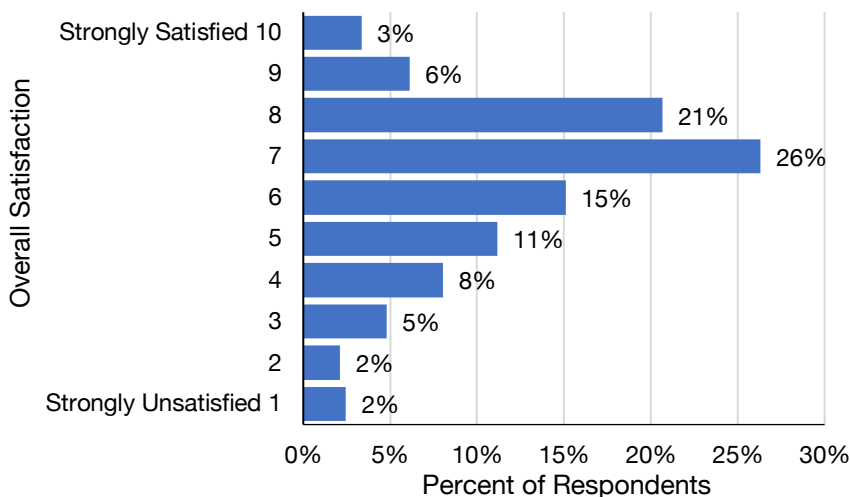
Figure 2-1: Results of overall satisfaction rating for all respondents

Additionally, respondents were asked about their satisfaction with 29 indicators of HSR service on a five-point scale from 1 (Strongly Unsatisfied) to 5 (Strongly Satisfied). A total of 1883 valid responses were collected. Figure 2-2 shows all the complete results for all service indicators.

To sum up, the five indicators with the highest levels of unsatisfaction are; 1) Weather protection at bus stops, 2) Bus crowdedness, 3) Comfort amenities at bus stops/shelters, 4) Frequency of service on weekends and holidays, and 5) Off-peak service frequency. The five indicators with the highest levels of satisfaction are 1) Walking distance from home to

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the bus stop, 2) Walking distance from the bus stop to work, 3) HSR service area, 4) Number of transfers needed to accomplish a daily trip, and 5) Staff professionalism and helpfulness.
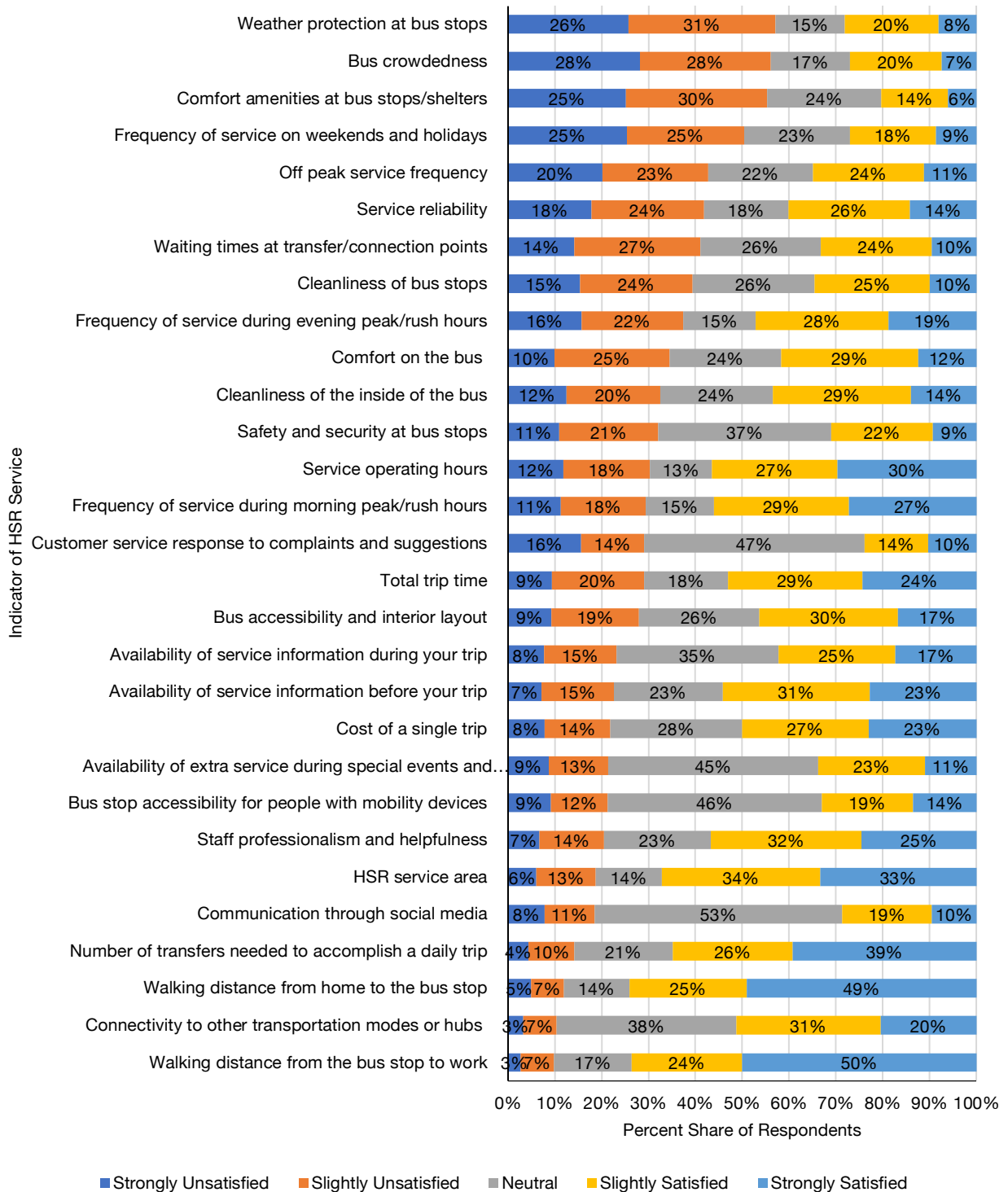
Figure 2-2: Satisfaction with indicators of HSR service

Considering the route-level analyses, Table 2-1 and

Table 2-2 highlight the routes that are associated with low and high levels of satisfaction. The five routes with the highest satisfaction are all shorter, local routes. With the exception of Route 18, they all operate in the Downtown, Central, and Dundurn areas of the City. The

five routes with the highest dissatisfaction all run on the Mountain and travel longer distances. The five routes with the highest levels of unsatisfaction all run on the Mountain and travel longer distances.

Table 2-1: Top Five routes with Highest dissatisfaction

Rank	Route Name	Number of Customers	Percent of Customers Overall Dissatisfied
1	44 – RYMAL	198	23%
2	41 – MOHAWK	389	22%
3	20 – A-LINE EXPRESS	176	22%
4	27 – UPPER JAMES	329	21%
5	43 – STONE CHURCH	166	21%

Table 2-2: Top five routes with Highest satisfaction

Rank	Route Name	Number of Customers	Percent of Customers Overall Satisfied
1	12 - WENTWORTH	56	71%
2	8 - YORK	51	71%
3	18 - WATERDOWN	27	70%
4	6 - ABERDEEN	111	62%
5	7 - LOCKE	104	2%

The levels of satisfaction expressed by customers to each service attribute are grouped into five constructs that represent; Comfort & Cleanliness, Operation & Reliability, Access & Transfer, Information, and Stops & Amenities. The results presented in Figure 2-3 highlights that, in general, daily HSR customers (the dominant group in the sample) are relatively not satisfied with the quality of HSR service across three constructs; Operation & Reliability, Stops & Amenities, and Comfort & Cleanliness.

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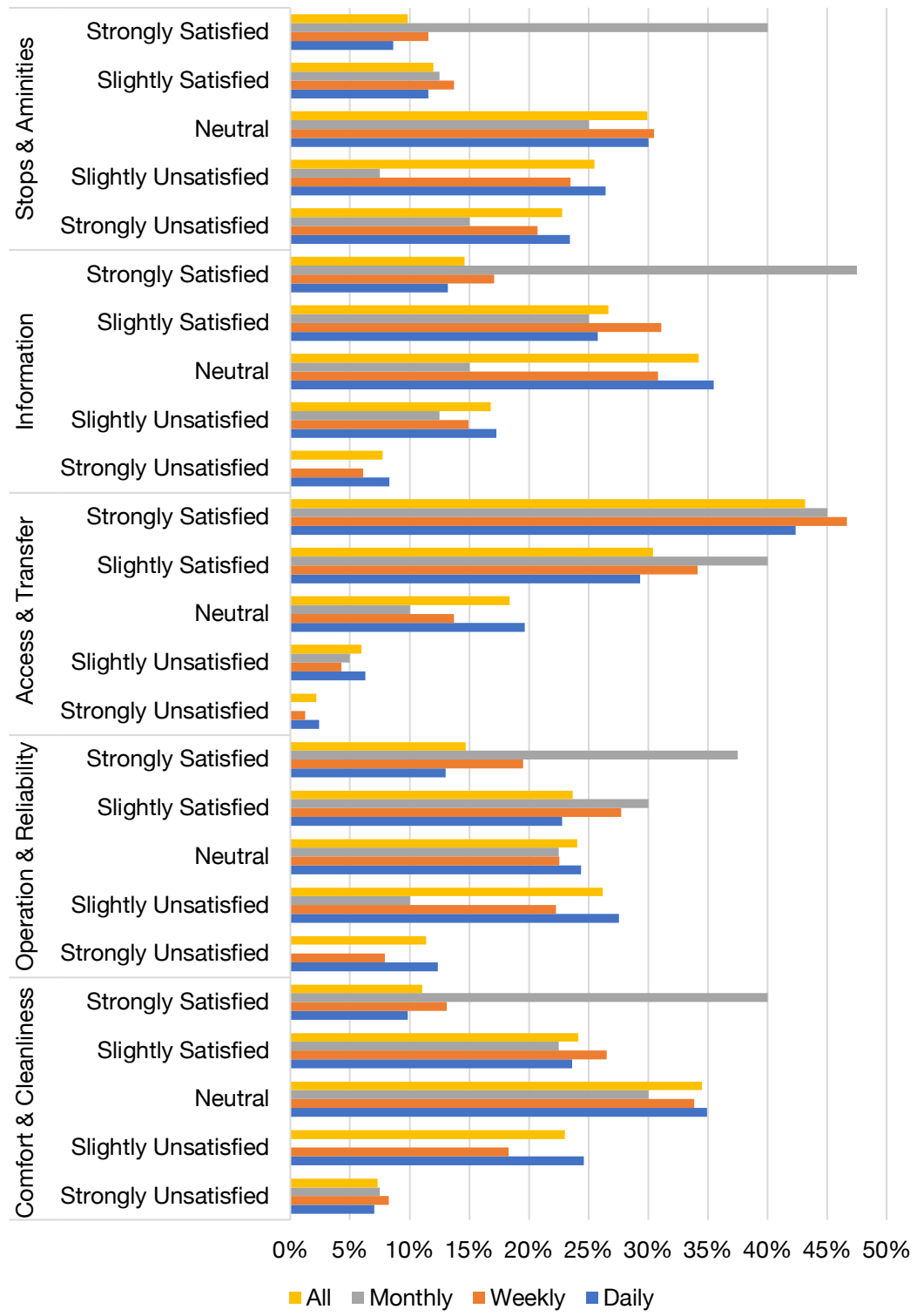
Frequency of HSR Usage	Daily	Weekly	Monthly	All (including monthly and never)
Number of Respondents	1507	328	40	1883

Figure 2-3: Satisfaction with HSR service (constructs)

3.   HSR Desired Service Quality (All Users)

All respondents, both current and potential customers, were asked to rate the importance of 30 possible improvements to HSR service (indicators) on a five-point scale from 1 (Strongly Unimportant) to 5 (Strongly Important). All improvement indicators and their associated importance are shown in Figure 3-1. In addition, Figure 3-2 reports the results of both current and potential customers.

Considering all survey respondents, the five indicators that were rated as the least important are: 1) USB chargers/plugs are available on buses, 2) The availability of secure bike racks at bus stops is increased, 3) The option to 'Rate your Trip' in real-time, 4) Walking distance to the bus stop is reduced, and 5) WIFI is available on buses. While the five indicators with the highest importance are: 1) Service is more often on time and as scheduled, 2) Wait time at transfer/bus connection points is reduced, 3) Better protection of weather at bus stops, 4) Total trip time is reduced, and 5) Service area coverage is expanded.

For current and potential customers, the results indicate that both groups of customers have lower levels of importance related to the availability of secure bike racks, USB chargers on buses, and reducing the walking distance to bus stops as highlighted Figure 3-2. While for the highly important service improvements, the desires of current and potential customers are almost identical. Both groups emphasize the need for more reliable operation, shorter wait time, weather protection at stops, and expanding the service coverage area as detailed in Figure 3-2.

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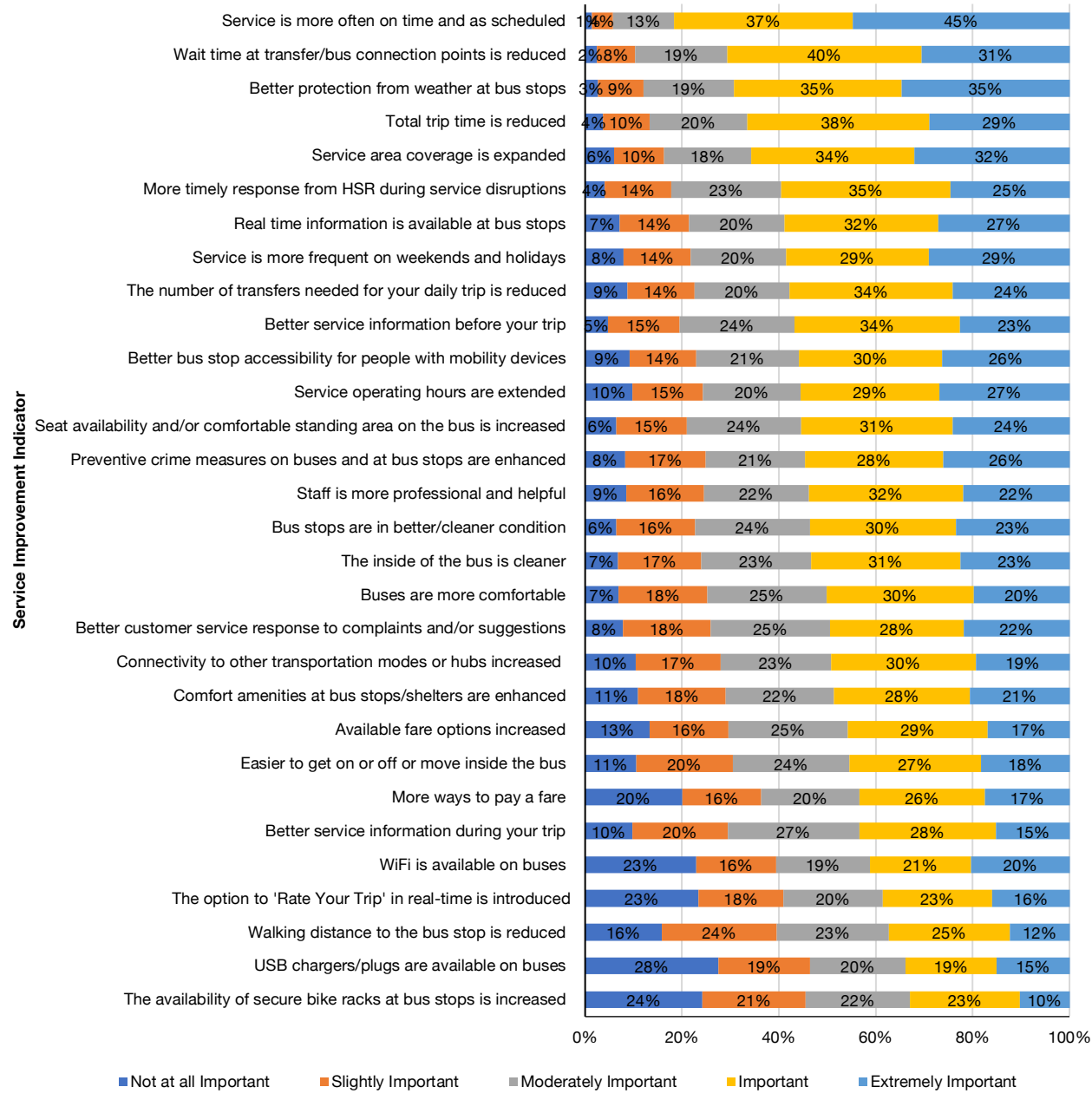
Figure 3-1: Importance of improvements to HSR service (indicator-level)

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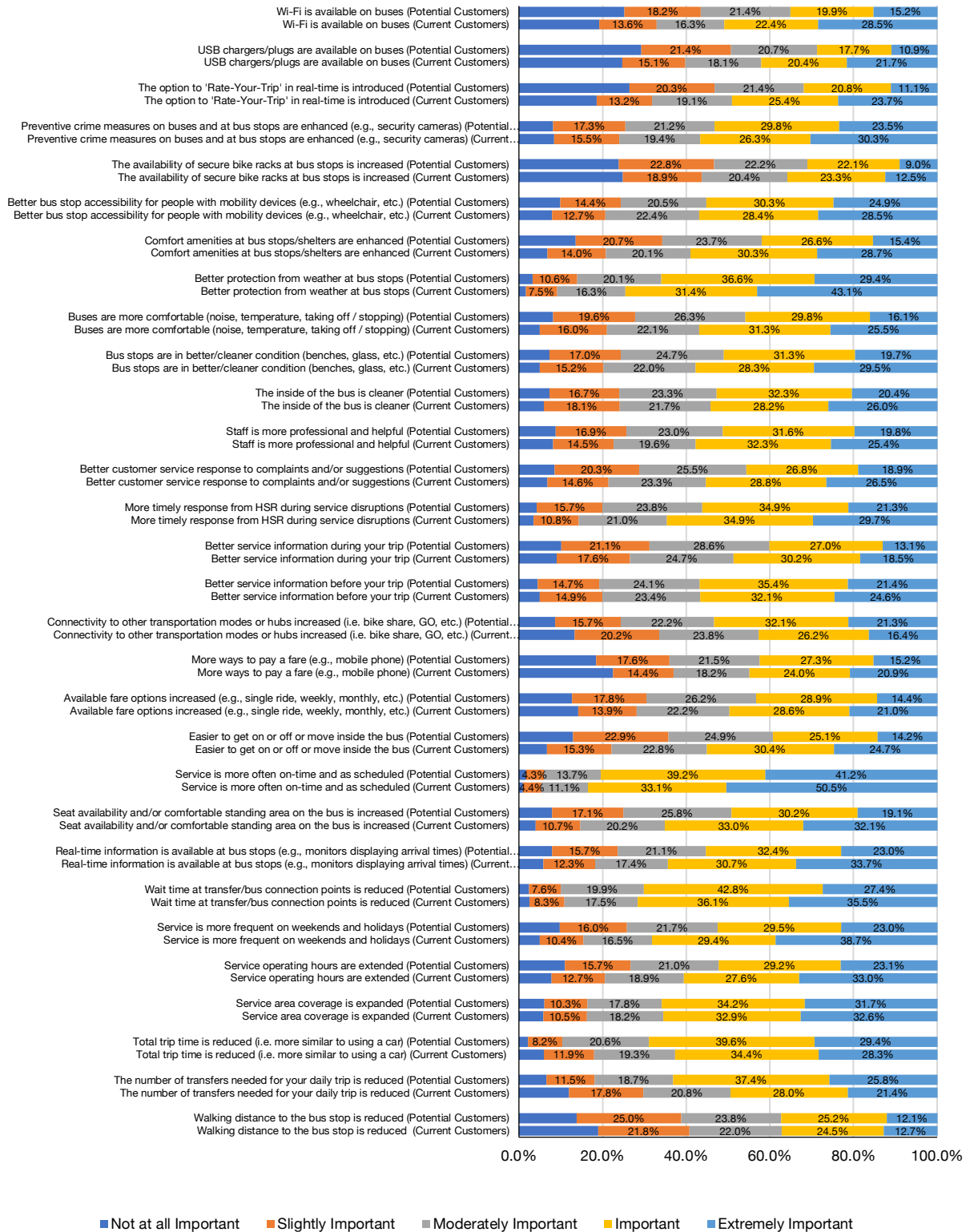
Figure 3-2: Importance of improvements to HSR service (Current n=1883 and potential customers n=2971)

Legend: ■ Not at all Important ■ Slightly Important ■ Moderately Important ■ Important ■ Extremely Important

The important data (desired quality measures) is also grouped into six constructs, including Comfort, Cleanliness, and Safety, Information Provision, Service Coverage and Hours, Travel Time and Transfer, Integration, Payment, and Connectivity, and Mobile Phone Services.
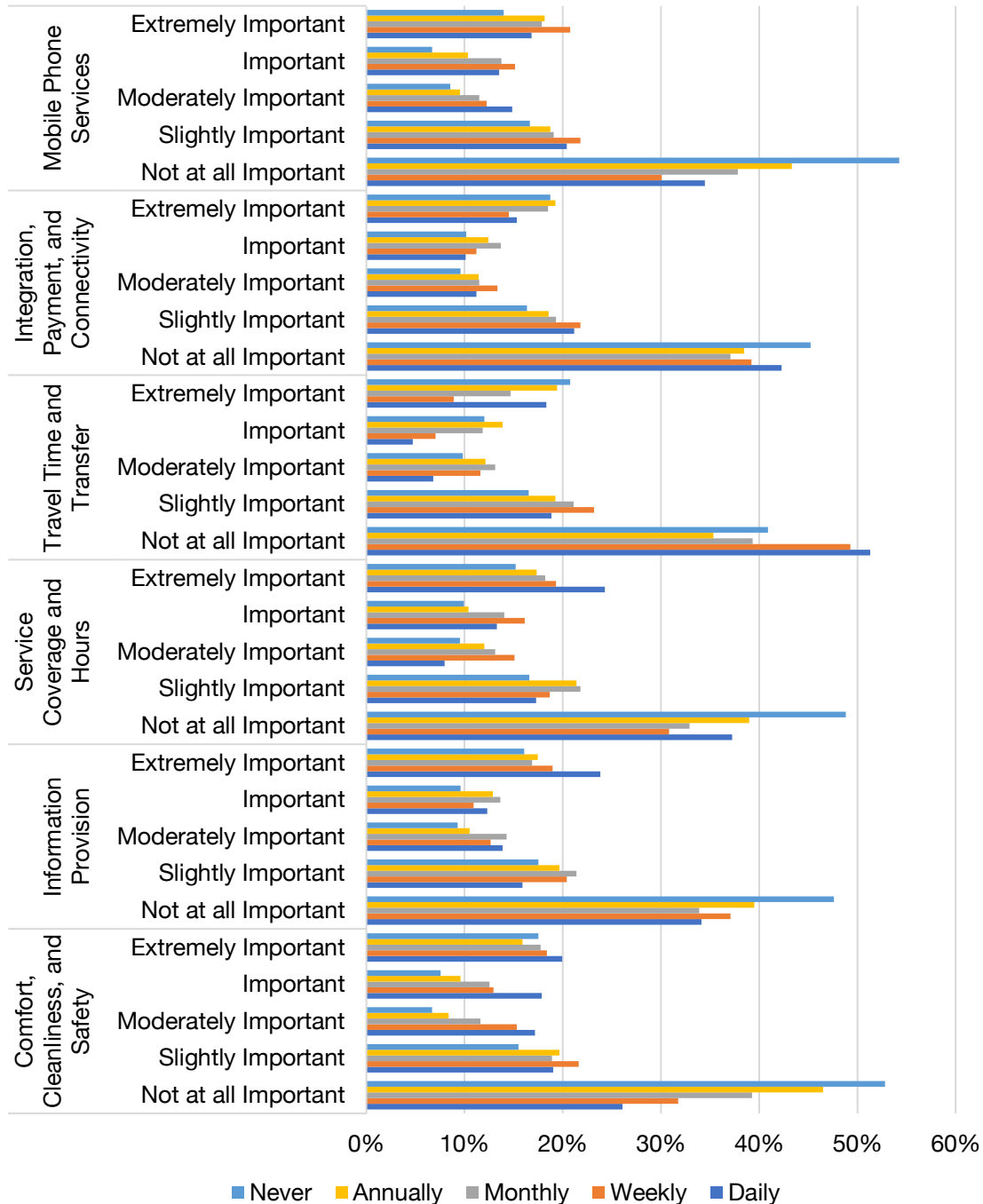
Frequency of HSR Usage	Daily	Weekly	Monthly	Annually	Never	Total
Number of Respondents	1926	942	560	577	849	4854

Figure 3-3: Important of improvements to HSR service (constructs)

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Figure 3-3 presents the importance allocated to each construct across customers with varying HSR usage frequencies. The results show that despite some minor variation on the desired levels of quality between current and potential customers, both groups expressed a clear message that service improvements are required across all customer types.

4. Importance Performance Analysis (IPA)

The Importance-Performance Analysis (IPA) is applied to integrate both satisfaction and importance measures. This provides a different lens for evaluating the aspects/attributes of products and services. IPA compares the relative importance of service quality aspects and the satisfaction associated with each aspect.

The results of the IPA are graphically displayed on a two dimensional matrix, the x-axis represents satisfaction (performance), and the y-axis represents importance, which forms four quadrants; **Concentrate here** (top left: high importance & low satisfaction), **Keep up the good work** (top right: high importance & high satisfaction), **Low priority** (bottom left: low importance & low satisfaction), and **Possible overkill** (bottom right: low importance & high satisfaction). Figure 6-1 shows the IPA matrix for current customers. The interpretation is focused on Concentrate here quadrant.

1. Walking distance from home to the bus stop
2. Number of transfers needed to accomplish a daily trip
3. Total trip time (door-to-door)
4. HSR service area (i.e. takes me where I need to go)
5. Service operating hours
6. Frequency of service on weekends and holidays
7. Waiting times at transfer/connection points
8. Bus crowdedness (seat availability and available standing room)
9. Service reliability (i.e. service is on time)
10. Bus accessibility and interior layout (e.g., ease of movement)
11. Connectivity to other transportation modes or hubs (i.e. bike share, GO, etc.)
12. Availability of service information before your trip
13. Availability of service information during your trip
14. Customer service response to complaints and suggestions
15. Staff professionalism and helpfulness
16. Cleanliness of the inside of the bus
17. Cleanliness of bus stops
18. Comfort on the bus (noise, temperature, taking off / stopping, getting on and off)
19. Weather protection at bus stops
20. Comfort amenities at bus stops / shelters
21. Bus stop accessibility for people with mobility devices (e.g., wheelchair, etc.)
22. Safety and security at bus stops

Figure 4-1: IPA matrix for current users

The IPA matrix shows that:

- Seven quality aspects are located in the QIV – Concentrate here quadrant.
- There is a 95% probability that the following five quality aspects are in the QIV – Concentrate here Quadrant regardless of the sample chosen; 9 (service reliability), 19 (weather protection at bus stops), 7 (waiting times at transfer/connection points), 6 (frequency of service on weekends and holidays), and 8 (bus crowdedness).
- While, two quality aspects, that are currently QIV – Concentrate here Quadrant, might shift to the QIII – Low priority quadrant. These are 17 (cleanliness of bus stops), and 20 (comfort amenities at bus stops/shelters).

For more information, the IPA report provides a route-specific IPA analysis as well as IPA based on different SEDs segmentation (e.g. age).

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5. Quality Assessment Models and Willingness to Pay (WTP)

The choice experiment data was utilized in a series of discrete choice statistical models. First, the analysis was carried out for all participants. Then the dataset was classified into three groups based on the HSR frequency of use into; **Infrequent/non-customers of HSR** (i.e. never or annually use HSR), **Regular HSR customers** (i.e. weekly or monthly use HSR), and **Daily HSR customers** (i.e. daily use HSR).

Regarding the unlabelled choice scenarios (choosing between different transit services), the general model shows that:

- Hamiltonians, in general, prefer shorter journey and walking times, lower fares, and higher service frequencies (i.e. shorter headways),
- Hamiltonians appreciate on-board real-time information more than at-stop real-time information, and both (i.e. on-board and at-stop) are more preferred to no-real-time information provision at all, and
- They express a high preference for direct trips (i.e. zero transfer) over multiple transfer trips.

And the frequency of use-based models show that:

- Infrequent/non-customers are the most sensitive to journey time, while regular customers are the least sensitive.
- Infrequent customers are more lenient regarding trip fare than other customers' categories.
- Infrequent customers appreciate shorter walking times more than regular customers, while regular customers are the least sensitive to walking times.
- Daily customers show a high preference for high-frequency transit service compared to regular and infrequent customers.
- Infrequent customers demonstrate the highest preference for direct trips compared to other customers' categories, while daily customers demonstrate the highest preference for real-time information provision.

Regarding respondents' willingness to pay for service improvements:

For 10 minutes reduction in journey time (actual time spent on the bus or buses)
- Infrequent customers and regular customers would tolerate a fare increase of $1.35 and $0.85, respectively. And, frequent daily customers are willing to pay $0.82,

A five-minute decrease in walking time
- Infrequent customers and daily customers are willing to pay $0.53 and $0.12, respectively. Regular customers are willing to pay only $0.09,

Five minutes decrease in service headway
- Daily customers are willing to pay $0.37 while both infrequent and regular customers are willing to pay around $0.33,

A zero-transfer trip
- Infrequent customers are willing to pay $4.33, while regular and daily customers would tolerate a $2.36 and $2.04 fare increase respectively,

A one transfer trip
- Infrequent customers will tolerate a $2.71 fare increase while regular and daily customers are willing to pay $1.65 and $1.64 respectively,

At-stop real-time information provision

- Daily and regular customers are willing to pay $0.68 and $0.55 respectively while infrequent customers are willing to pay $0.41

On-board real-time information provision,
- Infrequent customers are willing to pay $0.93 while regular and daily customers will both tolerate a fare increase of $0.88.

With respect to the labelled stated choice scenarios (choosing between bus, auto, and ride-hailing), the analyses investigated the influence of the characteristics of the available travel modes on mode choice from the respondents' perspectives. The general model indicates that:

- There is an intrinsic preference for HSR over other alternatives among respondents.
- Trip cost affects transit use more than private vehicle use while slightly affect the ridesharing alternative.
- Increasing parking cost helps reducing car use in favour of other modes.
- Increasing journey time decreases the utility of the chosen travel mode.
- Walking time seems to be insignificant for HSR use, while out of vehicle walking time decreases the utility of private vehicle use.
- High-frequency transit service and real-time information provision add to the HSR utility and hence increase the probability of using HSR.
- Concerning service reliability, a five minutes late scenario negatively affects HSR utility more than two minutes early scenario.

And the frequency of use-based models show that:

- Infrequent/non-customers are the most sensitive to ridesharing cost, while daily customers are the least. This might be attributed to the low rates of using this mode among daily transit customers,
- Infrequent customers highly support on-board real-time information provision while daily customers are the most supportive, among other customers' categories, of at-stop real-time information provision.
- Infrequent/non-customers are more affected by Out of vehicle walking time than other customers. Additionally, they highly prefer shorter journey times more than other customers,
- Regular customers are the most sensitive to private vehicle's trip cost, while infrequent customers are the least,
- Regular customers are the most sensitive to parking cost compared to other categories,
- Daily customers are the most sensitive to transit fare, while infrequent customers are the least sensitive,
- Daily customers appreciate high-frequency transit service more than others. Additionally, they are the most affected group by the two minutes early scenario as well as the five minutes late scenario,
- Daily customers are the only group of customers where walking time is proved to be significant, albeit at a 90% confidence level. Given the considered walking times in the experiment, daily users do not mind walking to the transit service.

Regarding the willingness to pay for improvements associated with different travel modes:

Journey time
- Infrequent customers are willing to pay: 1) $1.78 for 10 minutes reduction in HSR journey time, 2) $1.50 for 10 minutes reduction in ridesharing journey time, and 3) $1.43 for 10 minutes reduction in private vehicle journey time.

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- Regular customers are willing to pay: 1) $3.16 for 10 minutes reduction in ridesharing journey time, 2) $1.42 for 10 minutes reduction in HSR journey time, and 3) $1.03 for 10 minutes reduction in private vehicle journey time.
- Daily customers are willing to pay: $4.42 for 10 minutes reduction in ridesharing journey time, 2) $1.08 for 10 minutes reduction in private vehicle journey time, and 3) $0.99 in 10 minutes reduction in HSR journey time.

Walking time

- This variable does not prove to be significant for infrequent and regular customers while daily customers show a willingness to pay of $0.16 to walk five minutes more to access HSR, which implies that very frequent customers are indifferent regarding walking to transit service considering the proposed walking times (5, 10, 15 minutes).

Out of vehicle walking time

- Infrequent customers are willing to pay $2.32 to decrease out-of-vehicle walking time by 5 minutes while regular and daily customers are willing to pay $0.96 and $0.98 respectively for the same out-of-vehicle walking time reduction.

Service headway

- Infrequent and regular customers are willing to pay $0.47 and $0.46 respectively for 5 minutes reduction in HSR service headway while daily customers are willing to pay $0.41 for the same reduction in the service headway.

HSR service reliability

- Daily customers are willing to pay $1.09 to avoid a 2 minutes early scenario, while infrequent and regular customers are willing to pay around $0.85 to avoid the same scenario. Whereas regular customers are willing to pay $2.17 to avoid a five-minute late scenario while infrequent and daily customers are willing to pay $1.94 and $1.87 to avoid the same 5 minutes late scenario.

Real-time information provision

- At-stop real-time information provision does not prove to be significant for infrequent and regular customers; however, daily customers are willing to pay $0.86 for at-stop real-time information provision. Whereas infrequent and regular customers are willing to pay $1.74 and $1.29 for onboard real-time information, while daily customers are willing to pay $1.03.

To summarize the WTP results for the unlabelled transit scenario experiment, there is evidence that infrequent customers are showing a high tolerance for fare increases to get the service they would want. This could also be interpreted to mean that aspects other than fare costs may explain why such consumers use transit infrequently. There is particular sensitivity to the thought of having to switch buses one or more times to complete the trip. This sensitivity is also there for very frequent customers, but the feeling is less strong. The more experienced customers show more interest in an amenity at the actual bus stop, such as real-time information. Overall, there is some strong evidence that less frequent or casual customers think about transit in a different way from those more experienced, regular and daily, customers.

To summarize the WTP results for the labelled mode choice experiment. It appears that a late bus is perceived as very undesirable by people whether they use transit or not. An early bus is perceived less negatively, although daily customers seem to see it as more of a problem relative to other people. Infrequent/non-customers are much more sensitive to the

journey time spent on a bus and may perceive it as a less desirable environment than being in their private vehicles. They would pay more to shorten this time. They would also perceive any out-of-vehicle walking time associated with an automobile trip in a negative way.

6. Behavioural and Attitudinal Orientation

The attitudinal and behavioural orientation have a significant bearing on the way customers choose to travel. These are considered key influential factors for mode choice. The survey collected several attitudinal and behavioural statements detailed in Figure 5-1. The graph shows how survey participants indicated the accuracy of each statement on a scale of 1 to 5, where 1 is very inaccurate, 5 is very accurate, and 3 is neutral. The results are displayed in ascending order based on the sum of moderately and very accurate.

The results indicate a good perception associated with using transit to navigate around Hamilton. Three statements were perceived to provide an accurate representation of the survey participants, including "I think using transit is a good decision," "It is easy to travel around the city using transit," and "finding routes and schedules does not require too much effort." On the other hand, there are also very positive indications that emerged from the self-reported disagreements with some statements. Most notably is the fact that users do not consider transit as old fashion, nor they think that transit is for those who are less fortunate. In addition, it seems that ridesharing is not one of the dominant modes of travel in the city yet. The same is observed for carpooling.

Additionally, the behavioural intentions of respondents were measured through assigning a level of agreement to the 10 statements shown in Figure 5-2. The most notable results are associated with the willingness to use transit for potential users and continue to use for current users if the service is significantly improved. That said, there is a predominant car reliant attitude emerging from the results, with strong agreement associated with statements such as; "I choose my car for all trips", and "even if transit is reliable, fast, and free, I would continue using my car".

Taken together, the results portrayed in Figure 6-1 and Figure 6-2 indicate that the general attitude is receptive of transit use. However, this is conditional on service quality improvements. In addition, it should be noted that such a general attitude is not reflected across the entire sample, as there are some user groups that have no intention to use transit under any circumstances, and **this group should not be targeted through service quality improvements.**
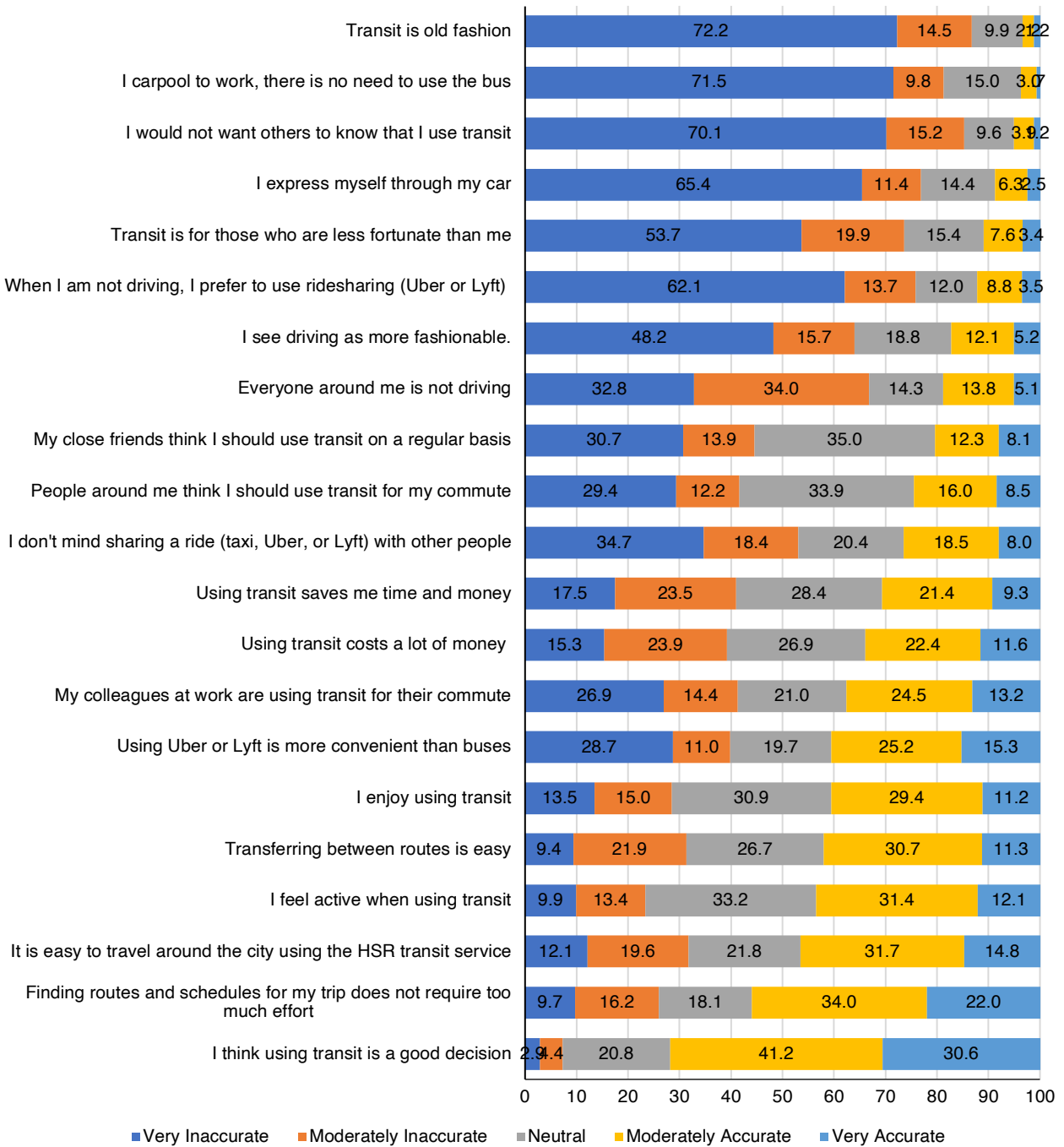
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Figure 6-1: Self-reported results of attitudinal statements

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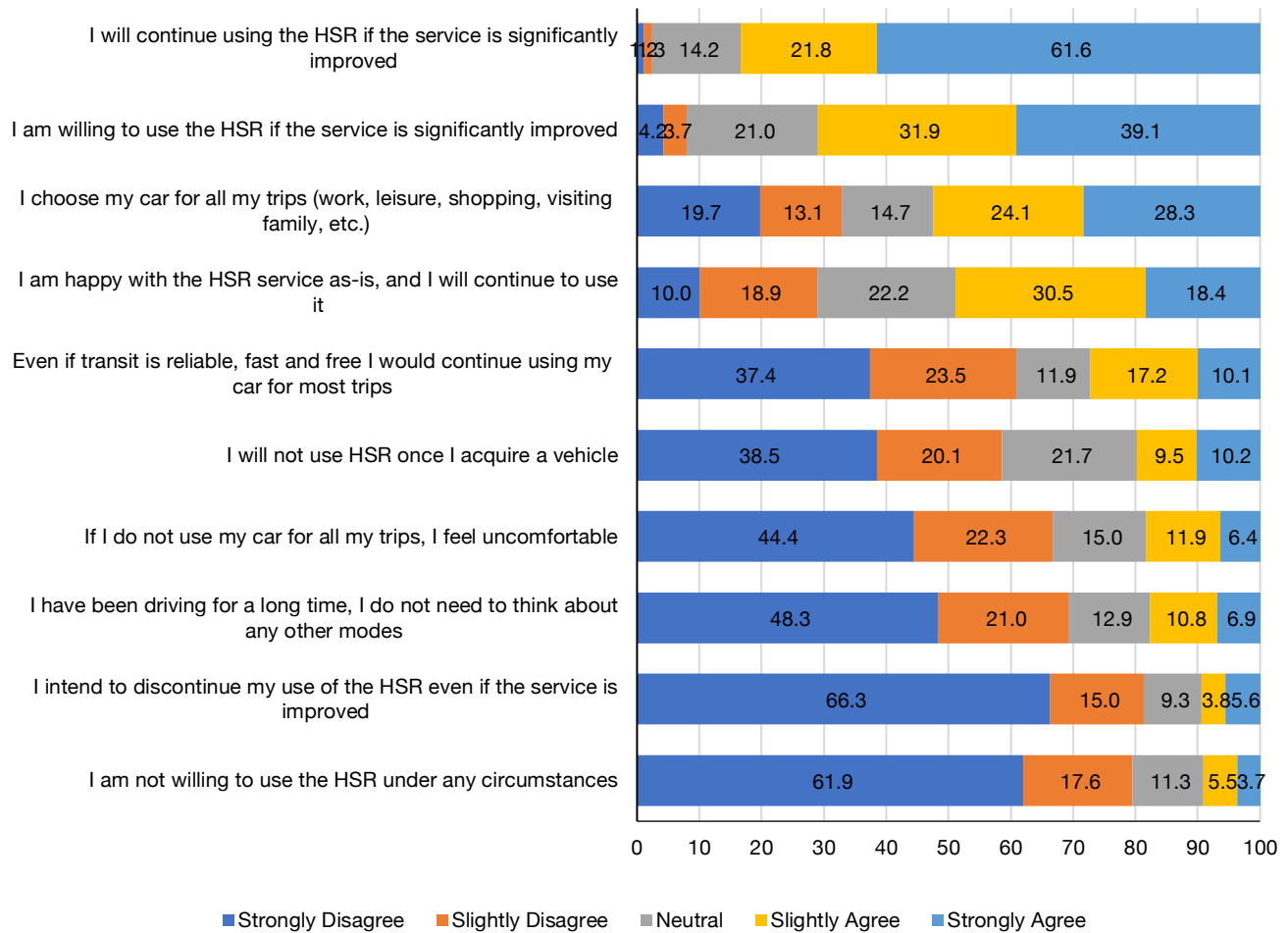McMaster University | Civil Engineering

Figure 6-2: Behavioural intention statements

7. Conclusions

Several direct remarks emerged from analyzing the perceptions of customers towards HSR service quality. These are detailed in the report and summarized in the previous sections. That said, some indirect observations are noteworthy.

First, given that this is the first analysis of HSR service quality and consumer preferences, additional targeted analyses are required to further distill the large volume of results generated. Second, the perceptions of customers towards HSR service quality cannot be analyzed in isolation from HSR performance. The developed quality analyses must be used to inform the planning, operation, and performance standards of HSR service.

Figure 7-1 illustrates the Quality Loop Model, which must be integrated to advance the service quality. The model identifies four different measures of bus service quality. These include 1) Perceived Quality (the quality of service as perceived by customers), and 2) Desired Quality (the quality expectations and the desires of customers). Both represent the perspectives of customers, which are analyzed in this report.

Further, 3) Delivered Quality (the quality level delivered by the service provider); Targeted Quality (the quality standards targeted by the service provider); 4) Perceived Quality (the

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quality of service as perceived by customers); and Desired Quality (the quality expectations and the desires of customers). Both represent the perspectives of service providers, which must be integrated with the findings of this report. This analysis is currently being developed.
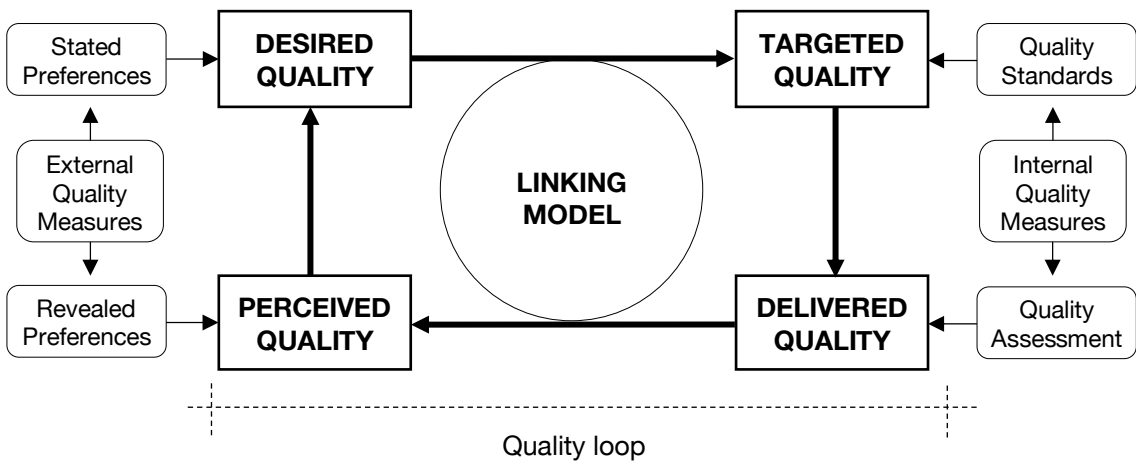

Figure 7-1: The Quality Loop Model

The transit service is considered successful ONLY if the quality loop is retained.

END OF REPORT