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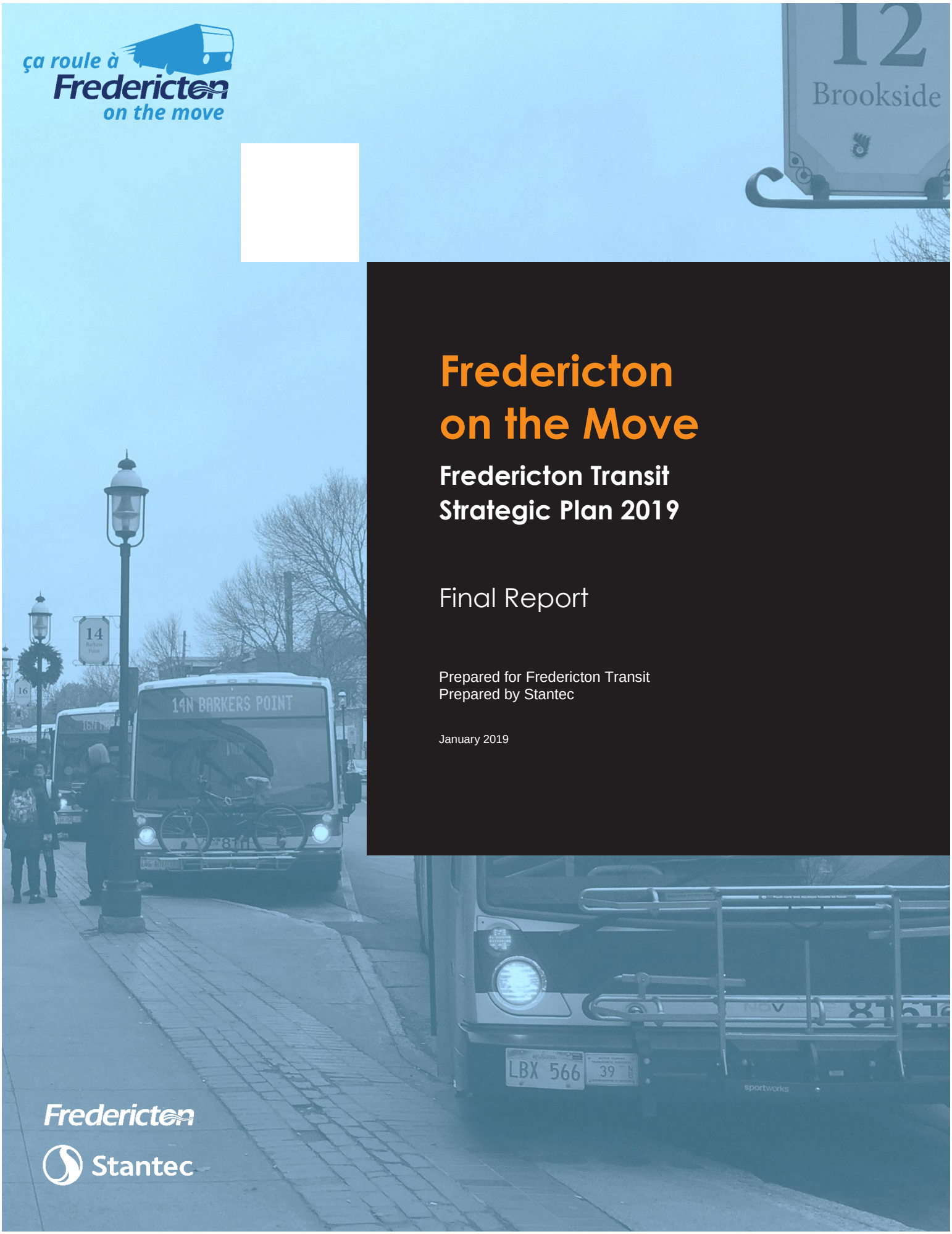

Fredericton on the Move

Fredericton Transit Strategic Plan 2019

Final Report

Prepared for Fredericton Transit
Prepared by Stantec

January 2019

Fredericton

Stantec

Final Report

Fredericton on the Move

Fredericton Transit Strategic Plan 2019

January 7, 2019

Prepared for:

Fredericton Transit

Prepared by:

Stantec Consulting Ltd.
Transit Advisory

Fredericton Stantec

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Strategic Plan Background

The City of Fredericton, located on the St. John River, is a burgeoning scene for innovation and technology in Atlantic Canada. As a relatively compact city with growing pressure for new residential and office developments, Fredericton recently released its new Growth Strategy, firmly acknowledging the desire for compact growth and intensification, along with new mixed-use developments. Overall, Fredericton is looking at a future that will encourage density and diverse land uses to help ensure sustainable and equitable development for its residents.

With added pressure for growth comes added pressure for transportation; simply put, more people means more travel. Nevertheless, roads can only be expanded so much and new highways can only add limited capacity. While building new road infrastructure is necessary when accommodating population growth, it can't be the only reaction. To foster sustainable growth, a variety of travel options becomes necessary, and Fredericton Transit, providing over 1.37 million trips in 2016 (5,000 passenger trips per day on average), is currently playing a vital role in moving people around the City of Fredericton.

Fredericton Transit retained Stantec Consulting Ltd. (Stantec) to help devise the Fredericton Transit Strategic Plan (herein referred to as "Strategic Plan"), aimed at ultimately improving service quality and growing transit ridership while identifying new and innovative ways to provide transit more efficiently and effectively in the future. By reviewing current operating procedures, operating data, city demographics, conducting stakeholder outreach, and providing market scans of tech, advertising, and other best practices, Stantec aims to provide a Strategic Plan that not only updates the last plan from 2008, but steers Fredericton Transit forward with fresh and bold ideas and recommendations.

About Fredericton Transit

Fredericton has many of the necessary ingredients for transit, including population and job density, mixed land use, populations with little or no other travel options, and the need to connect people with many useful destinations and opportunities. The areas with the greatest transit propensity, that is, the areas that are likely to generate high transit ridership are the City Centre, neighbourhoods around the City Centre, pockets on the north side – most notably Nashwaaksis, and pockets on the south side near Prospect and Regent and around the universities.

Fredericton Transit is productive compared to its peers and carries 22 passengers by hour, the most out of a peer group including the transit systems in Brandon, MB, Kingston, ON, Lethbridge, AB, Moncton, NB, North Bay, ON, and Red Deer, AB. Furthermore, Fredericton Transit has low operating costs per hour and per rider. Nevertheless, Fredericton Transit has seen stagnant ridership despite increases in service hours and service area population. Taken together, a targeted approach is necessary to help grow ridership and improve cost recovery and ultimately the sustainability of transit in Fredericton.

For the most part, Fredericton Transit's routes are performing adequately, but there is certainly room for improvement. Strategies such as greater service frequency along key corridors, such as the university campuses, Biggs Street/Dunns Crossing, Irvine Street, and Marysville could help spur additional trips that may not be taken at present due to the low frequency of transit routes throughout the midday. Furthermore, addressing bus stop spacing and amenities, and ensuring that stops are accessible and connect with pedestrian infrastructure could reduce barriers to transit use. Finally, low performing routes, particularly Lincoln and Silverwood, require attention with the

goal of improving mobility for residents of these neighbourhoods, while reallocating higher capacity resources from these areas to places where they could benefit a larger segment of transit users.

Stakeholder Engagement

Stakeholder outreach requires more than just informing stakeholders; meaningful engagement requires that all stakeholders are included in the decision-making process. In forming this plan, Fredericton Transit engaged stakeholders with a broad spectrum of interests including riders, non-riders, city staff, agency staff, politicians and members of the greater Fredericton community. Engagement tactics included internal and external stakeholder meetings, one-on-one stakeholder interviews, operator workshops, Committee of Council presentations, Steering Committee presentations, public engagement, surveys, service ride-alongs, and a roaming “Idea Bus”.

Prevalent themes emerging from the stakeholder engagement exercises included the following:

- Affordability and fares. There is the sentiment that fares are expensive, particularly for low-income residents, and for UNB undergraduates who have been previously unwilling to enter into a U-Pass arrangement with Fredericton Transit.

- Transit service. Many users desire Sunday service and more frequent evening service. Snow clearing at bus stops in the winter poses a serious problem for safety and accessibility, and more amenities like shelters and benches would be appreciated. Direct service between Kings Place and Regent Mall was also a frequent request, and survey results indicated that riders would prefer more frequent buses even if it means bus stops are located farther away from their origins/destinations.

- Parking. The supply of parking in the City Centre is constrained but prices are low, so the financial incentives of using transit are relatively small. It was noted that by identifying park-and-ride lot locations, users can transfer between personal cars and transit.

- Convenience. Transit is inconvenient for people commuting from neighbouring jurisdictions. ReadyPass has some interesting features but with live arrivals that are sometimes inaccurate. There are limited locations for users to purchase transit fares.

Based on stakeholder engagement and community outreach, together with a thorough analysis of existing conditions, datasets, field visits, and discussions with Fredericton Transit staff, Stantec developed a list of gaps (or needs) of Fredericton Transit regarding different aspects of its business, which were used as a basis for developing recommendations. The gaps and recommendations are summarized into the six headings below:

- Service Planning and Operations
- Technology
- Fares
- Partnerships
- Marketing
- Fleet

Service Planning and Operations

Transit service standards are industry-wide best practice—they tell the public and the agency staff how goals and values are translated into service levels that the agency strives to maintain. Furthermore, standards provide systematic and objective ways of planning, monitoring, adjusting, and evaluating transit service provision. Service planning aims to ensure that transit service is attractive for the present, but also responsive to the future, and relies

on community engagement, values-informed goals and objectives, and data-driven metrics. Fredericton Transit does not currently have service standards. Without guiding standards and commitments that are visible to the public, it is difficult to chart a clear direction in service design and provision; it is also difficult for decision-makers and elected officials to endorse the desires of the transit agency. Moreover, Fredericton Transit needs to identify unmet demand and track customer satisfaction beyond call-in customer compliments and complaints.

The current network provides service across most of Fredericton, with a focus at Kings Place for timed transfers. While this system works well for the most part, we note a few areas that need attention, as well as limitations, that shape the proposed networks presented later, including:

- Indirect or circuitous routes between Regent Mall/Corbett Centre/Knowledge Park area and the City Centre. These areas are major destinations and trip generators. While these two areas are linked by a direct path along Regent St., Regent St. itself presents few trip generators in between and is mostly mid-density and residential. Currently, the most direct path is route 16N/17S from Kings Place via University Ave., the university campuses, the hospital, and finally the mall.

- Beyond the core of the south side of the City (roughly beyond 2 km of Kings Place), residential density is moderate to low, making it difficult to run productive transit service. This is most pronounced in Lincoln and Silverwood, as well as on much of the north side.

- Meandering roads that are not gridded force circuitous bus routes, prolonging running times and irritating passengers by forcing non-direct travel paths oftentimes running counter to the direction of intended travel.

- Lack of east-west routes, particularly on the south side. The north side has two separate routes that approximate an east-west route along Sunset-Main-Union.

North Side Transfer Hub Evaluation

For a transit hub to be successful, we need a location where buses can operate safely and efficiently, where riders can wait safely and comfortably, and where the area serves a purpose beyond solely transit. At present, there are no sites that truly fulfill the above criteria on the north side. For example, Brookside Mall, with cooperation from management, could provide a location with room for a terminal; however, after the mall closes, despite trip generators like Sobey's, NB Liquor, provincial government employers and Goodlife Fitness, reduced activity and no natural pedestrian activity (compared to the City Centre neighbourhood around Kings Place) could reduce the sense of passenger safety.

In the short-term, Stantec recommends establishing a convenient, safe, and accessible transfer location on the north side were routes converge to facilitate timed transfers, similar to what occurs at Kings Place. This can occur on-street, given that the location provides safe pedestrian access. In the medium-term, based on ridership and transfer volumes, as well as land development, a north side transfer location may be potentially established at the SmartCentres, while a long-term solution, again dependent upon redevelopment, may be a location along Main St. to capitalize on the street's revitalization. Anecdotally, Stantec heard many desires from both riders and non-riders for an east-west route on the north side. While not financially feasible within the existing funding envelope for transit, piloting an east-west route may also alleviate the requirement of north side-to-north side travel patterns to head into the south side. Stantec recommends that this be piloted contingent on a funding source be identified. Depending on

level of treatment and amenities, the capital cost for a new north side hub could range from $1-5 million or more; to confirm, Stantec recommends that a detailed feasibility study be undertaken as a near-term next step.

Park-and-Ride Evaluation

Some desirable characteristics of successful park-and-rides include: proximity to a major highway, easy entry and egress, low cost of acquiring or leasing land, and an ample, developed parking supply in a safe location. The introduction of park-and-ride services could help boost ridership from suburban areas and help mitigate traffic congestion in the City Centre, which is an important goal in the Growth Strategy. In the Fredericton context, it would be prudent to design park-and-rides with the following concepts:

- In the short-term, operate park-and-rides along existing routes to minimize the costs of a dedicated route between park-and-rides and the central location (most likely Kings Place).
- In the medium-to-longer terms, depending on demand (such as buses with full loads leaving park-and-rides and thus passing by passengers along regular routes), dedicated limited-stop service between park-and-rides and downtown could be implemented.
- Park-and-ride locations should be prioritized at locations with sufficient existing parking, removing or minimizing the infrastructural costs of acquiring land or constructing parking.
- Locations should have good road access from highways and other high-capacity roads.
- Locations should be at or near multiuse sites.
- Locations should be far enough away from Kings Place such that people are incentivized to use transit rather than just drive the whole way.

Potential locations for park-and-rides in the short term include SmartCentres, Regent Mall, the Corbett Centre, and the Kingswood Entertainment Centre. The Fredericton International Airport is another potentially fruitful location in the event that Fredericton Transit begins to service the airport.

Sunday Service Evaluation

While most businesses and other activities were historically closed on Sundays and holidays, nowadays, most businesses are open on Sundays and some holidays, and as such, their employees and patrons need to reach these destinations. The final decision of Sunday service of course rests with the community—there is no doubt that Sunday service will add costs to the City, likely with modest ridership. But if the community values mobility and accepts the additional costs, then Fredericton Transit should move forward with Sunday service.

For pilot implementation, an attractive option might be to only run the two most popular routes of the system, 10N/11S and 12N/13S. These routes serve key destinations, including the Brookside Mall on the north side, Kings Place, Regent Mall and Corbett Centre. Furthermore, route 10N/11S serves the universities (service on Windsor St.), and the Hospital. Some of the densest neighbourhoods, such as Forest Hill, are also served. This represents an attractive option in terms of its financial performance. Operating these routes at the same frequency as Saturday but with a shorter service span should be considered as an additional cost management strategy for the purposes of the pilot; this is a common approach used in other major Canadian cities.

Nonetheless, Sunday service could be implemented as pilot in the medium term, where routing and frequency improvements would occur in the short-term (see below). Sunday service would require not only operators, but

administrative support as well, marketing and advertising materials, impact fleet maintenance and have other associated costs that would require capital investment. Sunday service would also require renegotiation of the Collective Agreement with the frontline; currently, any desires to introduce a Sunday service would be treated as overtime and compensated at two times the operator's hourly wage. This is cost prohibitive and not consistent with industry best-practice.

Routing

A detailed route-by-route analysis, including a detailed service plan, is beyond the scope of the Strategic Plan, however, routing recommendations are provided at a high level, meant to spur creative ways of improving mobility in Fredericton and to assist the capable and dedicated Transit staff in developing a more effective and efficient network. Increasing service on routes or in areas with high productivity may require a reduction of service on less successful routes, particularly if budgetary constraints exist. Strategies that might be employed by a revised route network include:

- Straightening routes when possible and where the street network allows pedestrian access to bus routes/stops.
- Providing an east-west route along Dundonald.
- Removing unproductive service in Silverwood and replacing it with an on-demand solution delivered by contracted shared taxis, whereby people are picked up from their homes in Silverwood and taken to Kings Place where they may transfer. Contingent on ridership levels meeting service level targets of a minimum of 10 boardings per service hour, conventional fixed route transit could be reintroduced to the area at a later date as warranted.
- Improved service frequency throughout the network on both the north and south sides as a result of replacing unproductive service in Silverwood.
- Reducing overlaps in service area by spreading out routes along Smythe and Regent Sts., since areas in between would be at a 500 metre or less distance between either streets and routes.
- Minimizing re-routing, particularly on the north side, given its lower density and challenging and disconnected street network.
- Acknowledging that while Kings Place acts as the major transfer point in Fredericton's radial network, its current layout is not optimal for transit customers or for other street users. While moving the hub to the rear of Kings Place mall is an option, it comes with pitfalls as well. We recommend a detailed feasibility study that leverages transit and urban design expertise and includes public feedback to determine the best approach for an alternate downtown transit hub.

Technology

Technology is now playing a fundamental role in not only transit service planning and delivery, but in the provision of mobility services. Staying relevant and attracting new ridership for transit agencies now hinges on exploiting technology for providing customer information, trip planning capabilities, as well as for internal operations. Moreover, technology can improve customer and operator safety. With more technology comes more data, and as such, the need for staff with the skills to translate data into information which inform decision-making. Currently, Fredericton Transit makes limited use of its somewhat outdated technology. Technology like automatic vehicle location (AVL) and automatic passenger counters (APC) can enable evidence-based decisions, such as route and service planning.

Technology is also lacking with respect to passenger and operator safety, namely on-board cameras and is something that needs to be addressed as a priority. These tools support onboard safety of passengers and operators and contribute to ridership attraction by increasing the perception that safety is monitored and taken seriously.

We appreciate that financial resources are finite. From its experiences at numerous transit agencies across North America, Stantec has seen and proven that oftentimes an upfront capital investment is warranted as it will translate into increased ridership and/or reduced operating expenses for the agency that more than offset the level of investment. Therefore, we are proposing pragmatic recommendations that will require a new, yet reasonable, investment to enable Fredericton Transit to proceed with the modernization of its technology efforts. The federal government's Public Transit Infrastructure Fund (PTIF) presents opportunity as a funding source for the recommendations presented below.

Some opportunities for technology improvements include:

- Work with ReadyPass to generate a General Transit Feed Specification (GTFS) feed that could be used to power other third-party apps such as Transit App, Rocket Man or Google Maps. For reference, GTFS is a real-time feed specification that allows transit agencies to provide real-time updates about service to application developers in an open data format for transit schedules and associated geographic information.

- To enable microtransit or on-demand solutions in lower density areas of the city increasing productivity and lowering the cost of providing service in those areas, Stantec recommends that Fredericton Transit invest in on-demand/dynamic scheduling software. On-demand solutions such as the one envisioned for Fredericton allow agencies to create "pop-up" routes in real-time based on demand for service. Many of these newer software packages require only a tablet onboard the vehicle and a cellular connection which Fredericton Transit already has and can provide additional benefit in the form of improved Para Transit scheduling too. Fredericton Transit should consider any Para Transit dispatch system upgrade needs as part of its exploration of an on-demand service as it is possible some efficiencies could be found by joining these systems.

- Modernize the fare collection system. Cash handling and paper-based fare media are administrative cost drivers for Fredericton Transit and are sources of fare evasion; these products should be minimized in the future. Closed-source payment, such as fare cards, are becoming obsolete, so moving to open-source fare payment, such as Interac, Visa, MasterCard, etc., and mobile/Smartphone is a much more viable option.

- Ensuring customer and operator safety is paramount for Fredericton Transit. With the installation of camera systems on the entire fleet, Fredericton Transit can protect itself from liability issues, help protect operators, and monitor routes and capture boarding and alighting data.

- Acquiring APCs can help Fredericton Transit assess passenger demand across routes, route segments, and individual stops, which can provide data for evidence-based route and service planning.

Fares

The fare table plays a central role in the outcome of fare recovery, as well as providing fares that are tailored to the community, ensuring that the right fare exists for the right person and trip. Nevertheless, the fare table is not the only tool to ensure a healthy recovery. Fare evasion was noted by Stantec, particularly at Kings Place, and designing policy aimed at reducing fare evasion can boost the average fare, while also improving customer sentiment that the agency takes fare evasion seriously, and that service quality justifies the fare they pay. On that note, Stantec heard

repeatedly that fares are expensive for many residents of Fredericton. While Stantec does not recommend a free fare should be implemented, nor should a decrease of fares be undertaken, we've identified areas for opportunity to expand the options to fit the right fare with the right rider.

The choices a transit agency makes regarding fares should reflect the values of the community it intends to serve, while also being accountable to taxpayers who may or may not use transit. A difficultly arises when fares are set too low to sustain service improvements or develop an attractive and useful bus service, as well when they are set too high that the system loses riders, particularly riders who switch to driving since the bus provides no added incentive, such as not needing to pay for parking or using priority lanes, cutting travel times.

It is recommended that Fredericton Transit keep the fare table simple. Complexity is a barrier to use and contributes indirectly to fare evasion, particularly for infrequent riders. We recommend that a single cash fare be maintained, and 10-ticket books be maintained at a single price (i.e. no discounts for seniors and students). Monthly pass fares should be available for adults and discounted passes for low-income residents. The low-income monthly fare product would be geared at providing an affordable transit option based on the ability to pay rather than based solely on age or occupation. Based on the peer analysis and industry best-practice, we recommend the following discounts:

a. 10% discount on cash fare for 10-ride tickets (i.e. a 10-ride ticket is equivalent to 9 cash fares)
b. 25-30% discount on cash fare for adult monthly pass (assuming 40 one-way trips per month, so with the discount applied an adult monthly pass is equivalent to 28-30 cash fares)
c. 40-50% discount on a monthly pass for qualifying low-income residents (regardless of age or occupation)

A low-income pass would provide unlimited monthly trips for qualifying individuals who complete a form and present a statement of need, such as federal or provincial documentation. This pass should be offered at a 40-50% discount from the regular adult monthly pass. Using a similar discount as Kingston's, Fredericton Transit could set a low-income monthly pass at 50% discount from the adult pass, or $40.00 at the current cost. It is important to clearly define the parameters of who qualifies for the low-income pass, such that revenues and cost recovery are not severely impacted. This strategy requires the retirement of the annual senior pass and of the monthly student pass, so it is expected that increased revenues from seniors who are not low-income are used to offset the decreased revenues from implementing the low-income pass. Alternatively, Fredericton Transit could establish a senior monthly pass at a similar discounted rate to a student monthly pass.

A sincere discussion is required with the community, local and provincial levels of government, as well as local businesses and non-for-profits regarding the development of low-income passes. These passes represent real costs for the agency and thus the City of Fredericton. Ensuring that costs are shared appropriately for the advancement of low-income fares and social equity is essential, as the burden should not fall solely upon Fredericton Transit.

It is also recommended that Fredericton Transit develop non-fare revenue sources. This includes advertising and any additional revenue from dedicated parking levies, but Fredericton Transit should also explore the relevance of existing provincial government grant funding programs, and should lobby for provincial contributions from gas tax or other sources. Currently, the Province of New Brunswick is one of the only jurisdictions in Canada that does not provide operational funding for transit. Finally, ensuring that the cost of transit is competitive with the cost of driving (parking, etc.) is critical to attracting and sustaining new ridership.

Partnerships

To be successful, transit service cannot exist in a vacuum; transit relies heavily on the community it serves and on collaboration with partners that remove snow from streets and sidewalks, partners that plan neighbourhoods and that determine land uses and zoning, and partners that benefit from customers delivered by transit vehicles. In addition, Fredericton Transit has a limited number of partnership arrangements with organizations in and around the City and may be missing opportunities to develop a more reliable stream of revenue while providing better service to Fredericton.

There is a myriad of possible partnership opportunities between Fredericton Transit and different groups and organizations local to Fredericton. Not all partnership opportunities will come to fruition, and others will take time to cultivate, so it is recommended that Fredericton Transit begin (or continue) conversations in the near future with prospective partners including community organizations, technology companies, key trip destinations, neighbouring municipalities, and other municipal departments. In preparation for conversations, it is important to consider the benefits, risks, and potential drawbacks for each partner, and consider strategies to mitigate the risks.

Marketing

A formal marketing plan which provides strategic direction of when to market, the audience, the message being conveyed and the medium, does not exist for Fredericton Transit. Moreover, there are many opportunities related to marketing and communications for Fredericton Transit. These opportunities include improving brand visibility and recognition, generating additional revenue streams, and more. With improved marketing and communications comes improved ridership, so long as strong marketing efforts are backed up by good service quality.

Opportunities to improve marketing include:

- Establishing a “Transit is Cool” culture in Fredericton.
- Leveraging grass roots marketing as a powerful and cost-effective tool, similar to what Fort Sask Transit did in the creation of replica bus stop signs containing user information.
- Guerilla and street marketing to reach wide audiences quickly and effectively at events such as the Scotiabank Fredericton Marathon, RibFest, and Doors Open Fredericton.
- Cooperative marketing involving local businesses for joint purpose.
- Rider-centric technology that facilitates integrated mobility as a customer expectation.
- Marketing to internal transit staff, especially the front-line operators, regarding how to communicate the positive impact by Fredericton Transit to the public.

Fleet and Facility

Devising a future transit strategy requires long-range fleet and lifecycle planning that considers the marketplace, governmental policy, future service development plans, legislation, and the attributes of the various types of propulsion products. It is also important to consider the advantages, lifecycle costs, and risks of adopting new or alternative fleet vehicles within the local context, as one transit system’s solutions may not be appropriate in another environment. For example, adopting a lower-emission propulsion source, such as diesel-electric hybrid buses or battery electric buses (BEBs), requires much higher capital costs and is best-suited to urban environments with frequent “stop-and-go” activity and traffic congestion.

Stantec believes that Fredericton Transit is currently best-served continuing with diesel as its primary propulsion source for conventional buses. Considerably higher capital costs aside, alternate propulsion types such as BEBs or diesel-electric hybrids are best suited to dense urban environments with plenty of “stop and go” activity and traffic congestion. Stantec believes that the 15-year lifecycle currently implemented is advantageous and realistic given Fredericton’s operating parameters. However; Stantec recommends that Fredericton Transit update its procurement specifications to require stronger provisions for future purchases while at the same time enhance its scope so as to be clearly seen being non-proprietary. The principal key of course is that Fredericton Transit require a stainless steel framed bus (of a non-brittle stainless steel grade) along with non-metallic body panels. The current Nova Bus LFS product is exclusively built with a stainless frame while New Flyer offers this feature for its frame as an option. Reviewing specifications of larger transit agencies or “piggy-backing” on the orders of other transit agencies or joint procurement initiatives with other peer agencies in New Brunswick may yield greater value-for-money for the agency and a product built with better componentry.

Importantly, Fredericton Transit’s entire fleet will soon be able to deploy ramps, and together with accessibility upgrades to bus stop infrastructure, persons with disabilities will be able to take advantage of more fixed route services. The recommendations throughout this Plan will help support accessible fixed route services, particularly with implementation of the Accessible Transit Plan.

Facility Considerations

Moving the Transit Administration and Operations Offices to the site of the existing storage facility is desirable as it provides the opportunity for Administration and Operations to be co-located in the same workspace, however, we do not recommend the relocation of the Administration and Operations Offices at this time. Fredericton Transit’s capital budget is better invested in the near term into the other elements described in this Strategic Plan such as in enhancing technology for service optimization and customer/operator safety, marketing and branding, in upgrading the accessibility of bus stops, and in the development of park-and-rides to attract new riders and retain the loyalty of existing riders.

Performance Criteria

A major goal or desired outcome of this Strategic Plan is to grow transit ridership by offering an attractive and viable transit service to more people for more trips. Performance criteria help transit agencies, indeed any organization, track progress towards certain goals or objectives. While the overarching intent of this Plan is to increase ridership and improve operational efficiency, we can measure different key performance indicators that help inform our progress towards our goals.

Performance indicators are useful because they provide an indication of trends in performance, helping identify areas that need attention and correction, as well as areas of success. Performance indicators or criteria are also useful for tracking the implementation of plans, like the current Strategic Plan.

Stantec recommends that Fredericton Transit develop of list of indicators or criteria that will track progress of this plan, as well as performance important for the agency itself, and for its customers. This list should include financial, productivity, and safety related indicators. These indicators should be tracked based on the available data, and should evolve over time as more data becomes available and more sophisticated tracking is possible.

Moving Forward

Stantec presents a consolidated and summarized version of its recommendations broken down into an implementation timeline of short-term (within the next 2 years), medium term (3-5 years) and long-term (5 years or more into the future) recommendations. The recommendations below provide a blueprint for moving Fredericton towards achieving many of the community's objectives expressed in the Fredericton Growth Strategy, the City Centre plan, as well as other documents.

Service Planning and Operations Recommendations

Short Term (0-2 Years)	Medium Term (3-5 Years)	Long Term (5+ Years)
• Develop park-and-rides leveraging existing parking lots along existing routes. • Update route network to be more effective and efficient for present-day Fredericton. • Replace Route 18 (Silverwood) with an on-demand solution. • Restructure Kings Place hub by moving half of the bus stops onto adjacent York St. and/or undertake a feasibility study that further considers the urban design and transit pros/cons of relocating the transit hub at the rear of Kings Place	• Pilot Sunday service. • Explore the potential for a north side transfer hub. • Further restructure the downtown transit hub pursuant to the recommendations of the feasibility study.	• Collaborate with private developers to develop park-and-rides further afield and/or with dedicated routes. • Prepare to evolve Route 20 (Lincoln) into a more productive service that also runs to the airport.

Technology Recommendations

Short Term (0-2 Years)	Medium Term (3-5 Years)	Long Term (5+ Years)
• Identify opportunities to improve data collection and analysis. • Install passenger counting system to create accurate, real-time data to support service realignment decisions. • Install internal and external camera systems to improve safety and attract ridership.	• Invest in on-demand/dynamic scheduling software. • Make further improvements to data collection and analysis based on needs identified in years 1 and 2.	• Remove handheld two-way radios from buses and replace with an integrated hands-free CAD/AVL/MDT solution • Monitor the progression of Bus Collision Warning System technology and consider implementing or piloting.

Fare Recommendations

Short Term (0-2 Years)	Medium Term (3-5 Years)	Long Term (5+ Years)
• Update the fare table to ensure it is as simple as possible. • Begin exploring onboard payment options that reduce the number of cash fare payments	• Modernize the fare collection system by installing simple open and mobile fare collection alternatives.	• Gradually phase out Fredericton Transit fare media such as tickets, transfers, and passes, as the use of open and mobile fare payments grows.

Partnerships Recommendations

Short Term (0-2 Years)	Medium Term (3-5 Years)	Long Term (5+ Years)
• Harmonize U-Pass agreement between institutions and seek to establish contractual partnerships with additional post-secondary institutions.	• Continue cultivating partnerships and pursuing new partnerships as feasibility permits.	• Develop co-branded advertisements with local businesses. • Develop partnerships with local business to offer discounts upon presentation of

Short Term (0-2 Years)	Medium Term (3-5 Years)	Long Term (5+ Years)
• Investigate the feasibility of EcoPass agreements with major employers. • Begin (or continue) conversations with prospective partners and pursue viable partnership options that benefit both parties.		Fredericton Transit fare products

Marketing Recommendations

Short Term (0-2 Years)	Medium Term (3-5 Years)	Long Term (5+ Years)
• Simplify route naming convention. • Retain marketing agency/consultancy with transit expertise to develop a Marketing Plan.	• Begin implementation of new bus stop signage, to improve system accessibility. • Implement the findings of the Marketing Plan completed in the short term aimed at attracting new riders and increasing service quality for existing passengers. • Improve the use of the Fredericton Transit webpage, or ideally develop a dedicated Fredericton Transit website with the new branding.	• Continue implementation of new bus stop signage consistent with updated Fredericton Transit branding.

Fleet Recommendations

Short Term (0-2 Years)	Medium Term (3-5 Years)	Long Term (5+ Years)
• Maintain the 15-year fleet lifecycle for conventional transit, while updating purchase specifications.	• Maintain an asset management plan and perform periodic reviews of fleet, facilities, and productivity.	• Perform periodic reviews of fleet, facilities, and productivity.

Short Term (0-2 Years)	Medium Term (3-5 Years)	Long Term (5+ Years)
	• Monitor trends in efficiency improvements for fleet such as hybrid, CNG and electric.	

Performance Criteria Recommendations

Short Term (0-2 Years)	Medium Term (3-5 Years)	Long Term (5+ Years)
• Develop performance criteria, objectives, data collection methods, and tracking tools. • Start collecting data needed for performance monitoring.	• Publish criteria and performance on Fredericton Transit website. • Revisit criteria, objectives, etc. and modify as needed depending on data availability and feasibility.	• Expand criteria to be tracked based on improved data collection, adoption of new technology, public feedback, etc.

1.0 PROJECT BACKGROUND

1.1 INTRODUCTION

Fredericton Transit provides public transit six days a week across 12 routes for nearly 60,000 residents. Current ridership trends reveal stagnation, and while operating costs of Fredericton Transit are relatively low compared to its peers, improving efficiency could help, together with other strategies, to stimulate ridership gains.

The Strategic Plan process aims to position Fredericton Transit as an essential element of high quality, safe, and reliable transportation in Fredericton. Fredericton Transit will contribute to the liveability and quality of life of Fredericton, adding vibrancy to the downtown and neighbourhoods. Fredericton Transit will play an important role in attracting and retaining new businesses and industry, enabling a less car-dependent work force and citizenry.

The purpose of this section is to provide a performance review of Fredericton Transit's current operations and to analyze current trends of its service area. A clear understanding of Fredericton Transit and of Fredericton will help identify gaps and needs, identify strengths on which to build, and identify opportunities for improvement.

About Fredericton

The City of Fredericton is home to 58,220 residents. As the capital of the province of New Brunswick, a sizable employment base is government, as well as other service sectors. Indeed, the downtown or City Centre where many government (provincial, federal, and municipal) offices are located, is a major trip generator, and it is estimated that over 95% of the labour force from surrounding areas work in the City of Fredericton. Figure 1 displays the map of the City, identifying municipal wards as well.

Fredericton Transit — Strategic Plan 2018

City Wards

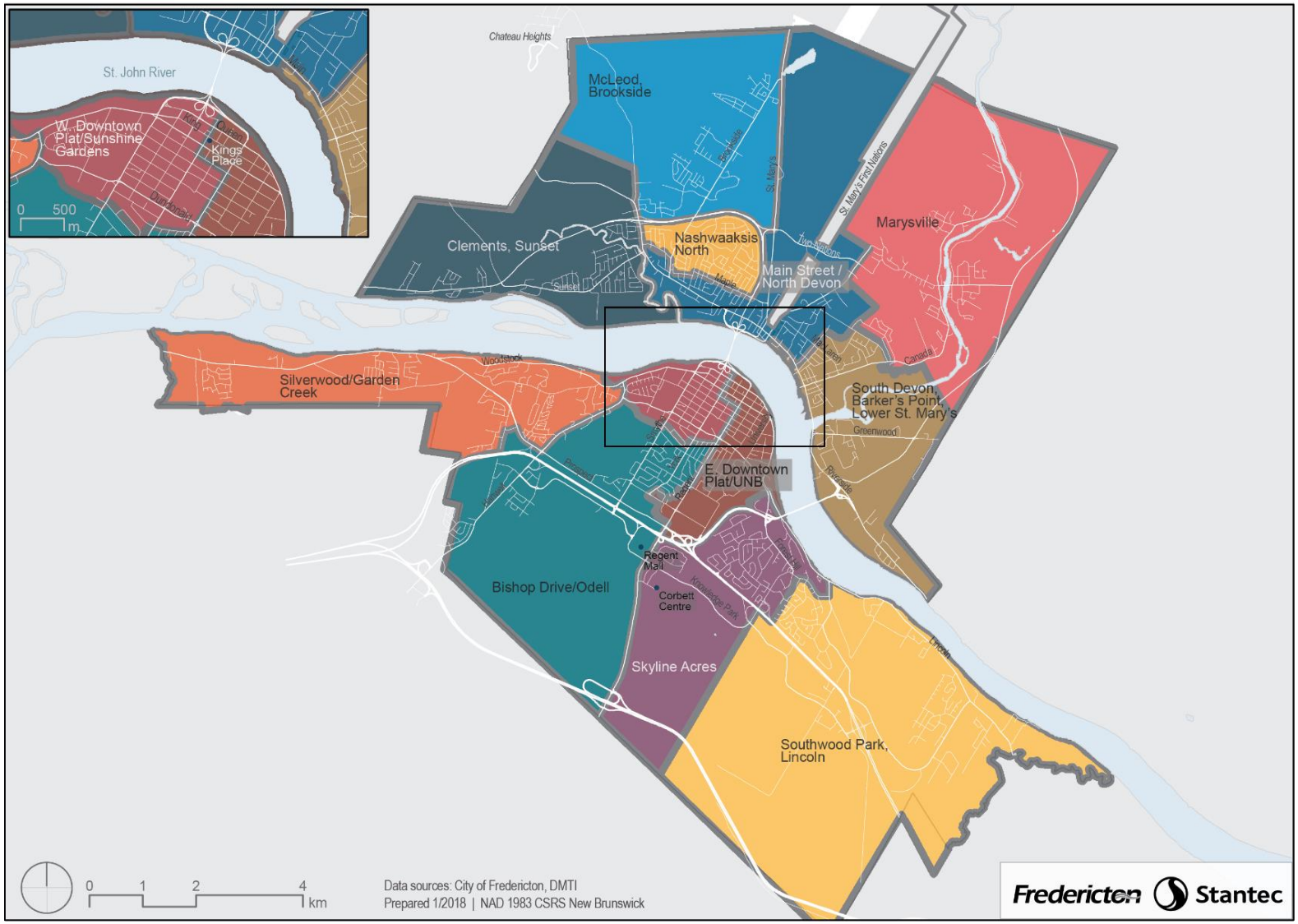


Figure 1 City wards of Fredericton.

Understanding the demographic composition of Fredericton is essential in developing transit tailored to the city's needs. Table 1 compares demographic statistics of the city with those of the Fredericton-Oromocto economic region, the province and with Canada.

Table 1 Demographics.

	Fredericton	Fredericton—Oromocto	New Brunswick	Canada
Total population (2016)	58,220	137,527	747,101	35,151,728
Total population (2011)	56,224	135,467	751,171	33,476,688
Population change (2011 - 2016)	3.6%	1.5%	-0.5%	5.0%
Dwellings	28,431	65,997	359,721	15,412,443
Average household size	2.2	2.3	2.3	2.4
Median household income	$60,592	$65,365	$59,347	$70,336
Unemployment rate	8.8%	9.4%	11.2%	7.7%
Labour force	31,505	72,440	381,790	18,672,475
English spoken at home	88.0%	91.6%	68.7%	63.7%
French spoken at home	3.7%	4.1%	28.0%	20.0%
Recent immigrants	4.4%	2.0%	1.3%	3.5%
Caucasian	89.8%	94.7%	96.6%	77.7%
Minority groups	10.2%	5.3%	3.4%	22.3%
First Nations	3.2%	4.4%	4.0%	4.9%
Male	47.5%	49.2%	48.9%	49.1%
Female	52.5%	50.8%	51.1%	50.9%
14 and younger	8.9%	16.3%	14.8%	16.6%
15-34	57.4%	25.3%	21.8%	25.3%
35-64	22.9%	41.2%	43.5%	41.2%
65 and older	10.8%	17.3%	19.9%	16.9%
No degree	11.8%	16.0%	22.0%	18.3%
High school only	27.2%	29.7%	28.5%	26.5%
College degree	18.5%	20.4%	21.8%	19.4%
University degree	35.1%	24.4%	16.7%	23.3%
Other	7.3%	9.5%	11.0%	12.6%
Owned	58.4%	73.9%	74.9%	68.1%
Rented	41.6%	26.1%	25.1%	31.9%
Single detached home	45.9%	66.1%	69.3%	53.6%
Semi-detached home	2.8%	2.2%	3.9%	5.0%

	Fredericton	Fredericton—Oromocto	New Brunswick	Canada
Apartment (<5 storeys)	31.7%	15.9%	13.8%	18.0%
Apartment (>5 storeys)	1.8%	0.9%	1.2%	9.9%
Other	17.8%	14.9%	11.8%	13.5%
% Spending >30% of income on housing	23.9%	16.7%	16.8%	24.1%
Car (driver)	75.4%	82.8%	83.6%	74.0%
Car (passenger)	8.3%	7.7%	7.7%	5.5%
Transit	4.4%	2.3%	2.3%	12.4%
Walked	9.4%	5.2%	4.6%	5.5%
Bicycle	1.5%	0.8%	0.4%	1.4%
Other	1.1%	1.3%	1.5%	1.2%
Average commuting time (min.)	15.4	18.6*	18.9	26.2

**For York County, Fredericton-Oromocto Economic Region does not have comparable statistic, York County is nearest comparable geography.*

The City of Fredericton has grown nearly 4% since the 2011 Census, favourably comparable to the Canadian average of 5%. More importantly, this growth is substantial, given that New Brunswick's total population slightly declined between 2011 and 2016. It is important to note that the percentage of young adults in Fredericton (age 15-34) is more than double the provincial and national averages, which is supported by a series of post-secondary institutions including University of New Brunswick (UNB), St. Thomas University (STU), New Brunswick College of Craft and Design, and New Brunswick Community College. Often with little disposable income, post-secondary students are prime candidates for transit use, who may be drawn to transit through discounted fares or student pass programs.

Furthermore, Fredericton's unemployment rate is 8.8%, greater than the Canadian average, but still lower than the regional and provincial averages. Household median income is $60,592, less than the Canadian median, but higher than the regional and provincial averages. With a total labour force of nearly 32,000, Fredericton seems economically strong; economic prosperity usually bodes well for transit, since transit availability close to work destinations is a good predictor for commuting by transit.

With an average commute time of 15 minutes, and only 4% of commuting trips made by transit, the perceived convenience of driving directly from door to door may deter transit use. This is further supported by the nearly 10% of residents choosing to walk to work, suggesting that trips are often short, or can be made quickly on foot. While unlikely to compete with short, walkable trips, transit must therefore come to be perceived as convenient and quick and competitive with vehicle trips.

About Fredericton Transit

Fredericton Transit operates public transit on 12 routes and carried over 1.37 million riders in 2016. Operating hours are from 5:55 am – 11:15 pm, and service frequency varies from half-hour headways during rush hours to hourly during off peak, and less frequently in the evenings. Service hours on Saturdays are similar to weekdays (7:00 am – 10:00 pm), but with hourly frequency throughout the day. The only exception to this are routes 18 and 20, which operate only during peak weekday hours on a 75-minute frequency with no Saturday service. Fredericton Transit currently does not offer Sunday service on any routes.

Table 2 list the routes and provides approximate operating hours and peak and off-peak frequency.

Table 2 Fredericton Transit service span and frequency.

Route	Weekday Service Hours	Weekday Frequency	Saturday Service Hours	Saturday Frequency
10N Carlisle	6:40 am – 11:10 pm	Peak: 15 min Off-Peak: 30 min	7:40 am – 11:10 pm	60 min
11S Prospect	6:15 am – 10:50 am	Peak: 15 – 30 min Off-Peak: 30 min	6:45 am – 10:50 pm	60 min
12N Brookside	6:40 am – 11:05 pm	Peak: 30 min Off-Peak: 60 Min	7:10 am – 11:05 pm	60 min
13S Prospect	6:15 am – 10:30 pm	Peak: 30 min Off-Peak: 60 Min	6:45 am – 10:30 pm	60 min
14N Barkers Point	6:20 am – 10:40 pm	Peak: 30 min Off-Peak: 60 min	6:20 am – 10:40 pm	60 min
15S Hanwell	6:15 am – 11:00 pm	Peak: 30 min Off-Peak: 60 min	6:45 am – 11:00 pm	60 min
16N Marysville	6:10 am – 10:40 pm	Peak: 30 min Off-Peak: 60 min	6:45 am – 10:40 pm	60 min
17S Regent	6:15 am – 11:15 pm	Peak: 30 min Off-Peak: 60 min	6:45 am – 11:15 pm	60 min
116 Kings Place	6:30 am – 10:05 pm	Peak: 30 min Off-Peak: 60 min	7:30 am – 10:05 pm	60 min
216 Corbett Centre	6:15 am – 9:40 pm	Peak: 30 min Off-Peak: 60 min	7:15 am – 9:40 pm	60 min
18 Silverwood	Peak Only 6:30 am – 8:30 am 4:30 pm – 6:30 pm	Peak: 75 min Off-Peak: None	None	None
20 Lincoln	Peak Only 6:15 am – 8:45 am 4:15 pm – 6:45 pm	Peak: 75 min Off-Peak: None	None	None

1.2 BACKGROUND INFORMATION REVIEW

The current planning process relies on an understanding of previous planning efforts, successes, and challenges. This section provides overviews of some important planning documents and plans relevant to transit.

2008 Strategic Plan

Faced with rapid population growth in the mid-2000s, the City of Fredericton commissioned a Strategic Plan for Transit with the intent of growing and improving transit service in 5-10 years. To do this, key strengths and weaknesses of the existing system are explored, including the network's ability to meet the travel needs of residents.

Divided into a “north side” and “south side” by the St. John River, trips originate in both areas, however most trips (88%) terminate on the south side, where the downtown core and most employment destinations are located. With North Fredericton underserved by transit, direct and frequent north-south connections, and a possible north-side transfer point are recommended for the future network.

The 2008 Transit Plan noted the following recommendations:

- A base frequency of one hour on all routes, with 15-minute frequency on route 11 during peak hours (providing service to UNB and STU campuses).
- Sunday service is too cost prohibitive, and therefore only as a long-term recommendation through zone buses, similar to an on-demand service.
- Relocate buses from Kings Place to garage, as bus bays do not accommodate the 40-foot fleet.
- Park-and-ride lots into the City (connecting to transit) recommended as a strategy to keep routes out of low-density suburbs.
- Increase marketing and branding of transit and advertising at shelters to increase revenue.
- St. Mary’s Street and Maple Street intersection as a ‘sub-terminal’ for the north side, similar to Regent Mall.
- Create U-Pass programs for UNB students and staff, and employee passes with major employers in the City.
- Improve accessibility of buses and bus stops to accommodate an aging population, and those with disabilities.

These recommendations provide a comprehensive overview of service gaps, and opportunities for the future which are grounded by an understanding of travel demand. A highly educated, yet aging population suggests demand for commuting by transit exists in the City, however 80% of riders are currently “captive riders”, who use transit because car ownership is not within their means. Broadening the appeal of transit through direct and frequent service, as well as a broad marketing campaign are believed to increase ridership in the future.

Fredericton Growth Strategy (2017)

By 2041, Fredericton is expected to add slightly over 50% of its current 60,000 population and add 12,000 new jobs. As a result, the dilemma arises regarding how to accommodate this growth. While traditionally Fredericton and surrounding municipalities have expanded outward, Fredericton presented choices to its residents based on three scenarios or models for growth: dispersed growth, focused on consuming undeveloped land at periphery of the city, as well as outside the municipal services boundary; north side growth, focused on developing lands on the north side of the St. John River, but less dispersed than the first scenario; and compact growth, focusing 25% of development in the existing Urban Core, as well as some outside the services boundary, but balanced on both sides of the river—this scenario as envisions mixed uses of some areas outside of the boundary (Figure 2).

Supported by most participants of the planning process, the compact and balanced scenario helps achieve the major principles of the Growth Strategy:

- Efficient land and infrastructure use
- Supports transit, cycling, and walking for a balance of mobility options
- Reinforces downtown vitality
- Facilitates more complete communities

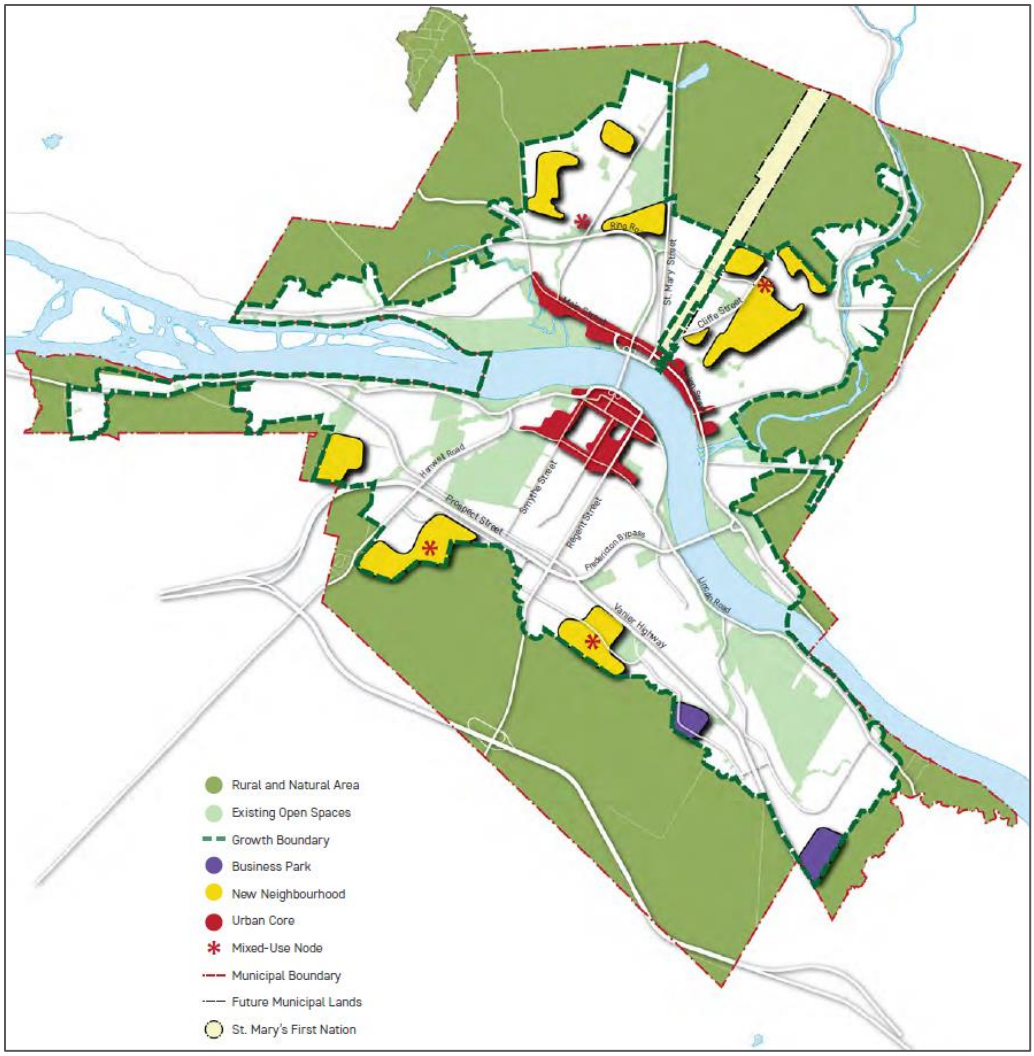


Figure 2 Selected growth scenario.

Source: Fredericton Growth Strategy, 2017.

Regarding transit, new compact mixed-use development enables efficient and productive transit service by reducing distances between trip generators, creating the necessary densities and mixes of land uses. Furthermore, densifying the Urban Core, in particular Main St. on the north side, can enable opportunities for transit to serve trips for many purposes more efficiently than single occupancy vehicles. And with a large population increase, the need to stem single occupancy vehicle trips is substantial. Community Goal 8 in the Growth Strategy is for a complete transportation system, where the City will foster viable alternatives to private vehicles, specifically “the transit system will be easy to use and comfortable for those who rely on it or choose to use it.

The current Transit Strategic Plan should ensure that new growth areas/neighbourhoods are considered in future service plans, and that strategies aim ridership growth among choice riders, such as by improving the attractiveness of transit through more frequent and direct service.

Fredericton Municipal Plan Update – Transportation Background Review (2016)

The City of Fredericton is developing a new Municipal Plan—Imagine Fredericton—a master plan aimed at guiding land use decisions and policies to help implement the Fredericton Growth Strategy. The current Municipal Plan is nearly 30 years old.

The City, along with consulting staff, developed technical background reports to inform the Municipal Plan. These included a Transportation Background Report prepared in 2016 which provides information regarding the current state of transportation in the City. The Report acknowledges that a sustainable transportation system is important to provide a variety of choices which balance modes and users, thereby ensuring the system is not singularly focused on private vehicles.

The Report notes that the majority of travel is in the north-to-south direction which places strain on the Westmorland Street Bridge, the main connector between north and south sides. This pinch point forces travel downtown that may not be destined for the downtown. Moreover, the active transportation network includes multiuse trails, bike lanes, and natural trails.

After providing a primer on current transit conditions, the Report notes some opportunities, namely that a lack of data and technology makes evidence-based planning and decision making difficult— “good planning relies on good data”. Informed decisions need data, as does setting performance measures and thresholds. Part of the current mandate is to identify tech solutions that will help Fredericton Transit measure performance and acquire data to help planning and operations.

Other opportunities include:

- Developing a strategic vision and objectives with measurable goals to guide decision making
- Establishing a north side transit hub
- Examining commuter services to key employment centres and neighbouring municipalities and the Airport
- Exploring park-and-ride locations
- Considering transit-orientated development to coordinate land use and transport planning
- Implementing accessible routes and incentivizing use of public transit for mobility impaired users in alignment with the City’s new Accessibility Plan
- Developing service standards that will guide decisions that trigger route revision, retirement, and creation.

Fredericton City Centre Plan (2015)

Many cities across North America develop plans to reinforce the character of downtowns by adding residential developments, and revitalizing commerce and business uses, the Fredericton City Centre Plan provides recommendations for public realm and open spaces, building use, and all forms of circulation. The document acknowledges that a lively downtown needs places to visit, work, live and shop.

Downtown Fredericton is already a major trip generator for the City, and transit service is focused at Kings Place, where riders can transfer between buses, as well as walk to final destinations in a relatively small, compact, and walkable downtown.

Particularly for transit services, the City Centre Plan provides recommendations for traffic-calming on downtown streets, limitations for additional parking, and an integrated intermodal transit hub.

Traffic-calming through road diets and other mechanisms could have a negative impact on bus circulation, and thus should be pursued in collaboration between Community Development, Transportation, and Transit staff to ensure that bus circulation on key streets is not hindered.

The City Centre Plan also acknowledges that while transit is an important component for the vitality of downtowns, the current layout of bus bays at Kings Place Shopping Centre is not ideal, causing congestion and detracting from the visual appeal of King St. In line with the 2008 Strategic Plan, it is recommended that the terminal, while maintained in the downtown on the same block, be moved to one of two sites (Figure 3), either behind the current mall or on the former SMT site, at the corner of King and Regent Sts. Moreover, the City Centre Plan recommends that the terminal be integrated with a mixed-use building, ensuring that the terminal continues functioning as a destination as well, encouraging use throughout the day and natural surveillance.

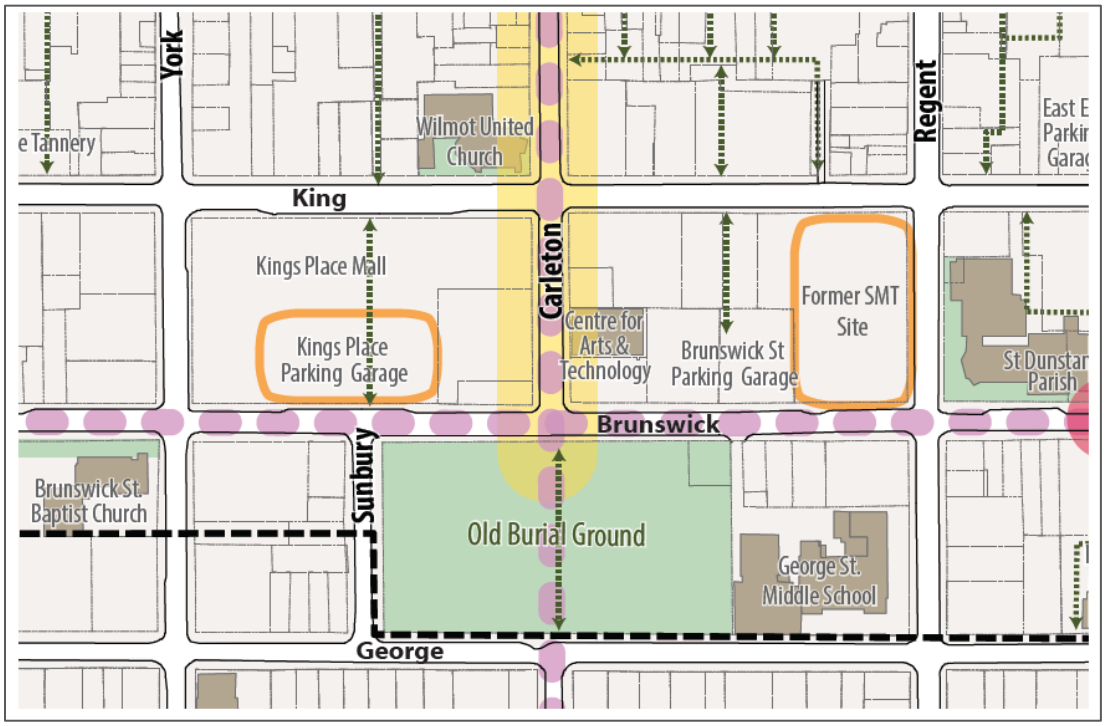


Figure 3 Two potential sites for bus terminal relocation.

Source: Fredericton City Centre Plan, 2015.

Many transit systems are recognizing that stand-alone bus terminals result in undesirable consequences due to the absence of activity from passengers and buses when transfers are meant to be timed, such as loitering, homelessness and crime; they often become a cost-driver from a safety and security perspective necessitating extra staff. A major principle of transit-oriented development is that transit should be integrated within useful settings, like businesses, retail, and living opportunities, so that a transit station acts both as a terminal and as destination. The current Transit Strategic Plan will keep this principle in mind to ensure that recommendations regarding the downtown transit terminal contributes to the vitality of Fredericton's downtown, instead of detracting from it.

Fredericton Transit Accessibility Plan (2017)

While Fredericton Transit's active fleet consists of fully low-floor buses, older low floor buses do not contain spaces or security measures for mobility devices, and as such, the fleet is not universally accessible. Furthermore, the majority of bus stops are not accessible, meaning they lack features like sidewalks and landing pads. Bus stop inaccessibility

is further amplified during the winter months given the eight-day service standard to have them cleared of snow and ice; this presents a significant barrier to transit. The City does operate a specialized transit program to support mobility impaired individuals and collaborates with the local taxi service to accommodate these individuals outside of Transit operating hours.

The Transit Accessibility Plan comes at a crucial time. As a result of the Plan and associated federal funding, Fredericton Transit is purchasing new low-floor buses with mobility device positions which will ensure that the entire fleet is accessible. The City is also committed to upgrading priority bus stops for accessibility. Another important feature for accessibility is auditory announcements pre-boarding and on-board for visually impaired customers which were included in the Accessibility Plan recommendations.

The Accessibility Plan reviews the current state of accessibility legislation, provides an industry review of accessibility plans, defines accessibility standards and guidelines, and finally provides recommendations regarding accessible bus features, accessible bus stop design, travel training, and snow clearing, among other topics. An implementation plan is also provided, prioritizing busy stops for accessibility upgrades.

Acknowledging a rider's ability instead of disability can help improve travel flexibility for riders with disabilities or mobility challenges. By investing in accessibility infrastructure on conventional service, riders with disabilities may be able to use conventional services more frequently, and together with specialized transit service, can reduce the burden on the door-to-door service.

While specialized transit is not a focus of the current study, improving conventional transit's accessibility can help more people travel with greater flexibility while also increasing the community's social cohesion, though this change may impact operations due to ramp deployments or bus kneelings. As a larger proportion of persons with disabilities use conventional transit, attention must be paid to ensuring that operations respond to their particular needs.

Fredericton Transit is currently transitioning to a low-floor fleet with ramp deployment capabilities and together with infrastructural upgrades at bus stops, fixed route services will become more accessible for persons with disabilities.

From Surfaces to Services: An Inclusive and Sustainable Transportation Strategy for the Province of New Brunswick, 2017-2037 (2017)

Authored by the New Brunswick Rural and Urban Transportation Advisory Committee (RUTAC), this recent report describes a "[…] vision that ensures every New Brunswicker has opportunities to access the transportation they need to achieve economic and social inclusion."

From Surfaces to Services makes a social justice case to improve the accessibility of transportation options for residents of New Brunswick to connect people to jobs, schools, and other opportunities, while reducing dependence on private vehicles. An overarching theme is to improve environmental sustainability and relieve the financial burden that car ownership can impose on certain households.

Transit is identified as a major component of providing equitable and sustainable travel alternatives to the private vehicle, but the plan acknowledges the lack of provincial funding is a major hindrance to delivering useful and viable public transit with the ability to lure drivers away from vehicles. Furthermore, the plan calls on the province to develop a transportation plan and vision for the province which improves data collection to inform decision making while enabling and helping municipalities to provide transportation alternatives to the private vehicle.

RUTAC proposes that the Province of New Brunswick dedicate funding for transit, and importantly, that the Province encourage municipalities to align transportation and land use planning to encourage developments that are transit

supportive. While the City of Fredericton is geared toward providing sustainable development, it is sometimes at odds with the Province, which appears to have little appreciation for urban issues such as transit and equitable transportation, even for its Capital City. As a predominately rural province, New Brunswick faces the difficult task of garnering support and critical masses in major cities (Moncton, Saint John and Fredericton) to make transit attractive and productive. As the capital city with large urban employment in the services and governmental industries, the City of Fredericton's economic health impacts the region and the province as a whole. Providing dedicated funding to improve transit services will positively benefit the City's economy, and thus the province's economy as well.

1.3 MARKET CONDITIONS

Public transit is both a business and a public service—transit needs to be financially sustainable and responsible to the taxpayers who may or may not ride transit, while also ensuring that it can provide vital transportation to residents without other means of travelling. Typically, these conflicting goals result in difficult decisions to remove service, to serve certain neighbourhoods over others, or to design routes that intend to provide coverage at the expense of ridership or productivity.

To understand the ingredients for successful and productive transit services we need to understand the market for transit. In other words, we need to understand the demographics of a city, its layout, and where people are going. Transit normally works best when it can provide fast and frequent service to a large amount of people travelling for different purposes. Nevertheless, sometimes transit must also provide access to residents who are elderly or low-income for example, residents unable to drive to get a lift but who must still travel as a basic right to or within the city.

This section explores some of the basic ingredients of successful transit, including density, diverse land uses, urban design, and sociodemographic composition.

Population Density

The population density of the City of Fredericton is 439 persons per square kilometre. Nevertheless, because of history, development and legislation, population density across the city varies by neighbourhood.[1]

The densest areas are in the neighbourhoods directly south of the city centre, in the Town Plat (Figure 4). Another very dense neighbourhood is around Forest Hill Rd. due to the Forest Hill Residence for students attending STU as well as the concentration of apartment buildings on Biggs Street/Dunns Crossing. Residential density is lower on the north side of the city and Fulton Heights is the densest neighbourhood on the north side.

The map in Figure 4 also outlines the catchment or service areas of bus stops in Fredericton—the areas within the dashed outlines are within a 400-metre or five-minute walk from a bus stop.[2,3] Most of the densest areas of the City area within the service area, as well as low-density areas on the north side along Canada St. and Brookside Dr. Again, on the south side of the City, low density areas, particularly in Lincoln and Silverwood are also served by

[1] Most of this analysis relies on dissemination area-level data. Dissemination areas represent small, stable geographic units, with a population of 400 to 700 people. Note that some dissemination areas are geographically larger, while other are smaller, but aim to contain 400 to 700 people. Census tracts, which are larger geographic units (containing dissemination areas) with 2,500 to 8,000 people, are used in some analyses, like job data, when dissemination area-level statistics are unavailable.

[2] Note that what this map doesn't show, however, is the frequency of bus service.

[3] About 73% of the city's population lives within a five-minute walk (400 metres) of a bus stop. Note that dissemination area-level data were used in this calculation. Moreover, walking distance buffers were used in these calculations which provide a more conservative estimate of service area population; air distance buffers that are typically used can overestimate service area and thus service area population. This calculation is approximate and used to get a sense of service area coverage. More detailed analysis requires smaller geographic disaggregation, such as data at the dissemination block-level. However, these data are not yet available for the 2016 Census.

transit, but at peak hours only. However, while most of the areas flanking the Lincoln route (route 20 along Lincoln Rd.) have low residential density and are primarily agricultural, the Lincoln Heights neighbourhood is relatively densely populated. As such, it will be important that any service changes to unproductive routes like the 18 and 20 does not remove service to dense areas, such as Lincoln Heights, that happen to be further away from the City Centre.

Tracking and mapping population density raises the idea that not all of Fredericton is suitable for fixed route transit service and that furthermore, providing transit service beyond an area that can provide useful transit ingredients will likely result in low productivity routes. Fredericton Transit could define a *transit service boundary* consistent with the general concept of the urban growth boundary recently established in the Fredericton Growth Strategy (different and smaller than the *municipal boundary*), where transit resources would be prioritized before areas falling outside of the of the transit service boundary. The transit and urban growth boundaries may or may not be similar. The criteria to develop the transit service boundary could be determined by aligning with the forthcoming transportation plan and policies of the new municipal plan.

Overall, the City Centre has a good amount of residential density that is necessary to build ridership and productive transit service. Accordingly, new developments described in the Growth Strategy and further below should have some minimum density that can support transit, just as infill in the City Centre will build future demand for transit.

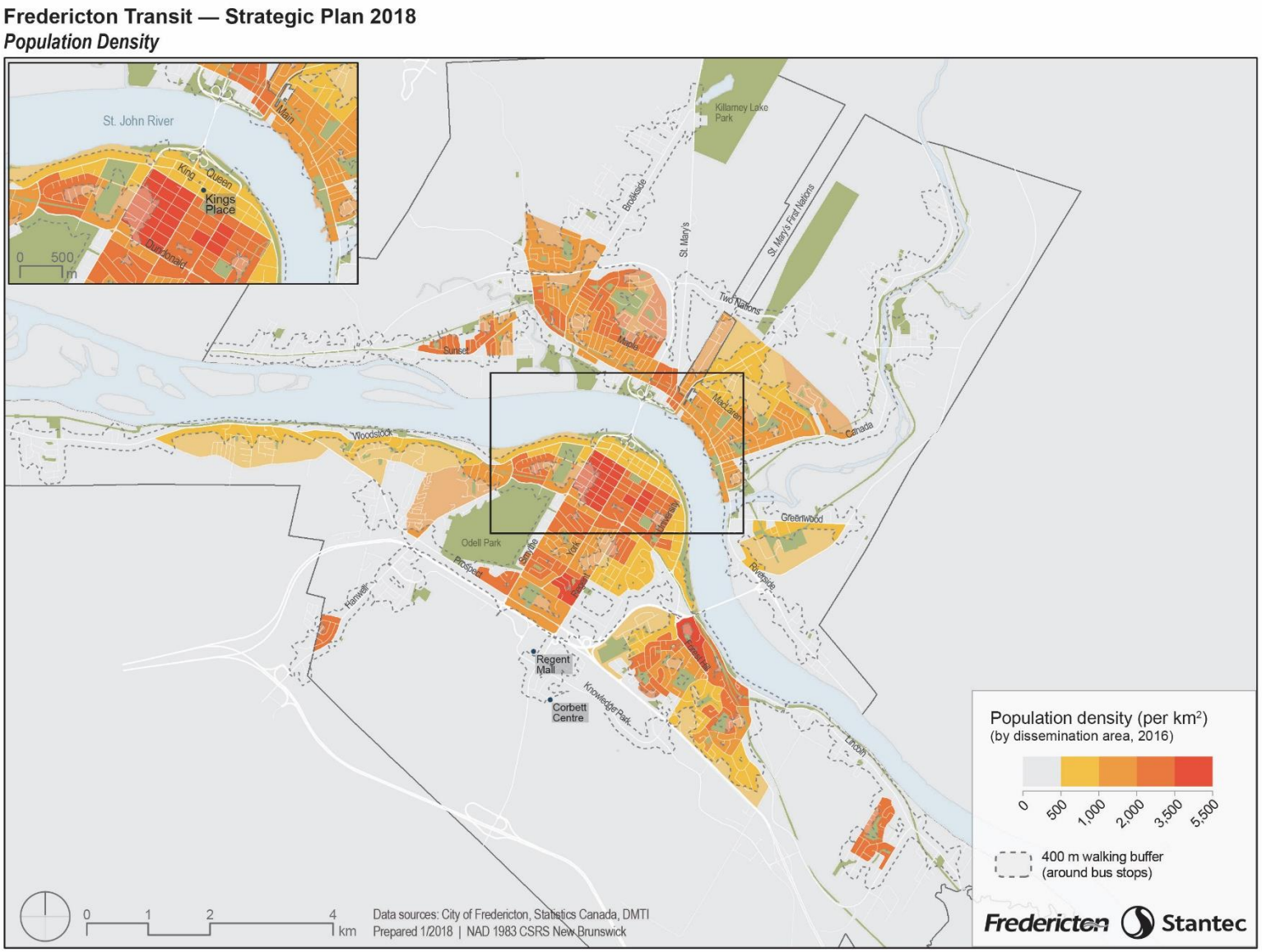


Figure 4 Residential population density.

Employment Density

Fredericton is a monocentric city, meaning that the majority of residents from the City and neighbouring communities commute to the city generally, and downtown specifically for work. Employment density is another necessary ingredient for transit, and having the ability to commute by transit (i.e. having a bus stop near one's work) is a stronger predictor of transit ridership than residential density.

Figure 5 displays the number of jobs per square kilometre by census tract. The densest area for jobs is the downtown or city centre, which also receives the most transit coverage and is the home of the primary transfer hub at Kings Place.

There are also small pockets of employment density in neighbourhoods outside the city centre, such as at malls like the Regent Mall on the south side, and along Main St. on the north side. Furthermore, employment density is also very high at institutional areas of UNB and STU. Nevertheless, the area with the greatest job density is the City Centre, with over fours times as many jobs per square kilometre than the next densest job centre, the university campus and surrounding neighbourhoods.

It's important that transit reach jobs both downtown and in other neighbourhoods in a quick and efficient way so that transit is a viable option for commuting. Otherwise, coupled with free and abundant parking, the private vehicle offers the quickest and most convenient way to commute—there is little incentive to take the bus.

Given that Fredericton's employment is concentrated in the city centre, some of the outlying communities could benefit from park-and-ride lots. Nevertheless, typical commuter buses from park-and-ride lots are premium services on coach-type buses at premium fares, with few stops—these services operate like express services.

Part of this assignment involves studying the feasibility of park-and-ride lots. Regions and cities can help reduce congestion by fostering park-and-ride, so that people drive to transit stations and then take transit to their final destination. Some challenges to implementation that will be explored in subsequent phases including the appropriate siting of park-and-ride lots, the resources (fleet and operators) needed for service at park-and-ride lots, as well as the limitation of Fredericton Transit to operate outside municipal boundaries.

Regardless, the density at the centre of the region and city helps transit because for short trips (because of proximity between housing and work), transit can compete with the private vehicle.

Fredericton Transit — Strategic Plan 2018

Employment Density

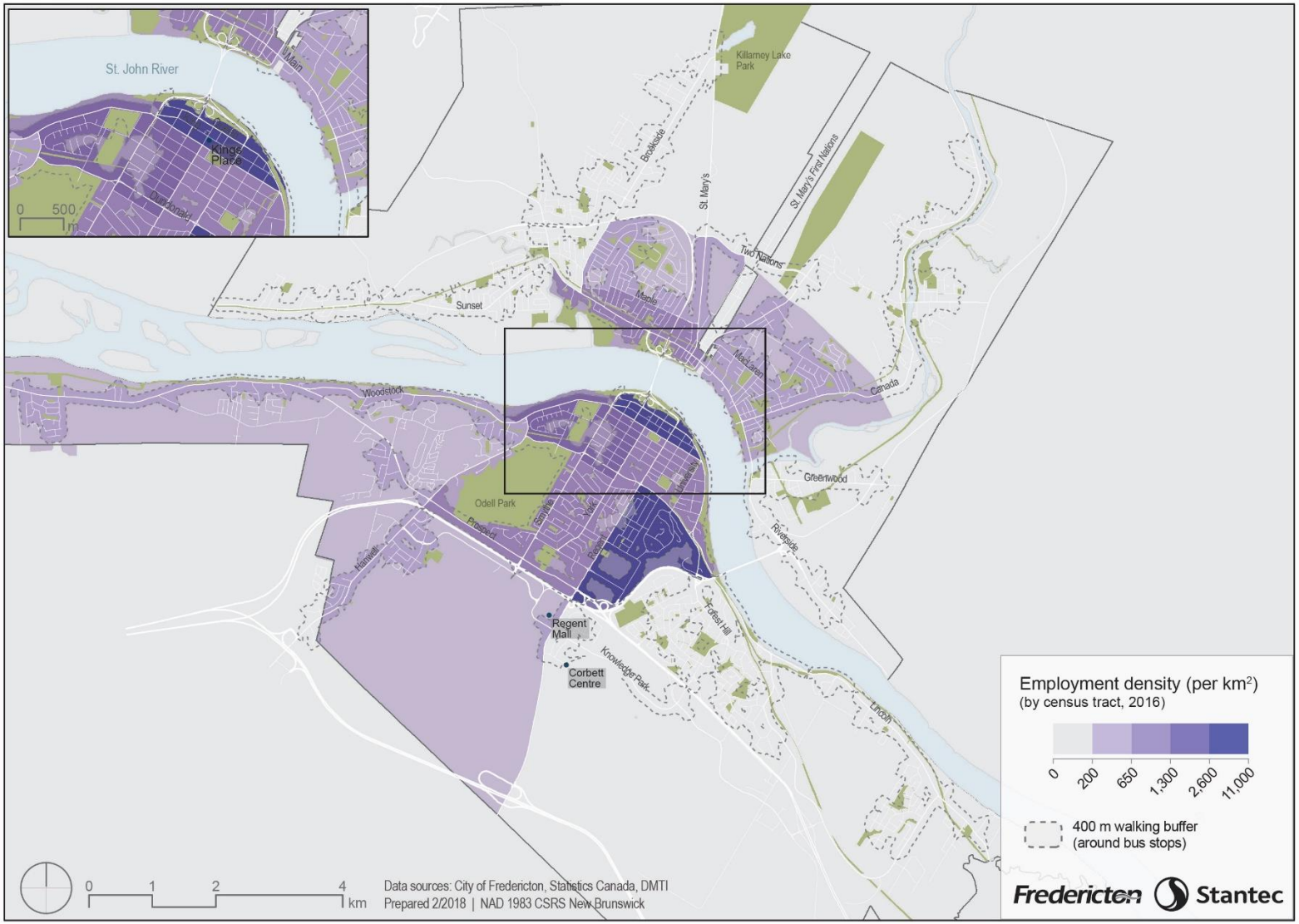


Figure 5 Employment density.

Land Use Diversity

The preceding discussion about population and job densities points to important underlying requirements for strong transit use: mixed land uses, such as residential and commercial or retail, within proximity to one another, can stimulate productive transit trips.

While residential land uses predominate outside of the central city (Figure 6), the City Centre and surrounding neighbourhoods provide a good mix of residential and retail land uses; moreover, the City of Fredericton has also zoned specific areas as 'mixed use'. Currently, Fredericton Transit provides good coverage of the residential and mixed-use neighbourhoods, which is important for generating trips for many different purposes. Making transit useful for different types of trips helps attract different types of riders throughout the day, in addition to the typical 9-to-5 commuter. Put simply, connecting different places for different people encourages routes with all-day, two-way demand, lowering operating costs per passenger.

Mixed uses also enable walkability, a key ingredient for productive transit. Most people access transit by walking to a bus stop, and then walking from the bus stop to their destination. Having mixed-uses promotes walkable environments, facilitates short trips, and together with pedestrian infrastructure, can spur transit use. Over short distances, travel times by bus can approach travel times by vehicle, offering a viable option for residents who may not wish to drive or can't drive altogether.

Focusing transit services in dense, mixed-used areas, such as along Main St. on the north side in accordance with the Main Street Urban Design Plan, and by connecting dense residential neighbourhoods south of Dundonald St. with the downtown, will promote useful trips and productive transit. Indeed, the most productive routes of the network (discussion in a later section), 10N/11S and 12N/13S connect dense, mixed-use neighbourhoods with the City Centre.

Certain populations tend to rely on transit to a greater degree than most of the general population, namely persons of low income and persons who are unable to drive or lack access to a vehicle.[4] As such, educational facilities, recreational facilities, and senior's centres are transit trip generators.

Figure 7 shows that the majority of these transit trip generators fall within a five-minute walk from a bus stop,[5] and nearly all are within a 10-minute walk. While Fredericton Transit provides good connections between many points of interest and land uses, some of the difficulty of reaching one's final destination results from incomplete sidewalk or pedestrian infrastructure, which can act as a barrier to transit use.

[4] Students are usually only temporarily low-income, working part-time jobs with lower wages, while seniors may be low income due to fixed incomes based on pensions and other retirement income. Nevertheless, these are not the only two groups with low incomes. Furthermore, persons with low incomes may drive, not out of choice, but out of necessity due to job location, personal reasons, and so on.

[5] Educational facilities, 67%, recreational facilities 58%, and 1 senior centre.

Fredericton Transit — Strategic Plan 2018
Zoning

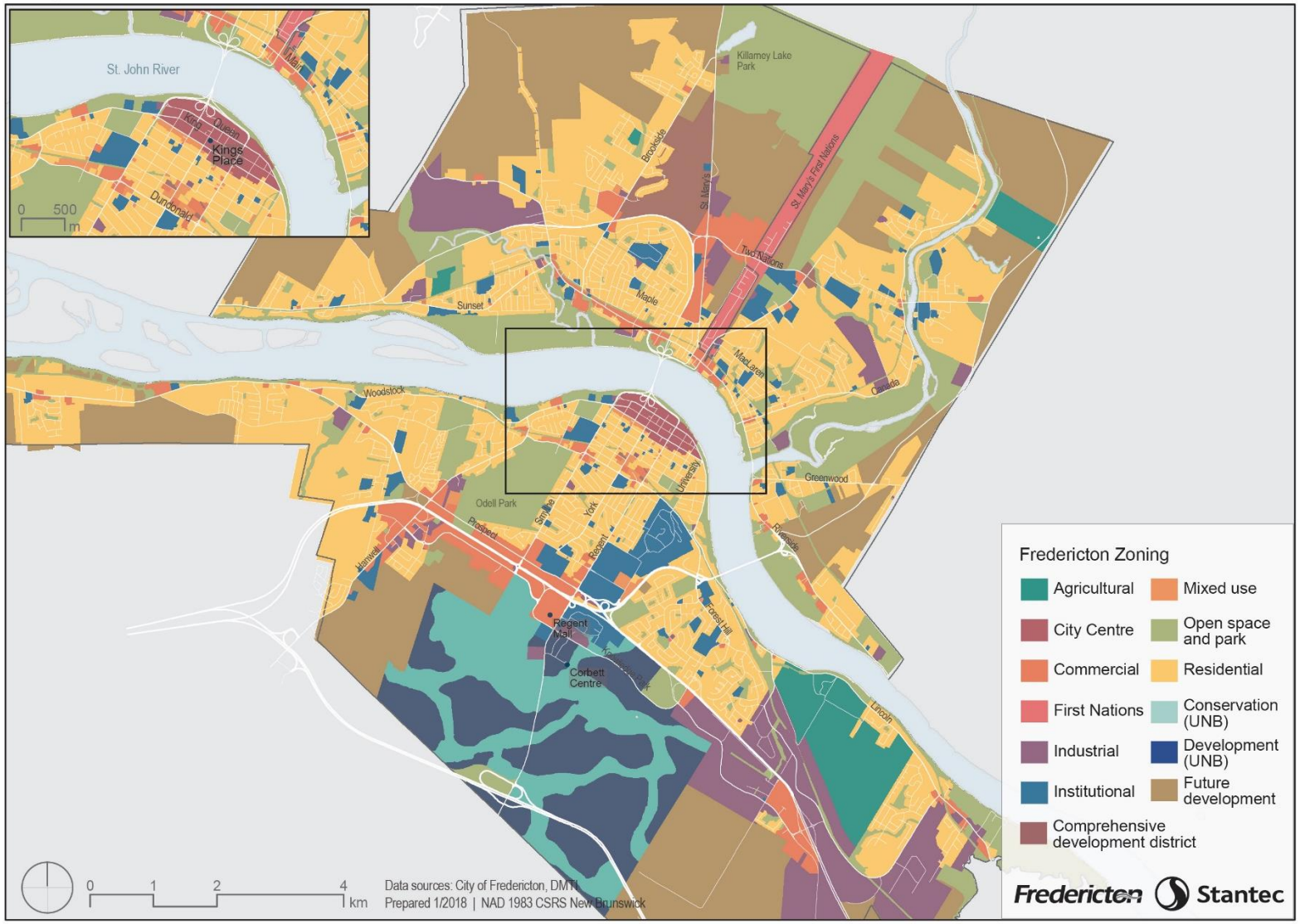


Figure 6 Current zoning in Fredericton.

Fredericton Transit — Strategic Plan 2018

Transit Trip Generators

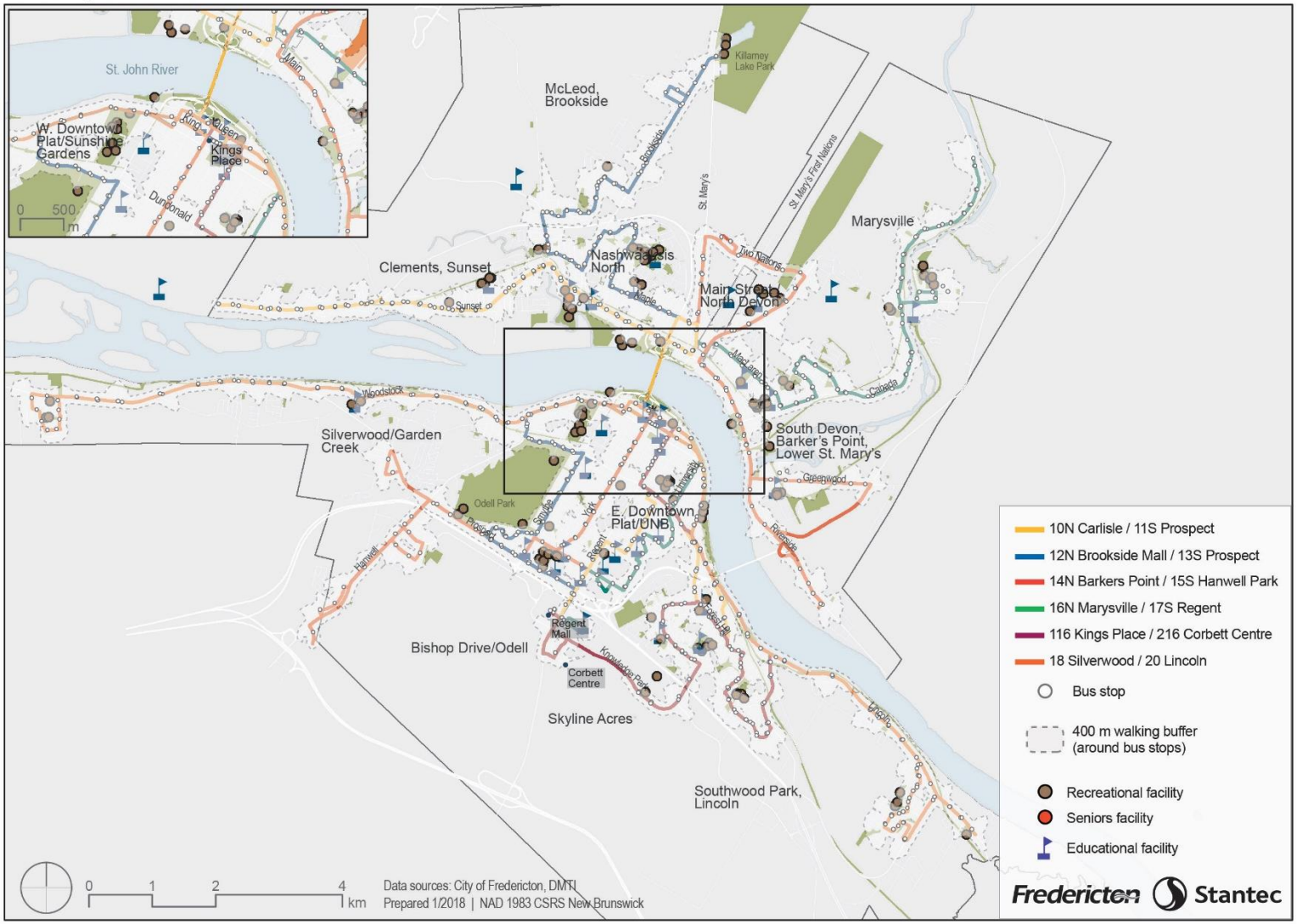


Figure 7 Transit trip generators.

Transit Mode Share

Transit mode share is typically a good indicator of both transit use and transit availability; one caveat is that individuals without other means of travel are reliant on transit, thus skewing transit mode share. Moreover, Statistics Canada only tracks mode choice for commuting trips, and successful transit depends on viable transit options for many different types of trips. Measuring the use for other trip purposes is usually difficult, however.

Nevertheless, observing current mode use patterns, together with other demographic data such as car ownership and household income, can help explain where transit is most useful to residents, as well as where service can be expanded or reduced.

The overall transit mode share for commuting in 2016 was 4.4%. This is low at an aggregate level, but consistent with other municipalities across Canada of similar size. Transit mode share varies widely across the city (Figure 8), with the highest mode share for residents living in the City Centre, particularly in East Downtown and in neighbourhoods adjacent to UNB and STU, which have transit mode shares above 15%—nearly four times the city average. This area is well served by transit, particularly by routes 10N/11S which are high frequency (15-minute headways) during peak hours.[6]

While most of the outlying areas on the south side have low transit usage such as along Woodstock Rd. (route 18), the transit mode share along the Lincoln route (20) is slightly greater than the Silverwood route. Nevertheless, both areas have public transit mode shares below the City average. In subsequent sections, it becomes clear that routes 18 and 20 are the poorest performing routes in terms of riders carried per revenue hour. While these findings—low public transit mode share and low productivity—may suggest that areas like Lincoln and Silverwood don't need transit, they instead could indicate that while fixed-route transit may never be productive in these neighbourhoods for various reasons,[7] alternative forms of mobility may be successful and productive by further understanding travel patterns and the needs of residents.

The north side of Fredericton sees a substantial transit mode share, particularly in the neighbourhoods surrounding Brookside Mall. These areas, served by routes 12N/13S, are a mix of lower income (see **Income** section) and higher density. Some residents are more likely to rely on public transit due to the expense of owning a vehicle.

[6] Frequency is freedom—having frequent transit service allows people to travel without being bound to a timetable. It's a positive feedback loop where the most popular routes, and thus the most productive it terms of riders per revenue hour, are typically frequent routes. Frequent routes then also attract greater ridership because these routes can provide flexible departure times.
[7] Likely reasons for low productivity (meaning few passengers per revenue or service hour) include low population densities, high incomes and high car ownership, long distances without any destinations along their route alignments, difficult to reach bus stops with few passenger amenities, lack of sidewalks, etc.

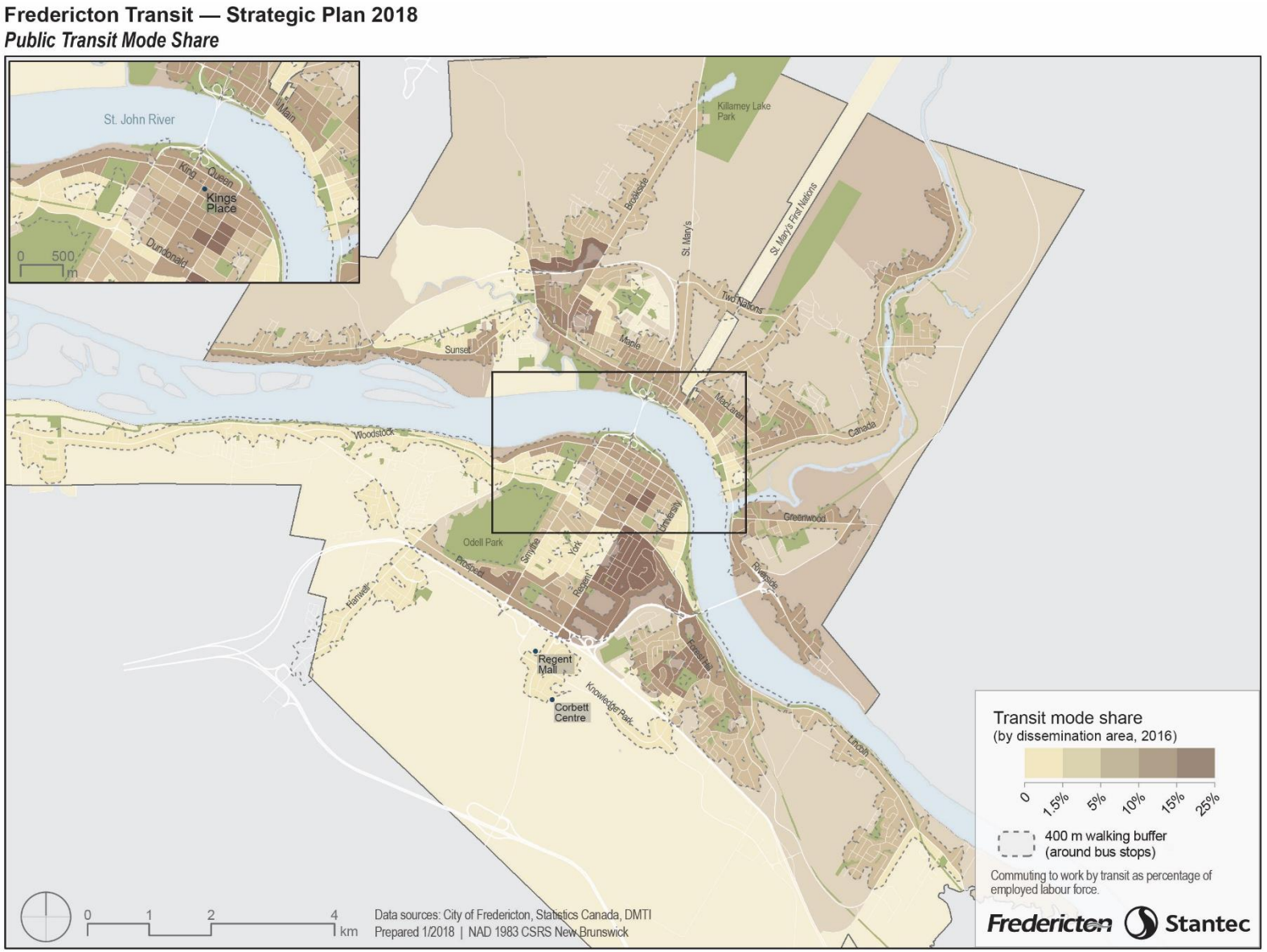


Figure 8 Transit mode share (commuting trips).

Income

One of the strongest predictors of transit use and ridership is car ownership. Unfortunately, Statistics Canada does not release car ownership data at the census tract or dissemination area levels.

As an imperfect proxy, we analyzed median household incomes, which can provide some clues as to car ownership, given that the Canadian Automobile Association (CAA) estimates that the cost of car ownership in New Brunswick is roughly $10,000 annually.[8] Households with low incomes would be less likely to own a car, and if they do own a vehicle, will likely devote a larger share of their income to car ownership.

The median household income in Fredericton in 2016 was $60,592. Figure 9 reveals that large portions of the City Centre and surrounding neighbourhoods on both north and south sides have median household incomes below the city median. Further away from the City Centre we find higher income neighbourhoods, such as Fulton Heights on the north side, and Lincoln and Silverwood on the south side.

By considering the transit mode share map in Figure 8 together with the income map in Figure 9, we can start to observe a similar but inverse relationship between income and transit use at the neighbourhood level. Neighbourhoods like lower Brookside are low-income (Figure 9) and display some of the highest transit use (Figure 8). Without actual car ownership data, it could be argued that areas with high transit use and low incomes likely have low car ownership or devote substantial amount of income to transportation. As such, these areas are likely prime markets for transit, and are likely the transit-dependent, 'captive' riders that form a substantial ridership base for Fredericton Transit.

[8] For a Honda Civic driven 10,000 km annually, the CAA estimates a cost of $3,884 for fuel, insurance, and license and registration, with the bulk of the cost, some $6,210, coming from depreciation and maintenance. Please see this calculator at http://caa.ca/drivingcostscalculator.

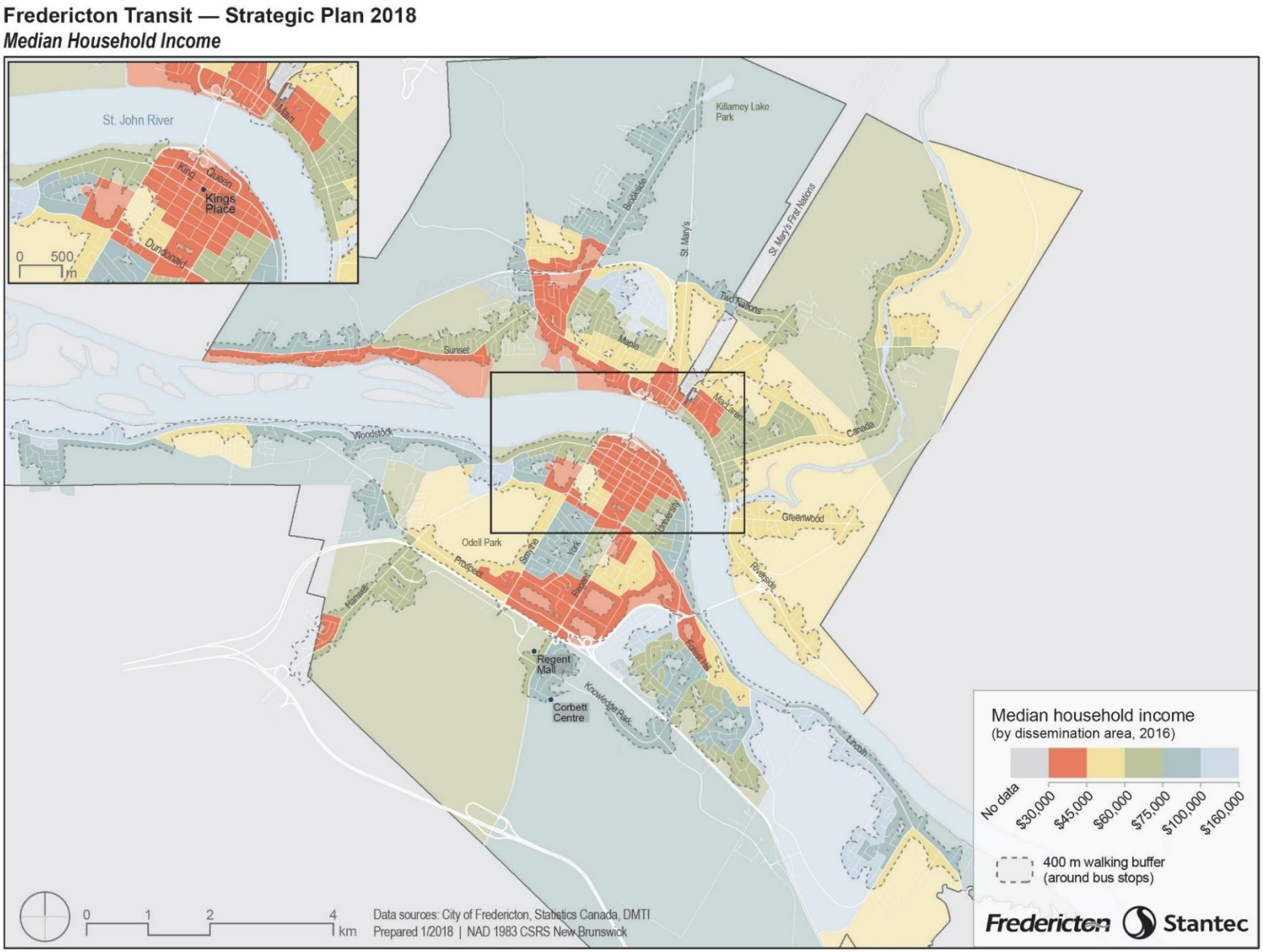


Figure 9 Median household income.

Future Developments

One purpose of this plan is to address mobility for future residents of Fredericton—by and large, much of the growth will go into the new neighbourhoods identified in the Growth Strategy, as well as developments already underway.

Delivering effective and efficient public transit to new developments is challenging—typically, North American cities and towns develop new parcels of land in a way that prohibits transit use and service by:

- Developing at low residential densities, typically single detached homes on large lots
- Facilitating or encouraging driving by providing ample parking and separating land uses
- Discouraging walking by not providing sidewalks, developing dead-end streets, and separating land uses.

All of the above stimulate driving and make it hard to run bus service in a cost-efficient manner. This is reflected in routes 18 and 20, which serve outlying areas that are low-density. Alternative service delivery methods, to be explored in this project could improve mobility in these types of developments.

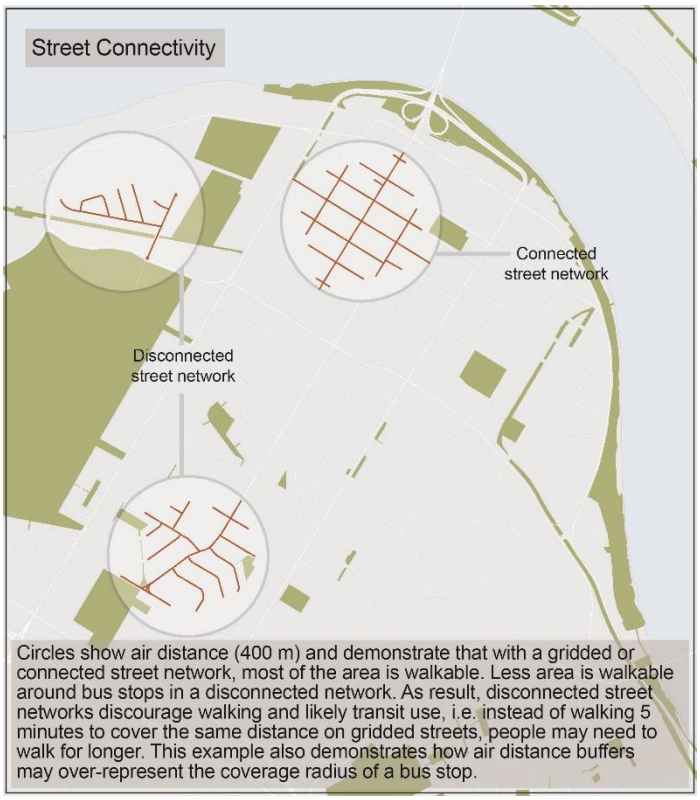


Figure 10 Street connectivity and walkability.

As many of the factors impacting transit use and resulting ridership are beyond the control of most transit agencies, the City of Fredericton plays a vital role in ensuring that transit is a viable travel option. Already, the Growth Strategy identifies a compact growth model, so that new developments are closer to the City Centre. This means that buses need to spend less time deadheading while in service (driving long distances between stops).

Furthermore, the Growth Strategy also proposes that many of the developments, in particular the 'new neighbourhoods' in Figure 11, be densely developed, and in some places, as mixed-use nodes (*red asterisks, Mixed-use node in* Figure 11). Again, density and diversity are transit-supportive and providing transit early after the first residents move in, along with some incentive such as discounted or free new homeowner's bus pass, could steer some trips away from vehicles onto transit.

While density and diversity in new developments are important for transit, so is good urban form, i.e., connected walkable streets, preferably in a grid shape like in downtown Fredericton, rather than dead-end streets (see Figure 10). This is important for transit for two reasons:

1. Gridded street networks improve the directness of travel and thus reduce the time needed to travel along straight orthogonal roads.

2. Connected streets, with the proper pedestrian infrastructure, allow people to walk to bus stops. Some of the biggest barriers to transit use surround poor access to bus stops. Moreover, lack of sidewalks and

accessibility features make it difficult to reach a bus stop, especially for seniors, persons with reduced mobility, and parents with strollers. The Fredericton Transit Accessibility Plan is a good start and working with Community Planning and Engineering & Operations is necessary to ensure that more bus stops are connected to sidewalks and that developing communities provide the right type of urban fabric for successful bus service.

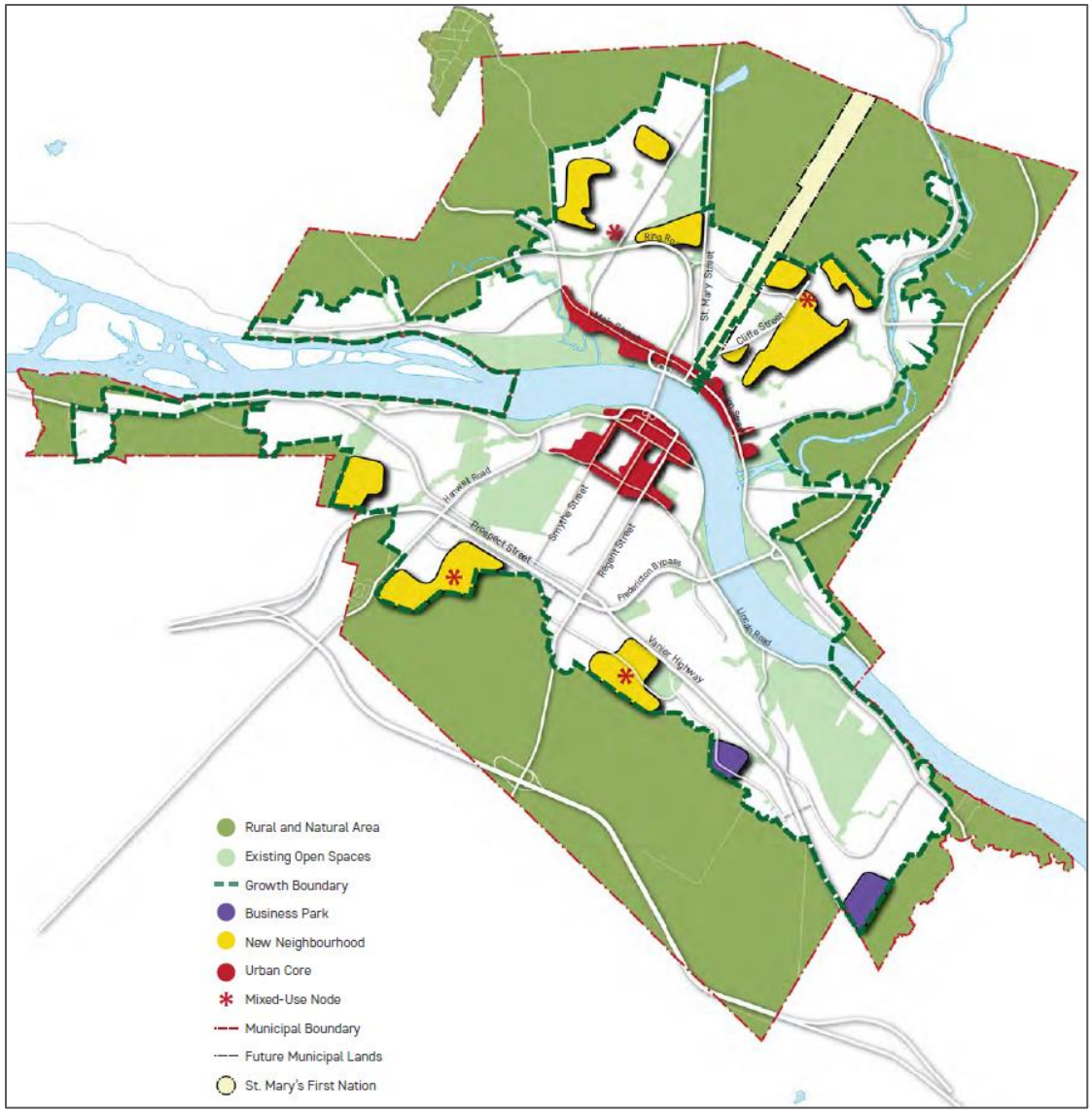


Figure 11 Growth and development from Fredericton Growth Strategy.

Market Conditions Summary

The analysis presented in Section 1.3 demonstrates that Fredericton has many of the necessary ingredients for transit, including:

- Density of population and jobs
- Mixed land uses
- Populations with little or no other travel options
- Need to connect people with many useful destinations and opportunities.

The areas with the greatest transit propensity, that is, areas that are likely to generate high transit ridership are:

- the City Centre;
- neighbourhoods around the City Centre;
- the universities;
- neighbourhoods including lower Brookside Drive on the north side; and, neighbourhoods around Prospect and Regent on the south side.[9]

Furthermore, this discussion also highlights that many of these necessities are beyond the direct control of Fredericton Transit and require collaboration with municipal partners. The Growth Strategy and overall direction of the City is a positive one for transit.

1.4 SYSTEM COMPARISON

By comparing Fredericton Transit to similarly-sized transit agencies or to agencies serving similarly-sized cities, we can begin to understand areas where Fredericton Transit is performing well, and likewise, where it is not performing well and how it may learn from peer agencies. We also looked over time between 2011 and 2016 to get a sense of any trends.

This peer comparison (Table 3) uses the peer group from the 2008 Strategic Plan to generate a group of peers that are similar, as well as larger, such as Moncton. Note that this analysis also includes Brandon Transit (which was not included in the 2008 Plan), an agency serving a comparable service area population and with comparable ridership.

Table 3 Peer transit agencies.

	Municipality	Service Area Population (2016)	Service Area Population (2011)	Annual Ridership (2016)	Peak Vehicle Fleet (2016)
Fredericton Transit	***Fredericton, NB***	***58,220***	***56,000***	***1,375,140***	***20***
Kingston Transit	Kingston, ON	120,494	112,310	5,193,481	55
Moncton Transit	Moncton, NB	116,940	120,525	2,307,725	24
Red Deer Transit	Red Deer, AB	99,718	91,877	2,553,287	43
Lethbridge Transit	Lethbridge, AB	96,828	89,074	1,211,415	26
Brandon Transit	Brandon, MB	58,003	53,000	1,021,537	11
North Bay Transit	North Bay, ON	47,084	49,000	1,360,337	15

[9] These ingredients, however, do not account for how far buses need to drive to reach areas favourable for transit use. These areas could attract high ridership, but be relatively expensive to operate (per passenger) due to the distances travelled. In Fredericton, most of the urbanized area is with 5 km of the City Centre (from City Hall).

All chosen cities operate bus systems and have populations hovering around 50,000 residents and are cities with small, older urban cores and substantial suburban settlements, similar to Fredericton. Of course, no two cities or agencies are similar, given demographic, historic, political and geographic differences. Moreover, transit agencies collect data and report statistics differently (such as ridership and boardings), despite best efforts for uniform reporting by CUTA. Thus, cautious comparisons are drawn. All data are from CUTA Fact Books.

Ridership

Annual ridership in 2016 ranged between 5.19 million for Kingston Transit to slightly above 1.02 million trips for Brandon Transit, while Fredericton Transit reported nearly 1.38 million riders. Despite a growth of 4% in service area population from 2011 to 2016, Fredericton Transit reported a mild 0.9% decrease in ridership over the same time period. This stagnation, while troubling at first glace, is in fact impressive given that the peer average change in ridership was a loss of 8.6%, even though the peers, on average, gained 4.4% in service area population from 2011 to 2016 (Figure 12). Kingston Transit's ridership grew by 46.1% over the same period, and some of these gains likely resulted from population growth, as well as a pilot project that introduced free transit for youth 14 years and younger, a new "BRT-lite" service and mandatory U-Pass programs at three post-secondary institutions. Fredericton Transit could look to increase ridership from students, particularly through U-Pass arrangements, and this will be one of the focuses of the Strategic Plan.

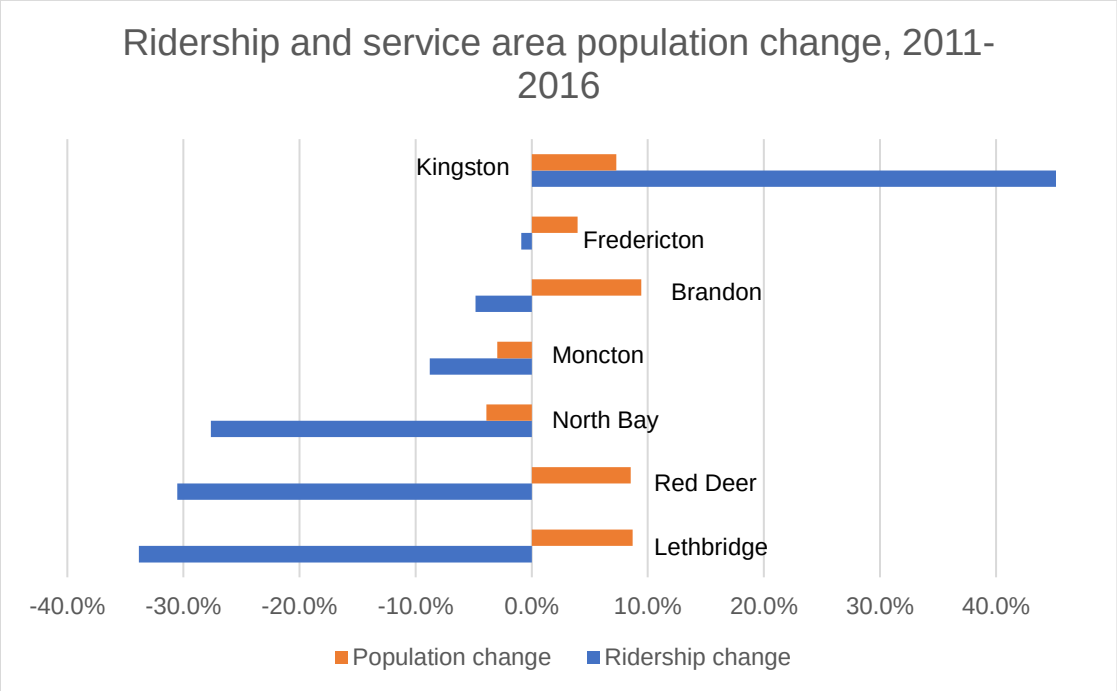


Figure 12 Ridership and population change, 2011 to 2016.

One way of examining the popularity of transit or its attractiveness is by analyzing ridership on a per capita basis; this also helps account for population changes. Rides per capita provide an indication of how much transit is used in a municipality or region.

Fredericton Transit has experienced a slight decrease in rides per capita from 24.11 in 2011 to 23.62 in 2016, slightly below the 2016 peer average of 24.44 rides per capita (Figure 13). Interestingly, compared to Moncton Transit (19.73

rides per capita) which serves the largest city in New Brunswick, Fredericton Transit has slightly more rides per capita, indicating that Fredericton Transit is a relatively well used system compared to the peer group.

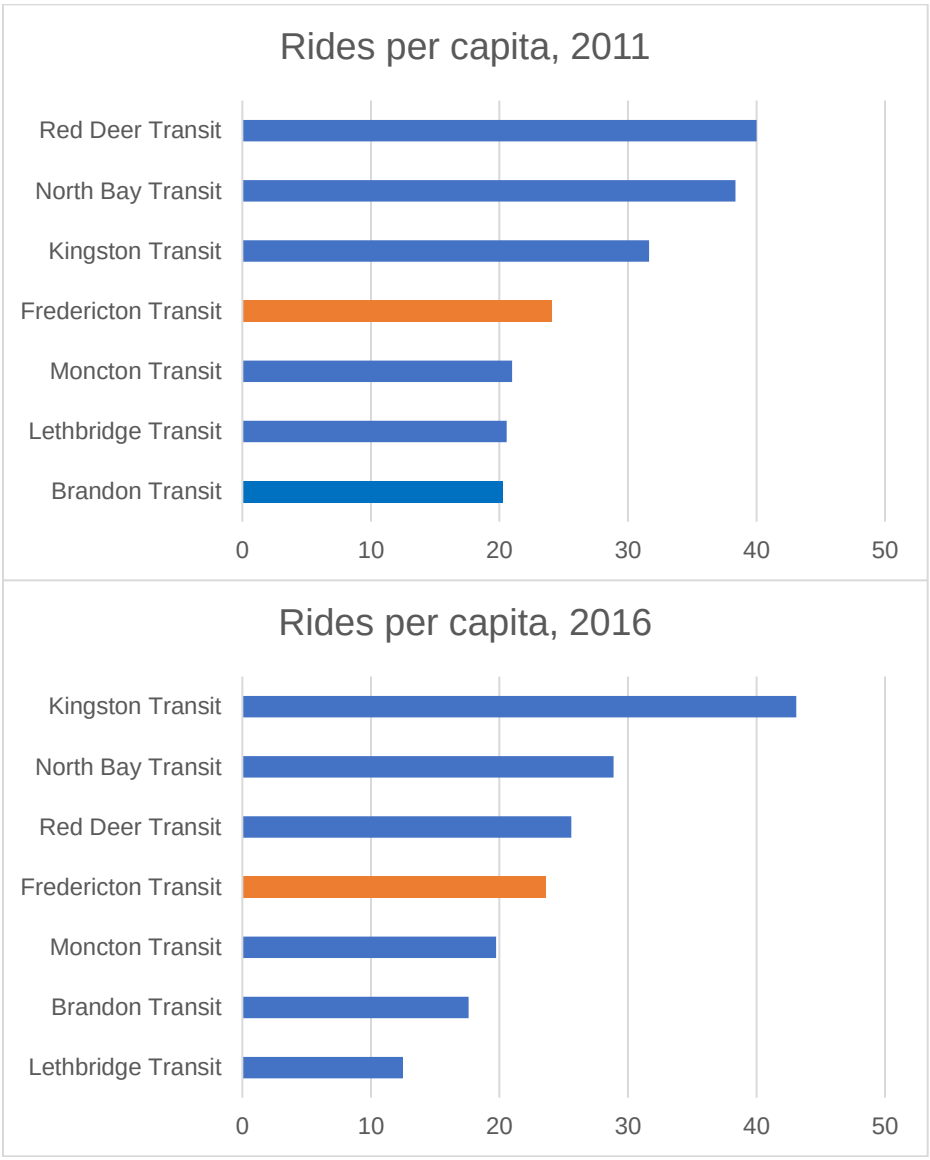


Figure 13 Rides per capita, 2011 to 2016.

Service Provided

According to the CUTA Fact Books 2011 and 2016, Fredericton Transit operated 36,000 revenue hours and 61,220 revenue hours respectively, which represents a 70% increase.[10] The peer average, on the other hand, increased by about 12%, from 100,285 to 111,975 hours.

This increase in service hours translates into an increase in the service provided to the residents of Fredericton, from 0.64 hours per capita in 2011 (the lowest in the peer group), up to 1.05 hours per capita in 2016, slightly below the

[10] This increase may be attributed to operational changes and/or data collection methods.

peer average of 1.26 hours per capita (Figure 14). This is a positive sign as providing more service is a necessary start to building and retaining ridership, such as through improved service frequency or longer service spans.

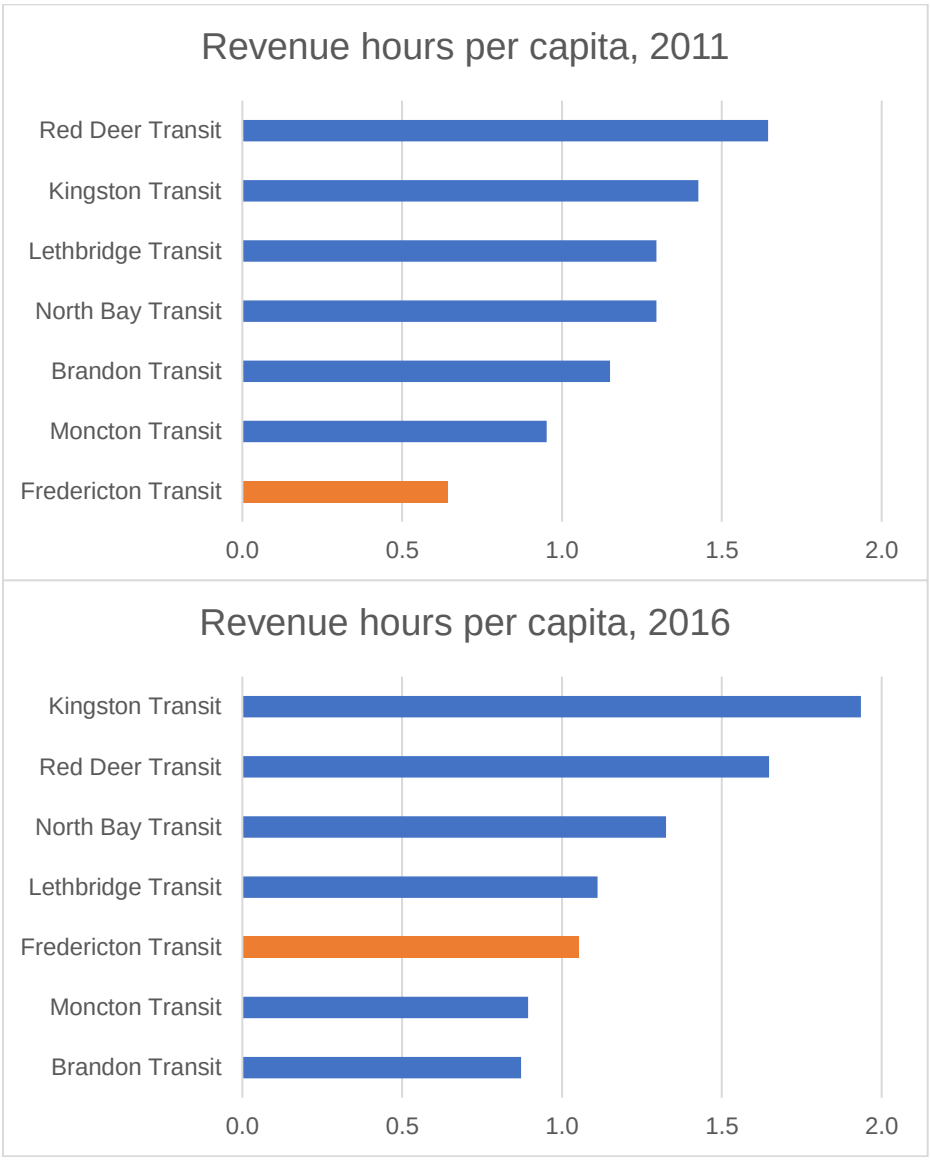


Figure 14 Revenue hours per capita, 2011 to 2016.

Service Utilization (or Productivity)

An industry measure of productivity of a public transit system results from the amount of service provided (revenue hours) and its utilization in the form of ridership or boardings. As such, rides per unit of service (revenue hours) provides a good understanding of the intensity of use of a transit system.

Compared to its peers (Figure 15), Fredericton Transit performs at the top of its class in both 2011 and 2016, with 37.50 rides per hour in 2011 (peer average in 24.16) and 22.46 in 2016 (peer average of 19.37). Though a top performer, this 40% drop from 2011 to 2016 suggests that although service hours have been increased substantially, ridership has remained stagnant. This trend has been observed nationwide and across North America, as transit agencies are struggling to attract new ridership and enhance productivity.

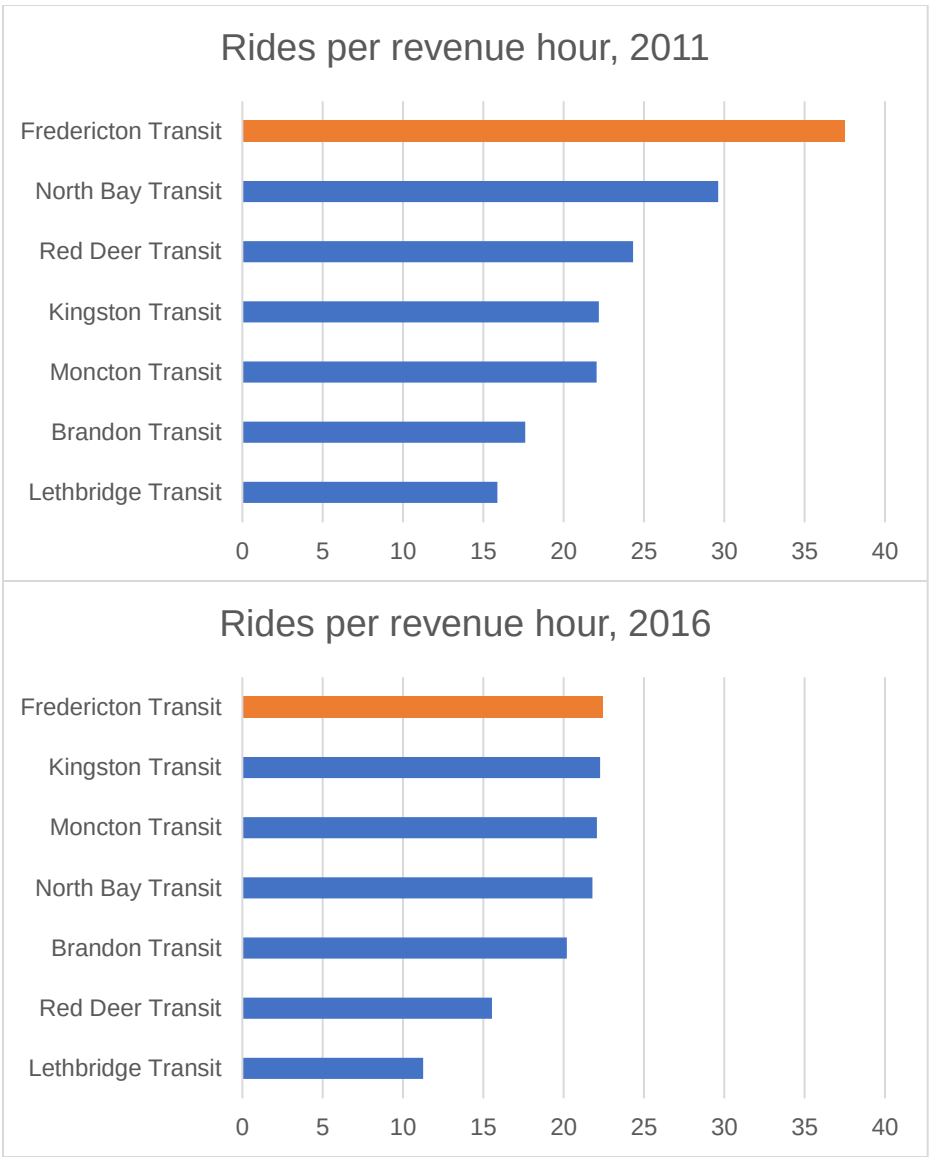


Figure 15 Rides per revenue hour, 2011 to 2016.

Financial Performance

While one measure of an agency's performance centres on ridership and usage, another key area is financial investment and financial efficiency. Fredericton Transit's operating cost has remained relatively stable from 2011 to 2016 at around $4.36 million in 2011 to $4.31 million in 2016; operating revenue has also remained consistent at $1.78 million in 2011 to $1.70 million in 2016.

By examining operating cost per unit of operation, that is, per revenue hour, we can observe the cost efficiency of a transit agency (Figure 16). In 2011, Fredericton Transit had the highest operating cost per hour, at $121, well above the peer average of $88. By maintaining expenses but increasing service hours, Fredericton Transit has reduced operating costs per revenue hour to $70 per hour in 2016 and performs below the peer average of $92. This significant 42% decrease suggests that further service hours can be provided, if necessary, at a reasonable operating cost per hour.

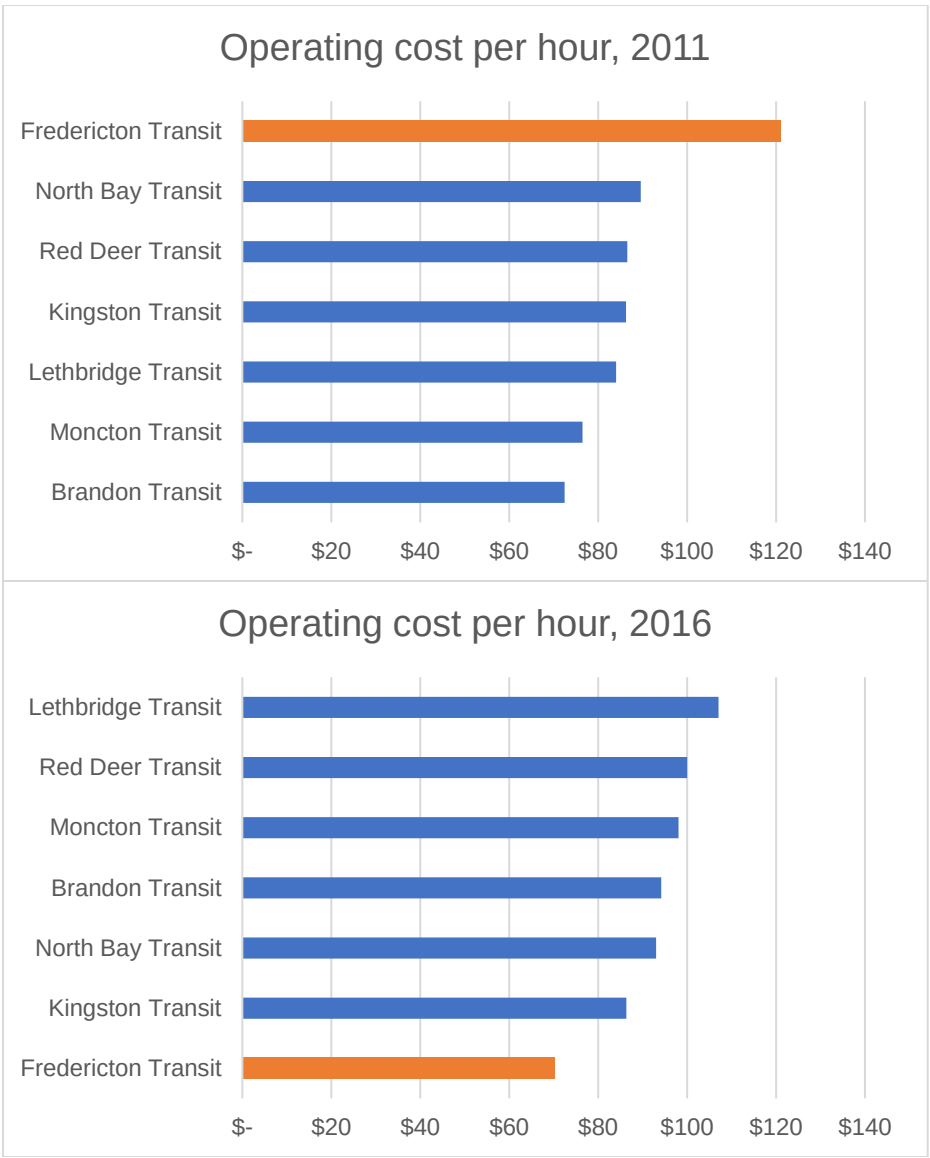


Figure 16 Operating cost per revenue hour, 2011 to 2016.

A measure of cost effectiveness of a transit agency is the cost per rider, where a lower cost per ride is preferable (Figure 17). Fredericton Transit's cost per ride is one of the lowest in the peer group; in 2011, cost per ride was $3.23 (peer average is $3.80) while in 2016, it decreased by 3% to $3.13 per ride (peer average is $5.19).

Taken together, this analysis reveals that Fredericton Transit has some of the lowest operating costs per hour and per passenger in the peer group.

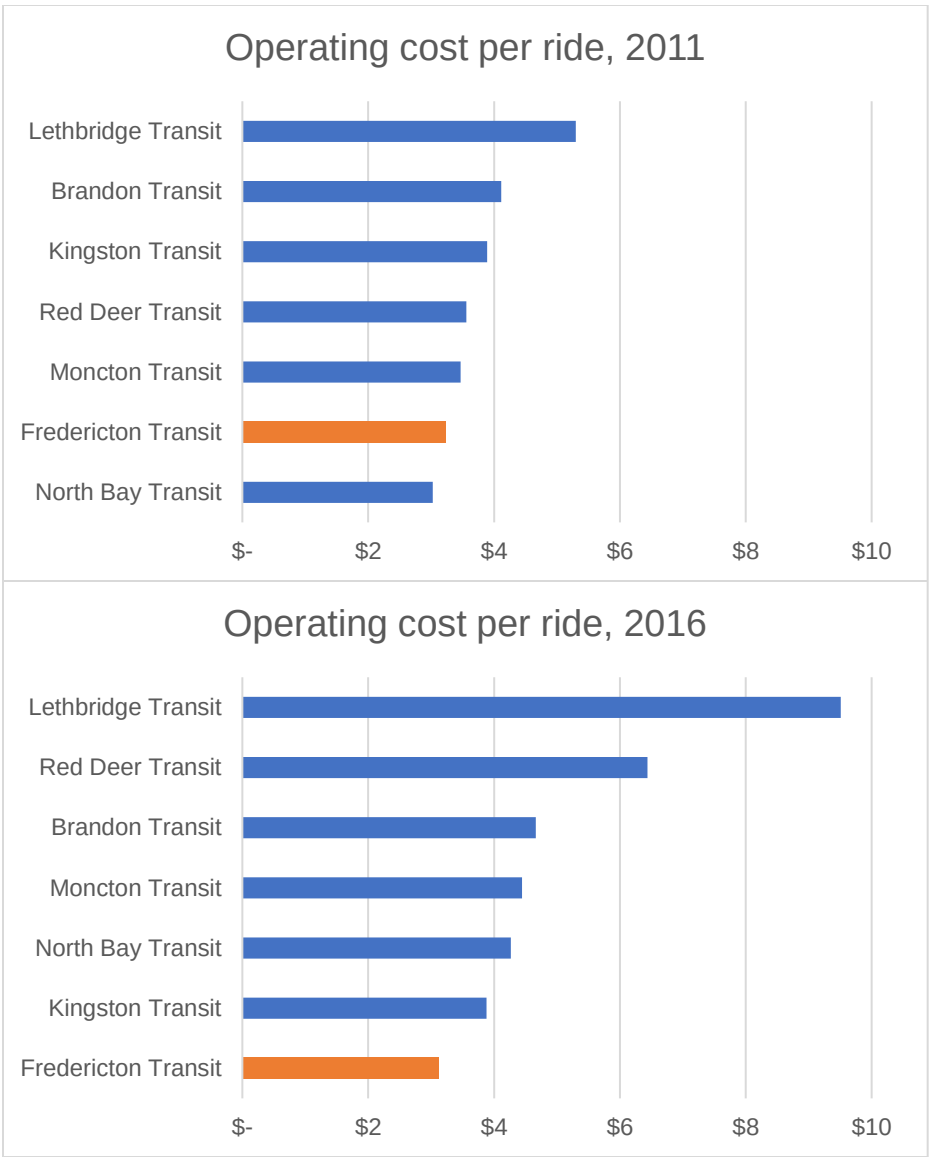


Figure 17 Operating cost per ride, 2011 to 2016.

Another important measure of financial health of a transit agency is the average or effective fare, that is, the total fare revenue divided by annual boardings or ridership. It's important to note that this average fare accounts for the fact that not all passengers pay the full cash fare, and use discounted monthly fares, for example, as well as concession fares such as for senior and student populations.

The average fare Fredericton Transit collected decreased by 8.88% from $1.26 in 2011 to $1.15 in 2016 (Figure 18). At the same time, the peer average increased 24.21%, from $1.27 in 2011 to $1.57 in 2016. Over this period Fredericton Transit increased cash fares and the price of a monthly adult pass. Furthermore, Fredericton Transit is somewhat unique among its peers since it offers an **annual** senior fare for $50, while transit agencies usually price senior fares similarly to student fares on a monthly basis with a consistent discount between both products. While preliminary discussions suggest that senior pass usage is low, adjusting this fare to a monthly fare comparable to the discounted student pass could help raise the average fare revenue per passenger. Further analysis of the fare structure and fare recommendations will be presented in subsequent tasks.

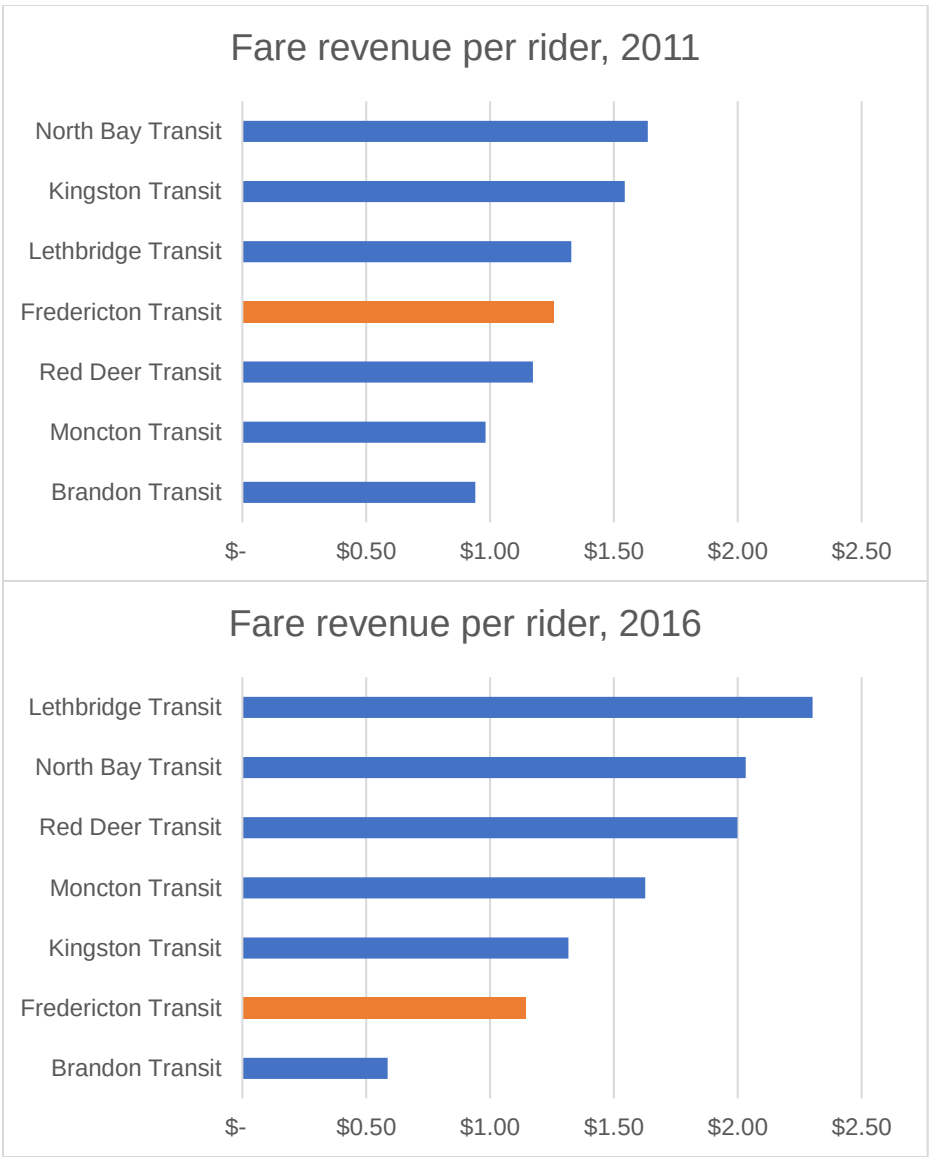


Figure 18 Fare revenue per rider, 2011 to 2016.

By analyzing the amount of operating costs covered by revenue, that is, cost covered through fares and non-fare revenues (advertisements, parking, etc.), we can consider how reliant an agency is on the regional or municipal tax base. Indeed, a substantial amount of operating cost should be recovered through transit fares, which is reflective of both service quality and usage.

Fredericton Transit's cost recovery ratio decreased 3.31% from 41% in 2011, to 39% in 2016 (Figure 19). Although on a bit of a downward slide over the period, this is a respectable cost recovery ratio for an agency of Fredericton's size and well-within North American industry norms. In both years, Fredericton Transit performs above the peer average, which saw a decrease in cost recovery ratio by 3.76%. Only North Bay Transit outperforms Fredericton Transit in cost recovery in both years (56% in 2011, and 49% in 2016, a decrease of 12.55%). A major reason for North Bay's greater cost recovery is likely its fare structure; a monthly pass is $86 compared to $80 for Fredericton, while a reduced pass for seniors is $61 month, compared to the annual cost of $50 of Fredericton's.

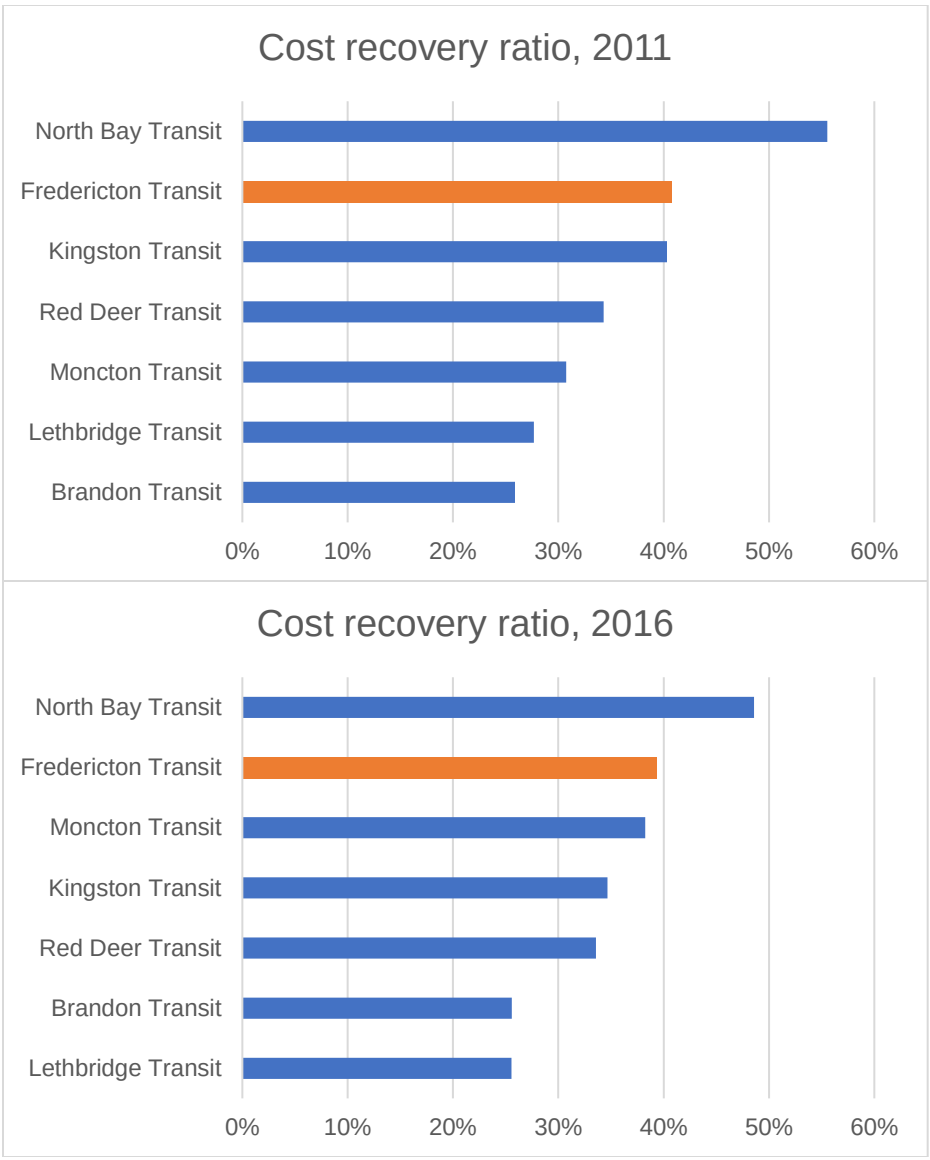


Figure 19 Cost recovery ratio, 2011 to 2016.

Finally, while a large municipal contribution to transit funding is typical of Canadian transit properties, it is important to note that provincial subsidies are also vital for public transit operations. While the federal government does not provide operating subsidies, in provinces such as Ontario, the provincial government contributes 28% of the operating subsidises; the rest comes from municipalities. The provincial government in Alberta provides little by way of operating subsidies, less than 1%. Nevertheless, New Brunswick, typical of small, more rural provinces in the Atlantic Canada, does not contribute operating funds to its municipal public transit providers. Furthermore, while Ontario and Alberta contributed 67% and 55%, respectively, to capital costs of their public transit providers in 2016, New Brunswick contributed 25%, depending mainly on federal (37%) and municipal (30%) contributions, as well as 8% from other sources. We note however, that Fredericton Transit did not receive any provincial contributions in 2016, and it is not clear how gas tax dollars have been distributed. As such, transit in New Brunswick depends heavily on local funding, and as discussed in Surfaces to Services, lobbying the provincial government for operating contributions would likely help in improving transit service. We believe the province needs to play an important funding role particularly as Fredericton Transit seeks to expand its service frequency and quality.

Based on this analysis, Fredericton Transit is productive compared to its peers and carries the most passengers by hour from the peer group, with 22 passengers or rides per revenue hour. Furthermore, Fredericton Transit has low operating costs per hour and per rider. Nevertheless, Fredericton Transit has seen stagnant ridership despite increases in service hours and service area population. Taken together, a targeted approach is necessary to help grow ridership and maintain cost recovery and ultimately the sustainability of transit in Fredericton.

1.5 ROUTE PERFORMANCE

As detailed in the previous section, Fredericton Transit has consistently improved service provision by supplying more transit in the form of revenue hours. The troubling part, however, is that this increase in service has not translated into an increase in ridership, as displayed in Figure 20 below.

With a $0.50 increase in cash fares in 2014-2015, ridership decreased by nearly 30% from its 2013 peak, and is still recovering today. While fare increases are commonplace to address increasing operating costs, a $0.50 cash fare increase and $10 monthly pass increase is significant, especially for captive riders, and is likely a chief cause of such drastic ridership decline. The ability for customers to trust their transit agency is a key factor to ridership and customer loyalty and retention. Large fare increases can detract from this level of trust, particularly if riders do not perceive an associated improvement in service.

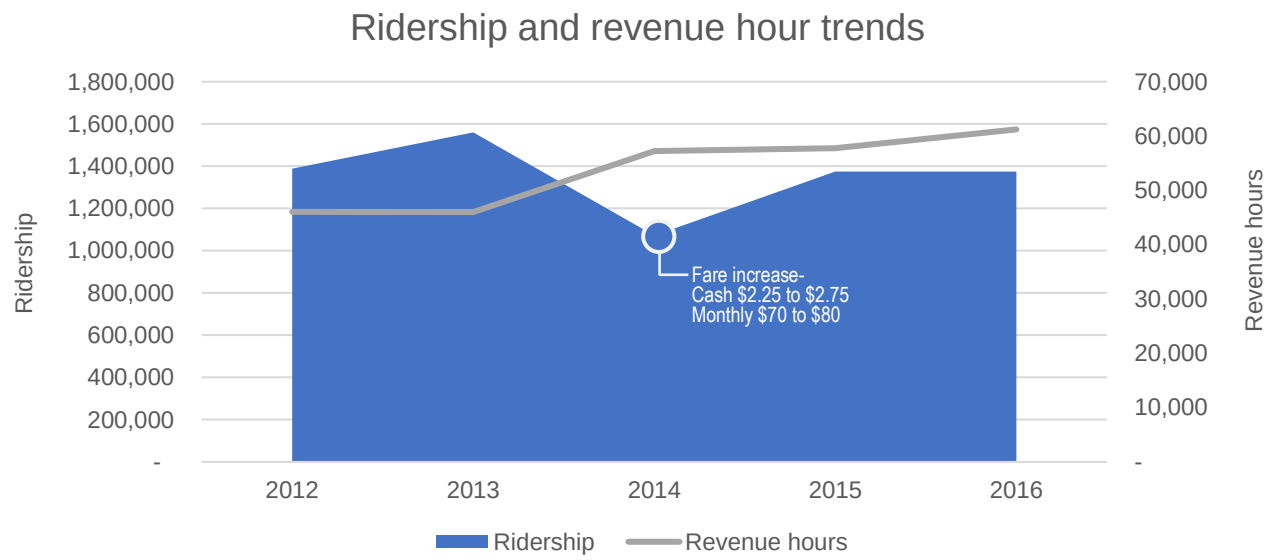


Figure 20 Ridership and revenue hour trends.

While some ridership has been recovered since 2014, it remains relatively stagnant today despite added service, and is not consistent from route-to-route. The following section provides a brief description of each route and their relative performance within the network (see Figure 21). In general, typical of smaller transit agencies, service on Saturdays carries fewer trips, nearly 48% fewer in Fredericton, and less service is operated with hourly service (Figure 22 and Figure 23).

Fredericton Transit — Strategic Plan 2018

Current Transit Network

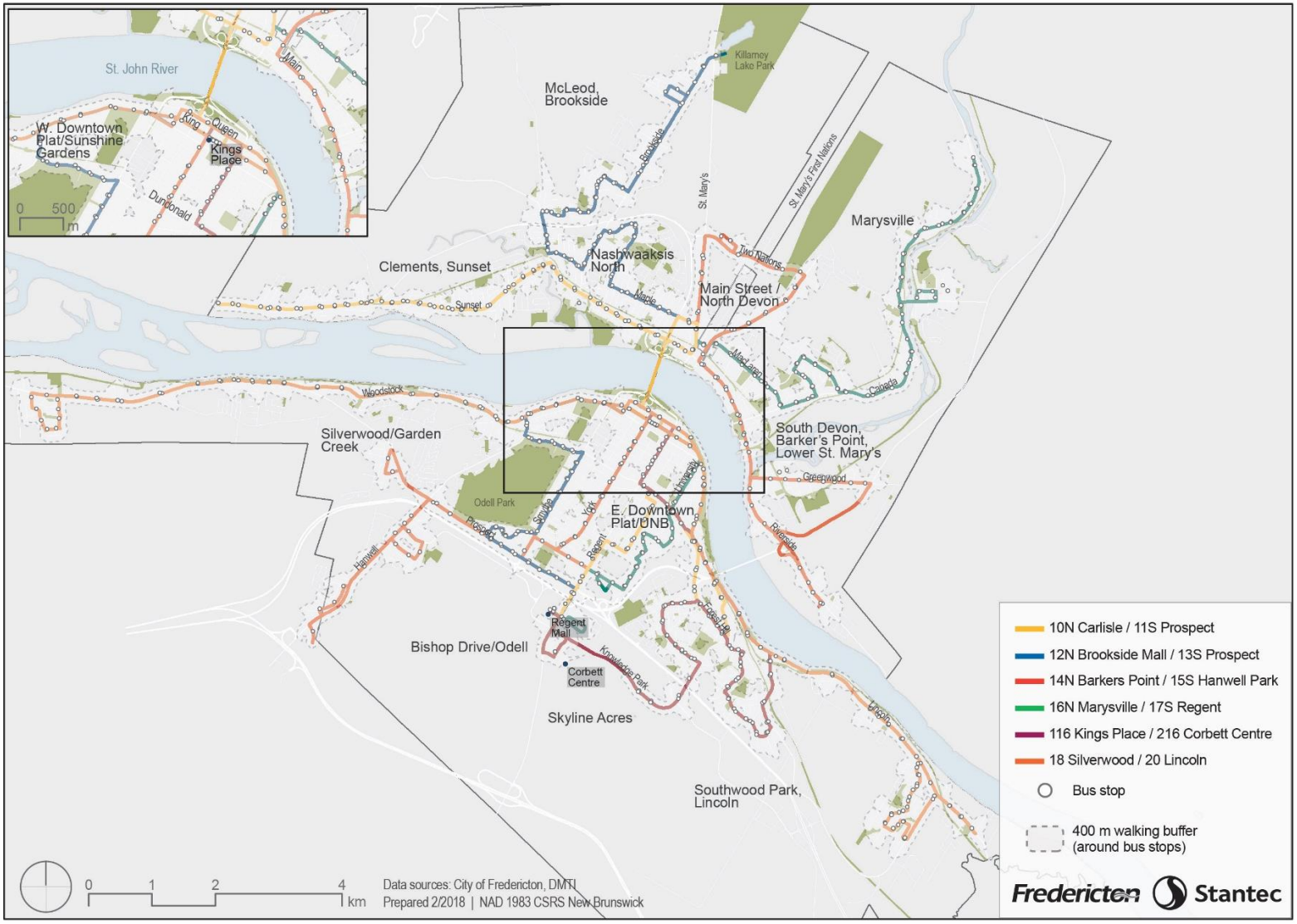


Figure 21 Current transit network.

Routes 10N/11S

Routes 10N and 11S are the highest performing routes in Fredericton, with over 1,500 average weekday boardings (Figure 22). With a 30-minute peak frequency and service hours from 6:30 am – 11:00 pm, these routes offer the highest level of service in the network. Furthermore, trip frequency is increased during morning and afternoon peaks to every 15 minutes to accommodate added demand mostly from students (15-minute headways from 7:15 am until 7:45 am at Kings Place and extra service during from September to May starting at Forest Hill Residence). While the routing alignment can be circuitous, high ridership on this route is not surprising given the direct connection made between the north side and downtown, and service at Kings Place, Regent Mall, Corbett Centre, the UNB and STU campuses, and the local hospital. Comparatively low ridership on Saturday suggests a frequent use of this route for work and school commuting during conventional work days, and perhaps a lower use of transit for non-commuting trips such as shopping, or leisure activities.

Routes 12N/13S

Routes 12N and 13S, in combination with routes 10N and 11S, form the backbone of the Fredericton Transit network. Routes 12N and 13S see comparatively high ridership (Figure 22 and Figure 23) on both weekdays and Saturdays, offering service from 6:30 am – 11:00 pm. The alignment of this route serves several residential and mixed-use neighbourhoods on the north side, and downtown including Fulton Heights, Brookside, Sunshine Gardens, and Uptown. Several commercial destinations including Brookside Mall, Regent Mall, and the downtown are also well served. Connections between routes can be made at Kings Place and Regent Mall, and with 30-minute peak frequency, this route is a convenient option for many riders. While off-peak and Saturday frequencies are hourly on this route, service hours remain approximately consistent on all days, prompting the high Saturday ridership, second to routes 10N/11S.

Routes 14N/15S

Routes 14N and 15S run a somewhat circuitous alignment through the north side of Fredericton, connecting to Kingswood via Uptown and the Downtown core. 14N/15S sees moderate ridership of 17 boardings per weekday service hour, and 10 per hour on Saturdays (Figure 23), which is of concern given the high frequency and service hours dedicated to it (30-minute peak frequency, 60-minute off-peak frequency). Serving many low-density neighbourhoods on the North Side including Barkers Point and the neighbourhoods surrounding the St. Mary's First Nation, demand for this route may be centred around commuting into the downtown for work or school, and may be made less efficient by deadhead time between key stops.

Routes 16N/17S

Routes 16N and 17S experience relatively high ridership, third to the 10N/11S and 12N/13S in the network (Figure 22 and Figure 23). This may be a function of several key stops along its alignment, including the Corbett Centre, Kings Place, and the UNB/STU campuses. These routes also serve the north side and provide direct connections between the St. Mary's First Nation, Devon, Marysville and the downtown. The 16N/17S also offers a relatively high level of service, with 30-minute peak frequency, 60-minute off-peak frequency, and hourly Saturday service. Ridership per revenue hour is comparable on weekdays and Saturday, suggesting that service is well-aligned with lower Saturday demand.

Routes 116/216

Routes 116 and 216 connect three transfer points: Corbett Centre, Kings Place and Regent Mall. The alignment chosen to connect these points is very indirect, serving multiple low-density residential neighbourhoods such as Skyline Acres and Southwood Park en route. Moderate ridership of 437 boardings per weekday and about 270 boardings on Saturdays may be a function of low-density along the route, and a lack of key destinations outside of the terminal stops (Figure 22 and Figure 23).

Routes 18/20

Routes 18 and 20 are peak-only services originating at Kings Place (Figure 21). Route 18 extends west from Kings Place to Silverwood, while Route 20 extends east to Lincoln. Both routes experience the lowest ridership in the network, likely attributed to peak-only hours on weekdays, and no weekend service (Figure 22 and Figure 23). The neighbourhoods served by these routes are generally low-density residential and relatively higher income, with poor pedestrian infrastructure, and do not connect with major commercial centres outside of Kings Place, prompting a transfer to another route to travel outside the downtown.

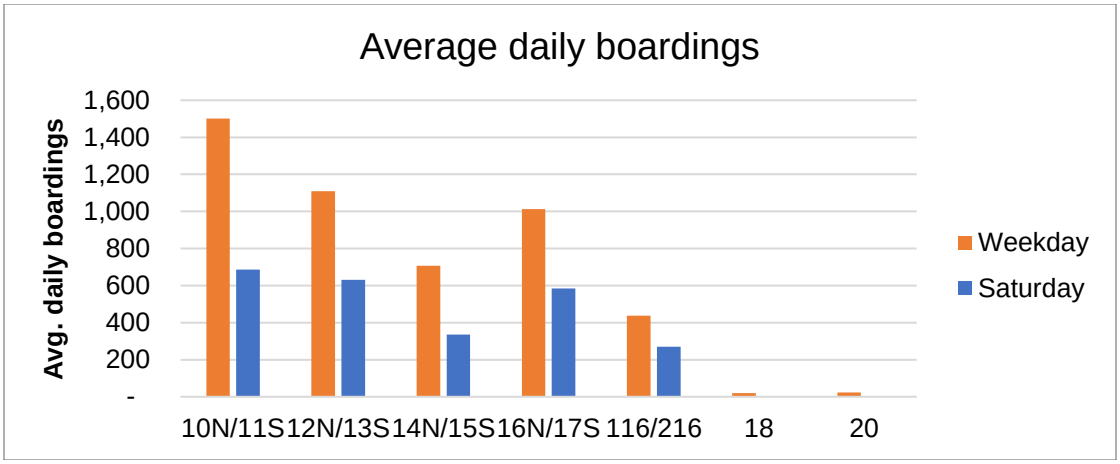


Figure 22 Average daily boardings.

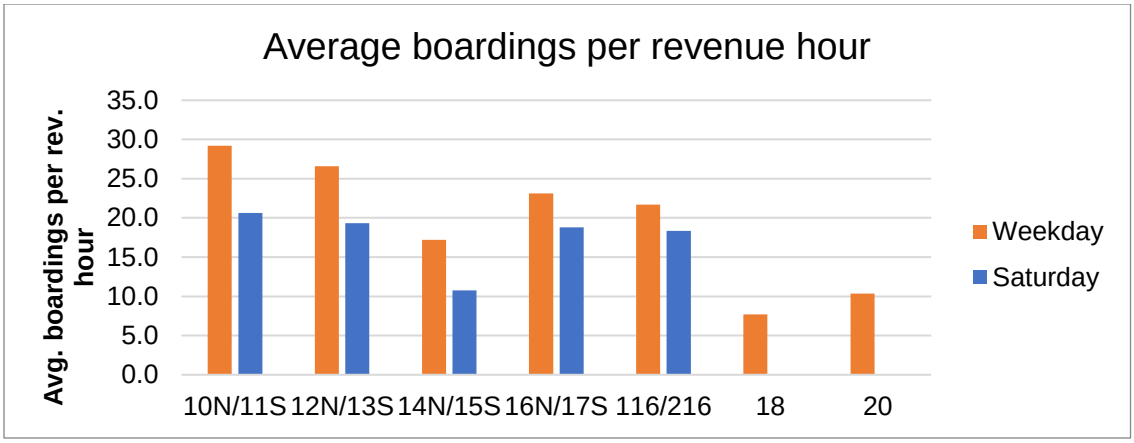


Figure 23 Average boardings per revenue hour.

Taken together, the analyses reveal that for the most part, Fredericton Transit's routes are performing adequately, but there is certainly room for improvement. Strategies such as greater service frequency along key corridors, such

as Kings Place, university campus, and the Regent Mall could help spur additional trips that may not be taken at present due to the low frequency of transit routes throughout midday. Furthermore, addressing bus stop spacing and amenities, ensuring that stops are accessible and connect with pedestrian infrastructure could remove barriers to transit use. Finally, low performing routes, particularly Lincoln and Silverwood require attention with the goal of improving mobility for residents of these neighbourhoods, while reallocating resources from these areas to places where they could benefit a larger segment of transit users.

2.0 STAKEHOLDER ENGAGEMENT

Stakeholder outreach requires more than just informing stakeholders; meaningful engagement requires that all stakeholders are included in the decision-making process. Throughout the process, Fredericton Transit engaged stakeholders with a broad spectrum of interests including riders, non-riders, city staff, agency staff, politicians and members of the greater Fredericton community.

The purpose of this section is to highlight representative themes that emerged repeatedly through various meetings with different stakeholders across different media. This section is not intended to provide a comprehensive discussion or inventory of all topics or issues discussed, but rather provide highlights of common themes. In turn, the emergent themes from stakeholder engagement have helped shaped other sections and the recommendations of this Strategic Plan.

Below, we provide a list of events held for consultation for this Strategic Plan development and then discuss prevalent themes.

2.1 STAKEHOLDER ACTIVITIES

The following list provides key stakeholder events, their dates, and locations. These events were publicized with print advertisements, online on Fredericton Transit's webpage and Facebook page, through the press, and by email mailing lists at universities and government agencies (like the City of Fredericton).

- Idea Bus – Tell Your Transit Story! A Fredericton Transit bus was parked at different locations across the city (Figure 24) to obtain feedback from passersby and generate interest in the Strategic Plan process
    - Saturday, January 20th at the Boyce Farmers Market.
    - Wednesday, January 24th, at STU, City Hall, Regent Mall, Brookside Mall.

Figure 24 Stantec team speaking to interested stakeholders onboard the Idea Bus.

- Ride-alongs: Stantec staff rode every route throughout the week of January 22nd to talk with riders and operators, spread the message of the survey and Strategic Plan process, gather feedback, and observe operations and transit service in situ. Riders were encouraged to fill out an online transit survey. Results of the survey are discussed in detail in Section 2.3.

- Internal stakeholder meeting: Tuesday, January 23rd at City Hall. Stantec provided a brief background presentation on the benefits of transit and some preliminary findings. The purpose of the Plan was discussed, as well as high-level goals of transit and the vision for mobility in Fredericton. Attendees included municipal staff across departments and divisions such as Community Development, Consulting and Human Services, Recreation, Culture, and Community Development, and Engineering and Operations.

- External stakeholder meeting / public open house (Figure 25): Thursday, January 25th and March 22nd at the Fredericton Public Library. Stantec provided a brief background presentation on the benefits of transit and some preliminary findings. The purpose of the Plan was discussed, as well as high-level goals of transit and vision for mobility in Fredericton. Attendees included stakeholders from across the city, including social services, private business, students, and other interested citizens. Some attendees followed up with a summary of their feedback on Fredericton Transit in letter format. In the March session, attendees were broken up into a workshop format where they could circulate among three stations, focused on accessibility, affordability and convenience, to provide their feedback.

- Promotion of online survey to non-riders at City parking garages with more than 2300 promotional flyers distributed to people enroute to their cars.

Figure 25 Public open house at the Fredericton Public Library.

- One-on-one interviews with stakeholders throughout the project: Stantec engaged with policymakers at the City and provincial levels, student representatives from UNB and STU, as well as the Fredericton International Airport. The goal of these meetings was to understand the perception of transit services, the current issues, barriers to transit use, as well as to gather feedback and ideas while also informing about transit best practices and realities.

- Operator workshops, January 23rd at the Transit Garage: Stantec staff met with transit operators to discuss with frontline employees major issues, ideas, ridership, and operations of Fredericton Transit. On March 20th, Stantec met with operators once again to present its preliminary findings and to continue collecting feedback.

- Other meetings, presentations, and sessions included: Transportation Committee of Council presentations (January and March), and Project Steering Committee meeting presentations (January and March).

2.2 PREVALENT THEMES AND CONCERNS

Affordability and fares

- One major point of discussion was that fares are expensive, particularly for low-income residents.
- Different ideas emerged including low-income passes, donate a ride, subsidized fares through community groups and social service providers, and free fares.
- Senior fares, at $50 a year, are thought to be too deeply discounted and that the fare could be set to the ability to pay regardless of age.
- Fare evasion is a concern, particularly at Kings Place while buses layover with doors open as well as short pays and altered fare media across the transit system.
- For undergraduates at UNB, who do not have a U-Pass agreement with Fredericton Transit, the main sentiment was that transit service isn't attractive enough (not frequent enough at off-peak hours, or peak hours for that matter, doesn't operate late enough, travel time is too long, etc.) and on-campus parking is affordable. As such, there is little incentive for a U-Pass given prevailing conditions. Interest in a U-Pass was noted, but only with the inclusion of a student-wide opt-out clause.

Transit service

- Bus service after 6 pm of one-hour frequency is very inconvenient for many users.
- Buses show up early and therefore riders may miss the bus and then have very long waits. Reliability is a chief concern.
- Snow clearing at bus stops in the winter is a big problem for safety and accessibility.
- Mixed reports of friendly bus operators and the need to have better customer service training for operators.
- Fredericton Transit should look for ways to expand service to the Airport because of the limited taxi availability, as well as the cost of taxis to/from the Airport.
- Sunday service was a common request, although a clear and informative discussion regarding actual costs is needed to determine fiscal feasibility.
- Lack of sidewalks deters or makes accessing bus stops difficult and unpleasant.
- Poor service levels (currently up to eight days) for snow clearing at bus stops.
- Different ideas were mentioned by many for new routes, different alignments, etc. Without a clear analysis of demand based on passenger volumes and travel patterns, these one-off comments without proper investigation, can lead to poor transit planning decisions and outcomes.
- More amenities like shelters and benches would be appreciated.
- Some discussion on transit priority lanes or other ways to improve travel speeds and also incentivize mode conversion (vehicle to bus).
- Direct service/express service between Kings Place and Regent Mall was a frequent request.

Parking

- While parking is generally free outside of the City Centre, in the City Centre, the supply is constrained but prices are still low. No incentive for transit.
- Parking strategy needs to work with transit strategy so that parking lots can be converted to better uses.
- Park-and-rides in the periphery may be a way to draw users who currently drive from outside of the city to the downtown.
- Government staff receive free first come first served parking downtown, and could be incentivized to use transit if the schedule fits their needs, as well as offer transit passes in lieu of parking.

Convenience/other

- Limited locations to purchase transit fares.
- Fredericton Transit, given the influx of employees from neighbouring jurisdictions, might need to become a 'regional' transit provider.
- Transit needs to become 'cool' and more visible throughout the community. A brand 'refresh' that is bilingual is badly needed.
- The benefits of transit should be advertised and promoted more.
- ReadyPass app has some interesting features, but it was noted that the live-arrivals aren't always accurate.
- Desire for live arrival information at key bus stops.
- The legibility of the routes and schedules need to be improved, as well as information inside the bus to alert riders of interlining or changes in destination.
- Fredericton Transit should be advertised by the tourism bureau as a way to travel around the city.
- Fredericton Transit could partner with breweries for special shuttles or tours.
- Need for direct provincial funding contribution for transit; it is unusual that New Brunswick is the only province in Canada that does not directly fund transit.

2.3 SURVEY RESULTS

A total of 2,312 surveys were completed by transit riders and the non-riding public in Fredericton, where approximately 50% of respondents had taken transit in the previous 3 months, and 50% had not. This survey therefore captures important information about satisfaction levels of current riders and provides insight into how non-riders may be attracted to the system in the future. A summary of survey results is presented below, with the detailed survey questionnaire provided in the second appendix.

Attitudes Towards Transit

Of the respondents who had taken transit in the previous 3 months, 57% of riders were either satisfied or extremely satisfied with the overall quality of service provided, and 65% had an overall positive impression of transit services in Fredericton.

Based on a scale of 1 to 5 from extremely dissatisfied to extremely satisfied, riders reported that they were least satisfied with the information at the stop/on the bus, the ability to transfer between routes, and the amount paid; whereas, they were most satisfied with their ability to get a seat on the bus, their comfort on the bus, and the behaviour/attitude of the driver. Figure 26 illustrates the satisfaction with each transit service element by percentage of respondents.

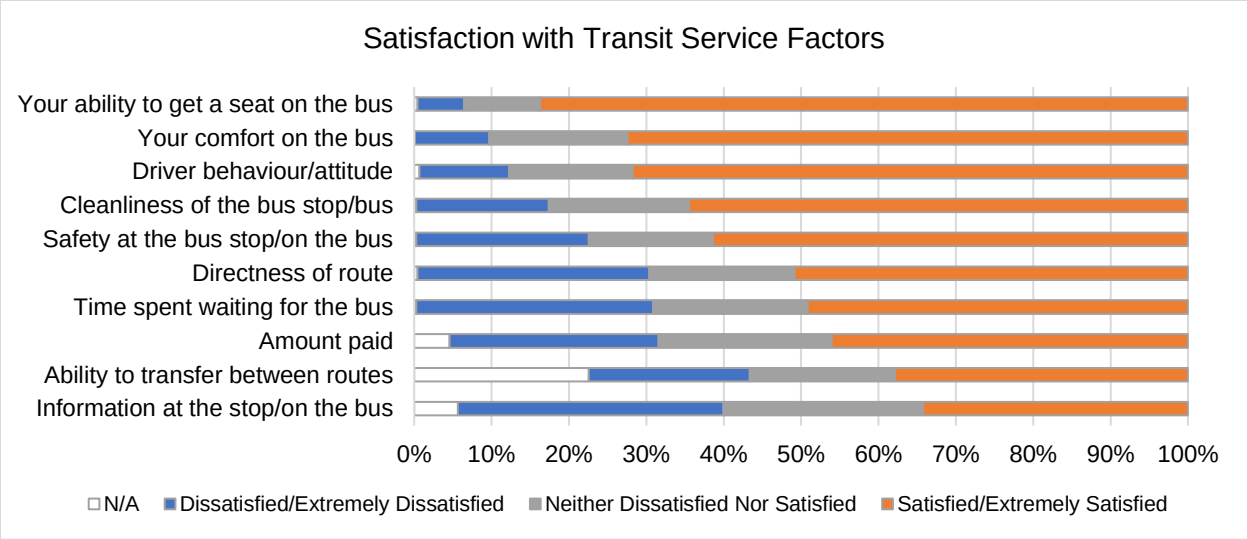


Figure 26 Satisfaction with transit service factors.

A major trade-off associated with providing transit services is deciding between transit coverage and service frequency. With limited financial resources, it is difficult to provide frequent service across all areas of a city, particularly in areas that have low population densities and are not located near major employment or commercial destinations. Given this trade-off, riders were asked if they would prefer a more frequent bus service or a bus stop closer to them. On a scale of 1 to 5, 53% of users agree or strongly agree with the statement “I prefer frequent bus service, even though I may have to walk farther to reach my bus stop.” Conversely, only 27% of users agree or strongly agree with the statement “I prefer a bus stop nearer to me, even though buses may come less frequently.” This finding indicates that service frequency is of high importance to riders, and that an increase in frequency may bring an increase in systemwide ridership, particularly if service is reallocated from unproductive routes to more productive ones.

The factors influencing rider satisfaction are also likely related to non-rider opinions as well, as the aspects riders find unattractive may also be acting as disincentives for individuals to take transit. When asked why they do not use transit, non-riders reported that the greatest contributing factors were that routes/schedules do not cover their needs, service is infrequent, and travel times are too long. Figure 27 presents the percentage of non-riders who disagreed or agreed with each statement.

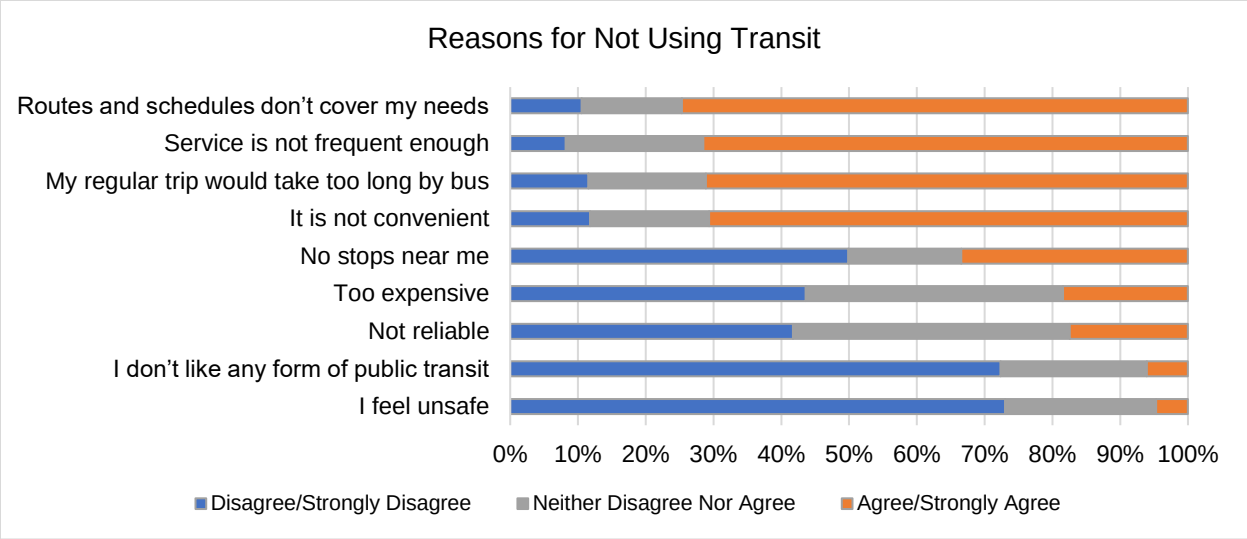


Figure 27 Non-rider reasons for not using transit.

When non-users were asked if they would take transit if convenient service was available (i.e. frequent, reliable, affordable), 76% responded that they would be likely or very likely to use transit. An opportunity therefore exists to increase ridership by attracting non-riders with service improvements that address the concerns of riders and non-riders alike. It is also noted above in Figure 27 that 72% of non-riders indicated that service is not frequent enough, whereas only 33% of non-riders indicated that there are no stops near them. This is further evidence suggesting that it may be prudent for Fredericton Transit to explore opportunities to improve service frequency, even if it means reducing the coverage of conventional fixed route service in lieu.

Travel Patterns

As part of the online survey of transit riders, Stantec asked riders to identify a common trip that they complete using transit, including trip origin, trip destination, as well as trip purpose. Moreover, Stantec also asked respondents for their home location to understand the distribution of Fredericton Transit's ridership across the City of Fredericton (and beyond).

Based on the routes taken by survey respondents, the sample population of riders is reflective of the general Fredericton Transit rider population, as compared in Figure 28.

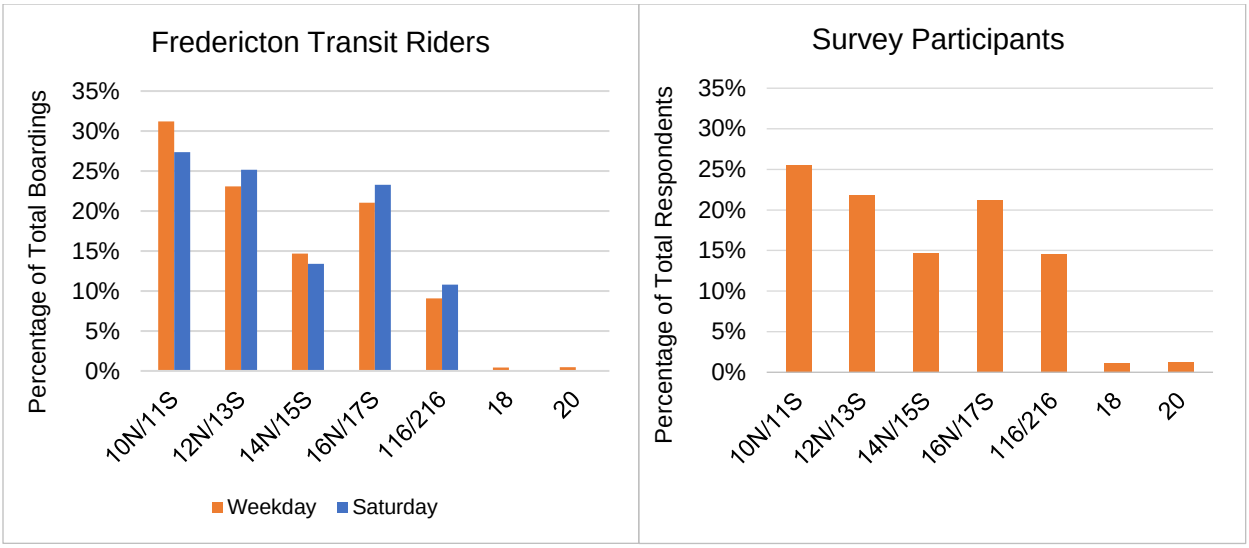


Figure 28 Fredericton Transit route boardings (left) and surveyed route use (right).

As Table 4 demonstrates, most respondents who use transit (with a valid and searchable response, 1,165 responses) reside on the south side of the City. Furthermore, nearly 82% of riders live within a 5-minute walk of an existing bus stop.

Table 4 Household location of survey respondents.

Location	Number of respondents	Percent of respondents
South side	750	64.4%
North side	361	31.0%
Outside of City boundaries	54	4.6%
Total valid responses	1,165	100%
Respondents within 400 metres of a bus stop	951	81.6%

Next, regarding trip origins and destinations (total of 908 valid origin-destination pairs), we found that 70% of trips originate from the south side of the City, while 88% are destined for the south side of the City. Moreover, as shown in Table 5, only 3% of trips are north side-to-north side, while the majority of all trips (origin-destination pairs), 62%, start and end on the south side of the City. The limited north side-to-north side trips may be due, in part, to the inability to transfer between north side bus routes without traveling to Kings Place on the south side. The survey results, therefore, are not necessarily reflective of demand, and the demand for north side-to-north side travel may be higher if seamless transfers between north side bus routes were provided.

Table 5 Origin and destinations, north side and south side.

From	To	
	North side	South side
North side	3% (29 trips)	26% (239 trips)
South side	9% (79 trips)	62% (561 trips)

These findings highlight the fact that most riders are destined for locations downtown (in and around Kings Place), schools (UNB and STU), and other places on the south side of Fredericton. Nevertheless, as future development occurs on the north side of the City, including new residential developments, and the redevelopment of Main Street, carrying out regular origin-destination surveys (every two years, for instance) is not only important for Fredericton Transit route and service planning, but for broader transportation planning across the City and region.

Finally, we also developed an analysis to understand movements of passengers based on the survey origin-destination data. The map below illustrates the most commonly travelled routes as reported by respondents. To develop this map, we took each reported origin and destination from the survey and found the shortest path along the road network that connected each pair. We then overlaid the collection of these shortest paths to produce a 'heat map' differentiating the street segments within Fredericton based on the likelihood each would be used for travel. In the map in Figure 29, redder colours indicate a higher density of riders across street segments, while bluer colours indicate a lower density of riders across street segments.

The map reveals that more survey respondents are travelling along the north-to-south axis than the east-to-west axis, particularly along the major corridor between the Westmorland Bridge and Regent Mall/Corbett Centre. Other corridors that emerged from this analysis include a portion of Main Street between Brookside Dr. and the Bridge, as well as between the Forest Hill area and university campuses. These movements support the design of key routes in the City (existing routes include 10/11 and 12/13), including:

- service along Main Street
- service between the north and south sides
- service between downtown and Regent Mall/Corbett Centre
- between the university campus and Forest Hill area where many students live

Moreover, these movements are not altogether unexpected given that many of the survey respondents were students, shoppers, and other current bus riders. Future work, particularly in collaboration with Community Planning and Transportation will need to look at travel patterns across all modes to better understand and plan for movement across the City and beyond.

Fredericton Transit — Strategic Plan 2018

Ridership Heat Map

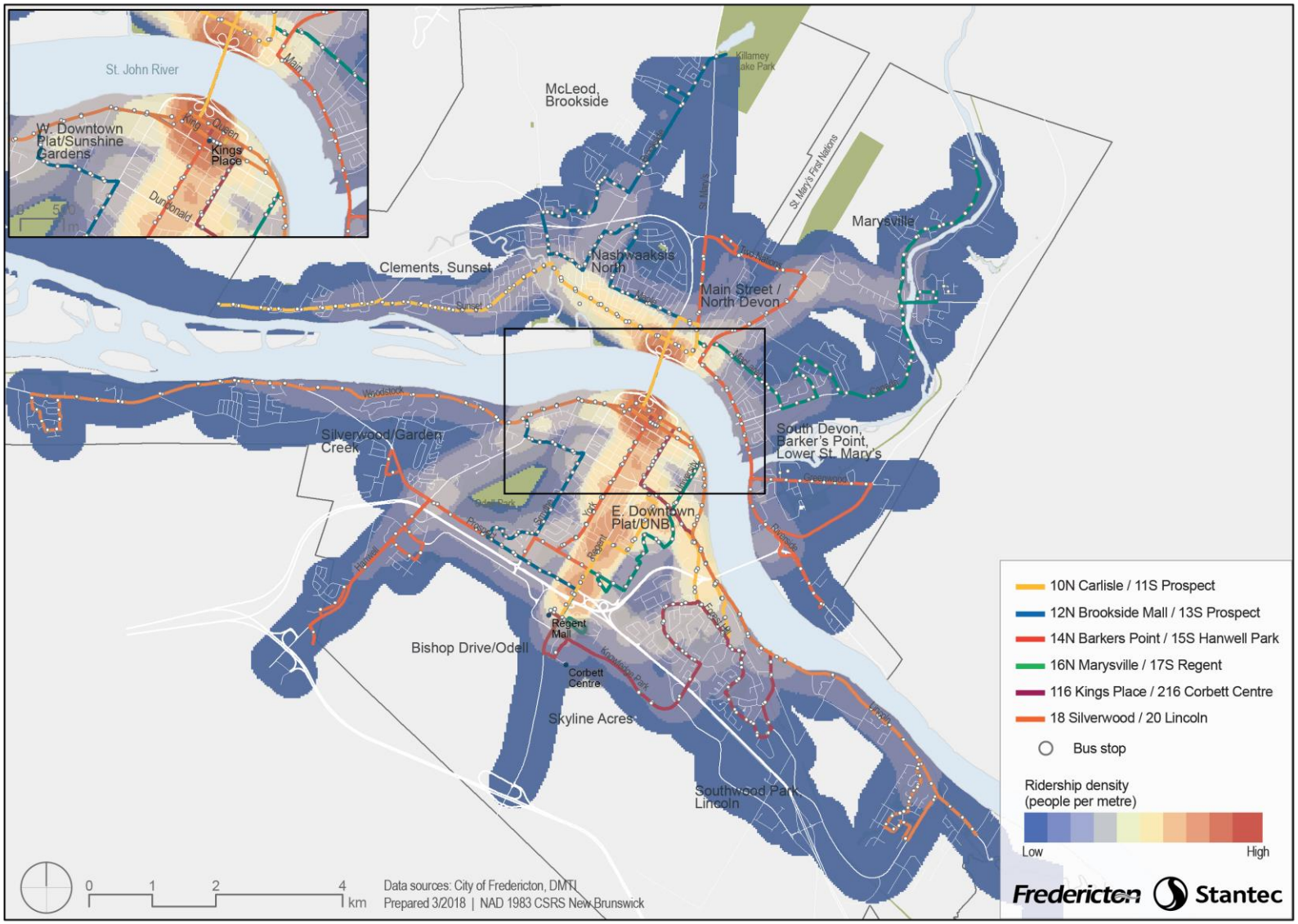


Figure 29 Fredericton Transit ridership heat map.

Transit Trip Purposes

It is important to understand the trip purpose and how often riders use the system to understand if users rely upon transit daily, weekly, or infrequently. The frequency of use by respondents is illustrated in Figure 30.

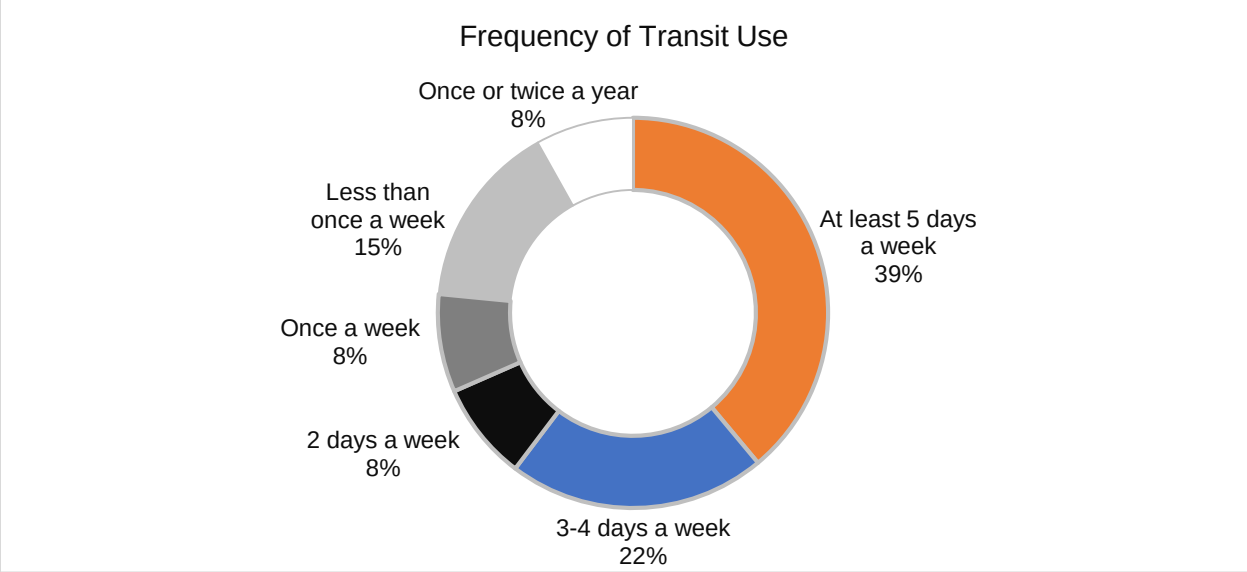


Figure 30 Frequency of transit use.

The greatest proportion of riders use transit at least 5 days a week (39%), with the next greatest proportion of riders taking transit 3-4 days a week (22%), which indicates that the majority of existing riders rely on transit on a regular basis. The amount of transit use is likely related to the transit trip purpose. Most of the transit trips made by respondents is for the purpose of commuting to/from work (54%), with the second greatest use of transit for commuting to/from school (17%), as shown in Figure 31.

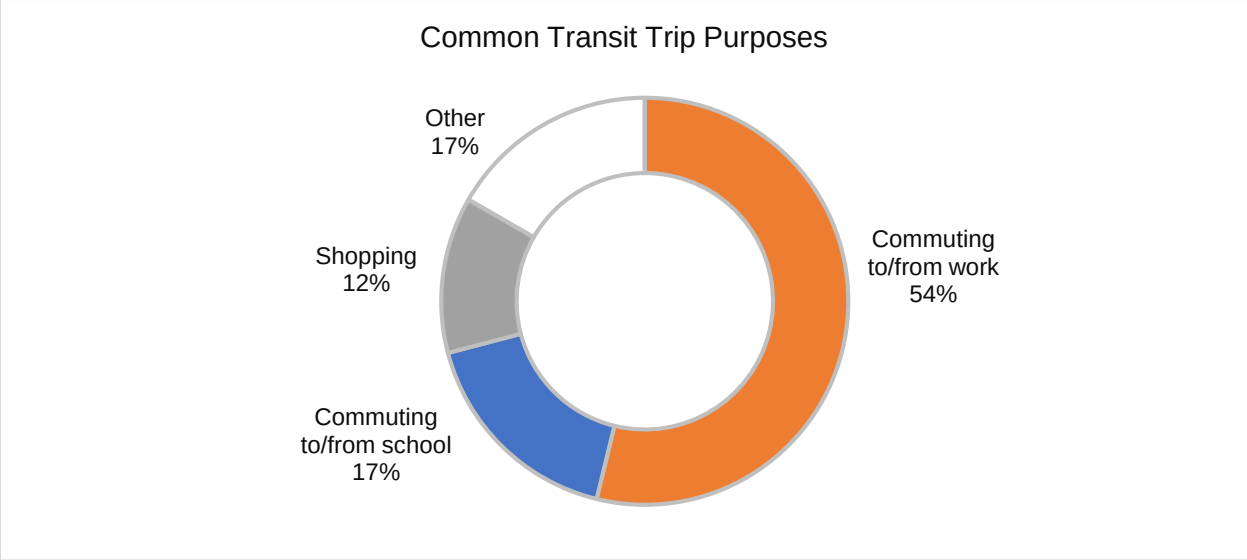


Figure 31 Common transit trip purposes.

Based on a report of nearly 700,000 transit riders in the United States, the American Public Transportation Association (APTA) reported that 63% of riders used public transit at least 5 days a week and 49% of trips were

conducted to/from work.[11] While the percentage of Fredericton using transit for commuting to work (54%) was found to be similar to the American average (49%), the percentage of respondents using transit at least 5 days a week is much lower (39% compared to 63%). The low percentage of riders using transit at least 5 days a week may be due to the percentage of respondents who were employed casually/part-time (22%), who may not conduct as many work trips. There is also a large portion of the employed labor force that identified being employed as clerical/professional (43%) and self-employed (5%). Self-employed individuals and service sector employees have increasingly flexible travel patterns (e.g. variable work schedules, multiple job locations, tele-commuting, etc.). Improving transit during the off-peak hours (i.e. midday, evening, weekend) can serve those who work outside of the typical 9-to-5 work day, as well as help attract riders for different trip purposes.

Transit Service and Scheduling

Many respondents commented that transit service is lacking outside of peak hours. In particular, it was noted that midday and evening wait times are too long, service should be available later at night, and buses should run on Sundays. While respondents mainly reported using transit during the morning and afternoon peak hours (59% and 69%, respectively), many also reported using transit midday and in the evening, as shown in Figure 32.

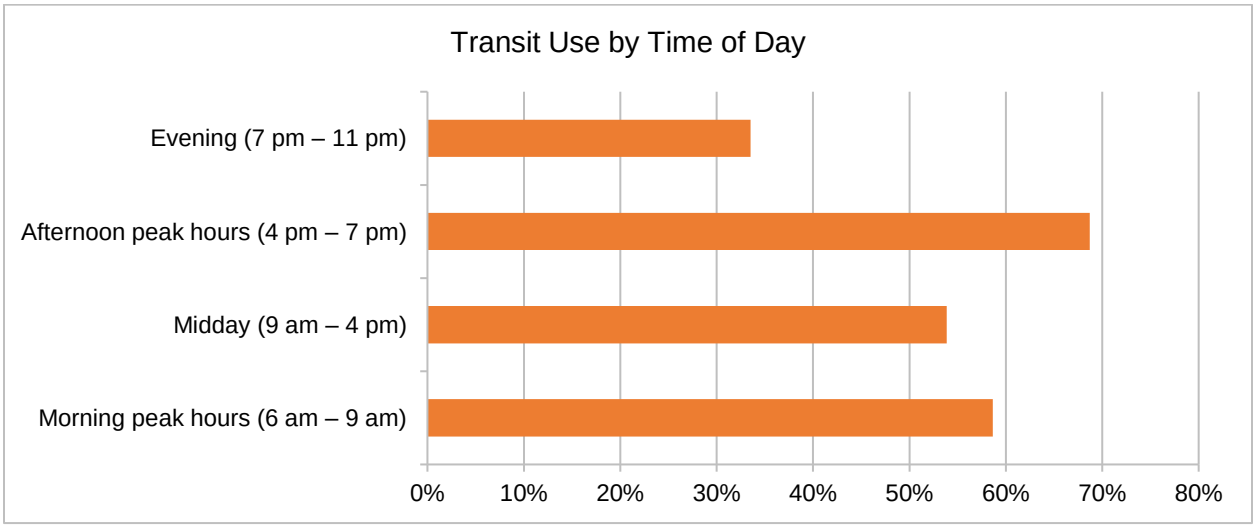


Figure 32 Transit use by time of day.

One of the key topics in the comment section at the end of the survey was the lack of service on Sundays, where approximately 260 comments referred to a desire for Sunday service. It was therefore unsurprising that 82% of riders agreed or strongly agreed that they would use Fredericton Transit on Sundays if it was available (60% strongly agreed). Many reported that they must pay for a taxi to get to/from work or discretionary activities, or choose not to go out altogether. For those who do not own a personal vehicle and rely on transit as their primary mode of transportation, absence of Sunday service places strain on their financial resources.

Ability to Transfer

Out of the respondents who indicated that they have used public transit, 34% reported that they transferred between bus routes to get to their final destination, and 66% reported that they did not. Of those who transferred, 92% transfer at Kings Place, 31% transfer at Regent Mall, 9% transfer at Corbett Centre, and 6% transfer at other locations. Some respondents pointed out a need for a transfer point or hub on the north side, as transferring between buses on the

[11] http://www.apta.com/resources/reportsandpublications/Documents/APTA-Who-Rides-Public-Transportation-2017.pdf

north side is currently facilitated through a transfer hub on the south side (i.e. travelling south to transfer at Kings Place and returning north). When asked if it would be more convenient to transfer between buses on the north side of Fredericton than currently at Kings Place, 27% of riders responded that they agree or strongly agree with this statement.

In addition to the ability to transfer between buses, transferability between other modes of transportation and buses is also of interest to transit agencies. Of those who take public transit, 98% of riders indicated that they access the bus stop by walking. Provision of greater multimodal connections/amenities to bus stops and major transfer points can help incentivize non-riders to take public transit for part of their trip. Park-and-ride lots, for example, offer convenient transfer points between private vehicles and public transit, and have been found to reduce the overall cost of travel for riders by 11% (based on the Washington State Department of Transit[12]). In Fredericton, park-and-ride lots would also bring the additional benefit of being a solution to the shortage of downtown parking and the associated competition for parking spots. It was indicated by 47% of non-riders that they either agree or strongly agree with the statement "I would use public transit if Fredericton Transit provided park-and-ride lots around the city." Consideration of park-and-ride lots at strategic locations around the city may attract new riders to the transit system and help to overcome long distances between trip origins and bus stop locations. Park-and-ride lots are explored further in Section 4.3.

Communication of Transit Services

Many respondents indicated that communication about schedules, next bus arrival, and next stop (i.e. communication on the bus) is currently lacking. The greatest source of schedule information is through online schedules, where 71% of respondents indicated that they view schedules online. When riders rely on online schedules for information, they are only provided scheduled information, rather than real-time information. Many riders (43%) reported that they use the ReadyPass app, offered by Fredericton Transit to deliver real-time bus location information, but comment that it can be inaccurate. Riders also noted additional apps, including Transit, MonTransit, and Moovit, which do not require downloading an agency-specific app. The use of other sources of information, such as paper schedules and Google Maps, are shown below in Figure 33.

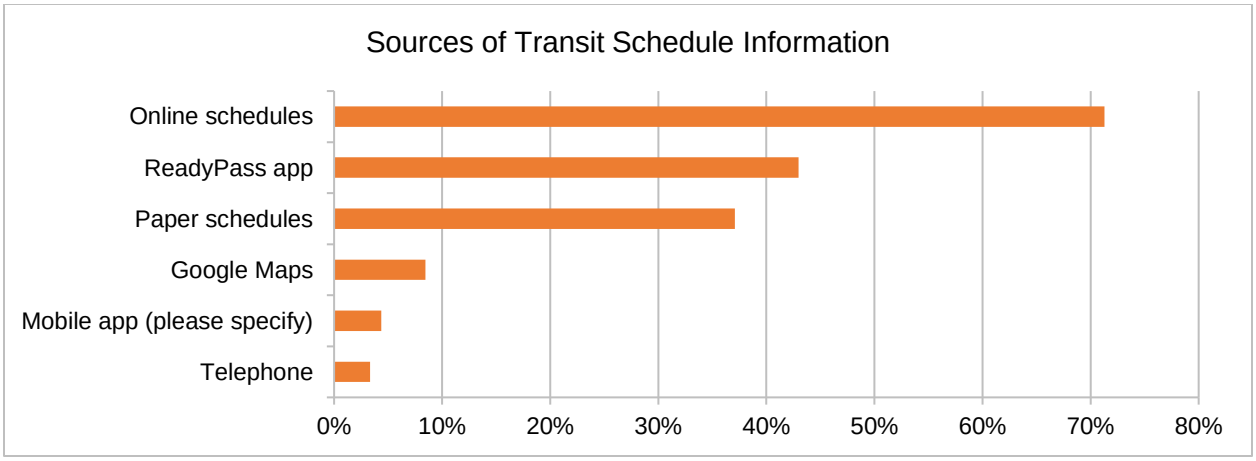


Figure 33 Sources of transit schedule information.

Fredericton Transit has conscientiously increased its marketing investment in recent years. Many non-users (66%) responded that they agree or strongly agree to the statement "I am familiar with the service provided by Fredericton Transit," and 63% agreed or strongly agreed to the statement "I know which transit bus route is closest to my home."

[12] https://www.wsdot.wa.gov/research/reports/fullreports/094.1.pdf

However, there is still room to improve marketing, branding, and communication of transit services to help inform the population about services provided and bring non-riders to the system. Marketing and branding of Fredericton Transit is discussed further in Section 8.0.

Affordability

Based on the survey comments, there is a sense that $80 is too expensive for an adult monthly pass, that the fare for children should be reduced, and generally that the fare is too costly for the level of service received. Currently, Fredericton Transit charges the same price for single ride tickets, offering no single ride concessions, and offers a small discount on a 10-ticket booklet. Given that the majority of users pay through either cash or ticket (see Figure 34), many riders do not benefit from the reduced monthly passes. Despite a higher percentage of users commuting to/from work (54%) than school (17%), there is a higher uptake of monthly student passes than adult passes. This difference may be because an adult pass is perceived as too expensive, adults do not plan to take transit frequently, communication about methods of fare payment is lacking, or that the distribution channels for adult passes are inconvenient compared to student passes. It is recommended that Fredericton Transit investigate this phenomenon further and explore ways to increase adult monthly pass purchases (i.e. through improved communication and additional purchase locations).

Many respondents also noted that $2.75 is an inconvenient amount to pay in cash, and that a fare card and/or improved fare payment options are desired.

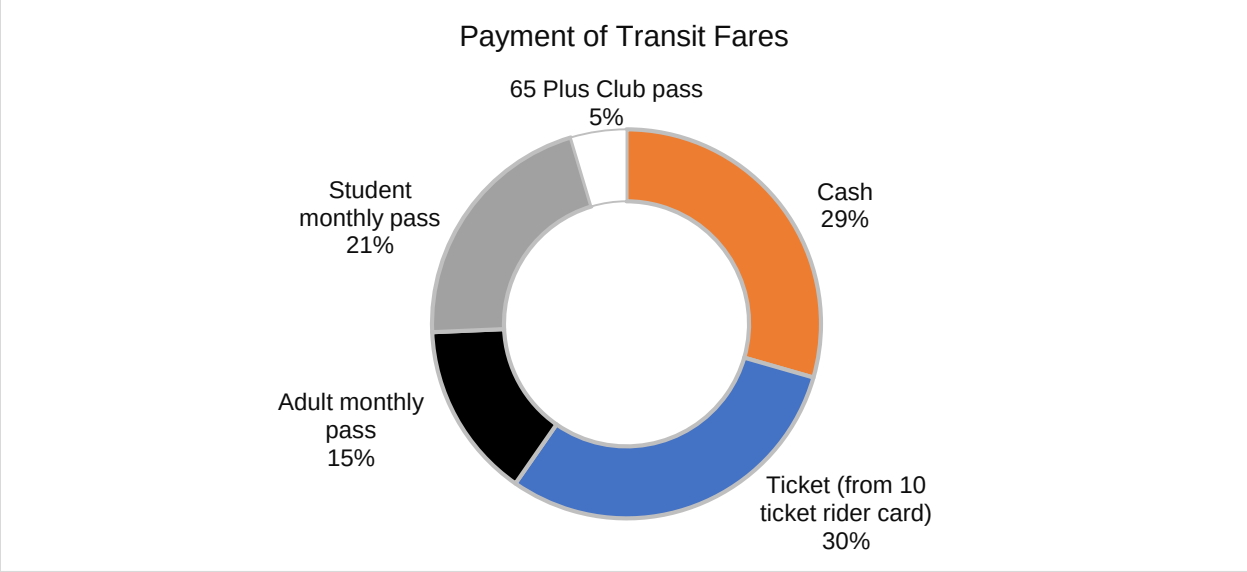


Figure 34 Payment of transit fares.

Comments also suggested that some patrons were not satisfied with the value of service for money, and pointed to transit agencies in other cities that have comparable fare prices to Fredericton while offering higher frequency transit services. The community's interest in reducing transit prices is not only related to the service that is provided, but is likely related to income level, as 54% of respondents indicated a total household income of $40,000 or less. A lower family income typically impacts the perception of value for money, as a household has limited resources to spend on transportation costs.

Accessibility

The online survey asked respondents if they used specialized transit or conventional transit services for typical trips. Specialized transit services were used by 6% of respondents, and conventional transit services were used by 94%. It was mentioned that some respondents experience difficulty booking Para Transit and must resort to taking a taxi instead. This may indicate that specialized transit is experiencing high demand, or that users do not plan their trips far enough in advance to appropriately book the service.

Accessibility around bus stops was also identified as an issue, particularly during winter months. Lack of sidewalks and/or snow clearance around bus stops makes it difficult for individuals with mobility impairments to access the bus.

Respondent Demographics

Approximately 73% of respondents were between the ages of 18 and 44, while 6% were 65 years of age and older. Despite the fact that only 6% of respondents were seniors, it should be noted that many comments were provided by family members, caregivers, or those who work with the senior population about challenges faced by seniors. In particular, the recent removal of the bus stop near Stepping Stone Senior's Centre (also near the Multicultural Association of Fredericton) arose as a common theme, where respondents expressed concern about the walking distance to the nearest bus stop (350 metres).

Over 62% of respondents identified as female, which is well above the general population who is female (52%) in Fredericton (2016 Census of Canada). This may indicate that females have a greater interest in providing feedback on the system due to a high frequency of transit use, or that they have greater input due to spontaneous travel behaviour. The higher proportion of females also has implications on travel behaviour, as women are more likely to conduct activities that are typically associated with care giving and household activities. The ability to transfer between buses, make multiple stops on a trip, and pay for children to ride transit may therefore have greater impacts on women than men.

Over 81% of respondents self-identified as White, 5% as Asian, 2% as First Nations, 1% as Arab, 1% as Black, 4% as other, and 9% preferred not to say. These proportions are similar to the general population in Fredericton, which is composed of 87% White, 3% Aboriginal, 5% Asian, 1% Arab, 1% Black (2016 Census of Canada).

UNB Bus Pass Survey

An online survey was also administered by the University of New Brunswick Graduate Student Union (UNBGSU) in December of 2017 to understand the needs of UNB graduate students and aide in negotiations for renewal with Fredericton Transit. Similar to the online survey conducted by Stantec, the infrequent bus schedule was identified as a main reason for not taking transit. Another main reason students do not take transit is due to the high automobile ownership, as 60% of respondents indicated that they have access to a car. This survey also showed that many graduate students (66%) would consider using the Bus Pass more often if the frequency of buses or number of routes increased.

Summary

Stantec administered an online survey to determine what current riders are satisfied with, and what needs attention. This survey received an enormous response, with 2,312 surveys completed, which indicates an immense community interest in transit services. While the majority of respondents have an overall positive view of Fredericton Transit services, a number of concerns were expressed by riders related to service frequency, span, travel time, affordability, and accessibility. Key considerations for the Fredericton Transit Strategic Plan include the following:

- **Sunday Service:** This emerged as a main theme, with many indicating they are financially challenged to pay for a taxi every week.
- **Affordability:** The fare structure is a sensitive topic in Fredericton and careful consideration will be required for any fare structure or payment method updates.
- **Travel Time:** Riders would prefer more frequent buses, even if it means bus stops are located farther away from their origin/destination, and non-riders identified infrequent bus service as a main reason for not taking transit.
- **Communication:** A formal marketing and branding plan should be followed to build support and strengthen communication about the transit services offered and bring new riders to the system.
- **Park-and-Ride:** Identifying park-and-ride lot locations can facilitate transfers between personal cars and transit, encourage non-riders to use transit for part of their trip, and provide a solution to the shortage of downtown parking.

3.0 GAPS ANALYSIS

Based on stakeholder engagement and community outreach, together with a thorough analysis of existing conditions, datasets, field visits, and discussions with Fredericton Transit staff, Stantec developed a list of gaps (or needs) of Fredericton Transit regarding different aspects of its business.

The list below aims at capturing the emergent themes or concepts that will help inform the additional considerations and recommendations in later sections of the Strategic Plan. We also provide rationale or explanation for each of the identified gaps or needs.

3.1 SERVICE PLANNING AND OPERATIONS

Transit service standards are industry-wide best practice—they tell the public and the agency staff how goals and values are translated into service levels that the agency strives to maintain. Furthermore, standards provide systematic and objective ways of planning, monitoring, adjusting, and evaluating transit service provision. Service planning aims to ensure that transit service is attractive for the present, but also responsive to the future, and relies on community engagement, values-informed goals and objectives, and data-driven metrics.

Fredericton Transit's current service standards should be reviewed and monitored to ensure they continuously reflect current industry standards and community goals. Without consistent application of guiding standards and commitments that are visible to the public, it is difficult to chart a clear direction in service design and provision. Moreover, Fredericton Transit needs to identify unmet demand and track customer satisfaction beyond call-in customer compliments and complaints. By combining various information sources, Fredericton Transit will be better able to design and deliver attractive and useful transit service.

1. Fredericton Transit needs to promote a culture of accountability internally and to the public.
2. Fredericton Transit needs to provide a more fiscally sustainable alternative to low performing (passengers per revenue hour) routes.
3. Fredericton Transit needs to investigate the pros and cons of Sunday service given that businesses and other destinations are typically open on Sundays.
4. Fredericton Transit needs to communicate more effectively and minimize the barriers that are preventing would-be riders from using the system.
5. Fredericton Transit needs to explore new strategies for attracting riders who live on the city's outskirts or in neighbouring municipalities.

3.2 TECHNOLOGY

Technology is now playing a fundamental role in not only transit service planning and delivery, but in the provision of mobility services. Citizens now expect seamless travel between modes using smartcards or open payments to pay for service, live arrival schedules, and up-to-date information at their fingertips. Staying relevant and attracting new ridership for transit agencies now hinges on exploiting technology for providing customer information, trip planning

capabilities, as well as for internal operations. Moreover, technology can improve customer and operator safety. With more technology comes more data, and as such, the need for staff with the skills to translate data into information which inform decision-making.

Currently, Fredericton Transit makes limited use of its somewhat outdated technology. Fredericton Transit provides live-arrival data through the ReadyPass app, owned by the local term firm Expedition Connect. Continued collaboration with ReadyPass and/or exploration of other applications could improve functionality and user interface. Furthermore, other technology like automatic vehicle location (AVL) and automatic passenger counters (APC) can enable evidence-based decisions, such as route and service planning. Fredericton Transit also lacks technology related to passenger and operator safety, namely on-board cameras.

Below are key needs that Stantec identified regarding technology.

1. Fredericton Transit needs to proactively promote safety and security of its customers and operators, and to refute malicious allegations filed against operators.
2. Fredericton Transit requires more reliable, accurate and automated vehicle data to inform scheduling and improve operations.
3. Fredericton Transit needs automated or improved methods to capture passenger activity to make informed decisions regarding route alignments, service plans, and service allocation.
4. Fredericton Transit needs to improve the universal accessibility of fixed-route service to facilitate all users onto fixed-route while reducing the need for paratransit service.
5. Fredericton Transit needs to improve the dissemination of information to customers to improve trip planning and attract new riders.
6. Fredericton Transit needs new payment methods to combat fare evasion and to enable fares to better suit its customers.
7. Fredericton Transit needs on-demand/dynamic scheduling software to enable on-demand routing, particularly for areas that are not supportive of fixed-route service.

3.3 FARES

Farebox revenue should form a substantial portion of operating revenue for any transit agency. Currently, Fredericton Transit recovers roughly 36% of its operating costs through the farebox, a healthy amount for an agency of its size. Nevertheless, Fredericton Transit should aim to maintain and increase its farebox recovery to demonstrate its fiscal responsibility and sustainability to its riders and to the non-riding public.

The fare table plays a central role in the outcome of fare recovery, as well as providing fares that are tailored to the community, ensuring that the right fare exists for the right person and trip. Nevertheless, the fare table is not the only tool to ensure a healthy recovery. Fare evasion was noted by Stantec and designing policy aimed at reducing fare evasion can boost the average revenue per rider, while also improving customer sentiment that the agency takes fare evasion seriously, and that service quality justifies the fare they pay.

Stantec heard repeatedly that fares are expensive for many residents of Fredericton. The prospect of free fares arose in discussions, which is a strategy that other transit agencies have tried in the past as a strategy to attract ridership.

The two biggest success stories are likely Austin, Texas and Burlington, Vermont, where ridership grew by more than 50% upon introduction of free fares, however in both cases the free fare model proved to be unsustainable financially and unsustainable in terms of matching supply with demand, and in both cases fares were reintroduced. More recently in 2013, free transit was implemented in Tallinn, Estonia, and negligible impacts to ridership and road congestion were realized, illustrating that it is no guarantee that free fares will induce significant ridership gains. A study by the Center for Urban Transportation Research out of the University of South Florida also identified that the implementation of free transit can undervalue the service and attract unwanted individuals such as vandals, vagrants, and drunks, which can serve to alienate the loyal ridership base. There is also the issue of fairness – by offering free transit, Fredericton Transit would be placing an arguably unfair burden on the taxpayers of the City of Fredericton. For these reasons, Stantec does not recommend that Fredericton Transit implement free fares.

Below, we identify areas for opportunity to expand the options to fit the right fare with the right rider.

1. Fredericton Transit needs a low-income fare product to enable riders with low or fixed incomes to avoid devoting a large portion of income to transit.

2. Fredericton Transit needs to curb fare evasion, particularly at Kings Place.

3. Fredericton Transit needs to provide a senior monthly fare that is commensurate with other fares for riders.

4. Fredericton Transit needs to engage and build a case for U-Pass arrangements with UNB undergraduate students as well as students attending NBCC and NBCCD; this may be more achievable if Sunday service is introduced and an extended Lincoln route to the airport made reality.

5. Fredericton Transit needs to implement an employee pass and partner with other employers across the city, including municipal and provincial governments and Hospital, to provide an EcoPass as an alternative to free parking.

6. Fredericton Transit relies mainly on municipal subsidies and fare revenue and currently collects revenue from advertising via bus wraps through a contractual agreement with Pattison Signs. Fredericton Transit needs to look for new revenue streams to reduce reliance on local funding, as well as to provide additional service regionally (advertising and lobbying provincial government).

3.4 PARTNERSHIPS

Transit service cannot exist in a vacuum; transit relies heavily on the community it serves and on collaboration with partners that remove snow from streets and sidewalks, partners that plan neighbourhoods and that determine land uses and zoning, and partners that benefit from customers delivered by transit vehicles. Nevertheless, these partners are not always visible and many of the barriers, as well as opportunities to improve transit use depend on partnerships and collaboration to ensure that factors beyond the direct control of a transit agency work to favour transit use.

In Fredericton, transit service and parking are a joint department; parking plays a crucial role that can incentivize or cannibalize transit use. Fredericton is currently undergoing a parking planning process that provides an excellent opportunity to help grow ridership. Furthermore, the lack of sidewalk connectivity to bus stops and snow buildup in the winter are two examples of features beyond the immediate control of Fredericton Transit, but play a major role in the ability to use and access transit service.

1. Fredericton Transit's bus stops have limited accessibility especially in the winter as the snow builds up. Fredericton Transit needs to do its part to ensure that the City evolves in a way that is transit supportive rather than transit prohibitive.

2. Fredericton Transit has a limited number of partnership arrangements with organizations in and around the City and may be missing opportunities to develop a more reliable stream of revenue while providing better service to Fredericktonians. For example, there is real opportunity to expand partnerships with community organizations, technology companies, major employers, and neighbouring municipalities.

3. Parking, while constrained in the City Centre, is still relatively abundant and inexpensive. Fredericton Transit needs to ensure that parking policy works in tandem with transit policy to achieve the goals of sustainability of the City.

4. Fredericton Transit needs to work with other New Brunswick transit agencies to petition for provincial revenue streams.

3.5 MARKETING

There are many other opportunities that Stantec identified during the course of this assignment that can be capitalized by Fredericton Transit. These opportunities include brand visibility and recognition, additional revenue streams, and more. These needs do not neatly fit into the previous categories and as such are listed below.

1. The Fredericton Transit brand has low visibility and recognition throughout the community.

2. The Fredericton Transit brand is outdated and does not speak to riders and non-riders.

3. The name "Fredericton Transit" may in itself discourage use from the Francophone population and does not comply with the official bilingual status of New Brunswick.

3.6 FLEET

Devising a future transit strategy requires long-range fleet and lifecycle planning that considers the marketplace, governmental policy, future service development plans, legislation, and the attributes of the various types of propulsion products. It is also important to consider the advantages, lifecycle costs, and risks of adopting new or alternative fleet vehicles within the local context, as one transit system's solutions may not be appropriate in another environment. For example, adopting a lower-emission propulsion source, such as diesel-electric hybrid buses or battery electric buses (BEBs), requires much higher capital costs and is best-suited to urban environments with more frequent "stop-and-go" activity and traffic congestion.

Fredericton Transit's fleet was reviewed with consideration of propulsion sources, lifecycle, maintenance, vehicle size, and facility locations. In Fredericton, the conventional fleet consists of twenty-eight 40-foot Nova Bus LFS models, with an average age of 9.96 years in 2017. The peak operating schedule requires 20 units, which means that Fredericton Transit has an above-average spare ratio of 40%.

Fredericton Transit's needs with respect to its fleet are outlined below.

1. The current lifecycle of Fredericton Transit buses is 18 years, although targeted for 15 years, which is longer than the vehicles' design life, resulting in mid-life structural refurbishment as well as engine and transmission overhauls.

2. Mid-life refurbishment costs necessary to maintain the 15-year lifecycle are required from operating and maintenance funds.

3. Prolonging the retirement of Fredericton Transit's older and less-clean engine technologies through refurbishment negatively impacts the community.

4. Fredericton Transit's fleet of diesel buses does not support the increasing push for low or zero-emissions buses.

5. Anti-icing products used on roads and at bus stops negatively impact bus structures, and cause deterioration to the bus floor as they are tracked onto buses by customers.

6. Fredericton Transit's administration office is separate from the maintenance storage facility, which limits communication and collaboration between operators, maintenance staff, administration and management.

4.0 SERVICE PLANNING AND OPERATIONS

As part of the Strategic Plan, Stantec has studied different alternatives and scenarios and how they may benefit Fredericton and mobility across the city. Options like Sunday service can expand travel options on Sundays, particularly for residents without access to a car or on fixed-income, while park-and-ride lots can help acquire new ridership and mitigate traffic constraints in the City Centre.

Stantec begins with an overview of the current route network.

4.1 CURRENT NETWORK

The current network provides service across most of Fredericton, with a focus at Kings Place for timed transfers. While this system works well for the most part, we note a few areas that need attention, as well as limitations, that shape the proposed networks presented later, including:

- Indirect or circuitous routes between Regent Mall/Corbett Centre/Knowledge Park area and the City Centre. These areas are major destinations and trip generators. While these two areas are linked by a direct path along Regent St., Regent St. itself presents few trip generators in between and is mostly mid-density and residential. Currently, the most direct path is route 16N/17S from Kings Place via University Ave., the university campuses, the hospital, and finally the mall.

- Beyond the core of the south side of the City (roughly beyond 2 km of Kings Place), residential density is moderate to low, making it difficult to run productive transit service. This is most pronounced in Lincoln and Silverwood, as well as on most of the north side.

- Meandering roads that are not gridded force circuitous bus routes, prolonging running times and irritating passengers by forcing non-direct travel paths oftentimes running counter to the direction of intended travel.

- Lack of east-west routes, particularly on the south side. The north side has two separate routes that approximate an east-west route along Sunset-Main-Union.

The maps below show the current transit network with residential density (Figure 35), home locations of survey respondents (Figure 36), and destinations of survey respondents (Figure 37), respectively.

Fredericton Transit — Strategic Plan 2018
Current network

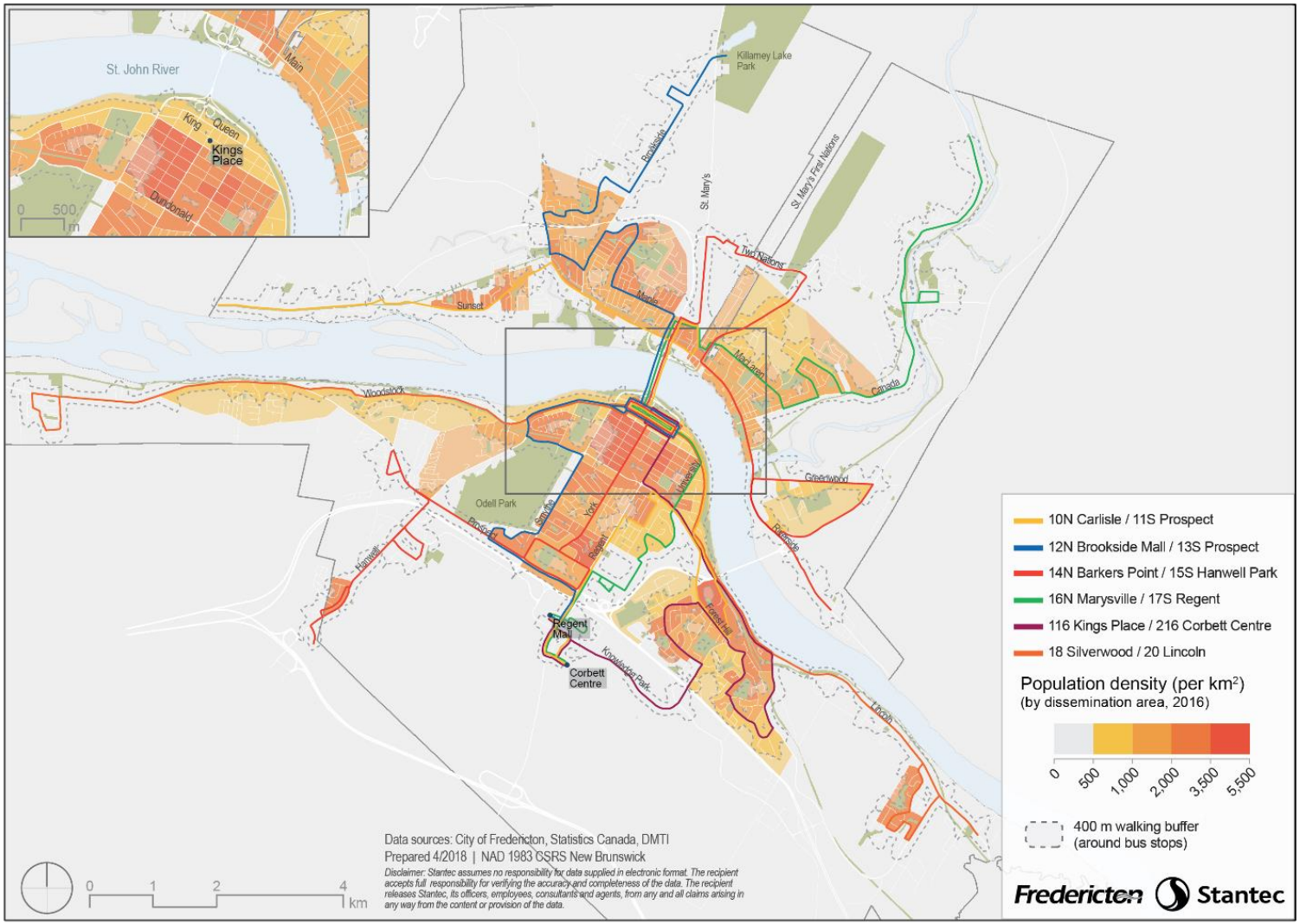


Figure 35 Current route network and population density.

Fredericton Transit — Strategic Plan 2018
Current network

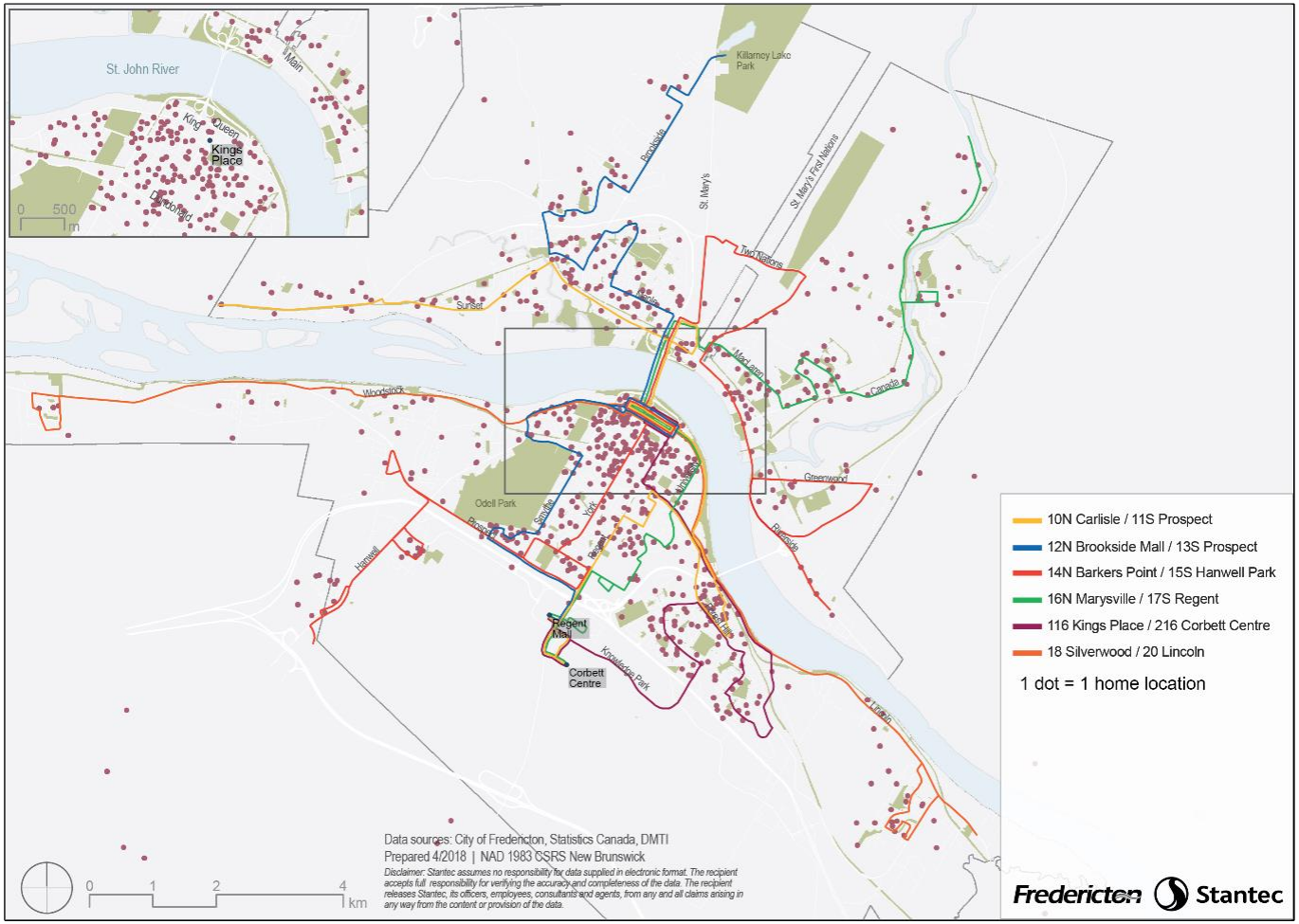


Figure 36 Home locations and current transit network.

This map shows that the spread of home locations (as per the survey responses) is quite large, but also reflective of population density at the dissemination area-level—higher in the centre and dissipating away from the centre.

Fredericton Transit — Strategic Plan 2018

Current network

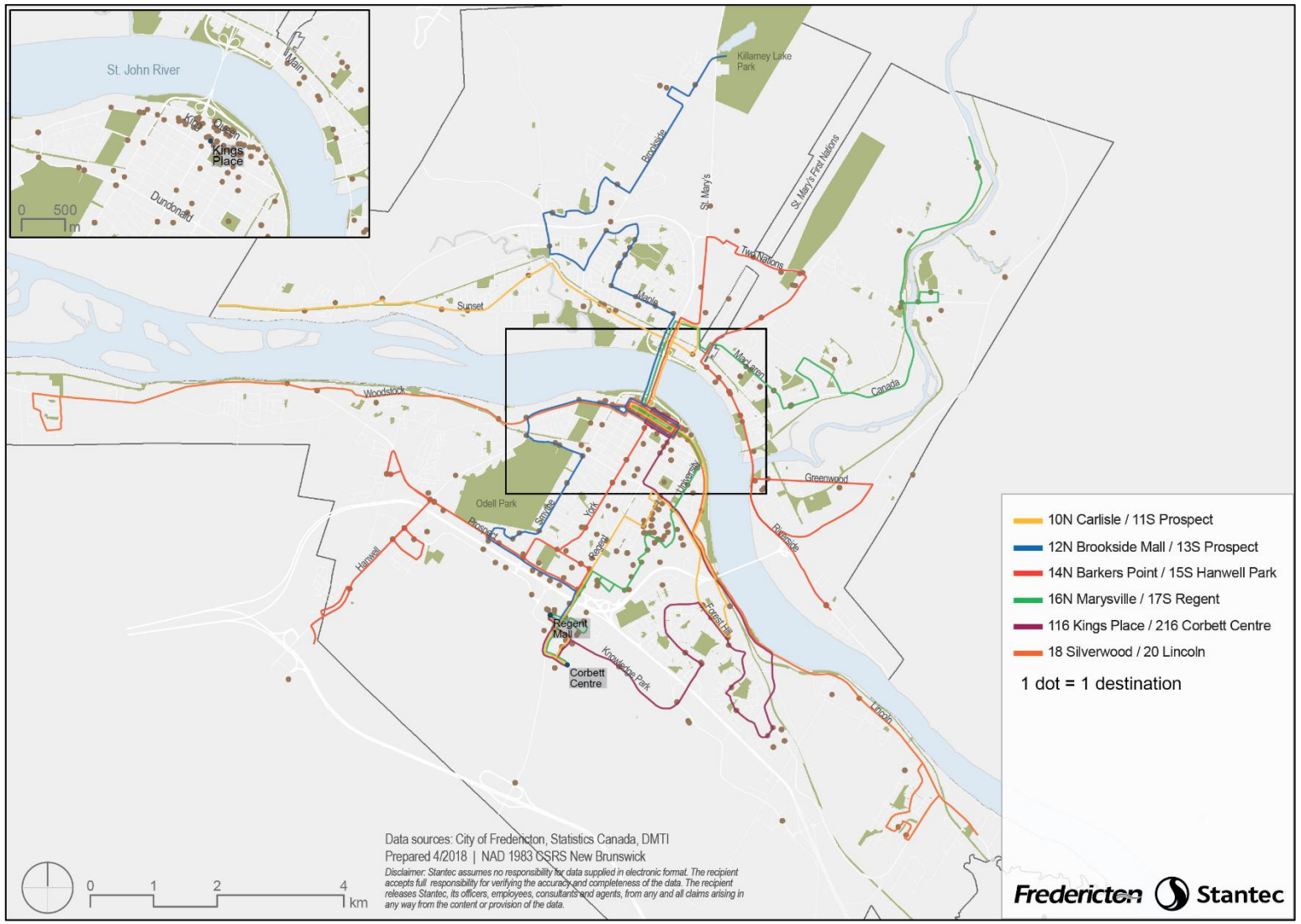


Figure 37 Destinations from rider survey and current network.

What's clear from the map in Figure 37 is that the spread is much narrower than home locations. Destinations are concentrated in the downtown (around Kings Place, visible in the map inset), university campuses, and the shopping malls (Regent, Corbett, SmartCentres, and Brookside). Other destinations are found along transit routes, but at lower densities.

These maps helped inform the alternatives presented below, bearing in mind that these are high-level concepts aimed to stimulate further discussions. In particular, routing and bus stop placement would need to be appraised, in conjunction with road redevelopment plans, ridership volumes and accessibility initiatives currently underway by Fredericton Transit.

4.2 NORTH SIDE HUB EVALUATION

The interplay between a possible north side hub and a park-and-ride lot

With the current network structure, all bus routes on the north side of Fredericton converge into Kings Place on the south side. In essence, the Westmorland Street Bridge behaves as a funnel, collecting the routes radiating on the north side, funneling them downtown at the Kings Place transfer hub. While this hub-and-spoke arrangement works effectively in a city with the size and layout of Fredericton, it's also possible that not all routes need to cross the St. John River, and thus facilitating north-side-to-north-side travel patterns.

A north side transfer hub hinges on the notion that not all bus riders (or travel in general) from the north side are destined for the south side of Fredericton. As such, a transfer point on the north side could eliminate the need to travel to the south side to continue to a destination back on the north side. Alternatively, restructuring an existing bus route to serve only the north side could achieve a similar outcome (travelling to the south side only to return to the north side); however, on the surface, the lack of pedestrian amenities along route alignments on the north side currently acts as a chief impediment to on-street transfers.

In this section, we evaluate the necessity, feasibility, limitations, and benefits of a transfer hub located on the north side of Fredericton. Furthermore, we frame this discussion together with the potential for a park-and-ride lot, the rationale being that it may be logical to consolidate a north side hub with a park-and-ride on the north side as a way to minimize the need and costs for land, amenities and other infrastructure. We first discuss the north side hub concept and then park-and-rides in turn.

North side hub background

Previously, Fredericton Transit operated a north side transfer hub at what is currently Pizza Delight and Worrall's Furniture, located at 243 St. Mary's St. (Maple/St. Mary's; Figure 38). This location, were it to serve as a 'new' north side hub, could be served by routes 14N/15S, 10N/11S, and 16N/17S; the only other route that enters the north side, 12N/13S, does not pass this location.[13]

[13] Routes 116/216 and 18/20 remain on the south side.

Fredericton Transit — Strategic Plan 2018

Current Transit Network with previous north side hub

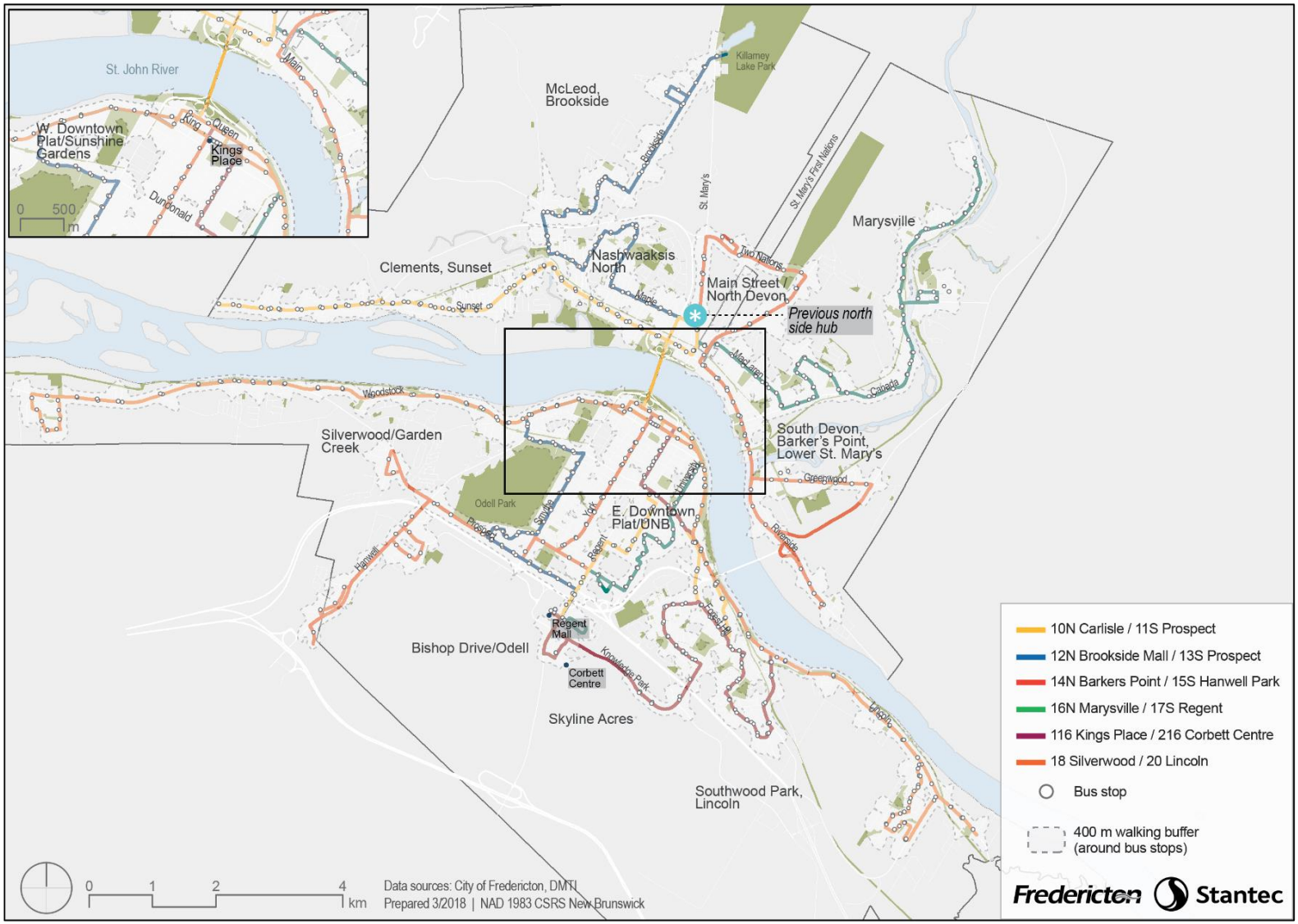


Figure 38 Previous location of north side hub.

The 2008 Strategic Plan reported that only 4% of surveyed riders identified starting and ending their journeys on the north side. The 2008 Plan explored the potential for a north side hub that would operate similarly to Kings Place (the 'south side hub'), in that routes would operate in a radial fashion—all routes on the north side would converge at a north side hub, while all routes on the south side would converge at the south side hub. In this scenario, a shuttle bus would connect the two terminals. The 2008 Plan identified potential locations for the hub, including Two Nations Crossing area, Brookside Mall, or along Main St.; it also pointed out that the previous location of the terminal, at St. Mary's St. and Maple St. is less than optimal as it's not a major destination in and of itself. As discussed further below, the 2008 Plan also righty recommended that wherever the site, the hub or terminal should "serve as both a key destination as well as a transfer point (similar to the Kings Place […])". The 2008 Plan deemed that a two-terminal model, linked by a shuttle bus, would not only increase operating costs and require substantial re-routing, but also inconvenience passengers travelling from the north side to the south side (riders would require two transfers, one at the north side hub to the shuttle service, and another at Kings Place from the shuttle service to a regular route). Given these findings, it was recommended that a short-term solution involve a transfer location in the St. Mary's/Maple Sts. vicinity to allow transfers between 4 of 5 routes. Longer term solutions suggested creating a sub-terminal, similar to the sub-terminal at Regent Mall, at the Fredericton North SmartCentres, together with a perimeter or circulator route for the north side.

A few desirable traits are needed for a successful transit hub. By successful, we mean a location which fulfills the needs of transit riders and of the transit agency. For transit riders, a successful hub provides a comfortable waiting environment, that is safe and pleasant. For a transit agency, a successful hub provides space to safely operate buses, accommodate turning movements, and satisfy operator requirements, such as washrooms (if necessary). Furthermore, other impacts are important as well, including mitigating the potential for negative impacts on traffic due to bus movements and vice versa, as well as providing a visually appealing location that adds rather than detracts from the local environment. While this characteristic may not be essential for operations, it helps when gathering public support and buy-in when building what is essentially a waiting spot where many buses will converge.

A good model for a transit hub is already found in Fredericton at Kings Place. While the current configuration of Kings Place does present some operational issues, namely that buses extend into traffic, Kings Place has many positives, including its natural surveillance from shoppers and other activities downtown, which increases safety and security, provides indoor waiting areas, and the fact that Kings Place serves as both an origin and destination.

Many transit hubs that are deemed 'unsuccessful' or 'poor' usually don't result from poor operations, but rather from feelings of danger or uneasiness from passengers. Poor hub siting that produces a sense of desolation or little natural activity results from the hub serving solely a transit purpose; simply stated, there's no other purpose for the location other than for transit. Without transit, there is no purpose for someone to visit that location. As such, these locations can feel unsafe, are difficult to guard, and can attract loitering. Instead, a location like Kings Place is successful because it has a purpose other than being a transit hub; Kings Place is a shopping and recreational destination, and includes offices as well. Even though Kings Place Mall closes at 6 pm, bars and restaurants in the City Centre on King and Queen Sts. are open later, providing natural pedestrian activity. Therefore, there are plenty of reasons for many different people to be at and around Kings Place, other than to use transit. This type of multiple use throughout the day encourages natural surveillance and adds a level of security for passengers waiting for a bus, in addition to providing shopping opportunities while waiting for a bus.

So, to reiterate for a transit hub to be successful, we need a location where:

- Buses can operate safely and efficiently
- Riders can wait safely and comfortably
- The area serves a purpose beyond solely transit

At present, there are no sites that truly fulfill the above criteria on the north side. For example, Brookside Mall, with cooperation from management, could provide a location with room for a terminal; however, after the mall closes, despite trip generators like Sobey's, NB Liquor, provincial government employees and Goodlife Fitness, reduced activity and no natural pedestrian activity (compared to the City Centre neighbourhood around Kings Place) could reduce the sense of passenger safety. To combat this, the agency could invest in additional security measures such as active surveillance including guards and video cameras, but that could become an unaffordable financial burden for the agency as well. The same can be said for the SmartCentre. While these locations may be suitable for a park-and-ride, since they already have ample parking and are served by bus routes, these locations would require restructuring most routes so that they would serve these locations, allowing for transfers.

Echoing the findings and recommendations from the 2008 Plan, for the short-term (next 2 years), it is not recommended that a north side hub be established. The travel demand (i.e. north-side-to-north-side, 3% of trips by respondents of the online survey) do not warrant a transfer hub at present. Furthermore, only 28% of survey respondents agreed or strongly agreed that a north side transfer hub would be more convenient for their trips.[14] Current trip patterns are not, to any significant degree, between east-west locations on the north side. Together with the finding that 65% of respondents do not transfer between bus routes on their most common trip suggests that at least for the time being, a north side transfer hub is unnecessary. Implementing it in the short-term is likely to inconvenience riders hoping for a quick trip downtown (or to other south side destinations) more so than it will be an effective tool to attract increased ridership from north side residents.

Nevertheless, it is acknowledged that there is a need for a north side hub in the mid- to long-term contingent on demonstrated land development and population growth. If a north side hub were to be established, a location other than the Maple St./St. Mary's St. area would require substantial re-routing to allow multiple routes to meet, as at Kings Place. The benefits of rerouting to support a north side hub in the medium term (2-5 years) may exceed the costs, if further development continues and if SmartCentres Fredericton North continues to evolve as a destination in its own right.

Indeed, one of the benefits to transit service of a barrier like a river is that it naturally forces parallel routes to converge and thus meet at a location close to the barrier. If routes were to do this in the absence of a barrier, the deviation would feel as a detour to bus riders. But since car drivers are also required to cross the barrier at a certain location, such as a bridge, the convergence of multiple routes feels less like a detour. Furthermore, the convergence provides an excellent opportunity for a transfer point.

This is exactly what happens at Kings Place. By crossing the river along the Westmorland St. Bridge, multiple routes meet at Kings Place, facilitating transfers. To maximize the success for a north side hub—for it to be useful for riders, pleasant and safe, for it to facilitate bus operations and minimize additional operating and capital costs—the north side hub is ideally located as close to the St. John River as possible, i.e. before the routes spread out across the north side. This is to say, while it is important to explore options such as SmartCentres in the medium-term, in the long-term it would be ideal to relocate the north side hub to be closer to the river. There is a unique opportunity for the in the context of the proposed redevelopment of Main St.

In the long-term (5+ years), we recommend that in coordination with the redevelopment of Main St., Fredericton Transit work with municipal and private partners to identify a location along Main St. close to the Westmorland St. Bridge where a terminal similar to Kings Place could be established. One rationale for this location is that, like Kings Place, Main St. is close to the river, where all routes are still focused after crossing over the bridge, minimizing the re-routing needed to bring the routes together at a transfer point. Another reason for proposing this location is that Main

[14] Compared to transferring at Kings Place. Twenty-eight percent responded as not applicable.

St. is slated for redevelopment as a mixed-use, dense corridor. As such, Main St. in the future would be a location used by many different people for many different purposes. This activity and land use would enable transit use, provide natural surveillance, and act as both a transit terminal and a destination. Another distinct possibility, further enabled by a redeveloped Main St., is a new route operating in an east-west orientation along Main St. This route would provide service along Main St., Clements and Sunset Sts. further west, and along Union and Riverside Sts. further east, and connect with a potential hub along Main St. to allow travel elsewhere on the north side, as well as travel to the south side.

For the first possibility of establishing a terminal or transfer hub along Main St. close to the Westmorland St. Br. (see Figure 39), cost implications are difficult to estimate for the following reason. Depending on the progress of redevelopment and land acquisition, the City of Fredericton could negotiate to integrate a terminal with a site that will be developed by a land developer, similar to using Kings Place as a terminal. This could reduce the capital cost of building transit infrastructure. Regarding operating costs, since minimal route realignment is required (based on existing routing, which may be altered in later stages of this project), operating costs would likely remain consistent with current operating costs. Finally, regarding passenger convenience, unlike the 2008 Plan that proposed a shuttle connecting north side and Kings Place terminals, the conceptual routing proposed in this scenario would allow passengers travelling to the south side to continue through the terminal, while passengers needing to travel to the north side would exit and wait for the appropriate bus to continue their trip. As such, passengers traveling from north side to north side would require one transfer, while those continuing to the south side would transfer only if necessary as they do now at Kings Place.

When considering an east-west route along Main St., depending on further development across the north side, more substantial rerouting of transit routes would be required. As such, operating costs may again remain consistent with current operating costs depending on the actual route alignment of the Main St. route, route optimization of other routes. Capital costs again would include transfer infrastructure costs since transfers between an east-west Main St. route and other routes would need to be facilitated. Finally, regarding passenger convenience, a route along Main St. could likely result in a transfer pattern similar to scheme mentioned above, with south side-bound travellers from the north side requiring one or no transfer on the north side, depending on trip origin and bus route. North side-bound travellers from the north side would also require one or no transfer, depending on bus route and trip origin and destination. This discussion, unfortunately, is intentionally vague at this time because of future north side development, travel patterns may require route optimization and a detailed line-by-line analysis which is beyond the scope of this project.

To conclude, a north side hub is an important future element currently lacking in Fredericton Transit's network and it is recommended that SmartCentres (or similar) be explored in the medium-term as a possible solution, but only in the context of it being an interim solution until the redevelopment of Main St. occurs in the long-term. While travel patterns and low density and development do not support the need for a north side hub in the short-term, the perception of added travel time and inconvenience for the passengers traveling between north side destinations who are forced to travel to Kings Place is real. Furthermore, the saturation of Kings Place with all buses converging at a certain time, while useful for transferring, can contribute to noise and visual nuisances.

Fredericton Transit — Strategic Plan 2018

Potential north side hub

Figure 39 Concept for potential north side hub location.

In the short-term, designing and implementing a hub at either SmartCentres or Brookside Mall would not only incur capital costs for infrastructure, but require major re-routing, causing detours, passenger inconvenience and increased operating costs. In the longer term, depending on park-and-ride implementation, some routing changes may be required to serve a north side park-and-ride.

North Side Hub Recommendations (see below in Section 4.3 for more details)

In the short-term, travel patterns do not warrant investment in a dedicated hub or transfer station, given that 3-4% of trips on Fredericton Transit are within the north side. Acknowledging that current north-side-to-north-side travel on transit is not necessarily an accurate reflection of demand, it is recommended that as commuter flow data becomes available, Fredericton Transit evaluate it to determine if route changes are warranted. It is also recommended that Fredericton Transit work with the City of Fredericton and towns in the region to carry out a detailed origin-destination study across all modes to obtain a more detailed picture of travel to better plan routes. Onboard passenger counters would also allow better data collection to support system planning and realignment.

Fredericton Transit will need to identify a safe and accessible location where routes on the north side currently converge to provide a timed-transfer location. Ideally, this location would have good pedestrian access and be accessible to persons with disabilities, and include a shelter. Focus should be placed on locations such as SmartCentres which are destinations in their own right and might continue to evolve with increasing pedestrian activity. Operationally, buses would wait at this location, similar to the situation at Kings Place for passengers to transfer to between routes (ideally, from a southbound bus to a northbound bus).

In the medium-term, depending on the results of the origin-destination analysis and Fredericton Transit's exploration of an ideal north side timed transfer location, Fredericton Transit may proceed with implementing a north side hub. Fredericton Transit would need to revise schedules to facilitate this scheme and the impact of this arrangement on timed transfers at Kings Place would need to be evaluated as well. Additional operational costs for required running time would need to be factored in last well. It would be ideal for the north side hub location to be combined with a park-and-ride lot (see section below), as the two together would be better than the sum of the parts. Another medium-term strategy is the revision of a route to serve as an east-west alignment on the north side.

In the long-term, it is recommended for Fredericton Transit to study potential for a north side hub location along Main St., leveraging redevelopment and potential for re-routing bus routes. Given the tenuous nature of redevelopment plans, development of a north side hub and park-and-ride at the SmartCentres in the medium term may provide a convenient transfer location if Main St. redevelopment is delayed; a hub at SmartCentres may also serve as a sub-terminal, similar to Regent Mall currently. Other possible locations include the area around Worrall's Furniture (Maple St., between Ring Road and St. Mary's). Depending on the development plans implemented from the Growth Strategy, as well as whether a third bridge is constructed, a north side hub can help Fredericton ians living on the north side adopt more sustainable travel modes. And finally, creating a north side hub positions the city to be more resilient as it would create an established structure or component within the system from which to create free flow into the downtown, and therefore reduced congestion, in the event of future emergencies such as the floods that occurred in 2018. Given potential funding dollars for improving community resiliency, establishing a north side hub helps position Fredericton as a more prepared city.

Given the many unanswered questions, it is difficult for Stantec to provide any defensible capital cost estimates for the development of a north side hub with the current level of information. Based on working with properties of similar size and scale, we believe the capital cost for a new north side hub could range from $1-5 million or more depending on amenities, treatments and facility size. Accordingly, Stantec recommends that a detailed feasibility study be

undertaken to confirm these parameters which will provide greater confidence to the Fredericton for planning purposes.

4.3 PARK-AND-RIDE EVALUATION

Park-and-ride programs are important parts of multimodal transportation plans. Park-and-ride lots serviced by express or limited stop buses are an attractive alternative to single-occupancy vehicle travel. Park-and-ride services have proven to reduce traffic congestion caused by motorists cruising to find open parking spaces in downtowns. Parking shortages that result from construction projects or from converting streets to pedestrian ways can be mitigated by the establishing park-and-ride networks.

A park-and-ride service in Fredericton will most likely be used by workday commuters on their way to jobs in the City Centre. Since this type of service is focused on commuters, i.e. 9-to-5 shifts, peak hour travel is toward the downtown in the morning, and away from the downtown in the evening. As a result, dedicated commuter or express service from park-and-rides is generally expensive to provide because of the one-way demand. This one-way demand usually results in heavily used service in the peak direction, but empty buses (or trains) returning in the opposite direction for subsequent runs.

The City of Fredericton, however, faces an uphill battle enticing commuters onto transit even with the most robust park-and-ride strategy because of the abundant prevalence of below market priced parking in the downtown core. This difficulty is further exacerbated since both City and Provincial employees are provided free parking as an employment perk on a first-come, first-served basis.

Primer on Park-and-rides

Park-and-ride lots serve as a very visual presence of the availability of public transit service and an agency's commitment to providing service on an equitable basis. Providing transit service to commuters from outlying areas can help reduce congestion and mitigate harmful by-products of single-occupancy vehicles, not limited to greenhouse gas emissions and traffic accidents and fatalities.

Some desirable characteristics of successful park-and-ride include:

- Proximity to a major highway
- Easy entry and egress
- Low cost of acquiring or leasing land
- An ample, developed parking supply

A safe location meaning it is lighted, has considerable traffic in and out and is visible meaning that parked vehicles can be seen by passersby.

In nearby Saint John, Saint John Transit operates Comex, a bus rapid transit (BRT) commuter type service for outlying areas. Three different routes offer peak service in morning and afternoon rush hours, and the number of trips provided from the different lots depend on demand, so route 53 has only one AM trip toward the city and one return trip, while route 52 has three trips toward the city in the AM and two return trips. Comex service is express in that it only makes a few stops along its route, both at dedicated park-and-ride lots, as well as at locations that offer parking such as the tourist bureau, a Tim Hortons, and a church.

Comex service is priced at $4.00 for a one-way fare, but regular commuters can purchase a monthly pass for $125.00 that offers free transfers to regular transit service. Compared to cash fares of $2.75 and monthly pass of

$77.00 for regular service, Comex comes at price that could incentivize mode switching. Municipal parking in downtown Saint John is $2.00 an hour, and monthly rates range from $77.00 to $121.74, compared to $1.00 an hour, and ranging from $45.00 to $100.00 a month for parking in downtown Fredericton. Given that transit fares are similar between Fredericton ($2.75 cash, and $80.00 monthly) and Saint John, but that parking fees are different, suggests that successful park-and-rides require a coordinated transit and parking strategy.

Saint John Transit operates a larger fleet and provides nearly double the number of trips than Fredericton Transit. Furthermore, Comex routes span between 20 to 40 km in length, which are longer than likely routes for Fredericton Transit. While making direct comparisons between Saint John and Fredericton is difficult, a few key lessons from Comex can be applicable to Fredericton Transit and will be discussed later in the recommendations.

Analysis for Park-and-Rides in Fredericton

Given the peaked one-way demand, coupled with the costs of operating this service, in the Fredericton context, it would be prudent to design a park-and-ride/commuter service with the following concepts:

- In the short-term, operate park-and-rides along existing routes to minimize the costs of a dedicated route between park-and-rides and the central location (most likely Kings Place)
- In the medium-to-longer terms, depending on demand (such as buses with full loads leaving park-and-rides and thus passing by passengers along regular routes), dedicated limited-stop service between park-and-rides and downtown could be implemented
- Park-and-ride locations should be prioritized at locations with sufficient existing parking, removing or minimizing the infrastructural costs of acquiring land or constructing parking
- Locations should have good road access from highways and other high-capacity roads
- Locations should be at or near multi-use sites
- Locations should be far enough away from Kings Place such that people are incentivized to use transit rather than just drive the whole way

About a third of respondents to the online survey who identified as current transit riders agreed or strongly agreed that they would use transit more often if park-and-ride lots were provided (34%, 402 out of 1,166), while 47% of current non-riders (525 out of 1,124) agreed or strongly agreed that they would use public transit if park-and-ride lots were provided. Thus, appetite does exist for park-and-ride service, although more detailed public engagement would be required at a later time to more clearly articulate the vision, goals, and actions for park-and-ride service.

One potential unintended negative consequence to park-and-rides could be the encouragement of sprawl due to the availability of transit at the periphery of the city. Furthermore, the issue could arise that a substantial number of riders originate from outside of Fredericton, and other than with their fares, these riders do not subsidize transit with tax dollars—a sincere discussion with neighbouring jurisdictions would be needed to determine cost sharing schemes, or whether riders from outside of Fredericton would need to purchase a separate fare. This then raises the issue of the cost of the fare on routes from park-and-rides. If the routes are regular, local routes, making all stops, then the fare should be the same as other local routes, given the service levels. However, if it's a premium service, with limited stops, or delivered in an over the road motor coach vehicle, a higher fare is warranted. Whatever the fare scheme, Fredericton Transit could benefit in the form of additional ridership by allowing customers of park-and-ride services to also use local service to incentivize transit trips in the city, similar to Saint John Transit.

Some potential locations for park-and-rides are reviewed below. Ridership estimates are very rough and focus on population rather than detailed travel demand or travel patterns. Note that thorough costing for infrastructure, cost sharing agreements, detailed travel demand forecasting, etc., have not been carried out. The following serves to illustrate the potential locations, their strengths, and their drawbacks. It is then up to Fredericton Transit, the municipality, land owners, and other stakeholders to work out the details, which are beyond the scope of the current assignment.

Please see Table 6 for evaluation details.

4.3.1 North Side Park-and-Ride

As discussed previously, in the short-term (0-2 years), a north side hub is unnecessary and likely to increase operating costs for Fredericton Transit and increase customer inconvenience. Regarding a dedicated park-and-ride for the north side, the most likely candidate is the SmartCentres (Figure 40). With ~1,000 parking stalls, potential park-and-ride users could drive to this location and take a 15S toward Kings Place, as well as shop at stores like Canadian Tire and Walmart. This bus trip between SmartCentre and Kings Place takes an estimated 10 minutes (without traffic).

Fredericton Transit — Strategic Plan 2018
Potential north side park-and-ride

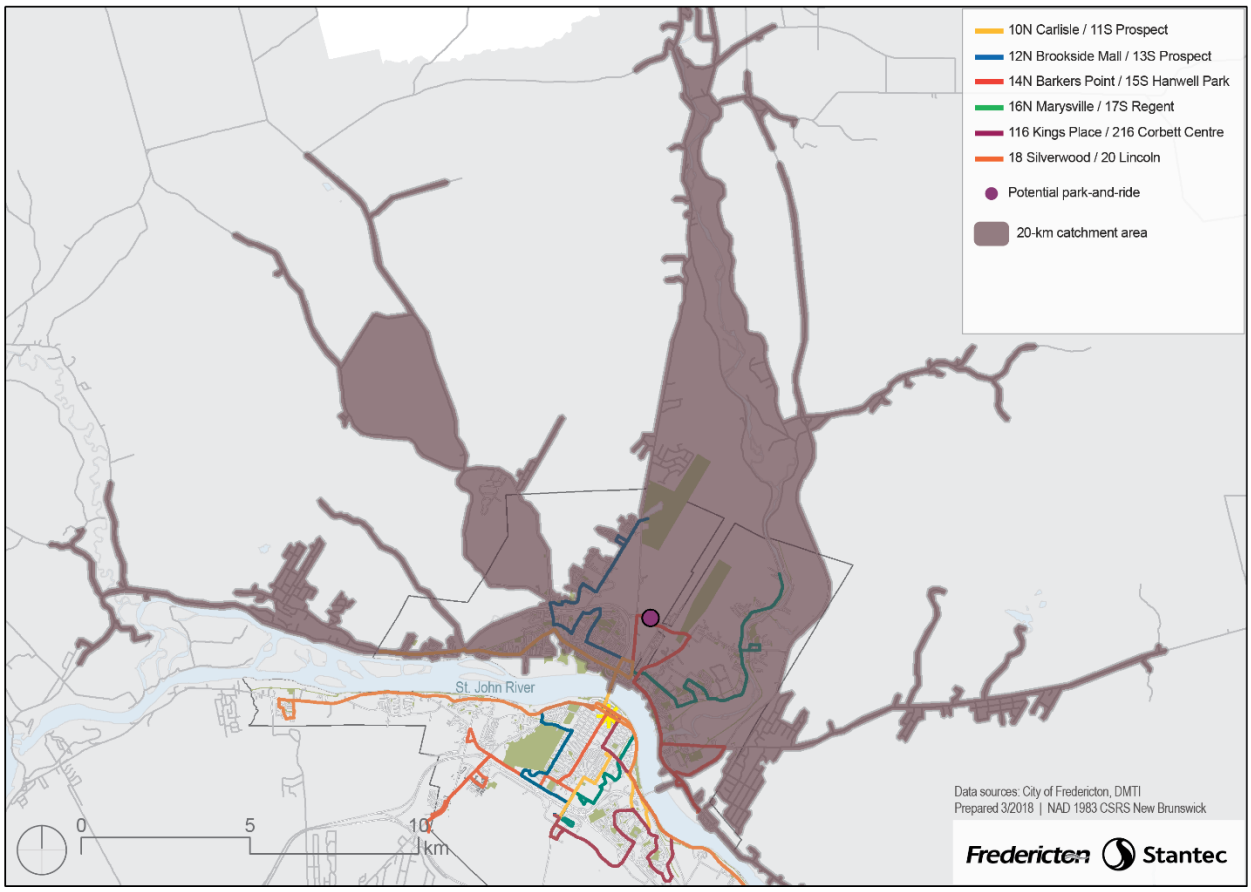


Figure 40 Potential north side park-and-ride at SmartCentres North.

Purple dot is potential park-and-ride location at SmartCentres North. Yellow asterisk is Kings Place. Dark shading is 20 km driving coverage from the purple dot.

4.3.2 South Side Park-and-Rides

Similar to the discussion above regarding a park-and-ride on the north side of Fredericton, potential locations on the south side of Fredericton include locations with existing parking and transit service. These locations include Regent Mall, Corbett Centre, Kingswood Entertainment Centre.

Regent Mall Park-and-Ride

The Regent Mall has a large surface parking lot and is served by routes 116/216, 10N/11S, 12N/13S, and 16N/17S. It also provides shopping opportunities. It is noted, however, that there will likely be a land lease and/or acquisition and construction cost incurred for a park-and-ride at Regent Mall and similar locations. Moreover, Regent Mall may be loath to give up parking space to non-shopping parkers, as the lot tends to fill up at certain times of the year such as over Christmas.

Corbett Centre Park-and-Ride

The Corbett Centre, located nearby to the Regent Mall, is a recently developed shopping mall, and is also directly across from Knowledge Park, a large employment centre (Figure 41). The Corbett Centre also has a large surface parking lot, and is current served by routes 116/216, 10N/11S, and 16N/17S.

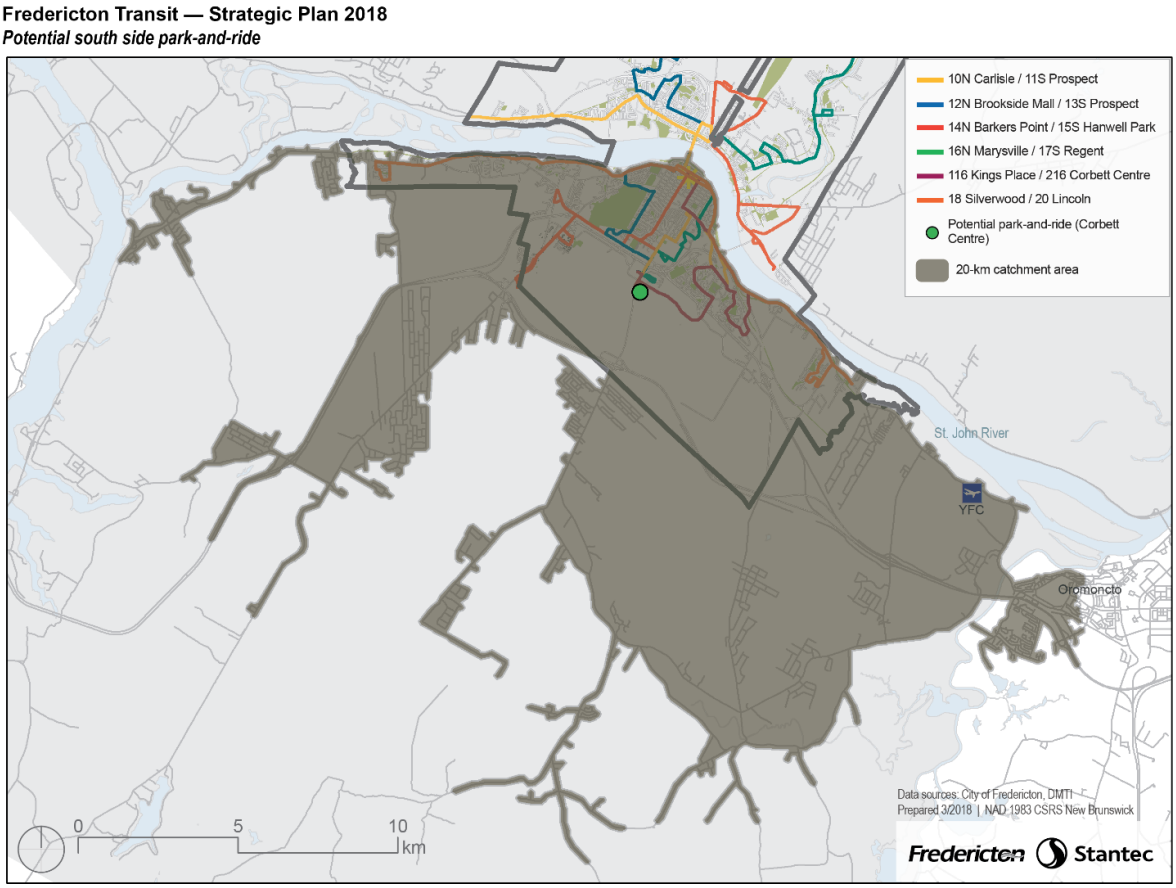


Figure 41 Potential south side park-and-ride location at Corbett Centre.

Green dot is potential park-and-ride location at Corbett Centre. Yellow asterisk is Kings Place. Dark shading is 20 km driving coverage from the green dot.

Kingswood Entertainment Centre Park-and-Ride

Located just beyond the city boundaries, Kingswood Entertainment Centre is served by routes 14N/15S (Figure 42). Kingswood is home to a golf course and other recreational facilities.

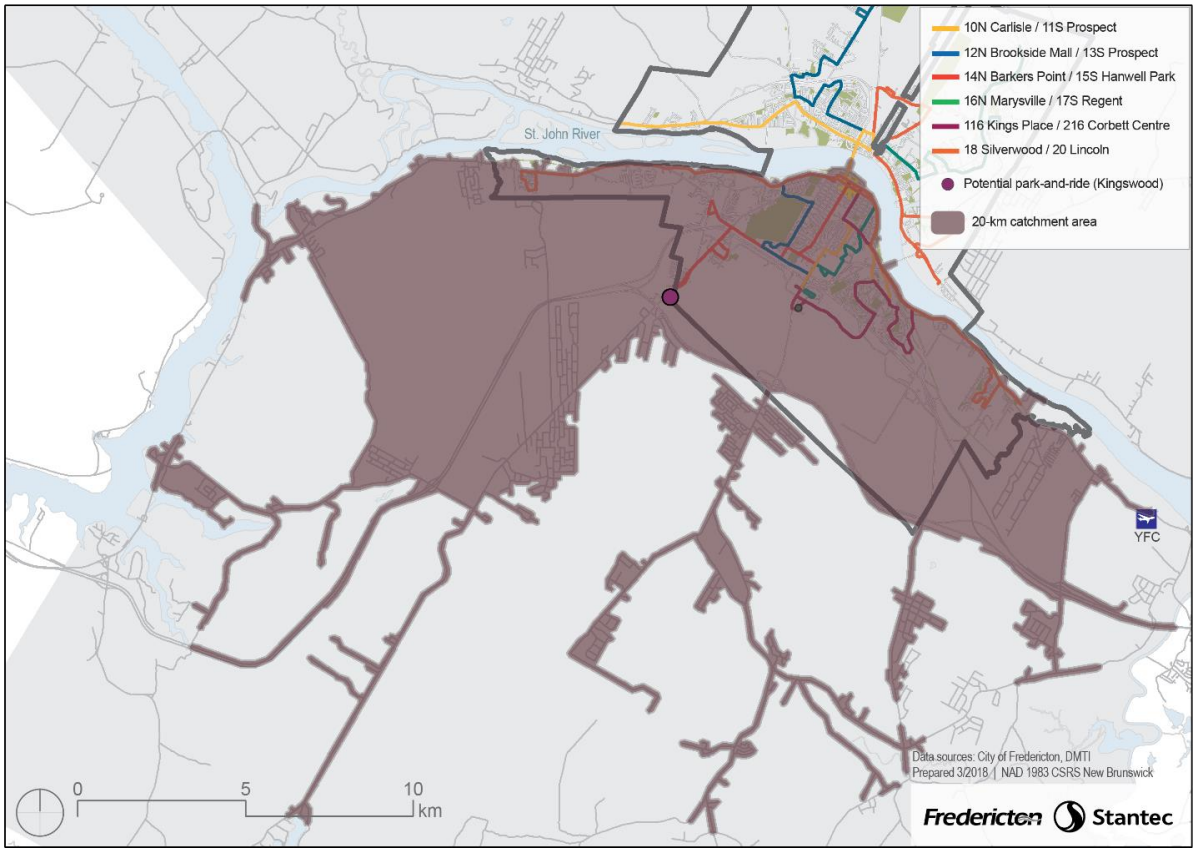


Figure 42 Potential south side park-and-ride at Kingswood.

Purple dot is potential park-and-ride location at Kingswood. Yellow asterisk is Kings Place. Dark shading is 20 km driving coverage from the purple dot.

Fredericton Airport (YFC) Park-and-Ride

While technically outside of the municipal borders of the City of Fredericton, the Fredericton International Airport (YFC) is in Lincoln, a small unincorporated suburb roughly 15 km east of the City, and only about 7 km west of Oromocto, a nearby town with a population of about 9,200. In addition to the Airport serving as a trip generator, the location also houses a flight school (solely for Chinese student training, a satellite campus of the Moncton Flight College) with an estimated 200 students and 80 staff, including a substantial portion living on-site. Given the Airport's proximity to Oromocto, the flight school's population, and the Airport's limited service by taxi, the Fredericton Airport could serve as a park-and-ride location. Management at the Airport has expressed an interest in constructing a park-and-ride lot for Fredericton Transit's use to build the case of extending fixed route transit service to the Airport. Furthermore, given the low productivity of route 20 (Lincoln) at present, establishing a park-and-ride, in conjunction with service to the Airport could improve productivity of the service (Figure 43).

As a discrete question in the online survey, respondents were asked to state their level of agreement with the statement that they would "use transit if Fredericton Transit operated buses to and from the Fredericton International Airport". Roughly 57% of current riders (666 out of 1,167) and 62% of non-riders (711 of 1,145) indicated that they agree or strongly agree with the statement, suggesting that airport service combined with a park-and-ride lot could be

successful at providing service to multiple (likely overlapping) markets (travelers to/from the airport, and commuters east of the City). Moreover, the business case of service to the Airport is strengthened if the cost of this service extension as well as new infrastructure development costs are not borne, or are only partially borne, directly by the taxpayers of Fredericton. Building on the positive and encouraging momentum established by this project, we recommend that Fredericton Transit continue discussions with the Airport and Flight College on strategies to extend service to the airport area which are mutually beneficial to all parties. The strategies will need to consider several challenges, including how to best balance the travel needs of commuters into Fredericton, employees at YFC, and flight passengers, especially considering that services that try to be everything to everyone often tend to be ineffective and inefficient. Once the target market(s) are identified it will be important to then evaluate scheduling, especially regarding the extent to which it may be feasible and appropriate to synchronize with flight schedules, as well as evaluate what vehicle size and specifications are most desirable for this unique service offering. Due to the additional nuances associated with this type of service, the YFC park-and-ride is better thought of as a medium or long-term recommendation.

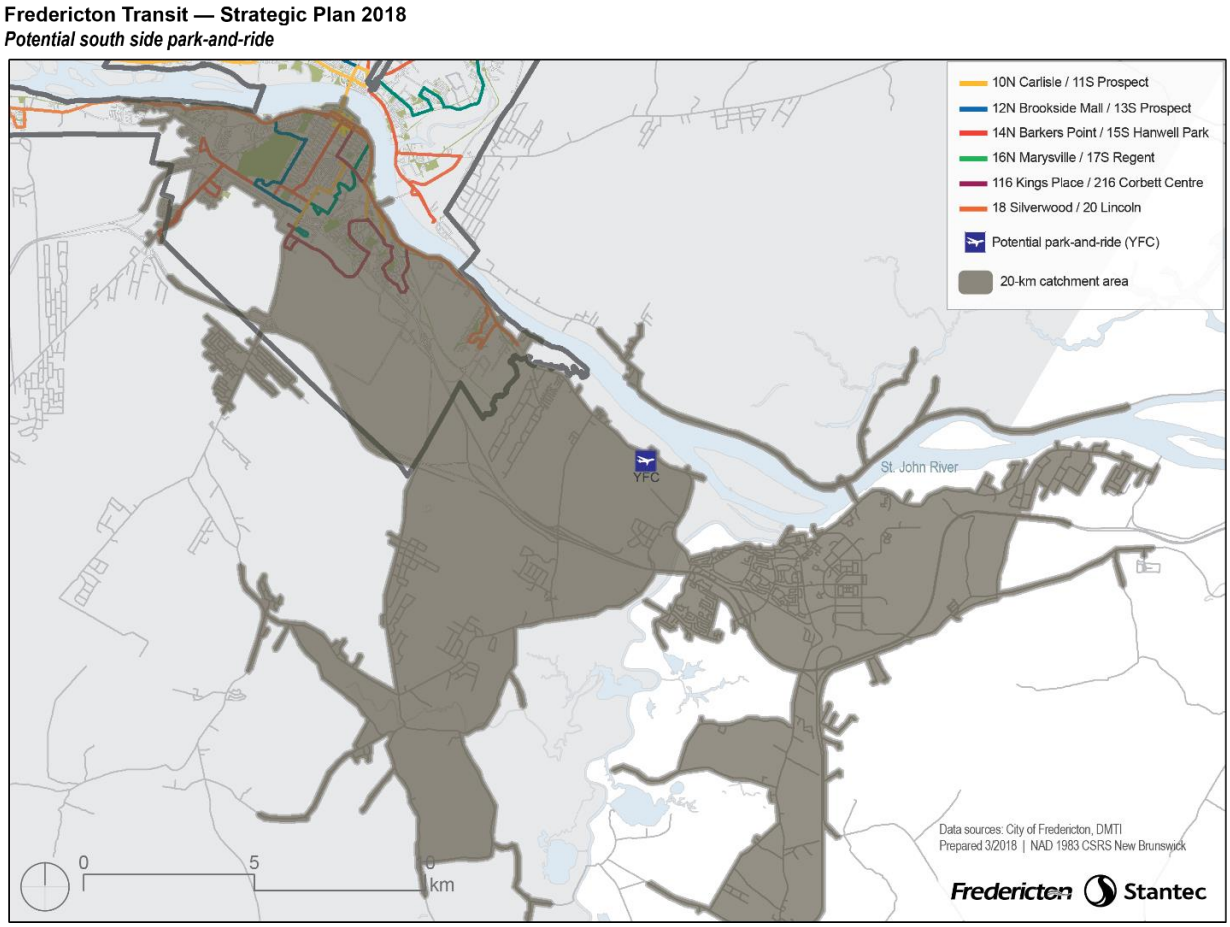


Figure 43 Potential south side park-and-ride at the Fredericton Airport.

Airport symbol is potential park-and-ride location at Fredericton Airport (YFC). Yellow asterisk is Kings Place. Dark shading is 20 km driving coverage from the Airport.

Table 6 Evaluation of park-and-ride lots.

Potential Location	Potential Drawbacks	Potential Advantages	Other	Estimated Ridership[15]
SmartCentres	• Building passenger amenities, like a shelter, benches, potentially next-arrival information • Negotiating with SmartCentres for parking use	• Large catchment area • Existing bus service • Shopping for passenger convenience • Access from Route 148 (St. Mary's) • Proven uptake of a northside park-and-ride during 2018 flood from communities such as Penniac, Noonan, and Pepper Creek	• Limited catchment outside of the city (for a 20-km radius) • Could investigate in the long-term, if ridership greatly increases, having a reserved bus lane along the Westmorland St. Bridge (southbound in the AM peak, and northbound in the PM peak)	• Total population of outlying communities on the north side, including parts of Douglas, Saint Marys, and Maugerville: 10,639. • Working age population (15 to 64): 7,215 • Estimated annual transit trips: 36,000
Regent Mall	• Traffic along Regent St. at peak hours could slow bus access to and egress from the Mall and Regent St. • Negotiating with Regent Mall for parking use • Building passenger amenities, like a shelter, benches, potentially next-arrival information • The three routes currently serving the Mall provide very indirect service to downtown/Kings Place	• Route 16N provides access to key destinations, including Knowledge Park, the hospital, UNB, STU, and Kings Place • Large catchment area (similar to Corbett Centre shown in the map below) • Good access from Vanier Highway (Route 7) • Shopping for passenger convenience	• Large catchment outside of the city (for a 20-km radius)	Same as Corbett Centre below
Corbett Centre	• Traffic along Regent St./New Maryland Highway at peak hours could slow bus access to and egress from the Corbett Centre and Regent St./New Maryland Highway • Negotiating with Corbett Centre for parking use • Building passenger amenities, like a shelter,	• Route 16N provides access to key destinations, including Knowledge Park, the hospital, UNB, STU, and Kings Place • Large catchment area (map below) • Good access from Vanier Highway (route 7)	• Large catchment outside of the city (for a 20-km radius), though would not provide additional catchment beyond what would be provided with a Regent Mall park-and-ride	• Total population of outlying communities on the north side, including parts of New Maryland, Oromocto, and Hanwell: 28,720. • Working age population (15 to 64): 19,490 • Estimated annual transit trips: 97,000

[15] Assumes 2 trips a day (250 days) per working age person, at a transit mode share of 2%, also discounted for 50% to include unemployment and commuting trips not destined for Fredericton. Note population is estimated from dissemination area population and excludes population within the City of Fredericton.

Potential Location	Potential Drawbacks	Potential Advantages	Other	Estimated Ridership[15]
	benches, potentially next-arrival information • Two routes currently serving the Corbett Centre provide very indirect service to downtown/Kings Place	• Shopping for passenger convenience		
Kingswood	• Traffic along Hanwell Rd. at peak hours could slow bus access to and egress from Kingswood and Hanwell Rd. • Of the three potential south side locations, Kingswood has the smallest parking lot with increasing demands for parking • Negotiating with Kingswood for parking use • Building passenger amenities, like a shelter, benches, potentially next-arrival information • Only one route serves Kingswood, and provides a circuitous path to Kings Place without access to key destinations en route	• Provides close access to peripheral community of Hanwell • Recreational opportunities for passengers • Good access from the Trans-Canada Highway	• Smaller population catchment outside of the city (for a 20-km radius)	• Total population of outlying communities on the north side, including parts of New Maryland and Hanwell: 23,345. • Working age population (15 to 64): 15,925 • Estimated annual transit trips: 79,000
YFC	• Located outside of City of Fredericton requiring negotiations between Lincoln and the City of Fredericton	• Land available to develop a dedicated parking area for Park and RideLarge transit markets at certain hours, particularly for flight arrivals/departures, as well as shift start and end times • Close to Oromocto enabling park-and-ride from Oromocto with service to downtown Fredericton	• Potential for park-and-ride at Airport with service from modified Lincoln route • Potential for dedicated bus service to/from park-and-ride, with subsidy from Airport or flight school • Potential for EcoPass program with minimum guaranteed ridership and corresponding cost recovery to Airport and flight school in exchange for guaranteed service levels	• Total population of outlying communities on the north side, including parts of Oromocto and New Maryland: 25,035. • Working age population (15 to 64): 17,220 • Estimated annual transit trips: 86,000 (*not including flight college or airport*)

Recommendations for park-and-ride strategy

- Promote use of fixed route as park-and-ride option by establishing relationships as pilots and/or with permanent agreements with landowners such as Walmart north side and Regent Mall or Corbett Centre south side.

- Conduct stakeholder negotiations with ownership of malls for use of parking.

- Contact Saint John Transit and ask for their feedback and lessons learned from establishing a park-and-ride system. What worked and what didn't work? Past experience and lessons learned can help avoid future errors in the Fredericton context. Based on previous experience in the US context around Washington, DC, Stantec noted that one of the biggest challenges were communicating the available parking spaces available at park-and-rides through dynamic signage, to ensure that customers did not arrive to find a full lot with no available spaces. The other challenge is the ownership and maintenance of the park-and-rides. Ensuring that the financial burden is not entirely borne by the transit authority is important. If a third-party owns the lots and charges for parking, this may discourage customers from using the lot and the service.

- Analyze key indicators before pilot
  - Measure boardings and alightings on each route from the selected locations at appropriate service times (AM peak and PM peak)
  - Measure travel times and dwell times
  - Measure parking occupancy in selected parking lots

- Set reasonable targets for the above indicators

- Pilot park-and-rides at locations that already receive transit service with existing parking lots, like the SmartCentres, Corbett Centre and Regent Mall.

- Analyze key indicators after pilot relative to targets (adjust if necessary)
  - Measure boardings and alightings
  - Measure travel times and dwell times
  - Measure parking occupancy in selected parking lots. Are patrons of the malls unable to find parking?
  - Observe changes in ridership? Does it require more buses, i.e., are buses already full when they reach the park-and-ride location (depending on route and alignment)?
  - If yes, conduct further analysis to determine whether express route (i.e. non-stop between park-and-ride and downtown, maybe one or two additional stops) is feasible: evaluate forecasted ridership and operating and capital costs (more drivers, more buses, etc.)
  - If demand is sufficient and mall ownership is collaborative, issue RFP for design and construction for amenities, like shelters, etc.
  - Lobby for funding from province and Government of Canada

- Study feasibility of providing new dedicated lots and park-and-ride services at the City's periphery in the longer term, such as the airport and Moncton Flight College:
  - Determine trip/travel patterns
  - Could current Lincoln route be extended? Intermunicipal agreement? Funding from province?

Park-and-ride lots, depending on the success of the pilot and additional demand, could be expanded to new locations. Working together with neighbouring municipalities, dedicated park-and-ride services could be established further away from Fredericton and offer direct express service to the City, similar to Comex in Saint John. With funding from provincial and federal governments together with dedicated fares and revised parking fees in the City, park-and-rides could help reduce congestion in the City Centre. Given the impacts on downtown parking associated

with bedroom communities whose residents commute in to the City Centre for work, such expansion should be done with funding and other contributions (i.e. land) provided by neighbouring communities and should not be borne fully by the City or Fredericton Transit.

Based on Stantec's past experience, we note the following when designing and implementing park-and-ride service:

- Formal agreements are preferable to 'handshake agreements' for use of parking lots. Having clear agreements between the transit agency and mall ownership can help avoid ambiguity when conflicts arise, such as wear and tear on infrastructure, trash generated by transit riders, etc.

- Relatedly, parking spaces for use by transit riders should be underutilized spaces so that primary use of the parking lot remains for mall customers and can persuade the mall administration during negotiations.

- Providing passenger amenities, including shelters, benches, refuse bins, as well as pedestrian infrastructure connecting lots to the bus stop are all important considerations, particularly at lots with high demand.

- Signage for directions to park-and-ride lots, as well as advertising lots, can be incorporated along highways as well as at park-and-ride lots, such as at the church in the photo below from Comex (Figure 44).

Figure 44 Advertisement for Comex park-and-ride lot.

Source: quispamsis.ca

- Online advertisement through social media and governmental websites are inexpensive methods for advertising and promoting park-and-ride service.

- Employer subsidized pass could help convert drivers to transit riders on commuter services, such as the discounted monthly passes offered by Saint John Transit for Comex, as well as regular transit service.

- On-street and indoor parking offered by the City of Fredericton should be priced so that park-and-ride service is a viable alternative, rather than as more expensive alternative to driving.

- Engage private developers. Rather than anticipate that the public will go to Fredericton Transit Park-and-Ride lots, why not put the lots where people are already going? Stantec has successfully planned and implemented park-and-ride programs with the assistance of private developers, shopping malls owners and operators and not for profit organizations such as churches that have underutilized parking supplies during the week. The benefit of developing park-and-ride facilities under Public Private Partnerships is that the transit partner does not have to spend capital funds on the development of the facility nor does it have to spend operating dollars to maintain the location.

4.4 SUNDAY SERVICE EVALUATION

While most businesses and other activities were historically closed on Sundays and holidays, nowadays, most businesses are open on Sundays and some holidays, and as such, their employees and patrons need to reach these destinations. Transit service, reflective of travel and activity patterns, was also typically suspended on Sundays and holidays. Presently, the lack of Sunday transit service is now seen as a hindrance in communities where employees need to reach work on Sundays, and citizens without cars need to travel on Sundays.

Weekend service, together with later service on weekdays, is costly to provide. Put simply, operating more revenue hours requires more labour and other related expenses. But providing service on weekends also provides freedom and flexibility of travel, particularly for residents without other ways to travel. Taken together, the case of added service, whether on weekends or holidays, or later into the evening, needs to consider additional costs, potential demand or ridership, as well as potential external costs and benefits. Furthermore, considering alternatives to fixed-route service for these typically lower demand periods is also important.

Part of Stantec's mandate regarding Fredericton Transit's new Strategic Plan is to investigate the feasibility of Sunday service. This report section details some of the background of Sunday service, explains the methodology, and provides results of a high-level financial analysis of potential Sunday service scenarios. The final decision of Sunday service of course rests with the community—there is no doubt that Sunday service will add costs to the City, likely with modest ridership. But if the community values mobility and accepts the additional costs, then Fredericton Transit should consider moving forward with Sunday service. Stantec also notes that the implementation of Sunday service may strengthen the business case to increase senior concession fares from their present price of $50 per year. The premise is that seniors, most of whom are retired, need to travel Sunday as much as they do on any other day of the week, and an improved ability for Fredericton Transit to meet their travel needs can be reflected in increased concession fares as recommended elsewhere in this report.

Background

Sunday service, as well as service on public holidays, is becoming more prevalent across transit providers in smaller communities. While the reasons are diverse, one major driving force for Sunday service is the simple fact that businesses are largely open on Sundays. As a result, Sunday is a day when many people travel to shop at big box stores, travel to work at operating businesses, as well as travel for recreational purposes.

A quick survey of the peer group discussed in Section 1.4 revealed that all offer Sunday and some holiday service. A few commonalities stick out, including:

- Reduced service hours compared to weekdays and Saturday, typically starting around 8-9 a.m., and ending around 7-8 p.m.

- Operating fewer routes. For example, Lethbridge operates 12 of 15 regular routes. However, many of the peers operate all routes.

- Most peers offer Sunday service and holiday service. Codiac Transpo (Moncton) does not operate on holidays, while Kingston Transit operates on most holidays except New Year's Day, Good Friday and Christmas Day.

- Reduced frequency on most routes, typically 30-minute to 1-hour headways, varying by route.

The purpose of this report section is to assess the costs of Sunday service for Fredericton Transit. Using the points above as guidance, tempered by local conditions and stakeholder feedback, we analyzed five distinct alternatives described further below.

Methodology

All data and assumptions (such as operating costs per revenue hour, ridership, etc.) are from CUTA Fact Book 2016 or Fredericton Transit, unless specified otherwise.

Alternative 1: Implement Saturday Schedule on Sunday

The first alternative we analyzed was operating Sunday service based on Fredericton Transit's current Saturday service schedule. Saturday service currently operates all routes except 18 and 20, from approximately 6:45 am until 11 pm (Figure 45).

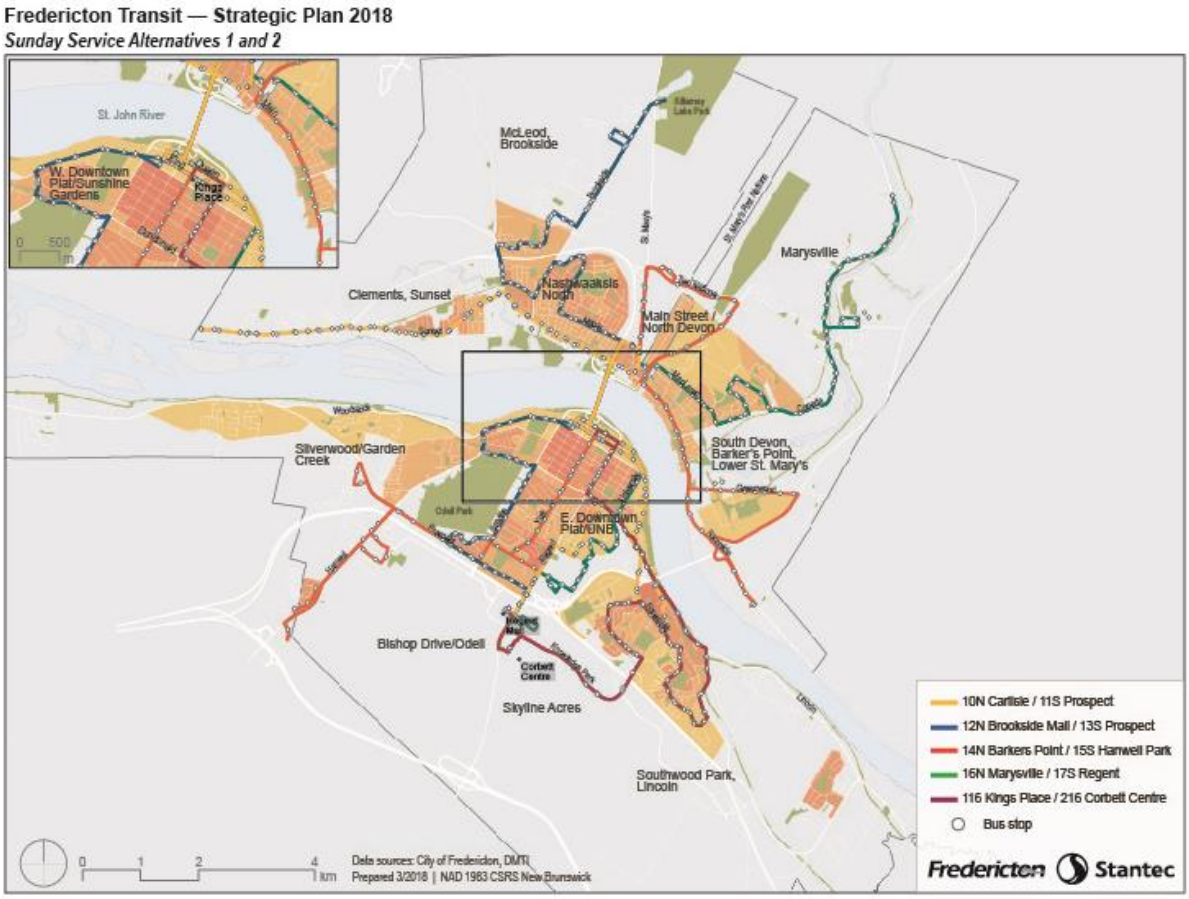


Figure 45 Sunday service concept for alternatives 1 and 2.

Alternative 2: Implement Saturday Schedule at a Reduced Service Span

The second alternative considers shortened revenue or operating hours, similar to the Sunday service offered by most peers (Figure 45). We used the current Saturday schedules, but reduced the hours so that first departure is between 8:30-9 am, while the last departure is between 7-7:30 pm. We used the current Saturday schedule for simplicity and to minimize modifications from the current schedule. Furthermore, the operating hours aim to reflect Sunday business hours. For example, most stores in Regent Mall, as well as the stores at the Corbett Centre operate from 12 – 5 pm. Later starts of Sunday service are common, and 8-9 am is reasonable. Last departures are harder to define, but last departures after 7 pm should allow enough time for employees working at these stores to finish shifts ending at 5 pm or later.

Alternative 3a: Busiest Routes Only

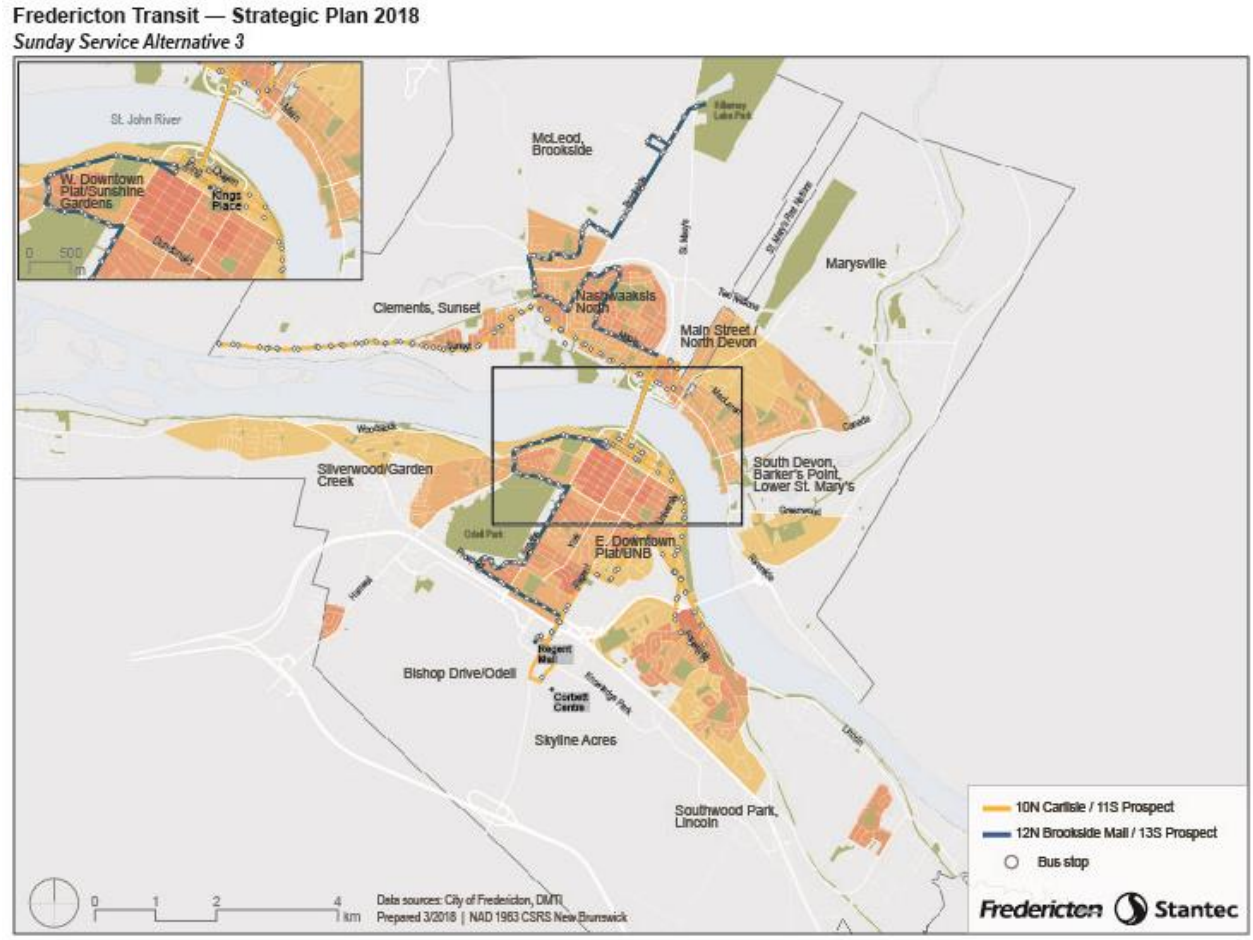


Figure 46 Sunday service concept for alternatives 3a and 3b.

The third alternative is to operate only the two most popular routes of the system, 10N/11S and 12N/13S (Figure 46). These routes see the highest ridership of all routes on Saturdays (average daily boardings, 10N/11S – 687, and 12N/13S – 631) and weekdays (average daily boardings, 10N/11S – 1,501, and 12N/13S – 1,110). These routes would operate on the same schedule as they currently operate on Saturdays, with 1-hour headways. These routes serve key destinations, including the Brookside Mall on the north side, Kings Place, Regent Mall and Corbett Centre.

Furthermore, route 10N/11S serves the universities (service on Windsor St.), and the Hospital. Some of the densest neighbourhoods, such as Forest Hill, are also served.

Alternative 3b: Busiest Routes Only and at a Reduced Service Span

Alternative 3b is a minor variant of alternative 3a. This alternative would see routes 10N/11S and 12N/13S operate, but on a shorter schedule, similar to the abbreviated schedule for alternative 2. This would have the advantage of focusing on productive, highly used routes, but providing service hours reflective of Sunday business operating hours.

Alternative 4a: Maximum Geographic Coverage for Minimum Cost

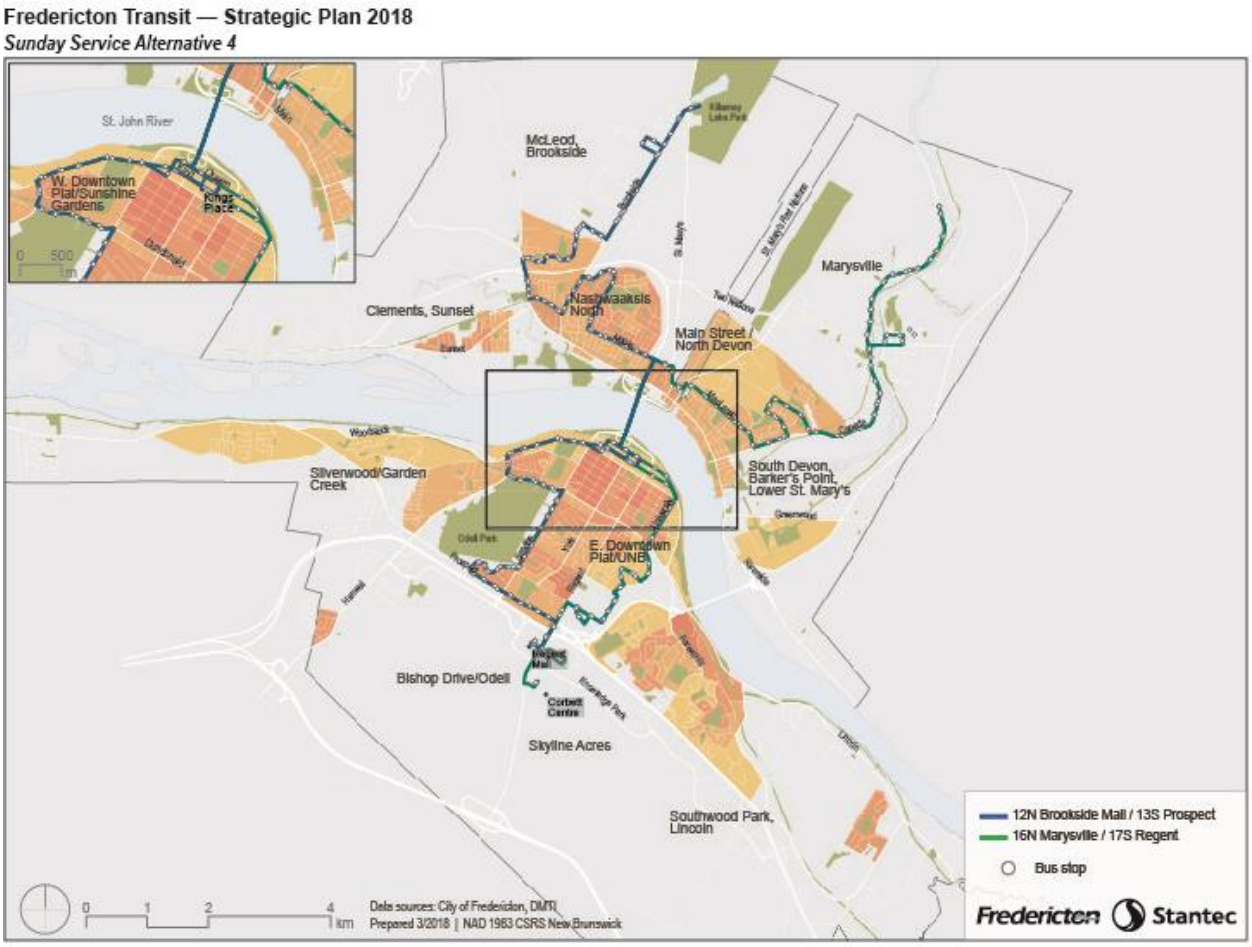


Figure 47 Sunday service concept for alternatives 4a and 4b.

The fourth alternative follows the idea of operating fewer routes or a 'skeletal' network on Sunday, but focused on 'coverage' (Figure 47). While alternatives 3a and 3b propose operating the two routes with the greatest ridership, alternatives 4a and 4b (see below) propose operating two routes aimed at providing the most geographic coverage of the city.[16] Alternatives 3a and 3b leave the northeastern section of the north side of the city without service. As such, alternatives 4a and 4b propose operating service along routes 12N/13S, and routes 16N/17S (average daily ridership, 585 on Saturday, and 1,012 on weekdays) to deliver service to Marysville, Devon, and Youngs Crossing/Canada Street. While major destinations are served by these routes (Kings Place, Regent Mall, Corbett Centre, UNB, STU,

[16] Population coverage of alternatives 3 and 4 are very similar, at 55% and 53% of the population, respectively.

and Brookside Mall), a major drawback of this alternative is the lack of service to the dense Forest Hill neighbourhood, where there resides a large student population. Alternative 4a proposes Sunday service mimicking Saturday schedule for these routes.

Alternative 4b: Maximum Geographic Coverage for Minimum Cost, at a Reduced Service Span

Alternative 4b proposes operating routes as in alternative 4a, but on a shortened schedule reflective of Sunday business operating hours.

Alternative 5: On-Demand Solution

The fifth alternative proposes operating service entirely in an on-demand fashion, operating in a door-to-door manner similar to the specialized transit service. Riders would pre-arrange trips through the current phone booking system, and trips would be delivered with specialized transit vehicles. The advantage of this alternative is that it offers full service area coverage as well as flexibility on when to travel, but it comes with the risk that it could potentially be very costly and/or Fredericton Transit will become overwhelmed with trip requests and have to start denying trips, thereby resulting in an unreliable service.

In the above scenarios, given the relatively high-level nature of this assessment, we note the following caveats:

- The routes have been assumed to run in their entirety, or more specifically, based on Saturday schedule.[17] Given actual demand, piloted Sunday service may benefit from shortened alignments, deleting portions of routes that serve very low-density areas. Piloting full route alignments and gathering boarding and alighting data by stop would help identify where to truncate routes.

  If it makes sense to truncate routes, this will need to be effectively communicated to Fredericton Transit riders. Many transit agencies opt to include an 'S' after the route number to indicate a short turn, however as Fredericton Transit already includes letters after its route numbers, including an 'S' to indicate 'South', a different strategy will be required unless Fredericton Transit desires to overhaul its route naming conventions. If truncating routes is deemed an appropriate Sunday service delivery strategy, it will also be important to evaluate the implications on operations. Depending on the percentage of the full alignment that is truncated, it may be prudent to revise service frequencies or interline routes in a different fashion, such as to avoid excessively long unproductive layover time at Kings Place.

- Similarly, for simplicity, we haven't considered modifying routes by combining portions of one route with another. For instance, in both alternatives 3 and 4, there is no service to the Fredericton North SmartCentres, which is open for business on Sundays. In alternative 4, shortening routes 16N/17S, for example, could allow for an alternate alignment serving the SmartCentres. Such strategies may also help alleviate the operational challenges that are presented by truncating routes as described above. While these route modifications are not captured here, the analysis below looks at revenue or service hours, and thus shortening part of a route and adding another portion would result in comparable revenue hours.

- Our analysis does not account for other potential recommendations in this study, such as efficiencies that may (or may not) be gained from a north side hub, for instance.

Results

Before providing costing results, we describe a few key assumptions and inputs.

[17] For Saturday service, first trips of many of the routes do not run the full alignment, and neither do the last trips.

First is the coverage provided by the different alternatives. By coverage we are referring simply to population within the service area and the extent to which they are served by transit. Table 7 provides results of the service coverage analysis.

Table 7 Sunday service alternatives and service coverage.

Alternative	Distance from operating bus stops (metres)	Service coverage
1	400	66%
2	400	66%
3a and 3b	800	55%
4a and 4b	800	53%
5	NA	100%

For alternative 1, coverage is the same as for a typical Saturday, meaning that except for residents in Lincoln and Silverwood, the rest of the city sees coverage similar to weekdays.[18] The same is true for alternative 2. For alternatives 3 and 4, where only two routes operate, we used a larger catchment area around bus stops—800-metres instead of the usual 400-metres. This is consistent with the practice of other transit properties with reduced Sunday service that modify their service standards for Sunday service, under the reasonable assumption that residents will walk further when fewer routes are operating. In alternatives 3 and 4, 55% and 53% of the population sees transit service, the major difference between alternatives 3 and 4 being the *geographic* range of coverage of the transit service. Alternatives 4a and 4b provide coverage to the eastern neighbourhoods on the north side of Fredericton, which are less dense than the areas covered by routes 10N/11S, resulting in a slightly lower population coverage. As such, ridership predictions for alternatives 3 and 4 (see below) are within 10% of each other, with the major differences being the neighbourhoods and thus the markets that would be served.

Finally, alternative 5 covers 100% of the population due to its on-demand nature, although it could be difficult to administer due to limited staff capacity, and it is more difficult to predict how efficiently it will operate.

Second, a sense of predicted Sunday ridership is warranted. Already, system-wide ridership on Saturdays is only slightly more than half of average weekday ridership, but this loss is not equal across routes (Table 8). It is likely that demand for transit service on Sundays would be even less than for Saturdays.

[18] Weekday coverage including service on routes 18 and 20 cover ~73% of the population.

Table 8 Current weekday and Saturday ridership (2016).

Route	Avg. weekday ridership	Avg. Saturday ridership	Drop in ridership
10N/11A	1,501	687	54%
12N/13S	1,110	631	43%
14N/15S	706	337	52%
16N/17S	1,012	585	42%
116/216	437	271	38%
Total	4,766	2,510	47%

While CUTA does not report average ridership by day, to get a sense of Sunday ridership, we looked to Greater Portland METRO,[19] a bus agency with an annual ridership of about 1.8 million, serving a population of 67,000 in Southern Maine. On an average weekday, over 6,000 trips are taken on Portland METRO, while this number drops to about 3,300 trips on Saturday. This represents a 46% drop, comparable to the 47% drop in ridership experienced by Fredericton Transit from weekdays to Saturdays as shown above in Table 8. Portland METRO's average Sunday ridership is about 1,400, representing a 78% drop from weekdays, and 57% from Saturdays. Using Portland METRO as a proxy, it can be expected that average Sunday ridership would result in about 1,000 trips for Fredericton Transit.

Table 9 summarizes these assumptions and data.

[19] Data from NTD 2016, Service spreadsheet. Greater Portland METRO operates all routes on Sunday from approximately 8:30 am until 9 pm. Most operating routes offer one-hour headways. Sunday service offered on some holidays.

Table 9 Peer comparison with Portland METRO and Sunday ridership estimate.

	Fredericton Transit	Portland METRO
Population	58,220	67,067
Annual ridership	1,375,000	1,810,825
Avg weekday ridership	4,802*	6,112
Avg Saturday ridership	2,510	3,294
Drop in Saturday ridership	*47%*	*46%*
Avg. Sunday ridership	NA	1,430
Drop in Sunday ridership	*NA*	*77%*
Predicted Sunday ridership based on 77% loss from weekday	1,089	--

*Includes marginal ridership from routes 18 and 20.

Based on operating costs from CUTA and service hours, we have estimate the following high-level costs for Sunday service. The values in Table 10 show annual amounts (unless noted otherwise). Please note that these costs are conservative estimates for *operating* costs only, and do not include costs related to marketing or other auxiliary elements.

Table 10 Sunday service alternatives analysis.

	Alternative 1	Alternative 2	Alternative 3a	Alternative 3b[a]	Alternative 4a	Alternative 4b[a]	Alternative 5
Description	Saturday schedule	Saturday schedule, shorter service span	Busiest routes only	Busiest routes only, shorter service span	Maximum geographic coverage	Maximum geographic coverage, shorter service span	On-demand
Pros	All routes operating	All routes operating Lower costs	Popular routes Lower costs	Popular routes Lower costs	Broader geographic coverage Lower costs	Broader geographic coverage Lower costs	Door-to-door
Cons	Expensive to operate	Expensive to operate Shorter hours	Limited service coverage	Limited service coverage Shorter hours	Limited service coverage	Limited service coverage Shorter hours	Limited Para Transit fleet Expensive to operate
Total routes	5 (or 10)	5 (or 10)	2 (or 4)	2 (or 4)	2 (or 4)	2 (or 4)	0
Total revenue hours (per Sunday)	128.38	89.28	58.57	40.15	56.48	39.05	Difficult to define
Population coverage	66%	66%	55%	55%	53%	53%	100%

	Alternative 1	Alternative 2	Alternative 3a	Alternative 3b[a]	Alternative 4a	Alternative 4b[a]	Alternative 5
Est. Sunday ridership	1,089	915	572	481	528	443	1,089
Est. fare revenue[b]	$65,148	$54,724	$34,216	$28.741	$31,555	$26,506	$65,148
Est. annual cost[c]	$534,075	$371,419	$243,637	$167,024	$234,971	$162,448	$1,138,051
Cost as a percent of current operating costs[d]	11%	7%	5%	4%	5%	4%	25%
Farebox recovery ratio (of Sunday service)	12%	15%	14%	17%	13%	16%	6%

[a] For alternatives with shorter operating hours, 16% loss was used to discount ridership based on online survey results from time of day ridership use.

[b] Fare revenue was estimated using average fare ($1.15) from 2016 CUTA Fact Book multiplied by estimated ridership and 52 Sundays in one year.

[c] Annual operating costs were estimated by using Fredericton Transit-estimated operating cost per hour ($80) multiplied by estimated revenue hours per Sunday and 52 Sundays in one year, except for Alternative 5. For Alternative 5, average trip cost ($20.09) was multiplied by the estimate number of trips on Sunday (1,089) and 52 Sundays in one year.

[d] Based on 2016 reported total operating expenses of $4,303,891.

Alternative 1 is the most expensive of the fixed-route service options, and the most cost prohibitive. Alternative 1 costs 11% of annual operating costs and recovers 12% from fares.

Alternative 2 is less costly than alternative 1 at 7% of the annual operating costs. Further adjusting of routing and headways across routes could optimize this scenario further.

Alternative 3a is a good option, offering service on the busiest routes that serve major destinations as well as neighbourhoods that have transit-supportive qualities, such as population density and lower-income residents (likely with low car ownership). Relatedly, alternative 3b is a good a compromise between service along these popular routes, and reducing service hours according to probable Sunday demand. Alternative 3b has the lowest operating costs of the group (4% of current annual operating costs) and delivers an estimated 17% in farebox recovery. Note current system-wide fare recovery for 2016 was 37%.

Alternatives 4a and 4b result in similar costs to alternatives 3a and 3b, but operate routes focused on covering more geography of the city. Because these alternatives have slightly lower predicted ridership that alternatives 3a and 3b, their cost recoveries are slightly lower too, at 13% and 16%, respectively.

In alternative 5, the cost per trip was estimated based on operating costs for specialized transit divided by the number of trips in 2016. The estimated cost per trip is $20.09. While this cost per trip may be sustainable for specialized service, at an estimated demand of 1,000 trips per Sunday, the operating costs escalate quickly (25% of current annual operating costs). Moreover, the difficulty of scheduling 1,000 trips on a single day would likely be very high, at least with current infrastructure and staff resourcing.

Recommendations

If City Council wishes to move forward with Sunday service, from Stantec's perspective, the most prudent way forward would be to first pilot Sunday service in the fall season into the winter. These seasons typically see the greatest transit ridership and capitalizes on student ridership attending post-secondary institutions in session. It's likely that ridership on Sunday, at least initially, would be less than Saturday ridership. Unless there are major objections during the initial round of stakeholder engagement, we recommend beginning with alternative 3b whereby major routes would be operated for a shortened service span. We recommend this alternative based on its forecasted financial performance and because the routes (as currently structured) serve transit-supportive neighbourhoods. Clear KPIs should be established from the outset to assist staff, Council and the public with understanding the outcomes of the pilot and determining whether to further implement the service. It is also noted that if Sunday conventional service is to be implemented, Para Transit should be implemented alongside conventional. Although there is no legislation in New Brunswick currently mandating Para Transit to follow the same service span as conventional transit, implementing Para Transit will help Fredericton Transit avoid Human Rights claims and moreover it is the right thing to do.

Based on public feedback and ridership counts, the pilot could be adjusted by trying different routes, or extending service hours based on demand. Furthermore, if ridership falls below expectations, it might be necessary to pilot different routes altogether. Further modifications based on ridership, new technology, route realignments, and public feedback could help optimize Sunday service.

We note that any of the above alternatives would need to consider recommendations derived at later stages of the ongoing Strategic Plan process. Namely, route restructuring or new routes may be better suited for piloting Sunday service. Furthermore, alternatives 3 and 4, by focusing transit service on only two routes, may be perceived as 'unfair' because of the lack of service in other parts of Fredericton that typically see transit service. This perception may be a

major obstacle to piloting a skeletal service. In actuality, operating routes that see the greatest amount of ridership, such as in alternatives 3a and 3b is a fair distribution of service because these routes operate with higher productivity (riders per revenue hour) compared to other routes. By ensuring that transit service is allocated to neighbourhoods that need and use transit service (dense, walkable neighbourhoods with populations with few other mode options), we can provide mobility options in areas that currently use transit. Moreover, operating routes that generate the most ridership is also financially prudent, as our estimates above clearly demonstrated that fare recovery for most alternatives is in the lower range (14-20%) and may not be perceived favourably by the non-riding taxpayers.

If the lack of coverage due to reduced Sunday service arises as an issue, Fredericton Transit could also investigate piloting door to door service in areas of the City that are not within 800 metres of an operating fixed-route. However, we caution against this for the following reasons. First, door-to-door service is, as shown by estimates in alternative 5, very expensive on a per passenger basis. Second, this can result in an unequitable distribution of transit service because some residents will be eligible for door-to-door service, while others will only be eligible for fixed-route. And third, communicating large differences in service delivery to the public may result in confusion and low Sunday usage altogether. If Silverwood and Lincoln are not granted door-to-door service on Saturdays, when routes 18 and 20 are not running, then similarly, the areas lacking coverage on Sundays should not be supplemented with door-to-door service.

One major hurdle, nevertheless, is that Sunday service, by being treated as pilot, may fail to generate substantial interest given the nature of pilots. In people's minds, a Sunday service pilot may be thought of as a limited time offer, and as such, may not be used due to uncertainty of continuation. To counteract this potential public reaction, Fredericton Transit should be proactive during initiation and implementation of the pilot and educate the public that this pilot will inform potential for Sunday service in the future. Uptake will depend on marketing and education.[20] Some branding, like "Fredericton Transit, now open for business on Sundays", would be helpful to communicate this message. Marketing this effort does not necessarily have to be a cost driver to Fredericton Transit. Word of mouth marketing and proactive community engagement are not only the most effective marketing tools but are also the least costly strategies of 'spreading the word.' To also help counteract possible confusing and low uptake of Sunday service, Stantec cautions against piloting too many variations of Sunday service, as doing so would make communication difficult and riders will be loath to use the service if they have the perception that the pilot might be restructured again in a couple of months.

Overall, while Sunday service may be a desire of the broader community, the full costs, which not only include operations, but will impact fleet maintenance, administrative staffing, trigger union negotiations, and likely require capital investment for marketing and other activities, must be estimated and discussed with the community. Given the large costs, a prudent approach would involve prioritizing routing optimizations (discussed in Section 4.5) and improvements in service frequency along key routes in the short-term, while piloting Sunday service could be better left to the medium term once costs are understood and service planning occurs.

4.5 ROUTING EVALUATION

Stantec has also studied the current routing and network of Fredericton Transit and tried to identify routing alternatives that may provide better service to those who are currently using transit, while also enticing new riders onto the system. The alternatives presented below were developed by considering feedback from stakeholders

[20] Marketing and other related costs were not included in the analysis above and would like account for an extra $2,000 to $5,000 expense, depending on the robustness of the marketing and outreach efforts.

gathered across many meetings and different media, informed by origin-destination data, as well as by discussions with Fredericton Transit staff.

Note, however, that a detailed route-by-route analysis, including a detailed service plan, is beyond the scope of this project. The discussion below is at a high-level and meant to spur creative ways of improving mobility in Fredericton and to assist the capable and dedicated Transit staff in developing a more effective and efficient network.

We worked with the following guiding principles when designing routing:

- Straightening routes when possible and where the street network allows pedestrian access to bus routes/stops. This was difficult in places like Hanwell and Valcour, where the street network does not provide direct access to Hanwell, so a route deviation is still required. Nevertheless, community outreach where Transit staff explain the benefits to minimize deviations, as well as working with municipal departments to create gridded developments or informal walking paths to access main streets, can be used to minimize route deviations.

- Providing an east-west route along Dundonald and Beaverbrook Streets, and Waggoners Lane.

- Removing unproductive service in Silverwood and replacing it with an on-demand solution described in a later section. This area could serve as a pilot, while Lincoln service continues and could be switched to an on-demand service, depending on negotiations with the Airport. Reducing service hours from route 18 could be shifted to provided more frequent service during peak periods between Kings Place and the campuses.

- Reducing overlaps in service area by spreading out routes along Smythe and Regent Sts., since areas in between would be at a 500-m or less distance between either street and route.

- Minimizing re-routing, particularly on the north side, given its lower density and difficult and unconnected street network.

- Increasing frequency (when possible given resources) on key corridors that can attract all-day two-way ridership. Frequent service can attract greater ridership by facilitating spontaneous trips and provides freedom to change plans. Straight, direct, and frequent routes are widely known to grow ridership in dense urban neighbourhoods. Frequent service, typically headways of 15 minutes or less, are desirable.

- The short-term restructuring of certain routes could work to facilitate the park-and-rides at existing lots and bus stops like at the Regent Mall. Later restructuring of routes would need to be coordinated with further park-and-ride service expansion.

Network Alternative 1

We developed a network concept shown in Figure 48 and Figure 49; this map also shows home locations from the survey respondents. We also propose some different route naming, removing N or S, similar to routes 116 and 216. Moreover, colours and naming were maintained close to the current network because of community and staff familiarity with the current network.

<u>Route 10 Carlisle / Route 11 Regent</u>

Route 10 Carlisle would operate between Carlisle and Sunset on the north side and end at Kings Place, as part of current route 11S does presently. Route 11 would operate between Kings Place and along Regent St. to Regent Mall, and then Corbett Centre. The major change to this route from the current alignment is full service along Regent St. and direct service between downtown and the shopping areas in the south of the city. Were a park-and-ride lot

developed at Corbett Centre or Regent Mall, route 11 would provide direct access to downtown. Frequencies of 15 minutes are suggested during peak hours, and 30 minutes at other times.

Route 12 Brookside Mall / Route 13 Dundonald

While no changes are proposed for the northern portion of this route, the southern portion experiences major change, so that service operates between Kings Place, along Woodstock Rd., Waggoners Ln., across Dundonald St. and Beaverbrook St., along Forest Hill Rd., along Lincoln Rd. and Kings Place. While designed as a large loop, riders can travel east-west along Dundonald-Beaverbrook and change to routes 10/11, 14/15, and 16/17 for north-south travel. This route would enable students living in the Forest Hill area access to the campus via a transfer to route 16/17. Frequencies of 15 minutes are suggested during peak hours, and 30 minutes at other times.

Route 14 Barkers Point / Route 15 Hanwell Park

The alignment of the north side portion of this route is unchanged, providing service to the SmartCentres and food bank. The alignment on the south side is quite different, as service is removed from York St. With service from route 10/11 along Regent, and service from route 14/15 along Smythe, York St. is roughly 500 m between both streets, so residents living between York and Regent could switch to route 10/11, and residents living between York and Smythe could switch to route 14/15.

This restructured route provides service to the Multicultural Association of Fredericton at Smythe and Saunders, two-way service around Fredericton High School (Priestman St., Regent St., and Prospect St.). Frequencies of 30 minutes for most of the day, and hourly at evenings are suggested.

Route 16 Marysville / Route 17 University

No alignment changes for this route are proposed here. Nevertheless, with the new route crossing Dundonald and Beaverbrook expected to be used by students living in Forest Hills and thus transferring to route 16/17 for access to UNB and STU, we propose frequencies of 15 minutes at peak times, and 30 minutes at other times. Infrastructural investment (shelters, waiting areas, etc.) will be needed at transfer points, such as at Beaverbrook and University.

Route 116 / 216

No changes proposed for this route. Nonetheless, as the naming recommendations for the other routes suggest that routes change name at Kings Place, we propose that route 116/216 become one route, route 116 perhaps, named “Skyline Acres” for its service to that neighbourhood, with direction being indicated as either “to Kings Place” for northbound service, and “to Corbett Centre” for southbound service.

Route 18 Silverwood / Route 20 Lincoln

Routes 18 and 20 are the poorest performing routes in the system, with less than 10 boardings per revenue hour, operating roughly two hours in both the morning and afternoon peaks. The difficulty with these routes lays with the low-density areas they serve, as well as the long distances between moderate pockets of density (like Lincoln Heights and Silverwood). Additionally, both routes have lower service frequencies (70-minute headways) which makes the service unattractive for discretionary transit customers.

For these reasons, Stantec proposes a service substitution strategy on route 18 to and from Silverwood, replacing conventional fixed-route service with an on-demand service further described below. Service substitution is proposed because it is more cost efficient than operating 40-foot buses on a fixed schedule – these are costs that can be

reallocated more effectively elsewhere in the system to maximize systemwide ridership. With on-demand service in Silverwood, is easier to calibrate the service level to the demand, while also providing a higher level of service in the form of picking up riders directly from their homes and dropping them off there too.

Depending on success of a pilot of on-demand service to Silverwood, Lincoln can follow a similar model after a year or two of the pilot. Service to Lincoln could remain as presently supplied, but Fredericton Transit should continue discussions with Fredericton International Airport and the Moncton Flight College initiated by Stantec during this project on the topic of service subsidies or an EcoPass program. Attractive service levels could be established if the Airport and Moncton Flight College subsidize service directly with operating funds and/or enter into an EcoPass arrangement where a quantified number of passes are sold each year. In either arrangement, Fredericton Transit's revenue stream is guaranteed giving it the funds for extending service beyond Fredericton city limits and justifying the service levels. As a park-and-ride location, this route may also attract commuters from Oromocto. More details are provided in a subsequent section.

Fredericton Transit — Strategic Plan 2018
Network Alternative 1

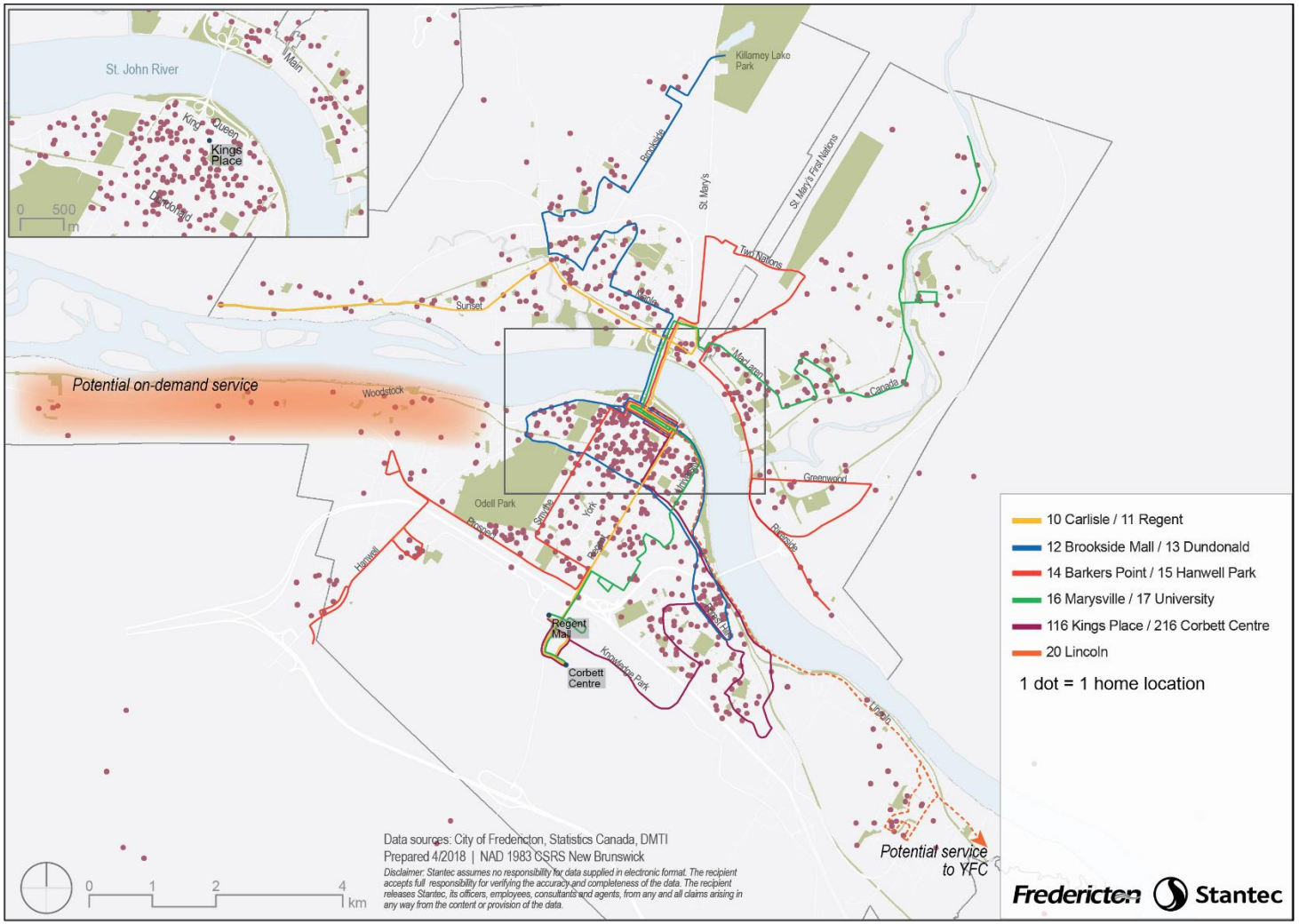


Figure 48 Network alternative 1 and home locations.

Note: The route network concept shown on this map is intended to only illustrate on a conceptual level the nature of service coverage and the general system route structure.

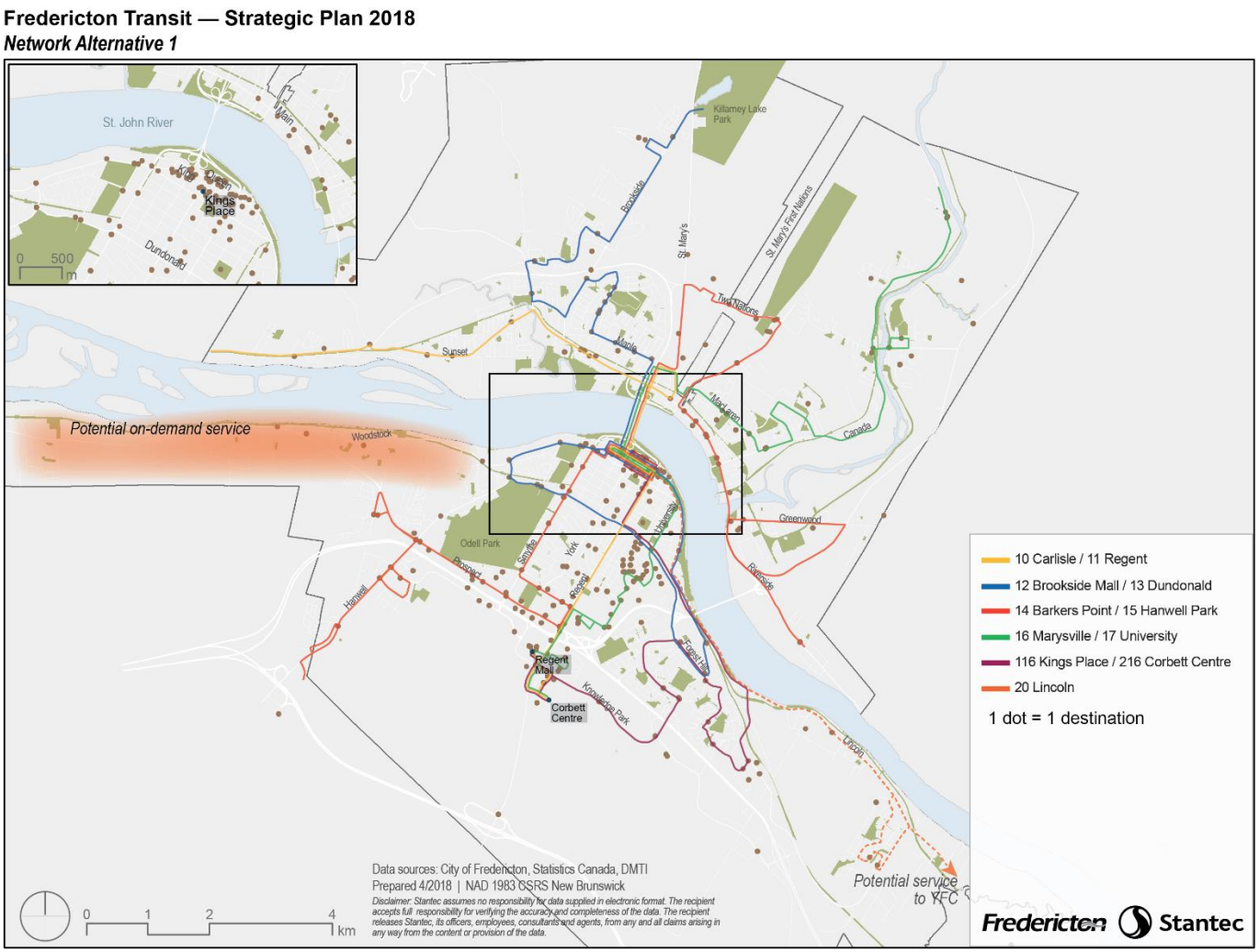


Figure 49 Network alternative 1 with destinations.

This map shows the proposed network Alternative 1 with the destinations from the survey. Most popular locations would be within a 5- to 10-minute walk of the proposed routes. *Note: The route network concept shown on this map is intended to only illustrate on a conceptual level the nature of service coverage and the general system route structure.*

Network Alternative 2

For the second proposed network, we used the same guiding principles above, resulting in similar route alignments, but modifying certain routes differently. The maps below present this network alternative (Figure 50 and Figure 51). We also propose some different route naming, removing N or S, similar to routes 116 and 216. Moreover, colours and naming were maintained close to the current network because of community and staff familiarity with the current network. These are only suggestions and would require community input and further refinement.

Route 10 Carlisle / Route 11 Regent

Route 10 Carlisle would operate between Carlisle and Sunset on the north side and end at Kings Place, as part of current route 11S does presently. Route 11 would operate between Kings Place and along Regent St. to Regent Mall, and then Corbett Centre. The major change of this route from the current alignment is full service along Regent St. and direct service between downtown and the shopping areas in the south of the city. Were a park-and-ride lot developed at Corbett Centre or Regent Mall, route 11 would provide direct access to downtown. Frequencies of 15 minutes are suggested during peak hours, and 30 minutes at other times.

Route 12 Brookside Mall / Route 13 UNB/STU

While no changes are suggested for the northern portion of this route, the southern portion experiences major change, so that service operates between Kings Place, along Lincoln, Forest Hill, Beaverbrook, through the UNB and STU campuses, the hospital, and finally Regent Mall and Corbett Centre. This alignment is a combination of parts of current routes 10N/11S and 16N/17S. This proposed route 13 links student areas in Forest Hill directly with the university campuses as well as Kings Place. Frequencies of 15 minutes are suggested during peak hours, and 30 minutes at other times.

Route 14 Barkers Point / Route 15 Hanwell Park

The alignment of the north side portion of this route is unchanged, providing service to the SmartCentres and food bank. The alignment on the south side is quite different, as service is removed from York St. With service from route 10/11 along Regent, and service from route 14/15 along Smythe, York St. is roughly 500 m between both streets, so residents living between York and Regent could switch to route 10/11, and residents living between York and Smythe could switch to route 14/15.

This restructured route provides service to the Multicultural Association of Fredericton at Smythe and Saunders, two-way service around Fredericton High School (Priestman St., Regent St., and Prospect St.). Frequencies of 30 minutes for most of the day, and hourly at evenings are suggested.

Route 16 Marysville / Route 17 Dundonald

No alignment changes for this route is proposed on the north side. The south side-portion experiences major change, so that service operates between Kings Place, along Woodstock Rd., Waggoners Ln., across Dundonald St. and Beaverbrook St., along University Ave. and Kings Place. While designed as a larger loop, riders can travel east-west along Dundonald-Beaverbrook and change to routes 14/15 along Smythe, 16/17 at University and Beaverbrook, and 10/11 at Regent. Frequencies of 15 minutes are suggested during peak hours, and 30 minutes at other times.

Route 116 / 216

No changes proposed for this route. Nonetheless, as the naming recommendations for the other routes suggest that routes change name at Kings Place, we propose that route 116/216 become one route, route 116 perhaps, named “Skyline Acres” for its service to that neighbourhood, with direction being indicated as either “to Kings Place” for northbound service, and “to Corbett Centre” for southbound service.

Route 18 Silverwood / Route 20 Lincoln

Routes 18 and 20 are the poorest performing routes in the system, with less than 10 boardings per revenue hour, operating roughly two hours in both the morning and afternoon peaks. The difficulty with these routes lays with the low-density areas they serve, as well as the long distances between moderate pockets of density (like Lincoln Heights and Silverwood). Additionally, both routes have lower service frequencies (70-minute headways) which makes the service unattractive for discretionary transit customers.

For these reasons, Stantec proposes a service substitution strategy on route 18 to and from Silverwood, replacing conventional fixed-route service with an on-demand service further described below. Service substitution is proposed because it is more cost efficient than operating 40-foot buses on a fixed schedule – these are costs that can be reallocated more effectively elsewhere in the system to maximize systemwide ridership. With on-demand service in Silverwood, is easier to calibrate the service level to the demand, while also providing a higher level of service in the form of picking up riders directly from their homes and dropping them off there too.

Depending on success of a pilot of on-demand service to Silverwood, Lincoln can follow a similar model after a year or two of the pilot. Service to Lincoln could remain as presently supplied, but Fredericton Transit should continue discussions with Fredericton International Airport and the Moncton Flight College initiated by Stantec during this project on the topic of service subsidies or an EcoPass program. Attractive service levels could be established if the Airport and Moncton Flight College subsidize service directly with operating funds and/or enter into an EcoPass arrangement where a quantified number of passes are sold each year. In either arrangement, Fredericton Transit’s revenue stream is guaranteed giving it the funds for extending service beyond Fredericton city limits and justifying the service levels. As a park-and-ride location, this route may also attract commuters from Oromocto. More details are provided in a subsequent section.

Fredericton Transit — Strategic Plan 2018
Network Alternative 2

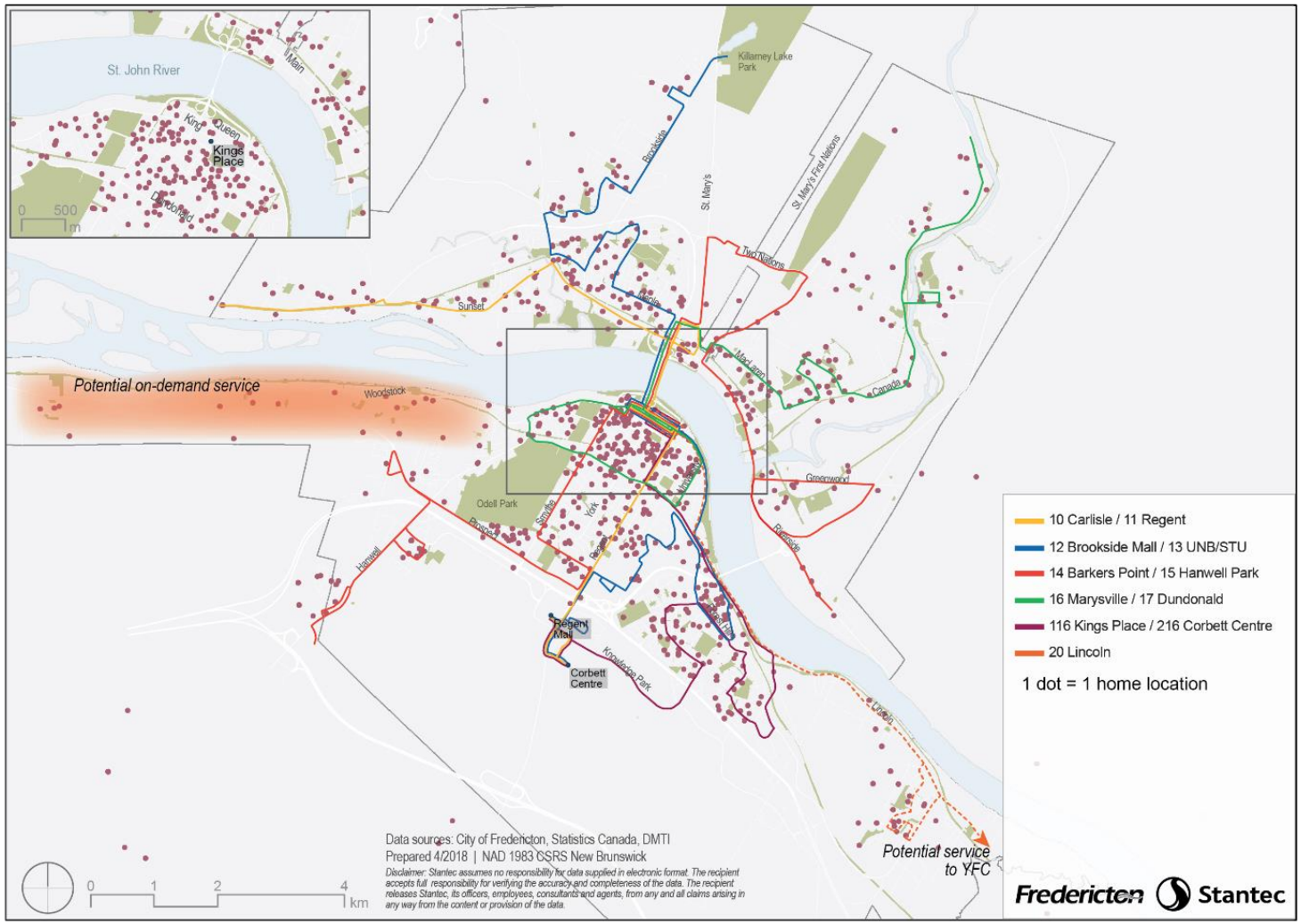


Figure 50 Network alternative 2 with home locations.

Note: The route network concept shown on this map is intended to only illustrate on a conceptual level the nature of service coverage and the general system route structure.

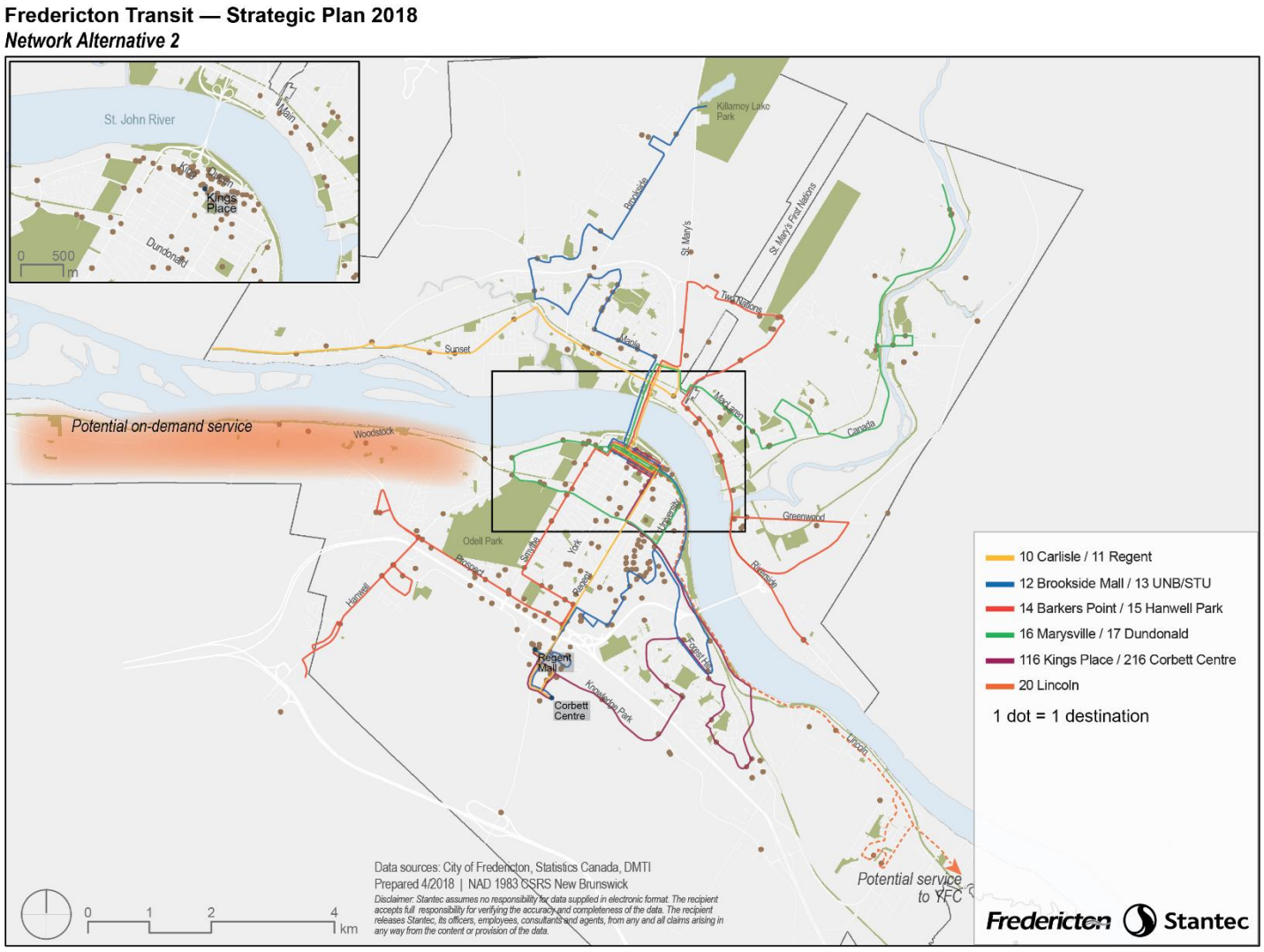


Figure 51 Network alternative 2 with destinations.

This map shows the proposed network Alternative 2 with the destinations from the survey. Most popular locations would be within a 5- to 10-minute walk of the proposed routes. *Note: The route network concept shown on this map is intended to only illustrate on a conceptual level the nature of service coverage and the general system route structure.*

Again, these are only conceptual suggestions, and further detailed studies of routing, street access, scheduling, operations, and costing will be required. Furthermore, community outreach is necessary for obtaining feedback on the proposed routing changes as well as community acceptance.

During this study, some interest was generated regarding transit service along Bishop Dr., just south of Prospect St. Currently, this street has some auto-oriented retail on the north side of the street (Value Village, a Kia dealership, Best Western), while the south side of the street lacks a sidewalk and has a large forest for most of its length. While Prospect St. has bus service and more trip generators than Bishop Dr., four respondents in the online survey indicated Bishop Dr. as a destination.

Providing bus service solely east-west along Bishop Dr. at the moment would be difficult to justify, consuming resources for likely low ridership demand—simply put the transit market isn't there. If interested in providing service along Bishop Dr. in the near future in the form of a pilot, we propose that:

- Route 12/13 be extended past Regent Mall along Bishop Dr., looping around the Valcour-Lian-Hanwell area, back on Bishop Dr. to Regent Mall, and then along its usual alignment
- This pilot would require marketing to advertise the new alignment to generate interest and potential ridership
- Running times and schedules would require adjustment, particularly for interlined trips.

Based on the network alternatives proposed above, another possibility is the adjustment of routes 14/15 to serve Bishop Dr rather than prospect every other trip, i.e. operate a branch of 14/15 along Bishop Dr., and one branch along Prospect (14/15 B for Bishop, and 14/15 P for Prospect, for example). However, a major drawback of this scheme is the reduction in service frequency along Prospect and Bishop, depending on the headway and trip patterns.

Overall, the ridership seems like it would be low, probably lower or about the same as along Prospect. In addition, looking at Google Street View (October 2016) reveals a lack of sidewalks on the south side of Bishop Dr., making two-way service along Bishop Dr. not overly pedestrian friendly.

Similarly, an interest in 'express' service along Regent St. from Kings Place to Regent Mall was expressed, with the underlying idea being that non-stop service between Kings Place and Regent Mall would be attractive for customers. Nearly 64% of survey respondents agreed or strongly agreed that they would benefit from such a route. At this point, however, it is difficult to argue either for or against this service for several reasons, the primary reason being that Fredericton Transit has no existing 'local' i.e. non-express route along Regent St. Currently, the most direct route between the two destinations is along routes 16/17 (via the UNB campus) and according to schedules, takes between 18-20 minutes. The driving route along Regent St. would take about between 8-14 minutes (according to Google Maps at morning rush hour). These time savings could attract ridership; however, without any data regarding the volume of passengers travelling between Kings Place and Regent Mall, we caution that implementing an express route would likely have low initial ridership, as well as added running costs, depending on whether demand is one-way (peaked) or two-way. As such, we do not recommend the implementation of an express route to Regent Mall at this time.

A prudent approach advised by Stantec is to implement one of the service concepts discussed above which introduces a fixed-route service along Regent St. and then to capture boarding and alighting data along the route to ascertain customer demand at the two points of interest. Then, with onboard surveys querying travel patterns and usage, a service plan for express service can be designed. However, a conservative running time for a local route

segment between Kings Place and Regent Mall along Regent St. would be on the order of 15 minutes, and an express service of 8-14 minutes (based on driving times provided by Google Maps) would introduce only marginal time savings. A more logical approach, depending on whether express service would be necessary once a route along Regent St. is established, would be a skip-stop or limited-stop service at peak hours, where this route would only service major bus stops, and would overlap with the local service. Redevelopment and possible densification along Regent St. would also play a role in designing express service. Taken together, Stantec recommends first implementing a local service along Regent St., capturing passenger demand and interest in an 'express' route, followed by a pilot to assess travel time savings and actual passenger demand. This is another example of where passenger counters on buses would generate timely and useful data for analyzing future service improvement opportunities.

Alternative Service Options

The proposed networks call for a fixed-route service substitution strategy to/from Silverwood and replacement with an on-demand strategy. Furthermore, the proposed networks leave service to/from Lincoln in place in the short-term and depending on success of an on-demand strategy in Silverwood, could be expanded to Lincoln. However, Lincoln presents different opportunities than Silverwood, namely because of the proximity to the Fredericton Airport as well as Oromocto. Interesting opportunities for park-and-ride and airport service can build a case for bus service to Lincoln. We discuss these in turn below.

Silverwood

The route to and from Silverwood (routes 18 and 20) operates in the morning and afternoon peaks, and in 2017, carried roughly 6 passengers per revenue hour, well below the system average of 20 passengers per revenue hour for weekday service (including routes 18 and 20). Furthermore, the dispersed and low-density residential character, as well as significant portion of the route along Woodstock Rd. with few to no trip generators, and poor bus stop infrastructure (most stops are on residential property) indicates that service to Silverwood could be provided in a more efficient and effective manner by operating not as a fixed-route service.

In neighbourhoods like Silverwood, transit agencies have tried different delivery methods to serve riders while minimizing the cost. One method successfully designed and implemented by Stantec in a similar neighbourhood is a service dubbed "home to hub", where specialized transit vehicles pick-up both specialized and regular riders at their homes during a scheduled time window, where regular riders are finally delivered to a 'hub' for service on regular routes. This scheme depends on a few factors, including space on specialized vehicles, standing trips for specialized service in the same neighbourhood, and a compact area with a nearby transit hub.

Stantec assessed whether home to hub could work in Silverwood and determined that the area is too dispersed for home service, and most importantly, an analysis of scheduled paratransit trips[21] revealed that no trip origins during peak service hours are in Silverwood. As such, home to hub was ruled out as a potential strategy since Fredericton Transit only has two specialized transit vehicles available for that service and are required for non-ambulatory customers.[22]

Instead, Stantec proposes that Fredericton Transit implement a scheme of taxi-delivered service through a contracted taxi service, similar to some elements of Fredericton Transit's paratransit service delivery for ambulatory customers.

[21] From January 2018.

[22] From the online survey of bus riders, 20 respondents living in an area bounded by the western city boundary, Prospect St. and Hanwell Rd. (out of 910 respondents) provided valid origin-destination information. Twelve of 20 destinations are in the City Centre, 4 are on the university campuses, one at the hospital, one at Regent Mall, one near Two Nations Crossing and Cliffe St., and one along Alison Blvd.

Given the rather favourable per trip cost ($7-12), taxi contracted service could provide trips for Silverwood residents for a lower cost compared to the per trip cost for fixed-route service. Stantec believes a shared service, where multiple passengers are picked-up and delivered stop-to-stop, would work best in this context. This is not envisioned to be a door-to-door service replacing taxi services rather a service substitution strategy, whereby passengers would be picked up from their homes in Silverwood and delivered to a central location such as Kings Place (and vice versa). This service option is envisioned to be subscription-based, meaning that riders need to prequalify by providing proof that their home address on file at Service New Brunswick includes a postal code within Silverwood. Then, once prequalified, riders would need to book their individual trips in advance indicating the time they would like to reach (or depart from) Kings Place at. Then, routes will be planned dynamically in accordance with demand, with as many riders grouped together in a single vehicle as possible.

Stantec recommends that Fredericton Transit issue an RFP for service for residents within a defined service area of Silverwood; residents could call and use a website (or app) to schedule a trip to or from their home in Silverwood within the City of Fredericton. Fredericton Transit would stipulate a fixed per trip rate, and guarantee a set number of annual trips. As an initial one-year pilot, this service could be restricted to morning and afternoon peak hours, similar to service currently provided. To help control costs, this service could be subscription based.

This pilot should be preceded by community meetings, as well as discussions to understand the travel needs and patterns of transit users in Silverwood. As well, goals for the service should be articulated, such as an acceptable cost per trip, and trips per revenue hour. These metrics can also be tracked to determine the performance of the pilot.

Ridership and costs should be reviewed periodically during the pilot, and results should be made public to increase transparency with the public.

Lincoln

Similar to Silverwood, the fixed-route to Lincoln and Lincoln Heights is a poor performer, only slightly better than Silverwood, at about 10 riders per revenue hour.[23]

Lincoln presents different opportunities than Silverwood, despite sharing similarities like low residential densities, lack of destinations along most of the alignment, and poor pedestrian infrastructure. It is noted that Lincoln is also one of the fastest growing communities with an expanding trailer park development. Nevertheless, the Airport is only about 6 km further east of the last stop along the Lincoln route, and Oromocto, with a population of about 9,000 is about 7 km from the Airport. These factors present additional opportunities to build a case for service to and from Lincoln, and potentially beyond.

Stantec developed two options described below, depending on available partnerships and funding.

Option A – No partnership availability

If the Airport and Moncton Flight College are not interested in a partnership and provide no subsidies or guaranteed ridership, such as through a U-Pass or EcoPass arrangement, Stantec recommends that Fredericton Transit maintain current service to Lincoln and use the pilot in Silverwood to determine the uptake and success of the on-demand strategy. If successful, Fredericton Transit could investigate the feasibility of on-demand service in Lincoln.

[23] From the online survey of bus riders, 23 respondents living in an area bounded by the eastern city boundary, the Saint John River, Vanier Highway, and Wilsey Rd., (out of 910 respondents) provided valid origin-destination information. Eleven of 23 destinations are in the City Centre, 6 are around Prospect St., 5 are around the university campuses, and one on the north side at Brookside and Ring Road.

Option B – Partnerships with YFC, Moncton Flight College, and interest for a park-and-ride

In this option, Stantec assumes that the Airport and Flight College are interested in a partnership with Fredericton Transit, whereby a large proportion the nearly 500 people (employees, students and staff) located at the Airport and College would participate in a U-Pass or EcoPass program similar to the current arrangements between Fredericton Transit and STU and UNB. By guaranteeing a certain amount of revenue and ridership, together with appropriate legislation an agreement between the City of Fredericton and the unincorporated area of Lincoln,[24] operating a fixed-route between Kings Place and the Airport may then become financially feasible through additionally generated fare revenue. Moreover, the City of Fredericton should negotiate to ensure that revenue service provided beyond the City's boundaries is subsidized by the Airport and/or Flight College, as well as the provincial government. Is it assumed that Fredericton Transit will work with the Airport and the College to customize transit schedules to suit the needs of customers, as well as capture demand from passengers travelling to and from the airport for flights.

In addition, establishing a park-and-ride at the Airport may also entice commuters from Oromocto to use transit service from the Airport to downtown Fredericton. The Airport expressed interest to Stantec in providing its land and building a park-and-ride lot for Fredericton Transit to entice the agency to extend service. This situation could also generate additional fare revenue and boost ridership. Service to the Airport, a popular destination for students as we discovered through our stakeholder engagement, could help build the case for a U-Pass agreement with UNB undergraduate students, which so far, has been elusive.

Finally, it should be noted that service to the airport would be costly overall, considering additional running times and thus buses required to maintain a desired service frequency. The benefits of serving the airport could stem from interest from tourists who do not wish to drive, or as well as arriving or departing Fredericktonians who are looking for a more affordable alternative to driving and long-term parking, taxis or getting a lift. As such, working with Tourism Fredericton also represents a potential partnership for piloting such a service. Understanding and identifying the target audience(s) for this service is important for designing a successful service plan.

Kings Place Transfer Hub

Currently, most routes converge at Kings Place along King St. for around 10-15 minutes every hour as the main transfer hub of the network. This arrangement forces a platoon of buses along the street and can lead to a visual nuisance and pollution due to idling buses. Furthermore, the current layout is less than optimal for several reasons, including the necessary angled positions of the bus bays that results in buses sticking out into the carriageway, as well as traffic congestion,

In addition, the timed-transfer nature of Fredericton Transit's current services requires that buses converge at Kings Place and stand for nearly 10-15 minutes for transfers to occur—this 10-15-minute time window facilitates transfers and adds a 'buffer' or 'cushion' for buses running ahead or behind schedule. Running more frequent service and thus reducing wait time, together with potential bus priority measures like reserved lanes or signal priorities where appropriate, or simply by adjusting running times and layovers at other transfer locations, can help reduce the standing time of buses converging at Kings Place. Nevertheless, the nature of pulsed or timed-transfers always require a finite layover time to facilitate passenger transfers. With further data captured regarding transfer activity between routes, Fredericton Transit may be able to reduce the layover time, as well as assess the potential for interlining certain bus routes, or remodelling the arrangement or positions of bus bays to facilitate predominant transfer patterns.

[24] Governed by the province of New Brunswick and administered through a Local Services Manager (LSM).

The Fredericton City Centre Plan (2015) proposed a redesigned and/or relocated transit hub from its current location on King St. in front of Kings Place (Figure 52) to the rear of Kings Place in the parking garage along Brunswick St. or at some other nearby site. While Stantec agrees that the current layout is less than optimal for several reasons, Stantec favours the prominence of transit being “in sight, and in mind”. The future evolution of the Kings Place transfer hub can follow many different approaches, but in all cases, it should be appreciated that being in the heart of downtown allows transit to generate ridership and visual exposure as a mode of mobility that should be valued by the community.

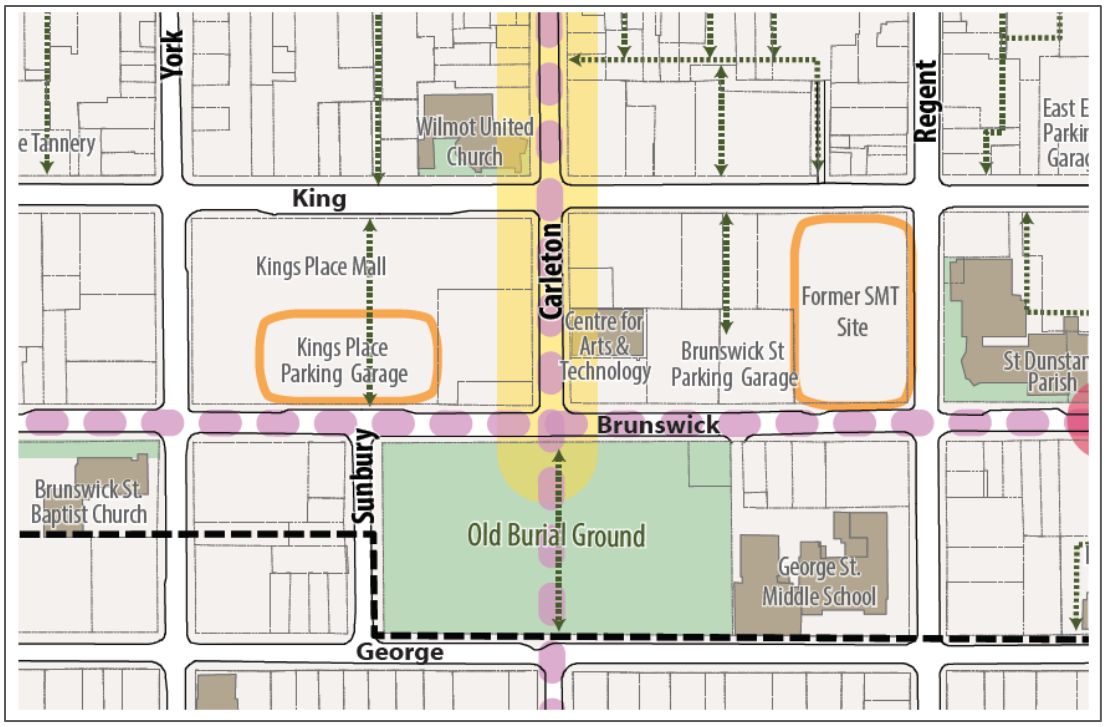


Figure 52 Two potential sites for the relocation of the transfer hub.
Source: Fredericton City Centre Plan, 2015.

The City Centre Plan considers the potential for moving the hub to the former SMT site, at the corner of King, Brunswick, and Regent Sts., which is currently vacant though privately owned. This site could provide an excellent opportunity in the future, given operational considerations, to integrate transit and a mixed-use site, ensuring that transit and land use development occurs hand-in-glove. We understand, however, that the purchase of land at the former SMT site has declined in feasibility since the release of the City Centre Plan.

Another proposed possibility is to move the hub behind Kings Place below the parking garage located on Brunswick St. (close to York St.). Part of the Strategic Plan assignment is to assess this possibility. Operationally speaking, changes would be minimal to running time and the only consideration would be that Brunswick St. is a one-way westbound street, so routing would need to take this into consideration.

Moving the hub to the backside would free up space in front of Kings Place, removing buses from the frontside of the complex. While this may improve vehicular traffic and remove the visual ‘nuisance’ of transit, from a bus customer’s perspective, moving bus activity from the front to the back of Kings Place would remove some of the benefits of the current location, namely, the natural surveillance of pedestrian activity on King St. as well as the prevalence and ‘free’

advertisement for Fredericton Transit. Stantec believes that for both customers and Fredericton Transit, keeping the transfer hub on-street benefits transit riders and Fredericton Transit.

Furthermore, Stantec believes that redesigning the streetscape and right-of-way in front of Kings Place provides an excellent opportunity to provide a street that functions to move people rather than cars, and provides an attractive place for pedestrian activity. In the rendering below (Figure 53), Stantec observes that the street redesign seems to be focused on cars, and if the City aims to design a sustainable mobility strategy, then the City should focus on moving people through transit and active transportation. We recommend that Fredericton Transit advocate for building upon the existing work in redesigning the streetscape in front of Kings Place to include transit considerations as well.

Figure 53 Rendering of transformation of Kings Place.
Source: Fredericton City Centre Plan, 2015.

It is also noted in Figure 53 that the Fredericton City Centre Plan assumes the absence of the sawtooth Kings Place transfer hub layout as it currently exists today. It is worthwhile, therefore, to consider all plausible transfer hub siting alternatives – not limited to only the existing SMT site or the parking garage on Brunswick St. as discussed above. Stantec summarizes below some additional options along with their pros and cons (Table 11).

Table 11 Options for Kings Place Transfer Hub.

Option	Option Description	Pros	Cons
1	Leave the Kings Place transfer hub as is, and reduce dwell time at Kings Place by extending routing by up to five minutes of runtime, or by increasing dwell time at secondary transfer points such as Regent Mall	• No capital expenses required • Transit remains highly visible and front of mind • No updates to route network required • Ideal for users to be close to the Kings Place entrance	• Operationally inefficient and traffic flow impeded with sawtooth layout • Unsupportive of City Centre Plan's efforts, which can lead to challenges for future collaboration
2	Move approximately half of the buses onto York St. between King and Brunswick (north facing), and use the additional space in front of Kings Place to update the layover from sawtooth-park to parallel-park	• Minimal capital expenses required • Minimal bus rerouting required to accommodate this change • Represents a willingness to build on the work of the City Centre Plan • Transit remains visible and front of mind	• May require the need to eliminate the on-street parking and loading options on this stretch of York St. • More awkward for users transferring due to limited visibility around the 90-degree angle • Requires Fredericton Transit to advocate for transit-focused tweaks to the City Centre Plan
3	Move all the buses onto both sides of York St. between King and Brunswick (north and south facing), and construct a pedestrian overpass, underpass, or midblock crosswalk to help mitigate jaywalking	• Completely supportive of the Kings Place streetscape initiative as described in the City Centre Plan • Transit remains visible and front of mind	• Capital expenses and construction required • Limitations in the ability for disabled individuals to make quick transfers • All parking along York St. between King and Brunswick would need to be eliminated though this could be offset by the introduction of parking on the south side of King Street

Option	Option Description	Pros	Cons
4	Move the transfer hub to Brunswick St. – either below the garage or on-street	• Removes buses and negative externalities (visual, noise and other pollution) from King St. • May be a catalyst for future development along Brunswick St.	• Transit is no longer visible and front of mind • Removes natural surveillance and street activity of buses and passenger activity along King St. • May impact the “respect the significance of the Old Burial Ground” on Brunswick St as per the City Centre Plan • Potential increased costs for on-the-ground and/or other security measures
5	Explore other downtown options such as King St./Regent St., Queen St./York St., or Westmorland St. north of Brunswick St.,	• Completely supportive of the Kings Place streetscape initiative as described in the City Centre Plan • Transit remains visible and front of mind	• Extensive bus rerouting would be required, the network would likely become more inefficient, and there would likely be pushback from operators on new awkward left turns that are required • Significant capital expenses needed to acquire the land and relocate the hub

While Stantec advocates for negotiating with mall ownership, city departments, and other stakeholders to maintain transit's role at Kings Place, we are also appreciative of preceding plans and political realities. In the short-term, Stantec recommends pursuing option 2 above. This option will reduce the number of buses in front of Kings Place and demonstrate a willingness on Transit's part to cooperate with other stakeholders. Depending on the outcome of such a scheme and depending on the progress of redevelopment of Kings Place, together with possible routing changes and a study on transfer patterns, fewer bus routes may need to converge at Kings Place. Otherwise, if a desire is still expressed for moving all transit activity to the rear of Kings Place, then proper design, wayfinding, and advertising should accompany these changes to provide sufficient visual cues of transit's location and role at Kings Place. It is also recommended that before the City seeks to implement a major move of this nature, that a more comprehensive feasibility analysis, which goes beyond the scope this plan, is undertaken to further consider the pros and cons and associated mitigation strategies. This analysis should be guided by experts from the fields of both transit planning and urban design, as well as include public consultation.

Additional Recommendations

In their current form, routing numbering and naming conventions are confusing and not intuitive; this is particularly true for individuals with cognitive impairments. Simplification is necessary and warranted. While the routing sections described some alternatives to renaming and improving customer understanding and information dissemination, we propose some other recommendations to simplify and streamline route naming:

- Eliminate N and S, as routes do not strictly operate in north or south directions.
- Route names and numbers should be to and from Kings Place, given its current role as the main transit hub. For example, route 10N/11S, can be renamed as route 10 from Corbett Centre to/from Kings Place, and route 11 to/from Kings Place to Carlisle. The headsign can read "10 Regent – to Kings Place" for northbound buses, and "10 Regent – to Corbett Centre" for southbound buses. For route 11, it could be "11 Main – to Carlisle" for northbound or westbound buses, and "11 Main – to Kings Place" for southbound or eastbound buses.
    - This scheme can now provide true 'two way' service, i.e. both sides of a street are served by the same route number, rather than two different numbers and N or S as present.
- Have one colour for one route (to/from Kings Place). This can increase both customer legibility, and also interlining options. Using colours as "naming conventions" is a strategy that is successfully used by York Region Transit in Ontario.

Furthermore, route and service planning depend on informed decisions. Obtaining accurate ridership counts, not only by route, but at the stop level, can help build the case to restructure routes and eliminate certain stops or upgrade passenger amenities at other stops. Stantec recommends that Fredericton Transit capture passenger boardings and alightings at all stops through manual counts aboard buses. In the future, depending on technology acquisition such as automatic passenger counters (APC), these data can be acquired automatically. Regardless, Stantec strongly recommends that Fredericton Transit conduct ridership counts on all routes at least twice a year to help rationalize routing and service decisions.

Relatedly, Stantec recommends that Fredericton Transit develop and implement service standards. Service standards are an industry-wide best practice and they tell the public and the agency staff how goals and values are translated into service levels that the agency strives to maintain. Furthermore, standards relate to data collection efforts and provide a means of planning, monitoring, adjusting, and evaluating transit service provision. Service

planning aims to ensure that transit service is attractive for the present, but also responsive to the future, and relies on community engagement, values-informed goals and objectives, and data-driven metrics. Fredericton Transit does not currently have service standards. Without guiding standards and commitments that are visible to the public, it is difficult to chart a clear direction in service design and provision.

The implementation of service standards is best supported by having appropriate technology in place to enable the accurate and efficient tracking of data. That is, technology acquisition such as automatic passenger counters (APC) serves dual purpose. Not only does it enable informed decision-making, but it also enables the tracking of service standards. Due to its importance, data collection technology acquisition should be considered a high priority item for Fredericton Transit. Moreover, it is recommended that Fredericton Transit identify unmet demand and track customer satisfaction beyond call-in customer compliments and complaints.

Transit Priority Measures

A number of communities across Canada and United States have and are actively implementing measures to improve bus operations and thus attract and retain ridership, namely through improved reliability of service and speedier travel times. While beyond the main scope of this Plan, we note some general tools or techniques for bus priority measures below:

Queue Jump Lanes Queue jump lanes work by providing lanes for buses to overtake traffic at certain signalized intersections. Together with transit signal priority (TSP, described next), these measures can give buses the lead at intersections to move them ahead of vehicular traffic.

Transit Signal Priority (TSP) works by providing either an early “green” light for buses to move ahead of other traffic or extended green lights for buses to either allow them to service a near side bus stop and then cross the intersection, or by providing more time to cross an intersection as the bus approaches an intersection.

Reserved Bus Lanes work by providing a lane for buses only, sometimes at peak hours in peak direction, or generally throughout the day. These bus lanes can speed up travel but require education and enforcement to ensure that these lanes are used only by buses. Right turning traffic, however, are allowed to merge into these lanes, eroding the benefits of reserved lanes.

Far side bus stop placement. Bus stops placed past an intersection can reduce bus running times by reducing the opportunities for a bus to get stuck at a red light. Nevertheless, this arrangement can cause conflicts with cars that won’t expect a bus to stop after an intersection, so educational awareness is necessary.

5.0 TECHNOLOGY

5.1 CURRENT TECHNOLOGY APPROACH

The use of technology is evolving rapidly in public transportation. Technology has made public transportation more effective and efficient and is enabling riders to personalize their riding experience.

Wireless technology has been especially influential in this change. Riders now can locate the nearest transit service to their location, know when the next vehicle will arrive and pay their fare. Technology has also introduced choice into the travel decision.

Fredericton Transit understands the influence of technology on its core services as well as the influence that technology has on the ways in which its riders use its transit services. Stantec advises its clients that technology is no longer a “nice to have”, but rather “a must” particularly as transit services compete with other transportation modes, including ride hailing and car sharing services, that are predicated on technology and ease of use.

Furthermore, from the perspective of Fredericton Transit and the City of Fredericton, new technologies allow for better decision making guided by data. At its most basic, automatic vehicle location (AVL) and automatic passenger counters (APC) help keep track of service quality, like on-time performance and reliability, and evaluate route alignments based on passenger volumes at the stop level.

What is required now are cost-effective technology solutions that continually enhance the rider experience to grow ridership while providing data and data analytics to help make Fredericton Transit services sustainable, both financially and environmentally.

Historically, Fredericton Transit has used minimal technology in the provision of service. This legacy approach has served the agency relatively well, but as Fredericton’s riders are becoming increasingly conversant with technology options in the transit context and see its deployment at other larger peer transit agencies, there are demands on Fredericton Transit to embrace it as well. This section reviews Fredericton Transit’s current technology investment into its operations.

User Information and Trip Planning

Fredericton Transit uses a locally-developed software platform called ReadyPass owned by Expedition Connect. ReadyPass provides real-time user information and limited trip planning capabilities. The app is free to download for customers and available on both iOS and Android platforms. Real-time user information is derived from global positioning systems (GPS) locaters from iPads that are installed on Fredericton Transit’s fleet. Locational data is pushed to the ReadyPass mapping platform and presented to the customer (Figure 54). The product provides trip planning information limited to showing bus routes that serve an identified end-point; route-planning with origins and destinations is not possible. Currently, Fredericton and Charlottetown are the only two agencies using ReadyPass.

Screenshots of the app are shown below.

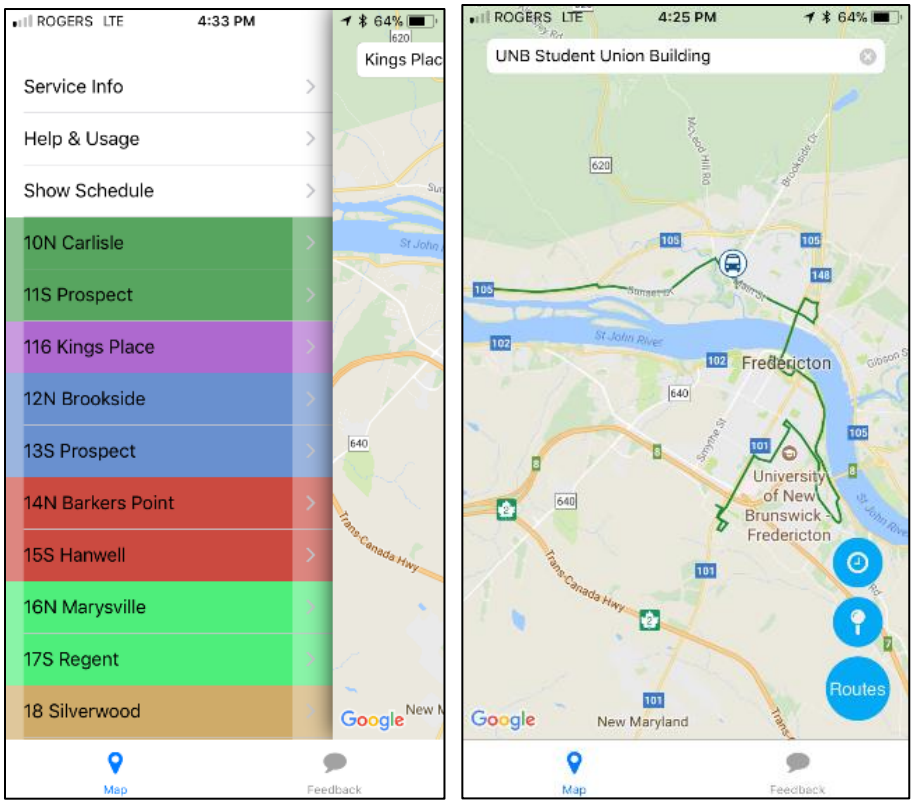


Figure 54 Current ReadyPass app interface.

Compared to other similar software platforms in the market, Stantec found Fredericton's ReadyPass interface to be limited in its capabilities, difficult to navigate and its real-time arrival information not always accurate. In its stakeholder engagement activities, Stantec heard many instances of ReadyPass app dissatisfaction for many of the same reasons cited by the consultant team.

In adopting the software, Fredericton had user interfaces uniquely developed for its system. Contrarily, Charlottetown adopted a broader approach to using the software including using the ReadyPass app to create a General Transit Feed Specification (GTFS). For reference, GTFS is a real-time feed specification that allows transit agencies to provide real-time updates about service to application developers in an open data format for transit schedules and associated geographic information. ReadyPass is capable of creating a GTFS real-time data feed but is not something currently requested by Fredericton Transit of Expedition – the owners of the ReadyPass.

Pushing out real-time GTFS open-source data enables Fredericton Transit to provide real-time user information through other platforms that are far more robust than ReadyPass such as Google's Transit Trip Planner or the Transit App. Transit App is an extremely popular platform particularly from the perspective that it can be used anywhere in North America. The company's business model is interesting that if an agency "endorses" its product as the preferred solution, the company provides support as well as advanced analytics to the agency without cost. Another bonus of GTFS data is that other third-party developers are able to pull the open source GTFS data from the internet and construct their own user-info apps with no cost to the agency as has occurred in many other jurisdictions. In Toronto, one of the most well-used mobile apps "Rocketman" was made by a third-party developer with the use of open data APIs.

Fare collection

Fredericton Transit uses gravity-fed fare boxes made by a Canadian supplier. Gravity-fed fareboxes have been a popular choice in the Canadian transit industry for their reliability and extremely low capital cost and minimal operating cost. However; cash handling and paper-based fare media are administrative cost drivers for Fredericton Transit as someone must count, process, and reconcile the fare collected in these devices. A downfall of gravity-fed fareboxes is that they make it difficult for operators to confirm whether a customer has provided sufficient fare.

The fareboxes currently installed on Fredericton Transit's buses cannot support modern fare payment methods such as dedicated fare card, open payment or mobile payment systems. Fredericton Transit's fareboxes would either need to be upgraded, a bridging-product acquired, or another appropriate workaround developed, such as a standalone validator with communication capabilities or leveraging the near-field communication protocols from the iPad tablets already installed on the buses, that could be used to facilitate these increasingly popular and demanded payment forms. Expedition, the owners of ReadyPass are rumoured to be developing a fare payment solution. Given its existing business relationship with the company, it may be Fredericton Transit's best interests to work with the company to develop a single holistic platform for user information and fare payment.

Handheld two-way radios

The agency relies on handheld two-way radios for vital operating communications. With this approach, a "dispatcher" is in near constant communication with bus operators about operating parameters "on-the-street" (vehicle location, schedule adherence, on-road issues, delays, mechanical issues, etc.). This is an outmoded approach to managing bus operations and no longer considered best practice. Most of Fredericton Transit's peers across North America have migrated away from using two-ways radios for ongoing operating communications in favour of computer-based dispatching systems with GPS capabilities that operate in real-time and are considerably more accurate.

Currently, handheld two-way radios are permissible according to New Brunswick's distracted driving laws. Interestingly, most other jurisdictions in North America have prohibited the use of handheld two-way radios in their distracted driving laws. Irrespective of the legality of handheld two-way radios, peers across North America are overwhelmingly migrating away from vocal communications inside the bus. Instead, most communications are increasingly done via Mobile Dispatch Terminals (MDT) with dispatch and emergency panic buttons underneath operator seats. If continued vocal communications are desired by Fredericton Transit, adoption of hands-free technologies is considered best-practice. This could be implemented in one of two ways:

- Base station ("gooseneck") microphones with tie-into pre-existing bus speaker system; or
- In-ear Bluetooth wireless earbuds for drivers.

5.2 FUTURE TECHNOLOGY PROSPECTS

Technology benefits riders, non-riders, and the agency itself in terms of operations, safety, and rider satisfaction. These benefits can provide operational improvements, as well as play an important role in communicating between the system and riders so that any impacts to service can be mitigated on the rider side of the equation. For the agency, it eliminates "running-blind" in the sense that it allows operations to get real-time feedback and information on how service is operating to adjust on-the-fly and provide a more proactive service as opposed to a reactive one. Beyond operations, the right technology can save transit service providers money by reducing costs, improving decision making, and encouraging new ridership through improved user information. Naturally, financial resources are finite and the merits of each must be scrutinized.

While many emerging transportation technologies are impacting the provision of transit service around the world, a select portfolio emerges that is of direct benefit to Fredericton Transit for the term of this business plan and the future. Generally, technology can be grouped according to operational, safety and rider benefit, with significant cross-over amongst the three.

Operations

The right technology can improve the operational effectiveness and efficiency of a transit agency. Without fiscal restraint, solutions that would provide demonstrable benefits to Fredericton Transit include:

- Computer Aided Dispatch / Automated Vehicle Location (CAD/AVL)

  CAD/AVL describes the use of computers and GPS in dispatching and tracking transit vehicles. CAD/AVL is accompanied by added costs of operating and maintaining additional computer equipment, but transit agencies benefit from improvements to customer service and operations through more robust real-time information than is afforded through a platform such as ReadyPass. Because CAD/AVL is becoming so common, it is increasingly becoming expected as standard for fixed-route systems. The good news is that the price of these systems has come down considerably because of their popularity. Although two individual products, CAD and AVL are generally discussed as one in the transit context as it is not a prudent investment to have one without the other.

  Many agencies have found that CAD/AVL has helped to improve service by increasing schedule adherence and enabling agencies to easily monitor bus driver performance. CAD/AVL also helps to reduce response time to operational problems by improving communication between bus operators and dispatchers. Dispatchers can handle communication with and monitoring of a greater volume of vehicles, which may also be conducted using mobile tablets on the street. Customers also perceive their transit systems to be more modern and reliable because they can access real-time bus arrival information. CAD/AVL also aids in planning by collecting better historical data. CAD/AVL has also been proven to improve safety and security on transit vehicles because many systems include a silent alarm and video monitoring capabilities. Addition of this technology would improve safety and/or perception of safety on buses for benefit of both passengers and operators.

- Mobile Data Terminal (MDT)

  An MDT is usually a portable computer added to buses to assist with information and data management at service delivery. The computer may be a laptop, tablet computer, or customized hardware. There are many applications for MDTs such as managing paratransit trip manifests, collecting passenger and fare data, communicating with dispatch, and trip routing. MDTs are an effective tool for analyzing operations data in greater detail than with traditional pen-and-paper data collection. MDTs are typically grouped as an integrated bundle with CAD/AVL and allow the agency to make most out of its investment into such a system. Without MDTs, CAD/AVL is of limited use.

  Common functions include:

  - CAD/AVL: MDTs can incorporate CAD/AVL by processing location data to transmit to a central server or dispatch. Some are also capable of serving as a GPS-based navigation assistant for vehicle operators.

- Communication: MDTs can be used to facilitate efficient communication between vehicles and dispatch. This is often in the form of pre-programmed text messaging, which uses significantly less bandwidth than voice calls over a two-way radio system.

- Data entry and information management: A common use for MDTs is to collect a greater level of operating detail than might otherwise be possible. This may include the ability for the driver to categorize passenger counts by fare type (half-fare, adult, passes, etc.), by boarding or disembarking location, and so on. Some systems can incorporate some level of automation, such as pairing a location from the AVL component with the passenger fare type.

- Automatic Passenger Counters (APC)

  An electronic device available for installation on transit vehicles which records boarding and alighting data. This technology can improve the accuracy and reliability of tracking transit ridership over traditional methods of manual accounting by drivers or estimation through random surveying. They are typically installed at transit vehicle doorways and using infrared beams to sense when people enter or exit a vehicle. While a useful data source, it should be noted that APC's are notorious for overstating ridership by counting "phantom passengers." Therefore, APC data require processing and validation against an alternate data source, such as electronic fare box information, MDT data, or manual counts to ensure accuracy.

- Cameras

  Fredericton Transit buses are not equipped with cameras. This is a worthwhile investment that helps to ensure the safety of both bus operators and customers. Further, cameras have become a vital tool to protect frontline staff by disproving malicious allegations brought against them and can further protect the agency from frivolous lawsuits. Camera recordings can also be used as a source for passenger counting and can be used to validate and calibrate APC counters. Last, recordings from buses are now also actively sought and used by law enforcement to assist in its investigations. This is a best-practice that should be adopted by Fredericton Transit.

- Automated pre-boarding or onboard next stop annunciators

  New Brunswick does not have prevailing accessibility legislation that requires pre-boarding or onboard next stop announcements. However, given anticipated Federal requirements and the interest for encouraging barrier-free lifestyles for those persons with disabilities and mobility-challenges, other properties have adopted automated next stop annunciators. Next stop annunciators work by tracking a vehicle's GPS coordinates that trigger an automated announcement when the bus passes a predefined geographical "ring-fence." This approach is considered best practice but can be costly because of the GPS tracking modules required.

- On-Demand/Dynamic Scheduling Software

  Transit agencies are increasingly exploring on-demand or dynamic scheduling software solutions to unlock the opportunities of microtransit. Fixed-route services are costly and not advantageous in areas where land use is singular and/or residential densities are low - the ridership generated in those areas often do not warrant the fiscal investment. Gaining tremendous interest, on-demand solutions allow agencies to create "pop-up" routes in real-time based on demand for service. Areas like Lincoln and Silverwood that have low residential densities and require 'in service deadheading' could benefit from on-demand solutions. Residents

in those areas could receive better mobility options than what is currently provided with fixed route. A software package, such as Via, TransLoc, RouteMatch, Good Travel Systems or SpareLabs, would be required to enable this opportunity.

Safety

Emergency room visits due to pedestrians injured while walking with cell phones have soared in recent years. The proliferation of distracted walking will further raise the risk of negative interactions between pedestrians and vehicles. At the same time, transit agencies continue to provide more service which will increase the interactions between transit vehicles and pedestrians/cyclists. Transit Cooperative Research Program's (TCRP's) report number 125 identified five factors that contribute to bus-pedestrian collisions and other road incidents:

- Operator distraction, multi-tasking and fatigue
- Tight or problematic schedules
- Timing/scheduling of buses
- Lack of training and follow-up enforcement by transit agency
- Lack of pedestrian friendly environments

Transit, just as much as any other road user, has a part to play in keeping roadways safe for everyone including, passengers, other motorists, cyclists, and pedestrians. Fredericton Transit has been fortunate that there have been few and far-between instances of bus-pedestrian collisions in the city. Proactively, some peer agencies such as York Region Transit are investigating and piloting new technology to minimize the potential for interface called bus collision warning systems (BCWS). There are four types of BCWS – predictive, active, passive and warning. Each has its purposes as well as resulting pros and cons but the overall purpose is the same: alerting the 'pedestrian' and bus operator that an interaction is about to occur and provide sufficient forewarning to prevent it. While this technology is still in its infancy, we believe Fredericton Transit should monitor developments and potentially consider this as future technology as reliability improves and costs decrease. As an interim cost-effective measure, some agencies have started tying-in their signalling system to their external speaker system to provide some type of audible warning to pedestrians that a bus is turning. Additionally, agencies like Cleveland RTA have complemented this approach with brightening-up the side of the bus by installing strobe marker lights and blinking chevrons on all side mirrors that are activated by the signal system that help catch the attention of individuals "walking with their heads down."

Rider

Improving the customer experience builds loyalty of current riders and entices non-riders to consider transit. Riders with access to real-time transit information have been shown to spend 15% less time waiting at bus stops than riders without this information. Additionally, a study of Chicago's bus routes found that access to real-time transit information increased average daily ridership by 2%, while a research study of real-time bus arrival information in New York found correlation with increased fare revenue.[25]

With the strong adoption of smartphones and the realities of non-stop connectivity for many transit riders, there are opportunities to improve their experience including:

- Next Bus Arrival System

  An application that considers historical travel times, actual vehicle position, intended stops and the typical traffic patterns to present an extremely accurate estimation on when the next bus will arrive at the nearest

[25] http://www.wri.org/blog/2016/02/real-time-transit-data-good-people-and-cities-whats-holding-technology-back

stop. If the user is not at a stop, it also provides users with information about the nearest stop and directs them on how to get to it. This type of information is typically generated by CAD/AVL systems as a GTFS and beyond the capabilities of application platforms such as ReadyPass in its current form.

- Trip Planner

  An application such as the one provided by Google Maps or the Transit App that will assist the user in getting where they want to go. Users provide a starting location, optional midpoints, the destination, and whether they would like to depart now, later, or perhaps arrive by a certain time. The trip planner will then produce a personalized plan based on these parameters that outlines both the path and mode(s) of travel. The data required to power a trip planner such as Google's Transit Planner or the Transit App is the GTFS feed.

- Advanced Fare Payment Systems

  The number of transit payment options has increased with mobile payments, open payments and more. Agencies can now choose between operating branded fare cards; contactless open payment systems (which allow the use of non-affiliated credit and debit cards); mobile phones; wearables or other smart tokens (easily portable devices which can display and transmit balances, connect to other devices via near-field communication or Bluetooth, etc.), such as the Barclaycard in London, UK; digital ticketing systems with video-based assistance, such as the NextAgent system in Essen, Germany; smart stations (which provide integrated ticketing platforms enabling connections to other transportation modes such as commuter rail or taxis); or region-wide fare cards which can be used across transportation modes and platforms, such as those used in Sweden and Scotland.

  The other payment system often overlooked is account management systems which are proving to be very effective for the delivery of certain types of services and for certain types of riders. Account management systems are perfect payment solutions for riders of paratransit services who are seniors and the disabled that may have challenges using traditional fare products. Mobile and open payment systems can communicate with a back office or central management system to validate the rider's eligibility to ride the service and to deduct the value of the ride the rider is taking from a prepaid account. In addition to accessible service programs, account management payment systems work well with commuter rail and bus programs where riders received some form of subsidy from an employer.

  Closed-source payment, such as fare cards, are quickly becoming obsolete, so moving to open-source fare payment, such as Interac debit, Visa, MasterCard, etc., and mobile is a much more advisable option. In the case of Fredericton Transit, we believe a simple and cost-effective solution such as the one developed by eiGPS/PIN Payment Solutions may be worthy of consideration. eIGPS created a product that can accommodate proprietary cards (closed loop), contactless credit cards and mobile devices (Supported Payment Credentials or SPCs). Their solution can be set up in a short period of time without disturbing legacy systems that may currently be in place such as Diamond fareboxes. The company recently launched a 150 bus pilot in Laval Quebec. Another option is to leverage the near-field technology available on the iPads currently installed in Fredericton Transit's fleet. An application to process the payments is required and currently being developed by ReadyPass.

- Mobile Transit System Notifications and Service Disruption Alert Systems

A service that will send a text or notification to the user's mobile device, notifying them of any delays, changes, or disruptions to service. It can be as simple as providing the user with information the user selects, or as complex as using the user's location and riding history to update them on routes they frequently use. Some agencies have embraced Twitter to provide real-time service updates which requires minimal technological investment, but does require staffing resources to be responsive and done well. It should be noted that many systems are using all forms of social media and traditional communication channels, i.e. agency websites, to communicate with passengers. Often communications and/or customer service staff performs these duties in addition to their traditional duties. Apps such as Transit App allow users the ability to receive notifications on a per line basis, based on feeds pushed out by transit agencies.

- Wi-Fi

  Wi-Fi could be easily provided through the assets Fredericton Transit procures in an integrated CAD/AVL/MDT package. The only additional cost to the agency for the service is for the increased bandwidth used by riders. However, in return the agency benefits from a new origin and destination (O-D) data source for route planning purposes by providing the service. Given that the duration riders spend on Fredericton Transit's routes is relatively short, the payback for providing Wi-Fi is limited.

The way in which people consume services around the globe and throughout different industries has changed considerably over the last decade. Our world is becoming evermore virtual with the need for information instantaneously. Our riders expect transit to be as nimble and easy to understand as the many other services they use daily. The Canadian Urban Transit Association's (CUTA's) Vision 2040 has recognized the role in which mobile apps have become pervasive in the transit world and that agencies must consider this new reality. Twitter and Facebook are great venues to communicate with passengers particularly in a city like Fredericton with a lot of students. This is a great first-step towards improving the lines of communication between Fredericton Transit and its riders. However; these functions must be given appropriate staffing resources to be effective and proactive; otherwise good intentions can quickly become "damage control" exercises where staff respond reactively to oftentimes negative, rude, and vulgar customer comments and complaints – a counterproductive use of time to what is trying to be achieved.

Autonomous vehicles

Excitement is spreading for autonomous vehicles (AVs). These driverless vehicles provide almost endless visions of barrier-free mobility, including vehicles picking up a rider, delivering them to their destination, and then picking up another rider, with tremendous implications for reducing car ownership, parking requirements, and freeing up valuable land for better uses. AVs are also thought to operate with a high level of safety, given the removal of human error and fatigue; however, it is also recognized that AVs are computers and that all computers will have glitches or fail at some point. Additionally, AVs in their current form do not perform well in winter conditions. Nevertheless, given the early days of AV test beds, many kinks still need to be worked out before AVs because viable commercial products to replace or augment mass transit as we currently know it.

Regarding transit, AV technology has substantial implications by reducing or eliminating labour related to transit operators. Driverless light-rail trains have been in operation around the world, and Vancouver's SkyTrain has been driverless from its inception in the middle 1980s. Some initial impacts on transit could involve converting line haul or BRT (bus rapid transit)-style routes to driverless operations, as well as providing on-demand solutions to low-density neighbourhoods.

Nevertheless, while AVs hold real promise, at present, the technology is still in its infancy and requires policy and legal framework too. The unionized nature of transit operations will likely require serious discussions regarding operator replacement. Infrastructural investments will likely be high due to the connected nature and the 5G wireless requirements of high bandwidth data for connected vehicles. Fredericton Transit should monitor developments in AVs, but in the short-term, focus on delivering more reliable and frequent transit service in traditional ways which will yield greater payback. As funding may become available from the federal and/or provincial governments for pilots, for example, Fredericton Transit could apply in the future, as AV tech could not only benefit line haul routes but help provide driverless service in low productivity areas for traditional transit, such as Lincoln and Silverwood. Regarding possible timelines, predictions for AV adoption vary widely, from being an imminent disruptor, to something that is many years away. We advise that Fredericton Transit keep a pulse on potential funding opportunities for AV pilots, as well as develop potential partnerships in the local IT sector with firms that may be involved in AV technologies.

5.3 TECHNOLOGY RECOMMENDATIONS

The next generation of Fredericton Transit requires cost-effective technology solutions that continually enhance the rider experience, to grow ridership while providing data and data analytics to help Fredericton Transit make evidence-based decisions. We applaud the investments that Fredericton Transit has previously made but suggest more resources will be required going forward for transit to stay relevant in the minds of its customers through modernized technology.

We appreciate that financial resources are finite. From its experiences at numerous transit agencies across North America, Stantec has seen and proven that oftentimes an upfront capital investment is warranted as it will translate into increased ridership and/or reduced operating expenses for the agency that more than offset the level of investment. Therefore, we are proposing pragmatic recommendations that will require a new, yet reasonable, investment to enable Fredericton Transit to proceed with the modernization of its technology efforts.

The federal government's Public Transit Infrastructure Fund (PTIF) presents opportunity as a funding source for the recommendations presented below. Accordingly, Stantec suggests that PTIF be explored to its fullest potential.

We identify our recommendations according to proposed timeframe.

Short-Term Recommendations (0-2 years)

1. **Fredericton Transit website:** Stantec suggests that Fredericton Transit develop a dedicated website with more robust user information than currently provided. This website should be timed to the launch of Fredericton's refreshed branding. A Fredericton Transit website would improve communication and enhance the rider experience, which are both keys to enticing travel mode conversion to transit.

2. **Work with ReadyPass to generate GTFS feed and endorse 3rd party app:** Stantec believes that the current user interface provided by ReadyPass for real-time next bus information is limited. A preferred approach is to work with the company to generate a GTFS feed that could be used to power other 3rd party apps such as Transit App, Rocket Man or Google Maps. In the case of Transit App, if Fredericton Transit were to "endorse" it as the preferred app of the agency, the company offers enhanced data analytics and support free of charge. This is the recommended approach to also improve data collection and analysis to support strategic decision making, as internal capacity to manage data at Fredericton Transit is currently limited.

3. **Install internal and external camera systems:** Ensuring customer and operator safety is paramount for Fredericton Transit. With the installation of camera systems on the entire fleet, Fredericton Transit can protect itself from liability issues, help protect operators, and monitor routes and capture boarding and alighting data.

4. **Issue RFP for onboard bus technologies like AVL-APC.** AVL-APC data can track performance and bus operations, including passenger counting at the stop level to help inform decision-making and planning. The time necessary to install, calibrate and begin acquiring data and report generation is non-trivial. Issuing an RFP in the short-term will help prepare for gathering data for performance tracking and evidence driven decision making in the medium and longer terms.

Medium-Term Recommendations (2-5 years)

5. **On-demand/dynamic scheduling software**: To enable microtransit or on-demand solutions in lower density areas of the city increasing productivity and lowering the cost of providing service in those areas, Stantec recommends that Fredericton Transit invest in on-demand/dynamic scheduling software. On-demand solutions such as the one envisioned for Fredericton allow agencies to create “pop-up” routes in real-time based on demand for service. Many of these newer software packages require only a tablet onboard the vehicle and a cellular connection which Fredericton Transit already has. Depending on the software provider selected, there are opportunities to integrate conventional transit into the same platform. It is rumored that ReadyPass is exploring a strategic partnership with SpareLabs, a company that has numerous installations of on-demand software at agencies similar to Fredericton’s size.

6. **Install a simple open and mobile fare collection solution:** Stantec believes that modernizing the fare collection system is a prudent step to reduce the agency’s administrative and fare collection costs that affords riders more choice in how they want to pay for service. We suggest a simple validator product such as the one developed by eiGPS is an appropriate solution and at a very reasonable price point. We understand that the approximate cost of the validator unit is approximately $300-$500 per bus installed. Cash handling and paper-based fare media are administrative cost drivers for Fredericton Transit and should be minimized in the future. Closed-source payment, such as fare cards, are becoming obsolete, so moving to open-source fare payment, such as Interac, Visa, MasterCard, etc., and mobile is a much more viable option. Another option is to explore the opportunity to leverage the near-field technology available in the IPads already installed in Fredericton Transit’s fleet. This near-field technology could be used to process payments assuming an appropriate app is procured for that function.

Long-Term Recommendations (5+ years)

7. **Wi-Fi**: Wi-Fi is becoming increasingly common across all consumer industries and transit is not immune to the demands for it either. In some regions across North America it is expected on transit and it has been shown to “speak volumes” to younger consumers. Free Wi-fi could be part of a mobile app solution since both are enhancements to the customer experience. Wi-Fi could be provided through the assets Fredericton Transit procures in an integrated CAD/AVL/MDT package. The only additional cost to the agency for the service is for the increased bandwidth used by riders. However, in return the agency benefits from a new origin and destination (O-D) data source for route planning purposes by providing the service.

8. **Remove handheld two-way radios from buses:** Irrespective of any change in the Distracted Driving legislation, Stantec recommends that handheld two-way radios be removed as they are not consistent with

the industry best practice. Many of the communications that currently occur through two-way radios could be replaced by an integrated CAD/AVL/MDT solution negating the need for two-way radios. Peers in North America are overwhelmingly migrating away from vocal communications inside the bus. Instead, all communications are done via MDTs with dispatch and emergency panic buttons underneath operator seats. If continued vocal communications are desired by Fredericton Transit, adoption of hands-free technologies are recommended as best-practice. This could be implemented in one of two ways:

- Base station microphones with tie-into pre-existing bus speaker system; or
- In-ear Bluetooth wireless earbuds for drivers.

9. **Monitor Bus Collision Warning Systems**: Bus Collision Warning Systems are still in their infancy and being piloted by bigger agencies who can provide the research and development support to perfect these products. As the accuracy of these products improves and the costs decrease, their may be a business case for them in Fredericton's future. In the interest of improved safety, Fredericton may wish to consider a simple solution such as brightening up the side of its buses with LED strobe marker and mirror lights as well as an audible warning tied into the external speaker system. A simple solution such as described could be implemented for $200-300 per bus and may reduce operating risk to the agency.

For a summary of how these technologies compare and recommended implementation timelines, see Table 12 (ranked by highest to lowest priority).

Table 12 Summary of recommended technology solutions.

Solution	Impact Category	Capital Cost*, ** ($ - initial)	O&M Cost*, ** ($ - ongoing annual)	Time Horizon	Example Providers	Notes	Ease of implementation (out of 5 – 5 easiest, 1 hardest)	Priority (1 of 8)
Camera system	Rider/ FT operations/safety	$5,000 per bus	10% of capital cost	Years 1 – 2	Seon	Recommended that there be both internal and external cameras that cover all angles of bus	4	**1**
Work with ReadyPass to Create GTFS Feed and Adopt 3rd Party App	Rider	Should not be any capital cost – FT buses already have IPads with location services	To be investigated with ReadyPass	Year 1	ReadyPass	GTFS feed could be generated from existing app; Fredericton Transit to follow up with ReadyPass on approach	5	**2**
Automatic Passenger Counters (APC)	Operations	$10,000 per bus installed	10% of capital cost	Years 1 – 2	Strategic Mapping	Does not necessarily need to be installed fleet wide. Some agencies just install a few units and rotate the buses on different routes if funding challenges exist.	2	**3**
Advanced fare payment system	Rider and FT operations	$300 to $13,500 per bus	Minimal up to $35,000 per year	Years 1-3	eiGPS Route Match Strategic Mapping ReadyPass App TransitToken	Capital cost dependent on sophistication of system installed. Stantec advocates for a simple solution.	3	**4**
Website	Rider	$50,000	10% of capital cost	Years 1-2	Transit Marketing Firm	To be launched in tandem with brand refresh	4	**5**

Solution	Impact Category	Capital Cost*, ** ($ - initial)	O&M Cost*, ** ($ - ongoing annual)	Time Horizon	Example Providers	Notes	Ease of implementation (out of 5 – 5 easiest, 1 hardest)	Priority (1 of 8)
On-demand dynamic scheduling software	Rider and FT operations	$300 to $25,000 per bus	$300 to $800 per bus per month	Years 1-3	TransLoc SpareLabs Routematch	Most require solutions require simple off-the-shelf tablets (iPads) and cellular data connection to enable	3	**6**
Handheld two-way radios	FT Operation / safety	~ $100 per bus – base station microphone ~ $450 per bus operator – Bluetooth	~ 2-5% initial capital cost	Years 4-6	REI, Motorola	Costs are dependent on solution-type selected	4	**7**
Bus Collison Warning Systems	Safety	~ $300 to $20,000 per bus installed	~ 2-5% initial capital cost	Year 6+	Protran Clever Devices	Costs are dependent on solution-type and sophistication selected	3	**8**

* Order of Magnitude Estimates
** USD pricing converted at 1.375 exchange rate

6.0 FARES

Every transit system faces difficulty when setting fares and developing concessions—what should we charge that riders are willing and able to pay, so that fare revenue covers a portion of operating costs, but that isn't too expensive to burden low-income riders? Are fares competitive with driving, or put another way, are transit fares, when accounting for return trips and the number of passengers, more expensive than parking at my destination? Is parking mostly free?

The choices a transit agency makes regarding fares should reflect the values of the community it intends to serve, while also being accountable to taxpayers who may or may not use transit. A difficultly arises when fares are set too low to sustain service improvements or develop an attractive and useful bus service, as well when they are set too high that the system loses riders, particularly riders who switch to driving since the bus provides no added incentive, such as not needing to pay for parking or using priority lanes, cutting travel times. Inappropriate fare structures can also add to instances of fare evasion unintentionally if fare tables are overly complicated but also deliberately from perceived low value for money and poor service quality.

New technologies in transit and in fare payment methods are helping transit agencies and their riders by facilitating fare payments, as well as enabling diverse fare products that can address equity concerns. Charging the right fare for the right trip, by using electronic fare media, can enable strategies like low-income fares, time-of-day charging, and distance-based or zonal fares.

Fredericton Transit charges a flat rate for bus travel, typical of most North American properties. Furthermore, Fredericton Transit also provides discounts to students and seniors, as well as through a U-Pass agreement with University of New Brunswick (UNB) graduate students and St. Thomas University (STU) students. Recovering approximately 37% of operating costs from fare revenue, Fredericton Transit compares rather favourably to similarly-sized agencies across Canada.

Nevertheless, through Stantec's various stakeholder engagement activities, the idea that fares are too expensive or that large segments of Frederictonians devote large proportions of their incomes to transit was prominent in many discussions. At $80, the monthly adult pass is on the higher end of the price spectrum of Fredericton Transit's peers, and given the low service frequency throughout the day, no Sunday service, and other shortcomings, can foster the idea that riders are paying a lot for little service.

The purpose of this section is to review and compare Fredericton Transit's current fare table with its peers, study fare elasticity with the aim of providing recommendations regarding fares. New technology regarding fare payments was discussed previously in Section 5.0..

6.1 CURRENT FARE STRUCTURE

Fredericton Transit's fare table is straightforward, offering cash trips, books of 10 tickets, and monthly passes, along with student discounts at monthly pass-level; seniors are able to purchase an annual unlimited pass (Table 13). This simplicity has a few advantages. First, instead of confusing passengers with too many fare products, with the simplicity of the fare table, riders can quickly decide on what product they should buy depending on trip purpose, and whether they qualify for student or senior discounts. Second, this simplicity facilitates fare collection and validation by transit operators and minimizes administrative effort.

In addition to these fares available to the general public, Fredericton Transit also offers student fares through U-Pass agreements directly to graduate students at UNB ($140 for an academic year) and students attending STU ($115 for an academic year). These U-Pass schemes allow students to pay a one-time fee and obtain this U-Pass for unlimited rides. While this arrangement is beneficial both to students—allowing unlimited rides on transit regardless of trip purpose—and to the agency—guaranteeing a set revenue as well as increasing ridership—these U-Pass schemes depend on broad roll-out and subscription from the entire student body. To date, UNB undergraduate students—the majority of the student body—have opted not to participate in the U-Pass agreement and any UNB student wishing to buy a transit pass needs to purchase general student fares (monthly pass for $55). Additional post-secondary institutions including the New Brunswick Community College and New Brunswick College of Craft and Design should also be approached for potential UPass partnership.

Fredericton Transit currently provides a generous senior's discount pass; for $50, seniors 65 years and older with government-issued ID can purchase this fare product at City Hall and take unlimited rides throughout a calendar year. In addition to the above programs, Fredericton Transit operates the Transit Fare Assistance Program (TFAP) which provides free paratransit and regular tickets to community groups and agencies via an annual application process.

Fredericton Transit provides a transfer window of 60 minutes on cash and ticket fares for one continuous trip.

Table 13 shows the fare products offered by Fredericton Transit, as well as their discounts using assumed multipliers for the individual fare product.[26] Discounts are greater for products that are expected to yield a greater number of bus trips, incentivizing riders to move from cash and single tickets to multiride products, as well as rewarding loyal customers.

Table 13 Fredericton Transit current fares (2018) and per trip discounts.

	Fare	Multiplier	Unit Price	Discount (on unit price)
Cash	$2.75	--	--	--
10-ride tickets	$25.00	10	$2.50	9%
Adult Monthly Pass	$80.00	40	$2.00	27%
Student Monthly Pass	$55.00	40	$1.38	50%
Senior Annual Pass	$50.00	384 (assumes 8 trips per week, 4 weeks a month, i.e. 32 trips per month)*	$0.13	95%
U-Pass UNB	$140.00	40		
U-Pass STU	$115.00	40		

*Due to the way that fares are purchased for annual senior passes, settling on a multiplier is difficult. At its most straightforward, 384 trips per year would be reasonable, but given that passes can be purchased anytime throughout the year, it is likely that the number of trips per pass decreases with time (from the beginning to the end of the year). With such an assumption, an 'averaged' multiplier of 32.4 is used later when describing the ridership attributable to the senior's annual pass.

The simplicity of the fare table, while reducing the barrier to *understanding* how and what to pay for a trip, may be inhibitive in other ways. Transit agencies across North America and Europe have tried different methods of administering fares and providing relief to low-income income individuals, attempting to offer equitable fares, while incentivizing transit use. For example, some transit agencies offer 30-day fares, rather than fares valid for a calendar

[26] Multipliers refer to the number of assumed trips that a fare product offers, so a 10-ticket book has a multiplier of 10, while many agencies use a multiplier for unlimited monthly passes anywhere from 20 trips to 50 trips.

month. This can be useful for workers with flexible schedules. Other transit agencies may offer off-peak fares that are cheaper than fares during rush hour; one goal of this strategy is to shift some travel demand from peak to off-peak times, while offering lower fares for off-peak travel, typically when disadvantaged riders travel to appointments or other errands. Finally, concessions for only students and seniors presents a glaring problem—what about residents who are of low income and are not students or seniors? Students are temporarily low-income, while not all seniors have low incomes. Some agencies are experimenting with fares based on income, instead of age alone.

In the following section, we review the fares of peer agencies to compare the different fare categories and discounts offered between agencies similar and bigger than Fredericton Transit. As well, we review some interesting fare strategies and policies with the aim of providing new ideas for fare policy in Fredericton.

Peer Comparison of Fares

Any time transit agencies are compared to one another, we must be cautious when drawing conclusions since cities develop differently over time, and no two agencies or cities are exactly the same and deal with different challenges and political climates.

The table below (Table 14) shows the list of peers, including their populations and ridership, as well as farebox recovery ratios and the amount of transit service they provide per capita. Moreover, Table 14 also shows the average fare of the agency which is the total fare revenue divided by ridership; since not all fares are paid at full price (such as student and senior discounts, as well as monthly fares), the average fare per trip provides a good overview of the actual fare collected per rider.

Table 14 Peer transit agencies.

Agency	Service Area Population	Annual Ridership	Revenue hours per capita	Average fare	Farebox recover ratio
Fredericton Transit	**58,220**	**1,375,140**	**1.05**	**$1.15**	**37%**
Kingston Transit	120,494	5,193,481	1.94	$1.32	34%
Moncton Transit	116,940	2,307,725	0.89	$1.63	37%
Red Deer Transit	99,718	2,553,287	1.65	$2.00	31%
Lethbridge Transit	96,828	1,211,415	1.11	$2.30	24%
Brandon Transit	58,003	1,021,537	0.87	$0.59	13%
North Bay Transit	47,084	1,360,337	1.33	$2.03	48%

All data from 2016 CUTA Factbook.

At 37%, Fredericton Transit's farebox recovery ratio is commendable and significantly above the group average of 32%, with the same ratio as Moncton and second only to North Bay with a recovery ratio of 48%. A reasonable target for farebox recovery, particularly of smaller transit agencies, is in the range of 35-50%. Fredericton Transit, considering its ridership and operating costs is performing well. However, it should be noted that if Sunday service is introduced the farebox recovery would likely be greatly impacted.

Furthermore, transit service quality or availability, approximated by dividing revenue hours by service area population (revenue hours per capita), is inherently linked with fares; simply put, people are willing to pay more for better service—if service does not meet your needs, you're less likely to take transit, or find that transit isn't worth the fares charged and be reluctant to use transit. Even worse, high fares coupled with poor service can beget fare avoidance or evasion, together with abuse of transfers. Fredericton Transit offers slightly over 1 hour of revenue service per

capita, on the lower end of its peers. Offering more transit service—though increasing total operating costs—could induce a 'virtuous circle', where more useful transit service can attract more riders, who could take more trips, increasing fare revenue, allowing for more transit service to be implemented, further spurring greater ridership and revenue.

Together with small but consistent fare increases, this strategy can increase average trip fare, farebox recovery, and the ability of Fredericton Transit to provide better transit service. This is perhaps best exemplified by Red Deer Transit; while serving a larger population and having a larger ridership than Fredericton Transit, Red Deer Transit offers about 57% more service hours per capita than Fredericton Transit, and collects about 74% revenue from each fare. By providing more service (1.65 revenue hours per capita) and increasing fares (to obtain $2.00 average fare per trip) to a level comparable to Red Deer Transit, illustratively, farebox revenue could increase to 41%.[27,28]

While the above is a simplified example for illustrative purposes only, given that fares, transit service, and ridership have complex relationships, it does suggest a case that increasing service could increase farebox recovery. Below we discuss the fare tables of peer agencies to understand how FT's fares and discounts differ among its peers.

Table 15 is a simplified table of fares, focused on the major and comparable fare products; other fare products are discussed afterwards. Assumed multipliers are noted by fare product.

Fredericton Transit's cash fare is comparable to its peers, and cash fares of $3 are common for single trips at properties in the peer groups, while agencies more comparable to Fredericton Transit's size (such as Grande Prairie and Belleville) charge fares between $2.00 to $2.50. Red Deer and Brandon Transits both offer discounted cash fares for students and seniors, but this practice typically incurs additional resources, such that riders who qualify for these discounts need to present some identification, either government- or school-issued IDs, or transit-branded ID cards.

Buying in bulk, either through 10 or some such multiple of trips, offers some discount so that the average discount for 10-ride tickets is about 15%; Fredericton Transit offers the smallest discount on 10-ticket books compared to its peers. Nevertheless, this is not an overly generous discount, considering the base fare is $2.75, and a discount of 10-15% from the cost of single ride is prudent. This fare product offers riders flexibility of using transit when they need it, and rewards loyalty by providing a moderate discount from single fares.

Lethbridge, Red Deer, and Kingston offer discounted 10-ride (or 12 or 6) tickets for students and seniors, but again this type of arrangement incurs administrative costs, and Fredericton Transit would do well to stick with offering one type of multiple ticket fare (10 rides).

One product used at many agencies across North America is the day pass, which offers unlimited trips usually for one day, or in some cases, 24 hours after activation. This fare is particularly useful for riders who do not regularly use transit enough for a monthly pass, but need to make multiple transit trips in a single day, whereby purchasing individual cash trips would be expensive. At an average per trip discount of 34%,[29] a similar type of pass could be piloted by Fredericton Transit at a cost of $7.25, to determine uptake and whether additional ridership would be spurred by offering this type of pass.

[27] Red Deer Transit offers 30-minute frequencies on most routes throughout the day, as well as Sunday service from 8:45 a.m. to 6:45 p.m.
[28] This estimated farebox recovery assumes that ridership will not change based on fare increases and/or changes in service provision. Ridership is assumed to be 1,375,140 (2016 CUTA reported statistic). Operating expense per revenue hour is also assumed to remain at the 2016 level ($70.30 per revenue hour). This is meant as an illustrative example to show how fares and service provision (revenue hours) can impact farebox recovery, not as a specific recommendation.
[29] Assuming 4 one-way trips in a single day.

All agencies offer a monthly pass that rewards loyalty by offering a discounted per trip fare, and also guarantees a set amount of revenue. How to set such a discount varies by agency, with a general industry-wide discount of anywhere from 20% to 40%. Fredericton Transit offers the smallest discount on monthly passes; at $80 for an adult monthly pass, this is a roughly 27% discount compared to the average of 33%. Based on various feedback and the table below, $80 may not represent a steep enough discount to convert riders using single or 10-ticket fares to monthly fare purchasers, and thus into regular transit users. Stantec heard throughout its stakeholder activities that $80 is simply too expensive for some riders. While it is not advisable to decrease fares in the coming years, it is advisable to increase fares regularly, but in small amounts. Discussed at length in a later section, Fredericton Transit has sporadically increased fares, such that from 2006 until 2013—7 years—the monthly fare was maintained at $65, which was increased by $5 (or 8%) in 2014, and by $10 (or 14%) in 2015.

This type of fare strategy has two major outcomes: first, it neglects regular inflation (usually around 2%) so that large jumps in fare price must be implemented (as from 2013 to 2014, and 2014 to 2015) to catch up to inflation, and second, because of such large spikes in price, these increases can chase away riders, or force riders to purchase cheaper fares (like single rides or 10-ticket) which will decrease the number of trips taken. This is evident by the loss in ridership reported by Fredericton Transit in 2014, which recovered in 2015, but below pre-2014 levels, despite increasing transit service (Figure 55). As such, a main recommendation is to ensure that fares are increased regularly, every year or two, but in small increments, such as by $0.25 increments for single trips, and a few dollars for monthly pass. In this manner, fares can be increased, and the discount offered on fare products can be maintained year after year.

Table 15 Fare tables from Fredericton Transit and peer transit agencies.

	Fredericton Transit	Lethbridge	North Bay	Red Deer	Moncton	Kingston	Brandon	Average
Cash	**Assumed multiplier of 1 trip**							
Single trip	**2.75**	3.00	3.00	2.55 *2.25 for students and seniors	2.50	3.00	1.50 *1.25 for students and seniors	2.61
10-ticket book	**Assumed multiplier of 10 trips (unless otherwise indicated)**							
Adult	**25.00**	22.50	27.00	26.00 *12 rides	21.00	15.00 *6 tickets	13.50	22.24
Discount from cash fare	**9%**	25%	10%	15%	16%	17%	10%	15%
Students (or youth) and Seniors	**No discount**	21.00	No discount	23.00 *12 rides	No discount	12.00 *6 tickets	11.25	17.85
Discount from cash fare	***No discount***	*30%*	*No discount*	*15%*	*No discount*	*33%*	*10%*	*22%*
Day pass	**Assumed multiplier of 4 trips**							
Day pass	**None**	7.50	8.00	7.00	14.00* Group day pass	8.00	None	7.63 *Excluding Moncton's group pass
Discount from cash fare	***NA***	*38%*	*33%*	*31%*	*NA*	*33%*	*NA*	*34%*
Monthly pass	**Assumed multiplier of 40 trips**							
Adult	**80.00**	77.00	86.00	70.00	64.00	76.00	84.25 *30-day pass	76.75
Discount from cash fare	***27%***	*36%*	*28%*	*31%*	*36%*	*37%*	*NA*	*33%*
Students or youth	**55.00**	62.00	71.00	60.00	49.00	56.50	47.00 *49.50 for post-secondary students	57.21
Discount from cash fare	**50%**	48%	41%	33%	51%	53%	6%	40%
Seniors	**NA *50.00 for an annual pass**	28.00 *280.00 for an annual pass	61.00	60.00	49.00	56.50	47.00	50.25
Discount from cash fare	**NA *assuming 32 trips per month for 12 months, 95%**	77% *76% discount with annual pass	49%	33%	51%	53%	6%	45%

All values represent Canadian dollars, except percentage values.

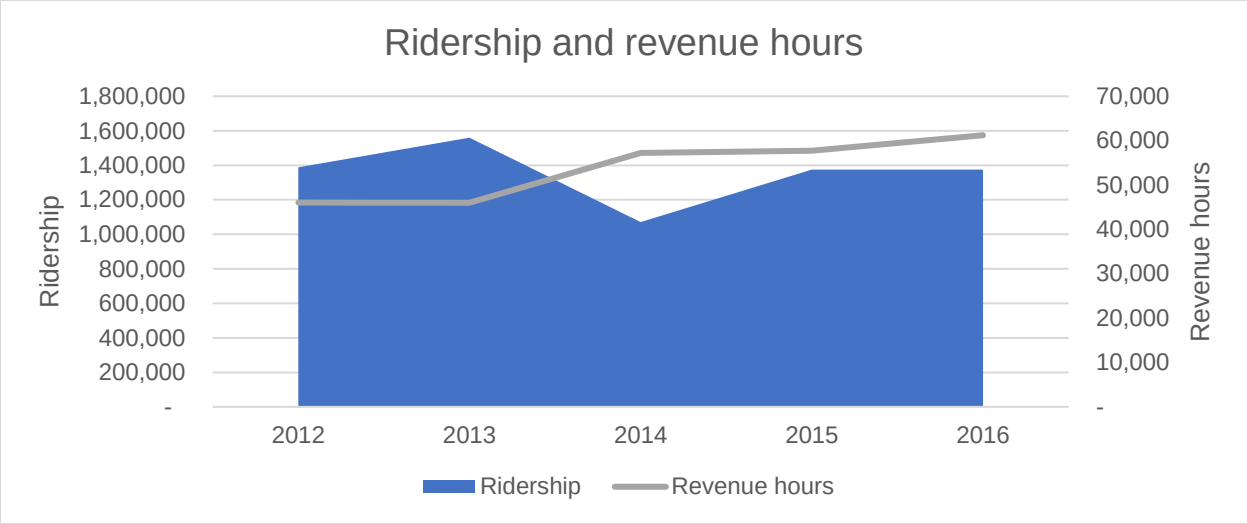


Figure 55 Ridership and transit service trends (2012 to 2016).

The preceding discussion reveals that Fredericton Transit offers some of the smallest discounts on its cash fares compared to the peer group. The simplicity of Fredericton Transit's fare table reduces the complexity or confusion for its riders. Below we discuss more specific fare types that Fredericton Transit may be interested in pursuing.

Kingston Transit offers commuter fares for monthly and weekly passes, which are discounted and allow unlimited travel only on weekdays. This is an interesting offer, but adds to complexity and if the goal of an agency or municipality is to encourage transit usage over cars, then excluding weekends eliminates the incentive for weekend transit use, an integral component of useful and viable transit.

Interestingly, Kingston Transit offers a low income monthly pass at $38.00 for adults, and $28.25 for students/youths and seniors. The adult low-income pass offers a 68% discount from the cash fare (compared to a 37% discount for a regular monthly pass), or a 50% rebate from the monthly fare of $76.00. For students and seniors, the discount for the low-income monthly pass compared to a single cash fare is 76%, and again, a 50% rebate from the monthly fare of $56.50. While these are deep discounts, they can certainly provide some relief for low-income individuals who must travel by transit while ensuring that transportation does not consume a substantial portion of an already low income. Given the interest of lower monthly passes from various outreach activities, we suggest Fredericton Transit pursue a low-income transit pass strategy (outlined further in Section 6.2).

Moreover, Kingston Transit is investigating whether to do away with age-based concessions (students, youth, seniors) altogether and offer "Affordable Transit Passes" instead. By completing an application and by visiting Housing and Social Services and presenting a tax assessment or another form of governmental proof of low income,[30] residents of Kingston can obtain this discounted monthly pass, as well as subsidies for other municipal services such as membership to city recreation facilities and programs, and pet spaying/neutering. With a shift from age-based to need-based fares, Fredericton Transit could look to partner with social assistance programs or other municipal departments to offer discounted fares to households below the low-income cut-off. Clearly, however, details regarding eligibility must be worked out.

[30] The after-tax low-income cut-off is defined by Statistics Canada for households of different sizes (and size of population) and in Kingston, it is $17,485 for a one-person household, and $21,281 for a two-person household, and so on. Currently, for Fredericton, the low-income cut-offs for a one-person household is $17,224, and $21,356 for a two-person household. More details can be found at http://www.statcan.gc.ca/pub/75f0002m/2012002/lico-sfr-eng.htmm and http://www.statcan.gc.ca/pub/75f0002m/2012002/tbl/tbl01-eng.htm, adjusted using the Bank of Canada Inflation Calculator.

While all the peer agencies offer discounted senior's passes at the monthly-level, Fredericton Transit offers only an annual senior's pass (Lethbridge Transit offers a monthly senior's pass for $28, or an annual senior's pass at $280). Fredericton Transit's senior's pass is deeply discount, and assuming 32 trips per month, it results in a discount of 95% from cash fares, or about $0.13 per trip (assuming 384 yearly trips).[31] The average discount (per cash trip) of the peer group is 45%. Applying this 45%-discount to Fredericton Transit's base fare would assume a cost of $1.50 per trip, and at 384 yearly trips, would result in a cost of an annual senior's pass of $576.00 or $48.00 monthly. This is a large increase from the current costs. Changing abruptly would undoubtedly cause a backlash from the active senior's community in Fredericton and would need to be carefully managed with a robust public engagement campaign.

As such, while it is strongly recommended that Fredericton Transit begin selling a monthly pass for seniors likely in the form of a low-income pass that reflects one's ability to pay (at 50% of an adult monthly pass), important outreach work will be needed to educate seniors about why the change is needed and what the benefits are. For Fredericton Transit and riders, having simple low-income passes based on the ability to pay reduces the need for concession based on age or occupation. Furthermore, according to recent financial figures, 465 seniors purchased annual passes in 2017 for a total of $23,250 in revenue; providing a low-income pass at $42 per month (assuming 50% of the proposed monthly fare price of $84), assuming the same number of seniors would purchase 12 monthly passes would increase fare revenue by about $230,000. This additional fare revenue could enable Fredericton Transit to offer better transit service to the community–$230,000 translates to over 3,000 more service hours, or 5% of the service hours provided in 2016. Holding outreach days at senior centres and community groups before deleting the current annual pass and introducing a new monthly product should focus on service improvements that the additional revenue can provide.

Finally, a chief source of fare revenue for many transit agencies all over Canada is the U-Pass—an agreement between transit agencies and post-secondary institutions where annual (or semester or academic year) passes are provided to students (and in some cases, faculty and staff) at large discounts. These U-Pass have a few important outcomes, such as guaranteeing a set amount of revenue for the agency (since purchase is obligatory for all students at a given institution), guaranteeing a certain service level (examples: frequency every 'X' minutes or new revenue for the agency to enable a new service to the airport; a popular destination for students going home to visit their families) and encouraging transit use for many types of trips, not only commuting to and from school.

The U-Pass has been used successfully to increase both ridership and revenue, for example, in places like Kingston and other university towns. Fredericton has two large post-secondary institutions, UNB (student body of ~7,000 part- and full-time undergraduates and graduates) and STU (~2,000 undergraduate students). These schools currently have a decent level of transit service compared to other destinations, but given their potential market (students with low income and likely low car-availability, environmentally-conscious students and staff, etc.), these schools would likely benefit from additional transit service. In addition, because of their constrained site, these schools also have limited, but relatively inexpensive parking ($190 per academic year or $23.75 per month). Stantec believes UNB's below-market price parking is the most significant detractor from increased transit usage by students; it stands as the key barrier for U-Pass desire amongst undergrad students.

[31] There are inherent difficulties in calculating the multiplier of FT's senior's pass for many reasons, including the annual nature of the pass, when pass are sold (passes sold in January instead of November would assume to carry more trips), and how revenue is reported. These challenges also argue for a simpler strategy, such as a monthly senior's pass.

Currently, Fredericton Transit has a U-Pass agreement with UNB graduate students only and STU; multiple referenda have defeated the motion of establishing an agreement with UNB undergraduate students, which would result in nearly $840,000 in revenue (assuming 6,000 undergrads, at $140 per U-Pass[32]).

For comparison, Lethbridge Transit offers a U-Pass for $289.00, substantially higher than $140 for UNB, and $115 for STU. Again, similar to the senior's annual pass, the U-Pass that Fredericton Transit offers is deeply discounted, and given the difficulty of establishing a contract with UNB undergrads, we caution against raising the U-Pass fare without additional service improvement that would directly benefit students, such as late-night services or Sunday services (to reach employment), or other types of incentives such as cooperative partnerships with business where presentation of a transit pass provides rebates at restaurants or cafes, for instance. Furthermore, a recent survey of UNB grads indicated that the majority of respondents (64%) are not 'happy' with the current level of service provided by Fredericton Transit. And while 48% of respondents feel that the price of the U-Pass is fair, 31% find it too expensive, while less than 2% think it should be more expensive. Taken together, any increase in fare should occur with service improvements and dialogue with students to avoid withdrawal from the U-Pass program.

From the fare analysis above, we uncovered that for most fare products, Fredericton Transit's fares are more expensive than the peer group average. Moreover, Fredericton Transit offers smaller discounts on multiride products (compared to single cash fares) than the peer group. Nevertheless, Fredericton Transit offers deeply discounted annual senior's passes, while all peers offer discounted monthly passes, typically equal in price to a discounted student monthly pass. Overall, while many of Fredericton Transit's fares may be on the higher end of the price range, some products may be undervalued for the levels of service being provided by the agency. While we discourage reducing fares, the practice of making large jumps in fare adjustments periodically is an unsustainable practice, resulting in the current fare table. With more gradual fare adjustments, particularly coupled with targeted fare policy revisions (such as a low-income pass) and service improvements, Fredericton Transit can grow ridership and slowly build a more attractive service.

6.2 FARE PROSPECTS

Low-Income Fares

Throughout North America, communities are increasingly vocalizing the sentiment that disadvantaged members of their communities should pay less for transit—arguments of environmental justice or social equity suggest that people who can pay more should pay more, and people who can afford less should pay less.

In the United States, Seattle and San Francisco offer low-income transit pass programs, whereas in Canada, Calgary and Kingston offer good examples of low-income schemes. Calgary Transit has a sliding scale or income bands, and depending on income and number of persons per household, monthly fares are provided at discounts of at least 50%. Low-income seniors and students/youths also qualify for the discounted monthly passes. Like Kingston, applicants must apply in person and provide a proof of residence, proof of age, and proof of income (Canada Revenue Agency Notice of Assessment, or any provincial documentation). Again, like Kingston, this transit program is combined with other social assistance programs under the "Fair Entry" banner, and offers low-income Calgarians assistance with property tax, recreation fees, and pet spaying or neutering. While the eligibility process may be undesirable for riders, it is necessary to avoid or minimize abuse of steeply discounted transit fares. For transit agencies, sharing the cost with other municipal agencies or departments can reduce and streamline the onus on the resident and reduce administrative costs. Edmonton Transit Service (ETS) recently developed a charitable initiative called "Donate-A-Ride", where riders can donate trips at the farebox, and corporate donations subsidize transit tickets for individuals in

[32] Current U-Pass agreement with UNB graduate students.

need. The money collected through this program is administered through the United Way, and the program is a partnership between private businesses, municipal government, and charitable organizations. These donations are tax-deductible and shifts the 'social cost' burden away from agency and City taxbase.

Fredericton Transit should take initiative and collaborate with Recreation, Culture & Community Development to investigate the possibility of offering low-income assistance with discounted transit passes and recreation fees. The introduction of low-income assistance passes could also reduce the increasing need for tickets via TFAP which has been experiencing an increasingly unmet demand. Over the last 7 years the demand for bus tickets via the TFAP program has increased by an average of 36% year over year. Prior to the introduction of the TFAP program, agencies would utilize their own budgets and purchase tickets for use by their clients. Although the TFAP program was introduced to mitigate these expenses, the growing unmet demand offers an opportunity for inter-agency collaboration.

Fredericton Transit could collaboratively investigate the establishment of a low-income fare administered through food banks, United Way, or other agencies that stipulate demonstrating need as a qualifying condition to participation. This process complements the existing TFAP criteria because participating agencies already conduct and record these practices in order to qualify for the TFAP program.

Taken together, a sincere discussion is required with the community, local and provincial levels of government, as well as local businesses and non-for-profits regarding the development of low-income passes. These passes represent real costs for the agency and thus the City of Fredericton. Ensuring that costs are shared appropriately for the advancement of low-income fares and social equity is essential, as the burden should not fall solely upon Fredericton Transit.

Employer Passes

Employer passes, also sometimes known as EcoPasses, work similarly to U-Passes. With an agreement between transit and local employers, reduced monthly (or sometimes annual) passes are offered to employees (sometimes mandatory) as a pre-tax benefit. Like a U-Pass, this has the advantage of encouraging transit use and ridership, while guaranteeing a certain amount of revenue for the transit agency.

Currently, the City of Fredericton and the provincial government offer discounted or free parking to employees. For provincial employees, parking is available on a first-come first-served basis in the downtown core. Nevertheless, the demand greatly outweighs the supply. Fredericton Transit should pursue agreements with municipal and provincial governments to offer discounted transit passes as a substitution to parking passes to their employees. With the majority of governmental functions located in the city centre, within walking distance of Kings Place where all bus routes converge, this is a natural incentive to leave the car at home and avoid the hassles of traffic and parking.

The critical issue is whether transit is viable for government workers and whether transit availability at peak times meets the needs of employees. By working to improve the effectiveness and efficiency of transit in Fredericton through multiple avenues, it may become possible to lure current drivers onto transit, particularly for government employees. Stantec understands that many employees live outside of Fredericton, beyond the reach of transit. As such, part of this project assessed park-and-ride lots which could incentivize transit trips and make EcoPasses with government employees more feasible. Furthermore, parking in the city centre is relatively inexpensive—a new parking master plan underway is examining pricing and other strategies. As the City of Fredericton grows, the provincial government will be obliged to find ways to assist the City with mitigating traffic congestion created in significant part by their employees and collaborating with the City to promote use of transit. The future need for a third bridge crossing can also potentially be delayed if a collaborative effort is implemented, with provincial support, to

promote use of transit and to discourage use of single occupancy vehicles particularly at peak times. Implementing solutions that ensure the cost of transit is competitive with the cost of parking and/or that allow flexible day-to-day choices with respect to mode of travel will be imperative.

Fredericton Transit should pursue employer pass agreements with other private and public employers around Fredericton, and offer subsidies dependent on the number of employees subscribed to the program. For example, in Kingston, employers with 0-10 employees receive a discount of $10.50 on the monthly fare of $76 (employees thus pay $65.50 per month).[33] Some example organizations in Fredericton include Opportunities New Brunswick,[34] firms in the IT sector, and the Regional Hospital. Stantec understands that the Hospital faces parking challenges and providing EcoPasses with the Hospital is a tremendous opportunity for Fredericton Transit to generate stable ridership and revenue.

Fare Elasticity Considerations

When increasing transit fares, it's important to reconcile expected annual inflation and service changes—hopefully improvements—to set fares for the coming year accordingly. Transit agencies are usually reluctant to increase fares, fearing public outcry and ridership loss. Furthermore, increasing fares might burden riders who are already devoting a large portion of income to transportation needs, along with housing and other basic necessities.

Since 2010, total revenues from fares have been increasing steadily, except for 2014 to 2015, where broad increases in fare prices (discussed below) most likely precipitated a decrease in ridership and thus a decrease in fare revenues. Nevertheless, as shown in Figure 56, fare revenues are at an all-time high.

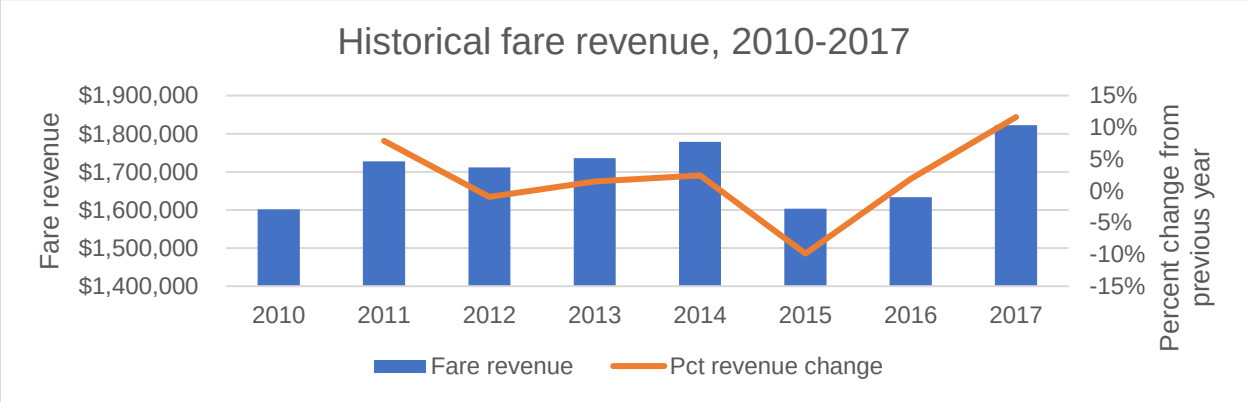


Figure 56 Historical fare revenue (2010 to 2017).
Note revenue figures include charters and paratransit (specialized) service revenue.

Looking at the past 10 years at the historical fare increases of Fredericton Transit can allow us to understand the changes that may impact ridership. First, Table 16 shows that cash fares, until 2015, have increased $0.25 nearly every two years, for a change in 11-14%; this is a prudent approach, and increasing cash fares by $0.25-increments every couple of years sets regular expectations for riders, and also simplifies the fare payment process, rather than increasing cash fares by smaller denominations, like nickels or dimes which usually do not justify or offset the increased cost of handling and processing the extra coinage.

[33] More details regarding Kingston's Employer Transpass Program can be found at https://www.cityofkingston.ca/residents/transit/fares/employer-transpass
[34] Opportunities New Brunswick offers services to companies interested in local business location and expansion in New Brunswick. Employs about 100, head office located at Place 2000, and encourages employees to lead an active lifestyle.

Second, while the 10-ticket book offers a small discount relative to the cash fare, which is industry-best practice, changes in the cost of the 10-ticket book should change along with cash fares, as in 2015. In general, updating the entire fare table is recommended, rather than specific fare products in some years, and other fare products in other years. In this way, riders can predict an increase in fares that is consistent, while regular increases will minimize large jumps in price, as has been the case for monthly fares.

Table 16 Fredericton Transit historical fares and changes in price (2007 to 2017).

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cash	1.75	1.75	2.00	2.00	2.25	2.25	2.50	2.50	2.75	2.75	2.75
Change in price	*NA*	*0.0%*	*14.3%*	*0.0%*	*12.5%*	*0.0%*	*11.1%*	*0.0%*	*10.0%*	*0.0%*	*0.0%*
10-ride tickets	16.00	16.00	18.00	18.00	18.00	20.00	20.00	20.00	22.50	22.50	25.00
Change in price	*NA*	*0.0%*	*12.5%*	*0.0%*	*0.0%*	*11.1%*	*0.0%*	*0.0%*	*12.5%*	*0.0%*	*11.1%*
Adult Monthly Pass	65.00	65.00	65.00	65.00	65.00	65.00	65.00	70.00	80.00	80.00	80.00
Change in price	*NA*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*7.7%*	*14.3%*	*0.0%*	*0.0%*
Student Monthly Pass	40.00	40.00	40.00	42.00	42.00	42.00	45.00	45.00	55.00	55.00	55.00
Change in price	*NA*	*0.0%*	*0.0%*	*5.0%*	*0.0%*	*0.0%*	*7.1%*	*0.0%*	*22.2%*	*0.0%*	*0.0%*
Senior Annual Pass	55.00	55.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Change in price	*NA*	*0.0%*	*-9.1%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
U-Pass UNB	NA	NA	140.00	140.00	140.00	140.00	140.00	140.00	140.00	140.00	140.00
U-Pass STU	115.00	115.00	115.00	115.00	115.00	115.00	115.00	115.00	115.00	115.00	115.00

Introduced in 2006 at $65, the adult monthly fare was not increased in price until 2014 to $70, and again in 2015 to the current cost of $80. This jump represents a 23% increase in two years. While cash and single tickets were increased relatively consistently between 2007 and 2014, this was not the case for the monthly fare. Below we examine the potential impacts of this strategy on ridership and thus revenues, but for the moment, it suffices to advise that monthly fares be increased along with all other fares, while maintaining a given discount from cash fares, which the previous analyses above point to a range of 20-30%.

The same argument can be made for the discounted student monthly pass, currently priced at $55. There was a large jump of 22% in price in 2015 from $45, which had been rather consistently increased from $40 to $42 in 2011, and $45 in 2013. As with the adult monthly pass, small, regular increases are preferred, set at about 20-30% below the cost of an adult monthly pass.

Again, regarding the drastically undervalued annual senior's pass, the price actually *decreased* from $55 in 2008, to the current $50-level. In fact, this $50 cost was the original price of the pass when introduced in 2000, which was increased to $55 in 2003 and to $60 in 2006, only to be *reduced* in 2007 to $55. As such, this fare product has not even been adjusted for inflation. While a sensitive issue, it will be important to either revise the senior's pass to a monthly product, equivalent to the cost of a student monthly discounted pass, or do away with age-based concessions altogether, and focus instead on the ability to pay.

Finally, U-Pass arrangements with UNB graduate students (introduced in 2009) and STU students (introduced in 2004) have not changed in price since their introductions, and as such, have not been adjusted for inflation. Given that both schools share the same campus and thus receive equivalent levels of transit service, it's advisable that future U-Pass arrangements set the price at either institution equally, as well as adjust for inflation regularly. Since

the rates have not been increased and considering U-Pass arrangements at institutions in similarly-sized cities across Canada, a rate of $150 is not unreasonable. Offering this pass for 12 months amounts to $12.50 per month, a very reasonable rate considering the current $55 monthly student fare.

While the greatest portion of fare revenue[35] in 2017 came from cash fares (25%, see Table 17), using the multipliers described in Table 13, we can see that the largest proportions of ridership come from the monthly pass products (40% combined adult and student, see Table 17).

Table 17 Fare revenue and ridership (estimated) by fare product, 2017.

	Revenue	Percent of revenue	Ridership	Percent of ridership
Cash	$450,954	25%	163,983	20%
Adult Monthly Pass	$384,868	22%	192,439	24%
10-Ride Tickets	$367,636	21%	147,055	18%
Student Monthly Pass	$260,446	15%	189,415	24%
STU U-Pass	$209,300	12%	72,800	9%
UNB Grad Student U-Pass	$83,720	5%	23,920	3%
Senior Annual Pass	$23,250	1%	15,006	2%
Total	$1,780,174	100%	833,731*	100%

*Estimated ridership counts. Based on assumed multipliers and may undercount actual ridership (boardings) as counted and reported to CUTA.

Given the link between service quality, fares, ridership and revenue, a useful analysis to uncover how given fare changes may impact ridership is a fare elasticity analysis. Essentially, by examining year-over-year changes in ridership overall, as well as by individual fare product, together with year-over-year changes in fare changes, we can uncover how fare changes will affect ridership.

The fare elasticity analysis was first performed at the fare product-level, and then individual fare elasticities were averaged to obtain an overall fare elasticity for Fredericton Transit. The aggregated fare elasticity is -0.6; so for every 1% increase in fare price, we can expect to see a 0.6% decrease in overall ridership. This value falls within the typical range of elasticities of -0.2 to -0.6. Nevertheless, the standard deviation for this value is quite high, 0.8. This is not unusual given that fare elasticities are notoriously difficult to predict and vary substantially by fare product, for different types of riders, at different times of the day, and for different trip purposes, to name a few factors. Moreover, riders may change purchasing behaviour and switch between fare products, which may be useful to converting riders to multiride products like monthly passes.

Fare Evasion Considerations

Fare evasion takes many forms, but each has the same result—a rider being transported by the transit agency without paying the appropriate fare for the service provided. Typical forms of fare evasion include:

- **No Fare Paid**: No money or valid pass/ticket/transfer collected or accepted by a bus operator;
- **Short Fare**: Less than the correct or total cash fare is tendered by the customer; and,
- **Expired/Invalid Fare Media**: Fare media, including transfers, presented to a bus operator is expired, invalid, manipulated original or fake.

Fare evasion is problematic for transit agencies as it enables revenue leakage that would otherwise contribute to the farebox recovery ratio and the overall financial health of the agency. Every transit agency has some level of fare evasion. Like in all communities, Stantec acknowledges that there are individuals in Fredericton who cannot afford to

[35] Excluding paratransit and charter revenue.

pay for transit fares. We believe a low-income strategy predicated on one's ability to pay is the optimal solution. The fare evasion referenced here pertains to customers who can afford to pay for fares but deliberately choose not to do so for a variety of reasons. Inappropriate fare structures can also add to instances of fare evasion unintentionally if fare tables are overly complicated, but also deliberately from perceived low value for money and poor service quality.

While not directly within the scope of this project, Stantec observed instances fare evasion occurring on the system while undertaking its stakeholder engagement activities. This problem is most acute at Kings Place where bus doors are left open while bus operators use washroom facilities in the mall. Seizing on the opportunity, fare evaders can enter the buses freely without presenting appropriate and valid fare media. A simple solution to solve this problem is to require operators to close bus doors whenever they are away from the vehicle. The decision of whether riders currently onboard the bus can remain on the bus or are requested to alight is at the discretion of Fredericton Transit; each approach has resulting pros and cons. Protection of fare revenue would further be strengthened by on-street supervision at Kings Place; this is a resource Fredericton Transit historically had but was eliminated at some point to reduce operating costs and full-time equivalents (FTEs). Stantec believes on-street supervision is warranted and necessary from multiple perspectives including safety and security, customer service / tourism and operations. Reinstituting this position should be strongly considered as a priority.

Last, while undertaking ride-alongs on the system, Stantec noted many instances of short fare where customers did not pay their 'fair share' for the service they were receiving. Supporting its firsthand observations, Stantec heard many anecdotes from frontline employees about 'crafty' fare evasion techniques including individuals tearing monthly passes in half and hiding the torn part inside of their cell phone cases as well as individuals letting others board the bus via the rear doors triggered by the automatic sensors in the bus. Frontline employees believed the problem of fare evasion to be a serious one.

Curbing fare evasion is not simple. Doing it correctly requires a multi-pronged approach that must consider all angles. There is no single "magic bullet" that can solve the issue on its own. To combat this issue, Stantec suggests that Fredericton Transit develop a fare evasion plan that would address the following:

- Determines what is an acceptable level for fare evasion (<2% is industry "gold standard") recognizing that there is a trade-off between enforcement costs and the level of fare evasion;
- Identifies enforcement activities that will be done to achieve the fare evasion target;
- Outlines formal procedure on what operators should do in instances where evasion is occurring;
- Establishes a public education strategy. This public education effort should be both for the operators and for the customers—Stantec advocates for a "fare is fair" campaign to raise awareness of the issue or other peer-to-peer strategies such as the one used by York Region Transit, in Ontario (Figure 57);
- Provides operator training on "protecting the fare box" in tandem with established standard operating procedures; and;
- Establishes performance measures (KPIs) for fare evasion and enforcement—essentially a communications tool for the frontline and public on how we are doing.

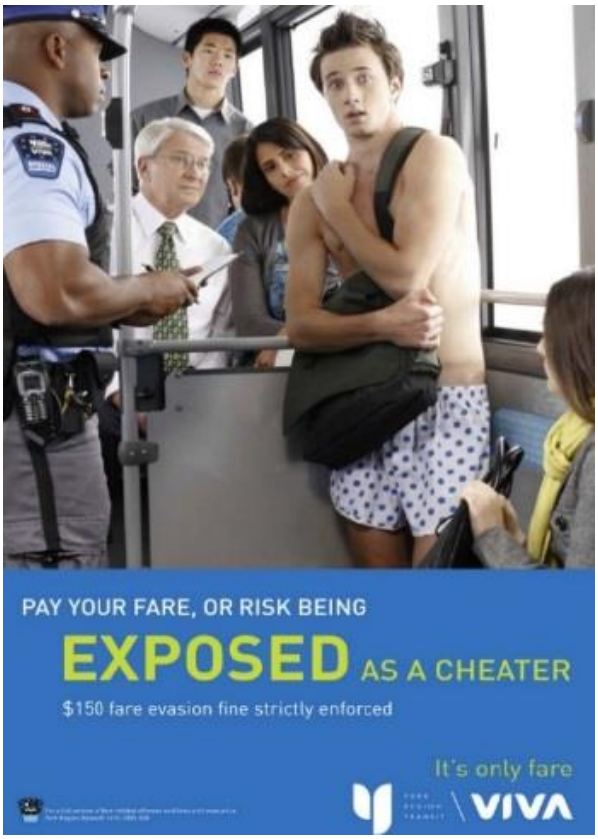


Figure 57 Example of fare evasion ad campaign from York Region Transit, Ontario.

Source: YRT/Viva.

Many transit agencies are beginning to eliminate paper and cash fare collection and move into electronic and digital fare collection. New fare payment technology, from smartcards to open payments through credit and debit cards, as well as smartphones are helping agencies empower their customers to choose the right fare. While another section of this report reviews technologies, including fare collection, this section describes some of the benefits of electronic fare media. Steps taken to address low income needs with respect to ability to pay may also reduce fare evasion as resolving the low income access to transit considerations will mean that those continuing to pay cash fares are more likely to have an ability to pay.

With an agency-branded smartcard, riders can load cash value or certain fare products, such as monthly passes or 10 tickets. With every tap on a fare reader aboard a bus, a certain value or product is deducted or validated. This can speed up the boarding process and reduce dwell times, speeding up bus operations since bus operators no longer need to visually validate fare payment.

The main benefit to such a system is the ability to program different types of fare products to such a high degree. For example, by combining a smartcard with an ID photo on the rear, cards can be programmed for seniors or low-income riders, for instance, reducing the administrative costs of requiring monthly verification—only specific cards will permit the purchase of specific fare concessions. Smartcards can also enable fares such as 30-day passes that can be activated upon validation, removing the necessity to purchase a fare for a calendar month. Furthermore, smartcards can enable distance-based fares, although for a city the size of Fredericton, this is likely unnecessary.

One important feature is that fares can be charged based on time of day. With a smartcard, users can select to buy off-peak or peak fares and they would be validated at the time of use. Similarly, cash value could be loaded on the

card and then specific rates could be deducted based on the time of day. Time of day pricing is something Fredericton Transit could consider once it has successfully launched and implemented an electronic fare collection system.

Moving away from cash and paper transfers to electronic means, either through smartcards or open payments with mobile phones and debit or credit cards, can reduce fare evasion. Moreover, it also reduces the expense of handling cash, which for Fredericton Transit, constitutes the majority of fare revenue (25%).

Finally, with electronic payments, important social equity concerns can be addressed not only through low-income passes, but also through fare capping. Fare capping works as follows. By allowing riders to pay per trip at the single trip cost which is then limited to the price of a monthly (or weekly) fare, riders have more flexibility and can travel without needing to buy additional tickets. Fare capping removes the need to purchase monthly fares, which requires a large upfront investment and may not be feasible for low-income individuals. Instead, fare capping allows a rider to pay for the trips they take, and once the number of trips taken matches a predetermined cap (like the monthly fare), trips taken above the cap are 'free'. This fare capping scheme would directly benefit customers of TFAP agencies, such as Christ Church Cathedral and Big Brothers Big Sisters clubs. These agencies run out of TFAP ticket allocations early in the year due to the regularity of activity scheduling and their full spectrum client support models. Therefore, fare capping would prevent penalizing clients who require and receive frequent care while fulfilling community equity demands.

Although smartcards offer flexibility and new possibilities, it is important to resist the temptation of implementing too many fare products that would drive away riders, instead of attracting them through simplicity of use.

6.3 FARE RECOMMENDATIONS

Based on the above analysis, we propose the following recommendations. Note that these recommendations are not ordered by priority, but rather ordered to provide a sense of flow and rationale to the high-level fare strategy for Fredericton Transit. Moreover, these are high-level recommendations that require that Fredericton Transit, City Council, and various stakeholders discuss the values and purpose of transit in Fredericton.

1. **Keep the fare table simple:** Complexity is a barrier to use, particularly for infrequent riders and contributes indirectly to fare evasion. We recommend that a single cash fare be maintained, and 10-ticket books be maintained at a single price (i.e. no discounts for seniors and students). Monthly pass fares should be available for adults and discounted passes based on income or the ability to pay. In this manner, adults, students, and seniors with low incomes would pay reduced fares.

2. **Raise fares consistently, every couple of years, and by moderate amounts, instead of large amounts infrequently:** ideally, fare increases should be done in tandem with service improvements. This strategy lowers the overall burden that large increases in fares incur on riders when an agency needs to boost revenues in order to pay for service adjustments. Regular and consistent fare increases can be anticipated, and coupled with service improvements, can mitigate potential ridership losses due to fare raises.

3. **Keep discounts consistent:** When increasing fares, the discounts offered relative to the single cash fare should be kept consistent. Based on the peer analysis and industry best-practice, we recommend:

    a. 10% discount on cash fare for 10-ride tickets (i.e. a 10-ride ticket is equivalent to 9 cash fares)
    b. 25-30% discount on cash fare for adult monthly pass (assuming 40 one-way trips per month, so with the discount applied an adult monthly pass is equivalent to 28-30 cash fares)

c. 40-50% discount on an adult monthly pass for qualifying low-income customers, regardless of age or occupation.

4. **Investigate the feasibility of a low-income monthly pass:** Broadly speaking, this pass would provide unlimited monthly trips for qualifying individuals who complete a form and present a statement of need, such as federal or provincial documentation. This pass should be offered at a 40-50%-discount from the regular adult monthly pass. Using a similar discount as Kingston's, Fredericton Transit could set a low-income monthly pass at 50% discount from the adult pass, or $40.00 at the current cost.[36]

   There are different ways that a low-income pass may be implemented, and Fredericton Transit will need to engage with different stakeholders and refine the process for eligibility (whether income will be the sole basis of eligibility, or whether income and age are considered) and implementation. Below we provide a high-level concept for low-income fares.

   For the purposes of a 'pilot' in the short term, we recommend leveraging the current TFAP[37] where non-for-profits and other institutions purchase transit tickets in bulk and give them away for free to members who already demonstrate need (low-income, disability, etc.). Participating organizations of the TFAP could purchase monthly fares (adult, senior and student) from Fredericton Transit at 50% discount and distribute to their customers on a first-come-first-served basis. These monthly fare media would not look different from non-subsidized media in order to reduce stigma of use. Eligibility would be monitored by TFAP organizations and Fredericton Transit. Other ways of addressing low-income fares could include the Donate-A-Ride scheme of ETS in Edmonton.

   Based on outcomes of the pilot (such as the number of monthly passes sold to TFAP organizations and then distributed, revenue, estimated ridership, feedback from the organizations, social assistance groups, and riders), the low-income pass can become a more widely distributed product. Like in Kingston, a low-income transit pass program could be paired with other municipal departments to offer assistance to access other programs, like municipal recreational facilities. Together with electronic fare media, such as smartcards, qualifying individuals (eligibility could be determined based on community values, but a good starting point is the low-income cutoff as defined by Statistics Canada, or another criterion used by social welfare programs in Fredericton) would present official documents at City Hall or through a partner organization, like in Kingston, and receive a smartcard with a photo ID that would allow them to load monthly low-income fares. This would remove the administrative costs of supplying this pass every month, as qualifying individuals would qualify annually, and load monthly passes at their convenience.

   Finally, whatever the solution, Fredericton Transit should be made whole for the cost of the low-income pass, i.e. Transit should recover the cost of the monthly fare. The difference between the retail (low-income) price and the true cost of the fare should be covered through the city, province, or private partnership (donations like ETS). The subsidy should not come from Fredericton Transit.

5. **Harmonize the U-Pass agreement between institutions to establish a consistent fare:** Both schools share a common campus, and therefore receive equal levels of transit service. Therefore, both student bodies should pay the same amount. Furthermore, the price of the U-Pass should be consistently increased annually or biennially, as with other fares, to account for inflation and service adjustments. It's recommended that all institutions are offered annual U-Passes for $150, and that this rate is subsequently increased incrementally with regularity. In time, the City may consider a term-based fee rather than an annual fee.

[36] This strategy requires retirement of the annual senior pass.
[37] http://www.fredericton.ca/en/transit/fares/transit-fare-assistance-program

Below in Table 18, we propose a scheme for fare increases for five years based on the recommendations above. These values are meant to guide a discussion on rationalizing the fare table.

Table 18 Fredericton Transit proposed fare structure.

	Year 1	Year 2	Year 3	Year 4	Year 5
Cash	$3.00	$3.00	$3.25	$3.25	$3.50
10-ride tickets	$27.00	$27.00	$29.25	$29.25	$31.50
Adult Monthly Pass	$84.00	$87.00	$91.00	$95.00	$98.00
Low-Income Pass	$42.00	$43.50	$45.50	$47.50	$49.00
U-Pass	$150.00	$160.00	$170.00	$180.00	$190.00

Note the incremental increases for monthly and U-Pass fares to mitigate large increases year-over-year. While the discount relative to a one-way cash fare varies, overall, the level of discount is consistent with the recommendations. Additional improvements to the system, as well as investments in partnerships, accessibility, etc., would be required to justify larger fare increases.

6. **Launch advocacy campaign for U-Pass:** Related to recommendation 4, Fredericton Transit should launch an advocacy campaign to obtain a U-Pass arrangement with UNB undergraduates. The additional revenue should be focused on providing better transit service for students to/from campus (more frequent service on school days, later hours into the evening, etc.).

7. **Investigate the feasibility of EcoPass agreements with major employers:** Starting with governmental agencies, and the regional hospital.

8. **Eliminate the annual senior pass and establish a monthly pass:** With a sincere outreach program focused on educating seniors on the necessity of moving from an annual to a monthly fare product, eliminate the annual senior pass and establish a low-income monthly pass that seniors who earn low incomes would qualify for. Elimination would likely require an approach where this outreach campaign occurs in the latter half of the year before deleting the annual senior pass.

   While this may incur some ridership loss and involve political controversies, the current $50 annual price is unsustainable—it undervalues transit service. None of the peer agencies offer annual senior passes, or senior passes at such a deeply-discounted level. Furthermore, additional revenue from monthly low-income passes would help fund additional service that could directly benefit seniors.

9. **Eliminate monthly student pass and replace with a low-income pass**. Students are most likely employed in low-income jobs or are unemployed (such as students in junior high school, etc.) and would qualify for low-income pass.

10. **Counter fare evasion by codifying and adopting a formal fare evasion plan that is strictly enforced**: Fredericton Transit needs to create a “fare is fair” culture to communicate the importance of fare collection to the overall financial viability and sustainability of the agency. This messaging should be both internal to frontline and external to Fredericton Transit’s customers.

11. **Ensure that fare increases, particularly any large increases, occur with visible improvements to transit service**: This could result from advertising more frequent services during rush hours for example, or advertising the environmental benefits of transit over single-occupancy vehicles. Though fare increases should occur

regularly, ensuring that fare adjustments occur alongside service improvements can mitigate some potential ridership loss due to fare increases alone. Implementation of the other recommendations of the Strategic Plan is particularly a great opportunity to increase fares, as users will be willing to pay more for what they perceive to be a better service. In addition, ensuring that fare increases and transit fares in general are competitive with parking fees is important for providing a viable and attractive alternative to driving.

Below we discuss a few interesting strategies that could generate additional ridership and address equity concerns, as well as generate added revenue.

Non-Fare Revenue Strategies

Non-fare, or ancillary, revenue can provide a substantial revenue stream for transit agencies. For Fredericton Transit, municipal contributions cover the majority of operating and capital costs not covered by fares, while new federal funding through the Public Transit Infrastructure Fund (PTIF) has allowed agencies across Canada to benefit from federal subsidies for new capital. Nevertheless, the province of New Brunswick is almost completely absent from financially supporting public transit throughout the province which is unusual when considering the Canada-wide context. While capital dollars are always welcome, they are of little value without matched operating dollars. In Quebec and Ontario, a substantial portion of operating subsidies are obtained from the province, and in Ontario, a portion of the provincial gas tax is dedicated to fund transit operational costs across the province as a proportion of an agency's ridership (70%) and population (30%). Fredericton, along with Moncton and Saint John could collaborate to lobby for provincial contributions from gas tax for instance,[38] or from the removal of property taxes on transit infrastructure.[39] This case is further strengthened as Fredericton Transit becomes a "regional transit" versus solely an agency that services the city limits of Fredericton.

The recent publication *From Surfaces to Services* outlines clear and bold strategies for New Brunswick's transit agencies, and working collaboratively can achieve the critical mass needed to mollify policymakers and politicians to support transit spending at the provincial level. Data from the 12 Year Transit Fare Assistance Program can be used to support a case for provincial fiscal contribution, particularly for low-income riders, this data could include the total number of agencies applied vs total number approved and annual numbered lists of approved agencies and their supply vs demand shortfall numbers.

Current fare assistance data shows that many agencies depend on the TFAP issued tickets, as such, the Community Liaison Budget has had to cover overspending to meet these agency demands which reduces funding for other municipal initiatives. Current TFAP data indicates that 90% of TFAP demand is currently unmet via this program, the gap in provision and the ongoing nature of these agency demands necessitates provincial subsidies and collaborative provincial petitioning.

Another important source for transit revenue is through advertising and parking fees. In 2017, Fredericton Transit derived nearly $120,000 in advertising revenue, or 6% of its total revenue, through advertising. This was slightly down from 2015, but has been steadily increasing since 2010. It's important to keep up this trend and expand where possible, such as by increasing the number of bus shelters (benefit to passengers as well), particularly in busy areas of Fredericton, increasing advertisement on the exterior of buses (including bus wraps), and on the interior. Furthermore, partnerships with local business could be explored as ways to generate some additional revenue, while augmenting the brand visibility of Fredericton Transit. These partnerships could involve a rotating set of businesses

[38] Although improved fuel efficiencies have decreased revenue from gas taxes.
[39] *From Surfaces to Services* p.18.

(monthly), that would offer discounts on products upon presentation of a valid monthly pass. The STM in Montreal has a program of the sort.[40]

Related to parking fees as a source of revenue, the fact that Fredericton Transit is within the parking department could provide an additional avenue for generating revenue through parking fees at lots operated by the City. Additional revenue could be earmarked for transit service, and raising the cost of parking (on-street and off-street) could also encourage transit use. Currently, the City of Fredericton is preparing a parking master plan. Without knowing the specific details and recommendations of that plan, it's well-known that parking prices and restrictions can influence transit use, the idea being that more restrictive and more expensive parking could shift some trips from driving to transit. It's recommended that Fredericton Transit and the City evaluate the feasibility of raising parking fees, which are currently as low as $1.00 per hour. Ensuring that parking and transit prices work together, rather than in opposition, may help fulfill the goals and vision of the Municipal Plan and Growth Strategy.

[40] See http://www.stm.info/en/offers-and-outings/benefits/exclusive-offers for more details.

7.0 PARTNERSHIPS

7.1 CURRENT PARTNERSHIPS

A transit system is made stronger when it is considered an integral part of the community. The strongest transit systems are typically those that have partnerships with other organizations and leverage them for mutual benefit. The TTC, for example, recently won the 2017 APTA Transit System of the Year award, likely due in part to the partnerships it has recently fostered with PRESTO, York Region, Waterfront Toronto, the National Ballet of Canada, and Corby Spirit and Wine, among others. Not only do partnerships provide a means for a transit agency to share costs, but each partnership also involves an additional group of stakeholders for whom the transit system is a vested interest. Fredericton Transit has a number of partnerships in place today which enhances its ability to provide a useful and reliable service for people in Fredericton. Current partnerships include the following:

- **St. Thomas University and Student Union and the University of New Brunswick Graduate Student Association**. Both organizations are currently engaged with Fredericton Transit in a U-Pass arrangement. This partnership is a win-win, whereby students are provided with reliable transit service at a discount, and Fredericton Transit is provided with a predictable source of revenue.

- **Expedition Connect**. This organization owns ReadyPass, the user-facing smartphone app that provides riders with an indication of when their bus will arrive. This partnership benefits Fredericton Transit with improved user information and it benefits Expedition Connect with a source of revenue. There are opportunities to expand this partnership, discussed further below in Section 7.2.

- **Community Groups**. Fredericton is partnered with 35 community groups through the current Transit Fare Assistance Program whereby regular single-ride and specialized transit tickets are distributed to these organizations based on availability and need. This partnership allows Fredericton Transit to offload the responsibility of distributing the tickets to community groups who are better positioned to do so. It benefits the community groups through allowing them to provide an additional service to their clients.

7.2 PARTNERSHIP PROSPECTS

To strengthen ties between Fredericton Transit and the community and encourage transit use for years to come, it is recommended that Fredericton Transit create additional partnerships wherever possible. Many of the possible partnerships are described in earlier sections of this report but for convenience and completeness, Fredericton Transit's partnership opportunities are summarized below as follows.

Partnerships with community organizations

Fredericton Transit might further partner with community groups such as Greener Village, Ability NB, and the Canadian National Institute of the Blind (CNIB). Greener Village is already familiar with local bus services, and they receive donated bus tickets, distributing them among their clients who are living on social assistance. A partnership between Fredericton Transit might involve an arrangement whereby Fredericton Transit supplies bus passes to Greener Village at 50% of the cost of regular monthly passes, and in turn Greener Village is responsible for distributing the passes to clients who fall below a predetermined low-income threshold. Similar partnerships can be formed with other community organizations. Low-income passes are discussed in additional detail in Section 6.0.

In the case of Ability NB and/or CNIB, a partnership arrangement might involve a Travel Training program. After the ramps aboard Fredericton Transit's conventional buses become operational, Fredericton Transit might develop a program that allows Para Transit users to become comfortable using the conventional bus system, and Ability NB can deliver the program to its network of mobility-challenged individuals. A partnership has already been developed between Fredericton Transit and Ability NB and can be further built upon as accessible improvements to the system are implemented. Travel training, along with bus stop accessibility improvements, operator training, and other tactics described in the Fredericton Transit Accessibility Plan (2017) would increase the travel options and flexibility for certain individuals who current travel with Para Transit. Other properties across North America that have implemented similar Travel Training programs have experienced cost savings of fewer specialized transit trips well in excess of the incremental costs of developing and executing the Travel Training program. Ability NB might also act as an advisory group for Fredericton Transit with respect to the accessibility of bus stops. Together with firsthand experience in Travel Training, Ability NB would be in a unique position to advocate for more accessible bus stops while working with Fredericton Transit to develop bus stop guidelines and design standards.

Partnerships with technology companies

Fredericton Transit currently has limited internal data tracking abilities. At the same time the user-facing ReadyPass app can be inaccurate and difficult to navigate. To solve this issue, Fredericton Transit might partner with organizations such as Transit App while growing its partnership with Expedition Connect (owner of ReadyPass; or similar organizations). Such an arrangement might involve Expedition Connect being contracted to track data on behalf of Fredericton Transit. This can include the output of a real-time GTFS feed to Transit App, which can act as a new-and-improved user-facing mobile application for personalized route planning and tracking next bus arrival information.

Partnerships with key trip generators and major employers

Key trip destinations, if planned for appropriately, have the potential to bring in a steady and predictable stream of ridership (and consequently revenue). The largest trip destinations, in most cases, can be found by looking at a city's largest employers. Many transit agencies enter partnerships with local employers whereby the agency supplies discounted monthly passes, also known as EcoPasses, for the employers to distribute to their staff in exchange for a guaranteed number of passes purchased every month. Not only is this a reliable revenue source for the agency, but it also helps guide transit planning activities to ensure the employer's place of business is adequately served by transit. On a case by case basis, schedule updates and/or stop relocation may be warranted. Fredericton Transit might consider exploring EcoPass arrangements with employers such as university faculty and administration, Regent Mall, the Dr. Everett Chalmers Regional Hospital and the Province of New Brunswick. Promotion among City of Fredericton municipal staff should also be pursued.

Similar to an EcoPass, a U-Pass is the common term for a similar discounted monthly pass for students attending a post-secondary institution. U-Passes bring similar benefits in terms of a reliable source of revenue and guidance for transit planning activities. Fredericton Transit already has U-Pass arrangements with St. Thomas University students as well as with the graduate students of the University of New Brunswick (UNB), but not with UNB's undergraduate students. Discussions with the UNB Student Union should continue in hopes that a similar arrangement might be reached with the undergraduate students. It is noted that by improving service to and from the UNB campus, as proposed in Section 4.5, UNB undergraduates may become more willing to participate in a U-Pass program and may vote favourably for a U-Pass in a future referendum. EcoPasses and U-Passes are also discussed further in Section 6.0.

Partnerships with neighbouring municipalities

Saint John Transit has a service called Comex that provides peak hour express service between the City of Saint John and the nearby towns of Rothesay, Quispamsis, and Hampton. While Rothesay and Quispamsis are larger than the towns that surround Fredericton, Hampton is comparable in size to Hanwell and New Maryland, and might provide insights into how a similar service could operate between Fredericton and Hanwell or between Fredericton and New Maryland. Depending on political interest and forecasted ridership uptake, Fredericton Transit might consider entering into a partnership with Hanwell or New Maryland to pilot an express service between a designated park-and-ride lot in Hanwell or New Maryland and Kings Place in Fredericton. The partnership would involve the neighbouring Village or Municipality, as well as the province, sharing in the costs of constructing the park-and-ride lot and operating the new express route, and Fredericton Transit in turn operating the service through a cost-share arrangement with the partnering Village or Municipality. This concept is supported by the 2017 report, Surfaces to Services: An Inclusive and Sustainable Transportation Strategy for the Province of New Brunswick, 2017-2037.

Another opportunity for Fredericton Transit which may be more compelling from a forecasted ridership standpoint but is more logistically challenging involving the coordination of more moving parts is to enter a partnership to provide service to the Fredericton International Airport. Possible partners for such a service could include Lincoln, the Government of New Brunswick, the Airport, the Moncton Flight College, and potentially the Town of Oromocto. A similar express service could be launched, operating with stops at Kings Place, the Potato Research Centre, Lincoln Heights, the Fredericton International Airport, and potentially also a park-and-ride lot in Oromocto. In this case, the express service could be combined with an EcoPass arrangement at the Fredericton International Airport or the Moncton Flight College, or both. Both organizations have expressed interest in contributing financially to the launch of an express service to the airport although discussions to date have been more informal and anecdotal in nature. It is recommended that Fredericton Transit continue conversations and work towards the launch of such an express service, as Fredericton Transit may not only be able to eliminate the unproductive Route 20 (Lincoln) in lieu, but service to the airport may make the prospect of a U-Pass more attractive to UNB undergraduate students.

Partnerships with other municipal departments

A final category of partnerships for Fredericton Transit's consideration is partnerships with other municipal departments. Fredericton Transit already has a working relationship with other City staff, although there is room to improve collaboration to the end of improving bus stop accessibility, improving the affordability of transit, and in promoting the visibility of transit. With respect to bus stop accessibility, Fredericton Transit can continue to work together with the Department of Engineering & Operations and Community Planning toward the goal of better integrating land use planning with transit planning. New developments such as those occurring to the southeast of the Bishop Dr. / Hanwell Rd. intersection can be planned with improved connectivity to the main thoroughfares, allowing for easier access to transit. Additionally, improved collaboration with the partners that remove snow from streets and sidewalks can have drastic improvements on the accessibility of the current bus network.

With respect to transit affordability and visibility, Fredericton Transit can work together with other divisions in the Department of Growth & Community Services in the rollout of a low-income bus pass program as well as in the promotion of the tourism and economic development benefits of transit. Tangentially related to transit affordability is the inexpensiveness of parking. Currently there are little financial incentives to switch to transit, but if parking policies were developed in coordination with transit strategies, transit could become a more compelling solution particularly for those commuting on a daily basis to the City Centre where parking is currently constrained.

7.3 PARTNERSHIPS RECOMMENDATION

In summary, there is a myriad of possible partnership opportunities between Fredericton Transit and different groups and organizations local to Fredericton. Working in tandem with City departments, community groups, and business will help fulfill community goals in the City's Growth Strategy for a compact, densely developed urban community with a "complete transportation system" that provides mobility choices. Not all partnership opportunities will come to fruition, and others will take time to cultivate, so it is recommended that Fredericton Transit begin (or continue) conversations in the near future with the prospective partners described above. In preparation for conversations, it is important to consider the benefits, risks, and potential drawbacks for each partner, and consider strategies to mitigate the risks.

8.0 MARKETING

8.1 CURRENT MARKETING APPROACH

The visibility of public transit plays an underappreciated role in attracting new ridership, and retaining existing ridership. Cities and municipalities make significant investments into their transit systems but have historically tended to starve the marketing and communications aspects of them.

The transit industry is becoming increasingly cognizant of the need for a long-term marketing and communications strategy which evolves the agency's brand, engages riders, and promotes discretionary trips as primary activities. The necessity of marketing transit cannot be overstated particularly considering that transit industry disruptors such as Transportation Network Companies (TNCs) are increasingly swaying market share. The need to stay relevant in the minds of transit's customers has never been more prevalent.

The City of Fredericton has made a significant investment in transit, however very little is done in the way of formal marketing to promote the agency. Stantec's survey demonstrated a general lack of awareness for the services provided by Fredericton Transit other than by transit dependent customers (i.e. those with no other means of transport other than transit). This creates barriers to use and weakens the public image of transit. Transit is not perceived as being "cool" in Fredericton but rather a choice of last resort. This is something Stantec recommends be proactively addressed.

Current branding is not memorable or striking

Limited to vehicles and bus stops and shelters, transit branding in Fredericton is not overly striking or memorable. Fredericton Transit has a dedicated brand as shown in Figure 58.

Figure 58 Current Fredericton Transit logo.

While it is commendable that Fredericton has a dedicated brand for transit, the visual language of the logo is antiquated and in need of an overhaul. Distinct, catchy brands with modern visual and verbal language that speak to its intended audience is increasingly becoming norm in the transit industry. As shown in Figure 59, GTrans (Gardena Transit) recently invested in a rebrand that was used to improve stop signage. Stantec encourages Fredericton to invest into a refreshed branding strategy that raises the profile of transit in the city and creates desire in potential customers.

Figure 59 GTrans (Gardena Transit) bus stop before and after rebranding.
Source: Gardena Transit, 2018.

In addition, Fredericton Transit currently does not have a French name for the agency, which is an issue given the official bilingual status of New Brunswick and Fredericton as its capital. A branding strategy should identify and recommend a new bilingual name for Fredericton Transit that could act as a 'relaunch' of the service and brand. In other bilingual markets like Ottawa and Moncton, the "Transpo" moniker has been used to derive bilingual and memorable names like OC Transpo and Codiac Transpo, respectively. Fredericton Transit can become "Fredericton Transpo", satisfying the bilingual requirement while maintaining the recognizable "FT" initials. A branding and marketing strategist should verify this idea.

Bus stop signage and fixed infrastructure does not act as marketing tool

Bus stop signage in Fredericton is not prominent and often blends into the natural environments because of its lackluster colour palate (Figure 60). In current form, bus stop signage and fixed infrastructure does very little to act as a marketing tool for transit. An advantage of fixed infrastructure such as bus stop signage and shelters is that it can be leveraged for marketing purposes, which is something not currently being done by Fredericton Transit. Additionally, signage does not convey a welcoming nor inviting environment for would-be transit customers and likely sends the wrong message about transit services in Fredericton. As an example, Stantec was confused by the unusual marriage of a no parking sign for automobiles with a bus stop sign at Kings Place. This is not considered best practice. Last, signage is not consistent across the system (different styles, typefaces, and graphics) which does not foster a holistic customer experience. The shade of blue used in the bus stop shown in the below left image, is different from the shade of blue used in the Fredericton Transit logo shown on the previous page. Stantec suggests investment in new signage is warranted and needed to change the perceptions of the agency.

Figure 60 Current bus stop panel designs.

Source: Google Street View (left).

The below images show some samples of high quality stop identifiers and branding used in transit, showing colour, user information, and branding tools to create a unique, memorable and recognizable identity for the agency. In addition, these are all samples of good communication of stop information. In the Halifax Transit example, the stop number, the routes servicing the stop, and the fact that the stop is accessible are all very clear.

Figure 61 Branding examples of bus stops and livery.

No formal marketing plan for the agency exists

While some enhanced marketing has been implemented during the past few years mainly though the Move with Fredericton Transit Facebook page, a formal marketing plan which provides strategic direction of when to market, the audience, the message being conveyed and the medium, does not exist for Fredericton Transit. In this regard, Fredericton Transit is similar to other peers its size where tactical approaches are sometimes taken such as a one-off campaign or advertisement, but an overall strategy with the goal and intent of marketing is missing. Different people have different reasons for using transit; we need to understand those reasons to market to them and we must understand how to reach them with our message and which message to use. Strategic considerations such as these are typically codified in a formal marketing plan which is considered best practice.

8.2 MARKETING PROSPECTS

Stantec is a proponent of simple, economical, and proven methods to market transit. In the age of constant “digital noise”, word of mouth marketing is making a strong comeback. Of course, this does not diminish the role or need for

strong web and app platforms to support those initiatives. As Fredericton Transit evaluates the role and future opportunities for marketing, Stantec highlights some of the most successful marketing approaches for consideration.

Establish "Transit is Cool" Culture in Fredericton

As demonstrated in Stantec's survey, customers have diverse reasons to use public transit. Indeed, the opportunity to leverage these reasons as real considerations exist to position transit as "cool" choice. There is a new generation of customer with a latent demand for public transit but the value proposition of Fredericton Transit has not been sufficiently established. Fredericton Transit could embark on a public education campaign that prompts answers to the overarching question...*Why is Fredericton Transit the Cool Choice?* Some possible answers include:

- Economic impact of reducing regional congestion – *traffic costs money*
- Environmental benefit – *keeping our Provincial Capital clean*
- Lifestyle benefit – *we drive, you enjoy life*
- Transit as the first choice

Below is example an of LA Metro's *"Make Transit Cool"* program, a fun way to advertise for transit, with a tongue-in-cheek approach (Figure 62).

Figure 62 Transit advertising from LA Metro.

Another example is shown from King County Metro's recent "Just One Trip" campaign trying to entice perspective customers to give King County Metro a chance for just one ride on the premise they will be hooked afterwards.

Figure 63 Transit advertising from King County Metro

Transit marketing does not need to be elaborate nor a cost-driver for the agency to be effective. At Fort Saskatchewan Transit (FST) in Alberta, the agency made replica bus stop signs that contained user information and placed them all over the city to raise awareness for its services. Below, the replica sign is shown at the entrance of a local Canadian Tire store (Figure 64). The cost of the replica signage was reportedly under $500 and was "homemade" entirely by city employees.

Figure 64 Guerilla and street marking can reach wide audiences.

From its experiences, Stantec believes nothing is more effective at attracting discretionary riders than being in the community promoting the message. This is a simple solution to educate would-be riders about transit and raise awareness. Oftentimes, people are interested in trying transit but intimidated at the prospect of the "first ride". Shown below, again in Fort Saskatchewan, is a community festival where one of FST's buses is parked and used as a "free attraction" for families - bus bowling (Figure 65). This fun and innovative approach to community engagement was well received and is believed to be directly linked to new ridership. In the Fredericton context, community engagement activities could coincide with important community events. The possibilities are endless, but some examples are as follows:

- FROSTival: a bus can be parked and promoted as "*Have your photo taken in the driver's seat*" as a means of getting kids interested in transit from a young age. As a double-benefit, the bus also offers shelter from cold winds and the elements.
- Fredericton Craft Beer Festival: consider partnering with event organizers to give away one "free" bus ticket to all attendees who have purchased a festival ticket, as a means of discouraging drinking and driving.
- Scotiabank Fredericton Marathon: a bus can be parked somewhere nearby the finish line with the slogan "C*ome aboard to rest your legs!*".
- RibFest: this might be the best opportunity of the year to turn a bus into a free attraction such as bus bowling, as was done successfully by FST.
- UNB/STU Orientation Week: consider partnering with universities to offer chartered shuttle service between on-campus and off-campus attractions.
- Doors Open Fredericton: the most popular attractions at Doors Open Toronto have historically been transit-related. Fredericton Transit might consider offering tours of its facility.

Guerilla and street marketing will be particularly important given the significant routing changes this report contemplates. Stantec recommends that Fredericton Transit partner with local high schools, UNB and STU to recruit volunteers and form "street teams" to assist with engagement efforts.

Figure 65 Cooperative makerting for transit at community events.

Local business and organizations can help promote Fredericton Transit through use of their own media opportunities such as shelf talkers in grocery stores, digital screens in retailers such as Tim Horton's, kiosks at shopping centres and inserts in company/organization communications.

Suggested messaging opportunities for local business partners could include:

- Sponsorship and/or advocacy of Fredericton Transit and public transit
- Promotional discounts for those that use Fredericton Transit

While the messaging is focused on service, the underlying intent for Fredericton Transit is that the agency has wide support in the community it serves. Here is an example of a very successful cooperative marketing relationship between Famima, a bakery, and LADOT in Los Angeles (Figure 66). In this sample, customers are given a discount for showing their monthly transit pass at the bakery, can purchase transit fare media at the store and are shown on a map how to get to the business using the transit routes that serve the location. A similar approach could be used in Fredericton to engage local businesses, particularly those downtown, that would be mutually beneficial both to transit and the business.

Figure 66 Cross-promotion of transit use and retailers.

Rider-centric technology that facilitates integrated mobility are a customer expectation

Fredericton Transit needs to be prepared to communicate with the customers of the future; customers who are tech-expectant. Fredericton Transit would benefit from a new web platform that reflects a modernized Fredericton Transit. This was touched on in the technology section of this report. The new web and app platforms require a rider-centric approach that implements a comprehensive user experience strategy, modern creative direction and design reflecting Fredericton Transit's master values, an operational content strategy, future-proofed technology strategy, social media integration and intuitive customer service mechanisms. The new web and app platforms must also have an eye towards consolidation of integrated mobility options and the future direction of the agency. It should provide wayfinding, trip planning and fare payment capabilities. Société de transport de Montréal (STM) has digital properties that are very robust and is a strong Canadian example of these functions being done well (Figure 67). Fredericton Transit already has a potential partner in the development of a similar offering in the form of Expedition Connect, who is keen to work towards a digital platform where other mobility applications for transit, roads, and active transportation networks can be layered on. It is recommended that Fredericton Transit commence exploratory conversations with Expedition Connect.

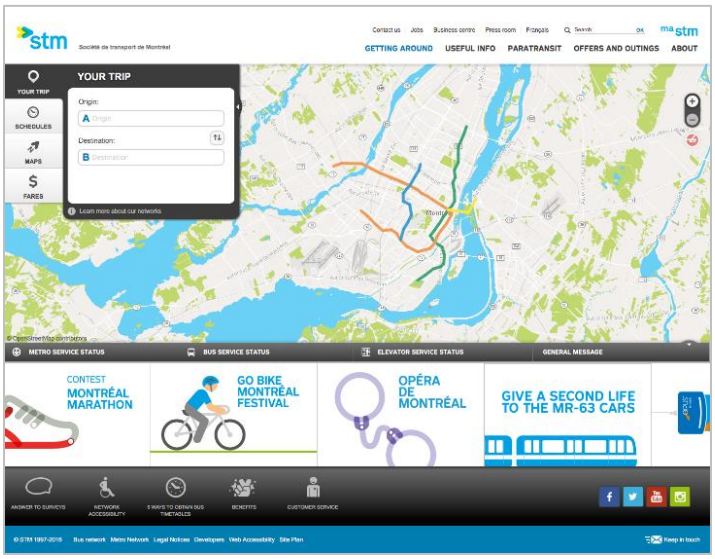


Figure 67 Example of a well-designed and interactive transit agency website, STM.

Marketing to internal transit staff cannot be overlooked

In speaking with front-line staff, we found that they are proud supporters of the organization, however they require more support on how to communicate positive impact by Fredericton Transit to the public. They are also seeking a feedback mechanism so that their experiences can help improve the quality of service and communications to riders.

It is important to consistently inform and train staff on how to communicate with transit's customers. For ease of education and information distribution, this can be produced as a series of actionable online self-help and or guidance systems that both staff and riders can refer to that enable front line staff to act as ambassadors of the new Fredericton Transit brand and its services. This online portal could be called – "*It's Our Fredericton Transit" Employee Engagement Program*. Here is an example of *BC Transit's Employee Engagement Action Plan* (Figure 68).

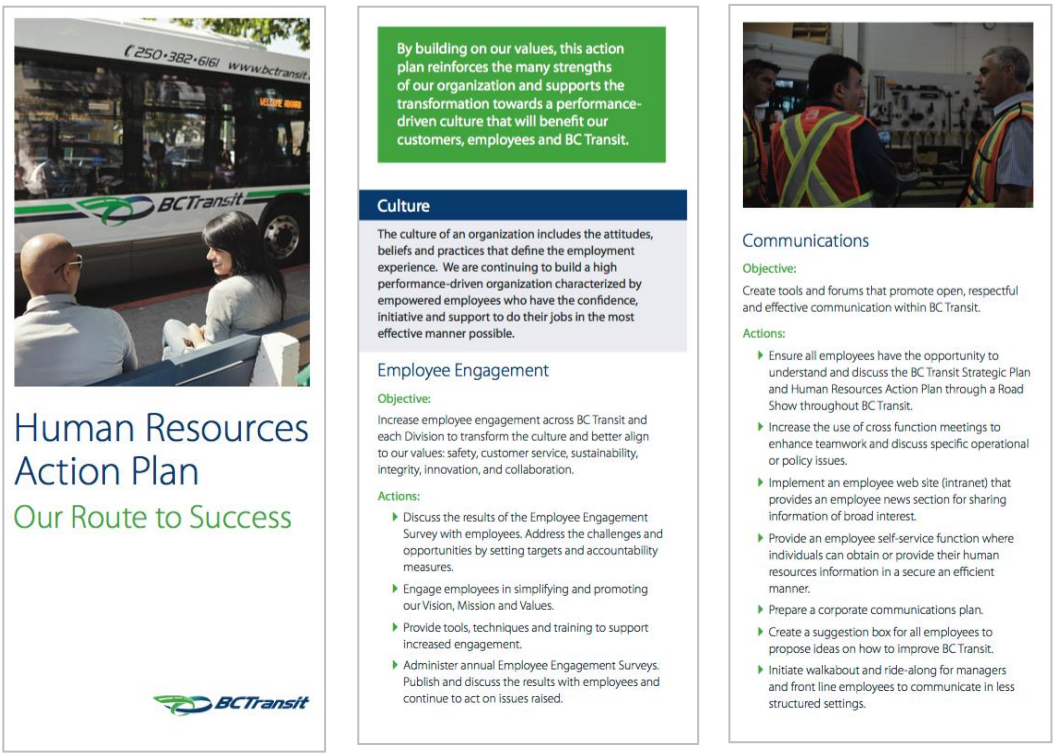


Figure 68 Internal marketing, BC Transit.

8.3 MARKETING RECOMMENDATIONS

Fredericton Transit would benefit from overhauling its identity and the method it communicates to current and prospective customers. A modern visual and written presence would elevate customer interest and experience. Establishing a "transit is cool" culture should be the primary focus of future marketing efforts.

New branding and marketing must be supported with a robust and properly funded effort, with the services of a marketing agency/consultancy procured to guide the efforts and produce content. Experience has shown that the most successful transit programs in North America that have steady ridership growth invest between 2 and 5% of their operating budgets on marketing.

We appreciate that financial resources are finite. From its experiences at numerous transit agencies across North America, Stantec has seen and proven that investments in marketing translate into sustained, as well as new

ridership. A marketing investment for transit in Fredericton should be scalable, economical, and results-oriented to build interest in transit.

We identify our recommendations according to the following proposed timeframe.

Short-Term Recommendations (0-2 years)

1. **Retain marketing agency/consultancy with transit expertise:** This firm would assist Fredericton Transit to develop a marketing plan, undertake a branding review and devise a future action plan.

2. **Develop marketing plan:** The resulting plan should be pragmatic, provide clear direction and outline an actionable implementation plan for market. At a minimum, the marketing plan should contain:
    - Vision and objectives
    - Marketing strategy
    - Tracking for KPIs
    - Budget
    - Implementation plan

Medium-Term Recommendations (2-5 years)

3. **Implement marketing plan and associated recommendations**
    i. **Develop new branding:** Continue working with a marketing agency/consultancy to develop new visual and written identity for the agency. Test new bilingual names for the agency. Identify deployment schedule for brand activation to include printed materials, digital and fixed infrastructure (bus and bus stops).

    ii. **Tactical marketing strategies:** In tandem with brand activation, initiate tactical program that initially raises awareness for the “new” Fredericton Transit but incrementally changes the focus to travel mode conversion. Grass-root tactics are encouraged as they are typically low cost but have a high yield.

    iii. **Develop new website for transit:** Fredericton Transit’s customers of the future will increasingly demand a better digital experience with rich user information. To support many of the recommendations contained within other sections of this report, particularly integrated mobility recommendations, a revamped digital experience will be required. This includes a dedicated Fredericton Transit website, which is a prospect that should be discussed with the City of Fredericton, but in the event that this is not possible Fredericton Transit should seek to better utilize its existing web and social media pages. The website should leverage the new branding and marketing plan and be launched with promotion across platforms.

Long-Term Recommendations (5+ years)

4. **Implement marketing plan and associated recommendations**

    i. **New bus stop signage:** To use fixed infrastructure as a marketing tool, it is recommended that bus stop signage be replaced with colourful, vibrant signage consistent with the new branding.

9.0 FLEET

9.1 CURRENT FLEET

Fredericton Transit has a current conventional fleet of twenty-eight 40-foot Nova Bus LFS models. At the beginning of 2017, Fredericton Transit's conventional fleet had an average age of 9.96 years, slightly higher than the national average age of 9.02 but slightly lower than the New Brunswick Provincial average age of 10.50 years. However, in the interim, the receipt of new vehicles and corresponding offsetting retirement of the oldest units in the fleet has brought the current average age to 6.04 years. Not unlike other municipal transit agencies across the country, Fredericton took advantage of the transit funding made available through the Public Transit Infrastructure Fund (PTIF). In doing so, the retirement of the oldest units which were of a high floor design occurred and the fleet became 100% low floor accessible.

Current schedules require a maximum of 20 units to be in operation at the peak service threshold which in turn yields eight vehicles as daily spares. This translates into a spare ratio of 40% which is on the higher side of industry norms. However, it is pointed out that a significant number of units do stay out for a full day which differs from the typical profile of heavy vehicle utilization in the a.m. and p.m. rush hour periods and much less service intensity at other times.

9.2 FLEET PROSPECTS

An informed evaluation of the marketplace, governmental policy, future service development plans, legislation, and the attributes of the various types of propulsion products should be considered to devise a long-term strategy.

Conventional transit buses have a 12-year design life set by US market

All buses, even those delivered in Canada, are designed to meet criteria and design lives set by the US Federal Transit Administration. The market for transit buses in the US is considerably larger than that of Canada; therefore, manufacturers align themselves with the parameters of that market. Heavy duty conventional buses, such as the Nova buses owned by Fredericton Transit, have a 12-year design life, medium duty vehicles have a 10-year design life and lighter body on chassis products such as Fredericton Transit's ARBOC buses used for Para Transit which have a 7-year design life. These design lives are largely tied to the capital funding programs of the Federal Transit Administration in the U.S. If a 12 -year design life bus is purchased, it is eligible for replacement and corresponding funding after 12 years of service in the US.

Canadian transit agencies have typically have had 18-year lifecycles

Canadian transit agencies do not have this federal funding arrangement (other than specific initiatives from time to time such as the current case with PTIF) and typically rely on provincial/territory or local sources. Because of this, lifecycles in Canada have typically been longer with 18-years as a common benchmark. Generally, achieving this target requires midlife structural refurbishment as well as engine and transmission overhauls. Increasing use of corrosion inducing anti-icing road (and bus stop shelter stops) products take their toll on body and structure condition. The products used at bus stops and shelters are tracked into buses by customers and could affect flooring structure, certain seat frames, floor heater boxes, etc. To make best use of capital funds and mitigate out-of-service downtime, other work may be tied into this exercise (power train rebuild or replacement, new driver's seat, etc.).

Mid-life refurbishments including the associated downtime and costs are eliminated and components are addressed on an as needed or independent time line scheme; e.g. driver's seats are replaced every four years and power plants at a certain kilometrage range. Vehicle specifications can be enhanced or written with longer structural warranties and corrosion resistant componentry.

Canadian transit agencies are moving to shorter lifecycles in alignment with design life

Canadian transit systems are increasingly adopting shorter vehicle lifecycles to match or move towards the considerably shorter design-life of the vehicles.

Fredericton Transit's fleet's actual lifecycle is 18 years, but aims for a 15-year lifecycle

Fredericton Transit strives for a target fleet lifecycle of 15 years, relegating its oldest units to the spare pool. Considering all available vehicles for revenue service, Fredericton Transit has historically replaced its buses at 18-year intervals. If fleet size remains constant, this translates to an average age of 9 years. It is noted that mid life refurbishment to help achieve that 18-year life is not performed as a specific event uniquely funded as a capitalized function. Instead necessary work to achieve the life cycle is performed and paid for as required from operating and maintenance funds. The extent of this work is no doubt mitigated by the fact that the Nova Bus LFS model since 2000 have been built with stainless steel frames and use a non-metallic body panel product.

The de-icing products that have become more intensively used on roads, sidewalks and in bus shelters over nearly the last half century have had a negative impact on bus structures due to their corrosive properties. Typically, mild steel and aluminum were principal structural and body components. Bus manufacturers have employed many products and techniques to counter this effect on their respective models. Coating the underside with isoclad and coating structural steel tubing with tectyl are examples but not necessarily total solutions. Hence the mid-life refurbishment was typically a routine event for many agencies in Canada and in the northern US.

Whereas liberal use of interior vehicle power washing on the now virtually extinct high floor old technology rubber floor/vinyl seating buses was somewhat effective, modern low floor buses with antiskid flooring, cloth covered seats, and electronic circuitry are not suited for such cleaning routines. Hence it is more challenging to reduce the impact of the de-icing product that is brought onto the bus floor.

As noted earlier the introduction of stainless steel frames combined with non-metallic exterior surfaces have greatly helped in buses enduring the environmental elements. In tandem, commercial cleaning product firms have formulated solutions that are effective, given the state of dirty bus interiors. While stainless steel is not subject to the same deterioration as mild steel, the weight of buses along with effects from road profiles can cause certain grades of stainless steel to crack as it is more brittle than mild steel. Manufacturers must select a stainless-steel product that can best suit the application (e.g. 304 grade).

As emission standards continue to become increasingly stringent and the demands for "zero-emission" fleets grow as is currently occurring in many jurisdictions, prolonging lifecycles is possibly counter-intuitive. It is fact that older and less-clean engine technologies such as Fredericton's 2006 Novas are more reliable and easier to maintain because they do not have the advanced emission controls newer buses do. However; refurbishing these vehicles and prolonging their retirement to circumvent current emission standards is merely delaying the inevitable.

9.3 FLEET RECOMMENDATIONS

Based on the above review of propulsion sources, lifecycle, maintenance, vehicle size, and facility locations, the following fleet recommendations for Fredericton Transit were developed.

1. **Continue with diesel as primary propulsion source for conventional buses:** Stantec believes that Fredericton Transit is currently best-served continuing with diesel as its primary propulsion source for conventional buses. Considerably higher capital costs aside, alternate propulsion types such as BEBs or diesel-electric hybrids are best suited to dense urban environments with plenty of "stop and go" activity and traffic congestion. Fredericton's route profile and landscape would need to be reviewed to determine if any tangible gains can be achieved by having sufficient stop and go events for braking to create adequate replenishment of energy in the batteries. In some routing profiles, buses are often "deadheading in service" where they are essentially running at high speeds and not picking up passengers. Hence benefits of regenerative braking, would not be realized with this type of duty cycle. Also at this time, battery electric buses have still not totally emerged from the prototypical form.

   Apart from the costs of acquiring electric buses themselves, the required supportive infrastructure is also cost prohibitive for Fredericton Transit at this time. First, the cost to upgrade facilities necessary to accommodate additional buses together with the upgrades required to support increased electricity consumption would be substantial; however, any future upgrades to garages or other facilities should consider the requirements of an electric fleet. Second, given Fredericton's rural landscape with long bus routes, on-route charging infrastructure would also be necessary, such as overhead charging stations at key layover points. While still expensive, as the prevalence of electric buses increases, the price of this infrastructure will drop; Fredericton Transit should, in the future, identify key locations that could house on-route charging, and then collaborate with NB Power to devise a strategy for electrical infrastructure requirements.

   One unique advantage diesel has compared to any of the alternate propulsion types is that it can sustain extended idling in emergency situations where the bus is being used as a shelter for a rescue or evacuation. This can be particularly helpful given Fredericton's winter climate. The fuel fired auxiliary heater provides a comfortable environment for patrons in stationary mode.

   Switching to CNG at this time, despite the small incremental vehicle capital cost from diesel would require the support infrastructure (supply source, dispensing station, building code modifications, etc.). However, its characteristics and potential benefits should not be discounted given world supply factors in the future. In Canada, the continuation and/or resurgence of CNG appears to be only in Hamilton Ontario and in British Columbia and Alberta.

   It is Stantec's belief that diesel-propelled products will continue to be dominant into the immediate future given the tremendous volume of units going through annual turnover. A recent article by Reuters in the US confirms this logic. The article stated that of 65,000 transit buses currently in operation in the US, only 300 are electric. Agencies are approaching the decision to switch propulsion types cautiously as they do not want to have to deal with the risks and costs of being early-adopters. However; if pressing environmental considerations or unforeseen funding opportunities present specific for "greener" technology, this recommendation can and should be revisited. In addition, staff should continue to investigate and maintain a familiarity with non-diesel options and related trends and product options.

2. **Adopt 15-year maximum lifecycle for conventional with updates to purchase specification:** While Fredericton Transit strives for a 15-year lifecycle by keeping its oldest vehicles as spares, in actuality, Fredericton Transit's fleet lifecycle is 18 years. Stantec believes that 15-year lifecycle is advantageous and realistic given Fredericton's operating parameters. However; Stantec recommends that Fredericton Transit update its procurement specifications to require stronger provisions for future purchases while at the same time enhance its scope so as to be clearly seen being non-proprietary. The principal key of course is that Fredericton Transit require a stainless steel framed bus (of an non brittle stainless steel grade) along with non-metallic body panels. The current Nova Bus LFS product is exclusively built with a stainless frame while New Flyer offers this feature for its frame as an option.

   Based on Fredericton Transit's fleet size of 28 units, purchasing 2 units annually would keep the service life just under 15 years and an average age of 7.5 years. A smooth process of annual purchases levels and makes predictable capital dollar requirements but also keeps operating maintenance costs relatively stable. Pre-establishing time and/or mileage related work or component routines (e.g. drivers' seats will be replaced every four years) also stabilizes expenses and keeps the fleet in a defined and perceived state of good repair. The accelerated turnover will more quickly retire older vehicles that have less stringent emission controls. Such action has a positive community impact. It also allows new engineering features and products to be introduced progressively and realize the results (e.g. electric cooling fans).

   Stantec recommends that a stronger warranty provision be included in the procurement document (e.g. 2 years/160,000 kms.). This would ensure that a portion of the fleet is under warranty for the most part with any cost for this option born in the capital account while generating savings on the operating account side. If this is combined with the vehicle life being shortened from 18 to 15 years, a larger proportion of the fleet would be under warranty at any given time.

   Reviewing specifications of larger transit agencies or "piggy-backing" on the orders of other transit agencies or joint procurement initiatives may yield greater value-for-money for the agency and a product built with better componentry. As an example, the Metrolinx Joint Procurement Initiative in Ontario standardizes certain items on the purchase while allowing individual agencies to select certain unique features. All buses purchased through this process have 12-inch high stainless-steel paneling on the aisle side of the driver's platform and front wheel housings to prevent damage from mobility aid devices. This was essentially a "free upgrade" because of the size of the joint procurement. Stantec further recommends that a consortium of New Brunswick or Maritime transit properties collaborating on a joint multi-year procurement would yield both buying power, price predictability and economies of scale. Much of the specification narrative can be condensed to cover the various properties with common items but allow for individual selection on "drop on or in items" (e.g. seats, floor covering, graphics, etc.) or commonality with existing fleets (e.g. transmission type).

3. **Maintain current spare ratio despite being higher than industry norm**

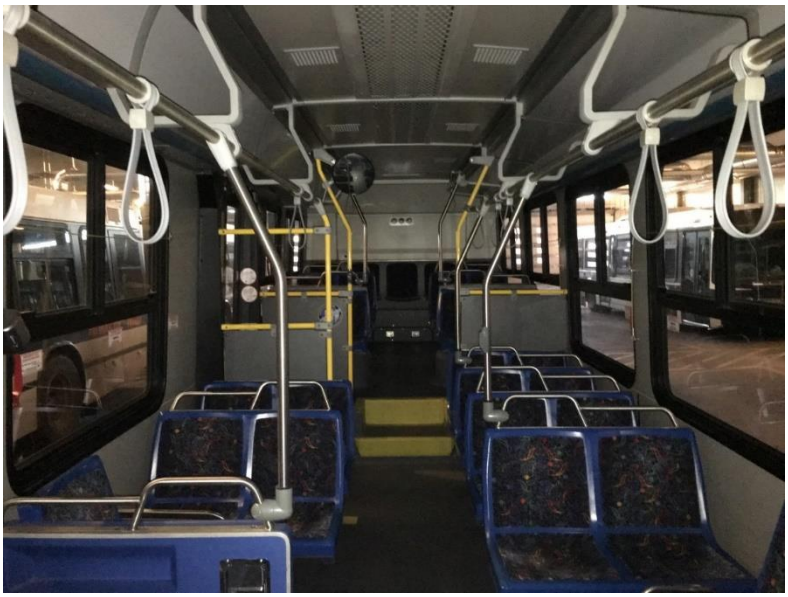
   Fredericton Transit's 40% spare ratio is higher than the operating norm of 20% in the industry. The service profile on less intense peaks combined with heavier service through the day coupled with a single weekday/day shift maintenance function does somewhat support this requirement. Also, low floor buses in an emergency (e.g. evacuation of a multi-story senior citizens' residence) can serve as easily accessed temporary shelter. Should the system expand and increase the fleet size, the corresponding economies of scale may permit the spare ratio to decrease. Also, if the average age of the fleet is reduced through initiating a 15-year life span, the accelerated turnover may reduce repair requirements which in turn could reduce the need for the current number/percentage of spares. Finally, maintaining the current spare ratio also facilitates the ability for Fredericton Transit to perform

periodic reviews of fleet, facilities, and productivity. It is recommended that Fredericton Transit undertake these reviews to ensure that the fleet and maintenance activities in general, are operating effectively and efficiently.

4. **Continue with acquisition of 40-foot buses**

With respect to bus size, the common 40-foot model is the optimum product given all of Fredericton's current circumstances such as full interchangeability on the route network. It is acknowledged that there may be a route or routes where a smaller 30- or 35-foot unit would be warranted. But with a small overall fleet, versatility and interchangeability are important considerations. Currently, there are no 30-foot products partially or fully built in Canada. While New Flyer offers a 35 -foot version of its 40-foot model, Nova does not. There are 30-foot products available from offshore vendors and from the US. In the latter case, the current exchange rate does not give much of a capital cost savings relative to a 40-foot made in Canada bus. The offshore products are relatively new in the market and sold through dealerships. At present, aftermarket service/parts may be a potential issue for Fredericton with offshore vendors. It is recommended that the bus type/size issue be reviewed in the future in tandem with any route or service profile/passenger demand and changed in market offerings of bus types. For instance, with the introduction of microtransit or "home-to-hub" solutions, a smaller vehicle such as the Dodge ProMaster may be more a more nimble and prudent choice.

Conversely, as a potential alternative concept for the future, down the road a service network realignment could create a situation where a few smaller vehicles would better suite a more lightly travelled route(s) that specifically serves a community or residential area. In such a case a nominal length 30-foot battery electric bus of North American origin might be ideal. Unlike the cutaway or van-based units, most nominal 30-foot length rear engine buses are classed in the heavy-duty life cycle range. Smaller buses are seen as less intrusive in residential or low-density areas and offer better maneuverability on residential streets. If supplemental funding (both vehicle and infrastructure) were to be available and there is a desire to move into lower emission alternate propulsion a small number of battery electric units of this size might allow a controlled move forward into this technology. The emerging and still somewhat prototype market will no doubt mature to allow such an opportunity. The reduced noise factor would also be appreciated in such areas. Overall however, the cost of operating a 30-foot bus is only negligibly lower than the cost of operating a 40-foot bus, since the major cost driver of bus operations is the labour—the cost of the operator and fringe benefits largely dictate the cost of revenue service, not the vehicle type.



9.4 FACILITY CONSIDERATIONS

Currently, Fredericton Transit's administration and operations are housed in one building, where administration occupies the second floor, while the dispatch and operator areas (including lockers, a small fitness room, washrooms, and lounge) are on the ground floor. Maintenance facilities, meanwhile, are housed in an attached facility to the main building. Finally, bus storage is housed in a newly constructed facility (or garage) adjacent to the main transit facility. The office location is 470 St. Mary's St (see Figure 69).

Figure 69 Current division of functions in two Fredericton Transit facilities.
Source: Google Maps.

In general, Stantec applauds Fredericton Transit's small, yet dedicated staff who are required to oversee a transit system with few resources. Stantec notes that staffing needs would likely change based on many of the recommendations in this Plan, such as a dedicated marketing and communication role, a transit planner role, field supervisor role, and so on, who would collaborate with and thus free up time for existing staff to focus on dedicated tasks, such as operations monitoring or financial reporting.

The difficulty that currently arises is that administration and operations on separate floors, limiting communication between operators, maintenance staff, administration, and management, which may unwittingly breed sentiments of animosity between the different groups. On the flip side, the colocation of administration and maintenance on the same floor, if executed properly, can foster a culture of communication and collaboration. This can allow for administration and management to better have a finger on the pulse of operations and maintenance, and it can allow

for operations and maintenance to have their issues and challenges better appreciated by management and addressed in a timelier fashion.

Moving the Transit Administration Office and Operations on the same floor of a new additional space on the site of the existing storage facility (garage) is desirable for the reasons stated above. Stantec, however, does not recommend the relocation of administration and operations at this time. Fredericton Transit's capital budget is better invested in the near term into the other elements described in this Strategic Plan such as in marketing and branding, in upgrading the accessibility of bus stops, and in the development of park-and-rides. All of these are more urgent needs for Fredericton Transit and will have a more measurable impact on ridership. If dedicated funding does become available, through governmental grants for instance, the construction and colocation of administration and operations with the storage facility could provide a better working environment. However, we also note that while housing both administration and operations functions on the same floor could improve communications, simply occupying the same physical space is likely insufficient, and both sides would need to be proactive at cultivating a good working relationship.

Stantec recommends that Fredericton Transit's administration and management team be proactive in maintaining an open line of communications with operations and maintenance, and pay frequent visits to the operations floor. In the short-term, if possible, reallocation or redesign of space on the current administration floor could be used to integrate some dispatch or operation functions to begin the integration of two functions. This phase would act as a precursor to an eventual colocation of administration and operations in the same building on the same floor.

In the long run, after the more pressing capital needs have been addressed, it may be appropriate to re-evaluate the prospect of co-locating administration and operations. When the time comes, Stantec recommends that Fredericton Transit review the current layout of its Transit Administration Office, identify any limitations, and propose tweaks to the office layout for improved efficiency. These tweaks may be implemented in the event the office is moved to the same site as the storage facility. Stantec also recommends that a detailed Fleet and Facilities Review (or Audit) be conducted at the same time. The possibility of relocating the Transit Administration Office presents a unique opportunity for Fredericton Transit to review other factors impacting the facility such as forecasted fleet growth, as well as lot size and equipment constraints, and make structural or operational adjustments to aspects of its storage facility at the same time within the same capital project.

10.0 PERFORMANCE CRITERIA

10.1 ABOUT PERFORMANCE CRITERIA

A major goal or desired outcome of this Strategic Plan is to grow transit ridership by offering an attractive and viable transit service to more people for more trips. As a by-product, increased transit use could increase transit mode share, and along with other sustainable modes, reduce the auto-oriented development and dependence of Fredericktonians, helping fulfill the vision of the Growth Strategy and new Municipal Plan for attractive and robust transportation options.[41]

Performance criteria help transit agencies, indeed any organization, track progress towards certain goals or objectives. While the overarching intent of this Plan is to increase ridership and improve operational efficiency, we can measure different key performance indicators that help inform our progress towards our goals. For instance, the San Francisco Municipal Transportation Agency (SFMTA) maintains an interactive performance metric dashboard on its website[42] divided into five different goals, with different indicators aimed at capturing objectives for each goal.[43] Goal 1, for example, is to create a safer transportation experience for everyone, and is tracked through two indicators, collisions per 100,000 miles and reported crimes per 100,000; both indicators responded to different objectives (improve safety, achieve Vision Zero, etc.) and are tracked with different metrics for different purposes and at different intervals.

Performance indicators are useful because they provide an indication of trends in performance, helping identify areas that need attention and correction, as well as areas of success. Performance indicators or criteria are also useful for tracking the implementation of plans, like the current Strategic Plan.

Industry best practice generally categorizes transit system measures into three fields:

Financial

- Which involves evaluating the affordability of transit and engaging with the monetary viability of the agency in conjunction with suggested development opportunities

Operational

- This involves an in-depth technical evaluation of how the transit agency is functioning, to determine which sectors of the agency are performing well and where to focus future efforts.

Social

- Determining the impact of transit on general daily resident functions, e.g. equity, accessibility, environmental and safety.

[41] This section should not be confused for service standards, which are guidelines that tell the public and a transit agency how and why transit services are provided, at what level, and where. Service standards from 2008 Strategic Plan are still largely valid, and others are described as appropriate throughout this Plan. The intent of this section is to describe criteria or indicators that should be captured and tracked over time to determine whether and how well Fredericton Transit is moving towards specific goals.
[42] See https://www.sfmta.com/performance-metrics.
[43] See SFMTA Strategic Plan at https://www.sfmta.com/sites/default/files/reports-and-documents/2018/04/sfmta_strategic_plan.pdf for inspiration.

Currently, Fredericton Transit does not publish or extensively track performance criteria, other than ridership, fare revenue, and customer complaints, to name a few. By adopting, measuring, and reporting the criteria below, Fredericton Transit will instill a culture of accountability and the data gathered can be used to formulate diverse transit policy, expose underutilized resources, reduce fare evasion, and increase transit efficiency vis-a vis route effectiveness and travel time. The performance criteria can be further used for comparative purposes to determine the extent of issues that Fredericton Transit is experiencing which facilitates a recalibration of goals based on agency preferences and community values.

Improve Travel Experience

The City of Fredericton has articulated its commitment to the social health of the city and safety is integral to achieving this. Riders of transit must feel that riding transit is not only efficient but by choosing Fredericton Transit they will reach their destinations safely and on-time. Schedule adherence/reliability is an important factor because it directly influences travel mode preferences which in turn impacts the extent to which Fredericton Transit is successful in carrying out its mandates.

In this case reliability and frequency are intrinsically linked. Commuters with access to private vehicles are often more critical of bus frequency and those without a choice are often more vulnerable. On low frequency routes (one bus every hour) a delay in service makes transit unappealing to most, especially for those who need to make a transfer and might miss their connection. For these individuals, alternate transportation choices prevail, such as taxi, walking, biking, and the personal automobile for those who can afford one.

Increasing reliability has additional advantages such as reducing actual and perceived customer waiting periods, the expanded version of this includes any time the customer is not at their destination and in an environment perceived as unsafe.

Measures:

- Accident rates (accidents per 100,000 km driven)
- On-time performance by route (% of buses that are operating 0-3 minutes late)
- Kilometres per mechanical breakdown (mean distance between failure)
- Safety complaints rate (number of safety-related complaints per year per 1,000 trips)
- Missed trips (% of trips missed or excessively late)

Activities: Review crash data and generate quarterly and annual reports. Categorize crashes into preventable and unpreventable, and conduct operator re-training as needed.

- Conduct quarterly or annual passenger safety surveys.
- Develop a Transit Security/Safety Plan that is shared with the public.
- Develop and creatively promote a Passenger Charter that outlines Fredericton Transit's responsibilities such as committing to service quality, as well as passengers' responsibilities such as paying full fare.

Finance and efficiency

Due to resident modal bias, a clear objective would be to provide transit service trip travel times that are competitive with private vehicles. However matching vehicle travel time often involves increasing bus frequency which in turn impacts fixed operating budgets. It also often involves improving the directness of routing, which involves municipal

input and/action. Reserved bus lanes, sidewalk connectivity and transit signal priorities are measures that can be implemented to increase the efficiency of the bus system and make it the preferred choice of travel for residents.

Therefore, an exercise in balancing options must be undertaken and standards are developed in contrast to other peer transit agencies practices to ensure that the recommendations put forward are realistic and align with industry best practice. Some of the peer agencies analyzed include North Bay, Belleville, Sarnia, Sault Ste. Marie and Prince George. The parameters for peer selection included fleet size, municipal population, average service area, number of fixed routes, average speed and average bus age.

Through comparative analysis we have determined that Fredericton Transit provides generous and diverse fare options, namely; children under 6 years old ride for free, (no other peer offers free up to 6, maximum age was 5 and most offer under 4 years of age). Fredericton Transit also offers discounted fare options under the Transit Fare Assistance Program, 65 Plus Club pass and the student monthly pass.

It is worth noting that Fredericton Transit is one of the few agencies reviewed that does not offer Sunday nor holiday service which is worth review alongside the cost-effective measures identified below:

Measures:

- Cost recovery ratio (total operating revenues divided by total operation costs)
- Park-and-ride lot usage (% occupancy of future park-and-ride lots at peak)
- Fleet management efficiency (most peer agencies have been able to reduce their vehicle maintenance and fuel expenses)
- Operating cost per revenue hour
- Boardings per revenue hour
- Travel time ratio (travel time on transit as a percentage of travel time when driving a personal vehicle)
- Effective headways (considering the effect of multiple routes operating along priority corridors)

Activities:

- Analyze transit vehicle hour delays, aim to reduce vehicle hour delays every year by investing in transit signal priority on specific intersections (e.g. Westmorland Bridge and downtown).
- Annually assess transit travel times and conduct fixed route transit ridership forecasting and service planning.
- Conduct annual fleet performance audits which include vehicle condition, utilization, fuel consumption and determination of vehicle and equipment surplus.
- Document transit service interruption for mechanical reasons and include the information across other sectors in the agency.
- Prepare an asset management plan for transit
- Consider the implementation of park-and-ride lots at strategic locations near the City’s boundaries with neighbouring jurisdictions.

Marketing & Customer Service

Customer service transcends face to face interaction and when prioritized, it can attract new transit customers and can be conjunctionally developed to retain ridership. Marketing provides an opportunity to correct transit misconceptions while reshaping customer behavior and an example of this is:

- The perceived belief that buses emit excessive pollution in comparison to the combined environmental impact of passenger vehicles.
- Industry trends have shown that even buses without full occupancy have better emissions than cars[44]
- Agency complaint data and on-board survey results were analyzed which led to the framing of this section. According to the 2018 Transit Survey results, customer service-oriented questions repetitively received high rates of response. Although the transit survey results are discussed in greater detail in another section it is relevant to refer to some results here due to the overlap with some recommendations.

Complaint data and survey results reflect that customer service, next to reliability, was a recurring point of rider frustration. Over 71% of survey respondents consistently responded to questions about possible route changes and driver/agency practice and rider acceptable compromises. This high response indicates that riders are engaged and willing to provide feedback on their preferences and values as it pertains to transit.

Survey results show that 45% of respondents are satisfied/extremely satisfied with driver behaviour and attitude which supports the complaint data and commentary about driver disposition and driving practices. Approximately 83% of respondents also indicated satisfaction with seating and comfort on the bus which is valuable based on the likelihood that their ratings are in comparison to passenger cars which is valuable in any marketing against single passenger car trips.

The high level of survey engagement combined with the absence of consistent customer feedback protocol presents a marketing opportunity that can be explored and leveraged to entice new ridership, retain existing ridership and ensure employee engagement.

Measures:

- Customer feedback rate (total feedback (compliments & complaints per 100,000 trips)
- Annual ridership (total trips)
- Annual ridership growth (in %)

Activities: Track, respond and publish customer service improvements and trends.

- Record real-time performance data and annually publish it. Include the results in an annotated form of the Passenger Charter, similar to GO Transit's method for communicating system performance.[45]
- Develop a Passenger Charter that outlines Fredericton Transit's responsibilities such as committing to service quality, as well as passengers' responsibilities such as paying full fare.
- Conduct biannual customer/employee satisfaction surveys
- Expand the transit page on the City of Fredericton website to include a customer service section.
- Conduct customer service training for operators.

[44] Federal Transit Administration 2008 National Transit Database (NTD): Public Transportation's Role in Responding to Climate Change, updated in 2010: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/PublicTransportationsRoleInRespondingToClimateChange2010.pdf
[45] GO Transit. Passenger Charter: https://www.gotransit.com/en/about-us/passenger-charter

Equity Goals

This section operates as a function of budget feasibility, land use analysis and requires additional data gathering to achieve the articulated outcomes.

As mentioned in our proposal, Fredericton Transit aims to provide transit service is that safe, reliable, and convenient for *all* residents, which makes the topic of service coverage and ridership important. In any city, there are often segments of the population who have a propensity to use transit based on factors such as income, ability, mobility, employment, household and preference. The ability to provide reliable service to these residents provides many benefits, namely, more consistent ridership which mitigates excessive cost burdens on routes with erratic ridership trends.

Survey results have also shown that over 81% of respondents would use Fredericton Transit if the agency offered a Sunday and late-night bus service. This shows that a large number of current users highly value these attributes and are feeling underserved by the agency. Strong engagement data about preferences of bus frequency over bus stop proximity indicate that meandering routes could be minimized to focus resources onto corridors with greater frequency.

In an effort to balance these needs, routes can be reconfigured to manage the “holding costs” of parked buses and provide a more frequent service to underserved populations which facilitates greater access to the city. This ensures that populations who are transit-dependent receive adequate transit service to access destinations and their opportunities.

Measures

- Transit coverage (% of Fredericton’s population within 400 m of regular routes, and 800 m of frequent (every 15 minutes or better) routes)
- Effective average fare (total passenger revenues divided by total trips) – provides insight into fare equity as well as stewardship to the non-riding taxpayers
- EcoPass uptake (EcoPass Trips as a % of Total Trips)
- U-Pass uptake (U-Pass Trips as a % of Total Trips)
- Concession ridership (Riders paying concession fares as a % of total trips)
- Average savings (cost to the consumer of taking transit as a % of the cost to the consumer of driving) – depends on parking fees, taxi prices, etc.
- Alternative service delivery uptake (annual ridership on possible future FT services that are not fixed route / fixed schedule)

Activities:

- Collect and analyze data showing population information to identify areas of transit dependency (persons 65-year-old and older, persons/households with incomes below the defined poverty line, minority populations).
- Determine geographic distribution of low income populations within the current service areas.
- Collect data about linearity, density and walkability for communities which will assist in the determination of which area/neighbourhood would more likely utilize transit, with the goal of creating frequent ridership.
- Use employment /major employer data to run a pilot service from specific underserved but dense areas.

- Consider implementing alternative service delivery strategies in areas that are not served by conventional fixed route service, or that have poor performance for fixed route.

While the criteria or measures listed above are by no means exhaustive, they are also unlikely or unable to be tracked by Fredericton Transit in the entirety either, at least in the short-term. The section above is meant to describe industry best practices and provide Fredericton Transit with guidance regarding performance criteria. Fredericton Transit should begin to gather data, as available, and maintain and publish historical performance similar to SFMTA. This adds to the transparency of the agency, its goals, and its performance toward achieving its goals. Implementing the recommendations and strategies from this Plan will help Fredericton Transit move toward these goals, but more resources, in terms of technology to acquire data, and staff to analyze and track data, as well as develop clear policy and goals will be needed.

10.2 PERFORMANCE CRITERIA RECOMMENDATIONS

Performance criteria provide objective and transparent ways of tracking progress and measuring how well Fredericton Transit is achieving its goals of providing “effective, efficient, enjoyable public transit”.

The following recommendations are:

Short-term (0-2 years)

- **Develop performance criteria, objectives, data collection methods, and tracking tools.** Fredericton Transit should develop a list of criteria based on objectives and feasible data collection and tracking methods. While not all the criteria discussed in above may be necessary or feasible, a short list should be developed to track progress on this Plan as well as performance overall.

- **Start collecting data needed for performance monitoring.** Based on the list of possible metrics, Fredericton Transit should start collecting and maintaining a database of performance metrics calibrated to its objectives. This collection can help revise what’s possible to measure, as well as spur new ideas.

Medium-term (3-5 years)

- **Publish criteria and performance on Fredericton Transit website.** More and more agencies are leveraging online tools to publish performance criteria and results of tracking these criteria. Transparency and accountability help engage the public and demonstrate a commitment to service quality.

- **Revisit criteria, objectives, etc, and modify as needed depending on data availability and feasibility.** Depending on new data availability and public feedback, Fredericton Transit can refine the criteria and objectives as needed and track different objectives.

Long-term (5+ years)

- **Expand criteria to be tracked based on improved data collection, adoption of new technology, public feedback, etc.** In addition to regularly updating performance metrics online, with new technologies and objectives, performance criteria should be revised to capture new goals and objectives. As well, long-term trending in performance criteria can help identify new issues or opportunities that may arise, as well as help guide a new Strategic Planning process.

11.0 MOVING FORWARD

In previous sections of this report, Stantec reviewed in detail Fredericton Transit's existing services, operations, technology, fares, partnerships, marketing, and fleet, and presented related opportunities and recommendations. To tie everything together, Stantec presents a consolidated and summarized version of its recommendations broken down into an implementation timeline of short-term (within the next 2 years), medium-term (3-5 years from now), and long-term (5 years or more into the future) recommendations.

11.1 SUMMARY OF SHORT-TERM RECOMMENDATIONS (0-2 YEARS)

Service Planning and Operations Recommendations

- **Update route network to be more effective and efficient for present-day Fredericton.** Two concepts are presented in Section 4.5 of this report, which are intended to be a starting point for Fredericton Transit to develop a detailed service plan. An updated route network can provide more direct connections between points of interest and minimize the amount of re-routing and route deviations.

- **Develop park-and-rides leveraging existing parking lots along existing routes.** Park-and-ride services in the short-term should be integrated with existing or modified routes as a way to grow ridership. Park-and-rides can boost productivity of existing routes, while acting as a travel demand management tool, helping relieve congestion and parking constraints downtown. Park-and-rides should be developed at locations that are far enough away from Kings Place that people are incentivized to use transit. Park-and-rides targeted for development in the short-term include SmartCentres, the Kingswood Entertainment Centre, and at least one of Regent Mall and the Corbett Centre. Following stakeholder engagement with mall owners and other groups, the most promising location for a park-and-ride lot should be selected to implement as a pilot. The park-and-ride strategy needs to be supported by a robust marketing effort to raise awareness of the new offering.

- **Eliminate Route 18 (Silverwood) and replace with a shared-ride, on-demand solution.** This route does not experience ridership levels that warrant keeping the route in its current form. It is recommended that Fredericton Transit issue an RFP for a taxi-delivered on-demand shared-ride service, whereby the fixed route is replaced with on-demand taxis for users who call to book their trip within a predefined service window. It is recommended that the service be offered only in the peak periods as the current fixed route to control costs. The cost of the trip would be paid in part by Fredericton Transit who would in turn secure a wholesale rate for trips with a taxi provider through the RFP process.

- **Move half of the bus stops at Kings Place from King St. onto adjacent York St.** This scheme will help reduce the number of buses in front of Kings Place and demonstrate a willingness to work with stakeholders. Depending on the outcome of this scheme (passenger complaints, transfers, response of mall ownership, etc) as well as the redevelopment of the mall frontage, infrastructural changes can remove the saw-toothed bus bays, while maintaining the prominence of transit at the heart of downtown. If stakeholders wish to move all transit to the rear of Kings Place to Brunswick St., then adequate signage, wayfinding, and advertising should be designed and installed to inform customers and potential customers about transit's location at Kings Place. A related short-term recommendation would be the undertaking of a feasibility study, done in collaboration with the owner of Kings Place, to further assess the pros and cons of relocating the transit hub

to the rear of the Kings Place facility. A feasibility study should engage both transit and urban design experts to the needs and objectives of both Fredericton Transit and the City Centre Plan are fully considered.

Technology Recommendations

- **Identify opportunities to improve data collection.** A good starting point would be to begin negotiations with Expedition Connect, the owner of ReadyPass, or a similar provider accordingly. At minimum, it is recommended that Fredericton Transit endorse a third-party app and work with ReadyPass to generate a GTFS feed. Concurrently, quick data collection wins should be implemented, such as performing manual counts of boardings and alightings across the network.
- **Install internal and external camera systems.** Cameras foster a safe work environment for operators, safe trips for passengers, and help to protect Fredericton Transit from liability issues and frivolous lawsuits.
- **Issue RFP for onboard bus technologies like AVL-APC and WiFi.** AVL-APC data can track performance and bus operations, including passenger demand to help inform decision-making and planning. WiFi would provide a beneficial quality of service enhancement that may serve to attract ridership and help to incentivize discussions regarding UPass and EcoPass partnerships.

Fare Recommendations

- **Update the fare table to ensure it is as simple as possible.** In doing so, senior passes should be priced the same (and use the same media) as student passes. We recommend a 10% discount on cash fare for 10-ride tickets, a 25-30% discount for adult monthly passes (assuming 40 trips per month), and a further 40-50% discount for low-income (based on ability to pay) monthly passes compared to adult monthly passes. The current price of $50 for an annual senior pass is unsustainable and undervalues transit service.
- **Engage the province in discussions regarding cost recovery to support the introduction of a low-income pass.** A low-income pass was expressed as a pressing stakeholder concern. Implementing such a pass could be challenging, and require the coordination and support of municipal departments, local community groups, and if possible, financial contribution from the province. Presumably other local transit agencies are facing similar challenges therefore it may be advantageous to collaborate with these peer agencies when addressing this issue with the province.
- **Develop non-fare revenue sources.** This includes advertising, but Fredericton Transit should also explore the relevance of existing provincial government grant funding programs, and should lobby for provincial contributions from gas tax or other sources.

Partnerships Recommendations

- **Harmonize U-Pass agreement between institutions.** A consistent fare ($150 for a pass valid for 12 consecutive months) should be established for UNB and STU, as both institutions share a common campus and therefore should receive equal levels of service. Advocacy efforts should be continued for U-Pass with the UNB undergraduate students, especially concurrent with any service and routing updates that are beneficial for students. Also explore possibility of offering U-Pass to other institutions including NBCC and NBCCD.

- **Investigate the feasibility of EcoPass agreements with major employers.** Fredericton Transit should start with governmental agencies and the regional hospital, as these are some of the largest employers and EcoPass arrangements with these employers can help inform transit service planning efforts to ensure each location is adequately served.

- **Begin (or continue) conversations with prospective partners.** Partners might include including community organizations, technology companies, key trip destinations, neighbouring municipalities, and other municipal departments. Pursue the viable partnership options that benefit both parties.

Marketing Recommendations

- **Simplify route naming convention.** The suffixes 'N' and 'S' can sometimes be misleading so these should be eliminated. For example, route 10N/11S can be renamed as route 10 for the alignment between Corbett Centre and Kings Place, and route 11 for the alignment between Kings Place and Carlisle. The headsign can read "10 Regent – to Kings Place" for northbound buses, and "10 Regent – to Corbett Centre" for southbound buses. For route 11, it could be "11 Main – to Carlisle" for northbound or westbound buses, and "11 Main – to Kings Place" for southbound or eastbound buses. Alternatively, Fredericton Transit could explore colour-based naming conventions – blue line, red line, etc – which several other transit peers are considering to simplify their naming conventions.

- **Retain marketing agency/consultancy with transit expertise.** This firm should assist with the development of a marketing plan, undertake a branding review, and devise an action plan. The marketing plan should be pragmatic and implementable, and provide clear direction for Fredericton Transit.

Fleet Recommendations

- **Transition to a 15-year fleet lifecycle for conventional transit.** At the same time, make updates to purchase specifications to require stronger provisions for future purchases. Maintain other aspects of fleet procurement and management (diesel propulsion, 40-foot vehicles, and spare ratio).

Performance Criteria

- **Develop performance criteria, objectives, data collection methods, and tracking tools.** Fredericton Transit should develop a list of criteria based on objectives and feasible data collection and tracking methods. While not all the criteria discussed in Section 10.0 may be necessary or feasible, a short list should be developed to track progress on this Plan as well as performance overall.

- **Start collecting data needed for performance monitoring.** Based on the list of possible metrics, Fredericton Transit should start collecting and maintaining a database of performance metrics calibrated to its objectives. This collection can help revise what's possible to measure, as well as spur new ideas.

11.2 SUMMARY OF MEDIUM-TERM RECOMMENDATIONS (3-5 YEARS)

Service Planning and Operations Recommendations

- **Prepare to evolve Route 20 (Lincoln) into a more productive service that also runs to the airport.** Seek to grow tourism and economic development by exploring airport and related service through discussions with appropriate stakeholder groups including the Fredericton International Airport, the

Government of New Brunswick, and the Moncton Flight College. The evolved Route 20 service should be accompanied by a park-and-ride lot at the airport. If discussions are not fruitful, it is recommended that Route 20 follow an on-demand model similar to that of Silverwood, offset by one year such that Fredericton Transit can benefit from the lessons learned of the Silverwood on-demand, shared-ride pilot launch.

- **Pilot Sunday service.** Sunday service should piloted possibly with a pilot focused on operation of major routes only, and for a shortened service span. This is likely the ideal scenario based on ridership projections, and it minimizes the financial investment for the pilot. However, a pilot involving full route service for shortened service span would likely be a more realistic reflection of potential service use. Following the pilot, Sunday service should be tweaked as needed, and the City should aim to proceed with full implementation.

- **Explore the potential for a north side transfer hub.** At this time, SmartCentres should be reevaluated as a possibility, contingent on the continued evolution of SmartCentres into a location with noticeable pedestrian activity. The success of the park-and-ride lot implemented here in the short-term would also serve to strengthen the case for a north side hub. Another candidate location for a north side hub is along Main St., leveraging redevelopment, although this is in the longer term. Nevertheless, it brings implications for a medium-term north side transfer hub in that a north side hub at SmartCentres should be designed as a bridging solution until Main St. is redeveloped. In all cases, it is likely necessary to alter the alignment of some bus routes along the north side.

Technology Recommendations

- **Invest in on-demand/dynamic scheduling software.** Doing so helps to enable microtransit or on-demand solutions in lower density areas of the city, like Silverwood and Lincoln, and also helps free up capacity for Fredericton Transit's management and administration team.

- **Continue data collection and analysis.** Continued data gathering and analysis will support route planning and service improvement for increasing ridership and overall efficiency of the transit system.

Fare Recommendations

- **Modernize the fare collection system by installing simple open and mobile fare collection alternatives.** This removes one of the barriers to transit use for riders and non-riders alike. Stantec suggests a simple validator product, such as the one developed by eiGPS, as an appropriate solution at a reasonable price point. Alternatively, Fredericton Transit could leverage its investment into the IPad tablets on their buses to process payments using near-field technology.

Partnerships Recommendations

- **Continue investigating the feasibility of EcoPass agreements with major employers.** Fredericton Transit should start with governmental agencies and the regional hospital, as these are some of the largest employers and EcoPass arrangements with these employers can help inform transit service planning efforts to ensure each location is adequately served.

- **Begin (or continue) conversations with prospective partners.** Partners might include community organizations, technology companies, key trip destinations, neighbouring municipalities, and other municipal departments. Pursue the viable partnership options that benefit both parties.

Marketing Recommendations

- **Develop and implement new branding for Fredericton Transit.** Based on our high-level appraisal of current brand equity, Fredericton Transit should develop and implement a new branding strategy. It should also include an updated visual and written identity as well as a bilingual name for the agency. Initiate tactical program that initially raises awareness for the “new” Fredericton Transit but incrementally changes the focus to travel mode conversion.

- **Develop a dedicated Fredericton Transit website.** The website should be consistent with new branding emergent from the Marketing Plan, and it should contain more robust user information while being easy to navigate for the user. It should be visually appealing and function for both mobile and desktop viewing. It should support the successful implementation of other elements of the Strategic Plan. As customers of the future will increasingly demand a better digital experience with rich user information, it is recommended that the website will also promote the use of the third-party trip planning app endorsed by Fredericton Transit in the short term.

- **Implement new bus stop signage.** This should follow the completion of the Marketing Plan and be consistent with the updated Fredericton Transit brand. Bus stop signage, if deployed properly, can be an effective marketing and user information tool.

Fleet Recommendations

- **Evaluate impact of transition to true 15-Year Lifecycle.** Continue maintaining other aspects of fleet procurement and management (diesel propulsion, 40-foot vehicles, and spare ratio).

Performance Criteria

- **Publish criteria and performance on Fredericton Transit website.** More and more agencies are leveraging online tools to publish performance criteria and results of tracking these criteria. Transparency and accountability help engage the public and demonstrate a commitment to service quality.

- **Revisit criteria, objectives, etc, and modify as needed depending on data availability and feasibility.** Depending on new data availability and public feedback, Fredericton Transit can refine the criteria and objectives as needed and track different objectives.

11.3 SUMMARY OF LONG-TERM RECOMMENDATIONS (5+ YEARS)

Service Planning and Operations Recommendations

- **Collaborate with private developers and other community partners to develop park-and-rides further afield.** In the longer-term (5+ years), opportunities for park-and-ride services with new routes outside of the City of Fredericton should be explored. Some examples include park-and-rides in Oromocto, Hanwell, and/or New Maryland. Introduce dedicated limited-stop service between these park-and-rides and downtown Fredericton. To further enhance the park-and-rides’ success, align the park-and-ride strategy with other

agency objectives such as the development of employer pass (EcoPass) programs and the pricing strategy for on-street and off-street parking.

Technology Recommendations

- **Make further improvements to data collection and analysis.** In the long-term this could involve the procurement of new technologies such as APC, capital budget permitting.
- **Remove handheld two-way radios from buses and replace with an integrated CAD/AVL/MDT solution.** All communications should be done via MDTs with dispatch and emergency panic buttons underneath operator seats, or through hands-free technologies. Such a solution is more expeditious and efficient, is safer from a distracted driving perspective, and is less noticeable for the riders.
- **Monitor the progression of Bus Collision Warning System technology.** Consider implementing solutions to improve safety while reducing operating risk to Fredericton Transit. Solutions might include (but are not limited to) audible warnings of turning buses to pedestrians, and/or strobe marker lights and blinking chevrons on all side mirrors that are activated by the signal system.

Fare Recommendations

- **Gradually phase out Fredericton Transit paper-based fare media.** As mobile and open payments become more prevalent, there will be less of a need to print and manage monthly passes and 10-ride Rider Cards, which can be costly to the agency and increase dwell time at bus stops. Fares should continue to be increased at predictable intervals and alongside service upgrades.

Partnerships Recommendations

- **Continue cultivating partnerships and pursuing new partnerships as feasibility permits.** Partners might include community organizations, technology companies, key trip destinations, neighbouring municipalities, and other municipal departments. Pursue the viable partnership options that benefit both parties. It is important to recognize that as Fredericton Transit and the City of Fredericton both evolve, so too the opportunities for partnerships will evolve. Some doors may close but new doors will open.

Marketing Recommendations

- **Continue implementing new bus stop signage.** This should follow the completion of the Marketing Plan and be consistent with the updated Fredericton Transit brand. Bus stop signage, if deployed properly, can be an effective marketing and user information tool.

Fleet Recommendations

- **Perform a detailed review of fleet, facilities, and productivity.** Re-evaluate the feasibility of co-locating the Transit Administration Office and Operations in a new space attached to the bus storage facility (garage).

Performance Criteria

- **Expand criteria to be tracked based on improved data collection, adoption of new technology, public feedback, etc.** In addition to regularly updating performance metrics online, with new technologies and

objectives, performance criteria should be revised to capture new goals and objectives. As well, long-term trending in performance criteria can help identify new issues or opportunities that may arise, as well as help guide a new Strategic Planning process.

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12.0 APPENDICES

12.1 THE NORTH AMERICAN BUS MARKET

Between 5,000 and 6,000 heavy duty urban transit buses are typically sold annually in North America. Canada accounts for approximately 10% of the total market. Some fluctuations do occur such as when a one-time or short term funding initiative beyond the typical programs is announced such as is currently occurring with the Public Transit Infrastructure Fund (PTIF). The bulk of production are 40-foot units, however articulated 60-foot versions as well as a limited number of 30-foot and 35-foot lengths are also produced in decent volumes. Over 90% of the market is dominated by three manufacturers. Two of the three (New Flyer Industries, Nova Bus) sell both in Canada and the United States and have plants in both countries while the third firm, Gillig, only sells buses in the United States (US). The largest manufacturer, New Flyer Industries (which also has the largest number of product variants has in recent years seen production splits roughly as follows between propulsion types: Diesel – 60%, Compressed Natural Gas (CNG) – 25%, Hybrid – 10% and Electric – 5%. The balance of bus production is split between smaller North American and foreign based firms who in many cases focus on niche markets as well as transit agencies. In November 2017, New Flyer acquired Arboc Industries, a manufacturer of low floor body on chassis bus product in both cutaway and rear engine designs. Smaller volume firms such as Eldorado National, Alexander Dennis Limited, BYD and Proterra cover the balance of the market. In the US, CNG accounts for a higher market share than quoted above with Diesel being correspondingly smaller.

An interesting market observation is that all current diesel and CNG engines used by New Flyer, Nova Bus and Gillig as well as the smaller production firms all come from one supplier - Cummins. Bus engines account for less than 5% of the heavy duty automotive engine market so are simply a version of large truck engines configured for buses. The progressively stringent emission control requirements that have been legislated for approximately three decades have been very challenging and costly and in fact some engine manufacturers have dropped out of the transit bus market.

Alternate propulsion types prevalent in North America

While Fredericton Transit's current conventional fleet is all diesel, the national fleet profile on bus propulsion types at the beginning of 2017 was:

Table 19 National Fleet Profile on Bus Propulsion (2017).

Propulsion Type	Percentage of transit vehicles in Canada
Diesel	87.0%
Compressed Natural Gas (CNG)	2.1%
Diesel-Electric Hybrid	9.3%
Electric (Battery Electric Buses and Trolley)	1.6%

A brief overview of the most common propulsion types is discussed below.

Diesel and Compressed Natural Gas (CNG)

Propulsion for heavy duty urban transit buses in North America consists of six basic variants. Two use traditional reciprocating motion internal combustion engines. Of the two, diesel fuel powered is the more common and has been the most common type of propulsion for this purpose for over sixty years. CNG-powered engines are also becoming increasingly present. CNG use in transit buses has grown in popularity over the last thirty years because of the traditionally lower cost of CNG relative to diesel. In both cases the engines are coupled to an automatic transmission.

CNG has been viewed as advantageous in comparison to diesel in two areas. Emission levels are cleaner and the supply of domestic CNG is abundant.

Diesel-electric hybrid

The third variant is the diesel-electric hybrid system. This propulsion type couples a diesel engine (generally one of smaller displacement than a conventional diesel powered unit) to an electric generator which drives an electric motor. The system includes large rechargeable batteries that supply electricity for the motor in addition to the generator and are recharged during vehicle braking, called regenerative braking. The inclusion of the batteries as a source of power reduces the dependency on the engine, lowering fuel consumption. There are two designs of diesel electric configurations; one is the simple series system as described above. The other, known as the parallel design includes a transmission component coupled to the engine. Output from the transmission and traction motor sources are optimally combined to yield the best performance for the road and speed conditions at that time and to optimize fuel economy. While in theory the same concept could be used in with compressed natural gas engines in place of diesels, this has not been pursued to any great extent.

Battery Electric Buses

Battery electric buses (BEBs) are a forth variant. Large storage batteries are carried on board and are charged when the bus is parked and connected to a designated power source, either a proprietary system or to a standardized charging point depending on the manufacturer. Electricity for the traction motor is drawn from the batteries. Depending on battery capacity, bus operating range can vary. While a product claim of now approaching 400 kilometres between overnight charging is in the current market offering, other configurations have shorter ranges requiring lapses for en-route recharging during a daily duty cycle. In the latter case, battery capacity which saves on weight and spaced are factors.

BEB's, like diesel-electric hybrids, also recharge batteries during regenerative braking. Stationary on route recharging for brief time intervals can also be done at layover or terminal locations. Induction charging while driving is also currently being investigated. Because of the service cycle profiles, it may be necessary to operate with a marginally larger fleet to offset the shorter range (duration of time or daily total run distance) that a battery electric product may have as compared to one of the other types. This enters the area of the service profile of each route and transit agency, vehicle dispatching and utilization methods and possible even Collective Agreements with the work force. The changing and variety of battery technologies will impact this item. BEBs are often hailed as an "emission-free" vehicles although source of electric power generation needs to be strongly factored in. Off shore and small American original equipment manufacturers with purpose built vehicles have been joined in the marketplace by the domestic firms offering BEB versions of their existing bus platforms. There are currently less than 200 BEBS currently in use across North America. Several pilot programs are underway where we will continue to learn about the viability/long term performance of this propulsion source.

Electric trolley buses

The fifth variant, the electric trolley bus operates much like the battery electric bus. In this case, electricity is drawn from overhead wires through sliding roof poles. It is possible to equip trolley buses with storage batteries to be used for short periods when the bus must go off route/off wire such as for a street diversion. However; there are now very few electric trolley bus systems operating in North America and all are successors to streetcar systems based on using an update of the existing infrastructure. The decades of the 1960's and 1970's saw this vehicle type virtually disappear in North America with a few systems (Edmonton, Hamilton and Toronto) carrying on for a few more decades. In Canada, only Vancouver has continued with these vehicles and only five cities in the US have retained operating them: Boston, Philadelphia, Dayton, Seattle and San Francisco. These vehicles however typically have withstood service lifes slightly longer than their diesel counterparts.

Fuel cells

A sixth variant exists in the form of fuel cells. Typically, stored hydrogen gas is converted to electric power and a traction motor is driven like the other propulsion types discussed previously. Like compressed natural gas, special dispensing provisions are required at the bus facility.

Popularization of alternate propulsion types

The strong concern and corresponding legislation to reduce emissions has been an influence in propulsion selection. Before the current versions of "clean diesel engines" hybrids and BEBs came into the market place, compressed natural gas (CNG) was viewed as the cleaner alternative. This was reflected in many United States transit agencies switching to this product in the 1990's. The changeover was not as pronounced in Canada. In fact, a number of Canadian systems that purchased fleets of CNG powered buses in the early days of this technology discontinued this propulsion source (e.g. Burlington, Toronto, Mississauga, Grand River Transit).

The other key factor in the historical favoring of CNG was price and supply of diesel. World economic and political situations can and did render diesel fuel a sensitive commodity. Conversely, CNG was basically all domestically sourced and relatively inexpensive and stable in supply. The aggressive legislative mandates by the California Air Resources Board made CNG an "appropriate" alternative in that State as well as other places.

Over the past several years certain changes have occurred in the diesel and CNG products. The continued legislated emission reductions have made diesel emissions much "cleaner." Diesel-electric hybrids use the same engines (i.e. same emission levels) as straight diesels but because propulsion is supplemented/complimented by the electrical side, less diesel fuel is used. However, diesel engines have become more complicated and maintenance intensive because of needing to attain reduced emissions. For example, a particulate trap filter (DPF) is now part of the exhaust system and a urea based liquid i(DEF)s sprayed into the exhaust gases to further reduce emissions. There are maintenance routines associated with the particulate trap filter that involve both cost and downtime. Thus; both capital and operating costs are now relatively higher for diesels than in the past. Diesel fuel has also been made more environmentally friendly through the reduction of sulfur content. Also, bio-diesel, sourced from vegetation is/has been used as a blended component into conventional diesel fuel.

From a capital perspective, CNG powered buses have always been more expensive to buy than diesel powered buses (but less expensive than diesel- electric hybrids). But with the accessories and other changes to diesel engines due to stricter emission standards, the price gap between current diesel and CNG buses has shrunk. Further, if facility/infrastructure costs are removed from the equation, the out-of-pocket vehicle servicing, repair and

maintenance costs of CNG over diesel may be negligible. True and accurate comparison requires a life cycle approach with both types in a compatible environment.

The ongoing quest to reduce emissions continues with concern for sustainability, renewable resources. The “green environment” perspective is particularly front and centre with current social consciousness and political posturing. Renewable resources including some tied into the CNG fuel cycle are viewed as attractive features. Because of the high profile that environmental/carbon reduction initiatives command, opportunities for funding may expand. This would no doubt include any propulsion type other than conventional diesel (even though current diesels are referred to as clean diesels based on emission controls and fuel characteristics).

Changing propulsion types comes with considerable costs

Buses

It is important to recognize that changing to another propulsion type will include significant capital costs regardless of how funds are obtained. While BEBs are currently in vogue, the cost of a BEBs is nearly twice that of a diesel bus. Added to the initial purchase cost is the reality that much is still unknown about the long-term “behavior” of these vehicles; this translates into risk for transit agencies that must be managed and provisioned for. Approximate capital cost premiums relative to diesel are shown in Table 20.

Table 20 Capital cost premiums (diesel).

Propulsion Type	Approx. Cost Premium Relative to Diesel
CNG	+10%
Series Diesel-Electric (Hybrid)	+25%
Parallel Diesel-Electric (Hybrid)	+45%
BEB, Electric Trolley and Fuel Cells	+100%

Due to component sourcing and labour outside of Canada, currency fluctuations and associated currency risk impacts the final pricing in Canada. Also impacting prices is the “hunger” of the marketplace at time of bidding and as well as bus delivery date projections.

It should also be pointed out that noise emission varies with the model type. The benchmark “white book” that outlines bus performance specifications and standards has a maximum noise emission threshold that buses must comply to. Diesels are the noisiest and of course are compliant. Next would be diesel-electric hybrids, followed then by CNG and finally the electric drive variants as the quietest.

Infrastructure

Infrastructure costs such as building code generated modifications, refueling hardware, charging infrastructure, transmission network upgrades need to be factored into the business case. Operating costs will be effected if changes to daily processes are triggered. This includes changing vehicle and staff deployment, dispatch procedures, employee training and accreditation, service line routines, etc. In addition, there may be other unforeseen added costs. For example, the agency may need to operate the existing and new propulsion products in parallel either until the fleet is turned over or in perpetuity if two or more types are retained. Infrastructure costs for each respective type are additional and need to be factored in. There may be compliance issues required to outfit a facility to store and dispense CNG fuel. For working on bus roof where batteries may be carried in diesel hybrid or battery electric modes,

fall arrest and hoisting provisions may need to be fitted in. Electric capacity feed at specific voltage and distribution circuits are required for battery electric buses being recharged while stored in the garage.

Training and maintenance

Training for maintenance personnel (and to a lesser extent for operating personnel) would be needed for a change in propulsion. And if the propulsion type is changed through the normal vehicle life cycle/turnover process (one for one) it would take a full life cycle from introduction of the new propulsion to completely change over the fleet (e.g. 15 years for a 15-year service life). This mean that during the turnover period, two propulsion modes would be in use and in need of maintenance. As an example, if a transit agency made the decision to switch from diesel to BEB propulsion and the fleet turnover (life cycle) is 15 years, there would be a need to service, repair, maintain infrastructure and train for both types for 15 years.

Premature for "total cost of ownership" comparisons between all propulsion types

It is still relatively early to make accurate life cycle costing between the various propulsion types, particularly BEBs. Batteries are constantly improving and will likely realize longer lives, greater range, and less failures in the future. At the same time, with mass uptake of BEBs comes the necessity to manage and dispose of batteries that have reached their lifespan for transit but may still have a useful afterlife as potentially battery banks for energy storage. Improvements to components through in service trial and error (e.g. better weather proofing) has reduced in service failures and increased mean distance between failures. An overarching theme is that diesel engines are more maintenance intensive due to the emission control features and apparatus that has been added to meet legislated standards as previously discussed. Conversely; with the increased use and product improvements of CNG engines, these engines are becoming less maintenance intensive as compared to the first generation over a decade ago. Comparisons of the various types need to be done in identical operating conditions in order that the results are "apple to apple" (e.g. same transit authority, same vehicle type and age and same route profile).

Diesel-electric hybrid buses offer some fuel savings through the combination of regenerative power when braking and the typical use of a smaller displacement engine. However, the savings vanish when the vehicles are used on route profiles with longer distances between stops and higher speed schedules (non-Manhattan duty cycle as defined by Altoona) as may or may not be the case in Fredericton. The start and stop/close stop placement profile of a downtown urban route is where the true economies of this technology are evident (Manhattan duty cycle). Similarly, BEBs are best suited for the constant start and stop environment to recover energy through braking. Diesel-electric hybrid and electric (both battery and trolley) do realize extended brake lining/pad life through the regenerative braking function. BEB and trolley electric buses also eliminate the automotive power train components of engines and transmissions, which avoids the use of lubricating fluids and filters, engine coolant product and lines, emission apparatus and testing, etc.

Long pay-back period for alternate propulsion types

A peer transit agency recently undertook a cost comparison analysis between current diesel and diesel-hybrid types propulsion types. The conclusion was that the fuel savings and other cost reductions in operations and maintenance at that transit property would offset the higher capital cost of the diesel hybrid after ten years in service. A net savings or return would generate for the residual life of the bus after the first ten years. This payback period appears to be very close to the design life of the buses.

Paratransit/specialized transit vehicles have limited propulsion choices

As the scope of this exercise only addresses the conventional bus fleet, specifics of the Fredericton Para Transit/specialized fleets are not addressed. However, two important areas should be touched upon. With the conventional fleet being all low floor, it naturally follows that the smaller buses in this service should match. While there may be a small cost premium over the high floor lift equipped cutaway chassis units, the parallel characteristics and public profile to low floor conventional vehicles cannot be ignored. Also, diesel engines are no longer available on some of the domestic cutaway designs. Gasoline engines in heavy duty commercial applications have improved and in many cases alternate fueling arrangements if required may be the only real challenge to address. Another advantage is the heat generation from a gasoline engine, for passenger and driver comfort eliminates the need for an auxiliary diesel fuel fired heater. Alternate propulsion types have not been pursued to the same degree in Canada as in the US or as intensively as on conventional vehicles. Both propane and CNG have seen some applications to this vehicle type.

12.2 FREDERICTON TRANSIT SURVEY QUESTIONS

Have you used Fredericton Transit within the last 3 months? (If yes, continue to rider survey, if no, continue to the non-rider survey).

Rider Survey

1. How often do you use Fredericton Transit?
    a. At least 5 days a week
    b. 3-4 days a week
    c. 2 days a week
    d. Once a week
    e. Less than once a week
    f. Once or twice a year

2. How long have you been riding Fredericton Transit?
    a. Less than 1 month
    b. 1-6 months
    c. 6-12 months
    d. 1-3 years
    e. More than 3 years

3. How would you travel today if Fredericton Transit was not available?
    a. Drive my own vehicle
    b. Get a lift from friend/family member
    c. Ride bicycle
    d. Walk
    e. Taxi
    f. Wouldn't make trip
    g. Other

For the following questions, please tell us about your typical or most common trip on transit. This trip should be a one-way trip (for example, home to work, or school to shopping mall) and could involve different modes of travel (for example, car and bus, or walk and bus, etc.)

4. Thinking about your typical trip on public transit, which Fredericton Transit service and routes did you use? (Please choose only one).
    a. Para Transit (if selected, send to question 18 onwards)
    b. Conventional Service (Dropdown list of all the routes that you use)

5. What is the purpose of your most common trip?
    a. Commuting to/from work
    b. Commuting to/from school
    c. Work-related trip (not commuting)
    d. Shopping
    e. Personal business
    f. Health care
    g. Picking up or dropping off a child
    h. Leisure
    i. Other (please describe)

6. What time of day do you normally use Fredericton Transit? (Please check all that apply)
    a. Morning peak hours (6 am – 9 am)
    b. Midday (9 am – 4 pm)
    c. Afternoon peak hours (4 pm – 7 pm)
    d. Evening (7 pm – 11 pm)

7. How do you typically get to your bus stop?
    a. Walk

b. Bicycle
c. Drive a car
d. Dropped Off
e. Other (Please specify)

8. Thinking about your typical one-way trip (e.g. home to work), where does your trip typically start? (Please indicate the **closest intersection or address** of your **origin**. This is **not** the bus stop where you start your trip.)

9. Again, thinking about your typical one-way trip (e.g., home to work), where does your trip typically end? (Please indicate the **closest intersection or address** of your **destination**. This is **not** the bus stop where you end your trip.)

10. Do you usually transfer between bus routes to get to your final destination?
    a. Yes
    b. No

11. If yes, please indicate where you transfer between buses.
    a. Kings Place
    b. Regent Mall
    c. Corbett Centre
    d. Other (please specify)

12. How did you typically pay your fare?
    a. Cash
    b. Ticket (from 10 ticket rider card)
    c. Adult monthly pass
    d. Student monthly pass
    e. 65 Plus Club pass

13. Thinking about your typical trip, how satisfied are you with the overall quality of service?
    a. Extremely dissatisfied
    b. Dissatisfied
    c. Neither satisfied nor dissatisfied
    d. Satisfied
    e. Extremely satisfied

14. Again, thinking again about your typical trip using Fredericton Transit, how satisfied are you with the following:
    a. Time spent waiting for the bus
    b. Ability to transfer between routes
    c. Your comfort on the bus
    d. Your ability to get a seat on the bus
    e. Information at the stop/on the bus
    f. Directness of route
    g. Driver behavior/attitude
    h. Amount paid
    i. Cleanliness of the bus stop/bus
    j. Safety at the bus stop/on the bus

    * All of the above include multiple choice options for extremely dissatisfied to extremely satisfied, and N/A

15. On a scale of 1 to 5, where 1 is strongly disagree and 5 is strongly agree, please rate the following statements:
    a. I would use transit on Sundays if Fredericton Transit operated buses on Sundays.
    b. I would use (or benefit from) an express bus service from Regent Mall to Kings Place.
    c. I would use public transit more often if Fredericton Transit provided park-and-ride lots around the city.
    d. It would be more convenient for me to transfer between buses on the North Side of Fredericton than currently at Kings Place.
    e. I would be interested in purchasing a reduced student fare from UNB.
    f. I would be willing to pay more for Fredericton Transit if the services they provide are better (faster, more frequent, take to where I want to go, later schedules)
    g. I would use transit if Fredericton Transit operated buses to and from the Fredericton International Airport.

h. I would use a late night bus service to get me home from evening events and activities if it were available

16. Public transit often requires tradeoffs when designing a bus service. On a scale of 1 to 5, where 1 is strongly disagree and 5 is strongly agree, please rate the following statements:
    a. I prefer travelling on one bus (no transfer), even though my bus may be indirect.
    b. I prefer shorter travel times, even though it may require me to transfer between bus routes.
    c. I prefer frequent bus service, even though I may have to walk farther to reach my bus stop.
    d. I prefer a bus stop nearer to me, even though buses may come less frequently.
    e. Transit should get priority over vehicle traffic in the city where feasible.

17. How do you check transit schedule information? (Please check all that apply)
    a. Paper schedules
    b. Online schedules
    c. ReadyPass app
    d. Mobile app (please specify)
    e. Google Maps
    f. Telephone

18. Do you have a positive impression of transit services in Fredericton?
    a. Yes
    b. No
    If no, why not?

To help us understand who rides Fredericton Transit and whether service is being provided at the right places, please answer the following questions. Again, no information will be shared and all information is confidential and used solely for the purposes of developing the transit plan.

19. Please provide the full postal code or address of your home location.

20. Do you own or have regular access to a car?
    a. Yes
    b. No
    If yes, how many cars are available for use in your household?

21. Do you have a mobile or smartphone?

22. How old are you?

    a. 12-17 years old
    b. 18-24 years old
    c. 25-34 years old
    d. 35-44 years old
    e. 45-54 years old
    f. 55-64 years old
    g. 65-74 years old
    h. 75 years or older

23. Do you self-identify as…?
    a. Male
    b. Female
    c. Other
    d. Prefer not to say

24. Do you consider yourself…? (Please check all that apply)
    a. White
    b. First Nations
    c. Asian
    d. Arab
    e. Black
    f. Other (please specify)

25. You are (Please check all that apply):
    a. Clerical/Professional
    b. Manual laborer
    c. Self-employed
    d. In school
    e. Retired
    f. Unemployed/not working
    g. Employed casually or part-time

26. What was the total combined income of every person living in your household over the past year?
    a. Less than $20,000
    b. $20,000 – 40,000
    c. $40,001 – 60,000
    d. $60,001 – 80,000
    e. $80,001 – 100,000
    f. More than $100,000
    g. Prefer not to say

In addition to your previous answers, do you have any other comments/suggestions you would like to provide to Fredericton Transit?

Thank you for your input!

Non-Rider Survey

1. How do you typically get around Fredericton? (Please choose one)
    a. Drive my own vehicle
    b. Get a lift from friend/family member
    c. Ride bicycle
    d. Walk
    e. Taxi
    f. Other

2. If you choose to drive a car, why do you choose to do so? (Please choose all that apply)
    a. Need to visit multiple destinations before returning home
    b. Need to transport children to/from school or daycare
    c. Cannot get home in an emergency otherwise
    d. Transit is not convenient for me, or takes too much time
    e. Prefer to drive my car
    f. It is more cost effective for me
    g. I don't know about other transportation options
    h. N/A - I don't typically drive alone

3. On a scale of 1 to 5, where 1 is strongly disagree and 5 is strongly agree, please rate the following statements: I don’t use transit because:
    a. Routes and schedules don’t cover my needs
    b. Service is not frequent enough
    c. My regular trip would take too long by bus
    d. No stops near me
    e. It is not convenient
    f. Too expensive
    g. Not reliable
    h. I feel unsafe
    i. I don’t like any form of public transit
    j. Other (please specify)

4. On a scale of 1 to 5, where 1 is strongly disagree and 5 is strongly agree, please rate the following statements:
    a. I am familiar with the service provided by Fredericton Transit.
    b. I do not use Fredericton Transit because I prefer to travel by car.

c. I know which Fredericton Transit bus route is closest to my home.
d. There is no Fredericton Transit bus stop near my home.
e. I believe public transit service reduces traffic congestion.
f. Public transit service is necessary and transit should get priority over vehicle traffic where possible.

5. On a scale of 1 to 5, where 1 is strongly disagree and 5 is strongly agree, please rate the following statements:
    a. I would use transit on Sundays if Fredericton Transit operated buses on Sundays.
    b. I would use (or benefit from) an express bus service from Regent Mall to Kings Place.
    c. I would use public transit if Fredericton Transit provided park-and-ride lots around the city.
    d. I would be interested in purchasing a reduced student fare from UNB.
    e. I would use transit if Fredericton Transit operated buses to and from the Fredericton International Airport.
    f. I would use a late night bus service to get me home from evening events and activities if it were available.

6. If convenient transit service (i.e. frequent, reliable, affordable, convenient) was available to where you live, work or go to school, how likely would you be to use it?
    a. Very unlikely
    b. Somewhat unlikely
    c. Neither likely or unlikely
    d. Somewhat likely
    e. Very likely

Please provide the full postal code or address of your home location.

In addition to your previous answers, do you have any other comments/suggestions you would like to provide to Fredericton Transit?

Thank you for your input!

Design with
community in mind