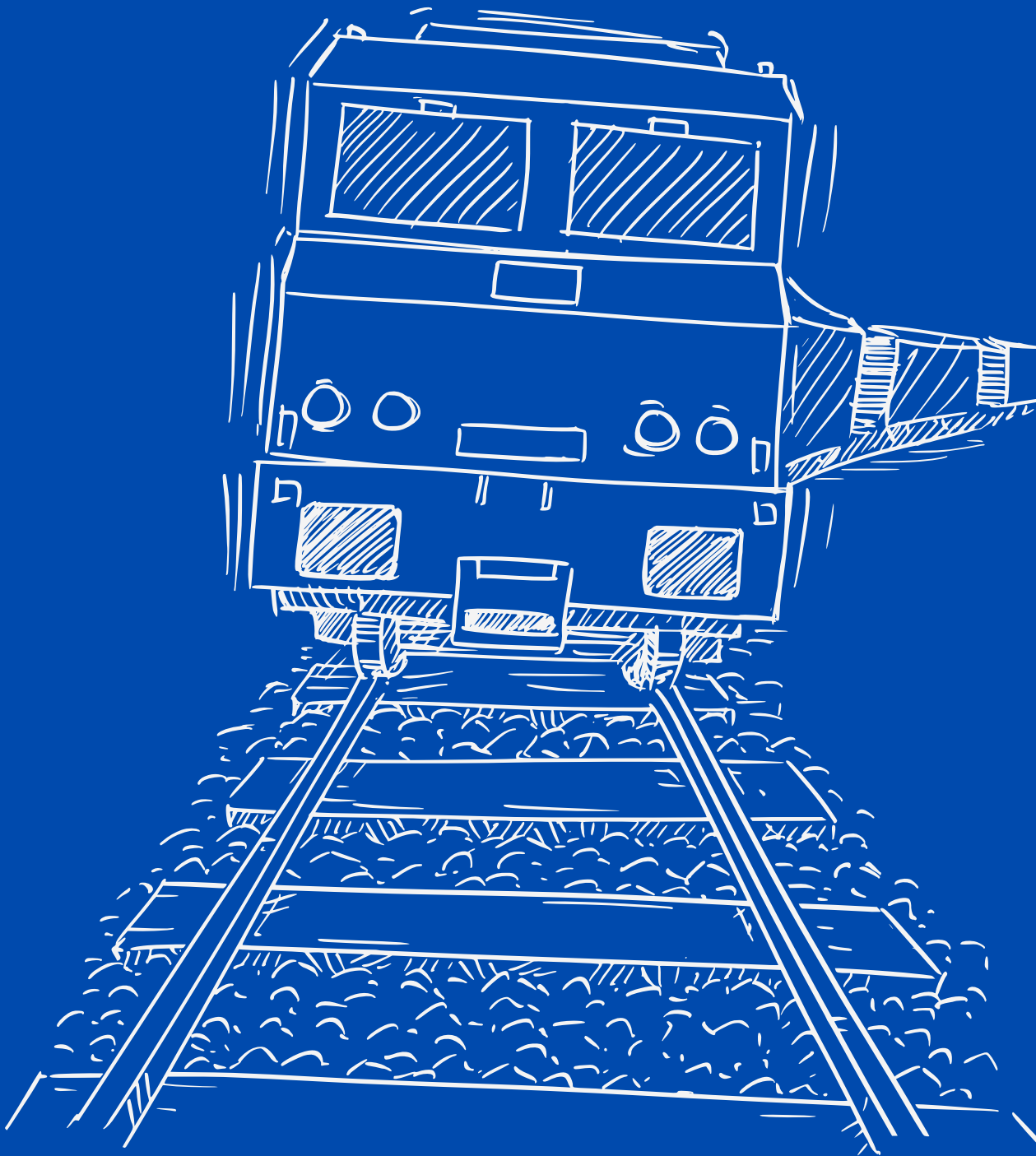


NEW
FRONTIERS IN
TRANSPORTATION



ANALYZING SURFACE TRANSIT INNOVATION
POST CLOSURE OF SCARBOROUGH SRT

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2021

MESSAGE FROM OUR STUDENT TEAM

At the beginning of the summer, our team decided to take part in the annual University of Toronto Transportation Alumni Network (UTTAN) “*New Frontiers in Transportation*” competition. We made lists of potential ideas that we could research for this competition. After hours of discussion about transit equity, we decided to pick a topic. One thing we all have in common is that we are all University of Toronto Scarborough (UTSC) students. As upper year UTSC students we have faced various challenges commuting to campus. Therefore, we decided to take on a project that we are passionate about and a transit issue we understand, will create transit equity issues once COVID-19 measures decrease and ridership increases.

We would like to express our special thanks of gratitude to UTTAN who gave us the opportunity to do this awesome project on Analyzing Surface Transit Innovations Post Closure of Scarborough SRT. By allowing us to participate in this competition it allowed us to connect with others, learn more about this issue and think about transit solutions that can be implemented across the GTHA not only within Scarborough.

We would also like to say thank you to our three mentors: Michelle Kearns, Mehemed Delibasic and Shahan Shaikh. All of our mentors were extremely supportive through out the process, taught us a lot about different projects they have done, gave us feedback and supplied us with resources that could be used in our project. This project would not have been possible without their support.

Sincerely,

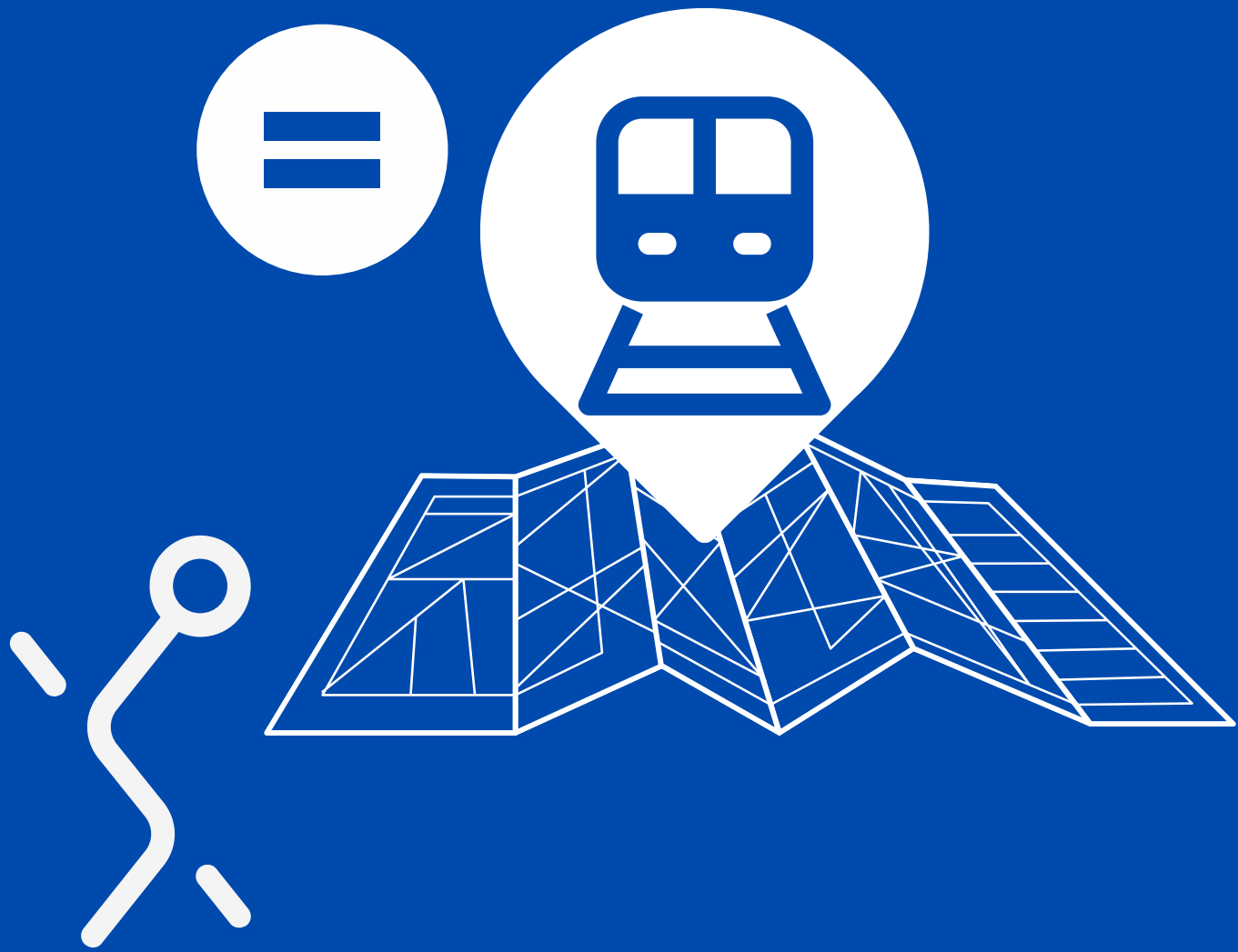
Anika Munir, Rajpreet Sidhu and Neil Patel

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EXECUTIVE SUMMARY

The purpose of this case study is to examine three transit alternatives regarding the impending closure of Scarborough RT (SRT). The three alternatives are; the implementation of a Bus Rapid Transit line, the development of a dedicated Bus Line and integration with the GO System. In this document, the problem is stated as the Scarborough RT is a crucial and high use transit hub and the geopolitical and technical background of the problem is reviewed. The research methodology applied is a policy and best practice review of surface transit innovations and a background review of relevant context. Each alternative is examined to understand the feasibility and operations of the alternative and key examples are explored. Many of the Alternatives discussed can be utilized in different urban centres located across the Greater Toronto Hamilton Area (GTHA) to promote transit equity as population increases in GTHA. To conclude, a multiple account evaluation is utilized to analyze the different alternatives and a recommendation for Integration with the GO System is made provided with reasoning. Throughout the process, equity is continuously considered as Scarborough ridership is a diverse group and often is disfranchised through transit inequity by the TTC. As our lived experiences of BIPOC youth utilizing Scarborough transit, we intentionally centered marginalized ridership and user benefits in our analysis.



1 PROBLEM

In December 2021, the Toronto Transit Commission (TTC) announced the closure of Scarborough RT (SRT), which is a light rail transit (LRT) known as line three that supports five stations connecting Scarborough to the southwestern portion of Toronto (Fox, 2021). TTC announced the closure of SRT, claiming the trains became difficult to maintain in order for reliable and safe transit service on line 3 (TTC, 2021). This was due to the age of the vehicles and their critical parts (TTC, 2021). TTC suggested Scarborough residents will have to use shuttle buses for seven to ten years until the Scarborough Subway Extension (SSE) is opened in 2030. (Boisvert, 2021).



Figure 1: Image of SRT (Spurr, 2019)

Scarborough RT carried 35,000 customers a day, before the pandemic, with 75% of trips passing through Scarborough Town Centre (STC) and Kennedy Station (Westool, 2021). This transit line connects Scarborough residents to the Bloor-Danforth Subway line two (Westool, 2021). Additionally, post-pandemic, the numbers of riders in Scarborough will rise as businesses start operating in-person, as individuals return to work and pandemic measures decrease (Chief Executive Officer, 2021).

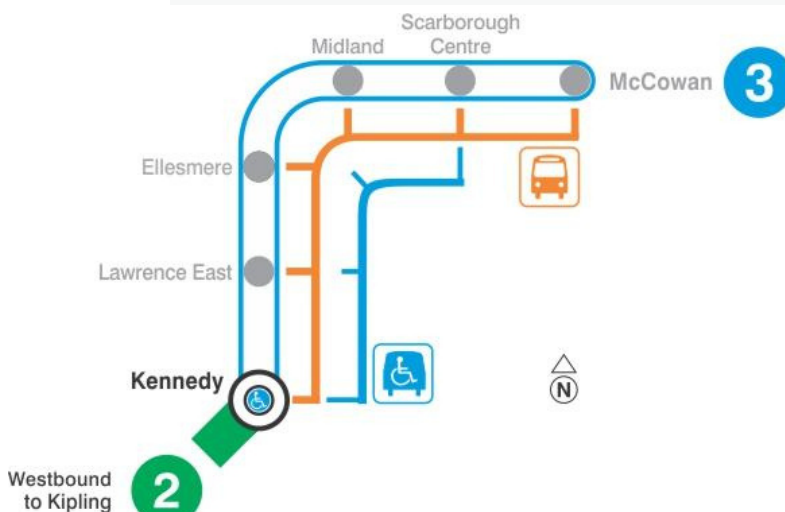
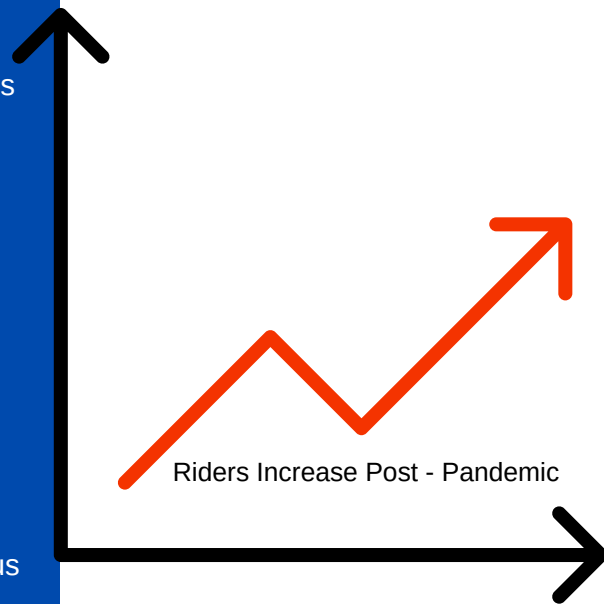


Figure 2: Map of Scarborough Line 3 / RT (Mackenzie, 2018)

As ridership will increase in increments during the post-pandemic period, it will lead to shuttle buses being unable to accommodate riders trying to commute within Scarborough or to other locations in Toronto. Shuttle buses will not be an effective transit method because of the traffic increase on roads, prolonged stops in between, and will not be able support as many passengers as the SRT was able to at a time. This will create transit equity issues in Scarborough as individuals are left with unreliable transit that will cause longer trip times and only be able to transport a small population at a time. Additionally, it is important to acknowledge Scarborough residents often work precarious jobs, live in low-income households and are racialized populations (Chief Executive Officer, 2021).



Transportation should be equitable and plays an important role in communities and the success of their residences. However, communities located in Scarborough will be facing challenges when they are given shuttle buses, rather than a supportive transit alternative until SSE is in operation. This case study will examine different surface transit innovations that could improve the transit experience for individuals due to the closure of the SRT. The three alternatives which will be considered in this case study are: Bus Rapid Transit (BRT), dedicated bus lanes and Integration with the GO system.



Figure 3: Photo of Scarborough (Scarborough town Centre, Ontario - aerial photograph)



Figure 4: Dedicated Bus Lane on Eglinton East (Robertson, 2020)



Figure 5: GO Train (To Do Canada, 2019)

03 RELEVANCE TO THE GREATER TORONTO HAMILTON AREA (GTHA)

Although the issue of removing a rapid transit line is unique to Scarborough and this case study focuses on Scarborough, it can still be applied to the Greater Toronto Hamilton Area (GTHA). Many communities in the GTHA lack supportive transit systems which will create inequities such as ridership. Which will increase as population continues to grow in the GTHA.

According to Metrolinx, the GTHA population today is just over six million people (Metrolinx, 2013). However, by 2031, the GTHA population is estimated to grow to 8.6 million people (Metrolinx, 2013). There are many urban centers located across the GTHA, which make them an attractive place to reside in as they can offer individuals with opportunities, better healthcare and more accessible resources. As the population increases in the GTHA, it will cause travel delays for transit users, unreliable trip times and higher transit vehicle operating costs associated with higher traffic volumes (Metrolinx, 2013). As transit operational costs will increase there will be a decrease in transit vehicles, leaving some communities vulnerable and without accessible transit in their community.

The three alternatives examined in this case study can be applied to communities across the GTHA that are located in congested areas, lack accessibility to GO systems and desire transit with reliable trip times. Each of these alternatives can be used by transit agencies across the GTHA to implement in their communities in the foreseeable future as population increases and transit infrastructure becomes a primary need to help individuals move around (Metrolinx, 2013).

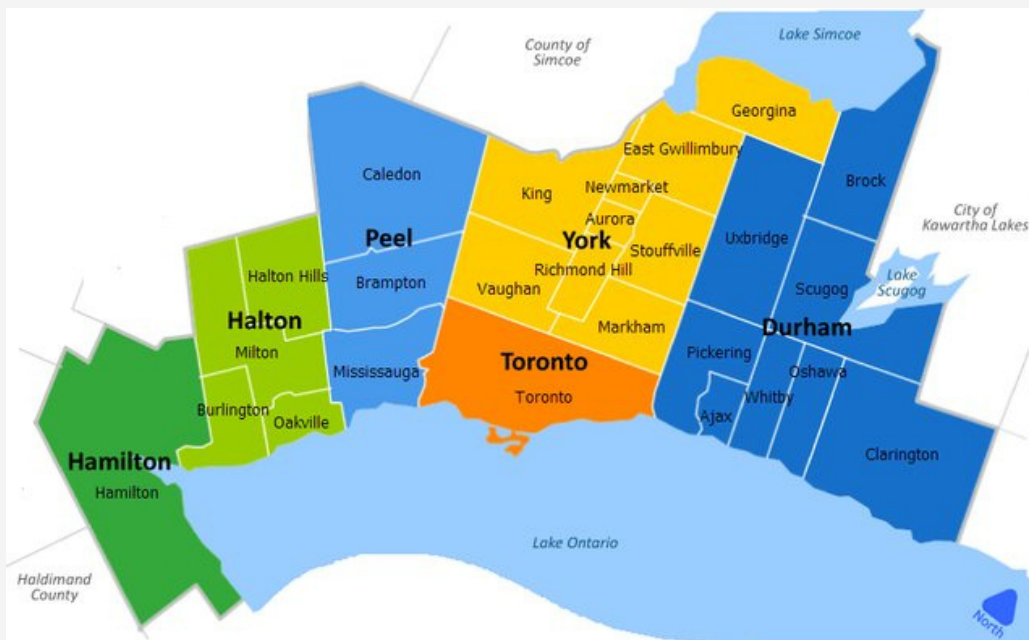


Figure 6: Map of GTHA showcasing all the areas (2021)

04 BACKGROUND & HISTORY

The Scarborough Rail Transit (SRT)

In December 2021, the Toronto Transit Commission (TTC) announced the closure of Scarborough RT (SRT), which is a 6.4 kilometre at grade light rail transit (LRT) with 5 stations connecting Scarborough to the south western portion of Toronto (Fox, 2021) [see Figure 1]. The SRT carried 35,000 customers per day in 2019 (Fox, 2021). The SRT is primarily used ‘for home to work and home to school trips’ and 18% of SRT users come from low income households (Chief Capital Officer, 2021).

Since its opening in 1985, Kennedy and Scarborough Centre stations have become significant transit hubs in the TTC’s multimodal network, as they account for over 75% of all ridership on the SRT line (Chief Capital Officer, 2021). The TTC is reviewing several options, the three short-listed options are:

“Option 1: Hybrid SRT and bus service to 2030.

Option 2: SRT to 2023 and Bus Replacement service 2023 to 2030 with new buses.

Option 3: SRT to 2023 and Bus Replacement Service within the current fleet 2023 to 2026 and new buses 2027 to 2030.”

The “SRT Life Extension Project Options Analysis” claims Option 1 is the highest cost option with the greatest amount of risk and does not recommend continuing with the option. Option 2 and 3 are low risk options that are recommended to be explored further. We will explore three alternatives in this report; transferring the SRT into a bus rapid transit, dedicated bus lanes and integration with the GO system.

Existing Transit Travel Patterns Destinations of all transit trips originating in Scarborough

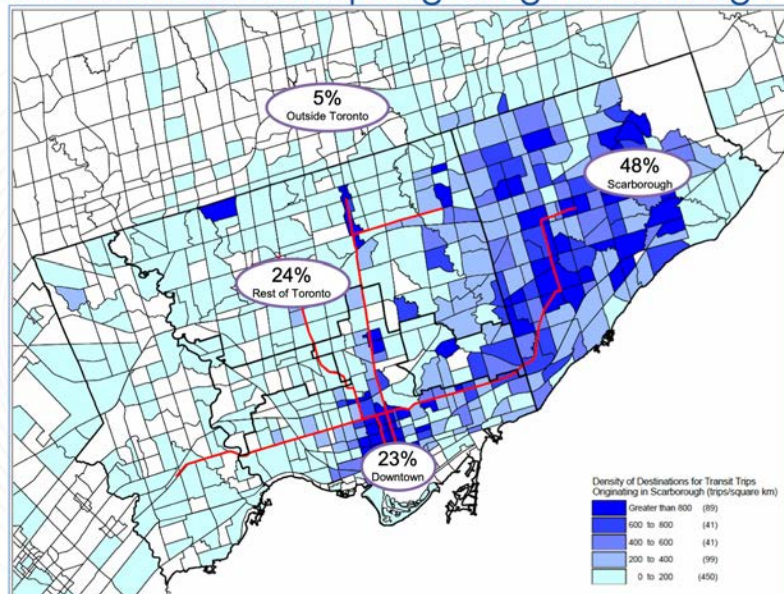


Figure 7: This map showcase where transit trips made from Scarborough Happen (City Planning Division, 2016)

Political History Behind the Scarborough Subway

Scarborough is an ethno-racialized suburb that comprises displaced migrants who have been pushed out of the downcore due to income disparity (Basu & Fielder, 2017). According to a 2016 neighbourhood profile, Scarborough village is composed of 73% visible minorities, 55% immigrants and 41% of the population commuting to work with 28% having a commute longer than one hour (Scarborough Village, 2016). However, it is important to note Scarborough is not a single entity nor demographic. There is a divide of Scarborough residents who commute on transit to the downtown core and those who commute within Scarborough. They are most transit-dependent within Scarborough and face the most equity challenges and are often not served by infrastructure that serves a one way flow downtown. As Scarborough Centre is an urban growth centre, hence development is promoted and proposed in the area.

In 1998, the second amalgamation of Toronto occurred, where Scarborough became one of the six boroughs (CBC News, 2013). Amalgamation was originally proposed as an efficient governance model, however, post amalgamation Toronto often left racialized and low-income communities out of planning decisions that were pro-development, technocratic, and claimed to be objective (Joy & Vogel, 2015). In 2007, Mayor David Miller proposed 'Transit City', a light rail expansion that would have two lines going into Scarborough and the provincial government pledged 7.2 billion dollars in funding (CBC News, 2013) [see Figure 8]. In 2010, Mayor Rob Ford canceled 'Transit City' claiming it was a "war on the car", promised subways, and created Metrolinx, a provincial private sector partner (CBC News, 2010 & Joy & Vogel, 2015).

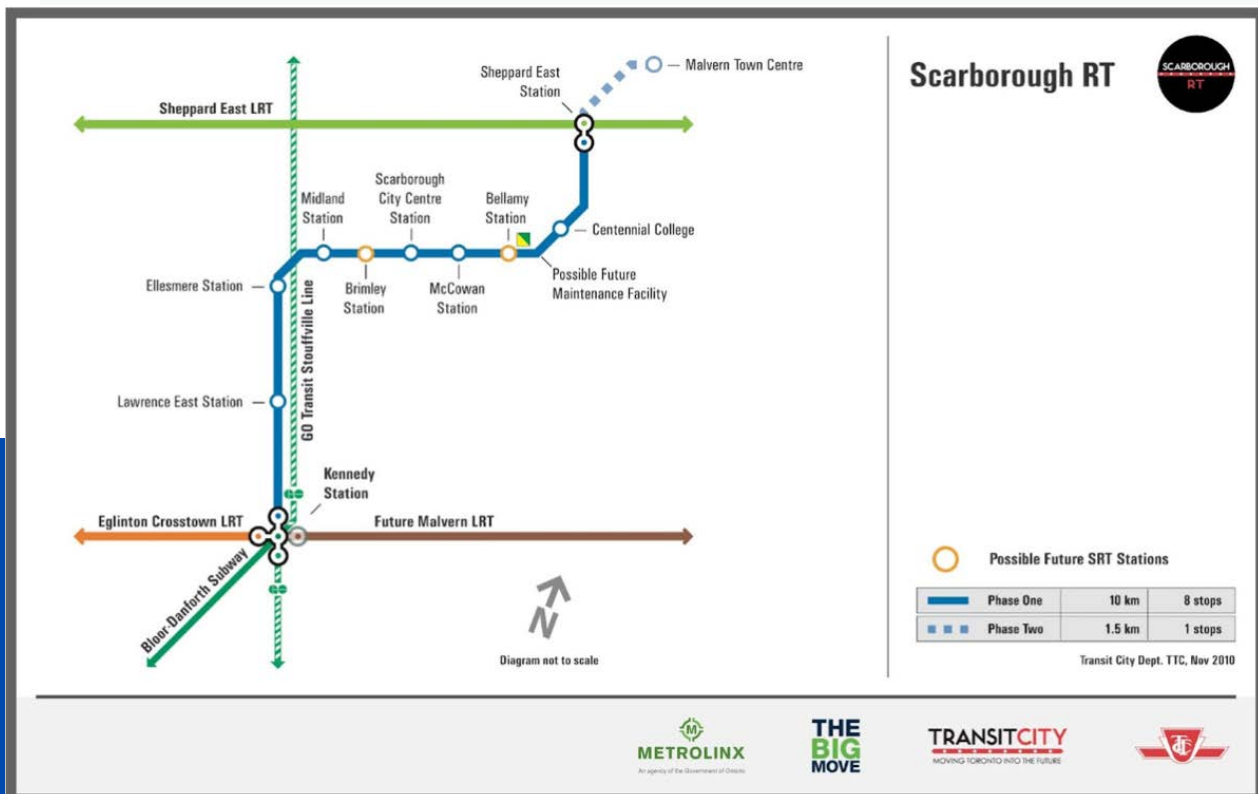


Figure 8: Map of Transit City Plan in 2010 (Johnson, 2017)

In 2011, the Metrolinx plan included a seven-stop LRT to replace the SRT (Pagliaro, 2020). The OneCity Plan was introduced in 2012 which included the subway extension in Scarborough and the plan was canceled in 2012 (CBC News, 2013). Then again, in 2012, the city signed an agreement with Metrolinx to build the LRT to begin construction in 2014 (Pagliaro, 2020). However, through various disjointed council votes and political tension by 2013, the 3 stop subway was the final decision for Scarborough transit (Pagliaro, 2020) [see Figure 9]. Mayor Tory promised to expand GO service with 'SmartTrack' and offered to build a one-stop subway instead (Pagliaro, 2020). Between 2015 to 2021, there are multiple switches from the one stop subway with the support of Premier Ford for the three stop subway and by 2019, the cost of the subway plan is 5.5 billion (Pagliaro, 2020).

As of April 2021, the three stop subway is still being proposed to be completed by Metrolinx and Ontario Infrastructure as the transit corridors have been identified (Metrolinx, 2020 & Metrolinx, 2021). The subway extension will probably not be completed by 2030 as large infrastructure projects usually have delays and research demonstrates buses have the lowest speed and highest problems of all transit options meaning Scarborough residents will have even longer commutes (Diab, & Shalaby, 2018).



Figure 9: Map of Scarborough Subway in (Johnson, 2017)

By 2021, there has been no material improvement for transit in Scarborough, as residents are still utilizing the SRT and dependent on buses. Scarborough has poor levels of transit services with underserved areas and many transit deserts which are urban sprawls not served by rapid transit (Waberi, 2019). Martin Prosperity Institute did a study analyzing the access to transit within the City of Toronto, and Scarborough had an average score of 20.97 out of 1,500 while the average was 66.5 (Waberi, 2019). The affluent suburbs have three times the better transit score of 102.8 (Waberi, 2019).

Scarborough also suffers from high levels of transit poverty, which are socio economic disadvantages such as low income, health issues, and a lack of access to reliable and safe transit (Allen & Farber, 2019). Public transit in Scarborough does not cater to traveling for families, long distances, or disabilities, and has high costs, delays, poor service, and various issues with safety (Basu & Fielder, 2017). Many Scarborough residents had to plan their entire days around transit as walking was not an option and within integration, Scarborough suffered from transit neglect (Basu & Fielder, 2017). Especially during the pandemic, Scarborough routes were consistently overpacked as one York University student, Austin Jafri said “As we know, the buses are packed. In fact, I have renamed the Lawrence bus. I call it the 54 COVID East.” (Draaisma, 2021). Again, some areas of Scarborough are composed of low-income, ethno-racialized residents who are consistently closer to environmental disamenities and do not have access to cost-effective transit systems (Teelucksingh. 2007).

The TTC claims there will be public consultations about the SRT closure (Westool, 2021). However, Scarborough has historically been left out of post amalgamation Toronto and decisions made in council on transit have not benefited the residents. Masooma Ali, a Scarborough resident “noticed that people of colour and people with lower incomes often get their needs met last, and when they do have the opportunity to contribute to a consultation, it’s not always what they’d expect” (Francis & Samuel, 2021). Planning decisions need to consider how Scarborough as an ethno-racialized, low income and immigrant suburb has been disenfranchised from decision making. Furthermore, the fumbling of the plans and regulatory gaps between municipal and provincial governments has worsened transit conditions in Scarborough.



Figure 10: Photo of TTCriders protesting outside of City Hall (TTCriders, 2014)

The TTC needs to act swiftly and more efficiently to ensure bus rapid transit or an effective plan is implemented to benefit Scarborough ridership. Despite the presence of strong social action community groups such as TTCriders & Scarborough Transit Action, and counsellors who are somewhat left leaning, the well being of Scarborough residents are still not included in decision making. This is due to underlying factors such as the social and ethnic composition of Scarborough residents, poor decision making structures in amalgamation and political conflicts in city council and between the provincial government.

08 RESEARCH METHODS

The research methodology applied is a policy and best practice review of surface transit innovations due to the closure of the SRT and a background review of relevant context. We reviewed and analyzed 3 alternatives; bus rapid transit, dedicated bus lanes and integration with the GO system.

Furthermore, we have reviewed the following documents:

- TTC's CEO reports, TTC analysis, and public consultation materials
- Metrolinx project updates and regional plans
- News articles
- Case studies of different municipalities in North America
- Policies proposed by the City Council

Our mentors have provided us with insightful, informative and guiding feedback while sharing resources, reports and aided in the restructuring of our proposal. Through this review of documents and support from our mentors, we will be able to understand the feasibility, user benefits and required service reliability for the three alternatives being reviewed. Our guiding issue is to ensure we consider the material impact on Scarborough residents, especially equity seeking groups.

We have also had one individual meeting and a group meeting with our three industry mentors:

- Michelle Kearns, Associate at Access Planning
- Shahan Shaikh, Designer at TTC
- Mehemed Delibasic, Assistant Vice President, Transportation planning and Traffic Eng. at McIntosh Perry

09 ALTERNATIVE 1: BUS RAPID TRANSIT (BRT)

Bus Rapid Transit (BRT) is a bus-based transit system utilizing dedicated bus lanes, stations, off board fare collections and frequent operations (Institute for Transportation and Development Policy, n.d.). BRT is similar to the light rail system, however it requires less infrastructure development and can improve regular bus services. This option is not recommended by the TTC due to the cost, high risk and necessary infrastructure changes.

The BRT route between McCowan and Kennedy station could be turned into a BRT route, however there are concerns around the elevated corridors and feasibility as the platform and track level are not aligned (Pagliaro, 2021). Hence, it is important to note this option may have the best benefit for ridership and user benefits, however the transforming of the SRT into a BRT may be another long delayed construction project with high financial costs. Councillor Paul Anislie for Ward 43 - Scarborough-Guildwood has stated “I am fully confident that people on McCowan are going to be riding buses longer 2030, The Scarborough Subway Extension system is not opening in 2030.” (Hanrahan, 2021) Additionally, the SRT has supported 35 000 travellers a day, hence it is difficult to see how regular buses can manage that size of ridership.

The BRT system additionally gives priority to buses at intersections and design features to reduce delays, such as off boarding payments, full dedicated right of way, further apart stops, signal timing and no traffic mixing (Institute for Transportation and Development Policy, n.d.). The goal of the BRT is to combine capacity and speed of light rail transit with flexibility, lower cost, risk and simplicity. The capacity of the BRT is on average 2,000 to 10,000 passengers per hour in peak direction and the speed can be 15 to 40 km/h (Metrolinx, n.d.). Hence, for the SRT route and ridership capacity, a BRT would be able to manage.



Figure 11: BRT In Pakistan an example of BRT around the world (Transit, 2015)

Ottawa Bus Rapid Transit (BRT)

Ottawa's bus rapid transit system is a 41 km route of dedicated transit ways with 26 stations which first opened in 1983 (Ottawa Ontario, BRT Case Study, n.d.). The citywide system has a 900 bus fleet with a daily average of 328 000 rider trips a day and is the most extensive BRT in North America (Ottawa Ontario, BRT Case Study, n.d.). BRT systems have been implemented in countries such as Colombia, Australia and Indonesia. By 2015, segments of the Transitway began to be converted to a light rail system. Ottawa's transitway is offered as a sustainable transit story as it has a low mode for automobile driving at 60% due to high rates of public transport and walking (Al-Dubikhi & Mees, 2010). However, there are key setbacks as the design of the stations are not desirable as passengers are exposed to harsh weather while accessing vehicles compared to subway stations (Al-Dubikhi & Mees, 2010). BRT's are also often referred to as cheaper to build and operate than light rails and can serve disappeared travel needs, however the BRT should have been considered 10 years ago as the SRT has had operational issues since then.

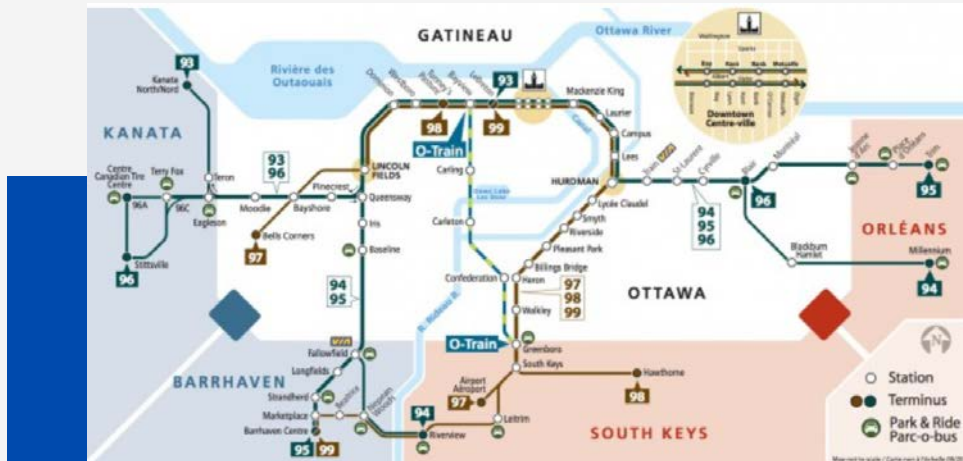


Figure 12: The transitway Ottawa map (SpacingOttawa, 2015)

Evaluation of Alternative

To evaluate this alternative, we will utilize a Multiple Account Evaluation (MAE) methodology, which is a framework that systematically compares different criteria and allows for analysis (Metrolinx, 2009). In our analysis, we are centering the transit users and user benefits. As mentioned above, Scarborough transit users come from low income households, and are composed of racialized and immigrant populations. This option is supported by University of Scarborough campus student leaders who represent students who utilize transit daily (Pagliaro, 2021). The goal is to find a balance of feasibility and provide reliable and efficient service to riders. Construction by the TTC is often delayed as the Eglinton Crosstown LRT has delayed their opening day several times (Eglinton Crosstown LRT, n.d.). Hence it is important to note the BRT can be the best option for ridership; there are concerns around infrastructure development by TTC to be completed efficiently as well as materials if new buses are not available till 2027 (Chief Capital Officer, 2021).

11 ALTERNATIVE 2: DEDICATED BUS LANES

The type of public transit that is primarily used in Scarborough are buses (City Planning Division, 2016). The existing bus routes in Scarborough run East and West, neglecting North and South (City Planning Division, 2016). By having fewer route options after the SRT closure occurs, it will encourage higher ridership on existing bus routes as individuals have fewer options in transit routes that they may take. An alternative solution is to have dedicated bus lanes those would ensure that bus rides in Scarborough are serving local needs and helping people move around their neighbourhoods every day, reducing trip times and increasing connectivity (City Planning Division, 2016).

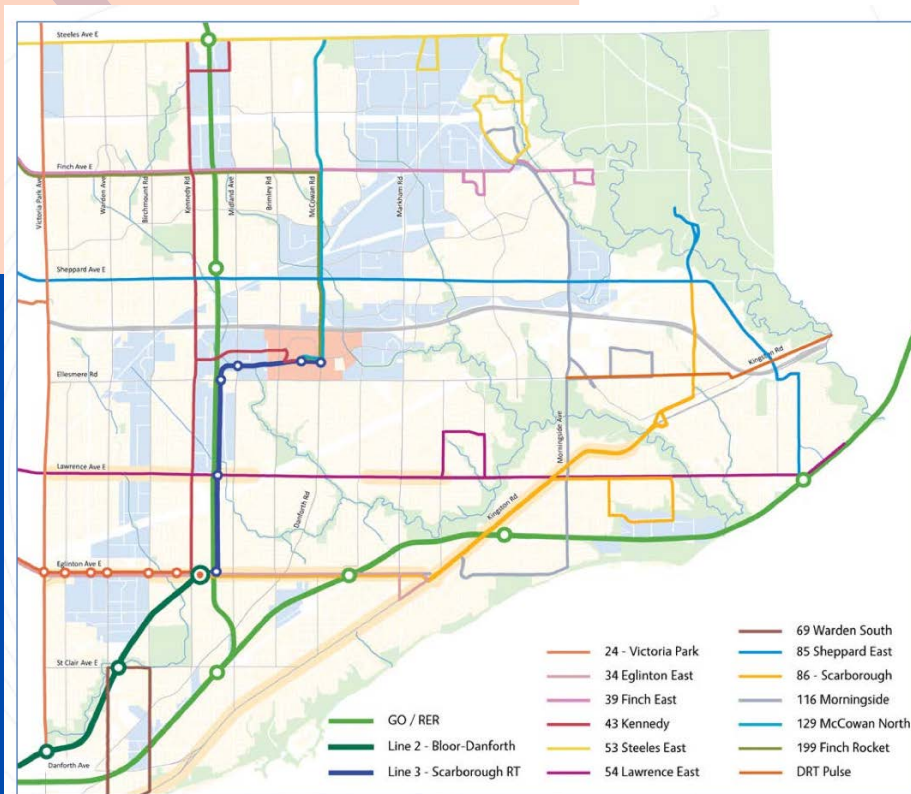


Figure 13: Existing Rapid Transit and Bus Routes in Scarborough (City Planning Division, 2016)

Buses

TTC plans to run 75 shuttle buses per hour with the purchase of dedicated buses to service SRT strip or utilizing spare buses (Westool, 2021). This will reduce the number of buses available during line failures and the new buses will be purchased in 2027 (Westool, 2021). With dedicated bus lanes across Scarborough communities, there would be a higher frequency of buses available to Scarborough residents in a sufficient manner. The number of buses, have increased over the years by a large percentage (TTC, 2021). To accommodate the transit needs of the growing population in GTA is it essential to add more buses and dedicated bus lanes to ensure that there is no overcrowding.

Also, the buses will operate faster and provide access to more individuals when they are not stuck in traffic. Buses stuck in grid locks lead to passengers collecting at bus stops; eventually, leading to overcrowding. During the pandemic, a health concern was overcrowding on buses. An article called: *“Mapping TTC crowding during a pandemic”* shared how overcrowding occurred in the neighbourhood improvement areas, and some of those are located in Scarborough (Marshall, 2020). The map below showcases many Scarborough neighbourhoods with overcrowded buses and these buses will only become more overcrowded when the SRT is closed (Marshall, 2020).

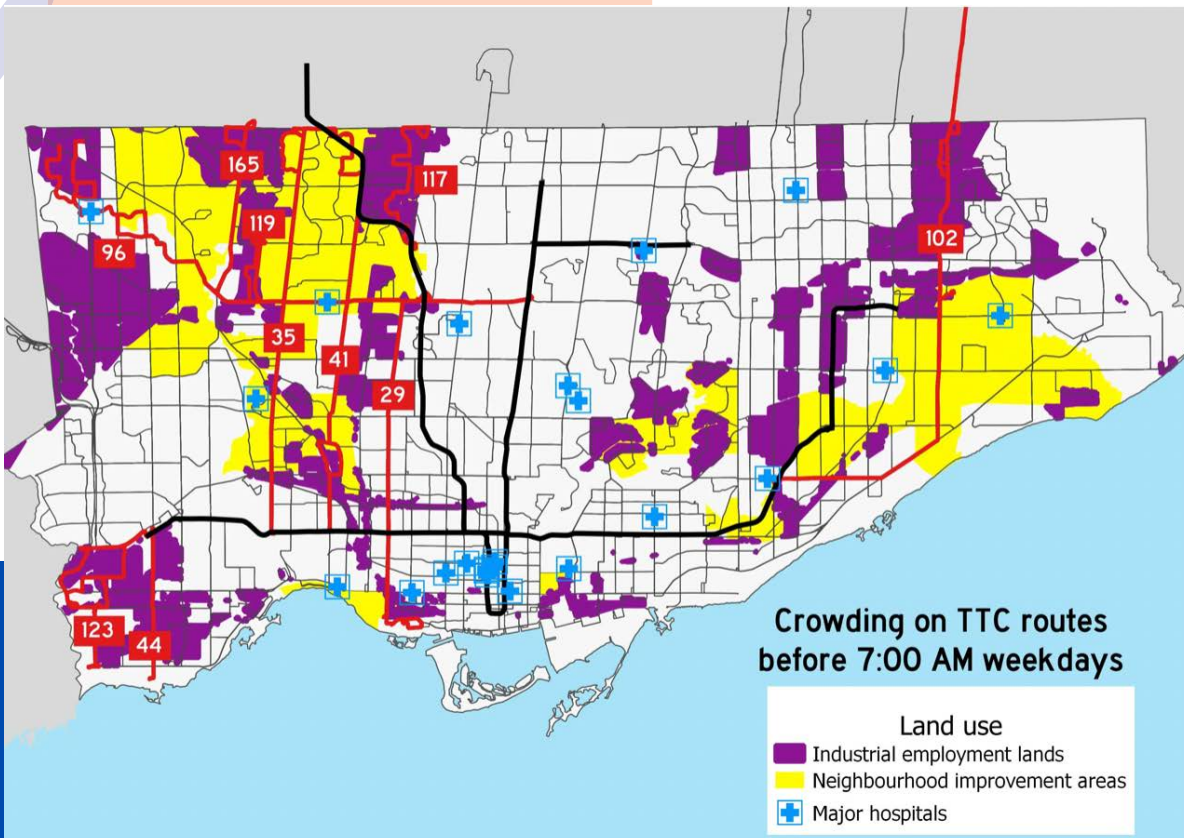


Figure 14: Map of overcrowded early morning TTC routes during the COVID-19 pandemic (Marshall, 2020)

RapidTO Dedicated Bus Lane Eglinton East

Recently, TTC implemented dedicated bus lanes for popular bus corridors around the city. The two bus corridors were Eglinton East and Jane Street (TTC, 2021). The Eglinton East bus corridor is in Scarborough. It is a 10.6 km route that runs from Kennedy Station to the University of Toronto Scarborough (UTSC) Campus (TTC, 2021). Even during the pandemic, this route played an important role in ridership around Scarborough (TTC, 2021). Many community members living around this corridor are essential workers. Some can only afford public Transportation as a form to get to work (TTC, 2021).

As ridership will increase during post-pandemic, students will return to UTSC campus for in-person classes and that route will be used more. High volume of commuters led to TTC designing a dedicated bus lane to ensure that travel time could be improved resulting in people to choose TTC as mode of transportation. Therefore, creating more profit for TTC, reducing carbon footprints and reducing overcrowding.

After months of having this dedicated bus lane in Scarborough, an article called: *“RapidTO bus lanes improve transit reliability and capacity in Scarborough”* discussed how the implementation of a dedicated bus lane improved bus transit reliability and increased capacity on bus routes, resulting in faster and more reliable commute times (City of Toronto, 2021). TTC found that dedicated bus lane reduced the travel time up to six minutes, compared to October 2019 baseline data (City of Toronto, 2021). Therefore, adding dedicated bus lanes for various bus routes after the closure of the SRT in Scarborough will lead to a reduction of trip times, and would encourage reliable transit across City of Toronto.

Case Study: Airport Dedicated Bus

The Toronto Pearson International Airport is one of the busiest airports in Canada and is a key location for individuals living in GTA to use for air travel. TTC has a bus called: *“900 Airport Express”*. It operates from Kipling Station on the Bloor-Danforth line 2 and goes to Toronto Pearson International Airport (TTC, 2021). The trip time of this route is ten minutes long and ensures individuals can get to the airport in a sufficient manner (TTC, 2021).

By adding a bus route that is dedicated to going to a particular location and has an effective trip time promotes ridership. Adding dedicated bus lanes in Scarborough after the closure of SRT will lead to sufficient trip times which will encourage higher use of the existing buses. As more riders will use the buses it will lead to a creation of profit for TTC. Operational costs will reduce as buses will not be stuck in traffic or having prolonged stops in between.

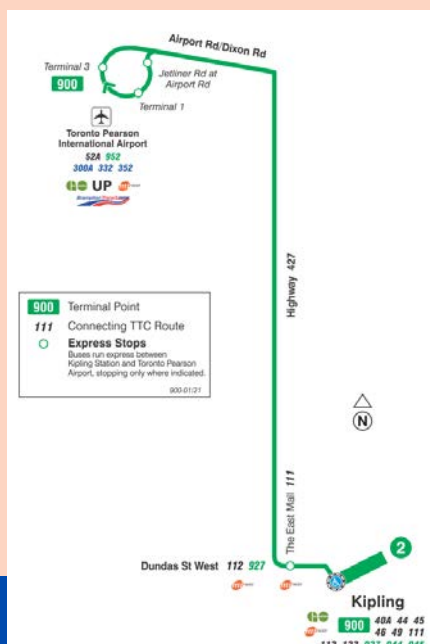


Figure 15: Showing express Airport Bus Route (900 airport Express)



Figure 16: The dedicated bus lane in Scarborough (2021)

14

ALTERNATIVE 3: GO TRAIN INTEGRATION

After the closure of the SRT, the residents of Scarborough and the GTHA that depend on transit in the area will need temporary solutions that can get people across in a fair amount of time while still being priced reasonably. By continuing to integrate GO services with the TTC, it will increase ridership numbers across all services, and reduce commute times throughout the city. With better integration of the GO system that is already in place, it gives the residents of Scarborough a better opportunity to connect with their neighbourhood, while also having access to reach jobs located in more industrial areas of the neighbourhood.

With current projections of the dense employment areas in Scarborough in 2041 are illustrated in Figure 17 below. With most jobs located away from 1 of the 2 existing GO rail lines, the system in place is not being used to its full potential. Therefore, by getting more residents into GO trains by having bus routes that serve people during peak ridership hours, and enacting a reduced-price program again, residents can expect that they do not need to rely on the SRT anymore.

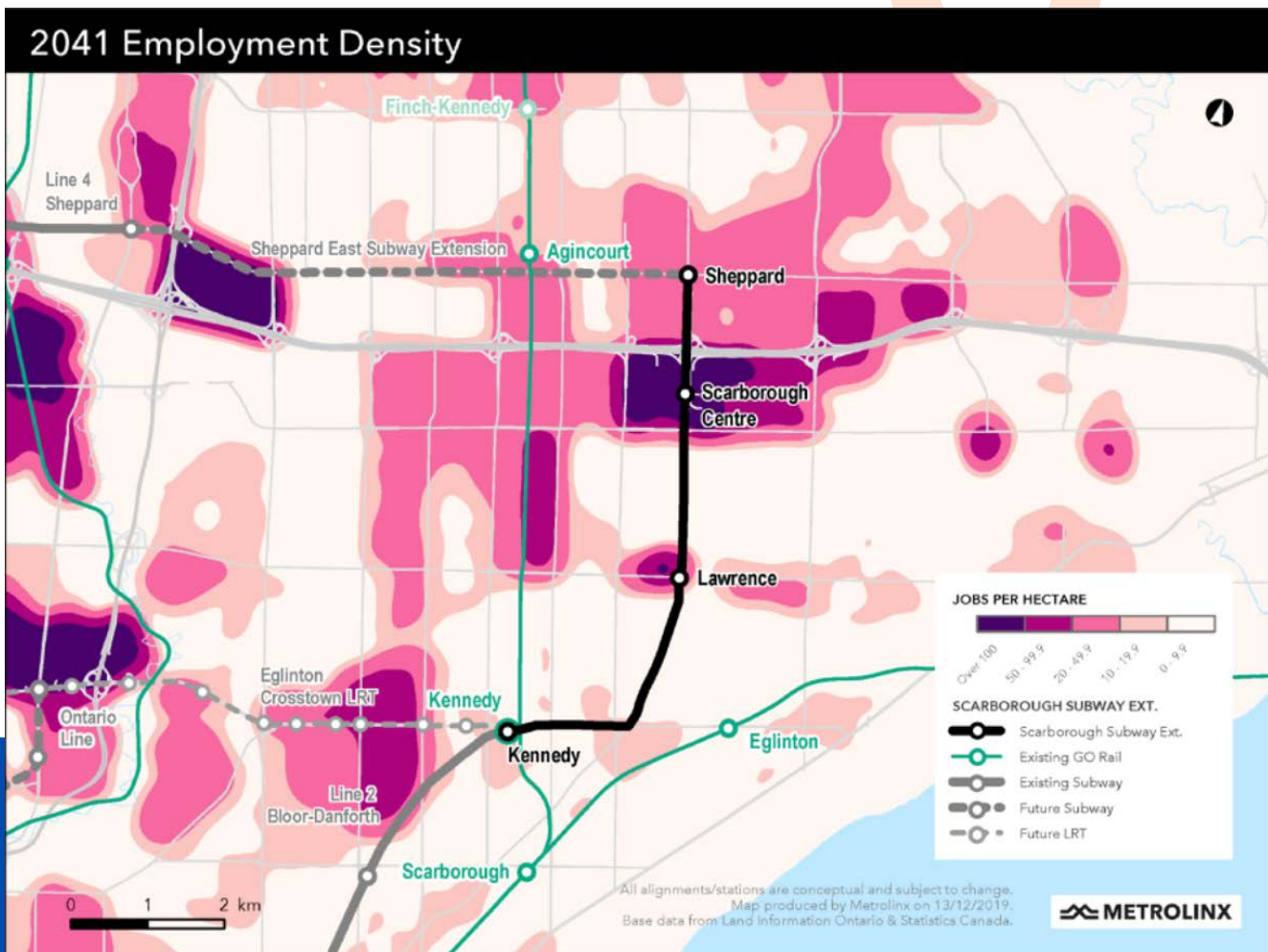


Figure 17: 2041 Employment Density (Scarborough Transit Planning Update Executive, 2020)

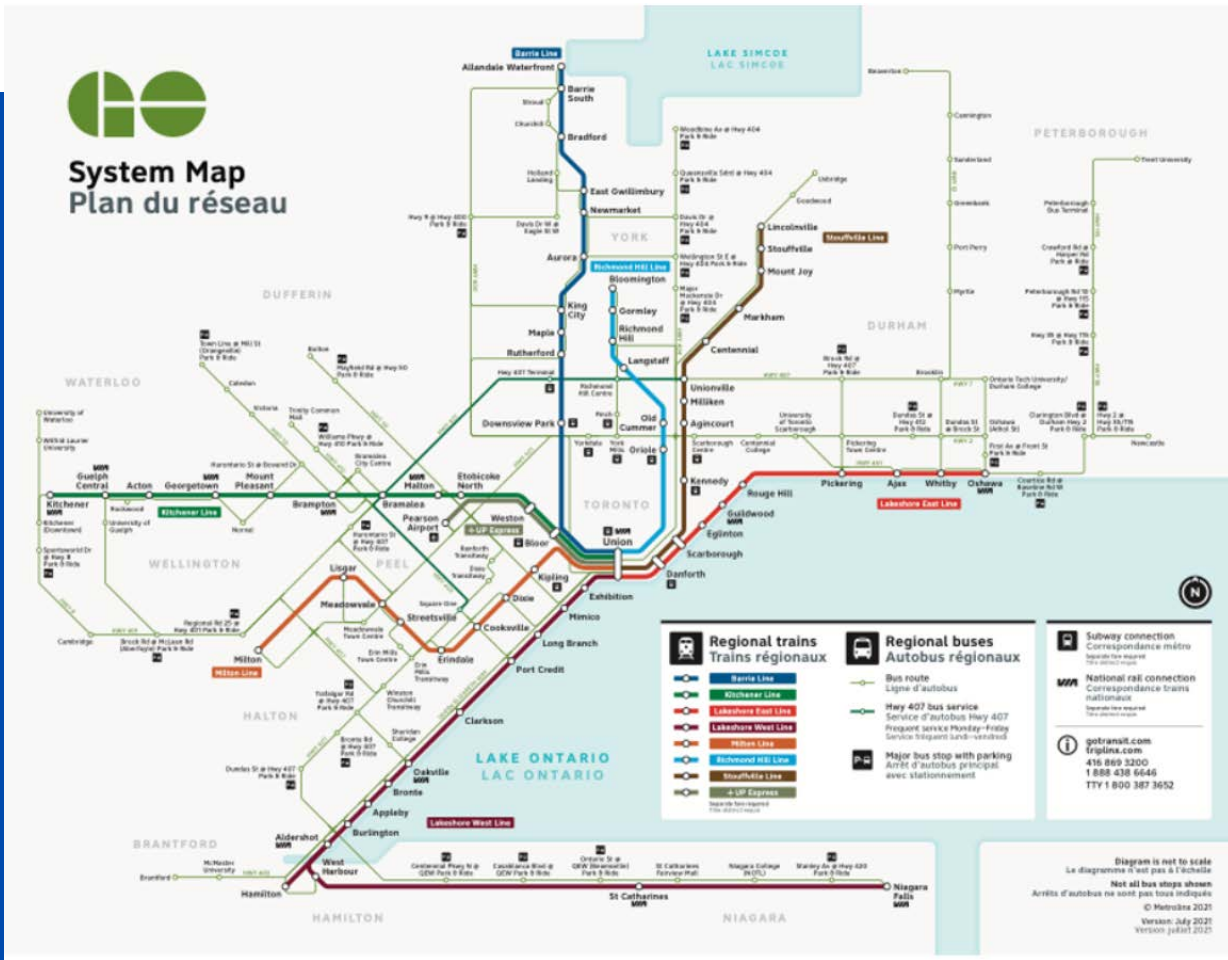


Figure 18: GO System Map 2021 (GO Transit, 2021)

With current travel times for a trip from Scarborough Centre to Bloor/Young taking roughly 55 minutes (using a TTC bus and Subway line), saving time for residents is an important factor when using transit. By taking advantage of the existing GO rail network and providing more access to it, the reduction of transit times drastically and help improve the existing TTC times with the reduction of the volume of people on one route. By just taking the GO from Guildwood station to Union Station, it takes only 30 minutes, however, getting people to the GO stations needs to be more accessible since there are not many stations located in Scarborough. By introducing a more integrated transit system that works with both GO and the TTC, residents can expect lower travel times, easier access, and a possible incentive (such as reduced fares).

By using the BRT system, having dedicated bus lanes can help get people to use the GO system more often, thus helping reduce congestion in the corridors. A partnership between the 2 companies can greatly benefit the city and can ease secondary issues such as confusion with the PRESTO system and how to use it initially. With most of the province's transit system operating with PRESTO, this partnership can also act as an unintentional education program for new residents of the area such that people can learn just by looking at posters and commercials.

Secondly, the TTC Double Discount Fare Program was terminated by the provincial government with the cause being budget overages according to Metrolinx (2020). Riders now do not have any financial incentive to incorporate GO services into their commute or vice versa for TTC. For many people who plan their trips based on their finances and live within lower income levels, this is imperative to the people of the GTHA. The closure of the SRT will without a doubt increase commute times and on top of that with the removal of the program increase fare costs for residents by more than \$700 a year according to the Toronto Star (2020, para. 3).

Without good commute times and good prices, it does not convince people to want to use public transit which continues to feed into a negative feedback loop of disservice to the transit system in the GTA and Scarborough. Currently, it would cost a rider 19.7 dollars to use both TTC and a GO Train from Rouge Hill Station to get into Union Station if the rider needs to take at least one bus to get to the station. This daily cost can roughly total to as much as \$900 a year on just transit alone. With the further implementation that is being continued by Metrolinx and the TTC for PRESTO for all services, it will give riders a more seamless and easy interaction with paying to use public transit and because the pandemic has caused people to be more aware of what and who they come in contact with, having a contactless system like PRESTO could not have been integrated at a better time to keep ridership going.

Financial Report							
Financial Report	2017-18	2018-19	2019-20	2020-21	2020-21	2020-21	2020-21
(\$ in '000)	Actual	Actual	Actual	Actual	Q1 Forecast	Variance	Budget
Revenue							
Fare Revenue	540,989	566,663	574,160	56,348	98,258	(41,910)	653,022
Non-fare Revenue	64,688	95,383	132,324	50,507	61,533	(11,026)	194,424
Third Party Construction Revenue	-	-	-	76,049	-	76,049	-
Provincial Contributions	341,309	478,135	590,394	961,560	1,004,334	(42,774)	404,334
Amortization of Deferred Capital Contributions	616,494	700,977	803,312	868,350	948,450	(80,100)	948,450
Total Revenues	1,563,480	1,841,158	2,100,190	2,012,814	2,112,575	(99,761)	2,200,230
Expenditures							
Supplies & Services ¹	97,112	98,193	128,635	184,458	364,513	(180,055)	195,725
Equipment maintenance	118,192	117,855	138,332	109,158	121,572	(12,414)	145,302
Facilities & track	146,002	168,967	145,414	161,149	165,881	(4,732)	157,986
Labour & benefits	318,656	336,167	352,201	379,607	356,578	23,029	363,462
Operations	314,570	356,336	375,400	291,846	337,785	(45,939)	430,725
Third Party Construction Expense	-	-	-	77,363	-	77,363	-
Amortization of capital assets	611,795	699,248	803,105	837,468	948,123	(110,655)	948,123
Amortization of long-term leases	327	327	327	327	327	-	327
Loss/(gain) on disposal and write-down of capital assets ¹	(19,837)	79,417	175,187	(10,870)	2,159	(13,029)	-
Total Expenditures	1,586,817	1,856,510	2,118,601	2,030,506	2,296,938	(266,432)	2,241,650
Net income/(loss)	(23,337)	(15,352)	(18,411)	(17,692)	(184,363)	166,671	(41,420)

Figure 19: Metrolinx 2020-21 Annual Report (Gray & Valk, 2021)

As seen in Figure 19 below it shows past fiscal years and the earnings made through fares, and it also shows quarter one of the 2020-21 year as well. It's accounted that Metrolinx had lost more than 90% (approximately \$517.9 million) in fare revenue alone due to the pandemic. Therefore, the optimization of services has never been more important from a financial standpoint and slowly bringing riders back to better service is necessary to convince them that the system they come back to in a post-pandemic world is safe and in their best interest for transportation. With the TTC CEO Rick Leary previously stating that Metrolinx was in talks with the province to try and extend the program, there is still a clear interest from both transit services to either create a new discounted fare program to complement the services or continue the old plan that was scrapped before.



Figure 20: Guildwood Go Station A popular station in Scarborough (201

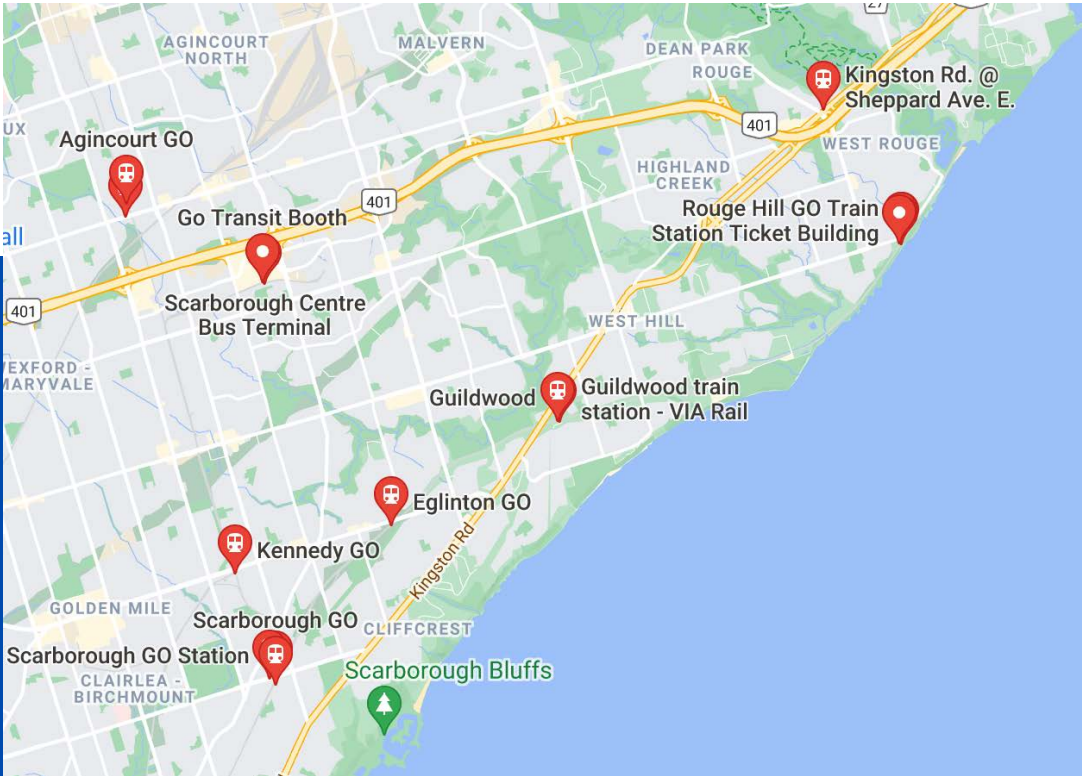


Figure 21: Map of Scarborough Stations (Google Maps, 2021)

ANALYSIS OF ALTERNATIVES CHART

ALTERNATIVE	TIMELINE	FINANCIAL IMPACTS	ENVIRONMENTAL IMPACTS	SOCIO-COMMUNITY IMPACTS	ECONOMIC IMPACTS
<p>Alternative 1: Bus Rapid Transit (BRT)</p>	<p>Procurement of materials and a large infrastructure project.</p> <p>Construction of BRTs can be 7 to 10 years depending on size and the TTC has a history of delayed construction.</p>	<p>With bus stops acting as its own miniature station, fare payment can occur off the bus rather than on it to reduce rider wait times.</p> <p>Large infrastructure project that will take a significant amount of financial commitment and risk.</p>	<p>High levels of construction and resources needed.</p>	<p>Can be <i>low riding</i> meaning that it is wheelchair accessible and safe for those with disabilities.</p> <p>During construction, impact on local businesses and communities need be considered - possible community benefit agreements.</p>	<p>Will bring in more revenue after project is completed and can be a long term investment.</p>
<p>Alternative 2: Dedicated Bus Lanes</p>	<p>More buses will become available in 2027.</p> <p>Dedicated bus lanes can be designed on existing routes in Scarborough.</p> <p>It will take 2-3 years to implement the planning, design and consultation process.</p>	<p>The acquisition of new buses will be what costs the most for this project.</p> <p>Lane painting and signage will cost TTC.</p>	<p>Reduction in emissions as vehicles are not stuck in traffic and can move quicker.</p> <p>Construction and paint resources needed to design the dedicated lanes.</p>	<p>Better experience for a marginalized ridership and communities living around these bus corridors. More encouragement of bus ridership as they move faster.</p> <p>People will be encouraged to go to local Scarborough businesses as bus times are not long.</p>	<p>Operational costs for TTC will be reduced as the cost of operating buses will be less as they move more efficiently.</p>

Alternative 3:
Integration with
GO System

Expected time until service ready would take a month or two maximum since it only requires an adjustment of current bus schedules and a creation of less than 5 new routes by using pre-existing data. Procurement of buses would be the only wait time for this alternative (until 2027).

Relies vastly on current infrastructure in place therefore minimizing construction costs related to transportation infrastructure.

Short term it may take a while until the project sees substantial amounts of profit due to decreased riders because of the pandemic.

With little construction needed; noise, smog and material pollution is reduced resulting in a cleaner project.

Uses existing fleet of buses to add extra service during peak hours/important routes to optimize needs meaning that efficiency is increased with minimal resources being used.

Connects residential areas to industrial/job dense parts of Scarborough.

Increases local desire and want to use public transit instead of the automotive.

Shows government leaders the need for public transit access.

Brings in new customers from both services to interchange more often.

Will the provincial and/or municipal government help with costs since reducing prices is a target of this (may inadvertently result in tax increase?)



Figure 22: A photo showing a bus being overcrowded in Scarborough (Kalinowski, 2015)

20 CONCLUSION & RECOMMENDATION

Best Alternative – GO Integration

By considering the impacts of all three solutions that can be put in place after the removal of the SRT in Scarborough, we have decided that the best solution would be the integration of GO and TTC transit services. With having dedicated bus lanes, the main problem results in roads being utilized. By taking away an extra lane on each side of the road, it reduces traffic to only one lane in areas that are already heavily congested. In addition, this solution assumes that many bus routes have high ridership numbers which may not be the case always. For example, routes like the 905 see higher numbers during the fall and winter season since most riders are commuting students and during the summer it plummets in riders. With the BRT solution, even though it can carry high volumes of people in a timely manner, an issue with this solution is that it needs large amounts of construction to have the infrastructure set up and ready for residents in the area. In York Region, the vivaNext rapidway brt project that started in 2016 and completed in late 2019 (Highway 7 West Woodbridge / Vaughan, n.d.).

With projects like the Eglinton LRT which started in 2011 and are slated to finish in 2022, it takes an extraneous amount of time to complete these large infrastructure projects for something that would be a temporary solution (Metrolinx, n.d.). With almost no construction needed and relying on the already built infrastructure for the integration of TTC and GO rail, this is a solution that can come to fruition almost immediately while also providing the best service to riders in the city and beyond. While comparing the brt and bus garage idea to this, we noticed that the costs of the project would be the lowest, therefore resulting in little help from both municipal and provincial governments to get this project running for the public. This solution also offers riders an incentivized reason to continue to use the project in the future and if the solution is deemed not needed in the future the only thing that would need to be removed are the extra buses used, which can be repurposed for other routes.

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