Subject: On-Demand Transit – Pilot Authorization (Simulation Results)

Report to: Public Works Committee

Report date: Tuesday, November 5, 2019

Recommendations

1. That Regional Council **APPROVE** the on-demand transit concept for NRT service expansion pilots outlined in this report, subject to 2020 budget approval.

2. That the Chief Administrative Officer **BE AUTHORIZED** to execute an Agreement with Via Mobility LLC. for the deployment of turnkey, on-demand transit service pilots such that the Agreement meets the approval of the Commissioner of Corporate Services, and subject to 2020 budget approval.

3. That all pilot periods **BE DEFINED** in the Agreement as 1 year with an option to extend for a period of up to an additional 12 months at the discretion of the Chief Administrative Officer.

4. That pending approval of recommendations 1, 2 and 3, that staff **BE DIRECTED** to engage with the local municipalities to confirm partnership and service parameters of the pilot services.

5. That this report **BE CIRCULATED** to area municipalities.

Key Facts

- The purpose of this report is to seek authorization to deploy on-demand transit solutions for NRT pilot projects after confirming local participation.
- LNTC-C 21-22-23 2018 identified the need for inter-municipal transit services in Niagara West, as well as establishing connections for Lincoln and Pelham.
- CAO 8-2017 included recommendations for providing connectivity to the communities of Sherkston and Crystal Beach.
- The 2019 Operating Budget included provisions for the deployment of transit services in these aforementioned communities. Jurisdictional definitions combined with the desire for service integration and potential for partnership delayed the original deployment timeline, now tentatively set for April 2020.
- The 2019 approved transit operating budget included a one-time transfer from Reserve of $3.0 million and therefore did not provide sufficient ongoing base level funding in 2020 to deploy the on-demand expansions into Niagara West, Crystal Beach and Pelham without the need for subsequent budget approval in 2020.

- Via Mobility, LLC (Via) was retained to conduct modeling and microsimulation work to identify preferred on-demand transit models, coverage and deployment options to enable Niagara Region to fulfill its planned expansions. The final recommendation for Niagara West was an integrated service model with an initial fleet size of approximately 7 to 10 vehicles. Secondary deployment opportunities in Port Colborne and Fort Erie require additional consultation with the respective local municipalities to confirm service design parameters.

Financial Considerations

The approved 2019 budget provided $7.9 million towards a strategic two-year IMT investment strategy. The 2019 funding included a 1.4% separate transit levy of $4.9 million plus a one-time transfer from Reserve of $3.0 million (0.9% of the 2018 levy).

The proposed 2019 Budget strategy was to utilize $2.2 million of the $7.9 million as a one-time reserve transfer in 2019 to support the $13.9 million of capital assets and reduce the annual debt over the next 10 years. According to the aforementioned strategy, $2.2 million would be allocated to transit expansions connecting Niagara West, Crystal Beach and Pelham to existing transit services in 2020. The 2019 direction to use a one-time transfer from Reserve therefore did not include sufficient sustainable base funds to deploy the on-demand expansions into Niagara West, Crystal Beach and Pelham without subsequent base level budget approval in 2020.

To secure funding for the on-demand Pilot project and all previously implemented service enhancements, a separate general levy of 1.3%, will be considered along with the following budget items:

	Council Report	Levy Amount (M$)	Levy Increase %
Previously identified reports			
Suicide Prevention Initiative	PHD 8-2019	0.200	0.05%
Waterfront Investment Program – Base funding	CSD 40-2019	1.000	0.27%
Smarter Niagara Incentive Program – Base funding	CSD 40-2019	0.600	0.16%
Brock LINC request for funding	ED 9-2019	1.500	0.41%
Niagara Regional Transit - phase in cost	PW 56-2019	4.754	1.30%
NRPS 2019 position hiring deferral	BRC-C 7-2019	0.706	0.19%
Long-Term Care Home Redevelopment capital funding	CSD 53-2019	5.620	1.54%
GO Project - Station Operations	CSD 17-2019	1.410	0.39%
Canadian Coalition for Municipalities Against Racism and Discrimination	CAO 14-2019	0.142	0.04%
EMS Central Hub capital funding	CSD 40-2019	0.390	0.11%
Potential request to-date		**$16.323**	**4.46%**

Unlike the ‘per-trip’ pricing models of Niagara Specialized Transit and Innisfil’s partnership with Uber, the on-demand model proposed in this report operates on a fixed hourly rate within a fixed budget. This pricing structure provides significantly more certainty in terms of budget containment. Should the demand increase to the point where it outpaces the capacity of the service, two options are available. The first would be to decrease the quality of the service by altering the parameters of the service, thus increasing its capacity. For example, increasing the maximum wait time from 1 hour to 1.5 hours. The second option would be to seek additional funding approval and deploy additional vehicles to maintain the existing level of service.

Analysis

In September 2018, staff brought forward 3 related reports (LNTC-C 21-22-23-2018) jointly identified as the IMT Service Implementation Strategy. This strategy identified the need for inter-municipal transit services to be developed to connect the municipalities in Niagara West, including Pelham and Lincoln which already operated local transit services, to the NRT network. Thus for the purposes of this report, Niagara West refers to the geographic area of Grimsby, Lincoln, West Lincoln, Pelham and Wainfleet. In addition, CAO 8-2017 identified opportunities for IMT services to be piloted which would connect Crystal Beach and Sherkston with the larger transit network in Niagara.

After the initial IMT expansion Service Plan strategies were approved in late 2018, staff developed fixed-route options for consideration; however the operational and financial limitations of providing this type of fixed-route service in large geographical areas with low population density quickly became apparent. As such, staff began to research

alternative deployment strategies in an effort to make transit more sustainable and accessible in these areas.

In May 2019, Niagara Region retained Via to conduct a microtransit feasibility study to consider the practicality and optimal service design of an on-demand microtransit service covering the entire western area of Niagara. In addition to Niagara West, additional service areas were evaluated in Fort Erie and Port Colborne. The travel patterns defined in the simulation were modeled using data from the Niagara Specialized Transit (NST) database and the MTO's Transportation Tomorrow Survey. A presentation of the preliminary results of the microsimulation were shared with the IMTWG at its meeting on September 19, 2019. The final report was provided to the IMTWG for their reference in late October. Through the IMTWG, staff have completed preliminary engagements with the affected municipalities in order to gauge support from local staff. At the request its respective local staff, presentations were given to the Councils of Pelham and Lincoln which provided an overall update on the status of inter-municipal transit and a high level primer of on-demand transit.

Similar to conventional transit, on-demand solutions include wheelchair accessible vehicles (WAV's). It is worth noting that because trip planning software is capable of prioritizing and dynamically routing vehicles and when combined with unique user profiles, an entire fleet of WAVs is not required to ensure that all riders receive the same level of service.

Niagara West

Two main operating systems were considered when developing the service parameters. The first was a pre-scheduled, on-demand system that would require riders to pre-book their trips a day in advance. The second was a dynamic, on-demand system that would operate with a 30 minute average wait time with a maximum wait time of 1 hour. Although both were feasible options, staff determined that pursuing the dynamic, on-demand service would provide a significant boost to the quality of service by allowing riders to request a ride when they require it as opposed to planning 24 hours in advance.

The dynamic, on-demand system allowed for three potential deployment models to be developed. However, further evaluation resulted in the dismissal of two of the models due to the potential for rider confusion stemming from the jurisdictional realities which resulted from the triple majority process in 2017 granting the Region non-exclusive authority to operate IMT routes only. While staff from Via and Niagara Region both agree that an integrated deployment model is preferred (integrated includes both local and IMT routes within and outside of a municipality), this model requires partnership from local municipalities from both a financial and jurisdictional perspective. One additional note is that when the graphic below was developed, a connection to Port

Colborne had not been included however, this has been corrected from a service design perspective.

Integrated Services Model (Preferred)

In this preferred simulation, by removing the jurisdictional barriers, the integrated services model (Figure 2) eliminates many of the challenges that riders face when using an intra-municipal service. While this service continues to permit inter-municipal trips (trips between municipalities), it also permits intra-municipal trips (trips within municipalities). For the sake of clarity, this model would permit trips from any origin to any destination within Niagara West. It would also permit trips between Niagara West and the St. Catharines Bus Terminal, the Welland Bus Terminal, or Port Colborne City Hall where riders would then gain access to the NRT and other local transit networks.

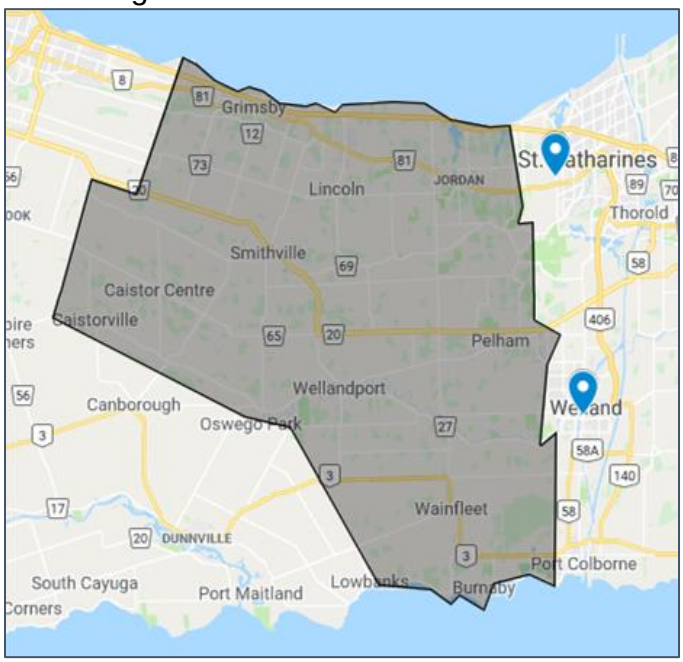


Figure 2 – Integrated Services Model

Niagara Region does not have the jurisdictional authority or adequate budget to independently operate the integrated services model and thus requires support from the local municipalities. That said, the benefits of this scenario are substantial from both a rider experience perspective and a cost-benefit perspective. Local municipalities would require significantly more funds to develop an independent localized on-demand service which would still require inter-municipal connections. More simply, by pooling resources, a higher level of service can be delivered for the riders without the need of coordinating travel across multiple systems. As previously stated, separate municipal transit services are not required under this integrated approach. This means that municipalities with small fixed route transit systems (i.e. Pelham and Lincoln), which only service a small portion of their geographical area, could feasibly choose to reallocate those transit

dollars into this integrated services model and significantly increase their ridership, coverage area, and level of service without an additional impact to their levy.

For those municipalities without existing transit dollars, full participation in the integrated model would require a net new impact on their levy. Should those municipalities not be able to commit new levy dollars to an integrated model, they would only be serviced by the on-demand system for inter-municipal trips. For example, residents in Grimsby, West Lincoln and Wainfleet would only be able to travel to a destination outside of their municipality.

For the various operating models, the trip demand was simulated at multiple levels to account for elements such as rider uptake, initiation of hourly GO rail service and continued population growth. Table 1 below provides some of the key indicators resulting from the microsimulation of the integrated services model where the maximum wait time was set at 1 hour.

Table 1 – Integrated Services Model Microsimulation Results

Trip Demand	Maximum Hourly Ridership	Recommended Fleet Size	Passengers per Vehicle Hour	Average Wait Times (Minutes)
Low	10 – 22	7 – 10	1.5 – 2.2	25 – 35
Medium	20 – 35	10 – 13	2.0 – 2.7	22 – 32
High	40 – 70	15 – 19	2.7 – 3.7	20 – 30

In an area where limited transit options exist such as Niagara West, a new deployment would expect to see a low initial trip demand. However, over the course of a 12 month pilot it is unlikely that a medium trip demand would be reached. That being said, factors such as initiation of hourly GO Train service would certainly affect that assessment.

Implementation

In order to implement the Integrated Services Model, a full service ‘turn key’ provider is required due to Niagara Region’s lack of staff, maintenance facilities and transit fleet. Staff is seeking authorization to formally procure Via for the deployment of the preferred option for the following reasons:

- Via is the only company known to the IMTWG which offers a full turnkey deployment. This includes:
    - Custom branded Mercedes vans (eliminates capital acquisition costs for Niagara Region)
    - Professional, background checked drivers
    - iOS and Android apps as well as dial-in capability for those without smartphones
    - Customer service and training
    - Marketing support prior to and after launch

- Via is willing to deploy a pilot for 1 year with an option to extend for up to an additional 12 months.
- Via values shared data – deployment includes a custom built dashboard and reports. All data collected is shared possession and access with Niagara Region.
- Via has over 80 deployments worldwide from North America to Europe and Asia
- Via integrates with major fare payment systems
- Via's software specializes in superior dynamic trip planning and dispatching which considers the following:
    - Combining trips by channeling ride requests to be accommodated by a nearby vehicle rather than dispatching a new car to the same area
    - Prioritizing the passenger per vehicle hour metric where feasible, allowing for a small fleet size relative to the service area
    - Encouraging 'corner-to-corner' service delivery, which means that the software directs the rider to a pickup location closer to a main intersection (roughly 100 – 200m average walk) except in cases where walking is unsafe like roads with a rural cross-section or where the rider requires wheelchair accessibility
    - Accessibility of service through user profiles to ensure that riders requiring a wheelchair can be serviced with the same average frequency as those who do not require one

Port Colborne and Fort Erie

Due to the recommendation included in the *Niagara Region Transit Service Delivery and Governance Strategy* by Dillon Consulting (CAO 8-2017), combined with interest from members of the IMTWG, staff elected to request Via assist in the design of potential solutions to connect the communities of Crystal Beach and Sherkston with the existing NRT network as part of the demand simulation exercise. The opportunities for these communities were developed with the same considerations and criteria as that of Niagara West. In similar fashion, the element of jurisdictional authority plays a major factor and creates significant barriers to providing a seamless, convenient rider experience. Without local involvement, Niagara Region would only have jurisdiction to deliver trips from Sherkston to Fort Erie or from Crystal Beach to Port Colborne, albeit counterintuitively. Therefore, it is imperative that any on-demand solution for these communities must involve the local municipalities of Port Colborne and/or Fort Erie.

Another component of the IMT Service Implementation Strategy was the upload of the Port Colborne Link and Fort Erie Link IMT routes to Niagara Region with the intent that the local municipalities would reinvest those savings into their local transit systems. These uploads are now complete and both Port Colborne and Fort Erie have both been paid retroactively to January 1, 2019.

Staff is seeking authorization to formally engage with the municipalities referenced in this report in an effort to improve connectivity for those residents who would benefit from

an on-demand model in rural or underserviced areas. If in discussion, not all of the municipalities are interested or capable in partnering with Niagara Region, a smaller solution may be pursued which relies on connections to existing NRT service in the respective municipality to deliver the inter-municipal portion of the trip.

Alternatives Reviewed

Staff originally developed a fixed-route service plan for Niagara West that included routes which connected the municipalities of West Lincoln (Smithville), Grimsby (GO station and downtown), and Lincoln (Beamsville and Jordan) to the St. Catharines hospital. Completing this exercise helped to develop a scope and budget. However, this option is not recommended due to the high operating and capital costs and low level of service. This became especially evident when compared against on-demand solutions which found that for a similar budget commitment, a much higher level of service can be achieved through on-demand solutions. Two of the most prominent service parameters determining the level of service are coverage area (population served) and service frequency (average wait time).

Having no staff or transit vehicles of its own, Niagara Region sought to leverage its relationships with its local transit partners to determine if they could operate an on-demand system in Niagara West if provided with adequate software. Unfortunately, those partners also lacked the available staff, vehicles and training resources necessary to accommodate this request. As such, this option was deemed not viable.

Staff also considered utilizing its existing service provider of Niagara Specialized Transit to provide the service if Niagara Region provided the software. However, an operational review of the service provider conducted in 2019 concluded that significant elements of the contract and service were deficient (PW 39-2019 & PW 40-2019). These elements included inefficient trip scheduling software, poor on-time performance, not meeting the data reporting requirements, and vehicle branding. This lead senior staff to determine that expanding the service contract with the existing service provider was not a practical option at this time. In addition, PW 39-2019 recommended not restructuring the contract with service provider in light of the Specialized Transit Study recommendations coming in late 2019.

There are a number of companies with software capable of dynamically routing vehicles which they in turn lease to transit providers (often referred to as Software-as-a-Service, S-a-a-S) for an annual fee. Given the consideration of the two aforementioned options, Niagara Region requires a full service operator which can provide demand modeling, service design, as well as a fully turnkey solution by providing vehicles, drivers, and customer support – in addition to the dynamic routing technology. This full turnkey solution is often referred to as Transportation-as-a-Service (T-a-a-S). Via is the only company known to the IMTWG which offers this type of service. Having a T-a-a-S deployment model is an ideal solution for two additional reasons. One, Niagara Region

desires to pilot on-demand solutions for entirely new service expansions and this gives flexibility to test on-demand strategies without a corresponding capital commitment. Two, the LNTC and IMTWG have recently initiated the Transit Governance Study with recommendations due by the end of Q1 2020. By initiating services in the pilot areas while simultaneously avoiding a long-term service contract, any potential new future transit entity will have the flexibility to pursue revised deployment strategies or engage with Via to formalize the pilot into permanent service. Thus procurement of any company which only offers S-a-a-S is not recommended for deploying pilot services at this time.

While implementing a solution that solely delivers inter-municipal trips is possible, local transit services would still be required in each municipality to provide support and connectivity. This type of model also has a number of shortcomings which would be likely to limit demand and negatively impact rider experience. For example, when daily GO rail service becomes available in Grimsby (and potentially Lincoln), an 'inter-municipal trips only' model would require riders in these municipalities to counterintuitively travel to adjacent municipalities rather than traveling to their nearest station in order to meet the criteria of making an inter-municipal trip. By leveraging the relationships built through the IMTWG, an integrated deployment model allows for municipalities to benefit from the pooled resources and streamlines the rider experience by eliminating the confusion and challenges of coordinating travel between multiple systems in Niagara West. For this reason, staff supports pursuing partnerships with those interesting local municipalities to provide enhanced levels of service in an integrated model rather than an inter-municipal model built along municipal jurisdiction.

Staff also considered the option of integrating its existing specialized transit service with a dynamic, on-demand transit service. While simulation results indicate this option makes the most sense from both rider experience and financial efficiency perspectives, staff feels that it would be premature to make any substantive changes to its existing specialized transit service until the dynamic, on-demand model could be validated given the vulnerable segment of the population it serves.

Relationship to Council Strategic Priorities

The IMT Service Implementation Strategy directly aligns with the Council Strategic Priority: Responsible Growth and Infrastructure Planning (Objective 3.1) through advancing regional transit and GO rail services and facilitating the movement of people and goods.

Other Pertinent Reports

- LNTC-C 21-2018 Inter-Municipal Transit (IMT) Service Implementation Strategy
- LNTC-C 22-2018 Inter-Municipal Transit Financial Impact Analysis
- LNTC-C 23-2018 Inter-Municipal Transit Capital Plan, 2019
- CAO 8-2017 Niagara Region's Transit Service Delivery and Governance Strategy

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