Transportation Association of Canada

Design and Implementation of Transit Services:

Guidelines for smaller communities

February 2016

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Abstract

Transit plays an essential role in improving the social, economic, and environmental conditions of Canada's cities and communities. While there is greater political attention to serving transit needs in larger urban areas, transit services are increasingly vital to improving the well-being of small communities.

There are unique challenges small and rural Canadian communities face in providing transit services, compared to large, more urban areas. The approaches to planning for transit and the range of solutions appropriate for providing transit is broader for small communities compared to larger urban centres.

Recognizing these unique conditions, the purpose of these guidelines is to provide guidance to planning and transportation professionals in planning for transit services in small communities. The guidelines were developed to tailor to a wide range of different stages of a transit service provision in the community:

- starting a new service
- expanding an existing service
- maintaining a service in potential decline

Recognizing that unique characteristics (e.g. land uses, travel patterns, demographics, economic conditions) of small towns and villages, these developed guidelines are intended to identify the directions and considerations required to planning and implementing a new or improved transit service.

Keywords

Traffic and Transport Planning

- Administration
- Financing
- Improvement
- Low density area
- Network (transport)
- Opening (road, transp line)
- Operational research
- Planning
- Public transport
- Rural area

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EXECUTIVE SUMMARY

Transit plays an essential role in improving the social, economic, and environmental conditions of Canada's cities and communities. While there is greater political attention to serving transit needs in larger urban areas, transit services are increasingly vital to improving the well-being of small communities. Providing transit services will become increasingly important in small communities as a result of an increasing aging population, the continued transition to a knowledge economy, the increasing cost of vehicle ownership, and the increasing environmental impacts from atmospheric pollutants.

There are unique challenges small and rural Canadian communities face in providing transit services, compared to large, more urban areas. The approaches to planning for transit and the range of solutions appropriate for providing transit is broader for small communities compared to larger urban centres.

The purpose of these guidelines is to provide advice and guidance to planning and transportation professionals in planning for transit services in small communities. The guidelines were developed to tailor to a wide range of different stages of transit service provision in the community:

- starting a new service
- expanding an existing service
- maintaining a service in potential decline

The guidelines include planning directions and technical approaches to effectively plan and design services, as well as to develop transit policies that promote cost effectiveness, maximize ridership, and respond to the needs of small and rural communities. The document outlines specific transit planning activities and topics including:

- **Consultation** – Outlines approaches to engaging with stakeholders and the public to ensure transit plans best address the needs of the community
- **Service needs and objectives identification** – Describes processes for identifying target markets based on community demographics and travel conditions
- **Service planning** – Provides guidance for planning and designing services in the community
- **Demand forecasting** – Describes the steps to forecast demand for new and revised transit services
- **Resource planning** – Outlines the equipment, infrastructure, staffing, and passenger information requirements to implement new or revised transit services
- **Governance** – Summarizes the options that define the ownership and responsibility for planning and delivering transit services
- **Financial planning** – Outlines the steps in estimating capital and operating costs associated with new or revised services and describes potential funding sources
- **Service implementation** – Describes the step-by-step activities needed to implement new or revised services
- **Service monitoring** – Outlines the steps to monitor the services to ensure it continues to meet the needs of the community

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1. INTRODUCTION

1.1 PURPOSE OF THIS GUIDELINE

Providing reliable transit plays an essential role in addressing the social, economic, community, and environmental challenges facing Canada's cities and communities across Canada.

While there has been greater focus on serving transit needs in large cities and metropolitan areas, transit services also have an increasingly important role to play in smaller communities, triggered in response to an increasingly aging population, continued transition to a knowledge economy, and increasing costs of vehicle ownership. Canada's small and rural communities present unique market opportunities and challenges for transit that are different and more variable than those in larger urban centres.

Although many of the strategies in this guideline can be applied to a range of community sizes, in general, this guide is intended for communities with populations of less than 100,000, with a special emphasis on smaller centres of under 50,000. This guideline also includes strategies for regional service where service is being provided to a region of smaller communities that make up less than approximately 150,000 in total population.

The purpose of this guideline is to equip planning and transportation professionals and community leaders with easy-to-understand technical tools to effectively plan and design services, as well as to develop transit policies that promote cost effectiveness, maximize ridership, and respond to the needs of smaller cities and rural communities.

The guideline is intended to be a starting point for communities thinking of:

- introducing new transit services
- expanding existing services to capture a larger market and achieve transit demand objectives
- sustaining existing services experiencing operational, financial, and ridership difficulties

1.2 HOW TO USE THIS GUIDELINE

This guideline is not necessarily intended to be read in its entirety, rather it aims to provide a quick resource to the various aspects of starting, planning, expanding and sustaining transit services for small communities.

Due to the diversity and wide range of land use structure and trip patterns in small communities, this guideline is also not prescriptive in how to plan for transit service. Rather, it identifies analysis direction on how to develop a transit service plan. The guideline also provides more tailored advice in some topics according to different community characteristics.

The document is organized based on the various stages of the planning process, to assist communities with planning for a new service or modifying an existing service.
Figure *1-1* shows these various stages by way of a process flowchart. For easy reference, the process flowchart directs you to the specific sections in the report that pertain to that stage.

Figure 1-1 – General transit planning process flowchart

2. TRANSIT SERVICE IN SMALLER COMMUNITIES

Challenges facing small communities are many – some similar and some very different from planning transit in larger communities. Key among these challenges are factors that comprise the small community context:

- a smaller population base means less ridership and smaller scale benefits from related factors such as congestion or pollution effects
- a smaller tax base to financially support the service
- larger distances between origins, destinations and population centres that increase costs and auto-dependence

Any transit strategy needs to have regard not only for the existing context, but also for the planned context. In fact, the real opportunity is to intertwine the emerging transit service and the desired future condition of the community as a quality place to live, work and visit.

2.1 CHALLENGE AND OPPORTUNITY

2.1.1 AUTO-CENTRED COMMUNITIES

Smaller communities are often relatively low-density communities, which makes transit more expensive to provide, and often established as auto-centric and auto-dependent communities – which makes transit more difficult to promote. At the same time, auto-centric communities often have a portion of the community with significant need – those that do not have access to a vehicle because they are too young or too old, or for whom auto travel is unaffordable or cannot drive due to disabilities. Smaller communities often have few other transportation options. The lack of personal mobility has been linked to social isolation, inability to access medical services, education, training, or employment, or recreational and cultural activities.

Poor access to employment reduces the available labour pool for employers, and also reduces the number of available jobs for potential workers. Similarly, a lack of access to education and training results in a less-skilled workforce. This reduces the employment options for those with access to jobs, and also reduces the amount of suitably skilled labour for employers. Together, these can lead to labour market inefficiencies, with negative effects on the local and wider economy. Further, a lack of access to other amenities and facilities can cause or exacerbate a wide range of social problems.

Providing dependable and affordable public transportation to these communities contributes to the overall health of individuals. Further, there is evidence that communities with transit services results in increased levels of activity, reduced obesity and reduced healthcare costs.

2.1.2 COVERAGE VERSUS LEVEL OF SERVICE

In many larger communities, transit systems must deal with finding a balance between level of service and area coverage when allocating system resources – the broader the coverage, the lower the overall level of service in terms of service span and frequency. Higher levels of service are typically aimed at

promoting choice ridership and increasing convenience, while maximizing coverage addresses the accessibility and mobility needs of all areas.

In smaller communities, the choice typically tends towards coverage – maximizing the number of people that have access to the service at the expense of frequent service and longer hours of operation.

2.1.3 RELATIONSHIP BETWEEN DENSITY AND RIDERSHIP

Simply put, the larger the number of people within walking distance of a transit service the greater the likelihood of it being used. This includes both people living within walking distance (population) and people working within walk distance (jobs). The combined density (population + jobs) is typically a useful indicator of potential transit demand. While providing service within close walking distance is important to generating greater ridership, it is equally important to provide services that are direct . There is a need for a fine balance in minimizing walking time while also minimizing in-vehicle travel time—where a transit service should sit within these two sometimes competing interests is based on key target markets for the service (described in Section 4.2).

Some sites (such as educational facilities or shopping malls) will attract significantly more trips than would be implied by their employment levels. However, such sites are typically few, and their effects can be considered on an individual basis. Small communities typically have lower density development, and this will limit the number of people (population + jobs) within walking distance of transit stops.

Single use areas are prone to large peaks and valleys in transit use. Conversely, mixed-use areas with a mix of building typologies result in a more even and consistent use of transit. They also tend to encourage people to walk or bike between uses (at shorter distances). Smaller urban centres communities are more likely to be more mixed-use communities, while fringe and very small rural communities tend to be primarily residential (and hence single-use).

2.1.4 COMMUNITY LOCATION

Community location can be both a challenge and an opportunity with several considerations for developing a transit service:

- Communities on the fringe of urban areas tend to have more external travel, but can capitalize on partnerships with the larger community to provide connecting transit services
- Smaller isolated communities tend to be more auto-oriented, requiring travel to more distant communities for employment and essential services
- A rural region may have scattered hamlets and villages where travel demand is between communities and more regional in nature. Providing an inter-municipal or regional service that links communities could not only meet travel needs but can also bring more resources to support a transit service.

2.1.5 BUILT FORM

The built form of smaller communities depends principally on when development took place. Older towns often have a historic core that is a focus for employment and commercial activities. Newer development may be single-use (typically residential) or have dispersed employment or commercial activities. Where a historic core is present, small communities should capitalize on the concentration of trip destinations, and also support the core’s continued use.

A small urban centre often can serve as a local and regional hub, providing a destination point for inter-community connections, walkability for access between the hub and local services. On a small scale, communities can introduce transit supportive elements – especially good walkability, and community network connections, increasing access to the hub and promoting transit access.

2.1.6 DEMOGRAPHIC PROFILE

The demographic profile of your community has a significant impact on the potential and the need for transit services.

- There is a growing trend for youth to be more receptive to using transit, and to have the ability to travel without depending on a car (either through ownership or use of someone else's vehicle).
- Communities that attract people (such as tourist destinations) from larger centres where transit has been available to them often expect transit services in their new communities. The presence of transit services make the small community a more attractive place to visit.
- Older populations are looking for the opportunity to age in place, without the need to move to larger urban centres. In some communities this means having the ability to connect to those larger centres, while in other communities it means having the ability to move about the area, accessing local services without the need to drive.

2.1.7 ECONOMICS

The small tax base of a small community often faces challenges meeting a number of priority needs, and historically, transit has been far down that list of priorities behind infrastructure, emergency services, recreation and other municipal services.

A local municipal person (such as a politician or dedicated community member) can play the role of 'transit champion'. Such a person can promote the benefits of transit, demonstrate the need within the community, raise awareness of the role that transit can play in community building, and generally help build the case for transit service. A transit champion in the community is often critical to success, and will play an important role in the planning and consultation process.

3. CONSULTATION

Public consultation is a critical element in planning for a transit service.

Effective consultation leads to more informed decisions, greater community understanding, and more effective solutions that better serve community needs. Consultation brings into the discussion the expertise, perspectives, and diverse ideas to develop a range of solutions that benefit the community and promote better value for money.

By bringing different perspectives to the table, consultation helps to:

- better balance and address opposing interests
- identify any unintended consequences and associated corrective actions of planning decisions
- serve as a "quality check" to ensure decisions fit with the needs of the community.

Public consultation generally involves informing citizens about the transit planning decisions being considered, and actively seeking the opinions of interested and affected groups. Effective consultation can also build public support and interest in transit projects and in improving transit service.

This section outlines the typical process for consultation particularly for introducing a new transit service, or making service improvements and policy changes to an existing system. This is then followed by a discussion on the various ways to perform public consultation.

3.1 CONSULTATION PROCESS

The consultation process typically follows four stages. The first three stages occur through the course of a planning process, while the fourth stage relates to facilitating ongoing dialogue with citizens and passengers. Undertaking a transit planning study typically arises from the need to build or improve policies and operations to a transit system in response to arising issues in the community.

The first stage aims mainly to communicate these issues to the public and inform stakeholders about the general directions the agency wishes to implement for a new system or improve an existing transit system. During this phase, participants generally have the ability to flag specific study areas that require attention (e.g. promoting a culture of transit use by expanding service at all times of the day or improving the rider experience by promoting increased schedule reliability).

After gathering public feedback and completing a more detailed technical assessment, the second stage presents the range of options that aim to resolve the identified transit-related concerns. The range of options varies depending on the complexity of the issue, as well as the degree to which the solution(s) may affect the social, environmental and economic realms of the community. It is also possible that there is a simply one solution, in which case, the consultation would involve confirming whether it is indeed the optimal solution.

Taking into consideration public feedback, the agency then identifies a preferred option and makes the decision available for stakeholder review. Again, depending on the complexity of the transit planning issues, there may be a need for further two-way dialogue to confirm the preferred option.

The fourth stage relates to promoting ongoing dialogue with passengers and the general community, and considering all complaints, compliments and suggestions raised. Fostering ongoing communication

with riders better prepares transit agencies to respond to changes in the community and to strive for continuous improvement.

Figure 3-1 is a summary of the general communication activities that take place at each of the four identified consultation stages.

Introducing a new service	Present current issues and the impetus for transit service in the community Seek feedback on the mission and objectives for the service	Present options for the new service, identifying the benefits and the costs associated with each option Seek feedback on the preferred option of participants and their rationale.	Present the assessment leading to the identification of a preferred option	Gather and assess ongoing customer feedback for continuous improvement upon introduction of new/revised service
Revising and minor route-related changes Revising larger system related changes	Present the current and anticipated issues with the transit service Present the major directions leading to the need for service changes	Present service options for service and policy changes Seek feedback on participants' preferred option and their rationale	Present the assessment leading to the preferred option	

Figure 3-1 – Communication activities at typical stages of the consultation process

There is some scope to combine stages 1 and 2, or stages 2 and 3 for communities unable to carry out all four stages independently. In the former case, background material is presented alongside preliminary options. This combines the information-orientated aspects of stage 1 with the feedback-orientated aspects of stage 2. This approach can work well where significant changes are proposed.

Alternatively, a combined stage 2 and stage 3 will present the possible options, their evaluation, and the final recommendation. This approach is more suited to minor changes, as it prevents those being consulted from having input into the options under consideration.

3.2 CONSULTATION METHODS

There are a number commonly used consultation methods, and depending on who is to be consulted, how formal the process is, and the communication means used. The various ways to perform public consultation include:

- Organizing Public Information Centres (PICs)
- Conducting survey research
- Leading discussion groups and workshops
- Conducting web-based consultations.

A brief description of these methods and their respective advantages and disadvantages are discussed in the subsequent sections.

PUBLIC INFORMATION CENTRES

Public Information Centres (PICs)—a more traditional method of public consultation-- are engagement events organized at strategic locations within the community where all participants are encouraged to understand and provide feedback to a proposed transit-related decision. It typically involves a presentation and/or information display boards to set the context and objectives of the consultation session and to seek feedback from community members.

Providing pre-event advertising, promoting appropriate local media exposure, and facilitating word of mouth by key stakeholders will help to encourage greater attendance and participation at PICs.

Advantages	Disadvantages
▸ Ability to solicit feedback from various geographic communities ▸ Allows for the presentation of verbal and visual information, which increases access to a range of people ▸ PICs can be organized in conjunction with large local events to improve attendance and participation	▸ May require extensive staff resources to develop a consultation plan, preparing and delivering the PIC, and analyzing feedback received from the consultation ▸ Outcomes may be difficult to interpret across different communities ▸ May not result in high attendance, thus information received from the PICs may not be representative of the larger community

SURVEY RESEARCH

Surveys comprise a standard set of questions to a range of citizens in a given community. They are a popular method of collecting qualitative and quantitative information. Surveys can be conducted through face-to-face interviews, self-administered written questionnaires, over the telephone, and increasingly via the web. Surveys are often distributed during public meetings, as an effective means to receive focused feedback.

Careful planning is needed for surveys to be successful. Questions must be clear, impartial, easily understood, unambiguous and should ideally be pre-tested before the survey is distributed.

Questions about the potential for use should be worded carefully, or even avoided, since people tend to over-estimate their future use of a service, based on their perceptions of how convenient it will be. A

better option is to ask questions about the attributes of a service that will make a service attractive to an individual, such as frequency, on-board amenities, service areas, hours of service and such.

A sample of an onboard survey is included in the Appendix A.

Advantages	Disadvantages
▸ Can be used to gain feedback from large and diverse groups of people ▸ Easy and fairly cost effective means to produce and distribute in large quantities ▸ Can effectively produce large amounts of qualitative and quantitative data	▸ Printed surveys may not be accessible for people with limited English literacy and persons with visual impairments ▸ Analyzing the data requires time, resources and experience ▸ Standardized nature of surveys limits the number and kinds of questions that can be asked

DISCUSSION GROUPS AND WORKSHOPS

Facilitated discussion groups involve participants selected either randomly from the public or from representatives of a given community—with the latter being most common. Organized discussion groups are a good way to identify a range of opinions related to transit service planning. Discussion groups encourage generally open-ended dialogue, which would be useful for example to identify the general transit-related needs and concerns of various stakeholder groups.

Workshops, however, are generally more structured activities that often combine dialogue with more collaborative and hands-on activities. Activities such as distributing plotted maps and encouraging participants to design their own routes with a limited amount of route distance available may be useful to design a system suited to community needs.

Advantages	Disadvantages
▸ Allows for the targeting of specific groups ▸ Adaptable to various stakeholder types and achieves a range of outcomes ▸ Capitalizes community energy and knowledge to develop effective service options ▸ Helps to build consensus, which may better lead to the service's success	▸ Participants may not be representative of the larger community ▸ Generates more qualitative information which may be more difficult to synthesize, particularly when there are divergent views ▸ Analyzing the qualitative data requires time, resources and experience

WEB-BASED CONSULTATION

The use of online consultation has become an essential part of a suite of methods being used in the consultation process. Depending on the scale of the planning work being undertaken, the consultation website could be developed as a standalone page or as a component of an existing page (e.g. part of a municipal website).

These consultation websites provide two-way communication between the transit agency and its citizens. They also allow transit agencies to relay information and feedback. If a physical public meeting is being held, current web chat opportunities enable participation in the convenience of people's homes.

Meanwhile, the development of online questionnaires provide a cost-effective way to seek citizen input about any planning decisions—though agencies will need to take proactive measures to allow for participation from all demographics, otherwise the results may not be representative of the public as a whole.

The use of social media, such as Facebook, Twitter, YouTube, have been useful to inform and even directly engage citizens in participatory decision-making. Agencies or municipalities that already engage in social media have a more advantageous position, as they may already have an existing following that could be used to relay information and encourage participation.

Advantages	Disadvantages
▸ Cost effective means to solicit citizen feedback ▸ Allows for information to be provided quickly ▸ Allows for citizens to participate in a time or place that suits them	▸ Online processes may skew responses, as it is possible for respondents to provide input more than once. Further, respondents are self-selecting. Consequently, responses cannot be considered statistically representative ▸ Resources are required to moderate online discussions and ensuring that questions raised are responded to in a timely manner ▸ Participation is limited to those who have internet access and are technologically capable

3.3 CONSULTATION MESSAGES

An important part of the message to generate support for transit service in a community is to properly and comprehensively reveal its benefits to the entire community. Support within the community must come from both potential riders, who will support the service with their patronage and fares, and also from the entire community (including riders) who will support it with their taxes.

Building this broad community support means describing the benefits that the entire community will derive from the service – not just riders. Investing in transit can fulfill many more objectives than simply moving one segment of the population from point A to point B. Often communities of a variety of scales are interested in transit as an opportunity to achieve one or several of the following objectivess:

- Attract and retain a population who see transit as adding to their quality of life. Youth are often in this group and a real focus of smaller communities
- Enable people to age in place. People who may have relied on cars during most of their life and who can no longer drive, can remain in their neighbourhoods and be mobile if transit is available

- Attract investment and business. By introducing transit, doors may be opened to attract a broader group of initiatives and investments that may not have been otherwise. Transit can often be the differentiator between relatively similar communities
- Increased property values. In many neighbourhoods, there was an association between the availability of transit and an increase in property values for properties within walking distance of a stop
- Increase the visual appeal of a community. With a reduction of car-dependency comes a reduction of parking lots and car-based infrastructure, and a corresponding increase and use of walking paths, trails, and cycling. These tend to result in a more attractive and animated public realm (e.g. downtowns)
- A positive effect on public health, both in the short term by providing access to health services to otherwise disenfranchised people, and in the long term by encouraging active life styles within a community.

4. IDENTIFYING SERVICE NEEDS AND OBJECTIVES

4.1 INTRODUCTION

Planning a transit service is similar to marketing any other service—there is a need to have a strong understanding of market conditions. It is important to identify and be clear about which specific markets to serve—this will help later in the process to identify what and how much service to provide and where it should be provided.

The discussion is divided into the three broad agency service conditions:

- **Starting** a transit service in a community with no existing service
- **Expanding** an existing service, whether serving a new area served or increasing service levels
- **Sustaining** an existing service, by evaluating whether the existing transit users can be served in a more efficient way. (This could include reducing service)

Each of these cases requires a similar assessment of target markets and their needs, then identifying the type of service best suited to meet those needs.

4.2 IDENTIFYING TARGET MARKETS

Regardless of the objective of your planning process, it is important to understand the market you are trying to serve, in terms of geography (where?), demographics (who?) and trip purpose (for what?). In developing your service approach, it is important to understand the needs in your community, the priority the community places on those needs and the resources available to meet those needs.

Figure 4-1 – Different target market areas

In terms of the demographic markets, a community could choose to provide “conventional transit” for the general population, or “specialized transit” for a specific group, most commonly referred to serving people with disabilities specifically. In terms of geography, it is important to understand where people need to travel to and where people are coming from and to define which of those patterns are important to serve and can support a successful service. Understanding and defining trip purposes to be

accommodated by the service is also important for defining the type of service to be provided. For example, school and commuting trips are often best-served by a service with a fixed route and fixed schedule, whereas trips for social or recreational needs can often be met with more flexible custom services. (As discussed below, the size of the community may also influence service type, with flexible service being more suitable for very small or rural communities).

Identifying the target markets and their needs on a comprehensive basis is one of the biggest challenges of developing or tailoring a service for the community. The needs of target markets are often best expressed by advocates for specific groups, and those without similar representation may go largely unnoticed. Similarly, the needs of represented groups may be overstated resulting from a kind of confirmation bias that leads to overestimating demand and the potential success of the service.

As much as possible, the characteristics of target markets and their specific needs should be based on reliable data, supported by consultation, related studies and community input.

4.2.1 DEMOGRAPHIC MARKETS

The ultimate goal of transit services for communities is too provide a travel option for a wide variety of demographic markets. For small communities, this often means starting with demographic markets that include broad categories based on age, income or other factors, since these typically represent the largest unmet need. In general, transit planning is based on serving all residents. However, financial constraints may result in communities focusing service on transportation needs for specific priority groups, such as some or all of those illustrated in Figure 4-2.

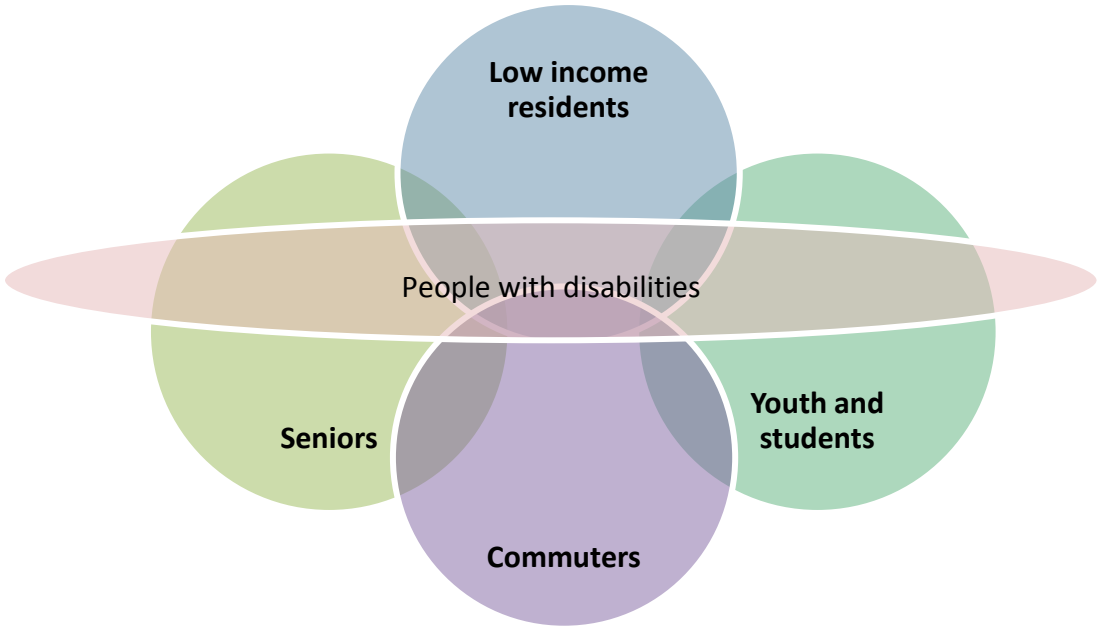


Figure 4-2 – Key demographic markets

Demographic markets are often identified by the community and often form the rationale for developing a transportation service in the first place. However, these markets still require good background information to properly understand the various factors needed to design an appropriate service.

4.2.2 GEOGRAPHIC MARKETS

Geographic markets are easier to understand and develop information for. Similar to demographic markets, the existence of an unserved (or underserved) geographic market may also be the impetus for considering implementing or expanding a service.

Geographic markets need to be assessed in terms of their size, population, demographic characteristics and location relative to existing transit services and to other travel markets.

Larger urban centres typically have areas with higher job or population density. These concentrate trips, and hence potential transit riders. This in turn allows transit services to be more efficient or cost-effective. Smaller communities usually lack such areas, and the advantages they bring.

Smaller communities however serve a wider array of different land use geographies, and this will end up influencing the most suitable type of transit. For example, a large rural area with dispersed origins and destinations is less likely support a conventional fixed-route transit system, and will likely need to look to other service delivery models.

4.2.3 TRIP PURPOSE

Services may be planned to serve general travel needs, or just those of travelling for a specific purpose. Specific trip purposes are often linked to the needs of demographic markets as well. These guidelines categorize trip purpose into five broad categories:

- Work/training
- School/post-secondary education
- Medical and social services
- Shopping (food and other)
- Social

Table 4-1 shows the range of considerations for each service objective around these market dimensions.

Table 4-1 – Approaches for service options: starting, expanding, sustaining

Step	Starting	Expanding	Sustaining
Demographic Characteristics Who wants to travel?	Identify service needs for: ▸ General population ▸ Seniors ▸ Youth ▸ People with disabilities	Improve or expanding services focused on demographic market	Reduce or eliminate service for select markets with lower ridership potential Tailor or improve services for other select markets with greater ridership potential
Geographic Market Where do people want to go?	Identify size of potential service area and related characteristics	Identify size of potential service area and related characteristics, relative to existing service	Reducing or eliminating service in low demand areas Shift services to serve higher ridership markets
Trip Purpose What trips do people need to travel for?	Identify service needs for: ▸ General ▸ Commuting ▸ School ▸ Shopping ▸ Medical ▸ Recreational	Expand service to meet other trip purposes by: ▸ increasing span of service ▸ improving service coverage ▸ Serving more key generators	Reduce, eliminate or tailor service for select trip purpose Focus on specific time-of-day services

5. SERVICE PLANNING

This chapter will provide guidance through the process of planning and designing services in the community. The process for service planning is summarized in the flowchart in Figure 5-1.

Figure 5-1 – Service planning process flowchart

5.1 ESTABLISHING A SERVICE AREA

The first task in designing a service is defining the geographic area in which transit service is provided.

Chapter 4 identified the key objectives for a new or expanded transit service. The identification of these objectives will help to provide directions for how the service area should be defined.

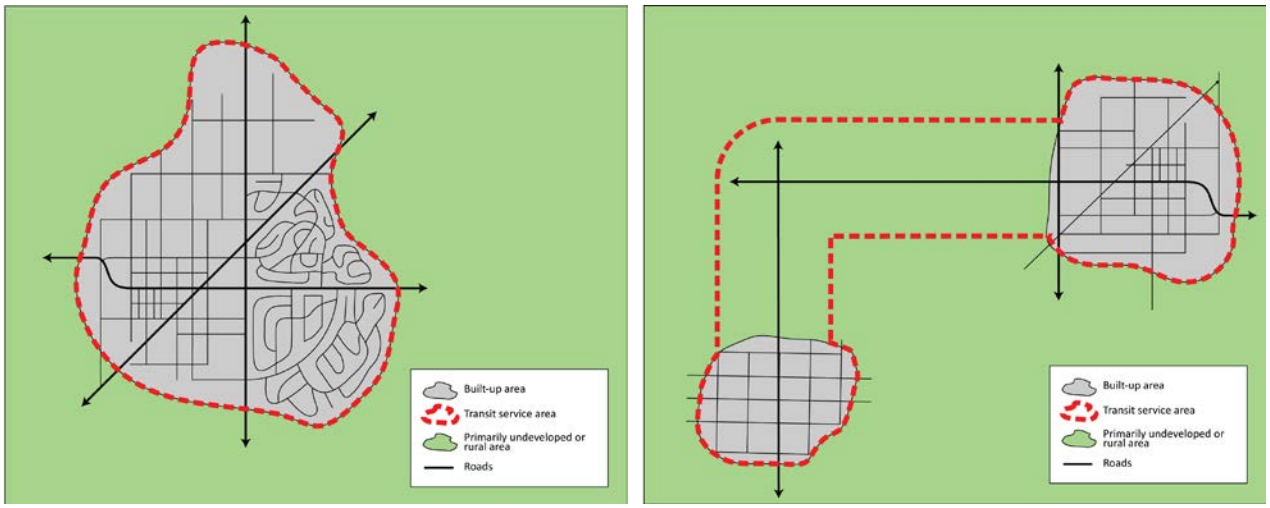
If the main objective of the service is to provide connections for work and school commuters, the service area should be designed to accommodate connections from residential communities to major employment centres and schools. For accommodating medical and shopping trips, services should provide connections from residential areas of higher concentrations of seniors to medical services and shopping centres.

The spatial relationships of a community will also affect how a service area is identified. It is important to provide good service coverage in the community so that passengers can connect between all origins and all destinations in the service area.

The definition of service coverage varies depending on the type of services provided and the operating environment, but for most systems, agencies aim to maximize the number of people and jobs that a system can capture within a comfortable walking distance (400 to 500 metres) to a stop. Thus agencies commonly ensure that the network covers as much of the built-up area within a specific density threshold.

Communities with more comprehensive cycling networks and higher cycling mode shares could plan with a larger service area catchment (500 to 800 metres) by providing amenities that promote cycling-transit integration such as bike racks on buses and bike parking facilities at major transit stops.

While it is important to maximize the people and jobs a transit network services, it is equally important to link important trip origins and destinations—even if this may require serving low density or rural land uses. Figure 5-2 illustrates the balancing required to ensure maximum coverage to key areas while providing good links between origins and destinations. Services that are operated in one contiguous built-up area (left image) will have greater potential to capture more passengers per distance travelled, compared with communities that will provide services between two or more distinct built-up areas separated by undeveloped land (right image)—both service options are appropriate service options to consider.



Providing services in a contiguous built-up area (more passengers per distance travelled)

Providing service not in a contiguous built-up area (fewer passengers per distance travelled)

Figure 5-2 – Service coverage in varying spatial relationships

AVERAGE SERVICE AREA POPULATION DENSITY

To provide some benchmarks for planning for a new or expanded service, the typical average population density within the service area of smaller systems is 1,300 persons per square kilometre. Since a majority of current transit agencies provide service generally within one contiguous built-up area, the average density figure identified reflects those spatial urban conditions.

It is more difficult to provide typical population density figures for systems that provide connections between distinct built-up areas as it is dependent on the distances operated between those built-up areas. Thus some further consideration is required to gauge the appropriate population density in these communities with more unique spatial relationships.

AVERAGE SERVICE AREA PER TRANSIT VEHICLE

At this early stage of the service design process, it is important to understand the cost impacts of providing service given a defined service area.

The number of peak period transit vehicles operating is dependent on the size of the service area, the speed at which the vehicles are travelling, and the frequency of its services. Using operating data from existing smaller transit agencies, and adjusting for their varying degrees of service frequencies, one bus for smaller agencies can operate with an average area of 2.1 square kilometres, assuming the majority of services operate every 30 minutes. Through a similar logic, if services are operated every 60 minutes, approximately 4.2 square kilometres per vehicle can be accommodated.

5.2 IDENTIFY SERVICE SPAN

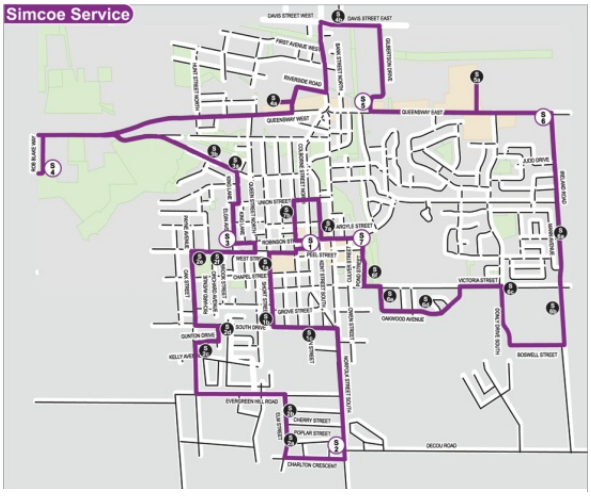
Span of operation is the general time period within a given day when service is provided. Similar to establishing a new or revised service area, the established objectives and key markets of the service (as discussed in Chapter 4) will help to better identify the appropriate span of service to operate. Specifically, identifying the right span of service requires understanding generally when the target market needs

1. to arrive (or start arriving) at their typical destination, and
2. to leave (or start leaving) their typical destination.

Figure 5-3 outlines the peak demand for various travel markets by weekday time period. Office workers typically travel between the weekday AM (6 am to 9 am) and PM (3 pm to 6 pm) peak periods. Seniors and people with disabilities making medical-related trips are commonly made during 9 am and 6 pm. Ridership demand for primary and secondary school commonly peaks between 7:30 and 9:00 am and from 2:00 pm to 3:30 pm.

In some cases, temporal ridership peaks are not commonly defined. In these cases close consultation with educational facilities and employers will provide a more definitive understanding of general times of travel.

Ride Norfolk, Ontario



Ride Norfolk provides community bus connections to all residents but geared to seniors for general travel and medical appointments to Simcoe.

The service operates on a fixed-route fixed schedule in Norfolk County between Simcoe and its surrounding towns including Waterford, Delhi, Port Rowan, and Port Dover, making route diversions to small villages. The service area population is approximately 60,000 people.

Eight trips operate within Simcoe, with three of those eight trips making rotating connections to Norfolk's surrounding communities once a week.

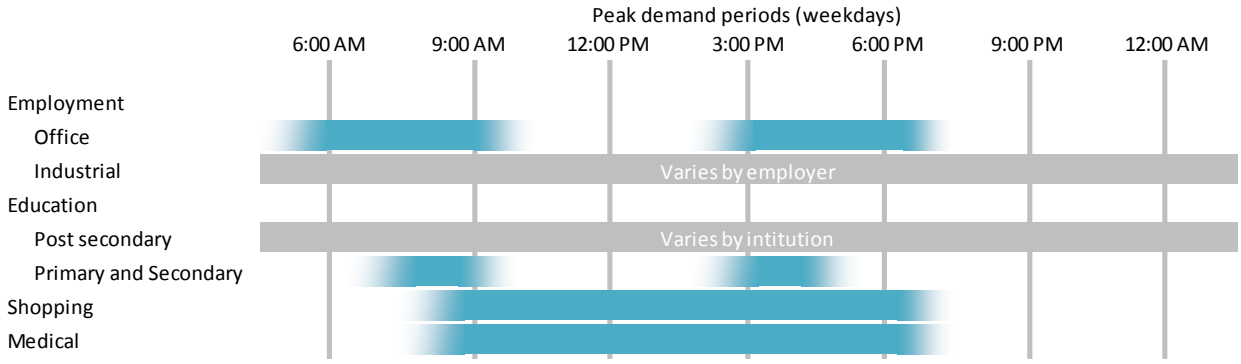


Figure 5-3 – Typical travel times for various travel markets

Transit agencies typically follow a logical progression to increasing the span of operation of a service, as illustrated in Figure 5-4. A new transit service could be introduced first by operating limited trips on select days of the week. As ridership and funding grows over time, there are opportunities to provide regularly scheduled services, starting with weekday daytime hours and expanding to other periods.

Not all routes necessarily need to follow the progression as shown in Figure 5-4. As supported by projected ridership and service objectives, a service could begin at Stage 2 expanding services over time.

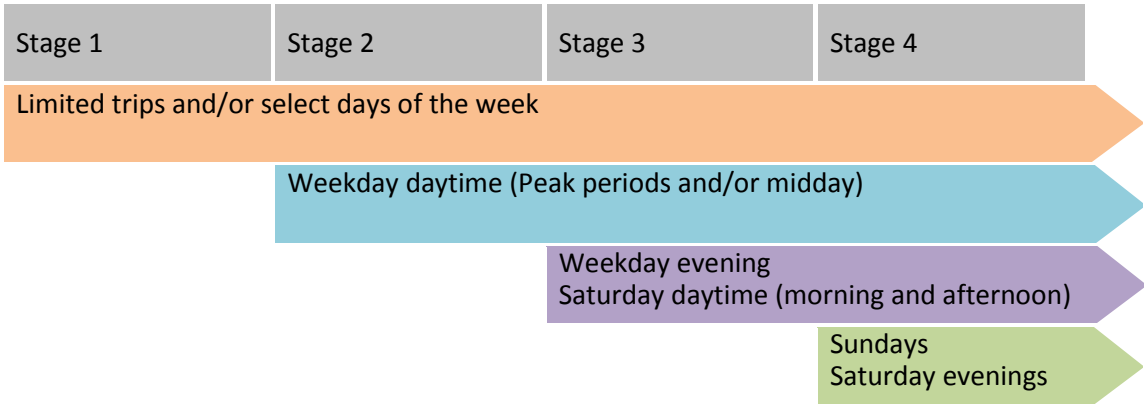


Figure 5-4 Typical expansion of service spans of a service over time

5.3 SELECTING A SERVICE TYPE

Transportation services can be delivered in a variety of ways, depending on the market characteristics, travel needs, travel patterns and resources available. Whether an agency is introducing a new service, or expanding and tailoring existing services, it is important to define (or redefine) the target markets to serve as discussed in Section 4.2. Responses to the following questions are critical to selecting the appropriate service type:

- Who do we want to serve?
- Where do they live and where do they want to go?
- Why do they want to travel?

- What is the service area's land-use and spatial characteristics?
- What existing transportation resources are available?

The following section describes each of the various service types from formal fixed-route transit services through less formal community-based options, and describes the general applicability of each to the different markets and service needs. In subsequent chapters, specific guidelines addressing demand levels, potential ridership, associated costs and revenues will help further define the identification of service options.

The answer to these questions is the key to understanding the nature of the types of services that might be provided.

- **Fixed-route fixed-schedule services**— referred commonly as "conventional transit"
- **Flexible transit services**— comprises a variety of service delivery models that combine fixed routes with flexible service, such as request stops or route deviations on demand.
- **Demand-response services**— service that is provided only on request, comprising of subscription or membership services, such as commuter shuttles, or specialized transit for people with disabilities using fully accessible vehicles that provide door to door service.
- **Coordinated community transportation**— service model where local transportation providers, such as social and health service agencies, and volunteer organizations collaborate to share resources and coordinate their services to increase capacity.
- **Other non-transit services –** ridesharing technologies, carpooling, vanpooling

Table 5-1 general direction for selecting the types of transit service based on the travel markets and the land use and spatial characteristics of the community to be served. For example, service areas with low population densities and a large rural service area may not have the concentrated demand or the resources to support a fixed-route system and may need to look to other service models. If the choice of transit service is only to provide fixed-route or flexible transit services, accessibility considerations (e.g. operating accessible buses, incorporating accessible stop amenities) need to be considered. Some provincial jurisdictions (e.g. Ontario) require that conventional transit such as those for fixed-route and flexible transit be accessible for people with disabilities. It also requires providing alternative forms of transportation (e.g. specialized transit) for people who are unable to use fixed-route and flexible transit services because of their disability.

Table 5-1 – Service type direction matrix by travel market types, and by spatial and land use characteristics

Focus of transit service	All markets	Specific Target Markets	
		Seniors	Persons with disabilities
Predominately residential community adjacent to large municipality	• Fixed-route • Flexible transit • Carpool, vanpool, ridesharing	• Flexible service	• Demand response (specialized service)
Various small towns, villages in region/county	• Fixed -route (inter-municipal) • Flexible transit • Demand response (within individual towns)	• Flexible service	• Demand response (specialized service)
Rural area with dispersed origins destinations	• Flexible transit service • Demand response • Coordinated community transportation • Carpool	• Demand response (subscription services) • Coordinated community transportation	• Coordinated community transportation • Demand response (specialized service)
Larger independent municipality (50,000 or greater) with town centre	• Fixed-route • Demand response	• Demand Response (incorporating community transportation)	• Demand response (specialized service)
Smaller independent municipality (under 50,000) with town centre	• Fixed-route • Demand response	• Demand response (subscription services) • Coordinated community transportation	• Demand response (specialized service)

5.3.1 FIXED-ROUTE FIXED-SCHEDULE SERVICES

A fixed-route fixed-schedule service is a type of transit operation that most people are familiar with whereby transit vehicles travel on a regular route alignment at scheduled times. In small communities, fixed-route fixed-schedule transit services are best suited to markets with limited access to autos, whether because of age, physical ability to drive, or income and where origins and destinations are focused in smaller geographic areas and along denser route corridors (major arterial roads with greater level of travel activity and land uses).

RIDERSHIP POTENTIAL

Fixed-route fixed-schedule services, without consideration for land use and spatial characteristics, have greater potential to generate ridership compared to the other service types. They provide passengers a reliable and consistent way to travel, as they can expect that the bus will be there at a certain location and at a certain time without the need to request the service.

However, for smaller communities, fixed-route fixed-schedule services may be too rigid to accommodate the wider, and lower scale, range of travel needs. Thus, operating solely fixed-route fixed-schedule services in these communities may not be the most cost-effective transit service solution. Fixed-route fixed-schedule services may be more ideal for routes where larger proportion of trips are made, such as between larger cities, towns and villages and along major road arterials with a denser range of land uses. Other land use patterns may need to more adaptable to better serve community travel needs in a more cost effective manner.

ROUTE ALIGNMENT

Providing further detail to the development of a service design, planners need to identify the specific route alignment for the planned service. Developing a route alignment is an iterative process that requires a number of complex and interconnected considerations, as described in the following subsections.

Make the right connections

The main impetus of providing transit services is to connect people to where they need to go. Thus, routes should be designed that reach residential areas, considering service coverage policies (see Section 5.1. These routes must also connect to major attractors (e.g. downtown, shopping malls, post-secondary schools, major employment centres, community centres) as well as to connect with neighbouring transit agencies and intercity/regional services where available.

Keep routes simple and direct when possible

Start with a simple route, assess service coverage, connections to major attractors, and then refine accordingly. Since buses can operate faster with fewer stops and turns along major streets and arterials, planned routes should utilize these streets where possible, given there is sufficient and safe pedestrian access from within the community. Trying to “connect all the dots” that lead to optimal service coverage can be counterproductive as it leads to routes that are either overly complex (and hence difficult for customers to remember) or too long (increasing travel time and operating costs).

Keep safety in mind

It is important to consider the conditions of the planned route and ensure the safety of the vehicle operation as well as the passengers on board or at bus stops. Consider also locating stops at or near existing lamp posts for adequate lighting at night. Avoid alignments that make it more difficult for buses to manoeuvre. For instance, the following route alignments should be avoided:

- Alignments that require the vehicle to make left turns at unsignalized intersections particularly from a minor to major road
- Alignments that operate on a very steep grade
    - If unavoidable, place bus stops only at the bottom or at the top of the grade change
- Alignments that require very sharp right turns at intersections with a small curb radii
    - The appropriate intersection curb radii varies depending on the size of the bus operated

When designing the route alignment, be mindful of the road cross-section configurations and assess possible locations of bus stops. Ensure that sidewalks (or a gravel shoulder at a minimum) and pedestrian crossings are available to allow for safe access to stops. Ensure also that the roadway speeds are appropriate for the placement of a bus stop. For instance, for roads that operate 80 km/h or greater,

it may be appropriate to include bus bays so that buses can safely decelerate and accelerate at these stops.

- Are roadway speeds appropriate for a bus stop?

Consider total route run time

- Be mindful of the total route run time
    - Assume 22 km/hr in an urban area and 40 km/hr for services connecting between two distinct urban areas separated by rural land uses
    - Allow 5 minutes per cycle for recovery/layover time
- Aim for total run time that yields a clock-face timetable (i.e. every 30, 60, 120 minutes)

ROUTE AND NETWORK TYPES

Route Types

There are a number of different route types to consider when developing service designs for a fixed route service, as summarized in Table 5-2.

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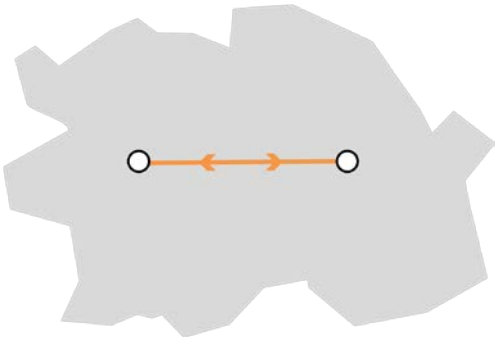
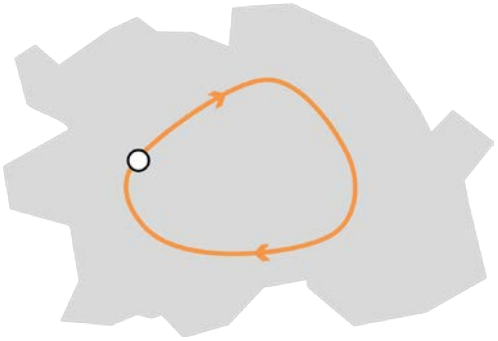
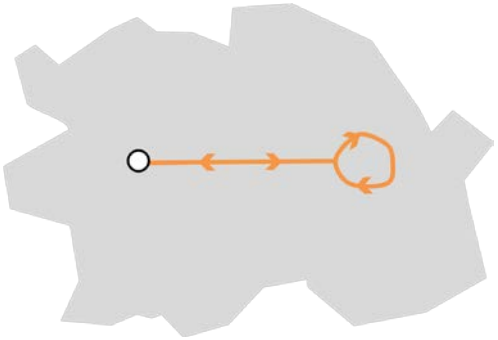
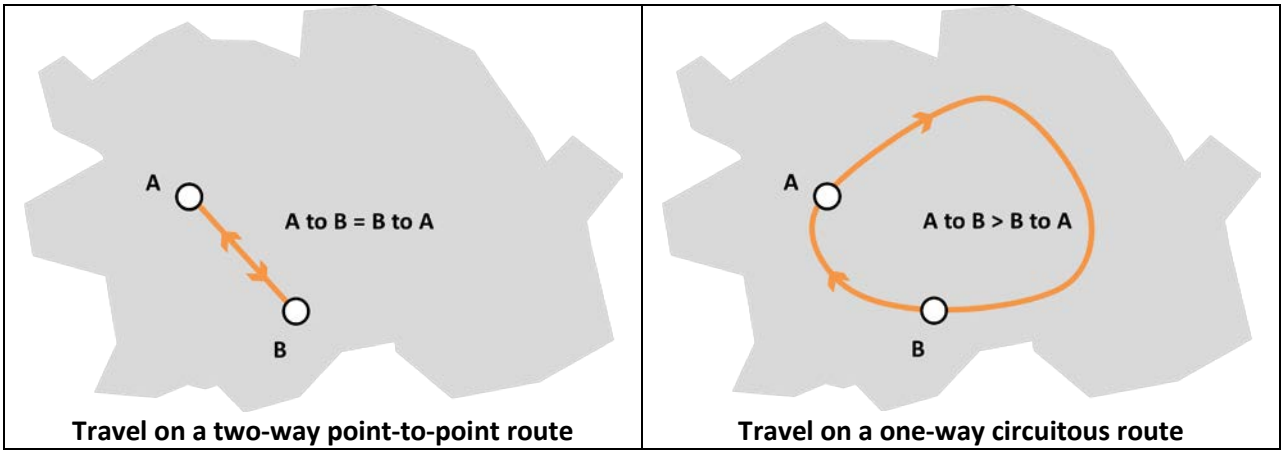
Table 5-2 – Major types of fixed-route alignments

Route type	Description	Examples
Two-way point-to-point routes	Route that has two defined route termini points and operates in both directions, following generally the same road segments Advantages: • Easier for passengers to understand • More direct service Disadvantages: • Provides less coverage	
One-way circuitous loop routes	Route that does not have defined terminus points where a route begins at one point, connections to various locations via a circuitous alignment, and returns back to the origin point without following the same route alignment Advantages: • Provides more coverage Disadvantages: • More difficult for passengers to understand, less direct service	
Hybrid alignment	Route that has one terminus point on one end, while the terminus point on the opposite end is unclear or not obvious Advantages: • Provides opportunity for a vehicle to turn around at terminus points without a bus loop • See points from other route types above Disadvantages: • See points from other route types above	

Two-way point-to-point routes provide a number of unique advantages over the one-way on-street loops:

1. Two-way point-to-point routes is typically better understood by passengers
    a. For example, assuming a passenger makes a return trip between Points A and B. On the return trip, the passenger intuitively assumes to take the same route in the opposite direction—this is not the case for one-way circuitous route.
2. Two-way point-to-point routes better accommodate linear trips
    a. For example, passengers commonly wish to travel from Points A to B and back to A using the most direct route. A two-way point-to-point route provides the same travel times for the outgoing and return trip, as opposed to a one-way circuitous route where the distance is longer in one direction and shorter in the opposite direction.



Travel on a two-way point-to-point route | **Travel on a one-way circuitous route**

Figure 5-5 – Travel comparison for a one-way circuitous route and two-way point-to-point fixed-route

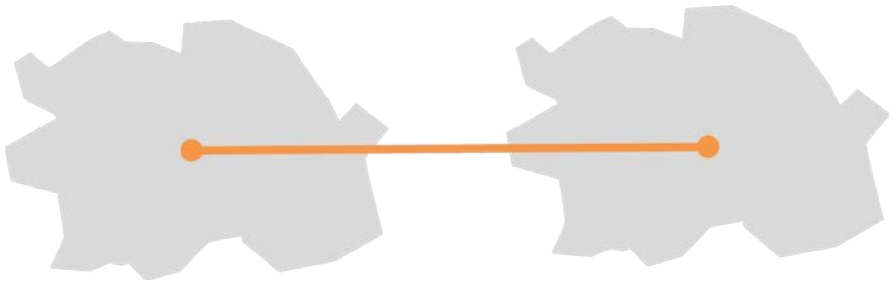
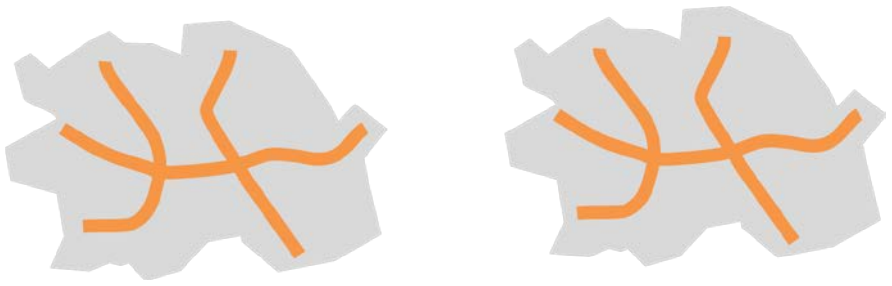
On the other hand, a one-way circuitous route provides different opportunities over two-way point-to-point route:

1. One-way circuitous routes can better spread a small quantity of service over the largest possible area
    a. Particularly relevant in small communities with dispersed land uses, this route alignment type helps to provide a base level of service to a wider geographic scale.
2. One-way circuitous routes provide opportunities to reach a wider range of destinations without the need to transfer compared to a two-way point-to-point route with the same service hours
    a. This type of service provides advantages mainly for passengers (e.g. seniors) where travel time is not as great a priority.

Network Types

There are generally two network types for fixed route services, based on the types of spatial connections made in the transit network. For small communities, a transit system can comprise either or both types. Table 5-3 summarizes the two types.

Table 5-3 – Network types

Classes	Examples
Connector Transit route that connects between two distinct communities each generally surrounded by a rural land use structure	
Local Transit route that serves destinations within one community	

Identifying and prioritizing which type of service to provide depends on the predominant travel patterns, the target markets, and the potential for those trips to shift to transit.

SERVICE FREQUENCY

Fixed-route, fixed-schedule services operate with a defined service schedule typically at a regular and consistent service frequency. Service frequency refers to the number of times a bus appears at each stop for a particular route in a given hour. On the other hand, headway is defined as the time interval of bus arrivals at a particularly stop on the route. Thus, a route can be described either by its service frequency (three times an hour) or by its headway (e.g. every 20 minutes).

Service frequencies commonly change, adapting to varying levels of ridership by the time of day. These variations in service patterns are typically structured based on service periods. A service period is the block of time which a route generally operates at the same service frequency. For instance, a service may operate every 30 minutes during the AM and PM peak period and every 60 minutes in the midday.

Establishing the appropriate service frequency depends on a number of factors including the travel behaviours of the target market and the scale of ridership at specific service periods and the total cycle time of the route.

Table 5-4 provides some general guidelines for minimum service frequencies. These minimum service frequencies provide a general basis for planners when designing a new or revised service depending on the general travel behaviours of different markets.

Table 5-4 – Typical minimum frequencies for fixed-route and flexible-route service types

Travel markets	Service notes
Employment	
Office	• 60-minute frequencies or better during the AM and PM peak periods
Industrial	• Align service closely with the shift start and end times for major large employers (if available) • 60-minute frequencies or better during the weekday daytime periods, with some limited trips in weekday evenings
Education	
Secondary	• Align service closely with the school start and dismissal times
Post-Secondary	• 60-minute frequencies or better with service during the weekday daytime periods and limited service weekday evenings
Shopping	• Service frequencies as ridership warrants – could be at regular service intervals or operate limited trips on select days of the week
Medical	• Service frequencies as ridership warrants – could be at regular service intervals or operate limited trips during the weekday daytime period

Depending on balance between estimated peak and off-peak ridership, consider higher frequencies in weekday peak periods. For instance, service frequencies could be tailored according to ridership by operating one bus throughout the whole day, with one additional bus operating during the AM and PM peak periods.

Estimated ridership levels are also an important determinant for identifying appropriate service levels. As a general guide, if the estimated ridership level per service hour is sufficiently high (greater than 25 passengers per service hour), then increase the number of buses per hour until ridership levels per service hour falls in the range of 15 to 25 passengers per service hour.

If estimated ridership levels per service hour is too low (less than 10) to warrant hourly service, consider the following options:

- Going from two-way to one-way service (where route is a large loop)
- Fixed-route in the higher ridership weekday service periods, dial-a-ride in the other periods
- Fixed-route in the higher ridership weekday service periods, no service in the other periods
- Fixed-route during weekday peak periods on specific days of the week (e.g. every Monday)

5.3.2 FLEXIBLE TRANSIT SERVICES

Flexible transit services comprise a family of transit services that have some combination of flexible routing and scheduling and are designed to meet specific needs of geographic or demographic markets. They typically serve geographic areas or serving demographic markets where the travel demand is less than what is required to sustain a form of fixed route transit.

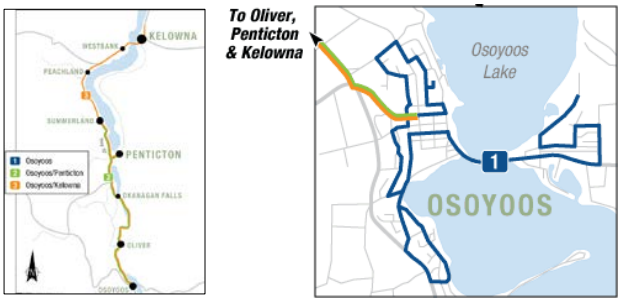
RIDERSHIP POTENTIAL

Flexible transit services are often well-suited to smaller and rural communities, as they allow greater coverage with the same or fewer resources. The major distinction between fixed-route and flexible services is that the former typically operates services on a fixed schedule. With flexible services, the flexibility can be used to combine service areas and meet specific travel needs, typically on some form of an 'on-demand' basis. In this way costs are controlled, since the service is only provided on as-needed basis.

ROUTE TYPES

Table 5-5 summarizes the types of flexible route services to consider.

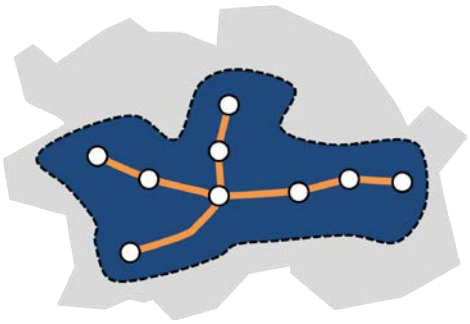
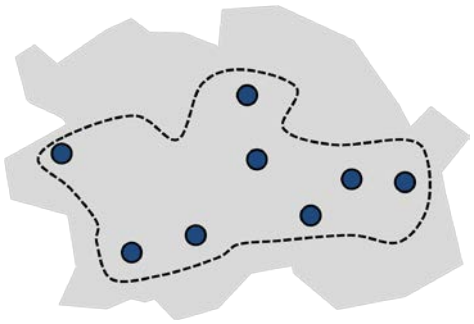
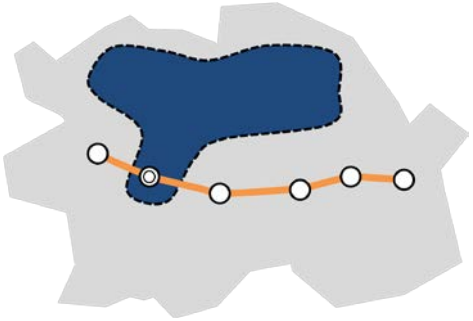
South Okanagan Transit System, British Columbia

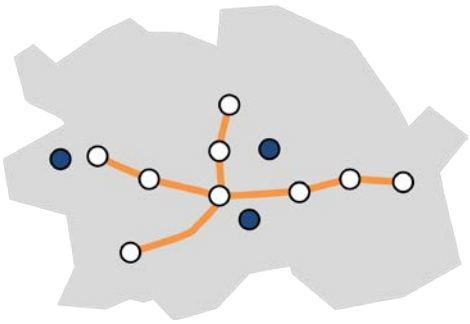
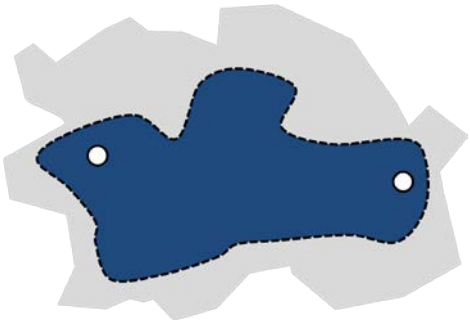


Provides service in Osoyoos with long distance connections to destinations in Oliver, Penticton, and Kelowna (12,000 people served).

The transit service provides fixed-route fixed-schedule service for all members of the public and is able to make route deviations where necessary within Osoyoos and Oliver to make door-to-door connections for passengers with disabilities unable to access the conventional transit network without assistance.

Table 5-5 – Types of flexible route services

Flexible route types	Example
• **Route Deviation:** A defined path and schedule is used to define a service area, but the vehicle(s) may serve requests for pick-up or drop-off within a specified zone around the path. The deviation-zone may or may not be strictly bounded. ▸ **Effective application:** Effective in areas with enough density to support a predictable route and schedule but could benefit from the flexibility of serving origins and destinations that are otherwise off-route. ▸ **Challenges:** Route deviations lead to more varied travel times for passengers; require greater administration and coordination between route dispatchers and drivers.	
• **Point Deviation:** Service is provided within a defined zone with a set of specific stops, but the path between the stops is unspecified and the vehicle will serve locations within the zone on request. ▸ **Effective application:** Effective in an area with specific trip destinations but dispersed origins, or vice-versa. ▸ **Challenges:** Travel times for passengers vary depending on the location of other passengers; require greater administration to plan and optimize routing.	
• **Demand-Responsive Connector:** Service operates entirely by demand-response, but includes scheduled transfer points connecting with a fixed route. ▸ **Effective application:** Effective option when there are scattered origins but a common destination once connected with the fixed-route system. ▸ **Challenges:** Travel times for passengers vary depending on the location of other passengers; require greater administration to plan and optimize routing. • **Flexible-Route Segments:** A portion of an otherwise scheduled fixed-route is operated as demand-response. Assigning a segment of a fixed-route to	

Flexible route types	Example
flexible service can be beneficial in very low-density areas. ▸ **Effective application:** Effective option when a system wishes to maintain a longer service span, but ridership levels in some off-peak periods do not support fixed-route service. ▸ **Challenges:** Travel times for passengers vary depending on the location of other passengers; require greater administration to plan and optimize routing.	
• **Request Stops:** a scheduled, fixed-route service in which certain stops are served only in response to passenger requests. Generally the vehicle must deviate off the fixed path to serve request stops. This is similar to route deviation, but limited only to specific stops instead of a range of unspecified locations within a zone. ▸ **Effective application:** Effective when there is an important location to serve (particularly to satisfy community objectives) situated a distance away from the fixed route but does not generate enough ridership to divert the service for every trip. ▸ **Challenges:** Route deviations lead to more varied travel times for passengers; require greater administration and coordination between route dispatchers and drivers.	
• **Zone Route:** a primarily demand-response service that has set departure and arrival times at its end points. The Zone Route is effective when there is not a defined corridor to travel, but a specific origin or destination exists within an area. ▸ **Effective application:** Effective option when a system wishes to maintain a longer service span, but ridership levels in some off-peak periods do not support fixed-route service. ▸ **Challenges:** Route deviations lead to more varied travel times for passengers; require greater administration and coordination between route dispatchers and drivers.	

SERVICE FREQUENCY

Like fixed-route fixed-schedule services, flexible transit service types typically operate at regular service frequencies. Service frequency refers to the number of times a bus appears at each stop for a particular route in a given hour. On the other hand, headway is defined as the time interval of bus arrivals at a particular stop on the route. Thus, a route can be described either by its service frequency (three times an hour) or by its headway (e.g. every 20 minutes).

Service frequencies vary in response to differing ridership levels over a given day. For better customer comprehension and more efficient service planning, schedules change by different service periods. A service period is a span of time a route generally operates at the same service at the same service frequency. For instance, a service may operate every 20 minutes during the AM and PM peak period and every 30 minutes in the midday.

Similar to fixed-route fixed-schedule services, the appropriate service frequencies for flexible transit services depends largely on the target market served, cycle time of the route, and estimated ridership levels.

Route Deviation, Flexible-Route Segments, and Request Stop service types, which share some of the principles as fixed-route fixed-schedule services (except that portions of the route may deviate to accommodate special trip), would follow similar minimum service frequencies as described in Table 5-6.

Table 5-6 – Typical minimum frequencies for fixed-route and flexible-route service types

Travel markets	
Employment	
Office	• 60-minute frequencies or better during the AM and PM peak periods
Industrial	• Align service closely with the shift start and end times for major large employers (if available) • 60-minute frequencies or better during the weekday daytime periods, with some limited trips in weekday evenings
Education	
Secondary	• Align service closely with the school start and dismissal times
Post-Secondary	• 60-minute frequencies or better with service during the weekday daytime periods and limited service weekday evenings
Shopping	• Service frequencies as ridership warrants – could a regular service intervals or operate limited trips on select days of the week
Medical	• Service frequencies as ridership warrants – could a regular service intervals or operate limited trips during the weekday daytime period

For other flexible transit services, service frequencies must also consider the need for coordination with other services or the need to be timed with major activities the routes serve.

For Point Deviation and Zone Route, services should be coordinated with the activities occurring at the common origin or destination. The following are some examples:

- If zone routes connect at a specific activity centre (e.g. a major bus station), consider the potential for service coordination between zone routes and major route connections serving the activity centre.
- If zone routes connect at a large employment centre, consider planning for services that meet specific shift start and end times.
- If zone routes do not converge at a specific location, consider planning for service based on the base service frequencies described in Table 5-6.

For Demand-Responsive Connectors, service should be coordinated with bus arrival times of the route being connected to. For example, the Connector service should arrive 3-5 minutes before the departure of the main fixed-route service so that quick transfers between services can be made. The Connector service should also wait at the stop until the arrival of the main fixed-route service so that it could pick up connecting passengers.

Estimated ridership levels are also an important determinant for identifying appropriate service levels. Given the wide ranging nature of flexible transit services, it is difficult to provide precise guidance to what is an appropriate service frequency given the scale of ridership. The more 'flexible' a service is (i.e. away from a fixed-route fixed-schedule service structure) the lower the potential of capturing a high level of boardings per hour. For instance, a Zone Route (more flexible) typically have lower passenger boardings per hour compared to Route Deviation (less flexible).

For flexible transit services, consider a 60-minute service as a starting point in the analysis. As a general guide, the service frequency is appropriate if it ranges from 7 to 15 boardings per hour.

If the estimated ridership level per service hour is greater than 15 boardings per hour, consider one of the following:

- Increase the number of buses per hour until ridership levels per service hour falls in the range of 12 passengers per service hour
- Plan a more fixed-route fixed-schedule service, if feasible

If estimated ridership levels per service hour is too low (less than 7) to warrant hourly service, consider the following options:

- Operate service every other hour
- Operating service on specific days of the week (e.g. every Monday)

5.3.3 DEMAND RESPONSE SERVICES

Demand-response service refers to service that requires riders to request a trip. The service may provide to door-to-door service, but typically does not follow a fixed route or have a fixed schedule. This service type often requires advance booking and is appropriate to service areas with low population density, with longer trip distances and with dispersed origins and destinations. Demand response systems can serve specific travel markets—such as seniors and people with disabilities—or it can also be made available to the general population.

SERVICE TYPES

Specialized transit services for people with disabilities

Specialized service refers to accessible demand responsive service designed to transport persons with disabilities and often requires riders to meet eligibility criteria. Specialized transit offers door-to-door service and may allow a support person to travel with the passenger.

To qualify for specialized services, prospective passengers are assessed based on a set of eligibility criteria. Typically, passengers who have a disability which prevents them from being able to use fixed-route services are qualified to use specialized transit services. However in some cases, eligibility for specialized transit services may expand to accommodate seniors and low income households, especially in communities where there is a lack of fixed-route services.

In some communities where there are a larger number of specialized transit service trips between specific origins and destinations, many agencies also provide community shuttle services to provide fixed-schedule services for eligible passengers. Community shuttle services serve a different function than typical fixed-route services in that it provides door-to-door transit services typically linking seniors' facilities to local medical and shopping centres. As a result, community bus routes are more indirect than typical fixed-route services.

Bancroft Community Transit, Ontario

Bancroft Community Transit operates demand response transportation services within Hastings County to outlying areas including Toronto, Kingston, Belleville, Ottawa.

The system runs on a base of volunteer drivers that use their own vehicles to operate the service, and are reimbursed for their travel expenses. The system also employs three paid drivers and owns two vehicles.

The service is available for people requiring transportation to legal appointments, special programs, counseling appointments, medical appointments, day care, work placements, and necessities of life. Eligible persons must be referred by a member community agency that they are connected with.

Subscription-based services for targeted travel markets

Demand response subscription based services are also provided, particularly in communities that have transit service gaps. Some seniors facilities and assisted living communities provide transportation to shuttle their clients to their daily needs including trips for medical, leisure, and shopping activities.

Employers can also provide shuttle services to meet service gaps for their employees. There are a

number of employee shuttles currently in operation particularly in suburban communities of larger metropolitan centres. For example, Crossiron Mills, a regional shopping centre in the rural outskirts of Calgary operates a private shuttle service for exclusive use of transporting current employees to and from their work.

Post-secondary educational institutions also operate shuttle services that connect various campuses and to highly frequented destinations (e.g. grocery stores). For example, the student union of the University of the Fraser Valley in Abbotsford BC operates service between the Abbotsford Campus and Chilliwack-Canada Education Park. The student union also provides shuttle services between the Abbotsford Campus and Langley, thus making convenient connections to the Metro Vancouver area.

IDENTIFYING DEMAND-RESPONSE SERVICE CHARACTERISTICS

Planning and designing for demand response services is more complex because of the potential variability in the route alignment, service frequency, as well as the logistics to connect people at disparate origin and destination pairs. Planning for demand services ultimately require identifying the number of vehicles that need to operate at specific service periods—this requires the need to specify a number of service- and demand-related characteristics. Figure 5-6 summarizes the process for planning for demand response services.

Step 1: Choose the type of on-demand service to provide

There is a variety of different on-demand service types to provide. In addition to providing door-to-door demand response services, Table 5-5 summarizes the types of route services, at least in part, that include a demand-response service component. The types of transit on-demand transit services can be mainly classified into three main categories, as outlined in Table 5-7.

Table 5-7 – Main types of on-demand transit services

Service type	Description	Activities to perform
Stop-to-stop	Buses operate only at designated stops. The provision of the service is provided only upon passenger request. Route alignment varies depending on the request for service on that trip.	Identify stops
Stop-to-door	Buses connect between a limited number of stops (e.g. at a commuter train station, shopping centre) to any location in a prescribed area.	Identify stop(s) to which the buses would converge Identify the service area of the service
Door-to-door	Buses connecting passengers from any origin to destination within the prescribed area.	Identify the service area that the service would connect to

Step 2: Identify the passenger markets to serve

Once the type of service is provided, the agency needs to identify the passenger markets to serve. A service that serves all passengers would yield a greater ridership base, compared to a service that restricts eligibility to specific markets (e.g. people with disabilities and seniors). The identification of the passenger markets is intended to ascertain the possible demand for the specific service. To provide an understanding of the general service and fleet requirements to accommodate the demand response service, a number of ridership assumptions are identified based on benchmark values of demand response services in small communities:

- **Service to all passengers:** Assume 6 to 8 passengers in the peak hour
- **Service to people with disabilities and seniors:** Assume 2 to 5 passengers in the peak hour

Land use patterns, travel patterns, and demographics affect ridership levels. These values are provided only to provide some initial direction for gauging the overall service hours and buses needed to support the service. Figure 5-6 provides details to estimating demand for demand response services once the service designs are completed.

Step 3: Determine route distance to serve assumed peak hour ridership levels

This step includes measuring the potential route distance for the planned service to accommodate the assumed ridership levels in Step 2. The challenge is that for demand response services, the 'stops' are not necessarily defined and vary trip-by-trip.

Origin-destination surveys may help to identify some key linkages that could be expected on a daily basis, which could be used to estimate the route distance required to accommodate the assumed ridership.

In the absence of available data, the agency could provide a more conservative estimate of fleet and service hour needs by maximizing the potential route distance of the service—this could be completed by identifying stops near the periphery of the service area (see Stop-to-door and Door-to-door diagrams in Figure 5-6).

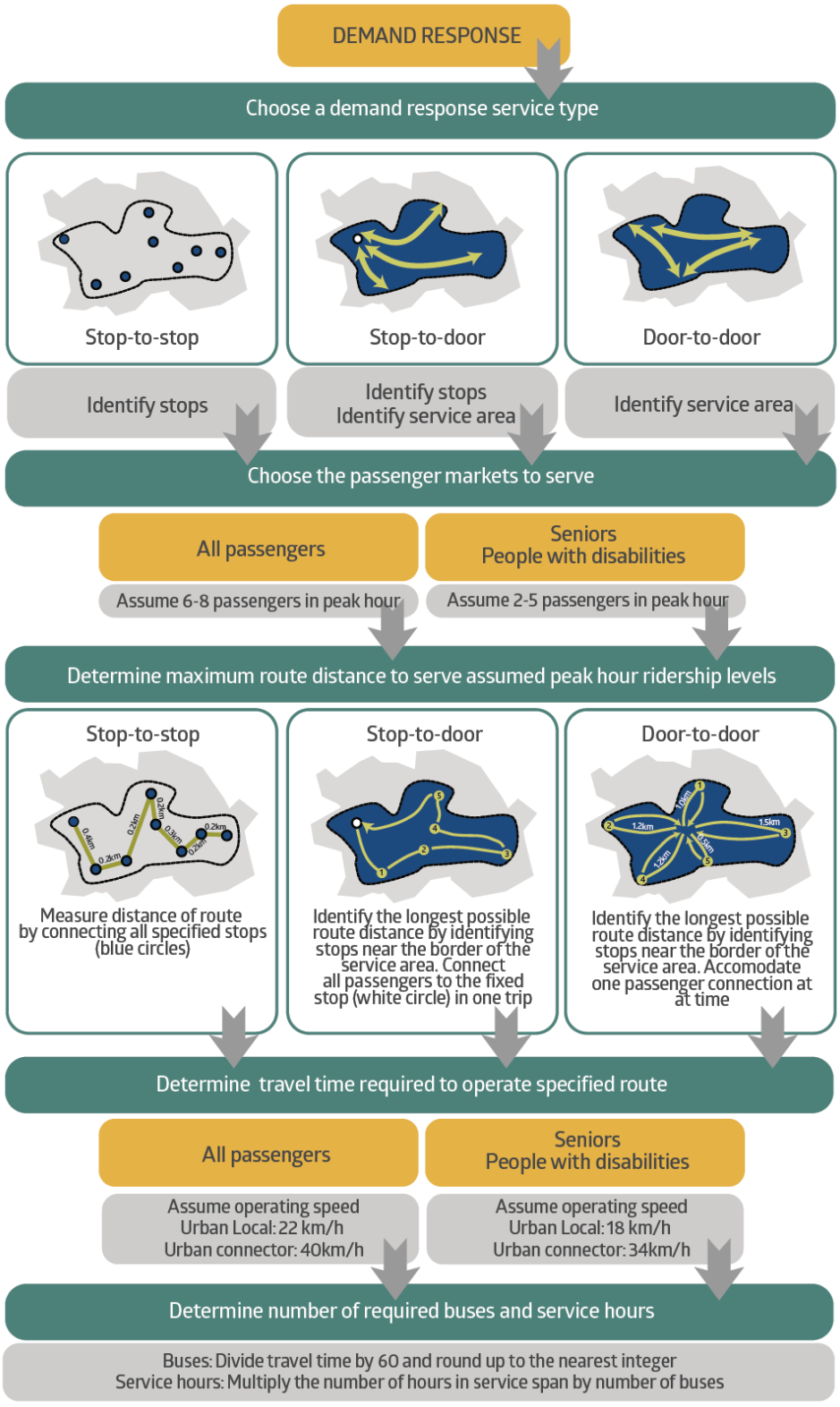


Figure 5-6 – Process for identifying demand response service characteristics

The approach for identifying route distances varies depending on the type of demand response services. The specific steps for each service type is outlined below:

1. **Stop-by-stop:** Measure the distance of the route by connecting all identified stops on the route
2. **Stop-to-door:** Measure the distance of the longest possible route by identifying stops near the service area border and connecting these points to the designated fixed stop in one trip
3. **Door-to-door:** Measure the distance of the longest possible route by identifying stops near the service area border and connecting these trips one passenger trip at a time

Step 4: Estimate travel time required to accommodate assumed ridership

Step 3 identified the required route distance needed to accommodate assumed ridership levels. Travel time for the route can be estimated by applying route speed assumptions, which are outlined below:

- **Service to all passengers**: Assume 22km/h for services within an urban area and 40km/h for services connecting between two distinct urban areas separated by rural land uses
- **Service to seniors and people with disabilities**: Assume 18km/h for services within an urban area and 34km/h for services connecting between two distinct urban areas separated by rural land uses

Step 5: Determine the number of required vehicles

Step 4 determines the travel time required to connect all passengers to their destinations in the peak hour. A value above one hour means that it is unable to satisfy all the trips within the peak hour with one vehicle—and thus more vehicles are needed. Dividing the travel time required in Step 4 by 60—rounding up to the nearest integer will provide an order of magnitude understanding of the peak fleet requirements for service.

The identified span of service (see Section 0) along with the general number of vehicles required to operate will determine the overall service hours needed to operate the service.

5.3.4 COORDINATED COMMUNITY TRANSPORTATION

While some small communities do not offer transit services, many community agencies within these jurisdictions offer their own transportation services to serve the needs of its clients. For instance, some health services agencies offer transportation for patients requiring non-emergency medical services. Seniors facilities (e.g. long-term care facilities and mature lifestyle facilities) often have bus services to local amenities for shopping, medical services, and leisure. With various agencies providing their own separate and independent transit services, there are opportunities for municipalities and communities to help coordinate services that are currently provided with the objective of providing improved customer service and optimizing available service. Coordinated community transportation is appropriate for smaller communities that cannot support a public transit system or that want to focus service on seniors and persons with disabilities and have local transportation resources that can be shared with interested human service agencies. Coordination could involve any or all of the following elements:

- **Customer service**
    - Information sharing – Establishing a repository of information on the transportation services provided that could be updated by each of the participating agencies

  - Travel training – travel training service delivery model, coordinated through mobility management office, so that passengers understand how to use transit services and receive a consistent customer experience

- **Operations**
  - Operator training – Providing integrated operator training service delivery model that allows for a consistent customer experience
  - Volunteer coordination - Developing common database and information on available and qualified volunteers available for all agencies
  - Joint dispatch – Sharing or integrating scheduling resources and software to allow for a single entry point for transit services

- **Service delivery**
  - Shared paid drivers or shared vehicles – Different organizations can share drivers and vehicles to serve riders from different agencies or organizations, reducing duplicate trips to free up capacity for more trips
  - Volunteer driver program – Implementing volunteer driver program, coordinated with individual agency programs
  - Integrated transportation service – Developing a joint scheduling call center program that allows for shared administration
  - Integrated service provision - Coordinate the scheduling of trips between participating agencies to promote improved cost-effectiveness

- **Fleet**
  - Joint maintenance - Common maintenance function with common provider (possible multiple locations) for all participating agencies
  - Joint procurement – Coordinate vehicle purchases that takes advantage of possible volume incentives
  - Joint insurance - Establish joint coverage among participating agencies to take advantage of possible volume incentives

5.3.5 NON-TRANSIT OPTIONS

Web and smartphone technology options

The rise of smartphone and web technologies recently expanded the potential for people to access transportation services. Ride-hailing applications such as Uber and Lyft have made it easy to connect users with people willing to give them a ride. Customers can request drivers with a tap of their smartphone, track the vehicle's whereabouts, and bill the ride with the user's credit card. Ride services from UberX (a component of Uber's offering) and Lyft are offered by ordinary drivers who own private vehicles. The cost of these services generally are more affordable than taxi services—Uber has a surge pricing scheme where the cost of a ride changes according to the demand for the service.

Other rideshare models such as Bridj and Leap have emerged (in San Francisco and Boston respectively) that offer a bus service which is summoned using a smartphone. Both are marketed as a luxury bus service which currently provides service making connections at limited locations. For Bridj, routes are

configured dynamically depending on the people requesting the service to minimize the travel time for passengers.

While the use of these technologies has broadened the transportation options available, most of these options have been generally offered in larger urban communities. Rideshare models like Uber and Lyft require developing a network of available drivers. Enticing drivers to offer ride-hailing services would require a large number of trips concentrated in a smaller area. As a result, there may be limitations to offering these service options in smaller communities unless there is greater financial incentive to offer services.

Additionally, while fares for these ride-hailing programs may be more affordable than taxi services, the costs are still quite significant and will still be much higher than typical local transit fares. Thus, agencies could investigate the feasibility of using these technologies to support on-demand transit services. However, there will be an expectation for the public agency organizing the service to subsidize the cost difference between the market rate for the ride and the typical transit fare.

Carpooling and vanpooling options

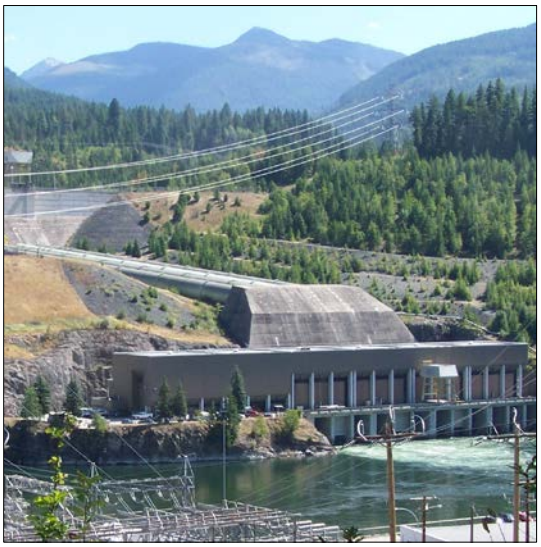
Carpooling is the sharing of car trips so that more than one person travels in a car. Particularly in small communities where the opportunities for frequent transit services that caters to all trips at all times of the day are more limited, promoting carpooling could help to satisfy the mobility of some travel markets, such as school, work, and to a lesser extent shopping related trips.

A vanpool is slightly different from a carpool in that a group of commuters share their ride to work in a passenger van that is owned, insured, and serviced by the organizing agency—which is typically a transportation agency, an employer, or a transportation demand management association.

Passengers typically share the cost of operating the van (at least partially) by paying a fare based on:

- the cost of leasing the van, gas, insurance, and maintenance,
- the amount of subsidy provided by the organizing agency,
- the number of riders, and
- the distance driven.

Kootenay Rideshare, British Columbia



This service is organized by a non-profit environmental organization, and includes messaging about the benefits of ridesharing to environmental sustainability. It is completely volunteer-run, as West Kootenay EcoSociety only maintains the website where people post ride requests or offers. Users can post ride requests or offers on the Kootenay Rideshare website to connect with passengers or drivers making the same trip. This message board is available to anyone looking for rides or passengers in the Kootenay Region. Fares are negotiated between passengers and the driver. Kootenay Rideshare administrators encourage drivers and passengers to share the expense.

Carpools and vanpools provide benefits to drivers and non-drivers. Drivers benefit as it is much more economical than driving one's own vehicle, while non-drivers gain from having more mobility options in the community.

It is important to note that for vanpools and carpools to be successful, there needs to be an appropriate scale of willing carpool participants who travel on a routine basis, more-or-less with common origin and destination points. Communities that are clustered around geographic towns and villages or in a primarily rural area along a busy corridor would provide greater opportunities for carpool and vanpool success. Additionally, promoting regular carpool and vanpool trips, such as for work and school purposes, are key potential markets that can help to lower auto reliance.

Carsharing

Carsharing is a short-term vehicle rental service geared for people who require occasional use of a vehicle or need one for short trips. Users typically register with a carshare program provider that allows them to reserve vehicles for use. Users can typically book vehicles by the half-hour to several days, depending on the car share provider. There are different operating models of carsharing:

- **Business-to-consumer:** a company owns a fleet of cars and enables sharing amongst members (e.g. Zipcar, Autoshare, Car2Go)
- **Not-for-profit:** a local organization facilitates carsharing with the goal of achieving community benefits such as changing driving habits and decreasing levels of car ownership (e.g. Community Carshare)
- **Peer-to-peer:** A fleet of cars is owned by a community. A web and mobile phone platform helps to match owners of cars with those wishing to rent (e.g. Getaround, no Canadian examples to date)

Carsharing, regardless of operating model, requires a specific threshold of users within a smaller geographic area for the program to sustain itself in the long term. Thus, there may be some challenges in introducing carsharing programs in smaller Canadian communities. Carshare vehicles need to be located in areas within walking distance or close to transit access to a considerable population who do not regularly have access to private vehicles.

5.4 SERVICE DESIGN WORKSHEETS

Worksheets are included as part of these guidelines to support the design of fixed-route and demand response transit services, based on the outlined steps in this subsection. The development of service designs through these worksheets will help to identify the total service hours operated and the estimated operating costs of providing the services. Refer to Appendix B for directions on how to use the service design worksheets.

Figure 5-7 and Figure 5-8 show the screenshots of the two worksheets.

WORKSHEET #4: SERVICE DESIGN - FIXED ROUTE

Purple = input
Orange = calculation
Green = output

Section 1: route inputs

Route information

Route name	Round trip distance (km)	Route type	Assumed speed (km/h)
Route 1 - King Street	20.6	Urban Local	22
Route 2 - Main Street	32.0	Urban Local	22
Route 3 - Oakwood	55.0	Urban Connector	40

Speed assumptions

Route type	Assumed speed
Urban Local	22
Urban Connector	40

Section 2: service design

Monday to Friday

Route information	AM Peak Period					Midday					PM Peak Period					Early Evening					Late Evening					
	Number of hours in serice period:				3	Number of hours in serice period:				6	Number of hours in serice period:				3	Number of hours in serice period:				3	Number of hours in serice period:				3	
Route name	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	Total Hours
Route 1 - King Street	2	30.0	56	4	22.0	1	60.0	56	4	22.0	2	30.0	56	4	22.0										18.0
Route 2 - Main Street	3	30.0	87	3	22.0	1.5	60.0	87	3	22.0	3	30.0	87	3	22.0	1	90.0	87	3	22.0						30.0
Route 3 - Oakwood	3	30.0	83	7	40.0	1.5	60.0	83	7	40.0	3	30.0	83	7	40.0	1.5	60.0	83	7	40.0						31.5
																										0.0
																										0.0
																										0.0
																										0.0
																										0.0

Saturday

Route information	Morning					Afternoon					Evening					
	Number of hours in serice period:				5	Number of hours in serice period:				6	Number of hours in serice period:				5	
Route name	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	Total Hours
Route 1 - King Street						1	60.0	56	4	22.0						6.0
Route 2 - Main Street						1.5	60.0	87	3	22.0						9.0
Route 3 - Oakwood						1.5	60.0	83	7	40.0						9.0
																0.0
																0.0
																0.0
																0.0
																0.0

Sunday

Route information	Morning					Afternoon					Evening					
	Number of hours in serice period:				4	Number of hours in serice period:				6	Number of hours in serice period:				4	
Route name	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	Total Hours
Route 1 - King Street						1	60.0	56	4	22.0						6.0
Route 2 - Main Street						1.5	60.0	87	3	22.0						9.0
Route 3 - Oakwood						1.5	60.0	83	7	40.0						9.0
																0.0
																0.0
																0.0
																0.0
																0.0

Service Summary

Service Hours

	Daily hours	Days per year	Annual service hours	Annual Operating Cost
Monday-Friday, excl holidays	79.5	251	19,955	1,696,133
Saturday	24.0	52	1,248	106,080
Sunday and holidays	24.0	62	1,488	126,480
Total		365	22,691	1,928,693

Operating cost assumptions

Operating Cost/Hour	85

Figure 5-7 Service design worksheet – Fixed route services

WORKSHEET #5: SERVICE DESIGN - DEMAND RESPONSE

Purple = input
Orange = calculation
Green = output

Section 1: route inputs

Route information

Service name	Route type	Passenger markets served	Assumed peak hour ridership levels	Maximum route distance to serve assumed peak hour ridership level (km)	Assumed speed (km/hour)	Assumed time to accommodate all passengers with one vehicle (hour)	Peak buses required
Orchard Heights	Urban Local	Seniors/people with disabilities	3	35	18	1.94	2
Brooklane	Urban Local	Seniors/people with disabilities	3	42	18	2.33	3
Community Connector	Urban Connector	All passengers	7	60	40	1.50	2

Speed assumptions

Route type	Assumed speed
Urban Local - All passengers	22
Urban Local - Seniors/people with disabilities	18
Urban Connector - All passengers	40
Urban Connector - Seniors/people with disabilities	34

Peak hour ridership assumptions

Passenger markets served	Assumed ridership
All passengers	7
Seniors/people with disabilities	3

Section 2: service design

	Monday to Friday					Saturday			Sunday		
Route information	AM Peak Perio	Midday	PM Peak Perio	Early Evening	Late Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening
Number of hours in serice period:	3	6	3	3	3	5	6	5	4	6	4
Route name											
Orchard Heights	2	2	2	2			2			2	
Brooklane	3	3	3	2			3			3	
Community Connector	2	2	2	2			2			2	
Total buses in service period	7	7	7	6	0	0	7	0	0	7	0
Total service hours in service period	21	42	21	18	0	0	42	0	0	42	0

Service Summary

Service Hours

	Daily hours	Days per year	Annual service hours	Annual Operating Cost
Monday-Friday, excl holidays	102.0	251	25,602	2,176,170
Saturday	42.0	52	2,184	185,640
Sunday and holidays	42.0	62	2,604	221,340
Total		365	30,390	2,583,150

Operating cost assumptions	
Operating Cost/Hour	85

Figure 5-8 Service design worksheet – Demand response services

5.5 PLANNING BASED ON DIFFERENT SCENARIOS

5.5.1 STARTING A NEW SERVICE

Planning a new service provides tremendous opportunity as the agency is able to start with a clean slate and develop services without legacy expectations. However working with a clean slate also presents the need to be very prudent with designing a transit service that is widely accepted and valued in the community.

Planning a new service requires a clear understanding of the community's service needs and objectives. That assessment is important to identifying the specific markets the new service is intended to serve. Chapter 4 identifies the process for identifying those strategic directions.

The strategic directions will then feed into the design of the new service. Sections 5.1 to 5.4 describe in detail the process and considerations for developing the services that meet community needs.

5.5.2 GROWING OR EXPANDING YOUR SERVICE

Expansion of service takes two main forms, each of these are covered in this section.

- providing transit service to areas and/or groups that currently lack service (target market expansion), or
- providing more service in the existing service area (service level increase).

This section will describe the planning approach for these expansion types.

TARGET MARKET EXPANSION

When expanding a transit service to serve a new area or target market, the overall approach will be similar to starting a new service. Certain steps will be easier, as the required inputs will be available from existing operations, rather than being estimated. For example, the mode share in the existing service area could be applied to the new service area.

Where the target market has been expanded, the service planning process should be applied to the overall expanded target market, rather than just the expanded market. Thus, a more holistic network-based planning approach is taken.

When a service area is only modestly expanded, the service planning process should be assessed in the new geographic area only. However, it is important to consider that the expansion of the service area may generate additional ridership in the existing service area, because new trip connections become possible. For example, with the expansion of the service area, a resident living in the expanded service area portion will now have connections between the new and existing areas of service and within the existing service area itself. Thus if the potential ridership uptake with the expansion of the service area is forecasted to be significant, the entire service area (including the expanded area) should go through the service planning process as a 'new' system. This will reveal whether the service type should change, or if additional service might be required.

SERVICE LEVEL INCREASE

The desire to increase service levels is generally either in response to existing usage (*demand-driven*), or as a means to increase transit usage (*supply-driven*), or sometimes both.

If increases are *demand-driven*, then this requires usage data at an appropriate level of detail. At a minimum, this requires usage levels by route. Further, usage by time-of-day allows increases to be targeted at appropriate times to avoid wasting resources at less busy times (or demonstrate that all-day increases are needed). Ideally, boardings/alightings should be available by stop. This allows identification of major trip attractors, and hence service changes can take this into consideration. If stop-level data isn't available, then there should be an understanding of the distribution of boardings/alightings, particularly if the route serves multiple major destinations.

If increases are *supply-driven*, then consideration should be given to the target market. The increases could include expanded service hours, service on additional days (weekends and holidays), converting one-way loops to two-way operation, or higher frequencies. All of these affect different travel markets, and hence will have differing potential to increase ridership. Alternatively, increases can be driven by policy, with the aim of making transit more attractive overall, rather than targeting specific growth.

Where service changes result in higher frequencies, this results in significant improvements for existing and potential transit users. One of the key advantages of car travel is the lack of waiting before a trip is started. A low-frequency bus service requires users to adjust their personal schedule to match the bus schedule, waiting at the start of their trip (such as at the end of their work day, or after a shopping trip), and/or waiting at the end of their trip (such as before the start of their work day, or for an appointment). For car travel, this would be like the garage door only being able to open at specific times.

Increasing frequencies reduces these negatives effects. In particular, when headways get below 10 minutes, transit users regard it as "turn-up-and-go" as wait times are low enough that the exact scheduled times cease to matter.

HIGHLIGHT SERVICE EXPANSION BENEFITS

Any proposed service expansion plans are made with the specific aim to improve the needs of the system's target market and meet identified goals and objectives. It is important not only to communicate these goals and objectives to the community, but also clearly identify how specific service expansion projects will help achieve those goals and objectives. Be clear about who (which markets?) would benefit from the improvements—this will help develop a more convincing case in support for the service improvements. For example, by extending a route into a new community, passengers in that community—of which 20% are aged 65 and over—would have a 5-minute shorter walk to access the system.

5.5.3 SUSTAINING YOUR EXISTING SERVICE

Changes in the community may pose fiscal challenges that require transit agencies to operate services with less resources. Particularly in smaller communities, changes in demographics, employment base, and municipal revenues may make it difficult to retaining levels of service. To address funding shortfalls for transit service, either costs must be reduced or revenues must be raised. The following sections provide approaches to sustaining an agency's services with constrained funding.

INCREASING REVENUE

The first step in sustaining an existing service is to examine opportunities for increasing potential revenue. This section discusses ways to do this, by having a rethink of the current service network, improving marketing and communication

Rethink the service network

In some cases, declining levels of ridership may be a result of a service that has not responded to the changing travel conditions of the community. Particularly in smaller communities that have undergone dramatic changes to the retailing and employment landscape, overall trip patterns in these communities may have changed. Thus to improve ridership, the first step is to identify whether services could be restructured to better meeting current and future travel needs. Assuming that the operating service hours remains the same, the approach is to almost start with a clean slate and go through the planning process as if it was a completely new system.

Changes could include adjusting the service area, changing route alignments, changing connection points, improving connections to high ridership locations, adjusting service frequencies according to ridership levels, improving customer service and information, and improving travel times (e.g. through transit priority, reducing underutilized stops, and coordinating signals).

With close consultation with the community and available data sources such as on-off counts and origin-destinations surveys, there is potential to make ridership gains with a constrained budget.

Improve marketing and communication

In some cases, the need to sustain existing service is predicated from declining or plateauing ridership levels. Thus, steps for increasing ridership levels may be a challenge. However, aside from adjusting service levels, span, alignments, and coverage, there are opportunities to increase ridership by working closely with the community to boost ridership levels.

Expanded marketing efforts could help raise greater awareness of transit services and empower residents and employees to choose transit. For instance, agencies could consider applying a suite of marketing applications as summarized in Table 5-8.

Table 5-8 – Marketing applications to improve transit ridership

Marketing activities	Description
Advertising	Use local print and radio mediums, billboard and street furniture advertising to publicize specific service changes and improvements
Community events	Use the opportunity at community events to spread awareness for available services and to engage with community members to improvement current services
Employer-based and school-based travel plans	Work directly with employers and student groups to promote available transportation options Organize events, activities, and incentives that support the use of walking, cycling, and transit on a regular basis
Personalized travel planning	Work directly with residents and through face-to-face interactions to work with them to consider how they could choose new ways to get around

Closely linked to marketing efforts is the need to provide clear and simple information for people to use transit. They need to know about the services and how to use them. This is particularly important in areas which have historically lacked service, or when the service type isn't a simple fixed-route network. Better information provision can include:

- Providing increased availability of existing information (e.g. at shopping malls, municipal buildings, libraries, leisure destinations, other major trip attractors);
- Providing information at bus stops (including service maps and route maps, schedule information, connections to other routes, map of local street network);
- Making better use of websites and wireless technology (downloadable schedules and maps - both separate and combined, fare information, bus stop locations, trip planning, real time trip planning applications); and
- Making schedule and route data in line with the General Transit Feed Specification—a standard format for providing schedule data in a computer-readable format. Making this data available allows use by online trip planners such as Google Maps, and potentially for use by independent software developers. Most commercial transit scheduling software has the capability to output data in the required format; there are also free online tools suitable for small systems.

Increase fares

Naturally, increasing fares will help to increase revenues and relieve, but not necessarily resolve, fiscal pressures in the system. Incremental and regular fare increases at the rate of inflation is a commonly accepted approach to ensure that revenues grow at least at the same rate as increases to operating costs. These regular increases will ensure that transit agencies are financially equipped to maintain

transit services over time and to continue to support ridership needs. Delaying regular service increases either leads to higher fare increases in the future or a degradation of service over time.

At the same time however, significant fare increases will negatively affect ridership levels. While fare increases, particularly in smaller communities are characterized as price inelastic (meaning that prices cause less than proportional changes in ridership), dramatic increases to fares will present adverse effects on the community groups, particularly those most reliant on transit services. Larger fare increases are generally not well supported by the community especially when there are no tangible improvements made to substantiate those fare increases. See Section 6.3 for a more detailed discussion on setting fares.

REDUCING COSTS

The priority should first be to identify ways to boost revenue before reducing costs. However, if a system has exhausted the options available to improve ridership, considerations may have to be taken to reduce the level of services provided. Similar to the approach to improve ridership, it is important to also start with a clean slate and go through the planning process as if it was a completely new (but reduced) system. Services should not be eliminated on a piecemeal basis—rather the wider network effects of any service changes must be considered. The sections below describe the ways in which service could be reduced.

Reduce service frequencies

A common approach to reducing costs is to reduce the amount of vehicles that operate, and in turn reduce the frequency. Service level reductions will undoubtedly have a negative impact on ridership levels. Thus, it is important to minimize these impacts by selecting services for reductions that demonstrate lower levels of ridership. Through ongoing performance and operational monitoring, agencies will be better informed about the ridership performance of each route at various operating periods. While minimizing impact on route ridership is an important factor in identifying which services and at what time period services should be reduced, there are a number of other questions to consider:

- Will the reduction in service lead to dramatic changes to service frequencies?
    - Depending on the number of buses operated on the route, a reduction in service may result in a dramatic change in service reductions
    - For example, a reduction of service from 4 buses (every 15 minute) to 3 buses (every 20 minutes) an hour may be reasonable, however a reduction from 2 buses (every 30 minutes) to 1 bus (every hour) results in a significant change in waiting time for passengers
- Will the reduction in service lead to service frequencies below identified service standards?
    - Routes may be provided to serve different functions and work together as part of an integrated network. Thus minimum levels of service may be established as part of a system's service standards to provide a basic coverage in the network

Reduce span of service

The span of service is the time duration (e.g. from 6:00 am to 6:00 pm Monday to Friday) a particular route is operating. To reduce operating expenses, the span of service of select routes could be adjusted. Examples of service span adjustments are outlined in Table 5-9.

Table 5-9 – Options to reduce span of service

Service span reduction options	Description
Scaling back first or last trips	A route which operates service every 15 minutes starting at 5:30am adjusted to start at 6:00am—resulting in the reduction of two earliest trips
Reduction in service for entire periods	A route that operates weekday peak and midday periods adjusted to only operate only during weekday peak periods.

The appropriate option to undertake is dependent on the scale of service reductions necessary. Scaling back first and last trips will result in only small reductions in service, while reductions in service for entire periods would bring greater reductions in service. Similar to reducing service frequencies, it is important to reduce service span on routes and at times which would have the least impact on ridership, while fulfilling established service standards. If the scale of service reductions is dramatic, there may also be a need to revise service standards to satisfy community needs within new financial realities.

Adjust service coverage

The network's service coverage could be adjusted at specific service periods with the objective of sustaining the route sections or service areas that have a higher observed level of ridership. While ridership decreases are definitely expected with these service reductions, the aim of these service changes is to lessen the rate of ridership declines with the intent of improving the financial performance of the system. It is noted that with adjustments to service coverage, there may also be parallel adjustments (and potential savings) to the service area for specialized transit.

Switch operation type

When a service is already operating at low frequencies, there may be limited opportunities to reduce service further. In these situations, there are opportunities to continue to maintain service, while reducing operating costs.

For fixed-route transit services, agencies could consider moving to a demand response "dial-a-ride" service where the vehicle would operate only if requested by phone, in person at transit hub stops, and even by smartphone as the technology evolves. While transitioning from fixed-route fixed-schedule service to a "dial-a-ride" service may provide marginal cost savings, these changes often lead to negative ridership impacts and do not resolve the financial sustainability of the service in the longer term.

If transportation service is also being provided by local health and social service agencies, or charities and volunteer organizations, communities can consider coordinating these individual services and pooling resources, such as drivers, volunteers and vehicles to maintain service at lower cost. (see Section 5.3.4).

On the other hand, given the higher costs of specialized transit, there may be some opportunities for shifting some current users onto conventional transit by limiting the eligibility criteria to only those who are unable to use conventional transit.

5.6 OTHER CONSIDERATIONS

5.6.1 INTEGRATED LAND USE PLANNING AND TRANSIT PLANNING

Transit is well used if it links "people to places" – i.e. if residential areas are linked with employment and commercial areas outside walking distance. The ease with which transit can do this depends on the distribution of land uses, and the road network that serves them.

The ideal road network provides few impediments to a direct route, with traffic (and hence transit vehicles able to move freely). This must be coupled with direct walking access from surrounding areas to the transit route. Curvilinear road networks and cul-de-sacs in subdivisions without appropriate connections forces transit routes to wind their way through local neighbourhoods, or not provide sufficient coverage. Figure 5-9 for instance shows the importance of coordinating the layout of road networks between neighbourhoods to remove the need for transit vehicles to make long diversions to serve a given community.

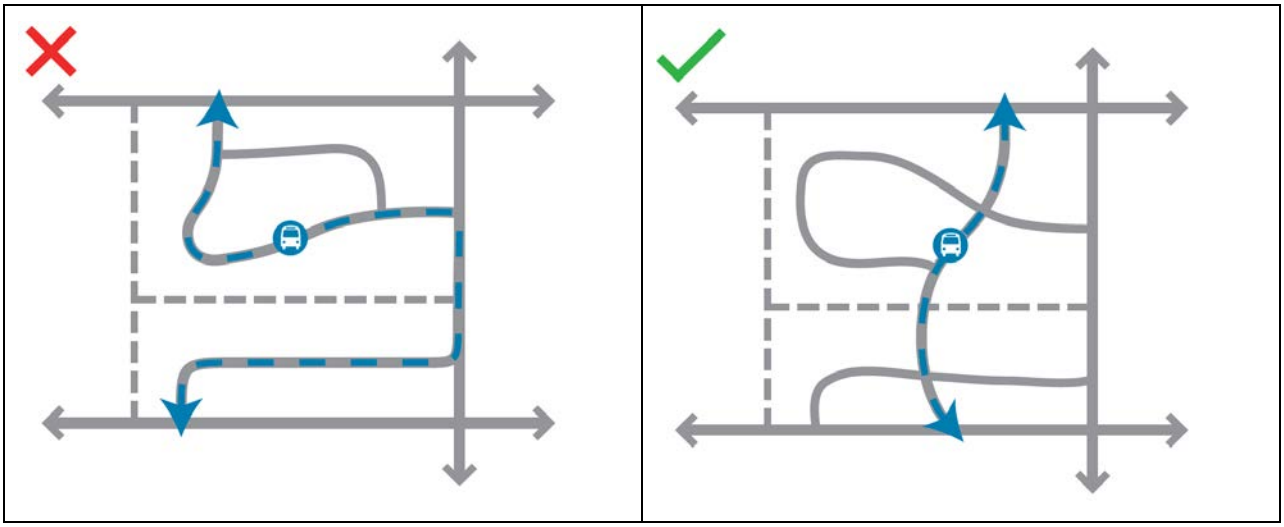


Figure 5-9 – Poor and good examples of road networks between subdivisions and neighbourhoods (Ontario Ministry of Transportation Transit-Supportive Guidelines)

Transit-friendly land use allows major destinations to be served by transit without significant detours. and orients density towards transit routes, particularly points served by multiple transit routes.

In terms of development form, higher density land uses should be encouraged along major transit routes to maximize the people and jobs that transit services can capture. Enhancing transit service while encouraging more intense forms of development can help to generate a positive feedback cycle of towards even greater transit demand and intensification. Figure 5-10 illustrates how higher density development should be oriented and aligned close to the transit corridor. While the building forms illustrated in Figure 5-10 may not scale well in relation to all smaller communities, the general principle to follow is that higher density developments should be encouraged along these corridors with transition to lower density uses incrementally farther away from the corridor.

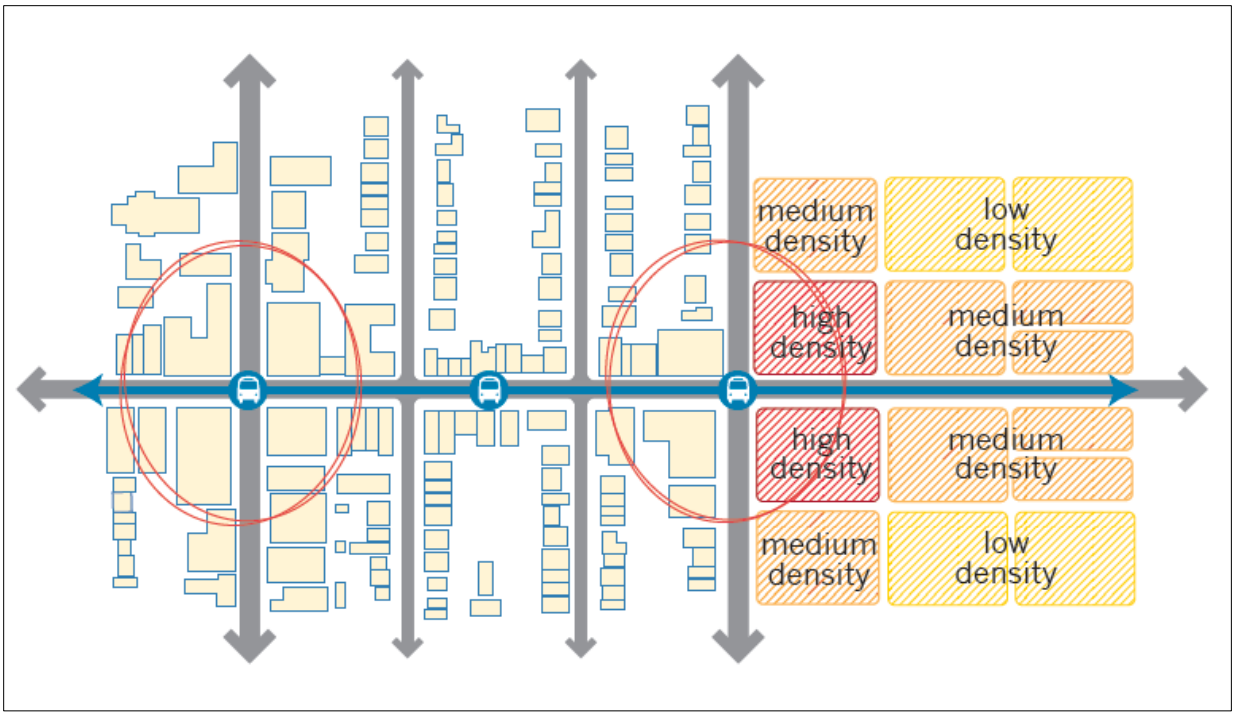


Figure 5-10 – Examples of neighbourhood designs along major transit routes (Ministry of Transportation Transit Supportive Guidelines)

Land-use strategies that support transit use in larger urban centres can also be applied to smaller and rural communities.

- Growth should be directed to existing or designated settlement areas.
- Protecting natural areas and agricultural lands from development will help to maintain the rural or historic character of small communities as well as help direct growth to centres with ridership potential.
- Discourage strip retail development along major roads that results in spans of undeveloped land with no ridership potential and extends operating costs of service.
- Concentrate services and institutional uses, such as schools, community centres, clinics, hospitals within 400 – 500 meter walking distance from each other or where transit service is available to support existing transit or new transit service.
- At the core of settlement areas, plan for a mix of uses and higher densities.

6. ESTABLISHING DEMAND – HOW MANY WILL RIDE?

The previous chapters identified the process for designing new and revised routes. The next question that arises is: how many will actually use the service?

Knowing the demand for the proposed services will help decision-makers understand the overall benefit the service will bring to its constituents and the financial implications of providing the service.

6.1 FACTORS INFLUENCING TRANSIT RIDERSHIP

There are a multitude of factors that influence transit ridership. These factors are important to consider when designing transit services, as well as estimating the demand for proposed services. The discussion on these factors is organized into three main subject areas: (1) socio-economic factors, (2) planning and land use factors, and (3) service and pricing factors.

It is important to note that there is an apparent "chicken and the egg" relationship between transit ridership and most of the factors discussed below. For instance, while communities with high levels of auto ownership demonstrate lower levels of transit ridership, it is important to recognize that the high levels of auto ownership are, inversely, partially a result of having limited alternative transport options.

Providing and improving services then leads to greater transportation choice, which promotes a positive feedback cycle towards lower levels of auto ownership over time. Thus, even if a community does not demonstrate these factors currently, providing and improving transit services, in an intertwined relationship, will lead to more positive conditions that will encourage transit ridership.

6.1.1 SOCIO-ECONOMIC FACTORS

AGE

Communities with higher proportions of seniors and students (both secondary and post-secondary) will likely have a higher proportion of residents with limited transportation options. Seniors exhibit a greater degree of physical disabilities that may limit their ability to walk, cycle, or drive to fulfill their mobility needs. However, they typically make fewer trips (less commuting to and from employment) than those in employment. Despite this, they are a key driver to supporting a basic level of transit ridership in the system.

Students (both secondary and post-secondary) demonstrate a higher level of transit ridership. This demographic group demonstrates a lower propensity to own or have regular access to a vehicle (increasingly by choice) and relies more greatly on transit services to get to school, to work and to fulfill recreation and leisure activities.

HOUSEHOLD INCOME

Generally, low-income households are associated with higher levels of transit use. Low-income households demonstrate lower levels of auto ownership and rely more greatly than other households on the use of transit services to meet their travel needs.

AUTO OWNERSHIP

A car is a significant household investment and once it is purchased, is likely to be used. Thus, the likelihood that a member of a household will walk, cycle, or take public transit is inversely related to the number of vehicles available within a household.

EMPLOYMENT LEVELS

Transit services in smaller communities often have captured a smaller proportion of the commuter travel market—levels of employment have a smaller influence on ridership compared to the larger systems. Nevertheless, a higher level of regional employment is associated with higher levels of transit ridership. Because work trips are more recurring (five times a week) compared to other trip purposes, changes in employment levels will have an impact on a system's ridership.

6.1.2 PLANNING AND LAND USE FACTORS

DENSITY

Density is a measure of the intensity of the use of land. Density is measured in many ways, but the most common measure is persons or jobs per unit area. There is no specific density level that must be met to support a basic level of transit ridership. However in general, the higher the density, the more conducive the community is to supporting greater levels of transit service, since there are more potential riders in the same amount of space. Lower density areas will need transit services to travel longer distances compared to a higher density community containing the same number of people and jobs. Thus in higher density areas, services will be more efficient.

MIXED LAND USES

Mixed land use means having a complementary and context-appropriate combination of housing types, job opportunities, and retail, that allow people to meet their daily needs in the specific walkable area. Mixed land uses exist in an array of different community sizes from small village "Main Streets" to larger urban downtowns. Depending on the occupancy rates of these mixed use-communities, these core areas serve as notable activity centres that play an important factor in growing transit ridership.

COST AND AVAILABILITY OF OTHER MODES

The more affordable and convenient it is for people to drive within a given community, the less likely they are to take transit. Measures that increase the cost of driving (e.g. parking fees, tolls, gasoline taxes) and decrease the capacity to accommodate vehicles (e.g. limited parking supply, limited lane capacity for general purpose vehicles) are major drivers to increase transit ridership.

Though politically difficult to enact, imposing fees and parking supply restrictions are effective ways to manage demand for auto use and boosting transit ridership, as these policies increase the cost of using a car and reduces its convenience relative to using transit. Parking facilities also occupy considerable space, and result in a less pedestrian-oriented environment.

PROVISION OF COMPLEMENTARY MODES

On the other side of the coin, a community with infrastructure and policies that promote the use of complementary modes to transit—such as walking and cycling—will lead to higher levels of transit use. Pertaining to fixed route services, passengers still need access to transit services from their point of origin. Thus communities that provide an extensive, well-maintained and safe network of pedestrian pathways will help to improve the transit customer experience, leading to increased ridership.

Additionally, communities with a permeable, safe, and well-maintained network of cycling infrastructure, along with cycle related amenities (e.g. secure bike lockers, bike racks, and shower facilities) can improve transit ridership because these amenities build a stronger culture of cycle use, and can help expand the transit service coverage. Passengers generally prefer to walk only five minutes to access a transit stop—that same five minutes covers a much larger distance on a bicycle, which may facilitate transit routes to make fewer route diversions to maintain service coverage.

6.1.3 SERVICE AND PRICING CHARACTERISTICS

QUANTITY AND COVERAGE OF SERVICES

Service quantity characteristics, such as service frequency and coverage, are also an important set of factors influencing ridership. Transit systems that have a high service coverage (i.e. covering over 90% of the population and employment in the contiguous built up area) and have higher service frequencies (i.e. with routes generally operating at least four times an hour in the peak period) support a wider range of riders, and thus would generate higher levels of ridership. Systems with lower service frequencies (i.e. generally with routes that operating at most twice and hour in the peak period) support a more captive ridership market, and thus would result in more modest ridership levels.

SERVICE QUALITY OF THE SYSTEM

Important factors that influence ridership include the provision of a high-quality transit service, good customer service, easy-to-understand information, on-time performance, and good passenger safety. These measures are the most basic elements that need to be met to grow system ridership over time.

PRICING

Fares do have an important influence on the ridership levels—a decrease in fares generally leads to higher levels of ridership. However, service increases generally promote even higher rates of ridership increases compared with the decrease in fares.

6.2 DEMAND ESTIMATION TECHNIQUES

Demand for transit systems is a difficult task to perform precisely. This is especially true when transit service is being introduced in an area that previously had none.

The simplest method for forecasting transit demand for transit services in smaller communities is to examine other transit systems with similar service levels, demographics and land use characteristics. This is typically a quick and effective way to obtain an indicative estimate.

The sections below describe two more detailed ways to estimate transit demand. The first is based around the total number of trips (by all modes) and applying an estimated mode share for transit. The second uses a set of worksheets provided with this report. These worksheets use a wide variety of inputs to provide a more precise estimate of demand and revenue.

6.2.1 TRIP FLOW DATA

Ridership can be estimated by understanding the total number of trips made in the proposed system/route service area and by applying an assumed transit mode share.

The availability of trip data varies depending on the municipality. Larger municipalities may undertake transportation planning studies that would be able to supply the information about the total amount of trips made between discrete areas within and outside the municipality.

In the absence of such data, Statistics Canada issues data on commuting flow as part of the Census, organized on a municipality basis (see Additional Resources in Chapter 13). The data provides insight on where people live and work. This can be used as a basis for understanding the order-of-magnitude riders a proposed route or system could carry. The data can be used to make inferences on the total number of trips that are made within the areas served by the transit system.

6.2.2 DEMAND ESTIMATION WORKSHEETS

Accompanying this report is a set of worksheets, enabling the user to estimate the likely ridership, revenue and costs associated with a transit system. Two of these sheets cover demand for conventional and specialized transit respectively. In all the sheets, values to be entered (or changed) by the user are highlighted in purple; intermediate calculations are highlighted in orange, and outputs are highlighted in green.

CONVENTIONAL TRANSIT

For conventional (fixed-route) transit, the key inputs are as follows:

- Municipal population
- Percentage of municipal population in service area (this can be assessed from the proposed route network, by assuming the service area includes anywhere within 400m of a transit route)
- Total daily trip rate (average one-way trips per person on a weekday; a default value is provided, derived from the 2011 *Transportation Tomorrow Survey*, conducted in southern Ontario)
- Service span (under ‘section 2’ - what hours of the day service is provided. The percentage of trips in each hour is also derived from the 2011 *Transportation Tomorrow Survey*)
- Estimated mode share (a range of typical figures is provided, and the user can either choose the most appropriate one for their circumstances, or substitute a figure obtained from elsewhere)
- Whether or not service is provided on Saturdays and Sundays

A screenshot from worksheet is shown in Figure 6-1.

WORKSHEET #1: CONVENTIONAL TRANSIT DEMAND ESTIMATION

Purple = input
Orange = calculation
Green = output

Section 1) Main inputs		
Item	**Value**	**Notes**
Municipal population	25,000	
% of population in service area	70%	
Service area population	17,500	
Total daily trip rate	2.07	weekday trips per person
% of trips within service span	83%	*Use Section 2 table*
Estimated mode share	1.00%	*See Section 3 table*
Daily transit trips (weekday)	302	
Saturday service?	Yes	(Yes/No)
Sunday service?	No	(Yes/No)
Average fare	1.7	

Section 3: mode share information	
Suggested mode shares	
Fixed route, over 20k people	1-2%
Fixed route 5-20k people	.75-1.5%
Fixed route, under 5k people	0.5-1%
Non-fixed route, over 5k people	0.5-1%
Non-fixed route, under 5k people	0.25-0.5%

Section 4: output	
Estimated ridership	
Weekday Daily ridership	302
Weekly ridership	1,631
Annual ridership	**85,051**
Annual fare revenue	**144,587**

Section 2: service span		
Trips covered by service span		
Hour	**In span?**	**% of demand**
0:00	No	0.5%
1:00	No	0.2%
2:00	No	0.1%
3:00	No	0.1%
4:00	No	0.3%
5:00	No	1.2%
6:00	Yes	3.5%
7:00	Yes	8.1%
8:00	Yes	11.3%
9:00	Yes	4.6%
10:00	Yes	4.1%
11:00	Yes	4.3%
12:00	Yes	4.1%
13:00	Yes	3.9%
14:00	Yes	5.8%
15:00	Yes	9.6%
16:00	Yes	8.5%
17:00	Yes	9.0%
18:00	Yes	6.6%
19:00	No	4.8%
20:00	No	3.5%
21:00	No	2.9%
22:00	No	1.8%
23:00	No	1.2%
Total	83.4%	*100.0%*

Source: 2011 Transportation Tomorrow Survey

Figure 6-1 – Conventional transit ridership worksheet

SPECIALIZED TRANSIT

The specialized transit worksheet is derived from CUTA's *Forecasting Demand for Specialised Transit* workbook. The key inputs are as follows:

- Municipal population
- Service hours on weekdays, Saturdays, Sundays, and holidays.
- Average fare (default value provided)
- Service use characteristics (for which default values are provided):
    - Target population rate (percent of population who is the intended target of specialized transit service)
    - Market penetration rate (percent of target population who actually applies for specialized transit service)
    - Eligibility rate (percent of applicants who are deemed eligible; default value provided)
    - Percent of active registrants (percent of registered customers who take at least one trip per year)

- Trip request rate (average number of passenger trips requested per active user each month)
- Denial rate (percent of denied or unaccommodated trip requests)
- Cancellation and no-show rate (percent of booked trips cancelled and no-shows)

A screenshot of the specialized transit worksheet is shown in Figure 6-2.

WORKSHEET #2: SPECIALIZED TRANSIT DEMAND ESTIMATION

Purple = input
Orange = calculation
Green = output

Section 1: Demand estimation

Input Name	Input Source(s)	Input Value		Output Name	Output Value
Municipal population	Agency	25,000		Target population	2,275
% of population in service area	Agency	70%		Persons applying for specialized transit	158
Service area total population		17,500		Registrants	155
Target population rate	Statistics Canada	13.0%		Active registrants	130
Market penetration rate	Agency	6.9%		Total trip requests	15,950
Eligibility rate	Agency	98.0%		Booked trips	15,327
Percent of active registrants	Agency; CUTA (Specialized Transit Statistics)	84.1%		Passenger trips per year	11,801
Trip request rate per year	Agency; CUTA (Specialized Transit Statistics)	123			
Denial rate	Agency; CUTA (Specialized Transit Statistics)	3.9%			
Cancellation and no-show rate	Agency; CUTA (Specialized Transit Statistics)	23.0%			

Section 2: Revenues

Input Name	Input Source(s)	Input Value		Output Name	Output Value
Average fare per trip	Agency; CUTA (Specialized Transit Statistics)	$2.00		Annual fare revenue	$23,603

Source: Adapted from CUTA's *Forecasting demand for Specialised Transit* workbook

Figure 6-2 – Specialized transit worksheet

6.3 ESTABLISHING FARES

Fares make up a portion of total revenues required to pay for costs of the service. The degree to which a system recovers its costs from fares depends not only on the cost of the fare itself, but a number of factors including a system's ridership, cost-effectiveness, and overall policy objectives. This subsection provides guidance to both establishing fares for a new system, as well as revising fares for an existing system.

6.3.1 ESTABLISHING FARES IN A NEW SYSTEM

When establishing fares for a new system, it is important to establish strategic policy principles that are consistent with the identified goals and objectives of the service.

For example, if a municipality wishes to start a new transit system to expand mobility options and for those who have limited alternatives, then the fare principles for the service would be to maximize social equity and community benefits. Under this direction, fares should be established in a manner that would be more affordable to the identified target markets. The flip side to establishing more affordable fare prices is the need for the system to recover a larger proportion of revenues through other means such as community grants, government grants, and municipal taxes.

Regardless of whether the service is intended to meet social and community objectives, or to maximize revenue, a new system must first promote ridership uptake in the system. Thus it is encouraged that fares be established lower in the initial years to provide an opportunity for people first to use the service and establish a culture of ongoing transit usage.

With these more strategic goals established, more detailed near term policies need to be developed. How much should a system charge for the service? The first step is to complete a review of fare policies of peer agencies to explore the range of fares charged for a service similar to the proposed system. To identify peer agencies to explore, the agency should examine other systems that operate a similar type of service (e.g. catering to longer distance trips, short urban area trips) and serves a similar target market (e.g. commuters, seniors, students, persons with disabilities).

The fare policy peer review should examine the specific fare characteristics of other systems including:

- Fare classes and definitions (e.g. adults, children elementary/high school students, post-secondary students, seniors)
- Payment options (e.g. cash fare, multiple ride tickets, monthly passes)
- Transfer policies (e.g. time based transfers, single trip transfers only, no transfers)
- Fare policies with neighbouring municipalities (e.g. free ride to connect to other systems, fare top-ups to neighbouring systems, full fare between systems)

It is recognized that communities may have different characteristics and different needs. Aside from completing a peer review, it is important to provide the opportunity to ask community stakeholders (e.g. advisory committees, council members, and community representatives) about their definitions for what is an appropriate fare for the service. When asking members of the public about what is an appropriate fare, it is important to provide the opportunity for them to understand the financial implications of their choice—particularly as tax revenues make up the difference from any changes to fare revenues. For example, an agency may ask the community to choose one of the following scenarios:

- Establish a $2 cash fare for the service and a $60 annual property tax increase on all households in the service area
- Establish a $3 cash fare for the service and a $45 annual property tax increase on all households in the service area
- Establish a $4 cash fare for the service and a $30 annual property tax increase on all households in the service area

Of course, specific calculations will be required to better understand the financial implications of fare price changes. With an understanding of the community's views on fare policies, as well as findings from peer review, the agency will have a much clearer understanding about what the fare policies should be for the community.

6.3.2 REVISING FARES FOR AN EXISTING SYSTEM

Similar to establishing fares for a new system, revising fare policies requires an understanding of the goals and objectives of the service. A service may need to achieve some short-term objectives such as to achieve a certain fare recovery ratio or meet a certain ridership or revenue target.

Fares are generally inelastic—meaning that fare changes cause less than proportional changes in demand for transit service. A typical rule of thumb identifies that every three percent increase in fares

results in a one percent reduction in ridership. Of course, this effect varies depending on two main factors:

- **User Type** – Transit dependent riders are generally less price sensitive than choice riders.
    - Certain demographic groups, including people with low incomes, non-drivers, people with disabilities, high school and college students, and elderly people tend to be more transit dependent and may have fewer alternatives of travel.
- **Trip Type** – Non-commute trips tend to be more price sensitive than commute trips, as commute trips are more difficult to avoid and follow a more regular routine.

Over time however, the responsiveness to fare decisions on ridership increases, as consumers take price changes into account in longer-term decisions (e.g. purchasing a car, using transit regularly, choosing where to live or work, etc.).

On the other hand, service changes have a slightly higher elasticity than fare changes because passengers can pay a higher fare to ride a trip but improving services allows for more trips to take place. However, service *reductions* produce a stronger (negative) change in ridership, as some existing transit trips will no longer be possible.

When there are no major changes to the overall objectives for the service, fares typically should be adjusted regularly at the rate of inflation. This is encouraged to avoid imposing more significant increases in fares when the agency responds to ongoing increases in operating costs.

6.4 ESTIMATING REVENUE

Passenger fares form an important part of the revenue sources for public transit and community transportation services. Most transportation providers charge each of their passengers or clients a fare for service. This could be in the form of a set fare per trip, a per kilometre rate, or a fare by distance formula with various fare zones established. Wait-time fees are also charged to passenger/clients by many community transportation operators or specialized transit operators that provide long-distance trips to out-of-town locations (especially for medical purposes, or non-emergency medical trips).

Cash fares, tickets and monthly passes, are all part of most public transit systems. Contactless smart cards are also increasingly being adopted by transit agencies. Discounts are also often provided to groups such as seniors and youth.

When a municipality operates both a conventional and specialized transit service; more and more systems are aligning their fares and requiring fare equity between both systems, in terms of costs and fare payment options. (In Ontario AODA legislation requires and mandates this).

Average fares can be calculated by examining systems with similar prices and discount structures. Dividing their total revenue by their total ridership will yield the average fare. Alternatively, the percentage of different passenger types (e.g., adult, child, senior) can be applied to the system under consideration.

7. RESOURCES – WHAT EQUIPMENT AND INFRASTRUCTURE ELEMENTS ARE REQUIRED?

7.1 VEHICLES AND RELATED INFRASTRUCTURE

Vehicles

Depending on the specific service delivery arrangements, a public agency may or may not have to purchase vehicles outright. For example, if a public agency contracts out its service operation to a third party, the agency could require that the third party contractor supply vehicles as part of the operational contract.

Regardless of which entity operates the services, appropriate vehicles will be required to run the transit service. Section 5 discusses how to develop a design for a proposed service and that allows the calculation of the number of buses needed for each route and in each service period. Determining the total number of buses needed for the system requires identifying the number of buses used during the peak period of the service, which is typically during the weekday AM and PM peak periods. Transit agencies typically allow for additional spare vehicles (about 15 percent of required peak vehicles) to accommodate those that may require maintenance.

The size of vehicles to purchase depends on the anticipated maximum passenger load on the vehicle. Table 7-1 summarizes the general passenger capacities for each type of bus.

Table 7-1 – Passenger capacity by bus type

General vehicle types		Passenger capacity
	Modified Van	2 to 5
	Cutaway bus	12 to 25
	Heavy duty bus (30 feet)	Up to 40
	Heavy duty bus (40 feet)	Up to 55

When choosing a vehicle, transit agencies need to consider the needs of people with disabilities. For instance, it is important that vehicles have the ability to accommodate customers with wheelchairs and scooters. These spaces for people with wheelchairs should have appropriate safety belts and restraints. For larger vehicles, there should be easy access for people seated in these spaces to request to alight.

To board and alight vehicles, cutaway buses and vans should have lifts or ramps on the side or at the rear the vehicle. It is now Canadian industry standard for conventional heavy-duty buses to be low floor—meaning there are no steps between the bus entrances and the passenger cabin area. Low floor buses not only improve passenger boarding time and accessibility (particularly to seniors), but also for people with mobility devices. Many buses are also equipped with a kneeling feature, which allows the

bus to be lowered to minimize the potential strain needed to board the vehicle from the bus stop platform. CSA Standard D409 outlines the accessibility requirements for vehicles in accessible service.

Garage and maintenance facilities

Garage and maintenance facilities are required to house and maintain the system's fleet. Typically, these facilities also include other functions including facilities for transit operators during the shift, training rooms, and administrative offices.

Depending on the size of vehicle fleet, some transit systems may have a separate facility while others may share its operation with other public works facilities. Like vehicles, the public agency could own and develop its own garage and maintenance facility or specify as part of a third party operational contract for them to accommodate the space and staffing required to support these functions.

Regardless of the party who would own the facilities, it is important to locate a garage to reduce the amount of time and distance where the vehicle must travel from the garage to the operated route and vice versa (known as deadhead distance and time).

7.2 BUS STOP INFRASTRUCTURE

Transit stops are the vital link to using fixed-route transit services. Thus, stop amenities are required to identify where vehicles will stop to allow passengers to board and alight and to present a more comfortable customer experience. The design and location specifications for all stop amenities will be summarized in the sections below. When designing bus stop infrastructure, careful consideration is necessary to accommodate passengers with disabilities, as the lack of an accessible path between (1) their origin or destination and (2) their transit stop prevents them from using a fixed-route bus service. Physical and cognitive barriers associated with bus stops can limit ridership potential to those with disabilities, limits their mobility choices, and could potentially lead to increased costs for specialized services. Thus as part of the discussion of amenity placement and design, this section includes specific details to best accommodate the needs of passengers with disabilities.

TRANSIT VEHICLE PAD

A transit vehicle pad is the bus stop area that provides the required surface (most typically a concrete surface) to facilitate passenger boarding, alighting and waiting. The bus pad should be generally equivalent to the length of the vehicle (where space allows) to provide a comfortable waiting, alighting and boarding area for both front and rear doors and denotes the transit agency's presence.

To accommodate people with mobility devices, there should be a stable, level and unobstructed landing pad to operate the vehicle's wheelchair lift and ramp. Wheelchair and scooter users require more space to wait and turn around than other transit users and therefore benefit from sufficient area at the bus stop to manoeuvre. Thus, a 2.0-metre length (parallel to the curb) and 2.75-metre width (perpendicular

to the curb) of unobstructed area should be accommodated to allow people with mobility devices to board, alight, and navigate between the bus pad area and the sidewalk.

STOP SIGNAGE / STOP POLE

Stop signage indicates to customers and bus operators where the vehicle will stop. Stop signage should be placed at a location that can be easily seen by customer and vehicle operators and not obstructed by other road signage, transit shelters, and street vegetation.

The pole should be located at a uniform position at all stops to help serve as a point of reference for those with disabilities, particularly the visually impaired. The design of each pole and sign should be consistent throughout the transit system as to provide a strong visual identity for the system and to provide clarity to transit users. Signage should be located downstream from the vehicle loading area so that there is clear visibility between waiting passengers at the stop and the transit operator. Signage should be faced perpendicular to the street, but visible on both sides so that it is visible to passengers locating the bus stop. Wayfinding for local attractions and services can also be included at bus stops and bus shelters.

ROUTE AND SYSTEM INFORMATION

Route and system information provides overall system information as well as more detailed route information for services that operate at that stop. Route information is often affixed to the stop signage pole, which includes individual maps of the various routes that operate at the stop, as well as the scheduled departure times at the stop. System maps are typically affixed inside the bus shelter when they are included.

SHELTERS

Shelters provide comfort to passengers waiting for the bus by providing protection from rain, sun, as well as harsh winds and temperatures. Shelters should be installed or positioned as to provide an accessible connection from the shelter to adjacent sidewalks, streets, and the transit vehicle pad.

The size of the shelter and its entrances should be wide enough accommodate people using wheelchair devices. It should have a minimum clear floor area that is 1.0 metres wide and 1.25 metres deep entirely within the perimeter of the shelter to accommodate a wheelchair or a scooter.

Where possible, system maps and general system information should be posted in all bus shelters. Maps and schedules should be easily readable by persons using mobility devices and, to the greatest extent possible, persons with visual impairments.

Shelters in some cases can be supplied by an advertising company. For those cases, the shelter advertising panel should be located on the downstream from the vehicle loading area to ensure passengers are visible to transit operators.

BIKE RACKS

Bike racks expand the option for transit users to access transit services. Cycling benefits transit because it allows transit services to capture a wider access area--particularly in smaller towns and rural locations where stops are less frequent and transit riders need to travel longer distances to access service. Bike racks should be located away from the general bus loading area so that it does not impede passengers, including those with disabilities, from getting on and off the bus.

BENCHES

Benches provide a place for people to rest while waiting to board a vehicle. They are typically located particularly in higher boarding stops as well as boarding with a higher proportion of seniors. Benches are typically placed further back on the sidewalk opposite of the road curb. For stops with shelters, benches are often included within the shelter.

In the past, advertising agencies have supplied benches in exchange for large ads on the benches oriented to auto drivers. This practice however has recently declined in popularity because the benches often are constructed and placed at a stop that suit more of an advertising function and less of a seating function.

WASTE AND RECYCLING RECEPTACLES

Receptacles help maintain system cleanliness of the bus stop. Receptacles should be included at stops with higher passenger boarding and alighting, however, they should only be included if there is a maintenance schedule to ensure that waste and recyclables are emptied regularly.

TRANSIT CENTRES

A transit centre is a facility served by multiple transit routes or modes of transportation (e.g. Intercity buses, local buses, rail services). The degree of available amenities varies depending on the number of routes, the scale of passengers served, and the land use context of the area. At a minimum, transit centres provide shelters for transit users as they wait to transfer to another transit service. More elaborate transit centres include a physical structure with an

enclosed waiting area with customer service wickets, transit operator rest areas, and washrooms. Often, transit centers incorporate park-and-ride facilities.

Transit centres should be located at major destinations (e.g. centre of downtown, at a major commercial area, or near the main entrance of a post-secondary institution) where routes naturally converge so that it provides greater convenience for passengers, reduces the amount of route transfers required, and create increased natural surveillance in the area. Having a prominent transit centres help to create a stronger presence for transit service and help to shape high quality urban places.

PARK AND RIDE FACILITIES

Park and ride facilities are dedicated places that allow auto drivers to park their vehicle and take transit services. In some cases, park and ride lots also help facilitate ridesharing, by designating these places for drivers to converge and carpool. Park-and-ride lots could also be located with businesses that have excess parking during the peak transit times (e.g. retail uses).

Park and ride facilities may have limited effectiveness in smaller communities because the economics (both time and money) of driving the whole trip is more competitive than driving part way to access transit services. Particularly when transit service frequencies and parking rates are low, there is limited economic incentive for drivers to use park and ride facilities.

7.3 SERVICE INFORMATION

It is important to make it easy for passengers to access transit service information.

Each transit system should develop route maps and schedules to ensure passengers can better understand the operation of the service. The material should be made available on buses, and major transit centres, and where transit fare media are sold.

Table 7-2 – Types of service information

Service information	Description
System map	Show how the various routes interconnect with one another and will help passengers know how to navigate through the system.
Individual route schedule	Show scheduled times at various “timepoints” along the route.
Individual route map	Show route alignment, connections with other services, major places of interest, and location of scheduled “timepoints”.
Fare policies	Summarize the fare policies (e.g. cash fares, ticket fares, and monthly passes for each individual passenger class (e.g. children, adult, high school students, post-secondary school students, seniors).
Service changes	Notify passengers about planned changes to services so that passengers can adequately plan for changes to their journey behaviour.
Open data (GTFS) API Real time Data	General Trip-planner and Real-time information. GTFS data is fast becoming the norm, rather than the exception.

The internet has become the norm for passengers to seek transit information. Thus, in addition to having available print materials, the information identified in Table 7-2 should be made available online.

7.4 STAFFING REQUIREMENTS

There are a number of staff positions required for the operation of a transit service. Table 7-3 outlines the general positions in a transit organization. The number of staff required for each of the identified positions varies according to the size of the transit service. In some cases for even smaller agencies, one employee may fulfill more than one of the outlined positions. Additionally a transit agency does not necessarily have to directly hire positions in the roles outlined. For example, a transit agency may contract out the operation and maintenance of transit vehicles. In this case, supervisor, driver and maintenance staff positions will be fulfilled by the contractor.

Table 7-3 – Staff roles for a transit agency

Position/Roles	Overall Job Activities
Manager	• Oversees the overall operation of the system • Provides accountability for the system's finances and staffing needs
Supervisor	• Schedules the employees and the fleet needed to support services • Manages the vehicle operator and dispatcher performance • Evaluates the system transit services and makes recommendations to improve service effectiveness and customer service
Dispatcher	• Coordinates the bus operator assignments for service • Monitors service performance and provides direction to operators to promote good customer service, safe driving practices, ensures schedule reliability
Driver	• Operates the transit vehicles and transports passengers safely • Collects and accounts for fares • Responds to customer related information and directions
Planning and administrative staff	• Provide planning, financial, reporting, and clerical support for the system's operation
Customer service staff	• Responds to service queries • Responds to trip requests (for on-demand transit services) • Gathers customer complaints and concerns • Sells fares
Maintenance staff	• Maintains all components of vehicles to ensure they are in safe and working order

8. COSTS – HOW MUCH WILL THIS COST?

Once an agency has a good idea about the services it wishes to offer, the financial implications for that service should be computed to understand whether the proposed service is within an affordable range. This section identifies how capital and operating costs are estimated.

8.1 ESTIMATING CAPITAL COSTS

Capital costs are the fixed, one-time or periodic expenses required for a transit service. They include vehicle purchases and refurbishments, physical infrastructure (e.g. garage facilities, terminals, transit stops and shelters), as well as equipment (e.g. computer equipment, vehicle communications equipment, etc).

Table 8-1 identifies the unit costs for major capital needs of a transit system.

Table 8-1 – Major capital costs

Item	Capital Unit Costs	Expected Life Cycle
Vehicles*		
Conventional 40-foot (12 metre) vehicle	$500,000	12 years
Conventional 30-foot (10 metre) vehicle	$450,000	12 years
Community bus, medium-duty transit cutaway	$250,000	7 years
Community bus, light-duty transit cutaway	$100,000	5 to 7 years
Modified vans	$60,000	5 years
Stop Amenities (Materials and installation)		
Concrete pad and bus pole	$1,800	20 years
Shelter**	$15,000	20 years
Bench**	$2,000	10 years
Garbage Receptacle**	$900	10 years
Bike post-and-ring	$350	20 years
Other		
Transit garage and maintenance facility***	$400,000 per bus	---
Advanced dispatching system - Computer-Aided Dispatch, Automatic Vehicle Location, Installation	$50,000 per system $10,000 per bus	---
Phone systems - Wiring, Network Services, Telephone Units, Control Units, Installation	$1,800	---

* Includes farebox and radio equipment
** Cost could potentially be paid by a private third party through a street furniture advertising contract
*** Cost varies depending on the specific requirements for the garage. Unit cost based on a medium sized system (40 to 80 buses). Smaller systems will more likely contract out storage and maintenance or use existing facilities jointly with other functions.

A worksheet is available to support the calculation of capital costs, using the assumptions identified in Table 8-1. A sample screenshot of the worksheet is shown in Figure 8-1.

WORKSHEET #3: CAPITAL COSTS

Purple = input
Orange = calculation
Green = output

Section 1: Main inputs						
Item	**Capital Cost**	**Units**	**Number needed**	**Start-up cost**	**Expected Life Cycle (years)**	**Replacement costs per year**
Vehicles*						
Conventional 40-foot (12 metre) vehicle	$500,000	per bus	5	$2,500,000	12	$208,333
Conventional 30-foot (10 metre) vehicle	$450,000	per bus	0	$0	12	$0.000
Community bus, medium-duty transit cutaway	$250,000	per bus	0	$0	7	$0.000
Community bus, light-duty transit cutaway	$100,000	per bus	0	$0	6	$0.000
Modified vans	$60,000	per bus	0	$0	5	$0.000
Subtotals for vehicles:			**5**	**$2,500,000**	**N/A**	**$208,333**
Stop Amenities - Materials and installation.						
Concrete pad and bus pole	$1,800	per stop	100	$180,000	20	$9,000
Shelter	$15,000	per stop	10	150,000	20	$7,500
Bench	$2,000	per stop	10	$20,000	10	$2,000
Garbage Receptacle	$900	per stop	10	$9,000	10	$900
Bike post-and-ring	$350	per stop	0	$0	20	$0
Subtotals for stops:			**100**	**$359,000**	**N/A**	**$19,400**
Other						
Transit garage / maintenance facility**	$400,000	per bus	5	$2,000,000	---	---
Advanced dispatching system - Computer-Aided Dispatch, Automatic Vehicle Location, Installation	$50,000 $10,000	per system per bus	1 5	$50,000 $50,000	---	---
Phone systems - Wiring, Network Services, Telephone Units, Control Units, Installation	$1,800	per system	1	$1,800	---	---

* includes farebox and radio equipment

** numbers based on a medium sized system (40 to 80 buses). Smaller systems will more likely contract out storage and maintenance or use existing facilities jointly with other functions.

Section 2: output	
Costs	
Startup costs	**$4,960,800**
Long-term per-year replacement costs	$227,733

Figure 8-1 – Capital cost worksheet

8.2 ESTIMATING OPERATING COSTS

Operating costs are the recurring expenses used to keep the transit operation running on a day-to-day basis. These expenses are associated with staff salaries and wages, fuel, rent, daily supplies and materials.

The scale of the number of revenue service hours operated is a measure often used for estimating annual operating costs. For smaller transit systems in Canada[1], the average operating cost is $93 per

[1] those with a service area population of under 150,000

revenue service hour operated. Contracted services tend to be less than the average, while specialized transit (both contracted and municipally-operated) tend to be cheaper as well, on an hourly basis.

As discussed in the beginning of this section, there are many expenses required to keep a transit agency running. Figure 8-2 categorizes the various expenses into five main areas:

- **Transportation operations** - Salaries, wages, benefits (for operators, supervisors, service planning/scheduling, management), vehicle licenses, insurance premiums
- **Fuel and energy** – Costs directly associated with transit vehicles
- **Vehicle maintenance** – Salaries, wages, benefits (for mechanics, service people, management), vehicle parts, supplies, purchased services
- **Plant maintenance** – Salaries, wages, benefits (for security, janitorial, trades, management), utilities, parts, materials, supplies, shelter maintenance
- **General and administrative** – Other miscellaneous expenses including salaries, wages, benefits (for marketing, human resources, finance, information technology), advertising, office supplies

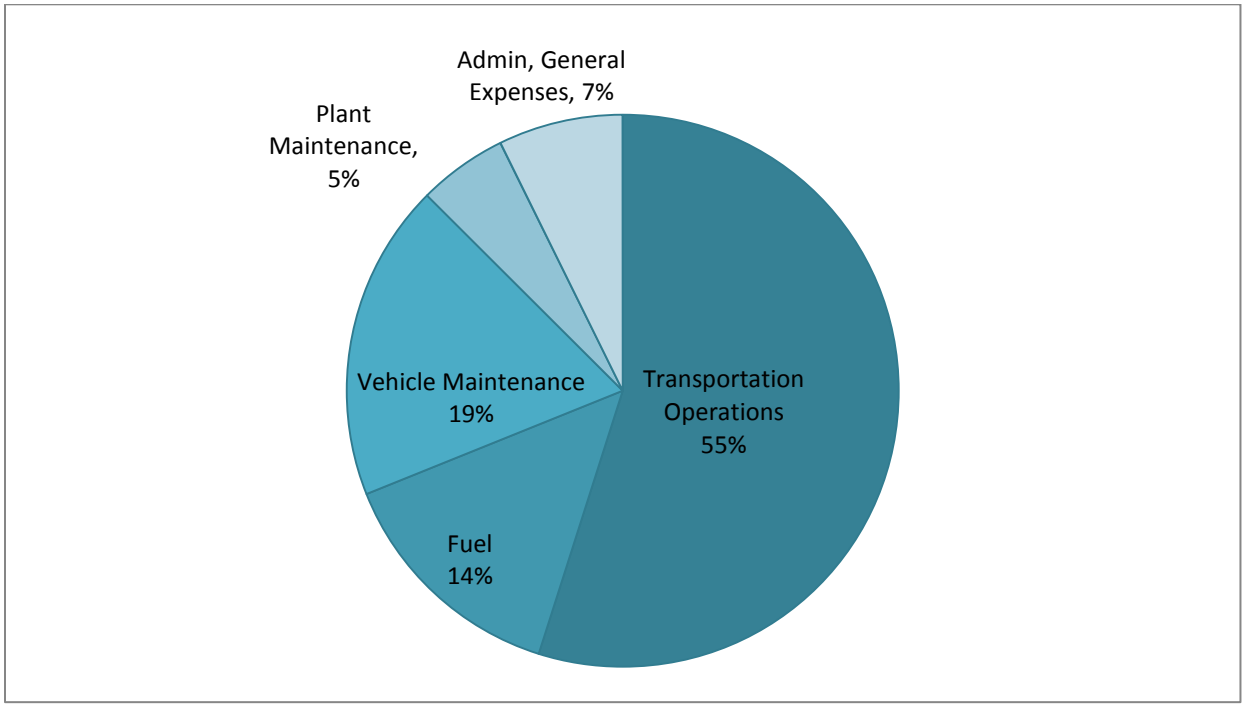


Figure 8-2 Operating cost breakdown for smaller Canadian agencies by cost type (2012 CUTA Factbook)

The Governance section (Section 9) discusses that an agency can choose to operate and maintain its own transit fleet, or solicit third party contractors to take on those responsibilities. In either case, the cost breakdowns would be similar—just that in the latter case (contracting out), the costs of Fuel, Vehicle Maintenance, as well as portions of costs from Transportation Operations and Administration would be paid out to the contractor.

The service design worksheets as discussed in Section 5.4 will support the calculation of the system operating costs.

9. GOVERNANCE

Planning, operating and managing an effective transit service requires effective governance. Governance, from a transit service standpoint, is the organizational structure that defines the ownership and responsibility for transit service to a community. Governance determines:

- who has the authority to make decisions
- who bears accountability and risk,
- who operates the transit services, and
- who maintains the system's assets

From the transit service standpoint, service delivery determines how the service is established and delivered.

This section explores the various forms of transit governance that small communities could consider when providing transit services. The examination of the various governance options will be classified into two different aspects: the policy level and the implementation level.

The policy level refers to the development of overall policy direction and translating policy priorities into plans and programs. The implementation level handles the execution of projects and delivery of service.

9.1 POLICY LEVEL – WHO DECIDES ON WHAT SERVICES TO PROVIDE?

On the policy-side of governance, transit services generally have been organized as part of the local municipal government (i.e. transit agency, municipal transit department, municipal transit commission, transportation services, or housed within other multifunctional departments) or operated as an arm's length non-profit organization (under contract to a municipal government, or a total stand-alone agency providing transportation to the community), private sector agency (under contract to the local municipal government – which will maintain a defined level of oversight), or a combination of both. Public transportation may also be provided by non-profit organizations providing service to their own or a specific client base, for example, persons receiving health or social services, or persons with special needs. The following sections describe these governance types in more detail.

9.1.1 LOCAL GOVERNMENT

In this common governance model, a local government (a local municipality, region, counties – either upper or lower tier government) agency establish, plan, fund and manage their own transit service. If a department is within the local municipality, it would be overseen by the city's Chief Administration Officer (CAO), and the local city council as would any other department. The local transit department plans, and manages the day-to-day operations, with funding for operations and capital requirements, being presented to the council for their approval.

Often significant changes to operations (i.e. major route changes) will require council approval (dependent upon local bylaws and protocols established by the council). Some communities establish separate commissions for their service, made up of councillors (either in part or as a whole), and established as the main decision-making body accountable for all organizational activities.

The local municipality and its transit agency can operate a transit system or contract these operations out to external parties (see next section).

Local government staff members will support the day-to-day administrative and managerial functions of the transit service, either in a dedicated role or a shared role with other municipal functions.

Table 9-1 – Advantages and disadvantages of a local government managed and operated service

Advantages of a local government managed and operated service	Disadvantages of a local government managed and operated service
Control over transit service ▸ Allows the public agency to have greater control over the transit service and ensure it is aligned with the goals of its jurisdiction. ▸ Usually better representation from the local elected bodies (City Councils) to manage and make decisions around operations ▸ Often can offer a more direct process for public accountability and dispute resolution for clients and customers	Requirements for experienced staff ▸ Need to employ experienced individuals to assist with policy-making, route planning, implementation, operation, maintenance, and financing. (This can be especially costly if starting a new transit system – by adding new staff and associated costs) ▸ Need for transit service to provide services to a wider market thus have less flexibility to satisfy the unique needs of the markets it wishes to serve Administrative cost ▸ Administrative cost associated with establishing and operating the system to be borne by the local government ▸ Costs are generally higher due to higher wages, better benefits than what a non-profit or private contractor would typically pay ▸ Costs continually escalate

9.1.2 NON-PROFIT ORGANIZATION

A non-profit agency will often operate its own transportation services to support its objectives in fulfilling the needs of its clients. These agencies provide a range of transit services with the objectives of providing greater access to employment, to medical services, to developmental services, as well as to satisfy day-to-day mobility needs (e.g. shopping, recreation, and leisure). This is especially applicable if the non-profit is operating the local Specialized Transit system.

A non-profit organization is governed by a board of directors, chosen to represent the diverse needs of the agency. The board is accountable for all organized activities, including financial performance and the execution of contracts. Often, non-profit organizations are less restricted in their financial relationship with municipal stakeholders for revenue support for the services. However, if the non-profit is under

contract to the local municipality to deliver the transit services, then that financial relationship for revenue support is more closely linked (example: Kingston Access Services, Kingston, Ontario).

Some non-profit organizations generally have a specific transportation focus and because of their specialty, are often more in tune with the needs of its client markets. Non-profit organizations that are under contract to a municipality also can have local council representation (with voting privileges) on the board, and the NPO's bylaws should be changed to allow for that in situations where the NPO is under contract to a municipality. This can ensure the municipality (which is usually funding the NPO – in whole or in part) has a voice/vote on the Board.

Non-profit organizations can also be approached to add transportation services to their mandate, taking on the management role for local transportation services.

Table 9-2 – Advantages and disadvantages of a non-profit organization

Advantages of non-profit organization	Disadvantages of non-profit organization
Greater autonomy ▸ Enjoys considerable freedom to make its own decisions without governmental interference ▸ Less constrained financial relationship with public stakeholders—as they are free to receive community grants and enter into fee-for-service contracts Funding ▸ Are able to secure donations and requests as a charitable organization. ▸ Can better recruit volunteers to help defray the cost of operation Service adaptability ▸ Can more easily adapt services to meet community demands Tax advantages ▸ Non-profit organizations are income and property tax exempt	Funding ▸ Must be able to be responsive and tailor services to the needs of applicable groups to receive grant contributions ▸ Unless funded by local government, (in whole or in part) the non-profit's funding is usually based on an annual request, subsidies etc. which can leave ongoing concern about the sustainability of the non-profit. Tax disadvantages ▸ Lacks automatic tax exemptions on the expenditures of goods and services—appealing for an exception is costly and time-consuming

9.2 IMPLEMENTATION LEVEL – HOW IS THE SERVICE DELIVERED AND BY WHOM

When operating a transit service, a transit organization may choose to directly employ transit operators and maintenance staff ('in house operations') or hire an external organization to handle operations and maintenance ('contract operations'). There are many factors to consider when you are deciding whether or not to use a third-party contractor for your transit management and/or operations. Some of those factors are listed below.

9.2.1 IN-HOUSE OPERATIONS

In an in-house operation, the transit agency or department will be responsible for employing the required staff to operate the vehicles, managing driver crewing needs, and managing the vehicle operations on the street. The transit agency will also be responsible for procuring the transit vehicles, and employing staff to maintain the vehicles. Within the Canadian transit experience, larger transit systems tend to keep operations and maintenance in house, with small systems contracting out all, or some of its service. There is also often a divide in how municipalities provide transit service for their conventional and specialized transit needs. Some for example choose contract operations for the specialized transit services while keeping in- house the operations for the conventional transit services.

More established systems also have retained in-house operations over the years due in part to the greater complexities involved that would adversely affect the transit's agencies existing unionized employees.

Table 9-3 – Advantages and disadvantages of in-house operations

Advantages of in-house operations	Disadvantages of in-house operations
Greater operational and maintenance control ▸ By assembling an internal team of operators, managers and maintenance staff, the agency has greater control over the operation of the service and training of staff. No need for additional contract oversight ▸ In-house operations do not require additional oversight (monitoring contractor performance to ensure public accountability)	Greater costs ▸ High capital costs for procuring new vehicles and providing storage and maintenance facilities. ▸ Union considerations: generally larger municipal systems are unionized work places. Negotiating contracts are time consuming and costly ▸ Greater operating costs: Because an in-house operation does not rely as much on the competitive open market, it may lead to higher costs of operation. These higher costs are often wages and benefits.

9.2.2 CONTRACT OPERATIONS

In this scenario, the municipality, transit agency, or department would tender a Request for Proposal (RFP) for the operation of transit services and solicit private companies who would bid on them. The operation of the transit vehicles and/or the maintenance of the transit fleet are commonly undertaken through contract operations, although there are situations where the transit agency under contract, may choose to contract out the maintenance and/or the storage of their vehicles.

A common example of this arrangement is when a transit agency contracts services to a local taxi company that already provides service at all times of the day. In higher capacity fixed-route services, a contractor can be asked to bid on operating the services.

Some contractors are asked to maintain municipally-owned vehicles, while others are asked to provide and maintain their own fleet.

Regional collaborations

Contracted operations can also include contracting services from a neighboring municipality that already runs a transit service. This can usually be achieved by a contract, or letter of understanding to allow the neighbouring municipality to provide the Transit services, expanding beyond its existing local municipal boundaries, into the new area to be served (example: Quinte West, Ontario, where the lead or host City is the City of Quinte West serving Brighton, and Picton along with parts of Wellington County).

A typical service contract will identify service provisions such as which days and hours of services, and policies on notification requirements for interested parties regarding schedule modifications. In financial matters, the contract will outline the fee for the provision of services, the payment terms, the amount of insurance liability, and the processes for negotiating service expansion or contraction during the contract period.

Additionally, a service contract will also usually spell out the service standards required by the responsible transit agency. Failure to meet those standards, will have clearly defined penalties, up to and including termination of the contract.

These service contracts will also usually require vehicle specifications, ensuring that the vehicle will be fully accessible for all passengers. Vehicle standards are generally covered off as well, areas such as: maintenance frequency/schedule, maximum age of vehicles, physical body damage and repair, and general cleanliness of the vehicle (exterior washes, interior).

Table 9-4 summarizes the advantages and disadvantages of contract operations.

Table 9-4 – Advantages and disadvantages of contract operations

Advantages of contract operations	Disadvantages of contract operations
Economic efficiency ▸ Relying on a competitive open market and creating incentives for good operations present greater opportunities to deliver services in a more cost effective manner. Greater operational and maintenance experience ▸ Private contractors typically already have the experience and knowledge in place to recruit the right staff to operate and manage the service effectively, as well as maintain the transit fleet. Costs ▸ Usually costs are found to be lower	Less operational control ▸ With operation and maintenance functions completed by a third party, transit agencies have less control (e.g. quality of the service, experience of operators, absentee rates, training) on how the service is run. To compensate for these issues, strong contractual agreements and contract oversight are needed. Need for greater oversight ▸ Contract operations require greater oversight to monitor contractor performance to ensure public accountability.

The municipality may also choose to buy its own transit fleet or request that the contractor operate and acquire its own fleet.

Municipal purchase of the required transit vehicles will result in an initial capital cost but will result in a lower contract operating cost. Additionally there is the issue of maintenance. A decision needs to be made on whether the maintenance of the vehicles is contracted out or not, if the municipality owns the vehicles.

Currently, securing capital funding from various levels of government (federal, provincial) is generally easier than obtaining operating funding—thus there may be greater incentive for municipalities to purchase the vehicles, even when considering the contracting out of operations.

Additionally, a contract which requires the third-party operator to supply its own buses typically requires longer contract terms because the contractor will need to have the appropriate revenue stream to ultimately defray the cost of purchasing the vehicles. This may not always be true, as some third party providers may have the equipment already in place.

10. FUNDING – WHERE WILL THE MONEY COME FROM?

Alongside the estimation of capital and operating costs is the identification of funding sources to operate the proposed services. Transit agencies for smaller communities typically rely on the following sources of revenues to support its capital and operating costs:

- Municipal government contributions (from local, county, or regional governments)
- Provincial government contributions
- Federal government contributions
- Community grants
- Farebox revenue

Figure 10-1 and Figure 10-2 provide the national composition of funding by source for capital and operating expenditures, respectively. As illustrated in the capital funding breakdown in Figure 10-1, smaller systems rely greatly on contributions from municipal and provincial governments—making up 98% of all capital contributions in 2012. The federal government and other agencies (e.g. community organizations) make up the remaining 2% of capital contributions.

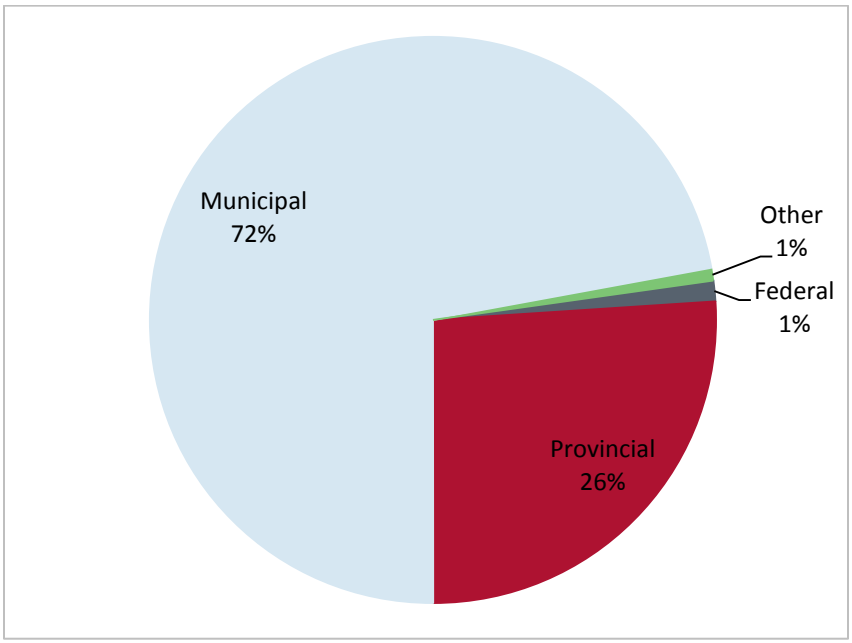


Figure 10-1 – Capital funding contributions of smaller transit agencies (2012 CUTA Factbook)

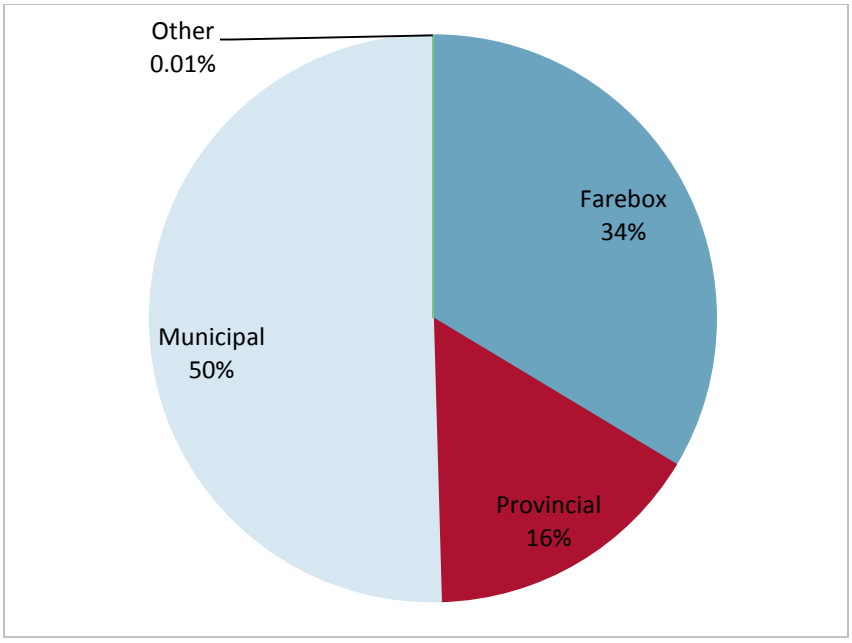


Figure 10-2 – Operating funding contributions for reporting agencies with less than 150,000 population (2012 CUTA Factbook)

At the national level, in terms of operating funding contributions, farebox revenue makes up just more than one-third of the total operating funding for smaller agencies. Exactly half of operating revenues were derived from municipal funds. The remaining 16% of operating funding originate from provincial sources.

10.1.1 GOVERNMENT CONTRIBUTIONS

MUNICIPAL CONTRIBUTIONS

The largest source of municipal revenue is property tax. In many Canadian jurisdictions, a portion of property taxes is earmarked for transit expenditures. Transit agencies have relied heavily on the use of property taxes to sustain their services. According to the Federation of Canadian Municipalities (2012), property taxes make up just less than half of its own-source revenue. As property taxes are also required to fund other forms of municipal infrastructure (e.g. roads, water infrastructure, recreation and leisure, and such), this funding source is often not sufficient to support public transit.

To supplement property tax revenue (though not at all significant as municipal contributions), municipalities also utilize other forms of taxation including vehicle registration tax, advertising sign tax, land transfer taxes, development charges, and parking taxes.

PROVINCIAL AND FEDERAL CONTRIBUTIONS

Funding programs from the federal government, and more notably provincial governments, have assisted agencies in supporting transit services in small communities. These contributions come in the form of one-time funding programs as well as sustained and regular funding streams. One-time grants are typically designed to respond to specific needs (e.g. support ridership growth, economic stimulus, reduce greenhouse gas emissions).

For example, the one-time Building Canada Fund dedicates a portion of the funding to small communities for capital projects for a wide range of infrastructure areas—as it relates to transit, the funds could be used to procure a new transit fleet and build transit-related facilities and infrastructure. Additionally, the Green Transit Incentives Program (Green TRIP) program is currently a non-renewable funding program in Alberta to support local priorities to provide sustainable public transit alternatives. Additionally, the Building Manitoba Fund provides transit capital and operating support for fixed route and specialized transit services.

On the other hand, regular funding streams typically are tied to specific government revenue sources. For instance, the Annual Gas Tax fund from the federal government provides funding for transit facilities, infrastructure and transit fleet procurement for all communities across the country.

COMMUNITY FUNDING FOR NON-PROFIT ORGANIZATIONS

Non-profit organizations operating fixed-route or specialized transit services may also have success in securing funding through community and social services agencies. **Error! Reference source not found.** outlines the types of community opportunities available to help defray the operating and capital costs of transit services.

Table 10-1 – Types of Community Funding Opportunities

Types of Community Funding	Description
Volunteer sector support grants	Aimed to support the capacity of community volunteers (e.g. Ontario Trillium Foundation)
Social support agencies	Support specific services and programs that create opportunities for communities (e.g. United Way)
Economic development agencies	Support improved access to employment, business, and tourism opportunities

In addition to seeking community funding, agencies can also take on their own fundraising. Fundraising takes on many different forms, charitable music concerts (Disabled Persons Action Organization), charitable BBQs (Quinte West Access and Public Transit), etc.

Non-profit organizations providing transit (in particular specialized transit) may choose to align themselves with dedicated gifting programs, to raise additional funds. Upon a person's death a bequest to the non-profit may be given, which is often a portion/percentage of their estate. Others who wish to donate in the person's memory are able to do so as well.

11. IMPLEMENTING THE SERVICE – HOW DO WE GET STARTED?

With the large components for planning a new or improved transit service completed, the next step is to establish a clear roadmap for implementation. It is important to set out the specific tasks that need to be completed and the timeframes for those activities leading up to the launch of the services.

This section sets out the full set of activities that need to be completed prior to implementation. Agencies implementing a completely new service will likely need to complete most of the activities in the list, while those improving or sustaining services will only need to complete a subset of listed activities. This implementation list is outlined generally in chronological order—though a number of activities may need to be completed in tandem or in an iterative process.

11.1 LIST OF IMPLEMENTATION ACTIVITIES

1. Establish and implement governance structure
   - Identify how the system will be governed (municipal council, board of directors, transit commission)
   - Identifying the organizational structure and relationships of all staff
   - Appoint or establish initial Board of Directors, Commission etc
   - Establish initial policy framework, including procedures and bylaws
   - Develop initial goals, objectives, and strategic plan
   - Develop service standards and guidelines to support planning decision-making
2. Confirm and secure capital and operating funding:
   - Identify subsidies, grants, and donations
   - Identify stable funding sources
   - Project revenues from passenger fares
3. Develop policies and procedures
   - Develop standard operating practices (SOPs)
   - Identify eligibility criteria and processes to use the service (for subscription-based services like specialized transit services)
   - Develop practices that meet legislative requirements (Highway Traffic Act, Public Vehicles Act, Accessibility for Ontarians with Disabilities Act, National (or provincial) Building Code)
   - Customer service standards and practices (including processes for accommodating passengers with disabilities)
4. Identifying operating practices and processes
   - For agencies with an in-house operation:
     a. Identify driver training processes and documentation
     b. Develop standard maintenance practices
     c. Develop service delivery guidelines
   - For agencies with a contracted operation:

d. Identify agreed upon conditions for ensuring safe operations, keeping with expected maintenance schedules, and providing satisfactory customer service
e. Develop performance-based measures to incentivize the desired conditions above

5. Conduct procurement activities
   i. Scheduling, crewing, dispatching software (as required):
      a. Evaluate systems to determine which best meets the communities needs
      b. Develop bid package including specifications
      c. Solicit bids, evaluate and award bids
      d. Install and test software
   ii. Buses:
      a. Develop bid package and specifications
      b. Solicit bids, evaluate and award
      c. Order, receive, inspect and accept buses
   iii. Contracting out whole or parts of operating and maintaining buses
      a. If contracting to a private third party:
         (i) Develop the scope of service required, and the Request for Proposals (RFP)
         (ii) Solicit bids, evaluate, and award contracts
      b. If contracting to a regional or nearby public transit provider:
         (i) Develop contract provisions, setting out the responsibilities and services required and the financial arrangements for providing the service

6. Conduct detailed route planning
   i. Develop detailed route schedules and verify arrival times at specific time points
   ii. Operate trial runs of the service to ensure drivers can operate the service safely
   iii. Make refinements to route and schedules accordingly

7. Establish stops and related infrastructure
   i. Finalize the location of stops
   ii. Design, procure, and install stop signage
   iii. Procure and construct bus stop infrastructure including bus pads, shelters, and other street furniture where appropriate

8. Establish call centre for customer service and requesting demand-response services
   i. Hire and train customer service staff to use equipment and the standard practices for working with customers
   ii. Establish a customer service phone access line
   iii. Establish telephony and computer equipment to support information provision, and for staff to log complaints, commendations, and feedback
   iv. If demand response services are provided:
      a. Establish demand response scheduling and dispatch software
      b. Create working system that ensures an effective linkage between trip requests, scheduling, dispatching, and service provision

9. Develop fare media and ticket sale outlets
   i. Design graphics for tickets, transit passes, transfers, taxi scripts
   ii. Procure the production of fare media

iii. Work with community partners to sell fare media

10. Conduct marketing activities to promote the service
    i. Establish system brand identity: name, logo, vehicle design (exterior livery, colour palette for interior), signage and information designs. Some parts of this may need to take place prior to the procurement of physical assets such as bus stops.
    ii. Develop or update customer Information: develop print material, including system map, route information, web information
    iii. Develop marketing plan to engage with the public about existing and planned services
        a. Create a presence at community events
        b. Engage on an ongoing basis with community groups (as identified in the consultation strategy)
        c. Include advertising signage within buses notifying existing passengers of changes.
        d. Conduct information sessions at major points of passenger activity informing them of service improvements
        e. Plan launch event along with subsequent customer appreciation activities

11. Launch the new or improved service
    i. Ensure customer service representatives are available during the initial period to assist passengers with the new or improved service
    ii. Ensure dispatch and supervisors are on prepared to respond to possible concerns on the road
    iii. Monitor the operations of the service and respond to changes based on established service standards

12. SERVICE MONITORING – HOW WILL WE KNOW IF IT IS WORKING?

12.1 PERFORMANCE METRICS – WHAT TO MEASURE / REPORT

Before a small transit system evaluates its performance in an area, it needs a benchmark against which it can compare its performance. The benchmark should be based on a system's goals and objectives, and these have usually been developed based on past performance.

For example: a small transit system may want to reduce the minimum call in period for specialized transit door to door type service from 2 days to 1 day. This goal would become the benchmark for the current or upcoming year. After one full year, it can measure its performance against this benchmark.

Measurement and evaluation processes need to reflect local priorities and conditions. What is deemed successful is a local issue, but transit staff can educate local policy boards and communities to ensure that expectations for performance are properly understood. This process is particularly important because the development and sustainability of transit systems are now more than ever dependent on local investment, whether public or private.

Transit performance measures can also monitor how well a transit system is performing at a specific time. Measures can determine if goals are being met, are not being met, or are being exceeded. From this, service trends can also be ascertained through performance measures. Transit agencies implement policies and procedures that are designed to improve performance, and these performance measures allow agencies to determine the effect of the changes through the use of before and after studies. Any before and after study should attempt to account for variables that may have caused the change, so it can be determined that some or all of the performance change resulted from the change in policy or procedure.

12.2 DATA COLLECTION – HOW/WHY TO MEASURE IT

The data used as a basis for performance measures must be consistent. However, gathering data can be a problem for many small systems. For small systems where staff often perform many functions at once, a systematic approach to data collection is important.

Accurate record keeping and having an integrated database is very important to a smaller transit system. Basing the performance assessment on readily available data can be important in minimizing staff time utilized for the collection of data.

Currently, because of budget and time constraints, evaluation by service monitoring is often an afterthought. To properly assess and control the provision of service, from both a passenger and a cost investment perspective, it is essential for the transit systems to understand and clarify its service performance expectations and to educate its policy boards and communities as to these expectations. The expectations must be understood and communicated clearly if transit investments are to continue to the level that will be required.

The most readily available data typically relates to system performance (such as passenger levels, service provision information, and financial measures). These are typically quantitative measures that allow direct comparison with previous years or other operators.

However, systems should also give consideration to collecting data that relate to public and passenger perception of the service. This includes information such as customer satisfaction, and ways to improve the service (from both customer and non-customers). These measures are useful in assessing whether the service is effective in serving the community's needs.

12.3 PEER GROUP BENCHMARKING

12.3.1 HOW TO IDENTIFY TRANSIT PEERS

Comparison to peers is another approach to assessing performance and a common performance assessment methodology. Shared basic characteristics need to be considered, as well as research on the performance of those similar systems on selected performance measures; and then comparison of its own performance to that of the peer services.

Despite widespread use, peer assessments typically include caveats, which usually indicate something to the effect that peer system comparisons should be treated with caution.

As such the selected transit systems may share similar characteristics but also other attributes, beyond the basic similarities, which may cause performance differences. This means that direct comparisons are not always exactly an "apples to apples" comparison.

While it may be that peer assessments may not always provide for a truly comparative analysis, they provide useful information for a transit system interested in knowing the performance of others on specific measures, and they show the range of performance achieved by the other transit systems. Importantly, such comparisons can provide a context for assessing an individual system's own performance.

Although an analysis of the transit system's own performance over time may provide the most accurate assessment of performance, given that the operating environment and factors affecting performance generally do not change significantly over the short-term, peer comparisons provide a framework for reviewing a transit system's own performance.

Understanding the different factors and characteristics that affect peer systems' performance may help an individual transit system consider strategies to improve its own performance.

Choosing peers, however, may not always be straightforward, and reported performance may be based on data and data definitions inconsistent across the peer groups.

12.3.2 DATA AND INFORMATION TO COLLECT

Some of the system attributes to consider for assessment when undertaking peer comparisons could include:

- Service area and operating environment
- Workforce characteristics (union vs non-union, volunteers, etc)
- Ridership market served, population

- Operating area: Urban, rural, or mix
- Type of routing and scheduling, demand responsive, community bus, fixed route systems
- Type of operator: public vs. non- profit, or private contractor
- Contracted operations (fleet maintenance, drivers, etc)
- Subscription or advance request vs. same day/next day trips
- Use of advanced technology
- Dedicated vs. non-dedicated vehicles (i.e. taxis)
- Service Type (for example, door-to-door vs. curb-to-curb vs. fixed route)

In addition to assessing these overall system characteristics, it is useful to assess a number of performance metrics to understand how the system compares with other peer agencies. Table 12-1 summarizes the performance metrics.

Table 12-1 – Common benchmarking measures

Metrics	What it explains	Typical performance (Smaller agencies)
Hours operated per capita	The degree of service a transit system provides to its population	< 1.0
Passengers per service hour	The extent of transit ridership for the number of services supplied	22
Passengers per capita	The degree to which a transit system attracts ridership	18
Operating cost per hour	The cost-effectiveness of operating transit service	93
Average fare	The affordability of transit service	$1.65
Revenue to cost ratio	The rate of return of the transit system	34%
Net cost per passenger	The cost-effectiveness of a transit service offset by fare revenues	$3
Municipal cost per capita	The degree of municipal subsidy to transit by each of its municipal population	$40
Transit mode share	The proportion of trips made by transit	2%

Data sources: CUTA Factbook 2012 / transit agencies / private communications

There are also a number of more qualitative measures that it might be appropriate to assess, depending on the needs of the community. These include:

- Increase in transit-oriented development and tax base
- Extent it serves target populations
- Increase in property values and tax base
- Passenger satisfaction
- Third party support and funding
- Increase in trips to key destination (e.g. downtown, community facilities)
- Service frequency

- Travel time
- Wait times

12.3.1 USING THE DATA

It is seldom necessary to collect data for all the measures described in this section. The aim should be to know what aspects of the service performance have the highest priority for assessment, and focus on collecting the data associated with those.

Once the data has been collected and comparisons made, the most useful next step is to examine the reasons for the differences. These will then either reveal potential areas for improvement, or highlight areas where the service is performing particularly well. In some cases, the differences may be caused by circumstances other than the service's performance (such as wider background conditions). Following this assessment, the information should be used to plan improvements to the service provision or operational practices, with future monitoring used to assess the success of those improvements.

13. OTHER RESOURCES

(Note: Links were accessed October 2015)

Transit service in smaller communities (Chapter 2):

- *Transportation and the New Generation: Why Young People Are Driving Less and What It Means for Transportation,* US PIRG Education Fund & Frontier Group, 2012 http://www.uspirg.org/sites/pirg/files/reports/Transportation%20%26%20the%20New%20Generation%20vUS_0.pdf

Consultation (Chapter 3):

- *Towards Coordinated Rural Transportation*, Rural Ontario Institute, 2014. http://www.ruralontarioinstitute.ca/file.aspx?id=b5980041-d1ce-4618-b742-1d62c39208f1
- *Issue Papers,* Canadian Urban Transit Association, 2003-2014. http://www.cutaactu.ca/en/public-transit/publicationsandresearch/issue_papers.asp
  Background Document on Public Consultation, Organisation for Economic Co-operation and Development, n.d. http://www.oecd.org/mena/governance/36785341.pdf
- *Planning for Transportation in Rural Areas*, Federal Highway Administration, 2012. http://www.fhwa.dot.gov/planning/publications/rural_areas_planning/page05.cfm
- *Consultation techniques*, Government of Queensland, 2011. http://www.qld.gov.au/web/community-engagement/guides-factsheets/methods-techniques/consultation.html
- *Price Appreciation Patterns around Transit Stations*, Bagheri et al, June 2012. http://webcontent.sauder.ubc.ca/sitecore/shell/Controls/Rich%20Text%20Editor/~/media/Files/Faculty%20Research/Urban%20Economics/TransitPriceAppreciationPatterns.ashx

Service planning (Chapter 5):

- *Towards Coordinated Rural Transportation*, Rural Ontario Institute, 2014. http://www.ruralontarioinstitute.ca/file.aspx?id=b5980041-d1ce-4618-b742-1d62c39208f1
- *Toolkit for Rural Coordinated Community Transportation,* Transit Cooperative Research Program, 2004. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_101.pdf
- *Transit-Supportive Guidelines*, Ministry of Transportation Ontario, 2014. http://www.mto.gov.on.ca/english/transit/supportive-guidelines.shtml
  TCRP Report 95: Demand Responsive/ADA Traveler Response to Transportation System Changes, Transit Cooperative Research Program, 2004. http://www.tcrponline.org/PDFDocuments/TCRP_RPT_95c6.pdf

Establishing demand (Chapter 6):

National Household Survey: Data tables. Statistics Canada, 2011. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/dt-td/Rp-eng.cfm?LANG=E&APATH=3&DETAIL=0&DIM=0&FL=A&FREE=0&GC=0&GID=0&GK=0&GRP=0&P

ID=106036&PRID=0&PTYPE=105277&S=0&SHOWALL=1&SUB=0&Temporal=2013&THEME=96&VID=0

Funding (Chapter 10):

- The State of Canada's Cities and Communities, Federation of Canadian Municipalities, 2012. https://www.fcm.ca/Documents/reports/The_State_of_Canadas_Cities_and_Communities_2012_EN.pdf

General:

- *TCRP Report 10: Fare Policies, Structures, and Technologies*, Transportation Research Board / National Research Council, 1996. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_10-a.pdf
- *TCRP Report 98: Resource Requirements for Demand-Responsive Transportation Services,* Transportation Research Board / National Research Council, 2003. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_98.pdf
- *TCRP Report 136: TCRP Guidebook for Rural Demand Response Transportation: Measuring, Assessing, and Improving Performance,* Transportation Research Board / National Research Council, 2009. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_136.pdf
- *TCRP Report 140: A Guide for Planning and Operating Flexible Public Transportation Services* Transportation Research Board / National Research Council, 2010. http://www.tcrponline.org/PDFDocuments/TCRP_RPT_140.pdf
- *TCRP Synthesis 94:* Innovative Rural Transit Services, Transportation Research Board / National Research Council, 2011. http://www.tcrponline.org/PDFDocuments/tsyn94.pdf
- *Transit Price Elasticities and Cross-Elasticities* (2015) Todd Litman / Victoria Transport Policy Institute. http://www.vtpi.org/tranelas.pdf
- *The Factors Influencing Transit Ridership: A Review and Analysis of the Ridership Literature.* Taylor & Fink / UCLA. http://www.uctc.net/papers/681.pdf

13.1 PHOTO ATTRIBUTIONS

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14. GLOSSARY OF TERMS

Term	Definition
Alighting	To get off a transit vehicle
Automated vehicle location (AVL)	System that identifies the real-time location of vehicles and communicates a signal back to a central control facility, used to improve on-the-road service management
Automatic passenger counts (APC)	Technology installed on transit vehicles that counts the number of boarding and alighting passengers at each stop and the time it occurs
Boarding	To get on a transit vehicle
Call Centre	Centralized office used for the purpose of receiving customer questions, compliments, complaints, and service requests
Capital costs	Costs of long-term assets of a transit system, including property, buildings, vehicles, and equipment
Computer-aided dispatch (CAD)	Software (through the integration of other technologies, such as automated vehicle location) that gives transit dispatchers and supervisors' decision support tools to manage the operations of a transit system.
Cutaway	A transit vehicle characterized with a vehicle body of a bus, but attached to a small- or medium-sized truck chassis
Deadhead	Distance or time that a vehicle travels when out of revenue service (e.g. leaving/returning to garage, changing between routes)
Demand	Degree to which a service area uses a particular good or service (i.e. transit service)
Frequency	Average number of scheduled vehicles arriving a particular stop on a route within a given hour (e.g. a bus departs from this stop four times an hour)
Headway	Scheduled time between successive vehicles on a route (e.g. a bus departs from this stop every 15 minutes)

Term	Definition
High-Occupancy Vehicle (HOV) Lane	Lanes designated for vehicles that carry at least more than one person (e.g. carpools, buses, taxis), designed to help move more people through congested areas
Kiss and ride	Facility where transit passengers can be picked up or dropped by motorists
Layover	Time in a transit schedule usually between the arrival time of a just completed trip and the departure time of the next trip to account for required recovery time, as well as to accommodate operator breaks and to provide more easy-to-follow transit schedule headways
Mode share	Proportion of people that use each of the various transportation modes
Operating costs	Total costs to operate and maintain a transit system including salaries, employee benefits, fuel, maintenance, taxes, etc.
Paratransit	Specialized transit services serving people with disabilities—provided typically to supplement fixed-route transit services
Park and ride	Parking area for automobile drivers who then board vehicles, shuttles or carpools from these locations
Recovery time	Time in a transit schedule between the arrival time of a just completed trip and the departure time of the next trip to provide the route to return to schedule to account for delays along the route
Revenue Service Hour	Time used when a revenue vehicle is in operation over a route and is available to the public for transit service
Ridership	Number of rides taken by people using a transit in a given time period
Ride-hailing / ride-sourcing	Passengers can request a ride from a ride-arranging service in real-time, usually through their mobile device, and a driver will respond to this request to fulfill the ride
Ride-sharing / carpooling	The sharing of a trip in one vehicle in which all occupants of the vehicle have a common destination and the driver's taking of passengers is incidental to the trip purpose

Term	Definition
Right of way	Land over which a public road or rail line is built
Running time	Time assigned for the movement of a vehicle over a route—typically measured on a route segment basis by various times of the day
Service area	A geographic area which is provided with transit services—typically defined as the area within 400 metres from a service route
Service coverage	How well a transit network geographically serves its defined urban area
Span of service	The hours when a service operates on a given day (e.g, 6 am to 10 pm). Service span often varies by weekday, Saturday, or Sunday
Specialized transit	Transit services provided to specific groups (such as seniors or people with disabilities), instead of to the general population
Transit signal priority	Measures that provide transit vehicles with priority at traffic signals

Appendix A

Example On-board Survey

On-Board Rider Survey

We conducting an on-board survey as part of our Transit Route Plan study, with a goal of making improvements to better serve our customers. Please take a few minutes to answer this questionnaire and help plan the future of the system

Please complete your questionnaire during your trip and return it to the on-board surveyor. Thank you.

1. What was the purpose of this trip?

☐ Work ☐ Recreation ☐ Shopping ☐ Medical

☐ School ☐ Other – specify _____

2. Where did you start this trip?

☐ From Home ☐ From Workplace ☐ From School

☐ Other, please specify _____

2A. The nearest intersection of this location is: *(e.g. King St & Main St)*

Nearest intersection: _____ and _____

3. What time did you begin this trip?

_____ ☐ AM ☐ PM

4. Did you transfer from another route?

☐ Yes – If yes, which route did you transfer from?

Route #: _____

☐ No

5. What route are you currently on?

Route: _____

6. Will you be transferring to another route for this trip?

☐ Yes – If yes, which route will you transfer to?

Route #: _____

☐ No

7. Where is your final destination on this trip?

☐ Home ☐ Workplace ☐ School

☐ Other, please specify _____

7A. The nearest intersection of this destination is: *(e.g. Queen St & High St)*

Nearest intersection: _____ and _____

8A. Did you make the same transit trip in the reverse direction *earlier* today?

☐ Yes – If yes, specify the time you made the earlier trip

Time: _____ ☐ AM ☐ PM

☐ No

8B. Will you make the same transit trip in the reverse direction *later* today?

☐ Yes – If yes, specify the time you made the earlier trip

Time: _____ ☐ AM ☐ PM

☐ No

9. How many days per week do you make this transit trip?

_____ days per week

10. What is your age?

☐ Under 18 ☐ 25 to 44 ☐ 65 and over

☐ 18 to 24 ☐ 45 to 64

11. What is your occupation?

☐ Student – Post-secondary ☐ Manufacturing ☐ Unemployed

☐ Student – Other ☐ Education/Health ☐ Retired

☐ Retail/Service ☐ Professional

☐ Other – please specify _____

Thank you for your participation. Please return this completed questionnaire to the on-board surveyor.

Appendix B

Worksheet Instructions

WORKSHEET INSTRUCTIONS

This document provides step by step instructions for using the worksheets that guide the planning for transit services. The worksheets include:

- Conventional transit demand estimation
- Specialized transit demand estimation
- Capital cost estimation
- Service Design – Fixed route
- Service Design – Demand response

These worksheets are intended to obtain an order-of-magnitude understanding of demand and costs of a potential service. The outputs generated from these worksheets should not be used as a robust technical approach to support transit service decision making. The assumptions were identified based on general characteristics of transit systems for small communities and may not reflect the unique system conditions.

WORKSHEET 1: CONVENTIONAL TRANSIT DEMAND ESTIMATION

WORKSHEET #1: CONVENTIONAL TRANSIT DEMAND ESTIMATION

Purple = input
Orange = calculation
Green = output

Section 1) Main inputs

Item	Value	
Municipal population	25,000	
% of population in service area	70%	
Service area population	17,500	
Total daily trip rate	2.07	Weekday trips per person
% of trips within service span	83%	See *Section 2 table*
Estimated mode share	1.00%	See *Section 3 table*
Daily transit trips (weekday)	302	
Saturday service?	Yes	(Yes/No)
Sunday service?	No	(Yes/No)
Average fare	1.7	

Section 2: service span

Trips covered by service span

Hour	In span	% of demand
0:00	No	0.5%
1:00	No	0.2%
2:00	No	0.1%
3:00	No	0.1%
4:00	No	0.3%
5:00	No	1.2%
6:00	Yes	3.5%
7:00	Yes	8.1%
8:00	Yes	11.3%
9:00	Yes	4.6%
10:00	Yes	4.1%
11:00	Yes	4.3%
12:00	Yes	4.1%
13:00	Yes	3.9%
14:00	Yes	5.8%
15:00	Yes	9.6%
16:00	Yes	8.5%
17:00	Yes	9.0%
18:00	Yes	6.6%
19:00	No	4.8%
20:00	No	3.5%
21:00	No	2.9%
22:00	No	1.8%
23:00	No	1.2%
Total	83.4%	*100.0%*

Source: 2011 Transportation Tomorrow Survey

Section 3: mode share information

Suggested mode shares	
Fixed route, over 20k people	1-2%
Fixed route 5-20k people	.75-1.5%
Fixed route, under 5k people	0.5-1%
Non-fixed route, over 5k people	0.5-1%
Non-fixed route, under 5k people	0.25-0.5%

Section 4: output

Estimated ridership	
Weekday Daily ridership	302
Weekly ridership	1,631
Annual ridership	**85,051**
Annual fare revenue	**144,587**

Directions

1. Enter the total population of the municipality.

2. Enter the percentage of the population that is in the service area.
   If you know the precise population in the service area, enter it directly into the "Service area population" cell.

3. Enter the daily trip rate.
   The daily trip rate is the average number of trips made per person.
   If you do not know your community's daily trip rate, use the default trip rate (2.07 weekday daily trips per person), which is based on the 2011 Transportation Tomorrow Survey (a transportation travel behaviour survey in southern Ontario).

4. Enter the estimated mode share.
   Use the suggested mode share information in Section 3, based on the type of service provided and service area population.

5. Indicate the service span for weekday service by indicating "Yes" or "No" to each hourly interval.
   For example, if the planned service operates from 6:00 to 18:59, indicate "Yes" for all hourly intervals from 6:00 to 18:00.

6. Indicate whether Saturday service is planned with a "Yes" or "No".

7. Indicate whether Sunday service is planned with a "Yes" or "No".

8. Enter the average fare for the system.
   This is calculated by dividing the total fare revenues collected by the number of passenger trips carried.
   If you do not know your system's daily trip rate, use the default trip rate ($1.70), which is based from the 2012 CUTA Factbook for small systems with less than 50,000 population.

   Next steps:
   - The inputs above provide a high-level understanding of the estimated ridership, including weekday daily ridership, weekly ridership and annual ridership
   - The ridership figures for Saturday and Sunday are based on the assumption that:
     - Saturday ridership is approximately 40% of weekday daily ridership
     - Sunday ridership is approximately 20% of weekday daily ridership
     - These figures are also based on the 2011 Transportation Tomorrow Survey

WORKSHEET 2: SPECIALIZED TRANSIT DEMAND ESTIMATION

WORKSHEET #2: SPECIALIZED TRANSIT DEMAND ESTIMATION

Purple = input
Orange = calculation
Green = output

Section 1: Demand estimation

Input Name	Input Source(s)	Input Value		Output Name	Output Value
Municipal population	Agency	25,000	1	Target population	2,275
% of population in service area	Agency	70%	2	Persons applying for specialized transit	158
Service area total population		17,500	3	Registrants	155
Target population rate	Statistics Canada	13.0%	4	Active registrants	130
Market penetration rate	Agency	6.9%	5	Total trip requests	15,950
Eligibility rate	Agency	98.0%	6	Booked trips	15,327
Percent of active registrants	Agency; CUTA (Specialized Transit Statistics)	84.1%	7	Passenger trips per year	11,801
Trip request rate per year	Agency; CUTA (Specialized Transit Statistics)	123	8		
Denial rate	Agency; CUTA (Specialized Transit Statistics)	3.9%	9		
Cancellation and no-show rate	Agency; CUTA (Specialized Transit Statistics)	23.0%			

Section 2: Revenues

Input Name	Input Source(s)	Input Value		Output Name	Output Value
Average fare per trip	Agency; CUTA (Specialized Transit Statistics)	$2.00	10	Annual fare revenue	$23,603

Source: Adapted from CUTA's *Forecasting demand for Specialised Transit* workbook

Directions

1. Enter the total population of the municipality.

2. Enter the percentage of the population that is in the service area.
If you know the precise population in the service area, enter it directly into the "Service area population" cell.

3. Enter the target population rate. This is the percentage of the population who the service is geared towards.
For example, if the service is intended to serve people with disabilities, identify the percentage of the population that has a disability. The Canadian average is approximately 13%. Provincial breakdowns are available from a **Canadian Survey on Disability** from Statistics Canada.

4. Enter the market penetration rate, which is the percentage of the target population who apply for specialized transit.
CUTA's Forecasting demand for Specialized Transit workbook includes a default market penetration rate of 6.9%

5. Enter the eligibility rate, which is the percentage of those who apply for specialized transit who are assessed to be eligible for specialized transit service. A default value of 98% is identified, which is based on CUTA's Forecasting Demand for Specialized Transit workbook.

6. Enter the percentage of active registrants. This is the percentage of eligible customers who have used the service at least once in a given year. A default value of 84.1% is identified, based on CUTA's Forecasting Demand for Specialized Transit workbook.

7. Enter the trip request rate. This is the average number of requests active registrants in a given year.
A default value of 123 trips is identified, based on CUTA's Forecasting Demand for Specialized Transit workbook.

8. Enter the trip denial rate. This is the percentage of requested trips that were denied, which could arise for a number of reasons (e.g. trip is beyond the service area, the trip could not be fulfilled because of the demand for service at that time). A default value of 3.9% is identified, based on CUTA's Forecasting Demand for Specialized Transit workbook.

9. Enter cancellation and no-show rate. This is the percentage of trips that were cancelled by the passenger, or who were not present when being picked up.

10. Enter the average fare for the trip.
This is calculated by dividing the total fare revenues collected by the number of passenger trips carried.
A default value of $2.00 is identified, based on CUTA's Forecasting Demand for Specialized Transit workbook.

Next steps:

- The inputs above provide a high-level understanding of the estimated ridership and potential revenues

WORKSHEET 3: CAPITAL COSTS ESTIMATION

WORKSHEET #3: CAPITAL COSTS

Purple = input
Orange = calculation
Green = output

Section 1: Main inputs

Item	Capital Cost	Units	Number needed	Start-up cost	Expected Life Cycle (years)	Replacement costs per year
Vehicles*						
Conventional 40-foot (12 metre) vehicle	$500,000	per bus	5	$2,500,000	12	$208,333
Conventional 30-foot (10 metre) vehicle	$450,000	per bus	0	$0	12	$0.000
Community bus, medium-duty transit cutaway	$250,000	per bus	0	$0	7	$0.000
Community bus, light-duty transit cutaway	$100,000	per bus	0	$0	6	$0.000
Modified vans	$60,000	per bus	0	$0	5	$0.000
Subtotals for vehicles:			**5**	**$2,500,000**	**N/A**	**$208,333**
Stop Amenities - Materials and installation.						
Concrete pad and bus pole	$1,800	per stop	100	$180,000	20	$9,000
Shelter	$15,000	per stop	10	150,000	20	$7,500
Bench	$2,000	per stop	10	$20,000	10	$2,000
Garbage Receptacle	$900	per stop	10	$9,000	10	$900
Bike post-and-ring	$350	per stop	0	$0	20	$0
Subtotals for stops:			**100**	**$359,000**	**N/A**	**$19,400**
Other						
Transit garage / maintenance facility**	$400,000	per bus	5	$2,000,000	---	---
Advanced dispatching system - Computer-Aided Dispatch, Automatic Vehicle Location, Installation	$50,000 $10,000	per system per bus	1 5	$50,000 $50,000	---	---
Phone systems - Wiring, Network Services, Telephone Units, Control Units, Installation	$1,800	per system	1	$1,800	---	---

* includes farebox and radio equipment

** numbers based on a medium sized system (40 to 80 buses). Smaller systems will more likely contract out storage and maintenance or use existing facilities jointly with other functions.

Section 2: output

Costs	
Startup costs	**$4,960,800**
Long-term per-year replacement costs	$227,733

Directions

1. Enter the quantity for each vehicle type required.

2. Enter the quantity of stops and amenities required.
   - Use an average of 2.5 stops per kilometre of one-way route
   - Enter the number of shelters on the route (not every stop may have a shelter)
   - Enter the number of benches on the route (one at each shelter + any at other stops)
   - Enter the number of garbage receptacles on the route (one at each shelter)
   - Enter the number of bike-post-and-ring assemblies on the route

3. Enter whether an advanced dispatching system is required in the capital cost estimation.
   - If you wish to include it in the cost, enter 1.
   - If you do not want to include it in the cost, enter 0.

4. Enter whether an advanced dispatching system is required in the capital cost estimation.
   - If you wish to include it in the cost, enter 1.
   - If you do not want to include it in the cost, enter 0.

Next steps:

- The inputs above provide an order-of-magnitude understanding of capital costs
- The inputs also identify the long-term per-year replacement costs, which would be required over the expected Life Cycle

Note:

- Estimating costs of the transit garage and maintenance facility is very complex, as it depends greatly on the land costs, the requirements needed for operations and maintenance, and whether the garage is shared with other public works facilities
- It is recommended that agencies get a more detailed assessment of garage facility capital costs

WORKSHEET 4: FIXED-ROUTE SERVICE DESIGN

WORKSHEET #4: SERVICE DESIGN - FIXED ROUTE

Purple = input
Orange = calculation
Green = output

Section 1: route inputs

Route information

Route name	Round trip [illegible]	Route type	Assumed sp[illegible] (f
Route 1 - King Street	[illegible]6	Urban Local	[illegible]22
Route 2 - Main Street	32.0	Urban Local	22
Route 3 - Oakwood	55.0	Urban Connector	40

Speed assumptions

Route type	Assumed speed
Urban Local	22
Urban Connector	40

Section 2: service design

Monday to Friday

Route information	AM Peak Period					Mi[illegible]					PM Peak Period					Early Evening					Late Evening					
	Number of hours in serice period:				3	N[illegible] hours in serice period:				6	Number of hours in serice period:				3	Number of hours in serice period:				3	Number of hours in serice period:				3	
Route name	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	Total Hours
Route 1 - King Street	2	[illegible]	56	4		1	60.0	56	4	22.0	2	30.0	56	4	22.0										18.0
Route 2 - Main Street	3	[illegible].0	87	3		1.5	60.0	87	3	22.0	3	30.0	87	3	22.0	1	90.0	87	3	22.0						30.0
Route 3 - Oakwood	3	30.0	83	7	40.0	1.5	60.0	83	7	40.0	3	30.0	83	7	40.0	1.5	60.0	83	7	40.0						31.5
																										0.0
																										0.0
																										0.0
																										0.0
																										0.0

Saturday

Route information	Morning					Afternoon					Evening					
	Number of hours in serice period:				5	Number of hours in serice period:				6	Number of hours in serice period:				5	
Route name	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	Total Hours
Route 1 - King Street						1	60.0	56	4	22.0						6.0
Route 2 - Main Street						1.5	60.0	87	3	22.0						9.0
Route 3 - Oakwood						1.5	60.0	83	7	40.0						9.0
																0.0
																0.0
																0.0
																0.0
																0.0

Sunday

Route information	Morning					Afternoon					Evening					
	Number of hours in serice period:				4	Number of hours in serice period:				6	Number of hours in serice period:				4	
Route name	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	# of Vehicles	Service interval (mins)	Run time (min)	Recovery time (min)	Avg Speed (km/h)	Total Hours
Route 1 - King Street						1	60.0	56	4	22.0						6.0
Route 2 - Main Street						1.5	60.0	87	3	22.0						9.0
Route 3 - Oakwood						1.5	60.0	83	7	40.0						9.0
																0.0
																0.0
																0.0
																0.0
																0.0

Service Summary

Service Hours

	Daily hours	Days per year	Annual service hours	Annual Operating Cost
Monday-Friday, excl holidays	79.5	251	19,955	1,696,133
Saturday	24.0	52	1,248	106,080
Sunday and holidays	24.0	62	1,488	126,480
Total		365	22,691	1,928,693

Operating cost assumptions

Operating Cost/Hour	85

Directions

1. Enter the name of the route.

2. Enter the round trip distance (the distance from one terminus to the other and back) of the route in kilometres.

3. Enter the general land use type that the route serves.
   - Urban Local – Route serves generally within one contiguous urban area
   - Urban Connector - Route serves between separate urban areas whereby the rural portion of the route is greater than 40% of the route distance

4. Enter the number of hours in the service period.
   For example, if the AM Peak period is from 6:00am to 9:00am, the period has a 3 hour span. In this case, enter 3.

5. Enter the number of vehicles you wish to operate on the route, expressed ideally in whole numbers.
   You can also enter vehicles in multiples of 0.5 as long as:
   - the sum of the vehicles operating in that period is a whole number
   - the routes that are allocated half-vehicles are connected at terminus points (this allows for two routes to be interlined)

   You may want to vary the number of buses to gauge the impacts to service frequency

6. Once you have identified an appropriate service frequency, enter the recovery time (in minutes) for the service.
   A few conditions to note:
   - Recovery time should be approximately 10% of the run time
   - Sum of the run time and recovery time should be divisible by the number of buses—this results in having a service interval in minutes that is an integer
     - For example: 2 buses operating with a 56 minute run time and 4 minutes recovery time (60 minutes total) results in a service operating every 30 minutes

   Next steps:
   - Repeat Steps 4, 5, and 6 for the other service periods. Space is provided for Monday to Friday, Saturday, Sunday
   - With the service designs completed, the service summary table is computed, showing the daily hours, annual service hours, and estimated annual operating costs

WORKSHEET 5: SERVICE DESIGN – DEMAND RESPONSE

WORKSHEET #5: SERVICE DESIGN - DEMAND RESPONSE

Purple = input
Orange = calculation
Green = output

Section 1: route inputs

Route information

Service name	Route type	Passenger markets served	Assumed peak hour ridership levels	Maximum route distance to serve assumed peak hour ridership level (km)	Assumed speed (km/hour)	Assumed time to accommodate all passengers with one vehicle (hour)	Peak buses required
Orchard Heights	Urban Local	Seniors/people with disabilities	3	35	18	1.94	2
Brooklane	Urban Local	Seniors/people with disabilities	3	42	18	2.33	3
Community Connector	Urban Connector	All passengers	7	60	40	1.50	2

Speed assumptions

Route type	Assumed speed
Urban Local – All passengers	22
Urban Local – Seniors/people with disabilities	18
Urban Connector – All passengers	40
Urban Connector – Seniors/people with disabilities	34

Peak hour ridership assumptions

Passenger markets served	Assumed ridership
All passengers	7
Seniors/people with disabilities	3

Section 2: service design

	Monday to Fri					Saturday			Sunday		
Route information	AM Peak Per	day	PM Peak Perio	Early Evening	Late Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening
Number of hours in serice period:	3	6	3	3	3	5	6	5	4	6	4
Route name											
Orchard Heights	2	2	2	2			2			2	
Brooklane	3	3	3	2			3			3	
Community Connector	2	2	2	2			2			2	
Total buses in service period	7	7	7	6	0	0	7	0	0	7	0
Total service hours in service period	21	42	21	18	0	0	42	0	0	42	0

Service Summary

Service Hours

	Daily hours	Days per year	Annual service hours	Annual Operating Cost
Monday-Friday, excl holidays	102.0	251	25,602	2,176,170
Saturday	42.0	52	2,184	185,640
Sunday and holidays	42.0	62	2,604	221,340
Total		365	30,390	2,583,150

Operating cost assumptions

Operating Cost/Hour	85

Directions

1. Enter the name of the service.

2. Enter the general land use type that the route serves.
   - Urban Local – Route serves generally within one contiguous urban area
   - Urban Connector - Route serves between separate urban areas whereby the rural portion of the route is greater than 40% of the route distance

3. Enter whether the on-demand service is for:
   - All passengers, or
   - Seniors and people with disabilities

4. Enter the maximum route distance in kilometres to serve the assumed peak hour ridership level (as discussed in Section 5.3.3 of the Guidelines, “Step 3: Determine route distance to serve assumed peak hour ridership levels”).

5. Enter the number of hours in the service period.
   For example, if the AM Peak period is from 6:00am to 9:00am, the period has a 3 hour span. In this case, enter 3.

6. Enter the number of vehicles you wish to operate on the route
   In Section 1, the entered information for Steps 1 through 4 calculates the approximate number of peak buses required for each service. Thus, enter the peak bus calculated values in Section 1 into the appropriate peak period column in Section 2.
   - If operating service for all passengers, the peak periods are commonly the Monday-Friday AM and PM Peak Period
   - If operating service for seniors and people with disabilities, the peak period is commonly the Monday-Friday Midday period

   Next steps:
   - Enter the number of hours in each operating service period
     - For example, if the AM Peak period is from 6:00am to 9:00am, the period has a 3 hour span. In this case, enter 3.
   - Enter the number of buses for the other service periods accordingly
     - You may wish to scale back the number of buses operated for other non-peak periods according to demand for the services.