

## Significant Predictors of Parking Demand

Parking demand is influenced by many factors and is difficult to predict. A primary predictor for parking demand is travel mode choice; if a person chooses to drive, they will need a place to park at the end of their trip. Research shows that household income and trip purpose are the two most significant predictors of whether one will choose to drive. The availability of parking at a destination also has a significant impact on a person's choice to drive or pursue alternative modes of transportation. The way a municipality manages its parking can strongly influence travel behaviour and assist in achieving (or not achieving) its planning goals.

Various factors (particularly a wide range of personal choices) influence travel behaviour, and demand for parking. Factors influencing travel behaviour can be broadly split into trip generation and transportation modal choice. Some of these factors are explored below.

### **Transportation mode choice**

The demand for vehicle parking stems from the number of trips generated using a private automobile. When a person chooses their travel mode they will typically balance three aspects of the trip: the duration of the trip between the available options; the cost of each option; and the convenience of each mode, considering the purpose of the trip and the time of day that it is occurring. These three primary components to mode choice are detailed below.

#### *Time*

In choosing a travel mode, the time to complete the trip between various travel modes (private vehicle, public transit, walk, bike) is a primary consideration. For example, if you can arrive at a destination in 10 minutes driving, 15 minutes biking, 40 minutes on the bus, and 50 minutes walking, then most people will choose driving as the tradeoff for time is usually worth the increased cost.

#### *Cost*

Price is often the strongest factor in deciding where motorists choose to park. Motorists are drawn to areas where parking is free and abundant, or where the price for parking is low enough to be acceptable. Some motorists will search for "free parking", even if it results in wasted time. In locations with high parking demand and higher parking costs, motorists may have a stronger incentive to explore other modes of transportation.

#### *Convenience*

In choosing a travel mode, convenience is a key factor for the trip as it relates to multiple areas of consideration. Many factors influence the perception of convenience to include total distance to destination, the expected duration of

travel, the time of day the travel is desired, and the attributes of the destination including the availability of parking and the expected time to find a vacant parking space.

In locations where there is a cost associated with parking, the convenience of payment also influences the travel mode choice. Historically, paying for parking has been relatively inconvenient due to technology that requires the user to pay with coins, or to prepay for a limited time period. Edmonton's EPark system now allows payment with coin, credit card, and mobile application, for a better experience than analog parking meters.

The purpose of the trip may also impact the perception of convenience and therefore also impact the preferred mode of travel. For example, the inconvenience of taking groceries on the bus often means that most people will choose to take a vehicle, even if bus service is available. Similarly, if the distance to the destination is long and expected time at the destination is short, then the inconvenience of waiting for the next bus influences the travel mode to private vehicle.

The convenience of parking at the destination is also a consideration for motorists. When a motorist is certain of free and available parking at their destination, this is a substantial convenience, and influences their mode choice to drive. Where parking is uncertain in availability, location, rules, or price, motorists are less likely to drive. Alternatively, if one chooses to drive but does not know where public parking may be available or how much it costs, they may abandon the trip entirely or re-route to a more familiar destination.

Parking information systems provide motorists with information including digital wayfinding signs. These signs direct motorists to available capacity at parking facilities in their vicinity and thereby reduce the amount of time needed to find parking. This increases the convenience of the trip, while also increasing the utilization of existing parking supply.

#### *Mode shift*

The City of Edmonton has policy objectives to increase the range of transportation options available to residents. As transportation options that have a more attractive balance between time-cost-convenience as compared to the private automobile become available, the need to accommodate vehicle trips and parking will decrease. This change will be gradual and in some cases it may take time for parking demand to adjust to changes in the factors identified above. Constrained parking supply can support mode shift over time.

### **Demographic characteristics of a traveler**

Demographic characteristics of the traveler play a large impact on determining travel mode. Gender, age and ability can impact decisions, along with personal preference and comfort levels. The household travel survey indicated that for trips to Downtown and the downtown fringe, there is a good correlation between greater household income and greater number of trips made by private vehicle. However, when the purpose of the trip is categorized as “personal business”, such as going to a bank or lawyer, or other errand, the trip is more likely to be taken by car regardless of household income.

### **Type of business**

Anecdotal evidence suggests that some types of businesses have higher parking demands than others. For example, doctors’ offices or day-surgery locations may have high volumes of patients that remain on-site for extended periods of time. Other health services, such as a dental office, typically have parking needs throughout the day. Businesses such as daycares or schools may have significant parking needs for brief periods, for example morning drop-off and pick-up times, with much lower requirements for the remainder of the day.

The business employee parking demand is dependent on the vehicle ownership rate, modal split for employees at a destination, and any incentives or disincentives to take other travel modes. Employees typically require parking for stays longer than four hours, and would use long-term on-site parking spaces. Businesses will typically have rules for employee parking, or designate areas of the parking lot for employee parking, so that the customers have access to the most convenient parking spaces.

### **Popularity of business**

Parking demand can vary depending on the popularity of a business. More popular businesses may generate more customer visits which may increase parking demand. A similar business that is less popular may have fewer clients and so require fewer parking spaces.

It is challenging to predict the popularity of a business at the development permit stage. As highlighted in the technical report that formed part of the May 2, 2019, Urban Form and Corporate Strategic Development report *CR\_6707 Comprehensive Review of Parking Regulations in Zoning Bylaw 12800*, even when controlling for a single franchise with multiple locations it was difficult to predict parking demand ratios.

### **Urban context**

Parking demand and supply are influenced by the surrounding urban context. This includes factors such as access to transit, active transportation options, and proximity of destinations that can be accessed without the use of a car. However the technical study found access to transit and walkability were not predictive

factors of the variation of demand between neighbourhoods. The study did find that at a neighbourhood level, established and developing neighbourhoods tended to have higher median demand for parking when compared to mature neighbourhoods.

**Summary**

This non-exhaustive list of predictors of parking demand illustrates that most cannot be effectively regulated through on-site parking requirements. Of the types of variables that the City can regulate, such as proximity to transit, uses and activities on-site, and geographic location in the city, Edmonton data (as presented at the May 7, 2019 Urban Planning Committee) shows that there is no correlation between those variables and the parking supply utilization. In particular, the variable with the highest correlation accounts for only 17 percent of the variance between sites.