

In summer 2016, The City of Calgary conducted a trip generation study focusing on apartment-based transit oriented developments (TOD) within 600 m of a light rail transit (LRT) station. Six TOD sites were included in the study that reflected TOD principles (i.e., walkable, higher density, mixed-use form of development, proximity to LRT station), but had different building specific attributes (e.g., number of dwelling units, amount of parking, distance from LRT station). The locations are not identified in this briefing note to maintain privacy.

The trip generation study resulted in TOD-Apartment trip generation rates, mode splits for all of the sites, change in mode split over time at a downtown site, mode split differences between rainy and clear weather at a TOD site, mode split differences between a TOD- and non-TOD-Apartment, and trip generation factors for a suite of building-specific variables. The study highlights the importance of site-specific factors in controlling the success of a TOD location.

### Highlighted Results

**Table 1: Trip generation rates from the 2016 TOD apartment study**

Trip Rates	Dwelling Units	Parking Spaces	Total Employees	Retail/Office Gross Land Area
Total trip rate	6.9	7.1	36.1	0.10
Vehicle occupancy trip rate	3.4	3.6	16.5	0.05
Number of vehicles trip rate	2.6	2.7	12.8	0.04

Average trip generation rates are presented in Table 1. The **number of dwelling units was the best predictor of the number of trips**; the relationship was linear and strongly correlated ( $r^2 = 0.78$ ). The number of parking spaces and total retail/office space were also highly correlated to the number of trips, but these correlations are likely driven by the number of dwelling units. The relationship between number of trips versus total number of employees was moderately linear ( $r^2 \sim 0.5$ ). There was **no correlation with the distance to the LRT station** and either the number of transit trips or the total number of trips.

If there is not a straight line relationship between the number of trips and the predictor, the trip rate should not be calculated using the ratio of averages (e.g., average number of trips divided by average number of dwellings). A non-linear relationship means the two components are not proportional and the trip rate is not directly scalable.

**Table 2: Comparison of trip generation rates for TOD apartments**

Trip Rates per Dwelling Unit	Total Trip Rate	Vehicle Occupancy Trip Rate	Number of Vehicles Trip Rate	Transit User Trip Rate	Pedestrian Trip Rate	Cyclist Trip Rate
Calgary TOD 2016 Study (12 hr)	6.9	3.4	2.6	1.6	1.8	0.1
ITE (24 hr)	-	-	6.7	-	-	-
TRCP Report 128 (24 hr)	-	-	3.6	-	-	-

The 2016 **TOD vehicle trip generation rates were lower than the ITE and TRCP estimates**, though the 2016 study was restricted to 12 hours while the ITE and TRCP values are from 24 hour studies (factors were not available to make direct comparisons) (Table 2).

**Table 3: Differences in mode split among TOD locations**

Statistic	Automobile Users	Transit Users	Pedestrians	Cyclists
Minimum	25%	9%	10%	<1%
Mean	50%	24%	24%	1%
Maximum	71%	44%	41%	2%

Although all of the sites were considered TODs due to their proximity (within 600 m) to the LRT, there **were large differences in mode split** among the locations (Table 3).

**Table 4: Mode split between non-TOD and TOD apartments**

Land Class	Automobile Users	Transit Users	Pedestrians	Cyclists
TOD Apartment (2017 study)	43%	31%	25%	1%
Non-TOD Apartment (2010 study)	70%	1%	28%	1%
Difference	-27%	+30%	-3%	0%

Despite the differences in mode split between locations, there was still pattern in the overall behaviour of TOD apartments and non-TOD apartments (Table 4). On average, there were **30% fewer automobile users at TOD apartments, with a parallel increase in the proportion of transit users**. Pedestrian and cyclist proportions were relatively consistent regardless of whether the location was transit-oriented.

**Table 5: Mode split of downtown transit-oriented development #1 over time**

Study	Automobile Users	Transit Users	Pedestrians	Cyclists	Total
Trips (2004)	422 (26.9%)	413 (26.4%)	658 (42.0%)	73 (4.7%)	1,566
Trips (2016)	546 (25.0%)	962 (44.1%)	644 (29.5%)	28 (1.3%)	2,180

TOD-Apartment #1 was located downtown, and was studied in 2004 and in 2016. Between these years, the **downtown location experienced near constant automobile use (25% of total trips), and a shift away from active modes (16% decrease) towards transit use (18% increase)** (Table 5).

**Table 6: Mode split of transit-oriented development #2 during different types of weather**

Study	Automobile Users	Transit Users	Pedestrians	Cyclists	Total
Study #1 (Rainy)	653 (69.2%)	230 (24.4%)	52 (5.5%)	8 (0.8%)	943
Study #2 (Sunny)	583 (61.1%)	215 (22.5%)	134 (14%)	22 (2.3%)	954

TOD-Apartment #2 was observed once during a rainy day, and again during a sunny day. The **rain resulted in a 10% decrease in active mode users, and a subsequent 8% increase in automobile users** (Table 6). Even though this site was only 50 m from an LRT station, automobile use was still the dominant (>60%) form of transportation during both types of weather.