5-2015

2014 Transit Oriented Developments Survey

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Recommended Citation

Dill, Jennifer and McNeil, Nathan. 2014 Transit Oriented Developments Survey. TREC-15-01. Portland, OR: Transportation Research and Education Center (TREC), 2015. http://dx.doi.org/10.15760/trec.74

TREC

Transportation Insight for Vibrant Communities

FINAL REPORT

2014 Transit Oriented Developments Survey

TREC-15-01 ■ *May 2015*

TREC is the Transportation Research and Education Center at Portland State University.

Portland State UNIVERSITY

May 6, 2015

TO: Jon Williams, Metro

FROM: Jennifer Dill, Ph.D.
Nathan McNeil

RE: Findings from 2014 TOD Surveys

Introduction

This report presents results from surveys of residents at several transit-oriented developments (TODs) in Portland, Hillsboro, Tigard, and unincorporated Clackamas County. The research complements our previous survey work for Metro done at eight TODs in 2010 and 11 TODs in 2007. TODs included in this study are shown in Table 1. Findings of a related survey of the non-residential Globe Buildings, housing the Oregon College or Oriental Medicine, are presented in a separate report.

Table 1: TODs included in study

	# of units	Affordable units	Senior units	Date built	Transit	Transit Station
Acadia Gardens	41	41	0	2012	Light Rail	Clackamas Town Center, Clackamas County
Central Eastside Lofts	70	0	0	2012	Light Rail/ Streetcar	SE Grand & E Burnside (Streetcar), Portland
Hollywood Apartments	47	10	0	2013	Light Rail	Hollywood/NE 42nd Ave Transit Center, Portland
K Station	54	33	0	2011	Light Rail	N Killingsworth St, Portland
Milano	60	0	0	2012	Light Rail/Bike	Rose Quarter Transit Center, Portland
Pettygrove	95	0	0	2012	Streetcar	NW 21st & Northrup (Streetcar), Portland
The Knoll	48	48	48	2010	Bus	Tigard Transit Center, Tigard
The Prescott	155	31	0	2013	Light Rail	N Prescott St, Portland
4th Main	71	0	0	2014	Light Rail	Hillsboro Central
University Pointe	287 (900 beds)	0	0	2012	Light Rail	SW 5th & Hall, Portland

Methodology

To allow comparison across the region, the surveys were conducted in roughly the same manner as in 2005, 2007, and 2010 with a very similar survey instrument. This year's survey was shorter, based upon feedback from Metro staff. The eight-page survey included the following sections:

- Information on your Household. This included questions on household size and number of vehicles.
- Information about up to ten trips taken on the most recent Tuesday.
- Frequency of walking or bicycling and taking transit to common non-work destinations in good weather.
- Changes in daily travel compared to previous residence.
- Information on your Place of Work/School and Commuting.
- Information on Commuting from your Prior Residence
- Information on your Current Place of Residence. This section focused on the importance of various items in selecting their home.
- Information on your Travel Preferences. This section attempts to gauge people's preferences for various modes.
- Typical miles driven in a week and changes in vehicle ownership resulting from characteristics of their current neighborhood.
- Information about you. This section includes standard demographic questions and some questions about mobility impairments.

Each survey packet generally included two questionnaires (one for each potential adult in the household), a cover letter, and postage-paid return envelope. Respondents were asked to recycle extra forms. In the case of two buildings (The Knoll and The Prescott), the building manager provided the number of adults residing in each unit, and so the exact number of surveys were provided in those cases. Each letter also included a link to an online version of the survey, for residents preferring to take the survey electronically. Exceptions to this were the Knoll, for which an electronic survey option was not included, and University Pointe, which was conducted entirely electronically. University Pointe residents were given postcards explaining the study and directing them to the online survey, and via email reminders with the link.

In buildings with an onsite building manager, the building manager was provided with $5 gift cards to a local merchant (which included Starbucks, Ristretto Roasters, and New Seasons), and provided the gift card to residents as compensation when they submitted a completed survey. In several cases without onsite building managers (e.g. K Station and The Hollywood), the compensation consisted of entering a drawing for one of five $50 Amazon.com gift cards per building. For all of the developments, we conducted a second mailing to non-respondents. To boost responses, an additional $100 Amazon.com gift card was provided to the winner of a drawing across several buildings among people completing their surveys after the previously stated deadline. Because of the large number of residents in University Pointe, a drawing for one of ten $50 Amazon.com gift cards was conducted, and a follow-up compensation offering of a $10 Starbucks gift card was provided to the first 20 completions on the final day of data collection for that site.

Sample sizes and response rates are in Table 2. The overall response rate is 35% among standard residential buildings in the study, and 12% in University Pointe (focused toward student residents). This response rate is in line with the 2010 data collection (35%), both of which are higher than in 2005 (29%) and 2007 (26%). Response rates for individual developments ranged from 22% to 59%.

Table 2: Response rates

	# units in survey	# vacant	# of units responding	Response rate	# Individual Surveys Completed[a]
Acadia Gardens	41	1	12	30%	18
Central Eastside Lofts	70	5	17	26%	27
Hollywood Apartments	47	1	16	35%	17
Killingsworth Station (K Station)	54	0	32	59%	39
Milano	60	6	21	39%	26
Pettygrove	95	3	20	22%	26
The Knoll	48	0	24	50%	27
The Prescott	155	5	49	33%	60
4th Main	71	22	11	22%	11
Sub-total	641	43	202	34% overall 35% average	251
University Pointe	900	?	109	12%	109
Total	1541	43	301	20% overall 33% average	360

[a]Most survey packets included two surveys, one for each potential adult resident. Therefore, the total number of surveys completed may be higher than the number of units responding.

Findings

Trip Generation

One section of the survey asked about trips made for the most recent Tuesday. The intent of this question is to generate a "trip generation" rate for each person. The survey mailings were timed to arrive on Tuesday or Wednesday so as to maximize accuracy in recall. The first two trips were captured using the questions shown below. Similar information was collected for up to eight additional trips using similar question wording.

We are interested in learning about how you get around during the day. For the next few questions, we are particularly interested in trips you made on *Tuesday of this week*.
If you were out of town on Tuesday of this week, you may answer the questions for another day of the week. Please indicate the day here: _____

1. On Tuesday of this week, the *first time* you left your home, where were you going?
   - 1☐ To work
   - 2☐ To school (as a student)
   - 3☐ Shopping, errands, or eating out
   - 4☐ Visiting friends or family
   - 5☐ Taking someone else someplace (e.g. child to school)
   - 6☐ Entertainment or exercise
   - 7☐ No particular destination (ex: a jog, stroll, or walking a dog)
   - 8☐ Other: _____
   - 9☐ I did not go anywhere on Tuesday. *Please skip to Question 7 on page 3.*

2. How did you get there?
   - 1☐ Drove alone
   - 2☐ Drove or rode with someone else
   - 3☐ Walked
   - 4☐ Bicycled
   - 5☐ MAX → How did you get *to* the MAX station *from* home? 1☐ walk 2☐ drive vehicle 3☐ ride as passenger 4☐ ride bus 5☐ bicycle 6☐ other (_____)
   - 6☐ Streetcar
   - 7☐ TriMet bus
   - 8☐ TriMet LIFT service or RideConnection
   - 9☐ Other: _____

3. Consider where you went after that. Where were you going?
   - 1☐ Home
   - 2☐ To work
   - 3☐ To school (as a student)
   - 4☐ Shopping, errands, or eating out
   - 5☐ Visiting friends or family
   - 6☐ Taking someone else someplace (e.g. child to school)
   - 7☐ Entertainment or exercise
   - 8☐ No particular destination (ex: a jog, stroll, or walking a dog)
   - 9☐ Other: _____

4. How did you get there?
   - 1☐ Drove alone
   - 2☐ Drove or rode with someone else
   - 3☐ Walked
   - 4☐ Bicycled
   - 5☐ MAX → How did you get *from* the MAX station *to* your destination? 1☐ walk 2☐ drive vehicle 3☐ ride as passenger 4☐ ride bus 5☐ bicycle 6☐ other (_____)
   - 6☐ Streetcar
   - 7☐ TriMet bus
   - 8☐ TriMet LIFT service or RideConnection
   - 9☐ Other: _____

The results are shown in Table 3 and Table 4. Table 3 present the data for all trips, including home-based (starting at home) and non-home based trips. Table 4 presents the information just for trips starting from home (home-based trips). These data are used to estimate a personal motor vehicle trip generation rate per unit, shown in Table 5. For the trip generation estimate, the respondent is assumed to have returned home by the mode they departed, and carpool trips are adjusted down to account for the carpool trips that were reported by respondents in the same household.

Table 3: Total Trips Per Person

	Total trips (mean)	Total transit trips (mean)	Transit Share	Total SOV trips (mean)	Total Carpool trips (mean)	Total Walk + Bike Trips (mean)	n
Acadia Gardens	2.8	0.3	10%	1.4	0.4	0.4	18
Central Eastside Lofts	3.4	0.6	17%	1.0	0.7	1.1	27
Hollywood Apartments	4.1	0.6	14%	1.7	0.4	1.2	17
K Station	2.7	0.3	10%	1.1	0.3	0.9	39
The Knoll	1.9	0.1	8%	0.8	0.3	0.5	27
Milano	3.7	1.0	28%	0.7	0.3	1.3	26
Pettygrove	3.1	0.3	10%	1.8	0.1	0.8	26
The Prescott	2.9	0.4	13%	1.5	0.3	0.6	60
4th Main	3.0	0.7	23%	1.0	0.6	0.6	11
University Pointe	3.3	0.9	28%	0.1	0.1	2.0	109
All TODs	3.1	0.6	19%	0.9	0.3	1.2	360
All TODs, except University Pointe	3.0	0.4	14%	1.2	0.4	0.8	251

Table 4: Trips from Home Per Person

	Home Based Trips (mean)	Home-based transit trips (mean)	Transit share	Home-based SOV trips (mean)	Home-based Carpool trips (mean)	Home-based Walk + Bike Trips (mean)	n
Acadia Gardens	1.3	0.2	17%	0.7	0.2	0.2	18
Central Eastside Lofts	1.5	0.3	19%	0.3	0.3	0.6	27
Hollywood Apartments	1.6	0.2	14%	0.6	0.2	0.6	17
K Station	1.2	0.1	11%	0.5	0.1	0.5	39
The Knoll	1.0	0.1	7%	0.4	0.1	0.4	27
Milano	1.8	0.5	30%	0.3	0.1	0.7	26
Pettygrove	1.6	0.2	10%	0.8	0.04	0.6	26
The Prescott	1.4	0.2	17%	0.7	0.2	0.3	60
4th Main	1.4	0.4	29%	0.4	0.1	0.4	11
University Pointe	1.5	0.4	25%	0.04	0.02	1.1	109
All TODs	1.5	0.3	19%	0.4	0.1	0.6	360
All TODs, except University Pointe	1.4	0.2	17%	0.5	0.2	0.4	251

Table 5: Estimated Home-based Personal Motor Vehicle Trips Per Unit

Building	# of responding residents	Total personal vehicle trips from home reported[a]	# of units	Estimated Trips per unit	ITE Trip Rate[c]	Percent of ITE Trips
Acadia Gardens	18	15	12	2.5	4.2	60%
Central Eastside Lofts	27	14	17	1.6	4.2	38%
Hollywood Apartments	17	14	16	1.8	4.18	43%
K Station	39	21	32	1.3	4.18	31%
The Knoll	27	13	24	1.1	3.4	32%
Milano	26	12	21	1.1	4.2	26%
Pettygrove	26	23	20	2.3	4.2	55%
The Prescott	60	51	49	2.1	4.2	50%
4th Main	11	5	11	0.9	4.2	21%
University Pointe	109	6	35[b]	0.3	4.2	2%
Total	360	174	237	1.5		
All but University Pointe		168	202	1.7		

[a] Carpool trips are carpool trips are adjusted down to account for the carpool trips that were reported by respondents in the same household.

[b] University Pointe rents beds to individuals, rather than units to groups of residents. There are an average of 3.14 beds per unit. Therefore, we estimate that the 109 respondents represent approximately 35 units.

[c] ITE Trip Rate is from the Trip Generation Manual, 9th Edition, 2012. Trip Rates for Mid Rise Apartments utilitze ITE daily rates for High Rise Apartments due to the lack of an ITE daily rate for Mid Rise Apartments, and the relative parity between High Rise and Mid Rise Apartments for AM and PM peak trip rates.

Overall, the residents at buildings other than University Pointe generated about 1.7 vehicle trips per unit on the weekday examined. This includes trips leaving and coming (to and from) home. The results show considerable variation between the TODs, perhaps due to some small sample sizes (e.g. Acadia Gardens and 4th Main), where the means can be influenced by high or low values. Other facilities, like the Knoll, may be less likely to generate trips due to their population (i.e. mostly senior residents in the case of the Knoll). University Pointe, with a largely student population, generated very few motor vehicle trips, and was much lower than all other TODs surveyed.

The overall trip rate could be compared to the ITE rates and other rates used to estimate vehicle travel generated by a development. The number from the survey will be slightly lower than reality, due to trips generated by non-residents, e.g. non-residents visiting residents and trips made by project employees. However, these are likely to be a small number of trips. The rate of 1.7 trips per unit (excluding University Pointe) is significantly lower than the rate Metro uses from the ITE *Trip Generation* book (about 6.6 trips per apartment) and lower than the rate estimated from the TOD surveys conducted in 2010 (2.8). The difference from 2010 appears to be due to (1) fewer total trips reported leaving home and (2) fewer motor vehicle trips from home. Why the residents of these TODs would be reporting fewer trips from home than the TODs in the 2010 survey is unclear. It could be due to differences in survey methodology or differences in demographics or trip-chaining patterns.

The ITE Trip Generation Manual (9th Edition, 2012) does break down residential buildings beyond the general "apartment" category, with its estimate of 6.6 trips per unit per day. The breakdowns for the best comparable land uses to the study buildings, including High Rise Apartments (4.2 daily trips), Mid Rise Apartments (no daily rate given, but hourly rates are comparable to High Rise Apartments), High Rise Condominiums (4.18 daily trips), and Senior Adult Attached Housing (3.44 daily trips), are all considerably lower than the general apartment rate of 6.6 daily trips. Still, these breakdowns do not provide adjustment for TOD characteristics, including transit access and mixed-use. (Please see the Appendix for additional analysis of the ITE rates.)

A 2008 Transit Cooperative Research Program (TCRP) report[1] on the effects of TODs observed that TOD vehicle trip rates are considerably lower than the standard ITE rate for apartments. Rates for Portland TODs in that report ranged from 13% to 94% of the ITE rates, with a mean of 59%. TOD trip generation rates for other cities were also lower than the ITE rates: 52% of the ITE rate for San Francisco, 37% of the rate for Washington DC, and 73% of the rate for Philadelphia area TODs (pg. 37). Excluding University Pointe, our estimated trip generation rates for the TODs in this study ranged from 21% to 60% of the ITE daily trip rates for the comparable type of development (e.g. high-rise apartment, senior living, etc.), with a mean of 40%. This difference is, therefore, comparable to the differences found in the TCRP study.

In addition to the undercounting of non-resident trips mentioned above, the lower rate (compared to ITE) may also be due to people underreporting trips. There is no reason to believe that the respondents would systematically underreport (or over-report) their trips on

[1] Arrington, G.B. and R. Cervero. TCRP 128: Effects of TOD on Housing, Parking, and Travel. Transit Cooperative Research Program, Transportation Research Board of the National Academies, Washington, D.C.: 2008.

the survey form, but there is no way to know for sure. Respondents might over-report transit trips if they thought that response would be viewed favorably by the researchers or other users of the data. It is not possible to know whether this occurred in this case. Respondents may also forget about trips, which would result in an underestimate. However, these factors are unlikely to account for all of the difference between the estimated rates and the ITE rates.

Much of the difference is likely due to increased use of alternative modes, compared to the apartments sampled by ITE. From the trips reported, we estimated the mode split for all trips leaving the TODs (Figure 1). About 55% of all trips were made in personal vehicles. This is significantly lower than the 2008-09 National Household Travel Survey (NHTS), where about 84% of all trips were made in personal vehicles. In addition, 17% of the TOD resident trips were made on either MAX, Streetcar, TriMet buses, or categorized as "other" (which were usually forms of transit, including TriMet LIFT and other paratransit-type service). This compares to about 4% of trips reported in the NHTS.

Mode Split

The mode split for all trips is shown in Figure 1. Overall, only 39% of all trips were made in personal motor vehicles (driving alone or carpool). Removing University Pointe from the calculations, 55% of the trips were made in personal motor vehicles, 20% by foot, 15% by regular, fixed-route transit, and 8% by bicycle.

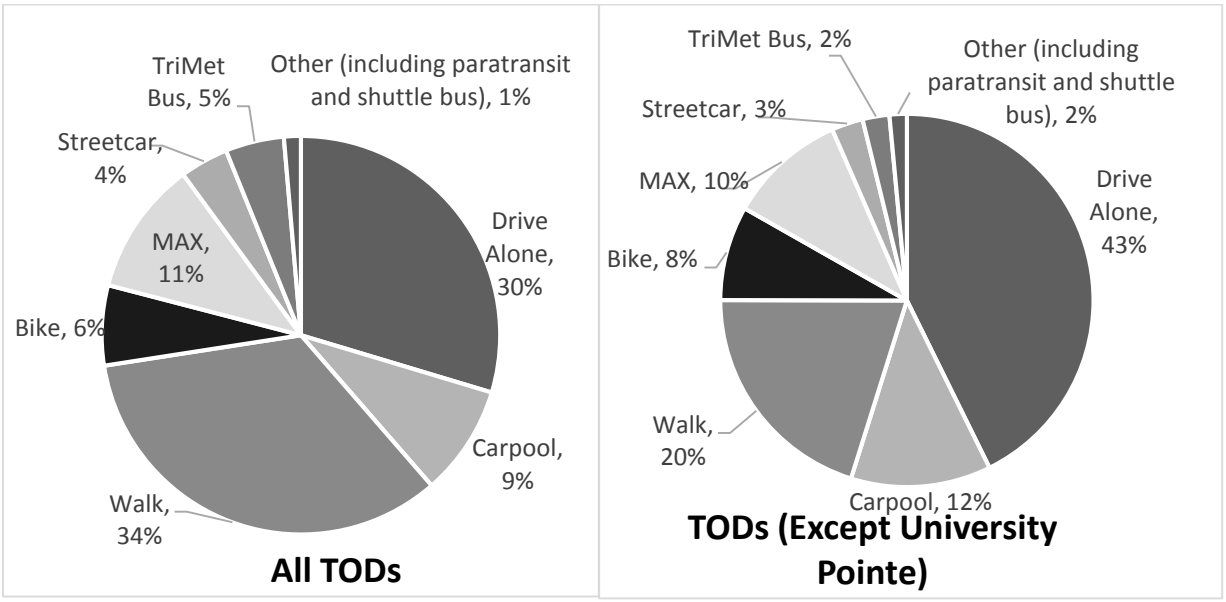

Figure 1: Mode Split for All Reported Trips

Vehicle availability, which is related to income, appears to explain some of these travel patterns. Most of the households had at least one vehicle (Table 6). Adult respondents living in households with one or more vehicles per person of driving age were far less likely to use transit (Table 7).

Table 6: Vehicle availability

All except University Pointe		University Pointe	
0	16%	Have Car	16%
1	58%	Have Access	10%
2	24%	No	74%
3+	3%	n	109
n	250		

Table 7: Vehicle availability and mode split

	All TODs		Excluding University Pointe	
	Less than one vehicle per person 16+	One or more vehicles per person 16+	Less than one vehicle per person 16+	One or more vehicles per person 16+
Private Vehicles	15%	64%	29%	68%
Foot/Bike	53%	25%	38%	21%
Transit	29%	8%	29%	6%
n	180	178	88	161

Commute Mode

Current Commute Mode

Another section of the survey asked specifically about commuting to work or school. Overall, 61% (n=215) of the respondents do work or go to school outside of the home. Of these, 27% used MAX or the Streetcar to get to work or school 4-5 days per week and 12% took the bus that often (Table 8). Only 28% of the respondents drove alone 4-5 days per week. The numbers do shift when University Pointe is removed (Table 9), with 40% driving along 4-5 days a week.

Of the respondents who currently commute by MAX or Streetcar (n=135), 94.5% walked or biked to the station, 3% took the bus, and 1.5% drove.

Table 8: Commute modes, all TODs Surveyed

	4-5 days per week	2-3 days per week	Once a week	1-3 days a month	Less than once a month	Never	n
Drive alone	28%	10%	6%	5%	6%	45%	258
Carpool	5%	5%	4%	7%	5%	75%	244
MAX light rail	21%	9%	8%	6%	6%	49%	247
Streetcar	5%	4%	9%	5%	9%	67%	241
TriMet bus	12%	5%	6%	6%	8%	63%	246
Walk	35%	6%	7%	6%	2%	44%	246
Bicycle	7%	3%	6%	6%	7%	72%	243

Table 9: Commute Modes, all TODs except University Pointe

	4-5 days per week	2-3 days per week	Once a week	1-3 days a month	Less than once a month	Never	n
Drive alone	40%	13%	7%	6%	7%	27%	171
Carpool	6%	5%	3%	5%	4%	76%	158
MAX light rail	21%	8%	2%	5%	8%	57%	159
Streetcar	5%	1%	3%	3%	8%	81%	155
TriMet bus	10%	3%	3%	3%	6%	75%	158
Walk	18%	4%	5%	7%	3%	62%	158
Bicycle	8%	4%	6%	5%	6%	70%	157

TOD respondents' primary commute mode was calculated based on the most frequently reported use of each of the modes listed in Table 8 and Table 9 (if two or more modes were tied for most frequently used, the respondent was marked as "combination or other"). Table 10 shows the primary mode of respondents compared to the 2009-2013 American Community Survey (ACS) primary mode of transportation to work of residents in the cities in which the TODs are located: Hillsboro, Portland, and Tigard. Because Acadia Gardens is in unincorporated Clackamas County, its zip code, 97086, containing portions of unincorporated Clackamas County and Happy Valley, is included for comparison. Use of motor vehicles was much lower among TOD residents than any of the overall cities, while transit and active transportation modes were generally higher.

Table 10: Primary Mode, all TODs except University Pointe, compared to ACS 2009-2013 data

	TODs, excluding University Pointe	Zipcode 97086 (Clackamas & Happy Valley)	Hillsboro	Portland	Tigard
Drove alone	53%	82%	76%	64%	78%
Carpooled:		11%	11%	10%	12%
Public transportation	26%	4%	7%	13%	6%
Walk/Bike	13%	2%	4%	13%	4%
Combination	8%				
n	236				

The price of parking at school or work effects people's commute mode choice. Of the respondents that would have to pay for parking at school or work, only 12% usually used a private vehicle to get to work (Table 11). In contrast, 60% of those that do not have to pay to park used a private vehicle. The respondents that would have to pay to park are likely working or going to school downtown or in the Lloyd District, also very convenient locations to reach by transit from many of these TODs.

Table 11: Commute mode and parking cost

	Would have to pay to park	Would not have to pay to park
Private vehicle	12%	60%
Transit	44%	22%
Walk/Bike	34%	10%
Other or combination	10%	8%
n	109	129

Change in Commute Mode

The survey also asked about the respondent's commute mode at their prior residence. For both the current and prior commute mode, we categorized people according to their most frequent mode. Of the 237 people who reported both commute modes, 13% switched from commuting primarily by private vehicle to transit and another 12% switched from private vehicle to walking or bicycling (Table 12). In contrast, only 4% switched from those modes to a private vehicle, indicating that there was a significant shift in commute mode away from private vehicles after moving to the TOD. Without University Pointe, the difference is

not quite as large, but still positive (Table 13); 9% switched from private vehicle to transit and 5% to walk or bike, while 4% switched from those modes to private vehicle.

Table 12: Changes in Primary Commute Mode from Previous Residence, All TODs

	New Mode				
Prior Mode	**Private Vehicle**	**Transit**	**Walk or Bike**	**Other or Combination**	**n**
Private Vehicle	32%	13%	11%	6%	145
Transit	2%	12%	2%	0.4%	38
Walk Bike	2%	4%	7%	1%	35
Other or Combination	2%	3%	2%	1%	18
Total	37%	32%	22%	8%	236

Table 13: Changes in Primary Commute Mode from Previous Residence, All TODs excluding University Pointe

	New Mode				
Prior Mode	**Private Vehicle**	**Transit**	**Walk or Bike**	**Other or Combination**	**n**
Private Vehicle	46%	9%	5%	6%	103
Transit	1%	10%	2%	0%	21
Walk Bike	3%	4%	6%	2%	23
Other or Combination	2%	3%	1%	0%	8
Total	53%	26%	13%	8%	155

Use of alternative modes for non-work trips

The survey asked people how frequently they walked or biked or used transit *from home* to get to various non-commute destinations in good weather. A separate question also asked the respondent how many times in the last 30 days they (1) took a walk, jog, or stroll around their neighborhood and (2) took a walk from home to a business or store in their neighborhood.

The results from the transit question are shown in Figure 2 for all of the TODs combined. Respondents were most likely to take transit for shopping and eating out, with over 20% of them doing so once a week or more.

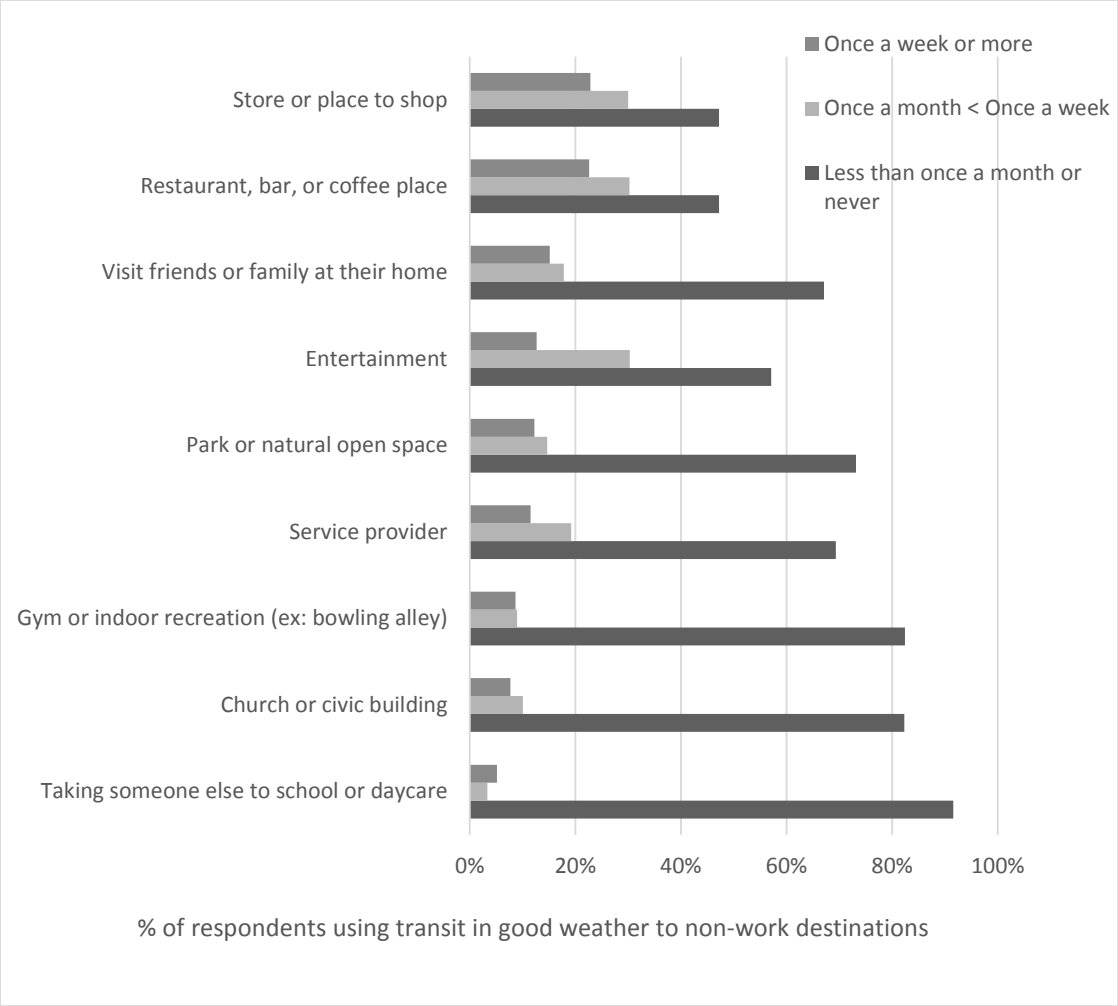

Figure 2: Frequency of taking transit to non-work destinations in good weather

Some of the results for walking and biking, separated by TOD, are shown in Table 14. Over half (52%) of the respondents walked or biked from home to a store once a week or more in good weather, while 62% walked or biked to go out to eat. The table is sorted by the average number of walking trips made from home to nearby businesses in the page 30 days. The differences between the TODs likely reflect the differences in the number of destinations within walking distance in these neighborhoods.

Table 14: Walking and biking for non-commute purposes

	Walks/ bikes to store once a week or more in good weather	Walks/ bikes to restaurant/ bar/café once a week or more in good weather	Walks/ bikes with no destination once a week or more in good weather	Mean # walk, jog, or strolling trips in neighborhood in last 30 days	Mean # walking trips from home to business or store in last 30 days	Mean # biking trips from home to business or store in last 30 days	n
Hollywood Apartments	88%	82%	53%	20.2	22.5	2.1	17
Central Eastside Lofts	46%	78%	58%	17.9	17.9	3.6	27
University Pointe	62%	63%	50%	17.7	17.8	1.5	101
Milano	72%	77%	68%	18.2	15.6	2.8	26
Pettygrove	61%	83%	65%	19.1	13.6	3.8	24
The Prescott	35%	74%	56%	20.3	11.1	3.7	57
Acadia Gardens	24%	22%	28%	8.8	7.7	1.6	18
Killingsworth Station	45%	49%	23%	16.5	5.0	3.8	35
The Knoll	28%	12%	17%	11.0	3.9	0.5	25
4th Main	64%	36%	46%	8.5	10.8	1.2	11
Total	52%	62%	47%	17.0	13.3	2.5	341

Overall Changes in Travel Modes

Another question asked about how their daily travel compared to their previous residence:

> For this question, please think about your current daily travel and your daily travel when you lived at your previous residence not long before you moved. We would like to know about how your travel has changed, for whatever reason. Please answer for your own travel only.

Overall, the TOD residents claim to be driving less and using transit and walking more than where they used to live (Table 15). Just over half (51%) claim that they drive a lot less now, 36% claim they use public transit a lot more now, and 40% claim they walk a lot more now. About equal shares claim to bike less (29%) and bike more (24%). This may reflect shifts from bike to transit or walking.

Table 15: Use of modes compared to previous residence

	A lot less now	A little less now	About the same	A little more now	A lot more now	n
How much do you **drive** now, compared to when you lived at your previous residence?	**51%**	14%	**27%**	5%	4%	346
How much do you use **public transit** (bus or rail) now, compared to when you lived at your previous residence?	7%	10%	**28%**	19%	**36%**	343
How much do you **walk** in your neighborhood now, compared to when you lived at your previous residence?	7%	11%	24%	20%	**39%**	348
How much do you ride your **bike** now, compared to when you lived at your previous residence?	21%	6%	**46%**	12%	13%	327

Notes: **Figures above 25% highlighted in boldface.**

Vehicle Ownership and Use

To see if there were shifts in vehicle ownership caused by moving to the TOD, the survey asked "Did the number of vehicles available for daily travel by your household change ***as a result of the characteristics of your current neighborhood?"*** For two-thirds of the respondents, moving did not impact the number of vehicles in the household (Table 16). However, 18% of the respondents did indicate that they got rid of a vehicle because of the characteristics of the neighborhood, compared with 2% who got an additional vehicle because of the neighborhood. Another 12% are considering getting rid of a vehicle.

Table 16: Change in vehicle ownership after moving

No, but I/we are considering getting rid of a vehicle because of the characteristics of the neighborhood	12%
No, but I/we are considering getting another vehicle because of the characteristics of the neighborhood	2%
No, moving to this place has had no impact on the number of vehicles	67%
Yes, I/we got rid of a vehicle because of the characteristics of the neighborhood	17%
Yes, I/we got an additional vehicle because of the characteristics of the neighborhood	2%
n	328

Residential Preferences

One section of the survey attempted to gauge how important various factors were to the respondents in choosing to live in their current home. The question was:

> In this question, we'd like to know ***what was important to you*** when you were looking for your current residence. Please indicate ***how important*** each of the factors was ***when you were looking for your current residence*** on a scale from "not at all important" to "extremely important."

The results are shown in Table 17, ranked from most to least important based on the average score. Living near transit was a priority for most of the residents. Well over half (61%) rated access to MAX as a 3 or 4 on the 1-4 scale; 37% did so for access to the Streetcar and 44% did so for access to busses.

Table 17: Importance of factors in choosing current residence

	Mean	Std. Deviation	n
High quality living unit	3.4	0.7	341
Affordable living unit	3.4	0.8	340
Easy access to downtown	3.1	0.9	337
Shopping areas within walking distance	3.1	0.9	340
Amenities in the building	3.0	0.9	336
Relatively new living unit	2.9	0.9	340
Access to MAX	2.9	1.1	339
Low crime rate within neighborhood	2.8	1.0	335
Sidewalks throughout the neighborhood	2.8	1.0	338
Parks and open spaces nearby	2.8	1.0	338
Close to where I work	2.8	1.1	331
Attractive appearance of neighborhood	2.7	0.9	339
Availability of off-street parking (garages or driveways)	2.5	1.2	339
Access to TriMet Busses	2.5	1.2	340
Close to friends or family	2.4	1.0	337
Lots of people out and about within the neighborhood	2.4	1.0	336
Easy access to the freeway	2.3	1.1	337
Bike lanes and paths nearby	2.3	1.1	337
Economic level of neighbors similar to my level	2.3	1.0	333
Low level of car traffic on neighborhood streets	2.2	0.9	335
Lots of interaction among neighbors	2.1	0.9	336
Access to Streetcar	2.1	1.2	339
Access to car share vehicles	1.6	0.9	338
High quality K-12 school	1.3	0.7	337

Note: Mean scores on a scale of 1-4, 1=Not at all important, 4=Extremely important

Residents were asked about how their current resident differed from their previous residence in terms of size, monthly cost, and commute. Unsurprisingly, the new residences were are generally smaller and more expensive, but also much closer to their work or school. Tables Table 18 to Table 20 show the results of these questions.

Table 18: Size of current residence compared to prior residence

Is your current residence smaller or larger (i.e. square /footage) than your prior residence?	A lot smaller	Somewhat smaller	About the same size	Somewhat larger	A lot larger	n
All except University Pointe	40%	29%	14%	15%	2%	243
University Pointe	58%	15%	10%	11%	5%	97
All	45%	25%	13%	14%	3%	340

Table 19: Cost of current residence compared to prior residence

Is your current residence more expensive or less expensive / (monthly costs) than your prior residence?	A lot more expensive	Somewhat more expensive	About the same cost	Somewhat less expensive	A lot less expensive	n
All except University Pointe	29%	30%	12%	20%	9%	242
University Pointe	42%	23%	20%	9%	6%	97
All	32%	28%	14%	17%	8%	339

Table 20: Length of commute compared to prior residence

Is your commute to work/school shorter or longer at your / current residence compared to your prior residence?	A lot shorter	Somewhat shorter	No difference	Somewhat longer	A lot longer	Not applicable	n
All except University Pointe	25%	19%	18%	15%	7%	16%	239
University Pointe	51%	12%	21%	5%	5%	5%	98
All	33%	17%	19%	12%	7%	4%	337

Despite the recognition that the current residences are smaller and more expensive than prior residences, survey respondents generally indicated that the residence did a good job of meeting their current needs. Asked how well the residence and its location met the current needs of their household, nearly three-quarters of respondents indicate that the residence met their needs "well" or "very well" across four different criteria including the location of the neighborhood, the characteristics of the neighborhood, the location of the building

within the neighborhood, and the characteristics of the residence itself. The results of these questions are shown in Table 21.

Table 21: How the TODs meet residents' needs

How well do you think your residence and its location meet the current needs of your household?		Very poorly	Poorly	Neither poorly nor well	Well	Very well	n
Location of your neighborhood in the region	All except University Pointe	0.4%	2%	9%	33%	55%	244
	University Pointe	1%	2%	7%	34%	56%	99
Characteristics of the neighborhood itself	All except University Pointe	2%	8%	16%	40%	34%	242
	University Pointe	0%	5%	22%	39%	34%	99
Location of your residence within your neighborhood	All except University Pointe	1%	7%	11%	41%	41%	243
	University Pointe	0%	0%	12%	37%	51%	98
Characteristics of the residence itself	All except University Pointe	2%	3%	10%	43%	42%	243
	University Pointe	8%	2%	15%	42%	33%	98

Travel Preferences

Some recent research examining the links between land use, urban form, and travel behavior has found that people's attitudes and preferences regarding travel can significantly influence decisions. To help examine this further, the survey included a set of questions about travel preferences:

> We'd like to ask about your preferences with respect to **daily travel**. Please indicate the extent to which you agree or disagree with each of the following statements on a scale from "strongly disagree" to "strongly agree." There are no right and wrong answers; we want only your true opinions.

Respondents ranked a series of statements from "strongly disagree" (1) to "strongly agree" (5). The results are shown in Table 22, sorted based on the statements respondents agreed with most strongly. The results show that these respondents place a high priority on walking and minimizing their travel.

Table 22: Travel preferences of TOD residents

	Mean	Std. Dev.	n
I like walking	4.1	0.9	333
I prefer to organize my errands so that I make as few trips as possible	4.0	0.9	332
Walking can sometimes be easier for me than driving	3.9	1.2	334
When I need to buy something, I usually prefer to get it at the closest store possible	3.7	1.0	332
I prefer to walk rather than drive whenever possible.	3.6	1.1	332
Public transit can sometimes be easier for me than driving	3.5	1.3	327
I often use the telephone or the Internet to avoid having to travel somewhere	3.4	1.1	333
The trip to/from work is a useful transition between home and work	3.4	0.9	325
I use my trip to/from work productively	3.3	1.1	326
I like driving	3.3	1.2	331
I like taking transit	3.3	1.1	329
I need a car to do many of the things I like to do	3.3	1.3	333
I try to limit my driving to help the environment	3.3	1.2	331
I prefer to take transit rather than drive whenever possible	3.2	1.3	332
I like riding a bike	3.2	1.4	329
Getting to work without a car is a hassle	3.0	1.4	326
We could manage pretty well with one fewer car than we have (or with no car)	2.9	1.3	331
Biking can sometimes be easier for me than driving	2.8	1.3	328
I prefer to bike rather than drive whenever possible	2.7	1.3	330
The only good thing about traveling is arriving at your destination	2.6	1.1	334
Traveling by car is safer overall than walking	2.6	1.1	332
I would like to own at least one more car	2.1	1.3	331

Note: Mean scores on a scale of 1-5, 1=strongly disagree, 5=strongly agree, 3=neutral.

Demographics

Some of the demographics of the respondents are summarized in Table 23. A majority of the respondents were women, and few of the households had children. Some of the respondents indicated travel limitations.

Table 23: Respondent demographics

	Average # people per household	% of homes with people under 16	% of respondents over 64	% female	n
Acadia Gardens	2.2	41%	0%	67%	18
Central Eastside Lofts	2.0	7%	0%	50%	26
Hollywood Apartments	1.4	0%	0%	38%	16
Killingsworth Station	1.3	0%	12%	58%	33
Milano	1.6	5%	0%	32%	25
Pettygrove	1.6	0%	0%	46%	26
The Knoll	1.1	0%	67%	72%	25
The Prescott	1.5	0%	2%	49%	57
4th Main	1.6	0%	9%	64%	10
University Pointe			0%	71%	97
Total	1.5	4%	7%	57%	333

The economic characteristics of the respondents and their households are shown in Table 24 and Table 25. The respondents not living at University Pointe were generally of moderate income and well-educated. On average, the households have fewer than one vehicle per person of driving age (at 0.2 cars per individual in University Pointe and 0.77 cars per household at all other TODs surveyed). In comparison, one study of TODs found average household car ownership generally in the range of 0.5 to 1.3 cars per household in various TODs, while another found TODs averaged 0.9 cars per household compared to 1.6 for non-TOD households (TCRP 128, pg. 34). The average cars per household in Portland, according to 2013 ACS 1 year data, is about 1.44, nearly twice the rate of the surveyed TODs.

Table 25 compares the income distribution to that of the cities of Hillsboro, Portland, and Tigard, along with zip code 97086 (Unincorporated Clackamas County & Happy Valley). While University Pointe residents were more likely to be in the lowest income bracket, residents in the other TODs were slightly less likely to be in the highest or lowest income brackets than the general populations of the cities in which they reside.

Table 24: Household income, education and vehicle availability

	Median Income (category)	% of respondents with income under $25,000	% of respondents with 4-year college degree	Average number of vehicles per person 16 or older	n
University Pointe	Less than $15,000	83%	26%	0.20	97
All other TODs	$50,000-74,999	22%	66%	0.77	236
Total	$35,000-49,999	40%	54%	0.59	333

Table 25: Household income of respondents, compared to 2009-2013 American Community Survey data

	Univ. Pointe	All other TODs	Zipcode 97086 (Clackamas & Happy Valley)	Hillsboro	Portland	Tigard
Less than $15,000	65%	5%	8%	8%	14%	7%
$15,000 - $24,999	18%	17%	5%	8%	10%	10%
$25,000 - $34,999	4%	11%	10%	9%	10%	11%
$35,000 - $49,999	6%	13%	11%	12%	13%	13%
$50,000 - $74,999	4%	22%	17%	20%	17%	16%
$75,000 - $99,999	1%	14%	14%	17%	12%	14%
$100,000 - $149,999	0%	15%	19%	16%	13%	17%
$150,000 and over	1%	4%	16%	9%	10%	12%
n	95	227	9,383	32,594	250,133	19,214

Conclusions

The survey results indicate that the TOD residents are using transit for commuting significantly more than residents of Portland, Hillsboro, and Tigard, and zip code 97086. The difference is likely due to a combination of factors, including the location of sites near transit, shorter commute times, vehicle ownership, and travel preferences of residents. In addition, it appears that residents of these TODs are generating significantly fewer vehicle trips per unit than assumed by using standard trip generation factors. This difference may be due to the demographics of the residents, which were more likely to be students or retired, and were less likely to own vehicles compared to the city population and previous TOD

surveys. Good public transit access was an important factor for most of the residents in choosing their current home.

A few key findings have emerged from the analysis done so far:

- Travel patterns of University Pointe residents are significantly different from those of other TOD residents. In particular, the University Pointe residents made far fewer trips in motor vehicles and made far more trips by walking and bicycling. These differences are expected since most residents are students attending Portland State University.
- Vehicle availability helps explain transit use. TOD residents in households with less than one vehicle per driver were far more likely to use transit (and far less likely to travel via private vehicles). However, the relationship may not be as simple as it appears. Seventeen percent of the respondents indicated that they got rid of a vehicle because of the characteristics of the neighborhood. Therefore, a share of the households with limited vehicle availability may have consciously chosen to have fewer vehicles because they could use transit or walk instead.
- Employed residents at the TODs are commuting regularly on transit at a higher rate (26%) than for all workers in the City of Portland (13%), Hillsboro (7%), Tigard (6%), and in zip code 97086 (4%). This finding reflects, in part, the proximity of the TODs to high-quality transit service.
- Parking pricing influences commute mode split. Respondents who did not have to pay to park at work or school were far more likely to drive to work.
- Moving to the TOD resulted in a net shift to increased transit commuting.
- Respondents indicate that they are driving less and using transit more now compared to their previous residence.
- Many TOD residents have opted to live in smaller residences at greater monthly cost in exchange for a shorter commute and living in a location and unit that suits their needs.

Appendix: Trip Generation Rates for Transit-Oriented Development

Part 1: ITE Trip Generation Manual Rates

We conducted background research on contemporary trip generation estimates for similar types of buildings to those surveyed in this project. The Institute of Transportation Engineers Trip Generation Manual (TGM), 9th Edition (2012), contains motor vehicle data based on "trip generation studies submitted voluntarily to ITE by public agencies, developers, consulting firms and associations." A selection of residential building types representing the best comparable examples to the Metro study are shown in Table 26, along with a few characteristics of the studies including in the TGM for each building type.

Table 26 ITE Trip Generation Manual Comparable Residential Building Categories

ITE Code	Name	Description	Metro Study TODs	# of ITE studies	ITE study Years
210	Single Family Detached		none	50+	late 1960s to 2000s
220	Apartment	# levels not specified	none	33	late 1960s to 2000s
221	Low Rise Apt.	1 or 2 levels	none	13	early 1970s to late 1990s
222	High Rise Apt.	10 or more levels	University Pointe	9	late 1960s to late 1980s
223	Mid Rise Apt.	3-9 levels	Central Eastside Lofts, Milano, Prescott, Pettygrove, Acadia, 4th Main	1	late 1980s
230	Condo/ Townhouse	# of levels not specified	none	25	late 1980s
231	Low Rise Condo/ Townhouse	1-2 levels condo or townhouse	none	5	late 1970s to 2000s
232	High Rise Condo/ Townhouse	3+ levels condor or townhouse	Hollywood, K Station	5	1980s and 1990s
251	Senior Adult detached		none	10	1980s to 2000s
252	Senior Adult Housing Attached		Knoll	8	1980s to 2000s

The 9th Edition of the TGM does not account for any building-specific or geographic traits that might be related to being "transit-oriented" other than the categories shown in the first column of Table 26. As evidenced by the final column in Table 1, the studies included in the manual are considerably dated in most cases. Despite these limitations, the available data do show that certain building types generate differing levels of motor vehicle trips. Table 27 shows the average, low, and high trip generation rates for studies included in each TGM category shown, along with the standard deviation. Daily rates were not available for mid-rise apartments; however based on peak hour trips, mid-rise apartments appear to be similar to high-rise apartments (both generated an average of 0.3 trips in an AM peak hour), and high-rise condos.

Table 27 Trip Generation per Dwelling Unit on a Weekday

		Daily Trips				AM Peak Hour			
Code	Name	Average	Low	High	Standard Deviation	Average	Low	High	Standard Deviation
210	Single Family Detached	9.52	4.31	21.85	3.7	0.75	0.33	2.27	0.9
220	Apartment	6.65	1.27	12.5	3.07	0.51	0.1	1.02	0.73
221	Low Rise Apt.	6.59	5.1	9.24	2.84	0.46	0.25	0.86	0.7
222	High Rise Apt.	4.2	3	6.45	2.32	0.3	0.18	0.47	0.55
223	Mid Rise Apt.	n/a	n/a	n/a	n/a	0.3	0.06	0.46	0.56
230	Condo/ Townhouse	5.81	1.53	11.79	3.11	0.44	0.15	1.61	0.69
231	Low Rise Condo/ Townhouse	n/a	n/a	n/a	n/a	0.67	0.33	0.82	0.83
232	High Rise Condo/ Townhouse	4.18	3.91	4.93	2.08	0.34	0.31	0.48	0.59
251	Senior Adult detached	3.68	2.9	5.7	2.04	0.22	0.13	0.84	0.47
252	Senior Adult Housing Attached	3.44	2.59	4.79	1.93	0.2	0.06	0.27	0.45

Source: ITE Trip Generation Manual, 9th Edition, 2012.

Based on available TGM data, the number of trips generated by TOD buildings similar to those in the 2014 Metro study would be expected to be closer to the 4.2 to 4.18 trips of the high-rise apartment or high-rise condo categories, respectively, than to the 6.65 daily rate for the "apartment" category (of unspecified height), or the 6.59 of the more specific "low rise apartment" category.

Part 2: "Smart Growth Trip-Generation Adjustment" Tool

A recent project by a team lead by UC Davis sought to calculate more accurate trip generation numbers for "smart growth" projects using inputs including TGM trip rates, information about the area surrounding the building, transit access, walking and bicycling facilities, amount of surface parking, and distance from the CBD, among others. The team created a tool which designed to replicate actual trip rates identified for a series of smart growth projects through a study. More details about the study and tool can be found online at http://ultrans.its.ucdavis.edu/projects/smart-growth-trip-generation.

Applicability of the UC Davis tool as based on meeting the following criteria:

- Land Use: The model applies mid- to high-density residential (ITE Trip Generation Manual Land Use Codes 220, 222, 223, 230, 232), office (710), restaurant (925, 931), and coffee/donut shop (936);
- Population and Jobs: J>4000 and R>(6900-0.1J), where J is the number of jobs within a 0.5-mile radius of the site and R is the number of residents within a 0.5-mile radius of the site;
- Transit: There are a total of >=10 bus stop locations on all bus lines that pass within any part of a 0.25-mile radius around the study site during a typical weekday PM peak hour or a total of >=5 individual train stop locations on all train lines that pass within any part of a 0.5-mile radius around the study site during a typical weekday PM peak hour;
- Bike and Sidewalk: It is recommended that the tool be applied only at sites that meet at least 1 of the 2 following smart-growth pedestrian or bicycle criteria: 1) There is at least one designated bicycle facility within two blocks of the edge of the site (designated bicycle facilities include multi-use trails, cycle tracks, and bicycle lanes; they do not include shared lane markings or basic bicycle route signs with no other facilities); 2) There is >50% sidewalk coverage on streets within a 0.25-mile radius of the site; and
- Overall: Meets all of the above criteria.

As shown in Table 28, only College Station meets all the eligibility criteria for the tool. The Knoll did not meet the land use criteria, as senior housing was not tested in the data collection process for the project. All of the other building locations either had insufficient population or job density in the surrounding area, or did not have adequate transit access to qualify. It may be worth noting here that the study was focused on "smart-growth" specifically, and not "transit-oriented" development. As such, a building might well be transit-oriented, but not qualify as a smart growth building according to the standards set forth in the project. Despite this limitation, we applied the model to all of the surveyed sites, with the results in Table 29. Our estimated rates are lower than the rates adjusted from ITE using the UC Davis methodology.

Table 28 Applicability of Davis Model to Portland Metro TOD projects

	Model Applicability				
Development	Overall	Land use	Population and Jobs	Transit	Bike and Sidewalk
College Station - University Pointe	✓	✓	✓	✓	✓
The Knoll				✓	✓
Central Eastside Lofts		✓			✓
Milano		✓		✓	✓
Hollywood Apartments		✓	✓		✓
The Prescott		✓			✓
Killingsworth Station (K Station)		✓			✓
Pettygrove		✓	✓		✓
Acadia Gardens		✓			✓
Hillsboro 4th and Main		✓			✓

Table 29 ITE Peak Rates and UC Davis Model Adjustment

Development	**Average Adjustment (Actual/ITE)**	**ITE Daily Rate**	**"Smart Growth" Adjusted Rate**	**PSU Survey Rate**
College Station - University Pointe	35%	4.2	1.4	0.34
The Knoll	75%	3.4	2.6	1.1
Central Eastside Lofts	68%	4.2	2.8	1.6
Milano	67%	4.2	2.8	1.1
Hollywood Apartments	72%	4.18	3.0	1.8
The Prescott	69%	4.2	2.9	2.1
Killingsworth Station (K Station)	73%	4.18	3.0	1.3
Pettygrove	70%	4.2	2.9	2.3
Acadia Gardens	75%	4.2	3.2	2.5
Hillsboro 4th and Main	74%	4.2	3.1	0.9