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Transit Oriented Development: Trip Generation & Mode Split in the Portland Metropolitan Region

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Introduction

The Portland metropolitan region has planned and implemented transit-oriented developments (T.O.D.) along light rail alignments and traditional transit corridors based on the assumption that promoting mixed-use, high density residential development close to transit will reduce vehicle trips, lessen congestion, and reduce air pollution. Oregon has state and local transportation policies that rely on alternative modes of travel to help reduce vehicle trips, yet there is little documentation on how effective T.O.D.s are at actually reducing vehicle trips and total vehicle miles traveled. This report attempts to calculate how successful Transit Oriented Developments in the Portland Metropolitan Region are at increasing transit use and pedestrian travel, and reducing the number of vehicle trips. It is intended to be a pilot study and a methodical guide for a future study.

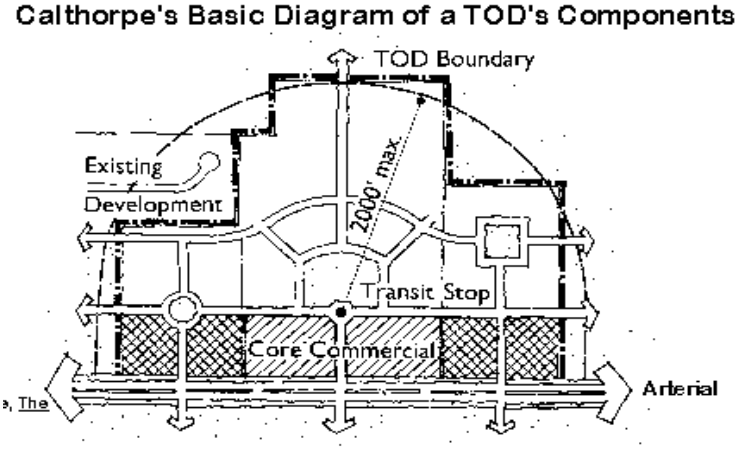
T.O.D. Definition

A Transit Oriented Development (T.O.D.) is a residential development with:

- Nearby access to a major transit line
- High density housing
- A mixture of land uses
- A design emphasizing pedestrian travel
- A low parking ratio

Figure 1 below shows a T.O.D. design done by Calthorpe and Associates.

Figure 1.



Methodology

The effectiveness of T.O.D.s to reduce vehicle trips and increase pedestrian travel and transit use was calculated through visual observation of the T.O.D.s. The automobile, light rail, walk, and bike trips originating and arriving at the TOD were counted. The counts were done for the morning peak travel period of 7 A.M. to 9 A.M. and during the afternoon peak travel period of 4 P.M. to 6 P.M. From the travel count, the mode split and the trips per dwelling were generated. The vehicle trip rates per dwelling were then compared to the trip generation rates from the Institute of Transportation Engineers (I.T.E.). To analyze a development, I.T.E. places traffic counters at all the motor vehicle access points to the site, and the motor vehicle trips entering or exiting the site are recorded. The I.T.E. rates are for motor vehicles only, whereas this study calculates trip generation rates for transit and pedestrian travel as well.

Eight T.O.D.s were counted for the study. To get an idea of the effectiveness of the light rail versus bus transit, six T.O.D.s were counted on the Portland Metropolitan Area Express (MAX) light rail line, and two counts were done at T.O.D.s on a major bus line. The T.O.D.s were chosen because of their T.O.D. qualities, and to get a spatial distribution that included developments on the eastside and westside light rail lines. The six T.O.D.s studied on the light rail line, from east to west were Gresham Central Apartments, Russellville Commons, Stadium Apartments, LaSalle Apartments, Quatama Village Apartments, and Club 1201 at Orenco Station. The two busline T.O.D.s studied were the Belmont Dairy Apartments and the Belmont Dairy Townhomes.

In addition to the trip generation rates, a second type of analysis was done to evaluate the effectiveness of the various T.O.D. attributes in reducing vehicle trips and increasing pedestrian and transit travel. A regression analysis was done with the T.O.D. attributes to determine the relationships between the attributes and the trip generation rates per dwelling. This was done in an attempt to determine the reasons behind the travel counts, and to determine what is working in a T.O.D. and what is not.

Mixed-Use Development

Chapter seven from the October 1998 I.T.E. Trip Generation Handbook does a study on how multi-use developments affect trip generation rates. The study defines a mixed-use development as:

- typically planned as a single real-estate project,
- typically between 100,000 and 2 million square feet in size,
- contains two or more land uses,
- some trips are between on-site land uses, and
- trips between land uses do not travel on the major street system,

and not as:

- a central business district,
- a suburban activity center or,
- an existing I.T.E. land use classification with potential for a mix of land uses, such as a shopping center, an office park/building with retail, or a hotel with limited retail and restaurant space.

By this definition only four of the developments meet the requirements of a mixed-use development; Russellville Commons, Belmont Dairy Apartments, LaSalle Apartments, and Club 1201. Only the LaSalle Apartments has limited on-site office space of 10,000 square feet.

The I.T.E. study estimates internal capture rates for trip origins within a multi-use development. The capture rates were estimated on the basis of studies done in Florida, and I.T.E. warns users of this limited scope. I.T.E. Tables 7.1 and 7.2 show the study's estimate of the unconstrained internal capture rate for trips between the three land use types of office, retail, and residential. Table 7.1 shows trip origins and Table 7.2 shows trip destinations. The internal capture rates for trip origins during the P.M. peak hour, travelling from residential to retail, are estimated at 53 percent and travelling from retail to residential is 12 percent.

I.T.E. Table 7.1 Unconstrained Internal Capture Rates for Trip Origins within a Multi-Use Development

WEEKDAY				
		MIDDAY PEAK HOUR	P.M. PEAK HOUR OF ADJACENT STREET TRAFFIC	DAILY
from OFFICE	to Office	2%	1%	2%
	to Retail	20%	23%	22%
	to Residential	0%	2%	2%
from RETAIL	to Office	3%	3%	3%
	to Retail	29%	20%	30%
	to Residential	7%	12%	11%
From RESIDENTIAL	to Office	N/A	N/A	N/A
	to Retail	34%	53%	38%
	to Residential	N/A	N/A	N/A

N/A – Not Available; logic indicates there is some interaction between these two land uses; however, the limited data sample on which this table is based did not record any interaction.

I.T.E. Table 7.2 shows the internal capture rates for trip destinations. During the P.M. peak hour, the internal capture rate for vehicles travelling to residential from retail, are estimated at 31 percent and travelling to retail from residential is 9 percent.

I.T.E. Table 7.2 Unconstrained Internal Capture Rates for Trip Destinations within a Multi-Use Development

		WEEKDAY		
		MIDDAY PEAK HOUR	P.M. PEAK HOUR OF ADJACENT STREET TRAFFIC	DAILY
to OFFICE	from Office	6%	6%	2%
	from Retail	38%	31%	15%
	from Residential	0%	0%	N/A
to RETAIL	from Office	4%	2%	4%
	from Retail	31%	20%	28%
	from Residential	5%	9%	9%
to RESIDENTIAL	from Office	0%	2%	3%
	from Retail	37%	31%	33%
	from Residential	N/A	N/A	N/A

N/A – Not Available; logic indicates there is some interaction between these two land uses; however, the limited data sample on which this table is based did not record any interaction.

While these reduction factors are fairly high, the trips between retail and residential are low, especially during the P.M. peak hour when the majority of the trips are work related. The internal capture rates in Tables 7.1 and 7.2 only account for the reduction related to mixed-use, and do not address the increase of transit options of a T.O.D.

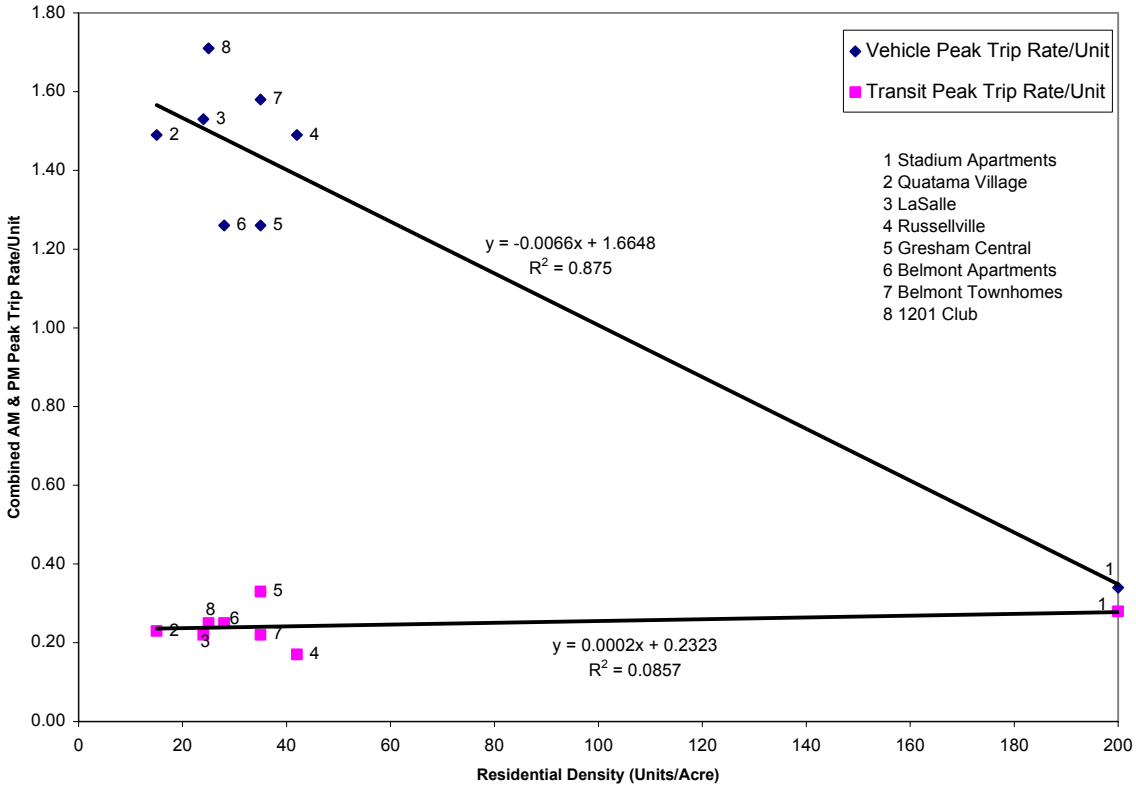
Regression Analysis of the T.O.D. Attributes

The T.O.D. attributes were recorded for each development, and this information was compared to the T.O.D.s vehicle and transit trip generation rate per dwelling using a regression analysis. It is hoped that the analysis will show the relationship between the T.O.D.s attributes and the trip generation rates. For example, a development with a low number of parking spaces per dwelling would likely have a lower vehicle trip generation rate than a development with a high number of parking spaces per dwelling.

A weighted-average of the combined A.M. and P.M. peak period vehicle trip generation rates per dwelling was used as the dependent variable in each of the scenarios. The regression tests were kept simple because with only eight T.O.D.s studied, the degrees of freedom are very low. Each of the T.O.D.'s attributes is listed in the case studies section of the report.

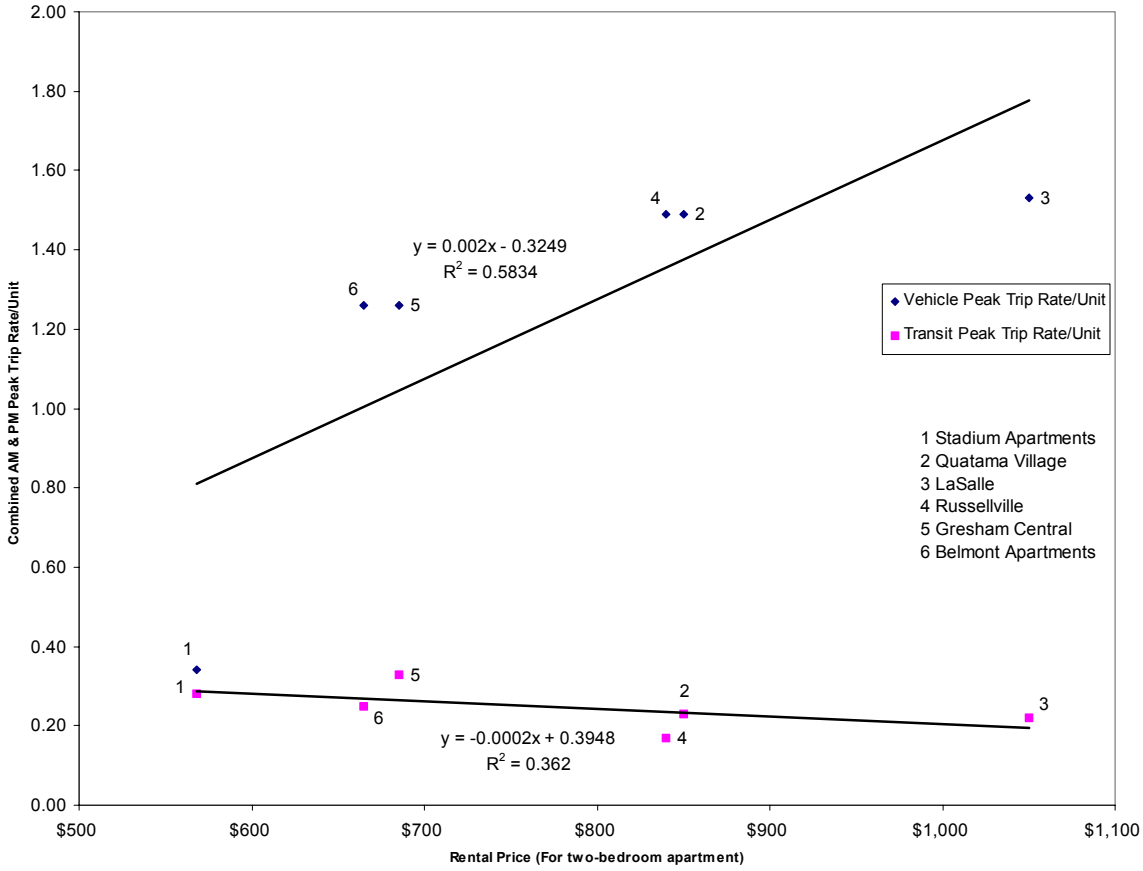
The first regression test was run with residential density measured in dwelling units per acre. The vehicle trip generation rate R^2 value of 0.875 is significant, and the analysis shows that as residential density increases the vehicle trip generation rate per dwelling decreases. The transit trip generation rate R^2 value of 0.0857 is not statistically significant. Chart 1 below shows the A.M. and P.M. combined trip generation rates for vehicles and transit on the Y-axis and the residential density on the X-axis. This regression has six degrees of freedom.

Chart 1. Trip Generation Rate and Residential Density



A second regression was done with the T.O.D.s rental price for a two-bedroom apartment and the combined A.M. and P.M. peak period trip generation rate. The vehicle trip generation rate has a R^2 value of 0.5834. Even though it is not statistically significant, the vehicle trip generation rate shows an increase as the rental price increases. The transit trip generation rate has a R^2 value of 0.362, which is not significant. Chart 2 shows the results of the T.O.D.s rental price and combined A.M. and P.M. peak period trip generation rate.

Chart 2. Trip Generation Rate and Rental Price



Even though there are only two degrees of freedom, a regression test was run with five of the T.O.D. attributes and the dependent variable of the combined A.M. and P.M. peak period. This was only done for the vehicle trip generation rates. The high R^2 value of 0.9756 shows the data is meaningful. Again for residential density, there is a significant relationship. As the residential density increases the vehicle trip generation rate decreases. The other significant attribute is that where T.O.D.s don't have mixed-use within a 1/4 mile there is a higher vehicle trip generation rate. Table 1 below shows the results of the regression.

Table 1. Multiple Attributes

$R^2 = 0.9756$

Variable	Estimated Coefficient	Standard Error	T-Ratio
Residential Density (Units/Acre)	-0.59884E-02	0.1814E-02	-3.301
On-Site Mixed-Use	0.11011	0.2012	0.5473
Mixed-Use within 1/4 mile	0.34717	0.1532	2.266
Distance to Downtown Portland (miles)	0.10337E-01	0.2054E-01	0.5033
Connectivity (Street Crossings)	-0.25061E-01	0.2021	-0.1240
AM & PM PK PD Vehicle Trip Generation Rate/Dwelling	1.4113	0.4902	2.879

A future study that looked more developments would provide more meaningful data about the relationship between the T.O.D. attributes and the trip generation rates.

Overall Findings

This preliminary research shows favorable results for transit usage in the T.O.D.s along the light rail line and at the Belmont Dairy. The average transit ridership in the Portland region is roughly five percent. The average for the eight transit oriented developments studied is 16 percent during the A.M. peak period, and 11 percent during the P.M. peak period. The larger percentage during the A.M. appears to be due to the higher share of people commuting to work in the morning that are more likely to use transit.

The average trip generation rates for the eight T.O.D.s is well below the Institute of Transportation Engineers (I.T.E.) rates for similar land use types. The T.O.D. A.M. peak hour trip generation rates aren't as low as the P.M. peak hour rates. The average total (including transit and pedestrians) A.M. peak hour rate from the eight T.O.D.s is 0.38, and the vehicle only rate is 0.29. The two rates that fit most of the developments are the Mid-Rise Apartment, Land Use #223 and the Apartment, Land Use #220. The A.M. I.T.E. peak hour rate for an Apartment is 0.51, and the Mid-Rise Apartment is lower at 0.30. The total (including transit and pedestrians) average P.M. peak hour rate for the eight T.O.D.s is 0.51, and the vehicle only rate is 0.41. Both these rates are well below the I.T.E. A.M. peak hour rates of 0.62 for an Apartment, and 0.63 for a Mid-Rise Apartment.

The I.T.E. trip generation rate studies are typically done in suburban areas with little or no transit service, but the lower average rates for the eight T.O.D.s appears to be only partly due to increased transit use. Even when all the transit and pedestrian trips are included in the T.O.D.'s trip generation rates, the rates are still lower than the I.T.E. rates. Few families were observed at the T.O.D.s. The smaller family size may be a factor in the lower trip generation rates. At the suburban T.O.D.s the A.M. peak period appeared to be earlier than the recorded 7 A.M. to 9 A.M. Another possible reason for the lower rates was that the counts did not capture the internal trips that took place in the larger T.O.D.s of LaSalle Apartments and Russellville Commons.

Case Studies

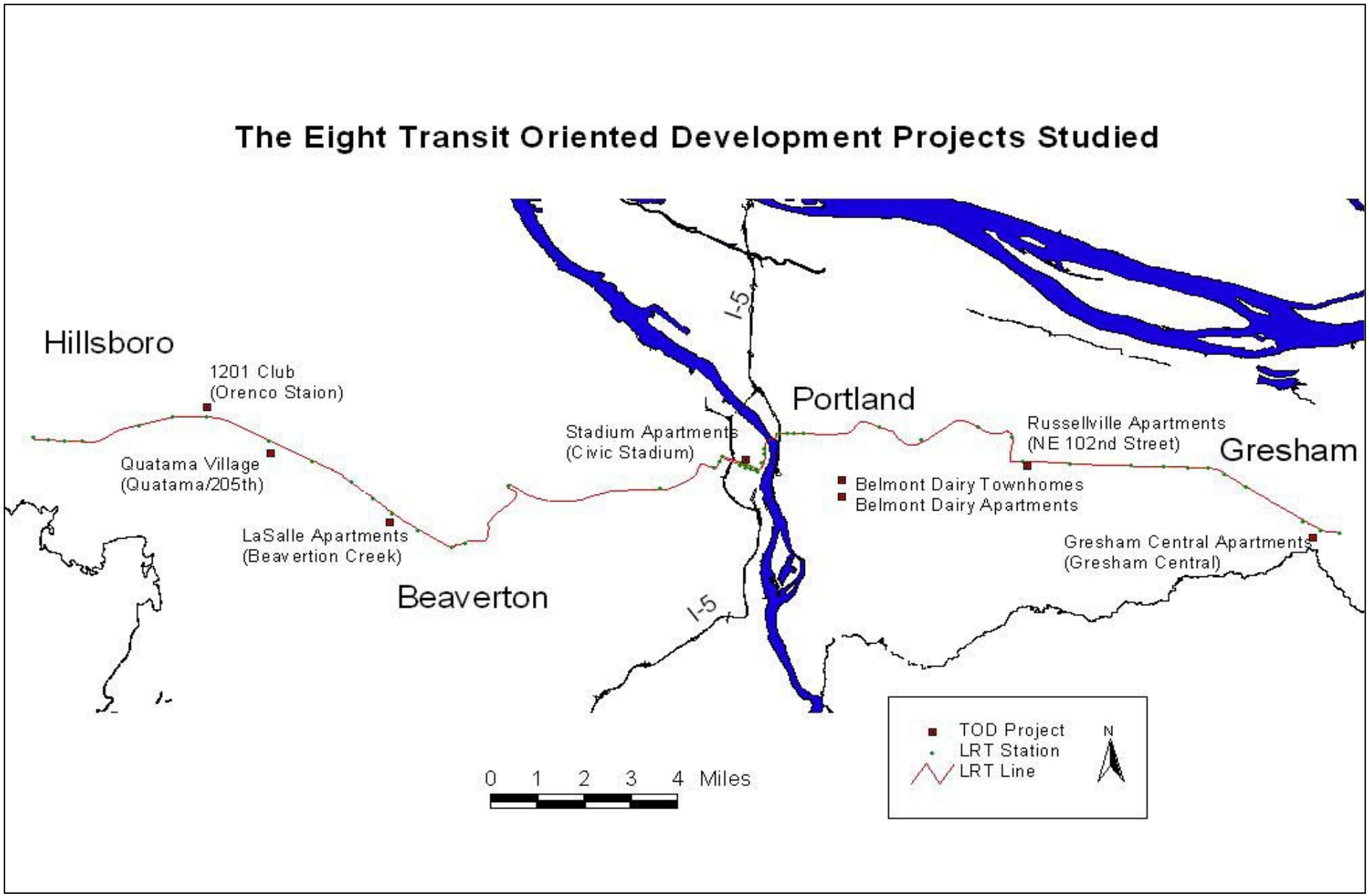
This section describes the eight T.O.D.s, and the issues that arose during each of the counts. The T.O.D.s are listed in the chronological order that they were counted.

The table below summarizes the attributes for the eight T.O.D.s studied.

Attributes	Stadium Apts.	Quatama Village Apts.	LaSalle Apts.	Russellville Commons Apts.	Gresham Central Apts.	Belmont Dairy Apts.	Belmont Dairy Twnhms.	Club 1201
AM Vehicle Trips/Hour/Unit	0.06	0.26	0.34	0.30	0.20	0.28	0.34	0.36
PM Vehicle Trips/Hour/Unit	0.12	0.49	0.43	0.45	0.44	0.35	0.46	0.50
AM Transit Riders/Hour/Unit	0.06	0.05	0.07	0.05	0.04	0.07	0.04	0.05
PM Transit Riders/Hour/Unit	0.08	0.06	0.04	0.03	0.13	0.05	0.07	0.08
# of Units	115	215	554	405	90	85	36	800
Rental Price	$468-$668	$600 – $900	$700-$1,400	$583-$1,100	$575-$795	$472-$1,295	N/A	N/A
Residential Density (units/acre)	200	15	24	42	35	28	35	42
On-site Commercial	2,310 sq. ft.	None	10,000 sq. ft.	22,000 sq. ft. when open	None	24,000 sq. ft.	None	None
Parking Spaces/Unit	0.6	1.8	1.8	0.95	1.5	1.5	1.0	1.8
Distance to Transit	50 feet	¼ to ½ mile	500 ft - ½ mile	¼ to ½ mile	1 block	1 block	2 blocks	200 ft. -¼ mile
# of streets between TOD and Transit	0 streets	1 arterial	1 minor street	2 streets	1 streets	0 or 1 street	1 to 2 streets	1 street
Number of Buildings	1	~10	~15	21	3	1	3	~20
Building Height (stories)	5	3	3 (1 bldg. is 4)	3	3	6	2	3
Size of Site	23,000 sq. ft.	14 acres	23 acres	11 acres	2.6 acres	133,000 sq. ft.	1 acre	31 acres

In the appendix following this section, each of the T.O.D.s has two spreadsheets showing the raw data from the counts. There is one spreadsheet for the A.M. peak period count and one for the P.M. peak period count.

The following map shows the MAX line and the locations of the eight T.O.D.s.


The Eight Transit Oriented Development Projects Studied
Hillsboro
1201 Club
(Orenco Staion)
Quatama Village
(Quatama/205th)
LaSalle Apartments
(Beavertion Creek)
Beaverton
I-5
Portland
Stadium Apartments
(Civic Stadium)
Russellville Apartments
(NE 102nd Street)
Gresham
Belmont Dairy Townhomes
Belmont Dairy Apartments
Gresham Central Apartments
(Gresham Central)
I-5
0 1 2 3 4 Miles
TOD Project
LRT Station
LRT Line
N

Stadium Apartments

The Stadium Apartments are located west of downtown at 737 SW 17th Avenue with the light rail tracks running on either side of the building. Stadium Apartments finished in 1998, is one of the earliest T.O.D.s in Portland. They were financed with tax exempt bonds and a Portland Development Commission loan. There are 115 units in the Stadium Apartments, with 56 studios, 55 one-bedroom units, and 4 two-bedroom units. All units are affordable for households at 60% of median income. A wide range of ethnicity was observed. The majority of the people living in Stadium Apartments were in there 20's and 30's, and no children were observed.

The TOD characteristics of Stadium Apartments are:

Number of Units:	115
Type of Units:	Low Income Apartments
Rents:	$468 - $668
Residential Density:	200 units/acre
Onsite Commercial:	2,310 sq. ft. of retail
Parking Ratio:	0.6 spaces/unit
Distance to Station:	40 feet
Number of Buildings:	1
Building Height:	5 story
Size of Site:	23,000 sq. ft.
Pedestrian Connectivity:	No streets between TOD and Station

The morning count took place on Thursday, November 18th and the afternoon count was on Tuesday, November 23. The automobile counts are very reliable as the building has only one entryway for the ground level parking garage, and the security gate is quite noisy. The person counts have small chance of error because of the building's multiple doors and the large number of people getting on and off MAX. It is also possible that if a person got off MAX and walked around the building they could be mistaken for a walker. Some of the walkers may have been on their way to or from the bus, but the bus stops were not visible from the apartment, so bus usage is not recorded.

Seven bikes were brought on or off westbound MAX in the morning, and only one bike for the afternoon commutes and the eastbound morning commute combined. It could be that the lower densities of the West Side require a bike to get to the MAX stations.

The Stadium Apartments have a very low percentage of automobile trips, and very high shares for light rail and biking/walking. Even with a low parking ratio of 0.6 spaces/unit, spillover parking was minimal. Only one person left the building in the morning, and got into their car parked in front of the building. The proximity to downtown makes transit and walking/biking favorable alternatives to travel to work. The lower income residents and the high cost of parking downtown are also a reason for the low number of automobile trips.

The Stadium Apartment’s vehicle only trip generation rates during the A.M. and P.M. peak hour are only a fraction of the I.T.E. rate for a Mid-Rise Apartment. The total

(including transit and pedestrians) trip generation rates for the Stadium Apartments are also well below the I.T.E. rates with the P.M. peak hour rate of 0.31 being less then half of the I.T.E. rate of 0.63.

Quatama Village Apartments

The second travel count took place at the Quatama Village Apartments located at 380 NW Gina Way in Hillsboro. The apartments are located southeast of the Quatama/ NW 205 MAX station. There are 207 total units, with one, two, and three bedroom apartments for rent. All apartments are market rate. The complex opened in April 1999, and the occupancy rate at the time of the count was 75 percent.

The TOD characteristics of the Quatama Village Apartments are:

Number of Units:	155 occupied (208 total)
Type of Units:	Market Rate Apartments
Sale Price:	Unknown
Residential Density:	15 units/acre
Onsite Commercial:	None
Parking Ratio:	1.8 spaces/unit
Distance to light rail:	¼ mile to ½ mile
Number of Buildings:	~10
Building Height:	3 story
Size of Site	14 acres
Pedestrian Connectivity:	1 arterial between TOD and station

The afternoon peak period count took place on Wednesday, December 8, and the morning count took place the next morning, Thursday, December 9. The site was chosen because it could be counted with only one person. There is only one driveway for the complex and a swamp blocks all access to the east. There is a large park-n-ride next to the station that was nearly full. There is no commercial development near the site; the adjacent land is mostly farmland, with some single family residential to the south. The only bus service is the 49 that serves the park-n-ride. No one from the Quatama Village Apartments used the bus.

N.W. 205 Street runs between the Quatama Village Apartments and the light rail station. The street is a 90 feet wide arterial with no crosswalk. There is also a hill to the south that obstructs the view of cars. Many of the pedestrians travelling to the station were observed running across the street.

The Quatama Apartments count yielded much different results than the Stadium Apartments count. Automobiles comprised the majority of the trips. The Quatama Village Apartments had the highest share of automobile trips at 83 percent during the morning peak travel period and 88 percent during the afternoon peak travel period. The transit use was similar to the average for all eight of the T.O.D.s. There were no walking or biking trips witnessed during either count.

The Quatama Village Apartment's trip generation rates were similar to the average of the other T.O.D.s, but below the I.T.E rate for an Apartment. The vehicle only rate for the Quatama Village apartments is 0.262 during the A.M. peak hour and 0.49 during the P.M. peak hour versus 0.51 and 0.62 respectively for the I.T.E Apartment.

LaSalle Apartments

The third T.O.D. trip generation count took place at the LaSalle Apartments south of Beaverton Creek Station, at the intersection of SW Milikan Way and SW 53rd Street. The morning count took place on Monday, January 31, 2000, and the afternoon count took place the next day, Tuesday, February 1, 2000.

The T.O.D. characteristics of LaSalle Apartments are:

Number of Units:	554 (roughly 525 currently occupied)
Type of Units:	Market Rate Apartments
Rents:	$700 - $1,400
Residential Density:	24 units/acre
Onsite Commercial:	10,000 sq. ft.
Parking Ratio:	1.8 spaces/unit
Distance to Station:	500 feet to ½ mile
Number of Buildings:	~15
Building Height:	3 story (one 4 story)
Size of Site:	23 acres
Pedestrian Connectivity:	1 minor street between TOD and Station

Two people participated in the visual count of the apartments with one placed at the northwest corner of the park and ride lot and the other at the southeast corner of the SW Milikan Way and SW 53rd Street intersection. Due to the large viewing distances, it was not possible to differentiate between S.O.V. and carpools. If a third person were added, this differentiation could have been made. The pedestrian numbers include the recreational activities of people jogging and walking their dogs.

Some pedestrians coming from other residential locations were witnessed cutting through LaSalle Apartments on their way to and from the station. To determine the number of non-LaSalle residents walking through the apartments, the number of people who exit off MAX and walk into the apartments is subtracted by the number of people walking out the other side of LaSalle Apartments. The opposite method was used for people walking into the apartments on their way to MAX from other residential areas. Some degree of error may have occurred when we assumed the people were cutting through the LaSalle Apartments to another location, when in actuality they could have been LaSalle residents walking off-site.

The park and ride Northwest of the apartments was roughly 50 percent occupied and small portion of the cars belonging to the LaSalle Apartment residents.

Unlike the first two travel counts this one includes traffic to the onsite commercial as a separate section to determine how the customers are travelling to the businesses. The

commercial travel count and mode split are separated in the categories of automobile, people on their way to or from the station, and pedestrians not using light rail walking to the businesses. No one was observed getting off light rail for the specific purpose of going to the onsite commercial. The workers of the onsite businesses are included in the count. The current onsite businesses are a pizza/coffee shop, a florist, a hair saloon, an insurance sales office, and the Beaverton Police Department. During the first hour of the morning count the majority of the businesses were closed. There are two unoccupied commercial spaces.

The majority of the resident's internal movements within the site were not able to be recorded due to site's large size of 23 acres. The onsite trips to the gym, swimming pool, community building, and children playing were not captured. This is part of the reason for the LaSalle Apartment's low pedestrian mode split share of three percent during the A.M. peak period and 4 percent during the P.M. peak period, compared to the average for all the T.O.D.s at eight and nine percent respectively. The light rail mode split for LaSalle apartments was twice as high during the A.M. peak period than during P.M. peak period. The LaSalle Apartments had the second highest mode split share for automobiles of all eight of the T.O.D.s counted. The Quatama Village Apartments had the highest Automobile mode split share.

The LaSalle trip generation rates were lower than the I.T.E. rate for an Apartment. The LaSalle vehicle only trip generation rate for was 0.34 for the A.M. peak hour and 0.43 for the P.M. peak hour, versus the I.T.E. rates of 0.51 and 0.62 respectively.

Russellville Commons Apartments

The Russellville Commons are located at NE 102nd Street and Burnside, south of the NE 102nd Street station. The morning count took place on Thursday, April 13, 2000, and the afternoon was on Wednesday, April 19, 2000. When the counts were done, the first phase of Russellville Commons consisting of 283 market rate apartments was nearly complete. The second phase will be adjacent to the station, and will compose of 120 apartments, 20,000 square feet of office, 2,000 square feet of retail, and a day care.

The TOD characteristics of Russellville Commons Apartments are:

Number of Units:	403 (roughly 215 currently occupied)
Type of Units:	Market Rate Apartments
Rents:	$700 - $1,400
Residential Density:	42 units/acre
Onsite Commercial:	None (22,000 sq. ft. when complete)
Parking Ratio:	0.95 spaces/unit and available on-street
Distance to Station:	40 feet at buildout (currently ¼ - ½ mile)
Number of Buildings:	21
Building Height:	3 story
Size of Site	11 acres
Pedestrian Connectivity:	2 streets between TOD and Station

Two people participated in the visual count of the apartments with one placed just south of the 102nd Street and Burnside intersection and the second at the southeast corner of the site. The site has good east/west street connectivity from 102 Street to the neighborhoods east of the development, and the residents of adjacent neighborhoods were driving through the development. Pedestrians were also traveling through the development on their way to and from the light rail station. Walkie talkies were used to separate the Russellville Commons trips from through trips. The counter observing a vehicle or pedestrian entering the site communicated its description to the other counter. If the second counter observed the vehicle or pedestrian within the estimated time to travel through the development without stopping, the trip was considered a pass through trip, and not recorded. Roughly 10 percent of the vehicle and pedestrian traffic was pass through traffic. By eliminating through traffic and allowing open communication between counters the walkie talkies enabled very accurate counts to be performed at Russellville Commons. The walkie talkies were used for the rest of the travel counts.

Very few of the resident's internal trips were observed due to Russellville Common's large size. The pedestrian movements are only low in the A.M. peak period with a walk/bike share of five percent and during the P.M. peak period they are near the average for the five developments with 10 percent. The transit share during the P.M. peak is less than half of the A.M. peak with 14 percent and six percent respectively.

The Russellville Commons Apartment's trip generation rates for total (including transit and pedestrians) and for vehicles only are well below the I.T.E. rate for an Apartment. During the P.M. peak hour Russellville Commons has total (including transit and pedestrians) trip generation rate of 0.53 and vehicle only rate of 0.45 versus the I.T.E. Apartment rate of 0.62.

Gresham Central Apartments

The Gresham Central Apartments are a new development located northwest of the Gresham Central Station at 800 N.E. Roberts Street. The morning and afternoon counts took place on Tuesday, April 25, 2000.

The project was built through a joint partnership between TRI-MET and a private developer. The development received a downtown Gresham housing tax abatement and $332,000 from a Department of Environmental Quality C.M.A.Q. grant for a transit oriented development. The project has a density of 35 units/acre. Due to the cost of structured parking, TRI-MET believes projects above 35 units/acre in Gresham will require higher rents or more public financial participation. The project opened in 1996, and is fully occupied.

The TOD characteristics of Gresham Central Apartments are:

Number of Units:	90 (fully occupied)
Type of Units:	Market Rate Apartments
Rents:	$575 - $795
Residential Density:	35 units/acre

Onsite Commercial:	None)
Parking Ratio:	1.5 spaces/unit and available on-street
Distance to Station:	1 block
Number of Buildings:	3
Building Height:	3 story
Size of Site	2.6 acres
Pedestrian Connectivity:	1 street between TOD and Station

Two people participated in the count of the apartments with one placed at the light rail station and the second at the west end of the site.

Despite the limited commercial or recreation destinations within walking distance of the Gresham Central Apartments, the walk/bike mode split share is higher than the average, at 16 percent in the morning peak period and 10 percent in the afternoon peak period. The site has good access to both the light rail and bus transit, and this is shown with a higher than average transit mode split of 14 percent in the morning peak period, and 20 percent in the afternoon peak period. The trip generation rates for the site were below I.T.E. rates for a mid-rise apartment. This is most likely due to the high mode splits of the pedestrian and transit trips.

Belmont Dairy Apartments

The Belmont Dairy Apartments are a mixed-income T.O.D. project located one and a half miles east of downtown Portland on a bus line providing service every eight minutes. The address is 3342 S.E. Morrison Street, adjacent to TRI-MET Bus Line 15. The project added five stories of apartments over a parking podium. The ground level of the former seventy-year old dairy has been converted into a 12,000 square feet specialty grocery store and 12,000 square feet of additional retail space. The housing includes 66 low-income apartments and 19 market rate apartments.

The project received a variety of financial assistance including a City of Portland Community Development Block Grant Loan, a City of Portland Livable Housing Council Loan, and a State Department of Environmental Quality C.M.A.Q. grant for transit oriented development.

The TOD characteristics of Belmont Dairy Apartments are:

Number of Units:	85
Type of Units:	Low-Income and Market Rate Apartments
Rents:	$472-$566 low-income and $795-1,295 market rate
Residential Density:	28 units/acre
Onsite Commercial:	24,000 sq. ft. of retail
Parking Ratio:	1.5 spaces/unit and available on-street
Distance to bus stop:	1 block
Number of Buildings:	1
Building Height:	6 story
Size of Site:	3 acres
Pedestrian Connectivity:	0 or 1 street between TOD and bus stops

The morning count was on Thursday, April 27, 2000, and the afternoon count took place on Wednesday, May 3, 2000. Two people participated in the count of the apartments with one placed on the southeast corner of the site, and the other at the northwest corner of the site to view the parking garage and access to the grocery store. The apartment's and the grocery store's shared parking lot made the count difficult because in addition to the external movements, the automobile and pedestrian movements inside the parking garage had to be differentiated between the grocery store and the apartments.

The apartments were built in an established retail district, and this appears to be shown in the high share of walk/bike trips at 24 percent in both the morning and afternoon peak periods. The transit use of this bus line T.O.D. is similar to the average of the light rail T.O.D.s, but considering Belmont Dairy's proximity to bus stops and downtown, and the low-income households, the transit ridership maybe lower than that of the light rail T.O.D.s. Stadium apartments, although closer to downtown has similar characteristics to Belmont apartments. Stadium Apartments has light rail shares of 28 percent in the morning peak period and 27 in the afternoon peak period versus Belmont Dairy Apartment's bus shares of 18 percent in the morning and 10 percent in the afternoon.

The total trip generation rates for the site including the transit and pedestrian trips were slightly higher than the I.T.E. rates for a mid-rise apartment, while the vehicle only trip generation rates were slightly lower than the I.T.E. rates.

Belmont Dairy Townhomes

The Belmont Dairy Townhomes are an owner occupied housing project located just north of the Belmont Dairy Apartments and retail center at 33rd Avenue and N.E. Morrison Street. The 36 new units are built out to the street with porches opening onto narrow courtyards between the three buildings. The development was built by a private developer. The site has east/west bus service every eight minutes from TRI-MET Bus Line 15.

The TOD characteristics of Belmont Dairy Townhomes are:

Number of Units:	36
Type of Units:	For sale townhomes
Sale Price:	Unknown
Residential Density:	~35 units/acre
Onsite Commercial:	None
Parking Ratio:	1.0 spaces/unit (option to pay for additional spaces)
Distance to bus stop:	2 block
Number of Buildings:	3
Building Height:	2 story
Size of Site	1 acre
Pedestrian Connectivity:	1 or 2 streets between TOD and bus stops

Two people participated in the Belmont Dairy Townhome's count. One person was at the northeast corner of the site, and the second at the corner of N.E. Morrison Street and 33rd Avenue. The morning count was on Tuesday, May 2, 2000, and the afternoon count was on Thursday, May 4, 2000.

Similar to the Belmont Dairy Apartments, the Belmont Dairy Townhomes have a high share of walk/bike trips. This appears to be due to the area's comprehensive sidewalk network, and the nearby retail destinations. The transit ridership numbers are slightly lower for the Belmont Dairy Townhomes compared with the Belmont Dairy Apartments. The trip generation rates are fairly consistent with the I.T.E. rates for Residential Condominiums/Townhomes. The total trip rate (including pedestrians and transit) are slightly higher than the I.T.E. rate, and the vehicle only rates are slightly lower than the I.T.E. rate. This is true for the A.M. and P.M. peak travel times.

Club 1201 (Orenco Station)

The 1201 Club is part of the master planned development at Hillsboro's Orenco Station. The owner occupied housing development is adjacent to the light rail station and block northeast of Orenco's retail center. The majority of the 1201 Club has been completed, and 52 of the planned 800 units were occupied at the time of the count.

The TOD characteristics of 1201Club are:

Number of Units:	800 when complete (52 occupied)
Type of Units:	For sale townhomes
Sale Price:	Unknown
Residential Density:	~25 units/acre
Onsite Commercial:	None
Parking Ratio:	1.8 spaces/unit
Distance to station:	1 block to ¼ mile
Number of Buildings:	`20
Building Height:	3 story
Size of Site	31 acres
Pedestrian Connectivity:	1 or 2 streets between TOD and bus stops

Two people participated in the 1201 Club count with one placed on the northwest corner of the site, and the other at the south end of the site to view the light rail station. The morning count was on Thursday, May 18, 2000, and the afternoon count was on Wednesday, May 17, 2000.

Club 1201 mode split shares are similar to the average of all the T.O.D. The percentage of walking trips should increase when Orenco Station is fully built out, and the surrounding facilities and destinations are complete.

The trip generation rates for the 1201 Club are higher than the average for all the T.O.D. The 1201 rates are similar to the I.T.E. rates for Residential Condominiums/Townhomes for A.M. and P.M. peak hours. The rates for the 1201 may be slightly inflated with interested buyers coming to view the townhomes.

Appendix

Total of All Eight Transit Oriented Developments

AM Peak Period (7 - 9 AM)

Travel Counts

Total	
Auto	722
Transit	155
Walk/ Bike*	76
Total	**953**

Per Unit Travel Counts, 1,273 Total units

Total	
Auto	0.57
Transit	0.12
Walk/ Bike	0.06
Total	**0.75**

Mode Split

Total	
Auto	76%
Transit	16%
Walk/ Bike	8%

Average of Total AM Trips/Hour/Unit = 0.38
Average Vehicle AM Trips/Hour/Unit = 0.29

ITE Apartment, Land Use #220
Average AM Vehicle Trips/Hour/Unit = 0.51

ITE Mid-Rise Apartment, Land Use #223
Average AM Vehicle Trips/Hour/Unit = 0.30

Total of All Eight Transit Oriented Developments

PM Peak Period (4 - 6 PM)

Travel Counts

Total	
Auto	1040
Transit	139
Walk/ Bike*	114
Total	**1,293**

Per Unit Travel Counts, 1,273 Total units

Total	
Auto	0.82
Transit	0.11
Walk/ Bike	0.09
Total	**1.02**

Mode Split

Total	
Auto	80%
Transit	11%
Walk/ Bike	9%

Average Total PM Average Trips/Hour/Unit = 0.51
Average Vehicle PM Trips/Hour/Unit = 0.41

ITE Apartment, Land Use #220
Average AM Vehicle Trips/Hour/Unit = 0.62

ITE Mid-Rise Apartment, Land Use #223
Average AM Vehicle Trips/Hour/Unit = 0.63

Stadium Apartments

AM Peak Period (7 - 9 AM), Thursday, November 18, 1999
Weather: showers, 50 degrees

Travel Counts

From Apartment		To Apartment		**Total**	
Drive Alone*	10	Drive Alone	3	Drive Alone	13
Carpool**	1	Carpool	0	Carpool	1
To EB MAX	10	From EB MAX	0	EB MAX	10
To WB MAX	3	From WB MAX	0	WB MAX	3
Walk	17	Walk	2	Walk	19
Bike	0	Bike	0	Bike	0
Total	**41**	**Total**	**5**	**Total**	**46**

*One was parked on the street.
**One was picked up.

Per Unit Travel Counts, 115 units

From Apartment		*To Apartment*		***Total***	
Drive Alone	0.09	Drive Alone	0.03	Drive Alone	0.11
Carpool	0.01	Carpool	0.00	Carpool	0.01
To MAX	0.11	From MAX	0.00	MAX	0.11
Walk	0.15	Walk	0.02	Walk	0.17
Bike	0.00	Bike	0.00	Bike	0.00
Total	**0.36**	**Total**	**0.04**	**Total**	**0.40**

Mode Split

From Apartment		To Apartment		**Total**	
SOV	24%	SOV	60%	SOV	28%
Carpool	2%	Carpool	0%	Carpool	2%
Light Rail	32%	Light Rail	0%	Light Rail	28%
Walk	41%	Walk	40%	Walk	42%

Average Total AM Average Trips/Hour/Unit = 0.20
Average Vehicle AM Trips/Hour/Unit = 0.06

ITE Mid-Rise Apartment, Land Use #223
Average AM Vehicle Trips/Hour/Unit = 0.30

Stadium Apartments

PM Peak Period (4 - 6 PM), Tuesday, November 23, 1999
Weather: partly cloudy, 45 degrees

Travel Counts

From Apartment	
Drive Alone	8
Carpool*	4
To EB MAX**	5
To WB MAX	0
Walk	10
Bike	1
Total	**28**

To Apartment	
Drive Alone*	11
Carpool**	3
From EB MAX	3
From WB MAX	11
Walk***	15
Bike	0
Total	**43**

Total	
Drive Alone	19
Carpool	7
EB MAX	8
WB MAX	11
Walk	25
Bike	1
Total	**71**

*Two were picked up.
**One Handicapped

*Two parked on the street.
**Two were dropped off.
***One had grocery cart.

Per Unit Travel Counts, 115 units

From Apartment	
Drive Alone	0.07
Carpool	0.03
Light Rail	0.04
Walk	0.09
Bike	0.01
Total	**0.23**

To Apartment	
Drive Alone	0.10
Carpool	0.03
Light Rail	0.12
Walk	0.13
Bike	0.00
Total	**0.37**

Total	
Drive Alone	0.17
Carpool	0.06
Light Rail	0.17
Walk	0.22
Bike	0.01
Total	**0.61**

Mode Split

From Apartment	
SOV	29%
Carpool	14%
Light Rail	18%
Walk	36%
Bike	3%

To Apartment	
SOV	26%
Carpool	7%
Light Rail	33%
Walk	35%
Bike	0%

Total	
SOV	27%
Carpool	10%
Light Rail	27%
Walk	35%
Bike	1%

Average Total PM Average Trips/Hour/Unit = 0.31
Average Vehicle PM Trips/Hour/Unit = 0.12

ITE Mid-Rise Apartment, Land Use #223
Average PM Vehicle Trips/Hour/Unit = 0.63

Quatama Village Apartments

AM Peak Period (7 - 9 AM), Thursday, December 9, 1999
Weather: partly cloudy, 45 degrees

Travel Counts

From Apartment	
Drive Alone	66
Carpool	10
To MAX	15
Walk/ Bike	0
Total	**91**

To Apartment	
Drive Alone	5
Carpool	0
From MAX	1
Walk/ Bike	0
Total	**6**

Total	
Drive Alone	71
Carpool	10
MAX	16
Walk/ Bike	0
Total	**97**

Per Unit Travel Counts, 155 units

From Apartment	
Drive Alone	0.43
Carpool	0.06
To MAX	0.10
Walk/ Bike	0.00
Total	**0.59**

To Apartment	
Drive Alone	0.03
Carpool	0.00
From MAX	0.01
Walk/ Bike	0.00
Total	**0.04**

Total	
Drive Alone	0.46
Carpool	0.06
MAX	0.11
Walk/ Bike	0.00
Total	**0.63**

Mode Split

From Apartment	
SOV	73%
Carpool	11%
Light Rail	16%
Walk/ Bike	0%

To Apartment	
SOV	83%
Carpool	0%
Light Rail	17%
Walk/ Bike	0%

Total	
SOV	73%
Carpool	10%
Light Rail	17%
Walk/ Bike	0%

Average Total AM Average Trips/Hour/Unit = 0.32
Average Vehicle AM Trips/Hour/Unit = 0.26

ITE Apartment, Land Use #220
Average AM Vehicle Trips/Hour/Unit = 0.51

Quatama Village Apartments

PM Peak Period (4 - 6 PM), Wednesday, December 8, 1999
Weather: showers, 45 degrees

Travel Counts

From Apartment		*To Apartment*		***Total***	
Drive Alone	45	Drive Alone	69	Drive Alone	114
Carpool	15	Carpool	21	Carpool	36
To MAX	6	From MAX	14	MAX	20
Walk/ Bike	0	Walk/ Bike	0	Walk/ Bike	0
Total	**66**	**Total**	**104**	**Total**	**170**

Per Unit Travel Counts, 155 units

From Apartment		*To Apartment*		***Total***	
Drive Alone	0.29	Drive Alone	0.45	Drive Alone	0.74
Carpool	0.10	Carpool	0.14	Carpool	0.23
To MAX	0.04	From MAX	0.09	MAX	0.13
Walk/ Bike	0.00	Walk/ Bike	0.00	Walk/ Bike	0.00
Total	**0.43**	**Total**	**0.67**	**Total**	**1.10**

Mode Split

From Apartment		*To Apartment*		***Total***	
SOV	68%	SOV	66%	SOV	67%
Carpool	23%	Carpool	20%	Carpool	21%
Light Rail	9%	Light Rail	14%	Light Rail	12%
Walk/ Bike	0%	Walk/ Bike	0%	Walk/ Bike	0%

Average Total PM Average Trips/Hour/Unit = 0.55
Average Vehicle PM Trips/Hour/Unit = 0.49

ITE Apartment, Land Use #220
Average PM Vehicle Trips/Hour/Unit = 0.62

LaSalle Apartments

AM Peak Period (7 - 9 AM), Monday, January 31, 2000
Weather: cloudy, 45 degrees

Residential Travel Counts

From Apartment	
Automobile	309
To MAX	66
Walk/ Bike	12
Total	**387**

To Apartment	
Automobile	45
From MAX	10
Walk/ Bike	0
Total	**55**

Total	
Automobile	354
MAX	76
Walk/ Bike	12
Total	**442**

Per Unit Travel Counts, 525 units

From Apartment	
Automobile	0.58
To MAX	0.13
Walk/ Bike	0.02
Total	**0.73**

To Apartment	
Automobile	0.09
From MAX	0.02
Walk/ Bike	0.00
Total	**0.11**

Total	
Automobile	0.67
MAX	0.15
Walk/ Bike	0.02
Total	**0.84**

Residential Mode Split

From Apartment	
Automobile	80%
Light Rail	17%
Walk/ Bike	3%

To Apartment	
Automobile	82%
Light Rail	18%
Walk/ Bike	0%

Total	
Automobile	80%
Light Rail	17%
Walk/ Bike	3%

Average Total AM Average Trips/Hour/Unit = 0.42
Average Vehicle AM Trips/Hour/Unit = 0.34

ITE Apartment, Land Use #220
Average AM Vehicle Trips/Hour/Unit = 0.51

LaSalle Apartments

PM Peak Period (4 - 6 PM), Tuesday, February 1, 2000
Weather: Raining, 55 degrees

Residential Travel Counts

From Apartment	
Automobile	148
To MAX	11
Walk/ Bike	11
Total	**170**

To Apartment	
Automobile	302
From MAX	31
Walk/ Bike	7
Total	**340**

Total	
Automobile	450
MAX	42
Walk/ Bike	18
Total	**510**

Per Unit Travel Counts, 525 units

From Apartment	
Automobile	0.28
To MAX	0.02
Walk/ Bike	0.02
Total	**0.32**

To Apartment	
Automobile	0.58
From MAX	0.06
Walk/ Bike	0.01
Total	**0.65**

Total	
Automobile	0.86
MAX	0.08
Walk/ Bike	0.03
Total	**0.97**

Residential Mode Split

From Apartment	
Automobile	87%
Light Rail	6%
Walk/ Bike	6%

To Apartment	
Automobile	89%
Light Rail	9%
Walk/ Bike	2%

Total	
Automobile	88%
Light Rail	8%
Walk/ Bike	4%

Average Total AM Average Trips/Hour/Unit = 0.49
Average Vehicle AM Trips/Hour/Unit = 0.43

ITE Apartment, Land Use #220
Average AM Vehicle Trips/Hour/Unit = 0.62

Russellville Commons Apartments

AM Peak Period (7 - 9 AM), Thursday, April 13, 2000
Weather: sunny, 60 degrees

Travel Counts

From Apartment	
Auto	108
To MAX	23
Walk/ Bike	4
Total	**135**

To Apartment	
Auto	21
From MAX	0
Walk/ Bike	4
Total	**25**

Total	
Auto	129
MAX	23
Walk/ Bike	8
Total	**160**

Per Unit Travel Counts, 215 units

From Apartment	
Auto	0.50
To MAX	0.11
Walk/ Bike	0.02
Total	**0.63**

To Apartment	
Auto	0.10
From MAX	0.00
Walk/ Bike	0.02
Total	**0.12**

Total	
Auto	0.60
MAX	0.11
Walk/ Bike	0.04
Total	**0.74**

Mode Split

From Apartment	
Auto	80%
Light Rail	17%
Walk/ Bike	3%

To Apartment	
Auto	84%
Light Rail	0%
Walk/ Bike	16%

Total	
Auto	81%
Light Rail	14%
Walk/ Bike	5%

Average Total AM Average Trips/Hour/Unit = 0.37
Average Vehicle AM Trips/Hour/Unit = 0.30

ITE Apartment, Land Use #220
Average AM Vehicle Trips/Hour/Unit = 0.51

Russellville Commons Apartments

PM Peak Period (4 - 6 PM), Wednesday, April 19, 2000
Weather: partly cloudy, 60 degrees

Travel Counts

From Apartment	
Auto	76
To MAX	0
Walk/ Bike	9
Total	**85**

To Apartment	
Auto	116
From MAX	13
Walk/ Bike	13
Total	**142**

Total	
Auto	192
MAX	13
Walk/ Bike	22
Total	**227**

Per Unit Travel Counts, 215 units

From Apartment	
Auto	0.35
To MAX	0.00
Walk/ Bike	0.04
Total	**0.40**

To Apartment	
Auto	0.54
From MAX	0.06
Walk/ Bike	0.06
Total	**0.66**

Total	
Auto	0.89
MAX	0.06
Walk/ Bike	0.10
Total	**1.06**

Mode Split

From Apartment	
Auto	89%
Light Rail	0%
Walk/ Bike	11%

To Apartment	
Auto	82%
Light Rail	9%
Walk/ Bike	9%

Total	
Auto	84%
Light Rail	6%
Walk/ Bike	10%

Average Total AM Average Trips/Hour/Unit = 0.53
Average Vehicle AM Trips/Hour/Unit = 0.45

ITE Apartment, Land Use #220
Average AM Vehicle Trips/Hour/Unit = 0.62

Gresham Central Apartments

AM Peak Period (7 - 9 AM), Tuesday, April 25, 2000
Weather: sunny, 60 degrees

Travel Counts

From Apartment	
Auto	27
To MAX	3
To Bus	2
Walk/ Bike	5
Total	**37**

To Apartment	
Auto	8
From MAX	2
From Bus	0
Walk/ Bike	3
Total	**13**

Total	
Auto	35
MAX	5
Bus	2
Walk/ Bike	8
Total	**50**

Per Unit Travel Counts, 90 units

From Apartment	
Auto	0.30
To MAX	0.03
To Bus	0.02
Walk/ Bike	0.06
Total	**0.41**

To Apartment	
Auto	0.09
From MAX	0.02
From Bus	0.00
Walk/ Bike	0.03
Total	**0.14**

Total	
Auto	0.39
MAX	0.06
Bus	0.02
Walk/ Bike	0.09
Total	**0.55**

Mode Split

From Apartment	
Auto	73%
Light Rail	3%
Bus	2%
Walk/ Bike	6%

To Apartment	
Auto	62%
Light Rail	15%
Bus	0%
Walk/ Bike	23%

Total	
Auto	70%
Light Rail	10%
Bus	4%
Walk/ Bike	16%

Average Total AM Average Trips/Hour/Unit = 0.28
Average Vehicle AM Trips/Hour/Unit = 0.20

ITE Mid-Rise Apartment, Land Use #223
Average AM Vehicle Trips/Hour/Unit = 0.30

Gresham Central Apartments

PM Peak Period (4 - 6 PM), Tuesday, April 25, 2000
Weather: partly cloudy, 60 degrees

Travel Counts

From Apartment	
Auto	45
To MAX	2
To Bus	2
Walk/ Bike	8
Total	**57**

To Apartment	
Auto	33
From MAX	17
From Bus	2
Walk/ Bike	3
Total	**55**

Total	
Auto	78
MAX	19
Bus	4
Walk/ Bike	11
Total	**112**

Per Unit Travel Counts, 90 units

From Apartment	
Auto	0.50
To MAX	0.02
To Bus	0.02
Walk/ Bike	0.09
Total	**0.63**

To Apartment	
Auto	0.37
From MAX	0.19
From Bus	0.02
Walk/ Bike	0.03
Total	**0.61**

Total	
Auto	0.87
MAX	0.21
Bus	0.04
Walk/ Bike	0.12
Total	**1.24**

Mode Split

From Apartment	
Auto	79%
Light Rail	4%
Bus	4%
Walk/ Bike	14%

To Apartment	
Auto	60%
Light Rail	31%
Bus	4%
Walk/ Bike	5%

Total	
Auto	70%
Light Rail	17%
Bus	3%
Walk/ Bike	10%

Average Total PM Average Trips/Hour/Unit = 0.62
Average Vehicle PM Trips/Hour/Unit = 0.44

ITE Mid-Rise Apartment, Land Use #223
Average PM Vehicle Trips/Hour/Unit = 0.39

Belmont Dairy Apartments

AM Peak Period (7 - 9 AM), Thursday, April 27, 2000
Weather: sunny, 60 degrees

Travel Counts

From Apartment		*To Apartment*		***Total***	
Auto	41	Auto	7	Auto	48
To Bus*	12	From Bus	0	Bus*	12
Walk/ Bike**	12	Walk/ Bike**	7	Walk/ Bike**	19
Total	**65**	**Total**	**14**	**Total**	**79**

*Two bus travelers were handicapped and picked up by a special bus.
**7 of the walk/bike trips patronized the attached grocery store.

Per Unit Travel Counts, 85 units

From Apartment		*To Apartment*		***Total***	
Auto	0.48	Auto	0.08	Auto	0.56
To Bus	0.14	From Bus	0.00	Bus	0.14
Walk/ Bike	0.14	Walk/ Bike	0.08	Walk/ Bike	0.22
Total	**0.76**	**Total**	**0.16**	**Total**	**0.93**

Mode Split

From Apartment		*To Apartment*		***Total***	
Auto	63%	Auto	50%	Auto	61%
Bus	18%	Bus	0%	Bus	15%
Walk/ Bike	18%	Walk/ Bike	50%	Walk/ Bike	24%

Average Total AM Average Trips/Hour/Unit = 0.47
Average Vehicle AM Trips/Hour/Unit = 0.28

ITE Mid-Rise Apartment, Land Use #223
Average AM Vehicle Trips/Hour/Unit = 0.30

Belmont Dairy Apartments

PM Peak Period (4 - 6 PM), Wednesday, May 31, 2000
Weather: partly cloudy, 60 degrees

Travel Counts

From Apartment	
Auto	23
To Bus	7
Walk/ Bike*	15
Total	**45**

To Apartment	
Auto	36
From Bus	2
Walk/ Bike*	7
Total	**45**

Total	
Auto	59
Bus	9
Walk/ Bike*	22
Total	**90**

*14 of the walk/bike trips patronized the attached grocery store.

Per Unit Travel Counts, 85 units

From Apartment	
Auto	0.27
To Bus	0.08
Walk/ Bike	0.18
Total	**0.53**

To Apartment	
Auto	0.42
From Bus	0.02
Walk/ Bike	0.08
Total	**0.53**

Total	
Auto	0.69
Bus	0.11
Walk/ Bike	0.26
Total	**1.06**

Mode Split

From Apartment	
Auto	51%
Bus	16%
Walk/ Bike	33%

To Apartment	
Auto	80%
Bus	4%
Walk/ Bike	16%

Total	
Auto	66%
Bus	10%
Walk/ Bike	24%

Average Total PM Average Trips/Hour/Unit = 0.53
Average Vehicle PM Trips/Hour/Unit = 0.35

ITE Mid-Rise Apartment, Land Use #223
Average PM Vehicle Trips/Hour/Unit = 0.39

Belmont Dairy Townhomes

AM Peak Period (7 - 9 AM), Thursday, April 27, 2000
Weather: sunny, 60 degrees

Travel Counts

From Apartment	
Auto	22
To Bus	3
Walk/ Bike*	5
Total	**30**

To Apartment	
Auto	2
From Bus	0
Walk/ Bike*	2
Total	**4**

Total	
Auto	24
Bus	3
Walk/ Bike*	7
Total	**34**

*3 of the walk/bike trips patronized the attached grocery store.

Per Unit Travel Counts, 36 units

From Apartment	
Auto	0.61
To Bus	0.08
Walk/ Bike	0.14
Total	**0.83**

To Apartment	
Auto	0.06
From Bus	0.00
Walk/ Bike	0.06
Total	**0.11**

Total	
Auto	0.67
Bus	0.08
Walk/ Bike	0.19
Total	**0.94**

Mode Split

From Apartment	
Auto	73%
Bus	10%
Walk/ Bike	17%

To Apartment	
Auto	50%
Bus	0%
Walk/ Bike	50%

Total	
Auto	71%
Bus	9%
Walk/ Bike	21%

Average Total AM Average Trips/Hour/Unit = 0.47
Average Vehicle AM Trips/Hour/Unit = 0.34

ITE Residential Condominiums/Townhomes, Land Use #230
Average AM Vehicle Trips/Hour/Unit = 0.44

Belmont Dairy Townhomes

PM Peak Period (4 - 6 PM), Wednesday, May 31, 2000
Weather: partly cloudy, 60 degrees

Travel Counts

From Apartment	
Auto	14
To Bus	1
Walk/ Bike*	6
Total	**21**

To Apartment	
Auto	19
From Bus	4
Walk/ Bike*	4
Total	**27**

Total	
Auto	33
Bus	5
Walk/ Bike*	10
Total	**48**

*5 of the walk/bike trips patronized the attached grocery store.

Per Unit Travel Counts, 36 units

From Apartment	
Auto	0.39
To Bus	0.03
Walk/ Bike	0.17
Total	**0.58**

To Apartment	
Auto	0.53
From Bus	0.11
Walk/ Bike	0.11
Total	**0.75**

Total	
Auto	0.92
Bus	0.14
Walk/ Bike	0.28
Total	**1.33**

Mode Split

From Apartment	
Auto	67%
Bus	5%
Walk/ Bike	29%

To Apartment	
Auto	70%
Bus	15%
Walk/ Bike	15%

Total	
Auto	69%
Bus	10%
Walk/ Bike	21%

Average Total PM Average Trips/Hour/Unit = 0.67
Average Vehicle PM Trips/Hour/Unit = 0.46

ITE Residential Condominiums/Townhomes, Land Use #230
Average PM Vehicle Trips/Hour/Unit = 0.54

1201 Club (Orenco Station)

AM Peak Period (7 - 9 AM), Thursday, May 18, 2000
Weather: sunny, 55 degrees

Travel Counts

From Apartment	
Auto	29
To MAX	5
Walk/ Bike*	3
Total	**37**

To Apartment	
Auto	8
From MAX	0
Walk/ Bike	0
Total	**8**

Total	
Auto	37
MAX	5
Walk/ Bike*	3
Total	**45**

*****All walk/bike trips were to nearby retail center.

Per Unit Travel Counts, 52 units

From Apartment	
Auto	0.56
To MAX	0.10
Walk/ Bike	0.06
Total	**0.71**

To Apartment	
Auto	0.15
From MAX	0.00
Walk/ Bike	0.00
Total	**0.15**

Total	
Auto	0.71
MAX	0.10
Walk/ Bike	0.06
Total	**0.87**

Mode Split

From Apartment	
Auto	78%
Light Rail	14%
Walk/ Bike	8%

To Apartment	
Auto	100%
Light Rail	0%
Walk/ Bike	0%

Total	
Auto	82%
Light Rail	11%
Walk/ Bike	7%

Average Total AM Average Trips/Hour/Unit = 0.44
Average Vehicle AM Trips/Hour/Unit = 0.36

ITE Residential Condominiums/Townhomes, Land Use #230
Average AM Vehicle Trips/Hour/Unit = 0.44

1201 Club (Orenco Station)

PM Peak Period (4 - 6 PM), Wednesday, May 17, 2000
Weather: sunny, 60 degrees

Travel Counts

From Apartment	
Auto	22
To MAX	3
Walk/ Bike*	2
Total	**27**

To Apartment	
Auto	30
From MAX	5
Walk/ Bike*	3
Total	**38**

Total	
Auto	52
MAX	8
Walk/ Bike*	5
Total	**65**

*All walk/bike trips were to nearby retail center.

Per Unit Travel Counts, 52 units

From Apartment	
Auto	0.42
To MAX	0.06
Walk/ Bike	0.04
Total	**0.52**

To Apartment	
Auto	0.58
From MAX	0.10
Walk/ Bike	0.06
Total	**0.73**

Total	
Auto	1.00
MAX	0.15
Walk/ Bike	0.10
Total	**1.25**

Mode Split

From Apartment	
Auto	81%
Light Rail	11%
Walk/ Bike	7%

To Apartment	
Auto	79%
Light Rail	13%
Walk/ Bike	8%

Total	
Auto	80%
Light Rail	12%
Walk/ Bike	8%

Average Total PM Average Trips/Hour/Unit = 0.63
Average Vehicle PM Trips/Hour/Unit = 0.50

ITE Residential Condominiums/Townhomes, Land Use #230
Average PM Vehicle Trips/Hour/Unit = 0.54

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