New Transit Cooperative Research Program Research Confirms Transit-Oriented Developments Produce Fewer Auto Trips

TRANSIT-ORIENTED DEVELOPMENT (TOD) PRODUCES APPROXIMATELY 50 PERCENT FEWER AUTOMOBILE TRIPS THAN CONVENTIONAL DEVELOPMENT. PEOPLE LIVING AND WORKING IN TODS WALK AND USE TRANSIT MORE AND OWN FEWER CARS. THE BENEFITS OF TOD AND THE SUBSTANTIAL INVESTMENT IN TRANSIT CAN BE CAPTURED THROUGH THE CREATION OF NEW PARKING AND TRIP GENERATION RATES THAT APPLY THE FINDINGS FROM THE TCRP RESEARCH.

BY G.B. ARRINGTON AND KIMI IBOSHI SLOOP

Figure 1. TOD housing produces considerably fewer trips than conventional development. The Merrick in Portland has an actual trip generation rate of 2.01 compared to the average ITE trip generation rate of 6.72 that was originally assumed for the development.

FROM SAN FRANCISCO, CA, USA, to Washington, DC, USA, the policy benefits of transit-oriented development (TOD) are well understood. However, the potential benefits are often muted because most residents of TODs in the United States are oblivious to the fact that a rail stop is nearby.

The Transit Cooperative Research Program (TCRP) recognized that TOD results in different travel behavior than conventional development, yet it had few data to support the argument. As a result, TCRP initiated a research study to identify the following: which factors determine the behavior and motivation of TOD residents, employees and employers in their mode choice; best practices to promote TOD-related transit ridership; and the contextual use of best practices.

One impetus for this research was to provide original, reliable data to help create new professional guidelines for TOD. In part, that meant an update of the Institute of Transportation Engineers (ITE) trip generation and parking generation rates, which help determine local traffic and parking impacts and impact fees. The current ITE trip generation rates are based largely on suburban areas with free and plentiful parking and low-density single land uses.

The research, completed in 2007 and summarized in *TCRP Report 128: Effects of TOD on Housing, Parking and Travel*, supports the hypothesis that residential TODs produce fewer automobile trips. Evidence was derived from original research on trip generation and parking from 17 built residential TOD projects

in four metropolitan areas as well as a literature review. See Figure 1.

RESIDENTIAL TODS PRODUCE 50 PERCENT FEWER TRIPS

The research's key conclusion is that ITE trip generation and parking generation rates overestimate automobile trips for TOD housing by approximately 50 percent. Over a typical weekday period, the 17 surveyed TOD-housing projects averaged 44 percent fewer vehicle trips than that estimated by the ITE report (3.754 versus 6.715 daily trips per unit), as identified in Table 1. The weighted average differentials were even larger during peak periods—49 percent lower rates during the a.m. peak and 48 percent lower rates during the p.m. peak. As a result, peak-hour impact fees and traffic impact studies based on the ITE report could be overstating the congestion-inducing effects of TOD housing by as much as 50 percent.

The TOD projects studied were in Washington, DC; Portland, OR, USA; the San Francisco Bay area; and the Philadelphia, PA/Newark, NJ, USA, area. These projects represented a cross-section of TOD, as shown in Table 2. All are within an easy walk of high-quality transit with a mix of modes—heavy rail, commuter rail and light rail. Projects ranged in size from 90 to 854 units. The primary use was residential; however, six of the 17 sites had incidental retail uses on the first floor.

The biggest effects were found in the Washington, DC, metropolitan area. Among the five mid- to high-rise apartment projects near Metrorail stations outside Washington, DC, vehicle trip generation rates were more than 60 percent below that predicted by the ITE report.

TOD housing in the Portland area also tended to have low weekday trip generation rates—on average, around 40 percent below that predicted by the ITE report. The Portland projects that performed best were those on the fringes of the city center. Collins Circle, on the western edge of downtown, produced trip rates 78 percent below those predicted in the ITE report.

The San Francisco Bay area also averaged vehicle trip generation rates substantially below those estimated by the ITE report. Among the East Bay TOD housing projects studied, Montelena Homes had the lowest

Table 1. Comparison of TOD housing and ITE vehicle trip generation rates: 24-hour estimates.

	TOD vehicle trip rate (24 hr.)	Average ITE Rate (24 Hours)			Regression ITE Rate (24 Hours)		
		ITE rate (24 hr.)	TOD rate as % of ITE rate (24 hr.)	% point difference from ITE rate	ITE rate (24 hr.)	TOD rate as % of ITE rate (24 hr.)	% point difference from ITE rate
Philadelphia/NE New Jersey							
Gaslight Commons	5.08	6.72	75.52	-24.48	6.76	75.05	-24.95
Station Square	4.76	6.72	70.81	-29.19	6.44	73.84	-26.16
Mean	4.92	—	73.17	-26.83	6.60	74.45	-25.55
Std. Dev.	0.22	—	3.33	3.33	0.22	0.86	0.86
Portland, OR							
Center Commons	4.79	6.72	71.30	-28.70	6.53	73.36	-26.64
Collins Circle	0.88	6.72	13.08	-86.92	7.22	12.17	-87.83
Gresham Central	5.91	6.72	87.95	-12.05	7.68	76.95	-23.05
The Merrick Apartments	2.01	6.72	29.84	-70.16	6.82	29.39	-70.61
Quatama Crossing	6.34	6.72	94.38	-5.62	6.22	101.95	1.95
Mean	3.99	—	59.31	-40.69	6.52	58.76	-41.24
Std. Dev.	2.42	—	36.05	36.05	0.62	36.88	36.88
San Francisco Bay, CA, area							
Mission Wells	3.21	6.72	47.80	-52.20	6.39	50.23	-49.77
Montelena Homes	2.46	6.72	36.57	-63.43	6.81	36.09	-63.91
Park Regency	5.01	6.72	74.61	-25.39	6.19	81.04	-18.96
Verandas	3.10	6.72	46.17	-53.83	6.54	47.42	-52.58
Wayside Commons	3.26	5.86	55.68	-44.32	6.00	54.34	-45.66
Mean	3.41	—	52.17	-47.83	6.39	53.83	-46.17
Std. Dev.	0.95	—	14.27	14.27	0.31	16.66	16.66
Washington, DC, area							
Avalon	4.72	6.72	70.21	-29.79	6.31	74.75	-25.25
Gallery	3.04	6.72	45.25	-54.75	6.66	45.66	-54.34
Lennox	2.38	6.72	35.41	-64.59	6.38	37.29	-62.71
Meridian	0.55	6.72	8.24	-91.76	6.34	8.73	-91.27
Quincey	1.91	6.72	28.49	-71.51	6.31	30.34	-69.66
Mean	2.52	—	37.52	-62.48	6.40	39.35	-60.65
Std. Dev.	1.53	—	22.76	22.76	0.15	24.06	24.06
Unweighted average	3.55	6.67	53.29	-46.71	6.59	53.92	-46.08

Note: Fitted curve equation for apartments: $T = 6.01(X) + 150.35$, where T = average vehicle trip ends and X = number of dwelling units. Fitted curve equation for condominiums (Wayside Commons): $Ln(T) = 0.85\ Ln(X) + 2.55$.

Source: Arrington, G., et al. *TCRP Report 128: Effects of TOD on Housing, Parking and Travel.* Washington, DC, USA: Transportation Research Board, 2008.

Table 2. Background on case study TOD housing projects.

	Housing			Other Characteristics			
	Housing type	# stories	# units	# on-site parking spaces	# drive-ways	Nearest rail station	Shortest walking distance from project to nearest station (feet)
Philadelphia/New Jersey							
Gaslight Commons (S. Orange, NJ)	A	4	200	500	3	NJ Transit: South Orange	990
Station Square Apartments (Lansdale, PA)	A	1–3	346	222	3	Pennbrook SEPTA	625
Portland, OR							
Center Commons (Portland)	A	4	288	150	2	60th Avenue MAX	450
Collins Circle Apartments (Portland)	A	6	124	93	1	Goose Hallow MAX	525
Gresham Central Apartments (Gresham)	A	3	90	135	2	Gresham Central MAX	620
Merrick Apartments (Portland)	A	6	185	218	1	Convention Center MAX	700
Quatama Crossing Apartments (Beaverton)	A	3	711		3	Quatama MAX	2000
San Francisco, CA							
Mission Wells (Fremont)	A	2–4	391	508	4	Fremont BART	3810
Montelena Apartment Homes (Hayward)	A	3	188	208	3	South Hayward BART	950
Park Regency (Walnut Creek)	A	3	854	1352	5	Pleasant Hill BART	1565
Verandas (Union City)	A	5	282	282	2	Union City BART	830
Wayside Plaza (Walnut Creek)	C	3–4	156	166	1	Pleasant Hill BART	1555
Washington, DC							
Avalon (Bethesda)	A	4	497	746	2	Grosvenor Metro	1020
Gallery (Arlington)	A	20	231	258	2	Virginia Square Metro	50
Lenox Park Apts. (Silver Spring)	A	16	406	406	3	Silver Spring Metro	420
Meridian (Alexandria)	A	10–16	457	560	2	Braddock Metro	920
Quincy Plaza (Arlington)	A	15–21	499	499	2	Virginia Square Metro	1020

Note: A = Apartments (rental); C = Condominiums (owner-occupied).

Source: Arrington, G., et al. *TCRP Report 128: Effects of TOD on Housing, Parking and Travel.* Washington, DC, USA: Transportation Research Board, 2008.

weekday rate: 2.46 trip ends per dwelling unit, 63 percent below ITE's rate.

Lastly, the two apartment projects near suburban commuter rail stations outside of Philadelphia and the Newark metropolitan area of northeast New Jersey averaged weekday vehicle trip generation rates that were roughly one-quarter less than that predicted by the ITE report. This is an appreciable difference given the relatively low-density settings of these projects and that commuter rail offers limited midday and late-night services.

TOD TRAVEL CHARACTERISTICS AND BEHAVIOR

In addition to identifying the number of trips taken by residents living in a TOD, the research studied the travel characteristics and behavior of people living, working and/or shopping in a TOD. The key conclusions of the research included the following:

- TOD households are twice as likely to not own a car and own roughly half as many cars as comparable households not living in TODs.
- Among the factors that attract households to TODs, neighborhood design; home prices and perceived value; and transit proximity were consistently placed in high value.
- Transit ridership is positively correlated to the extensiveness of the transit system, amount of traffic congestion and higher parking costs.
- Transit service headways of 10 minutes are ideal to support a transit lifestyle.

IMPLICATIONS OF THE RESEARCH

The research conducted in *TCRP Report 128* clearly supports that TODs perform differently than conventional development. Implementing the findings of this research through new parking and trip generation rates will allow communities across the United States to capture the benefits of TOD and reap additional benefits from the substantial investment in transit. The implications of new standards are varied:

- Local officials and neighborhoods may be more apt to support increases in residential densities near transit if shown proof that significantly fewer

automobile trips result from TODs than in conventional development.

- Developers would likely pay lower fees and extractions, by as much as 50 percent to reflect the actual performance of residential TODs. Those savings can be passed on to consumers in the form of lower housing costs.
- Parking availability and cost have a major impact on transit use. Transit agencies should plan for increased ridership from lower parking ratios for residential TODs.
- Housing affordability is a crisis facing the nation. More affordable TOD housing should be available to the public because of lower development costs and the need for less expensive parking.
- With TODs generating lower levels of traffic, it can be argued that it simply makes no sense to construct roadway improvements for TOD-related traffic that is likely not to materialize.
- The lower cost of development resulting from lower fees and development costs will make more TODs financially feasible than otherwise.

TCRP Report 128: Effects of TOD on Housing, Parking and Travel is available on the Transportation Research Board (TRB) Web site at www.trb.org/TRB/publications/Publications.asp. The research was conducted by PB PlaceMaking, Dr. Robert Cervero, The Urban Land Institute and the Center for Transit Oriented Development. ■

Reference

Arrington, G., et al. *TCRP Report 128: Effects of TOD on Housing, Parking and Travel.* Washington, DC, USA: Transportation Research Board, 2008.

G.B. ARRINGTON

was the principal investigator for TCRP Report 128. *He is a co-founder of PB's PlaceMaking group and leads PB's global transit-oriented development (TOD) practice. He is internationally recognized as a leader in TOD and for his skills in linking transit and land use to create livable communities of lasting value.*

KIMI IBOSHI SLOOP

assisted with the research for TCRP Report 128. She is a lead land use planner and policy analyst with PB's PlaceMaking group and has been involved in growth management issues in Portland, OR, USA, as well as transit-oriented development projects internationally.