

From: Eric Mandell <ericg.mandell@gmail.com>

Sent: Monday, February 15, 2021 2:51 PM

To: Planning <Planning@a2gov.org>

Subject: Rezoning

Hello,

My name is Eric Mandell and I live on Packard street just below downtown. I wanted to email you as I know you're considering rezoning certain areas of the city, and I wanted to encourage you to expand the area that you will be zoning as mixed-use. I think it's important for there to be more housing available to improve housing affordability in the city. Additionally, I personally prefer the style of development that comes with mixed use development. Walkable areas with multiple different types of buildings, residential, commercial, etc. in striking distance of each other makes for a much more desirable area to work and live.

Thank you for your consideration.

Best,
Eric Mandell

From: Jonathan Levine <jnthnlvn@gmail.com>
Sent: Saturday, February 20, 2021 5:34 PM
To: Planning <Planning@a2gov.org>
Subject: Does TOD Need the T?

To the Ann Arbor Planning Commission:

Following the Planning Commission's working session of February 9, I wanted to express my support for transit-oriented zoning reform that encompasses all our commercial corridors, rather than an incremental start at State and Eisenhower. A small-scale experiment runs the risk of failing to attract development (especially given some of the restrictive requirements that Will Leaf and I reference in our 11/13 memo) and leading the City incorrectly to the conclusion that transit zoning does not work in Ann Arbor. I urge the development of a zoning category applicable at a minimum to all the transit corridors referenced in the Council resolution of 11/16/2020 and potentially expandable to all the City's commercial and light-industrial districts.

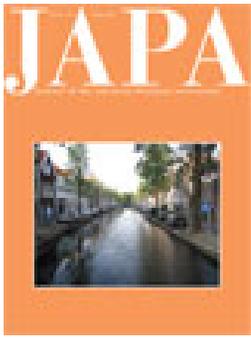
To this end, I'd like to call your attention to an influential article (attached):

- Chatman, Daniel G. "Does TOD need the T? On the importance of factors other than rail access." *Journal of the American Planning Association* 79, no. 1 (2013): 17-31.

In it, Professor Chatman shows that, while auto ownership, commuting, and grocery-trip frequency are considerably lower for residents near train stations, most of that effect has to do with ancillary factors (rather than the presence of transit itself) including housing type and tenure, density, and particularly parking availability. The implication is that the territory over which transit-friendly zoning can succeed may be broader than is sometimes thought. This may have relevance, for example, to areas including Briarwood Mall (15-minute bus service prior to pandemic-related adjustments), West Stadium (30-minute service), and South Industrial Boulevard (14-minute service).

Best wishes,

Jonathan Levine



Does TOD Need the T?

On the Importance of Factors Other Than Rail Access

Daniel G. Chatman

To cite this article: Daniel G. Chatman (2013) Does TOD Need the T?, Journal of the American Planning Association, 79:1, 17-31, DOI: [10.1080/01944363.2013.791008](https://doi.org/10.1080/01944363.2013.791008)

To link to this article: <https://doi.org/10.1080/01944363.2013.791008>



Published online: 09 May 2013.



Submit your article to this journal [↗](#)



Article views: 4869



View related articles [↗](#)



Citing articles: 48 View citing articles [↗](#)

Does TOD Need the T?

On the Importance of Factors Other Than Rail Access

Daniel G. Chatman

Problem, research strategy, and findings: Transit-oriented developments (TODs) often consist of new housing near rail stations. Channeling urban growth into such developments is intended in part to reduce the climate change, pollution, and congestion caused by driving. But new housing might be expected to attract more affluent households that drive more, and rail access might have smaller effects on auto ownership and use than housing tenure and size, parking availability, and the neighborhood and subregional built environments.

I surveyed households in northern New Jersey living within two miles of 10 rail stations about their housing age and type, access to off-street parking, work and non-work travel patterns, demographics, and reasons for choosing their neighborhoods. The survey data were geocoded and joined to on-street parking data from a field survey, along with neighborhood and subregional built environment measures. I analyzed how these factors were correlated with automobile ownership and use as reported in the survey.

Auto ownership, commuting, and grocery trip frequency were substantially lower among households living in new housing near rail stations compared to those in new households farther away. But rail access does little to explain this fact. Housing type and tenure, local and subregional density, bus service, and particularly off- and on-street parking availability, play a much more important role.

Takeaway for practice: Transportation and land use planners should broaden their efforts to develop dense, mixed-use, low-parking housing beyond rail station areas. This could be both more influential and less

Transit-oriented development (TOD) is a common urban planning strategy; in practice, it often means developing new housing near rail stations. The term TOD can refer to buildings near transit, clusters of buildings near transit, or larger areas of up to a half-mile radius around a rail stop that are high-density and mixed-use, with walk-accessible shopping, pedestrian amenities, lower parking supply, and physical designs that are thought to encourage households to walk, bicycle, and take transit instead of driving (e.g., Belzer & Autler, 2002; Calthorpe, 1993).

One of the main objectives of TOD policies is to reduce the regional and global environmental impacts of auto use. Pursuing environmental goals through TOD has two important premises: first, that households occupying newly constructed housing units near rail stations drive less than those in older housing near rail or those living farther from rail; and second, that the proximity to rail, as opposed to other attributes of TOD, is a critical part of the equation. There are reasons to doubt these premises. New housing might attract more affluent residents who drive more than those living in older housing near rail. Higher development density, less parking, and the presence of more shops and services nearby could all induce households to drive less, with or without rail access.

While studies have long found that households living near rail stations have substantially higher rates of transit use, particularly rail ridership (see review in Cervero, Ferrell, & Murphy, 2002), there are fewer studies of whether those households also own and use personal vehicles less. A study of selected transit-oriented housing developments in California in 2003 found that 72% of survey respondents commuted in personal vehicles, lower than the Census rate for surrounding cities of 90% in 1999 (Lund, Cervero, & Willson, 2004). A study of 17 transit-oriented developments in four U.S. urban areas, using vehicle counters in driveways, found 44% fewer vehicle

expensive than a development policy oriented around rail.

Keywords: transit-oriented development, rail transit, auto use, parking, sustainability

Research support: Data collection and initial research were funded under contract with the New Jersey Department of Transportation.

About the author:

Daniel G. Chatman (dgc@berkeley.edu) is assistant professor of city and regional planning at the University of California, Berkeley.

Journal of the American Planning Association,
Vol. 79, No. 1, Winter 2013
DOI 10.1080/01944363.2013.791008
© American Planning Association, Chicago, IL.

trips than the published rates in the Institute of Transportation Engineers manual (Arrington & Cervero, 2008). Because neither of these studies included a control group, the magnitude of the reported differences may not be generalizable. The nature of non-response to the TOD survey, the use of a different survey instrument, and the timing of the survey (a four-year difference) could all influence the lower observed auto use in comparison to Census rates; and lower vehicle trip counts in comparison to the Institute of Transportation Engineers estimates could be partly because those estimates are inflated (Shoup, 2005).

Well-controlled statistical studies about the impacts on auto travel of the built environment are relevant because they control for many of the factors that comprise TOD. However, compared to built environment factors like population density, there are relatively few studies that include rail or transit access. A recent meta-analysis of more than 200 studies in the built environment-travel literature found just six studies at the household or individual level that used vehicle distance traveled as a dependent variable along with distance to rail or bus as an independent variable (Ewing & Cervero, 2010). The average elasticity of vehicle use with respect to transit proximity was very small, at -0.05 , and likely not statistically significant.

Some research has found that rail access has either little association or a positive relationship with auto ownership or use. A study of San Diego and the San Francisco Bay Area found that proximity to heavy rail was associated with higher vehicle miles traveled when controlling for a large set of neighborhood-level built environment features (Chatman, 2008), and a study of Manhattan and Hong Kong found that rail station ridership was positively associated with the auto ownership of households living nearby (Loo, Chen, & Chan, 2010). A study of 370 metropolitan areas in the United States using structural equation modeling found that rail access was only weakly associated with auto distance traveled per capita (Cervero & Murakami, 2010). A simulation model conducted for Austin (TX) estimated that there was very little change in travel mode associated with increasing the share of new development near rail stations, although projected vehicle mileage was lower because auto trip distances were shortened (Zhang, 2010).

A slightly larger set of studies has found that rail access is associated with lower auto use. A study of both commute mode and auto distance traveled using data from a subset of 114 U.S. metropolitan areas in the National Household Travel Survey found that rail access, bus access, and urban form were all associated with lower auto use (Bento,

Cropper, Mobarak, & Vinha, 2005). Another study of National Household Travel Survey data at the national level, using structural equations, found that rail accessibility, measured in terms of walking distance, was associated with lower vehicle miles traveled, both directly, presumably by substituting for auto use, and indirectly, via an association with higher population density (Bailey, Mokhtarian, & Little, 2008). A study of travel diary data from New York City found that subway lines near home and work were correlated with lower auto use and more walking, while noting that subway lines might be a proxy for walkable neighborhoods (Salon, 2009). Two international studies also found the expected relationship. A study of Santiago de Chile found that distance to urban rail stations was associated with higher levels of auto commuting, primarily via a direct effect on mode choice rather than any strong effect on auto ownership (Zegras, 2010). A study of national data from Germany, focusing on licensed drivers owning cars, found that walking distance to transit was highly correlated with vehicle distance traveled (Vance & Hedel, 2007).

An important missing factor in all of the above studies is the availability of vehicle parking. Off- and on-street parking has been studied even less than rail access, largely because data are not readily available. A case study of two neighborhoods in New York City argued that differences among them in auto use were likely caused by parking availability and not by transit access, highway access, or demographics (Weinberger, Seaman, & Johnson, 2009). A Census tract level study of New York data from 1998 found that both transit accessibility and an imputed measure of off-street parking availability were positively associated with auto commuting to Manhattan (Weinberger, 2012). A recent New York study, using the same dataset, restricted to units for which Google observations of parking could be made, found that both subway distance and off-street parking supply were significant predictors of auto ownership (Guo, 2013). Studies of how auto use might be affected by on-street parking availability are even scarcer; one study shows that that street cleaning requirements in New York City are associated with more driving for households without off-street parking, and less driving for housing units with it (Guo & Xu, 2012).

Almost all of these studies have limited applicability to the research question here because they omit potentially important covariates of rail access. In addition to parking availability, these include neighborhood scale and subregional built environment measures, and the age and type of housing. Few of them test for the importance of being within walking distance of rail.

Study Design

I conducted a mail survey of households within a two-mile radius of 10 rail stations in New Jersey, some of them living in purpose-built TODs as well as those living in new and older housing nearby and farther away from rail. I selected two-mile radius areas, rather than sampling the entire state, in order to balance the need to control for spatially correlated influences on auto use with the need to observe travel behavior near and far from rail stops. Since transit use tends to drop off significantly beyond a half mile from the nearest transit stop (e.g., Dill, 2003; Pushkarev & Zupan, 1977), and since TOD is defined as being within walking distance of rail, households outside walking distance serve as controls. Restricting the sample frame to 10 station areas made it possible to collect on-street parking data for many of the respondents. These consisted of on-foot observations of on-street parking supply and use for a quarter-mile airline radius around the 10 stations. The analysis dataset was constructed by merging household survey and on-street parking data, then joining to that dataset neighborhood and subregional spatial measures constructed near respondent households using secondary data sources in a geographical information system. Only households nearest the rail stations had observations of on-street parking supply. These data assembly stages are described briefly below; more details are available elsewhere (Chatman & DiPetrillo, 2010).

The stations selected were Morristown and South Orange on the Morris & Essex Line, Perth Amboy and South Amboy on the North Jersey Coast Line, Rahway and Trenton on the Northeast Corridor Line, Westfield and Cranford on the Raritan Valley Line, and 2nd Street and Essex stations on the Hudson-Bergen Light Rail line (Figure 1). These stations provide excellent access to downtown Manhattan and can be characterized as a mix of light rail, heavy rail, and high-frequency commuter rail with very good transit accessibility. The two-mile-radius area around these 10 stations includes about 740,000 people, or about 9% of the population of New Jersey, with generally better transit access and higher population density than the remainder of the state.

I constructed a sample of 5,000 housing units, including 1,073 units in recently built or substantially renovated multifamily housing developments within walking distance of the stations. The remainder of the sample was drawn from a list of households based on U.S. postal service addresses in zip codes within two miles of the stations. This list was geocoded, and I randomly sampled 2,427 housing units within a quarter-mile airline

distance from the stations and an additional 1,500 units between a quarter mile and two miles away.

The survey questionnaire focused on housing unit characteristics, on- and off-street parking, work and non-work travel, household characteristics, and residential location criteria (see Chatman & DiPetrillo, 2010). The questionnaire was pretested, and revised, prior to fielding from June 3 to August 26, 2009. Five recruitment mailings were sent: an invitation letter with questionnaire, a reminder postcard, two subsequent letters with replacement questionnaires to non-respondents, and a final last chance contact letter, in a modified version of the Dillman total design method mail survey protocol (Dillman, 1978; Dillman, Dillman, & Makela, 1984). In total, 1,143 completed surveys were received, for a response rate of 25.4%. See Table 1 for a summary of data from the survey.

On-street parking observations were recorded for blocks fitting at least 50% within a quarter-mile airline buffer of the stations. Blocks were equally divided among three trained student surveyors. Field workers observed on foot during the evening peak parking period, between 5 p.m. and 8:30 p.m., collecting data on the number of on-street spaces by type (marked and unmarked), whether the spaces were occupied, parking duration limitations, space type (including limitations for disabled use and other permit holders), time restrictions, street cleaning, and no-parking periods, for 6,237 parking spaces on 818 street segments. The parking data were collected a year prior to the household survey (the delay was due to an interruption in research funding). The parking observations were merged with a street segment map and later aggregated in a GIS to construct measures of overnight parking spaces per road mile for a quarter-mile radius around the homes of the 532 households living within a quarter-mile airline distance of the stations.

The population density in Census blocks within a quarter mile of each respondent's home was calculated from data on population and land area of the blocks from the 2000 Census, using GIS. Local retail and total employment density were similarly calculated using the Census Bureau's 2008 Longitudinal Employer-Household Dynamics dataset (U.S. Census Bureau, 2008). Data on grocery stores, using NAICS code 445110, were downloaded from referenceusa.com, geocoded at the address level, and aggregated to the quarter-mile radius around respondent homes. The density of bus stops within a mile of home was calculated using bus stop locations from NJ Transit provided as of 2010. Network distance to the Manhattan central business district (CBD), defined as the nearer of Grand Central Station or Penn Station, was calculated using a street file and network

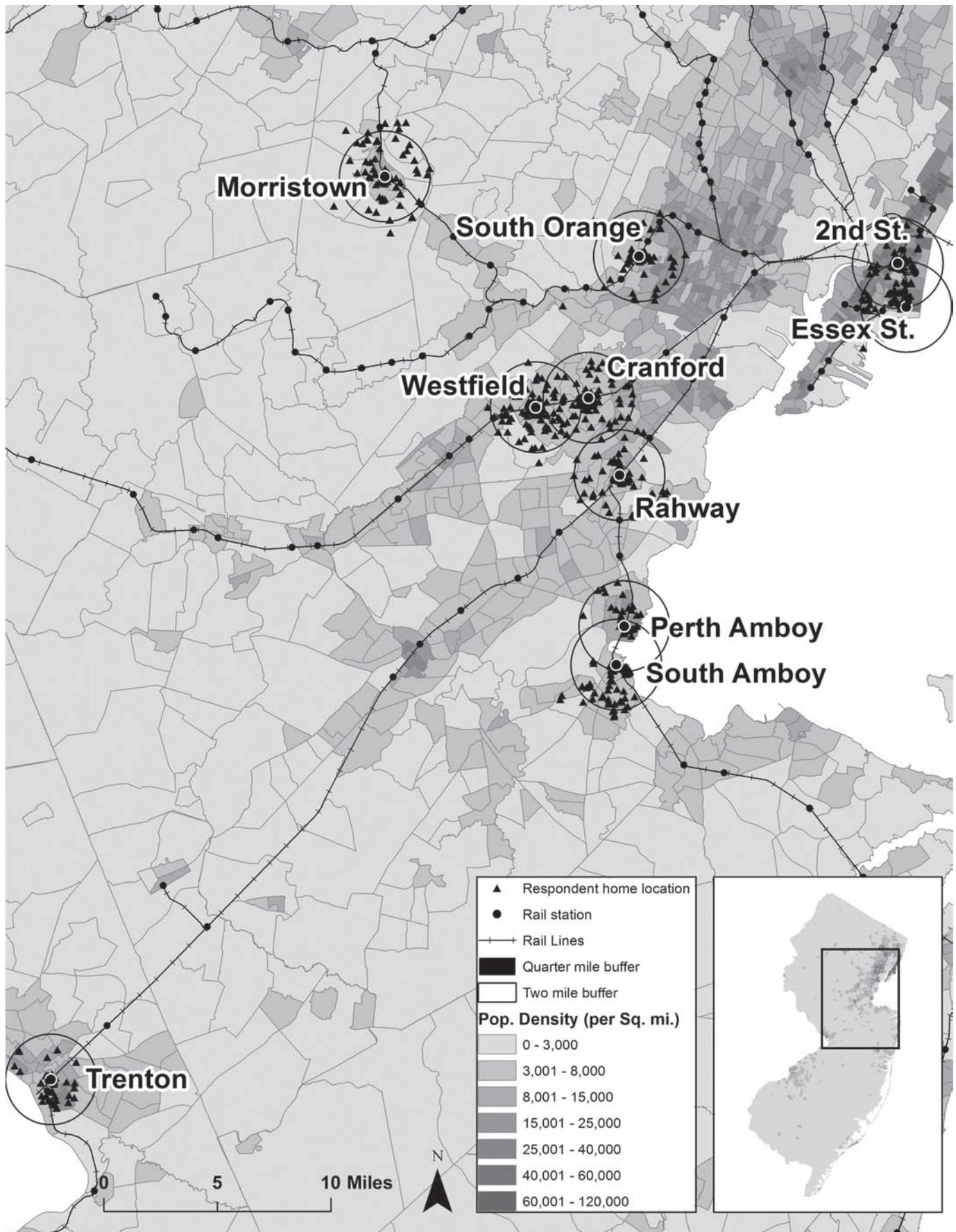


Figure 1. Selected stations with two-mile and quarter-mile buffers.

Table 1. Descriptive statistics (selected variables).

Variable	Obs	Mean	SD	Min	Max
Distance to nearest rail station (miles)	1,143	0.63	0.60	0.03	3.38
New housing near rail ^a	1,143	0.16	0.37		ind. var.
Older housing near rail	1,143	0.33	0.47		ind. var.
Older housing farther from rail	1,143	0.38	0.49		ind. var.
Less than one off-street parking space per adult in household	1,089	0.34	0.47		ind. var.
On-street overnight parking spaces (100s) per road mile within ¼ mile	532	1.67	0.67	0.42	3.02
Scarce on- and off-street parking ^b	508	0.15	0.36		ind. var.
On-street parking not observed	1,143	0.53	0.50		ind. var.
Duplex or triplex	1,143	0.08	0.27		ind. var.
Rowhouse or townhouse	1,143	0.08	0.27		ind. var.
Apartment or condominium	1,143	0.51	0.50		ind. var.
Other housing unit type	1,143	0.01	0.08		ind. var.
Missing housing unit information	1,143	0.01	0.08		ind. var.
Rental unit	1,143	0.37	0.48		ind. var.
Home owned without mortgage	1,143	0.13	0.34		ind. var.
Unknown unit tenure (owned or rented)	1,143	0.02	0.15		ind. var.
Population per square mile (000s) in Census blocks within ½ mile	1,133	12.6	12.2	0.13	87.6
Employment per square mile (000s) in Census blocks within ½ mile	1,143	8.5	14.7	0	89.6
Retail employment per square mile (000s) in Census blocks within ½ mile	1,143	0.5	0.5	0	4.8
Bus stops, 1-mile radius	1,143	103.7	118.7	0	622
Subregional employment density (000s per square mile in home PUMA)	1,143	4.1	5.5	0.40	19.6
Subregional bus stop density (10s per square mile in home PUMA)	1,143	3.8	6.0	0.31	23.7
Network distance to Manhattan CBD (miles, from home)	1,143	21.2	12.1	2.50	58.1
Household income (\$10,000s, coded at category midpoints)	1,031	11.6	8.4	0.50	32.5
Household income not reported	1,143	0.10	0.30		ind. var.
Household size	1,141	2.3	1.3	1	9
Children in household	1,131	0.24	0.43		ind. var.
Single-parent household	1,131	0.03	0.17		ind. var.
Hispanic	1,143	0.14	0.34		ind. var.
African American	1,143	0.13	0.34		ind. var.
Asian American	1,143	0.06	0.24		ind. var.
Native American	1,143	0.01	0.10		ind. var.
Race not reported	1,143	0.04	0.19		ind. var.
Full-time worker	1,143	0.71	0.45		ind. var.
Part-time worker	1,143	0.07	0.26		ind. var.
Worker in management occupation	1,143	0.12	0.33		ind. var.
Worker in financial occupation	1,143	0.08	0.27		ind. var.
Worker in sales occupation	1,143	0.06	0.23		ind. var.
Worker in clerical occupation	1,143	0.04	0.20		ind. var.
Worker in craftsman occupation	1,143	0.02	0.15		ind. var.
Worker in laborer occupation	1,143	0.02	0.15		ind. var.
Worker in service occupation	1,143	0.05	0.21		ind. var.
Worker in unknown occupation (not reported)	1,143	0.02	0.14		ind. var.
Retired	1,143	0.17	0.38		ind. var.
Chose neighborhood based on access to friends/family	1,143	0.31	0.46		ind. var.
Chose neighborhood based on access to leisure opportunities	1,143	0.11	0.31		ind. var.
Chose neighborhood based on access to job	1,143	0.46	0.50		ind. var.
Chose neighborhood based on access to transit	1,143	0.42	0.49		ind. var.
Chose neighborhood based on access to children's schools	1,143	0.16	0.37		ind. var.
Chose neighborhood based on quality of public services	1,143	0.02	0.15		ind. var.
Chose neighborhood based on design	1,143	0.28	0.45		ind. var.
Chose neighborhood based on distance to school	1,143	0.05	0.23		ind. var.
Chose neighborhood based on distance to shops	1,143	0.18	0.39		ind. var.
Chose neighborhood based on distance to highway	1,143	0.09	0.29		ind. var.
Chose neighborhood based on house characteristics	1,143	0.22	0.41		ind. var.
Chose neighborhood based on other characteristics	1,143	0.15	0.36		ind. var.

Notes: ind.var. = indicator (0–1) variable.

a. New housing defined as seven or fewer years old at the time of the survey. Near rail is within walking distance, defined as 0.4 miles measured along the road network.

b. Scarce on- and off-street parking defined as having less than the median value for on-street parking space availability and less than one off-street parking space per adult in the household.

analysis routine in a GIS. Subregional measures of population density, employment density, and bus stop density were created with the 2005–2007 pooled American Community Survey Public Use Microdata Sample for the Public Use Microdata Areas (PUMAs) within which the households lived.

I constructed residential location criteria variables using answers to the question, “Please rate the top three factors that attracted you to this neighborhood.” A dummy variable was set equal to 1 for any of a dozen such factors ranked by a respondent, regardless of rank value.

I set an indicator of off-street parking scarcity equal to 1 if the respondent reported having less than one off-street parking space per adult in the household, and 0 otherwise. I also constructed a variable representing the interaction between on- and off-street parking. If there is little off-street parking but ample on-street parking, or if there is plenty of off-street parking but no parking on the street, there should be no difficulty in parking a car. The variable was set equal to 1 if the household had less than one off-street parking space per adult and if on-street overnight parking availability was below the observed median value of 138 overnight parking spaces per road mile.

In the data description and analysis, I distinguish new from older units, and those within walking distance to rail from those farther away. New housing was defined as housing that had been built within seven years of the survey, based on respondent reports as well as independently collected information about selected buildings near the stations.¹ I defined walking distance as being within 0.4 miles of any rail station, as measured along the local street network, along which sidewalks were universally available in the study area. This is a bit shorter than Calthorpe’s (1993) 2,000-foot definition of walking distance for TODs. For most houses, it was roughly equivalent to a quarter-mile airline distance.

Table 1 shows means and standard deviations for the main variables used in the analysis.

Table 2. Auto ownership and use by age of housing and distance to rail.

Subgroup ^a	Vehicles per household	Vehicles per adult	Commuted via SOV (indicator variable)	Grocery trips via auto, per week
New housing near rail	1.14 **	0.73 *	0.36 **	1.47 **
Older housing near rail	1.40 **	0.81 *	0.59	1.84 **
Older housing farther from rail	1.77	0.86 *	0.67	2.44
New housing farther from rail	1.67	0.96	0.63	2.45
Complete responses	1,118	1,118	810	878

Notes: SOV = singly occupied vehicle.

a. New housing is seven or fewer years old at the time of the survey. Near rail is within walking distance, defined as 0.4 miles measured along road network.

* Statistically significant difference from new housing farther from rail at the 95% level.

**Value is also significantly different from the value for the category below it, at the 95% level.

Observed Differences by Rail Distance and Housing Age

Respondents living in new housing within walking distance of rail stations reported lower auto ownership, less auto commuting, and fewer weekly personal vehicle grocery trips than those living in new or older housing farther away (Table 2). They also had a lower rate of auto commuting and grocery trip frequency than those living in older housing near rail, a remarkable result given that this group also reported substantially higher household income.

A number of factors associated with proximity to rail and age of housing may play a role in influencing auto ownership and use. Both rental housing and smaller housing units may attract households who use autos less because they are younger, of lower income, and have fewer children. In these areas, new housing near rail is much more likely to be for rent, and almost all consists of smaller units; in fact, even new housing farther from rail is much more likely to consist of smaller units (Table 3, columns 1 and 2). Off-street parking availability is lower in new housing near rail than in housing farther from rail, although newer units have more on-street parking available to them (Table 3, columns 3 and 4). Although a higher share of older housing near rail has combined low on- and off-street parking, the difference is not statistically significant (Table 3, column 5). The larger neighborhood spatial context could also play a role. Population density for both new housing and old housing near rail, and, notably, for older housing farther from rail, is much higher than for new housing farther from rail (Table 3, column 6). New housing near rail averages more than 150 bus stops within a mile, which is much higher than the other subgroups (Table 3, column 7).

There are other possible explanations for the observed lower auto ownership and use of residents of new housing

Table 3. Housing, parking, and spatial characteristics by age of housing and distance to rail.

Subgroup ^a	1	2	3	4	5	6	7
	Rental unit	Apartment/ condo/ townhouse/ rowhouse	Scarce off-street parking ^b	On-street parking per road mile	Low on- and off-street parking ^c	Population density (000s per square mile, 1/8-mile radius)	Bus stops (1-mile radius)
New housing near rail	0.57 **	0.98 **	0.47 *	193 **	0.12	13,200 *	152 **
Older housing near rail	0.48 **	0.62 **	0.39 **	152	0.17	12,800 *	93
Older housing farther from rail	0.29 **	0.37 **	0.30 **	[183] * ^d	[0.07] ^d	13,400 *	101 *
New housing farther from rail	0.16	0.71	0.19	[149] ^d	[0.25] ^d	7,810	79
Complete responses	1,116	1,135	1,089	532	508	1,143	1,143

Notes:

a. New housing defined as seven or fewer years old at the time of the survey. Near rail is within walking distance, defined as 0.4 miles measured along road network.

b. Off-street parking scarcity defined as less than one off street space per adult in the household.

c. Below median on-street parking + less than one off-street parking space per adult (see text).

d. Brackets denote very small subsample sizes. On-street parking data was gathered primarily for housing units within walking distance of rail.

*Statistically significant difference from new housing farther from rail at the 95% level.

**Value is also significantly different from the value for the category below it, at the 95% level.

near rail, but for these, data are harder to come by. For example, perhaps recent movers to TODs optimize their commutes around transit in the short run, but in later years as their work locations shift, they begin to drive. It is also possible that changing lifestyle preferences among younger people explain some of the correlation of new TOD housing and lower auto use, or that shifts in the housing and labor markets, and the recent economic downturn, are more keenly felt by those recent movers who are more likely to save money by owning and using autos less.

To investigate some of these potential explanations, I carried out a series of multivariate regressions for auto ownership, auto commuting, and auto grocery trip frequency.² For each of the three measures I first carried out a regression with only rail proximity and age of housing. In the second regression I added other housing unit, parking, and spatial characteristics; in the third, I added demographic characteristics and residential choice criteria.³ Different houses and neighborhoods may attract households with different levels of and preferences for auto ownership and use. The second model in each of the tables implicitly includes these residential choice effects, while the third model is meant to estimate effects independent of those choices. The variation in coefficients denotes a range depending on how much of the effects associated with preferences and residential choice can be expected to occur in the future. The fourth model consists of a regression restricted to households within walking distance of a rail station, to test for the interaction of rail proximity and

other factors such as parking availability. Finally, for auto commuting and grocery trip frequency, I carried out a fifth model including auto ownership as an (endogenous) explanatory variable, as explained below.

Auto Ownership

I defined per capita auto ownership as the number of reported vehicles divided by the number of adults in the household. In the first model, per capita auto ownership was regressed on distance to rail and the housing age and walking distance threshold variables, using ordinary least squares. Each additional mile from a rail station is associated with an additional 0.09 vehicles per adult in the household (Table 4, column 1). Older housing, whether within walking distance of a rail station or farther away, is associated with fewer cars per capita (the omitted category is new housing outside walking distance). The coefficients together suggest that new housing near rail is associated with 27% lower per capita auto ownership than new housing farther away.

The correlation of vehicle ownership with both rail proximity and housing age markedly decreased when housing, parking and built environment measures were controlled (Table 4, column 2). Neither rail proximity nor housing age is a statistically significant predictor of per capita auto ownership, and, in fact, the coefficient on new housing near rail turns positive. Off-street parking scarcity, and low on- and off-street parking availability, are among the most powerful variables in this model. Houses with fewer than one off-street parking space per adult have

Table 4. Vehicles per adult in household as a function of distance to rail and other factors (OLS regressions).

	1	2	3	4
	Housing age and distance to rail	Add housing, parking, and spatial variables	Add demo- graphics and preferences	Near-station households; same variables as Model 2
Distance to rail (miles)	0.091 ***	-0.0034	-0.018	0.16
New housing near rail ^a	-0.18 ***	0.01	0.045	0.041
Older housing near rail	-0.11 **	-0.029	0.0017	
Older housing farther from rail	-0.14 ***	-0.048	-0.019	
Scarce off-street parking		-0.16 ***	-0.11 ***	-0.12 **
On-street overnight parking spaces		0.011	-0.0077	0.011
Scarce on- and off-street parking		-0.13 **	-0.11 *	-0.24 ***
Apartment/condo/row/townhouse		-0.065 *	-0.13 ***	-0.027
Unit type unknown		-0.35	-0.4 *	-0.23
Rental unit		-0.13 ***	-0.1 ***	-0.15 ***
Job density, ½ mile (000s)		-0.0023	-0.003 **	-0.0013
Bus stops, 1-mile radius		-0.0008 ***	-0.0007 **	-0.0004
Household income (\$10,000s)			0.006 ***	
Owned home without mortgage			0.074 *	
Household size			-0.065 ***	
Single-parent household			0.29 ***	
Hispanic			-0.075 **	
African American			-0.07 *	
Service occupation			0.16 ***	
Neighborhood choice: friends			0.055 **	
Neighborhood choice: leisure			0.1 **	
Neighborhood choice: access to job			0.051 *	
Neighborhood choice: near transit			-0.098 ***	
Neighborhood choice: public services			-0.2 **	
Neighborhood choice: looks/design			0.081 ***	
Neighborhood choice: near school			0.13 **	
Neighborhood choice: near highway			0.11 ***	
Constant	0.9 ***	1.11 ***	1.03 ***	1.23 ***
Observations	1118	1071	1063	525
Adjusted R^2	0.0245	0.1871	0.2776	0.1644

Notes: Included, statistically insignificant, not shown: [Models 2–4] duplex/triplex, unit type missing, tenure unknown, population density (¼ mile), retail employment density (½ mile), distance to Manhattan central business district, subregional bus stop density, subregional employment density; [Model 3] household income missing, children in household, Asian American, Native American, race unknown, occupation indicator variables (management, financial, sales, clerical, craft, labor, unknown), full-time worker, part-time worker, retired, neighborhood choice criteria indicator variables (school district, near shops/services, house characteristics, other).

a. New housing is seven or fewer years old at the time of the survey. Near rail is within walking distance, defined as 0.4 miles measured along road network.

* $p < .10$ ** $p < .05$ *** $p < .01$

0.16 fewer vehicles per adult, all else equal, while those with both low on- and off-street parking availability have an additional reduction of 0.13 vehicles per adult. Rental housing is also associated with 0.065 fewer vehicles per

adult. Of the built environment variables, the most significant is the number of bus stops within a mile of the home. The coefficient of -0.0008 implies that a one-standard-deviation increase in bus service (the

equivalent of 118 bus stops in the mile radius around home) is associated with 0.09 fewer vehicles per adult.

The third model in this set adds in additional controls for demographics and preferences of households, accounting both for the fact that TODs may attract previous transit users as well as the fact that they may enable households moving in to use alternative modes more (Table 4, Model 3). A number of coefficients on the newly entered demographic and preference variables are large and significant in this model, but I focus on the housing unit and spatial characteristics, as they are the most policy relevant. The distance from rail coefficients remain insignificant and small. The coefficients on off-street parking scarcity and the combination of low on- and off-street parking are reduced from -0.16 to -0.11 and from -0.13 to -0.11 vehicles per adult respectively, but remain substantive, each representing a 13% reduction in auto ownership at the mean. The coefficient on townhomes and apartments doubles, from -0.065 to -0.13 ; the increase appears to be due to household size being controlled, since larger households have fewer cars per adult. Townhomes and apartments might also have off-street parking that is farther from the unit. In short, this model suggests that sorting by income, household size, and housing preferences apparently does explain a significant share of the correlation of auto ownership with on- and off-street parking availability, the tenure and type of unit, bus access, and job density, but those measures remain significantly associated with lower auto ownership, in marked contrast to rail proximity.

Limiting the analysis to households near stations provides a test of how rail access may interact with other factors (Table 4, column 4). Low on- and off-street parking availability apparently has stronger effects combined with rail station proximity: there are 0.24 fewer vehicles per capita when the analysis is restricted to near-station households, almost double the relationship in Model 2.

Auto Commuting

Of the dataset of 1,134 respondents, 810 reported that they worked part or full time in the previous week, and of those, all reported their commute mode. A logit model of the decision to commute by auto (singly occupied vehicle) is presented in Table 5. Exponentiated coefficients, or odds ratios, are shown; the increment greater or less than 1 can be interpreted as a percentage change in the probability of auto commuting.

Before controlling for non-rail factors, each mile from a rail station is associated with a 74% increase in the odds of commuting via auto, and households living in new housing within walking distance of a rail station are only

43% as likely to commute via auto compared to households in new housing farther away (Table 5, column 1). New and old housing are statistically indistinguishable from each other in this initial model.

When housing unit, parking availability, and built environment variables are introduced (Table 5, column 2), the effect on auto commuting of being within walking distance of rail vanishes entirely, while the continuous distance-to-rail coefficient shrinks from 1.72 to 1.32 and becomes statistically insignificant. Off-street parking, job density, subregional bus stop density, and distance to downtown are all highly associated with auto commuting. Households living in older housing are more likely to commute via car when controlling for housing, parking, and built environment factors. Since all households living in new housing have recently moved, those occupying older housing are perhaps more likely to have experienced changes in the location of work or other chained activity locations since their last move, and driving to work may have become a more attractive choice.

When controlling for demographic characteristics and residential location criteria, the positive association between older housing and auto commuting loses statistical significance, although it remains relatively large in magnitude (Table 5, column 3). Having scarce off-street parking remains very significantly associated with lower probability of commuting via auto, with the odds decreasing from 63% to 57%. Rail access becomes more insignificant still.

The fourth auto commuting model is restricted to commuters within walking distance of rail to test for interactions between the presence of rail and other factors (Table 5, column 4). Households in new housing are less likely to commute via auto in this model, consistent with Model 2. While off-street parking is no longer independently significant, near-station households with both low on- and off-street parking commute by auto just 40% as much as other households. Few of the remaining variables in Model 2 are significant, with the exception of local population density.

Finally, I estimated an auto commuting model like Model 2 but with the addition of a single explanatory variable, the number of vehicles per adult. Since auto ownership is intimately tied to the commuting decision, adding it will tend to bias the coefficient estimates for the other independent variables. But it does illustrate how parking supply, housing characteristics, and transit proximity are directly correlated with auto commuting and indirectly correlated via auto ownership. The number of vehicles per adult has an odds ratio of 7.59 while off-street parking loses statistical significance, suggesting that its effects on auto commuting are felt primarily via the auto ownership link (Table 5, column 5).

Table 5. Probability of commuting by singly occupied vehicle as a function of distance to rail and other factors (logit regressions).

	1	2	3	4	5
	Housing age and distance to rail	Add housing, parking, and spatial variables	Add demo- graphics and preferences	Near- station HHs only, same variables as Model 2	All HHs, add vehicles per adult to Model 2
Distance to rail (miles)	1.74 ***	1.34	1.20	2.83	1.22
New housing near rail ^a	0.43 ***	1.00	1.00	0.61 *	1.02
Older housing near rail	1.06	1.68 *	1.41		1.83 *
Older housing farther from rail	1.00	1.79 **	1.61		1.93 **
Scarce off-street parking		0.63 **	0.57 **	0.85	0.83
On-street overnight parking spaces		1.30	1.10	1.13	1.51
Scarce on- and off-street parking		0.60	0.62	0.40 **	0.75
Tenure unknown		5.71 *	6.60 *	2.89	7.64 **
Population density, 1/8 mile (000s)		0.98 **	0.99	0.97 **	0.98
Job density, 1/2 mile (000s)		0.99 *	0.99 *	0.99	0.99
Subregional bus stop density (10s)		0.95 *	0.95 **	0.97	0.97
Distance to downtown (mile)		1.02 **	1.02	1.03	1.03 **
Household income > \$25,000			2.43 *		
Race unknown			0.35 *		
Labor occupation			3.12 **		
Neighborhood choice: leisure			3.26 ***		
Neighborhood choice: access to job			2.06 ***		
Neighborhood choice: near transit			0.39 ***		
Neighborhood choice: school district			1.75 **		
Neighborhood choice: near school			2.70 **		
Neighborhood choice: near highway			1.96 **		
Neighborhood choice: other			1.68 *		
Vehicles per adult in household					7.59 ***
Observations	810	785	782	400	773
Pseudo R ²	0.0446	0.121	0.2239	0.1296	0.1805

Notes: Included, statistically insignificant, not shown: [Models 2–5] on-street parking not observed, housing type dummy variables (duplex/triplex, apartment/condominium/rowhouse/townhouse, mobile home, other home, unit type unknown), rental unit, retail employment density (1/2-mile); [Model 3] household income, household income missing, owned home without mortgage, household size, children in household, single-parent household, Hispanic, African American, Asian American, Native American, occupation dummy variables (management, financial, sales, clerical, craft, service, unknown), part-time worker, neighborhood choice criteria dummy variables (friends, public services, looks/design, house important).
a. New housing is seven or fewer years old at the time of the survey. Near rail is within walking distance, defined as 0.4 miles measured along road network. Exponentiated coefficients. * $p < .10$ ** $p < .05$ *** $p < .01$

Grocery Auto Trip Frequency

Rail access could directly and indirectly reduce driving to the grocery store by reducing auto ownership; by lowering the rate of auto commuting, and subsequent auto-based grocery trips chained into those commutes, or by

encouraging the use of rail for the grocery trip itself. In the most recent National Household Transportation Survey, the category grocery/hardware/clothes shopping was the most common trip purpose, exceeding even commute trips in frequency (Federal Highway Administration, 2009). Grocery trips may be among the most routine because food

is a basic necessity; they may, therefore, be relatively easily to remember and report accurately.

I constructed a measure of weekly auto-based grocery trip frequency using answers to a question about the timing and mode of the last three grocery trips, and dividing the weeks elapsed since the longest-ago reported grocery trip by the number of those trips that were conducted via a personal vehicle, either singly or jointly occupied. The variable was constructed only for the 878 respondents (77% of the pool) who reported full information on at least two grocery trips. I estimated these regressions using ordinary least squares. The variable is continuous, ranging from 0 (in about 5% of cases) to as

high as 10.5 trips per week, with a mean of 2.07 trips per week.

The initial regression found an additional 0.51 auto-based grocery trips per week for every mile farther from a rail station, while new housing near rail has 0.73 fewer such trips than other new housing (Table 6, column 1). When controlling for parking supply, housing, and built environment characteristics, the significance of being within walking distance of rail and of housing age both disappear, although the distance-to-rail variable coefficient remains statistically significant as it decreases in size (Table 6, column 2). Each additional grocery store within a quarter mile of home is associated with a reduction of

Table 6. Weekly auto grocery trips as a function of distance to rail and other factors (OLS regressions).

	1		2		3		4		5	
	Housing age and distance to rail		Add housing, parking, and spatial variables		Add demographics and preferences		Near-station HHs only; same variables as Model 2		All HHs, add vehicles per adult to Model 2	
Distance to rail (miles)	0.51	***	0.33	***	0.28	**	0.6		0.33	***
New housing near rail ^a	-0.73	***	-0.011		-0.065		0.053		-0.059	
Older housing near rail	-0.39	**	-0.099		-0.25				-0.081	
Older housing farther from rail	-0.22		-0.14		-0.22				-0.13	
Scarce off-street parking			0.2		0.13		0.16		0.22	
On-street overnight parking spaces			-0.14		-0.16		-0.094		-0.14	
Scarce on- and off-street parking			-0.57	**	-0.48	*	-0.6	**	-0.45	*
On-street parking not observed			0.08		0.04		-0.14		0.11	
Grocery stores, ¼ mile			-0.098	***	-0.11	***	-0.14	***	-0.097	***
Bus stops, 1 mile radius			0.0023	**	0.0014		0.0001		0.0026	**
Job density, subregion (000s)			-0.07	**	-0.045		0.014		-0.068	**
Bus stop density, subregion (10s)			-0.077	***	-0.057	***	-0.068		-0.074	***
Distance to downtown (miles)			-0.034	***	-0.03	***	-0.013		-0.035	***
Household income (\$10,000s)					-0.013	*				
Full-time worker					-0.41	**				
Neighborhood choice: school district					-0.31	*				
Vehicles per adult in household									0.4	***
Constant	2.09	***	3.42	***	3.99	***	2.84	***	2.98	***
Observations	878		855		851		428		843	
Adjusted R ²	0.0757		0.1614		0.1662		0.1342		0.1687	

Notes: Included, statistically insignificant, not shown: Housing type dummy variables (duplex/triplex, apartment/condominium/rowhouse/townhouse, mobile home, other home, unit type unknown), housing tenure (rental unit, tenure unknown), population density (1/8 mile), employment density (1/2 mile), retail employment density (1/2 mile), household income missing, owned home without mortgage, household size, children in household, single-parent household, Hispanic, African American, Asian American, Native American, race/ethnicity unknown, occupation dummy variables (management, financial, sales, clerical, craft, labor, service, unknown), part-time worker, retired, neighborhood choice criteria dummy variables (friends, leisure, access to job, near transit, public services, looks/design, near school, near shops/services, near highway, house important, other).

a. New housing is seven or fewer years old at the time of the survey. Near rail is within walking distance, defined as 0.4 miles measured along road network.

* $p < .10$ ** $p < .05$ *** $p < .01$

0.098 auto-based grocery trips per week. Low on- and off-street parking has a coefficient of -0.57 , implying a 25% reduction in auto-based grocery trips. Neither on-street nor off-street parking is independently significant, suggesting that for non-work trips requiring goods carrying, the auto is doubly attractive and only significant impediments to its use may have an influence. Housing type and tenure, local population density, and local job density are not significant in these models, while subregional bus stop and employment density are negatively associated as expected. There are two puzzling coefficients: distance from the Manhattan CBD is associated with fewer auto-based grocery trips, and the number of bus stops within a mile is associated with more (although this latter effect declines and becomes insignificant once demographic characteristics are controlled). Perhaps there are more but also shorter auto trips in places that have high bus accessibility and are nearer to Manhattan. Trip distance is not measured in the dataset.

When demographic and residential location criteria variables are added, the implied effect of low on- and off-street parking remains large, at 0.48 fewer grocery trips per week, although it is now significant only at the 90% confidence level; the coefficients on subregional bus stop density, the number of grocery stores, and distance to Manhattan are slightly smaller but still significant; and subregional employment density and bus stops within one mile are no longer significant (Table 6, column 3). Worker status is associated with 0.41 fewer trips to the grocery store, which could be caused by time scarcity relative to non-workers. Of all of the stated residential choice criteria, only seeking good schools is associated with grocery store trip frequency.

When restricting the sample to households near rail stations, the distance to rail variable becomes statistically insignificant (Table 6, Model 4), suggesting that whatever role distance to rail plays in the use of autos for groceries, it is indirect. Perhaps it is a proxy for road congestion, which is not observed. The coefficient on low on- and off-street parking stays about the same as in Model 2 and the number of grocery stores nearby becomes again larger and more significant, while the subregional built environment measures are no longer significant.

Finally, when the number of vehicles per adult is added as an endogenous explanatory variable (Table 6, Model 5), each additional vehicle per adult in the household is associated with an additional 0.4 auto-based grocery trips per week, and the independent influence of low on- and off-street parking declines a bit but remains large and statistically significant at the 90% level. In contrast to the auto commuting models, this result implies that on- and off-

street parking availability may affect auto-based grocery trip frequency, even for people with high auto ownership.

Conclusions

Developing high-density, mixed-use housing near rail stations may reduce regional road congestion and auto pollution while slowing the growth in greenhouse gas emissions caused by auto use. But those benefits may not depend very much on rail access. In these data, the lower auto ownership and use in TODs is not from the T (transit), or at least, not from the R (rail), but from lower on- and off-street parking availability; better bus service; smaller and rental housing; more jobs, residents, and stores within walking distance; proximity to downtown; and higher subregional employment density.

Previous disaggregate studies testing the influence of rail access on auto ownership and use have typically controlled for only a subset of neighborhood or subregional built environment measures, rarely included housing type and tenure, and even more rarely controlled for on- or off-street parking supply. As others have argued, rail access and population density could be highly correlated with auto use due to unobserved variables like parking availability and walkability (e.g., Salon, 2009).

In contrast to the results here, a study of 1998 survey data from New York matched to current Google observations of off-street parking found that walking distance to subway stations in New York remained significant in predicting auto ownership when off-street parking was controlled (Guo, 2013). The analysis did not control for distance to downtown, subregional job and employment density, bus access, tenure and type of housing, or on-street parking availability; nor did it specifically test the walking-distance thresholds included here. The study area could also play a role. Subway access in New York City is highly correlated with more generalized transit accessibility.

The comparatively weak influence of rail access found in the present study is all the more remarkable given that New Jersey is so well served by rail and the share of rail commuting is so high. Although rail service undoubtedly attracts auto users in a way that buses do not, in some contexts it may also siphon off bus riders, walkers, and bikers. To test this hypothesis in the case of the commute to work, I estimated some additional commute mode regressions using binomial logit, like those presented in Table 5. Controlling for other factors, rail station distance was highly positively correlated with rail commuting, but negatively correlated with buses, walking and biking, ferry

use, and working at home.⁴ The apparent substitution between rail and other non-auto modes helps to explain why auto use varies relatively little as a function of distance to rail.

Some rail stations are located far from job and shopping clusters, and regional-level accessibility and distance to downtown are often shown to be more highly associated with travel patterns than are neighborhood characteristics (see Boarnet, 2011; Ewing & Cervero, 2010; Handy, 1993). Thus, some housing developments near rail might lead to unintended increases in auto use. This implies a continuing need for an explicit accounting of scale in specifying measures of the built environment to account for local, subregional, and regional measures (Chatman, 2008; Zhang & Kukadia, 2005).

The relationships among travel patterns, rail access, parking availability, and built environment measures are more complex than represented here. It is possible, for example, that rail investments could have played some role in either a market or political sense in increasing population density (cf. Bailey et al., 2008), increasing the number of grocery stores, and decreasing the amount of parking provided. But these results suggest rail plays at most an indirect role, and likely not a strong one, since the direct measure of rail is insignificant in all of the controlled models.

Policy Implications

Current sustainability policies are often quite focused on investing in rail and developing housing near rail stations. For example, California Senate Bill 375, a widely observed and admired attempt to incorporate climate planning within regional transportation and land use planning, gives special consideration to transit priority projects: dense housing development within a half mile of a major transit station or high-quality transit corridor (Cal. Govt. Code §21155.1). Such a focus primarily on TODs to reduce greenhouse gases could miss the boat. These results suggest that a better strategy in many urban areas would be to incentivize housing developments of smaller rental units with lower on- and off-street parking availability, in locations with better bus service and higher subregional employment density.

Rail station areas may be among the most likely to be targeted for housing development proposals because developers are aware that public opposition is often lower near rail stations and because policymakers and urban planners believe that rail access will mitigate traffic impacts. But such a policy will not serve long-

term sustainability interests if, in fact, rail investments and rail-proximate housing make little difference in auto use in and of themselves. The focus on rail is particularly problematic in cases where developments near rail stations are simply transit adjacent, with high amounts of parking, low density, and large units being offered for sale.

Denser housing developments coupled with good management of automobile parking could reduce auto use in many contexts, and there could be a substantial market for it. Previous research has suggested the need to reduce parking requirements to take account of the fact that demand for parking is lower in places with transit service (e.g., Rowe, Bae, & Shen, 2011). But parking requirements likely themselves affect travel by oversupplying parking (Cutter & Franco, 2012); in other words, parking demand may be lower in places with rail service partly because parking is scarce. Public agencies are heavily involved both in regulating minimum amounts of off-street parking and in providing and regulating on-street parking. Developers could be allowed to provide less off-street parking, while on-street parking could be priced, managed, and permitted in order to mitigate spillover effects (Shoup, 2005). Future population growth in the United States may well be concentrated in cities, and on-street parking may become scarce while private off-street parking will become very expensive to construct. If so, existing policies regarding on- and off-street parking could significantly constrain densification and infill development.

It is fortunate if access to rail is not a primary factor in reducing auto use, not only because rail infrastructure is expensive, but also because the fraction of available land near rail stations is limited. That said, ubiquitous higher housing density and scarce on- and off-street parking could cause greater local auto congestion if not carefully managed. In fact, positive regional and global effects may result from those negative local impacts, if they quash more driving. However, negative local impacts induce cities to frown on dense development and neighbors to protest it. How can urban planners bring about a more widespread relaxation of parking regulations, height limits, floor-to-area ratio standards, and general plans that restrict the form and location of development and redevelopment? That is the planning puzzle that deserves our focused attention. The pursuit of rail-oriented development may be a distraction from it.

Acknowledgments

A number of people contributed to the research study upon which this article draws. Project manager Stephanie DiPetrillo designed the physical layout of the paper survey, identified much of the “new TOD” portion of

the survey sample, managed the field survey of on-street parking, and helped write a report on the project from which some of the "Study design" section was extracted. Marc Weiner coordinated the household survey, with the able assistance of Orin Puniello. The mailings and data entry were carried out by ABT/SRBI, under the direction of Chintan Turakhia and David Ciemnecki. Marc and Chintan also advised on the questionnaire and sampling design. Dan Tischler coded verbatim occupational responses into standard occupational classifications. Nick Klein carried out the construction of most spatial measures in GIS, with initial work by Nicholas Tulach and Kyeongsu Kim. The grocery store counts were done by Matt Brill. The parking audits, and management of parking data, were carried out by Nick Klein, Lewis Thorwaldson, Katie Thielman, Milan Patel, Rodney Stiles, Liz Thompson, Charu Kukreja, Andrew Besold, Aaron Sugiura, Michael Parenti, and Graydon Newman. Thanks to Mike Manville, Robert Noland, Robert Cervero, and three anonymous reviewers for their very helpful comments on previous drafts.

Notes

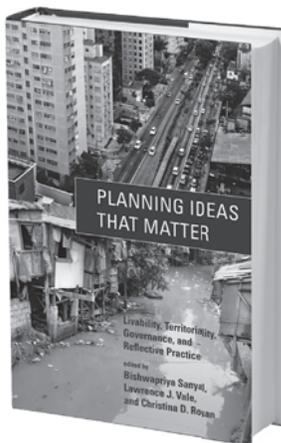
1. Housing age was reported by survey respondents and supplemented with information about the year of development for known multifamily projects. Almost 20% of respondents reported that they did not know the age of the unit they were living in or did not answer the question; only 6% of those were in multifamily units known to be new. The remaining units are assumed to be at least eight years old.
2. Alternative methods such as structural equations, nested logit, or two-stage least squares could be used to control for the potential endogeneity of residential location, public transit, population density, parking, or other dependent variables (e.g., Bailey et al., 2008; Cervero & Murakami, 2010; Deka, 2002; Salon, 2009). Such efforts require plausibly exogenous instruments and historical data, which are not present in this dataset, but could be the subject of future research.
3. Multicollinearity generally did not present problems in these data, with the exception of the variable for on-street parking and, in the models restricted to near-station households, the subregional built environment variables. For example, for the 14 models presented here, the variance inflation factor on distance to rail averaged 1.99 with a range of 1.72 to 2.29. When independent variables of interest were statistically insignificant in the presence of variance inflation, I removed other collinear variables to see if significance occurred once variance inflation was reduced. Statistical significance was generally unaffected, except for the spatial variables; as a result the set of spatial variables varies slightly for each of the model sets, except that Models 4 and 5 in each set are kept consistent with Model 2.
4. The carpooling model does a poor job of explaining the likelihood of carpooling; distance to rail is not significant, nor are many of the other built environment variables. I ran other variants of this modal categorization but results were very similar. Detailed results are available upon request.

References

- Arrington, G. B.,** & Cervero, R. (2008). *Effects of TOD on housing, parking, and travel: TCRP Report 128*. Washington, DC: Transportation Research Board.
- Bailey, L.,** Mokhtarian, P. L., & Little, A. (2008). *The broader connection between public transportation, energy conservation and greenhouse gas reduction*. Fairfax, VA: ICF International.
- Belzer, D.,** & Autler, G. (2002). *Transit-oriented development: Moving from rhetoric to reality*. Washington DC: Brookings Institution Center on Urban and Metropolitan Policy.
- Bento, A. M.,** Cropper, M. L., Mobarak, A. M., & Vinha, K. (2005). The impact of urban spatial structure on travel demand in the United States. *Review of Economics and Statistics, 87*(3), 466–478.
- Boarnet, M. G.** (2011). A broader context for land use and travel behavior, and a research agenda. *Journal of the American Planning Association, 77*(3), 197–213.
- California Senate Bill 375.** Cal. Govt. Code §21155.1 Retrieved from <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=prc&group=21001-22000&file=21155-21155.3>
- Calthorpe, P.** (1993). *The next American metropolis: Ecology, community, and the American dream*. New York, NY: Princeton Architectural Press.
- Cervero, R.,** Ferrell, C., & Murphy, S. (2002). *Transit-oriented development and joint development in the United States: A literature review*. Washington, DC: Transit Cooperative Research Program.
- Cervero, R.,** & Murakami, J. (2010). Effects of built environments on vehicle miles traveled: Evidence from 370 US urbanized areas. *Environment and Planning A, 42*(2), 400–418.
- Chatman, D.,** & DiPetrillo, S. (2010). *Eliminating barriers to transit-oriented development*. New Jersey Department of Transportation, Bureau of Research. Retrieved from <http://www.nj.gov/transportation/refdata/research/reports/FHWA-NJ-2010-002.pdf>
- Chatman, D. G.** (2008). Deconstructing development density: Quality, quantity and price effects on household non-work travel. *Transportation Research Part A: Policy and Practice, 42*(7), 1008–1030.
- Cutter, W. B.,** & Franco, S. F. (2012). Do parking requirements significantly increase the area dedicated to parking? A test of the effect of parking requirements values in Los Angeles County. *Transportation Research A, 46*(6), 901–925.
- Deka, D.** (2002). Transit availability and automobile ownership: Some policy implications. *Journal of Planning Education and Research, 21*(3), 285–300.
- Dill, J.** (2003). Transit use and proximity to rail: Results from large employment sites in the San Francisco, California, Bay Area. *Transportation Research Record, 1835*(1), 19–24.
- Dillman, D. A.** (1978). *Mail and telephone surveys: The total design method*. New York, NY: Wiley.
- Dillman, D. A.,** Dillman, J. J., & Makela, C. J. (1984). The importance of adhering to details of the Total Design Method (TDM) for mail surveys. *New Directions for Program Evaluation, 1984*(21), 49–64.
- Ewing, R.,** & Cervero, R. (2010). Travel and the built environment: A meta-analysis. *Journal of the American Planning Association, 76*(3), 265–294.
- Federal Highway Administration.** (2009). *National Household Travel Survey* [Data files]. Retrieved from <http://nhts.ornl.gov/download.shtml>
- Guo, Z.** (2013). Does residential parking supply affect household car ownership? The case of New York City. *Journal of Transport Geography, 26*(January), 18–28.
- Guo, Z.,** & Xu, P. (2012). Duet of the commons: The impact of street cleaning on car usage in the New York City area. *Journal of Planning Education and Research, 33*(January), 34–48.
- Handy, S. L.** (1993). Regional versus local accessibility: Implications for nonwork travel. *Transportation Research Record, 1400*, 101–107.
- Loo, B. P. Y.,** Chen, C., & Chan, E. T. H. (2010). Rail-based transit-oriented development: Lessons from New York City and Hong Kong. *Landscape and Urban Planning, 97*(3), 202–212.
- Lund, H. M.,** Cervero, R., & Willson, R. W. (2004). *Travel characteristics of transit-oriented development in California*. San Francisco, CA: Bay Area Rapid Transit District.

- Pushkarev, B.,** & Zupan, J. M. (1977). *Public transportation and land use policy*. Bloomington: Indiana University Press.
- Rowe, D. H.,** Bae, C. H. C., & Shen, Q. (2011). Evaluating the impact of transit service on parking demand and requirements. *Transportation Research Record*, 2245, 56–62.
- Salon, D.** (2009). Neighborhoods, cars, and commuting in New York City: A discrete choice approach. *Transportation Research Part a-Policy and Practice*, 43(2), 180–196.
- Shoup, D. C.** (2005). *The high cost of free parking*. Chicago, IL: Planners Press.
- U.S. Census Bureau.** (2008). LEHD Origin-Destination Employment Statistics (LODES) [Data file]. Retrieved from <http://lehd.ces.census.gov/data/>
- Vance, C.,** & Hedel, R. (2007). The impact of urban form on automobile travel: Disentangling causation from correlation. *Transportation*, 34(5), 575–588.

- Weinberger, R.** (2012). Death by a thousand curb-cuts: Evidence on the effect of minimum parking requirements on the choice to drive. *Transport Policy*, 20, 93–102.
- Weinberger, R.,** Seaman, M. , & Johnson, C. (2009). Residential off-street parking impacts on car ownership, vehicle miles traveled, and related carbon emissions. *Transportation Research Record*, 2118, 24–30.
- Zegras, C.** (2010). The built environment and motor vehicle ownership and use: Evidence from Santiago de Chile. *Urban Studies*, 47(8), 1793–1817.
- Zhang, M.** (2010). Can transit-oriented development reduce peak-hour congestion? *Transportation Research Record*, 2174, 148–155.
- Zhang, M.,** & Kukadia, N. (2005). Metrics of urban form and the modifiable areal unit problem. *Transportation Research Record*, 1902, 71–79.



Planning Ideas That Matter

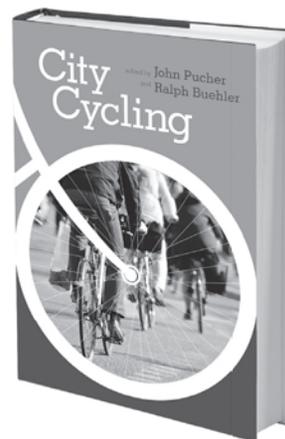
Livability, Territoriality, Governance, and Reflective Practice

edited by **Bishwapriya Sanyal, Lawrence J. Vale, and Christina D. Rosan**

"This volume of benchmark essays provides critical perspectives on some of the most important planning conversations in North America over the past ninety years."

— John Friedmann, University of British Columbia

408 pp., 34 illus., \$27 paper



City Cycling

edited by **John Pucher and Ralph Buehler**

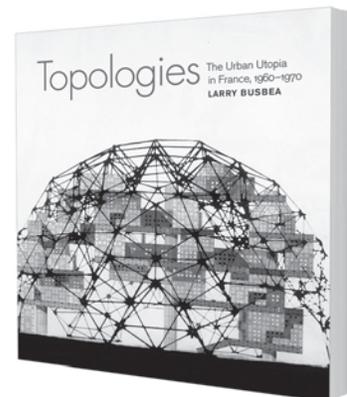
"This impressive book thoroughly documents the individual, community, and national benefits of getting more people on bikes and proposes specific measures for making cycling safe and feasible for everyone."

— Andy Clarke, President, League of American Bicyclists

368 pp., 62 illus., \$27.95 paper



The MIT Press



now in paper

Topologies

The Urban Utopia in France, 1960-1970

Larry Busbea

"Superb... the first book-length study of a time and place when technologically innovative design proposals flourished on architects' drawing boards but languished in the corridors of power."

— Martin Filler, *The New York Review of Books*

2400 pp., 137 illus., \$19.95 paper

From: arun <arunganesan123@gmail.com>
Sent: Saturday, February 20, 2021 5:05 PM
To: Planning <Planning@a2gov.org>
Subject: TC1 Zoning Redistricting Feedback

Subject:

Dear planning committee,

I have lived in Ann Arbor since 2003 throughout high school, college, and graduate school. I lived near Briarwood mall on Ann Arbor Saline road until 2017 and now live on Plymouth road near Kroger.

Being a student in the University of Michigan for a long time I enjoyed easy walking access to densely packed businesses and services. My friends lived right next to the university and had walkable access to local businesses and shops. This mixed-use zoning made this possible. I believe it granted the freedom for such densely packed use of land to come about organically. This kind of land use should be expanded to other areas in Ann Arbor.

I am happy to hear about the planned redistricting of the transit corridor in State Street/Eisenhower Parkway area. I would like to propose the following three amendments to the plan.

Proposed changes:

- Expand TC1 districting to all transit corridors beyond the Briarwood area
- Remove the 2+ floor and basement requirement. This restriction may prevent certain kinds of businesses from opening in this area. If developers feel the need to build multi-story, that can be left up to them and the demand will naturally dictate how the land is used.
- Remove the 60% transparency requirement on the first floor and 30% transparency requirement on upper floors. This requirement may be detrimental to building residential homes in this area.

- Arun Ganesan

From: Beth Collins <rdhbeth@gmail.com>

Sent: Monday, February 22, 2021 8:59 AM

To: Planning <Planning@a2gov.org>; Lenart, Brett <BLenart@a2gov.org>; DiLeo, Alexis <ADiLeo@a2gov.org>; Disch, Lisa <LDisch@a2gov.org>; Delacourt, Derek <DDelacourt@a2gov.org>

Cc: Ramlawi, Ali <ARamlawi@a2gov.org>; Briggs, Erica <EBriggs@a2gov.org>

Subject: Comments on Transit Supported Development for 2/23 meeting

Dear Planning Commission and Planning staff,

I live in Westover Hills, a "still affordable" neighborhood of 95 parcels and 52 homes on the SE quadrant of Wagner and Jackson Rds. We have almost half vacant parcels (you and Council approved the annexation of many just a couple months ago) adjacent to what some would call tear down homes (Horvath protest letter enclosed) (I call them fixer uppers), so some investors are already purchasing lots as they come available. My neighborhood is approximately 18% minority owner occupied homes, we have a supportive home for women, we have no paved roads or sidewalks, we have no playground within walking distance, we were forcibly annexed to the city from Scio when Gelman polluted our wells, we are adjacent to the wonderful Dolph Nature Area and First Sister Lake and ***I love my neighborhood and neighbors.***

While serving in the military, I lived and worked in Arlington Virginia and saw Transit Oriented Development work great on the Metro stops or nodes.

I am worried that with TSD, T1, TOD (it keeps changing :) on every bus line in town, that the underserved areas (like mine) may get 8 story or higher buildings adjacent to an existing home if parcels are combined.

Westover Hills neighborhood has been here since as early as 1920, my house was built in 1940. The car dealers, hotels, and commercial corridor came after us. The Master Plan land use plan (attached) (while may be outdated, I think these words should matter) states that since all this commercialization has gone on around us, this quadrant should remain housing. I am not opposed to allowing denser housing than the current single family, but am against any kind of commercial and even mixed use (unless it is gentle density). Re: the Horvath letter, I would say that the residents who live on Wagner now would disagree with him that this is just some "shithole" and should be bulldozed down. In fact the little house he bought with the two parcels adjacent has been vacant since he bought it 4 years ago.....why cant he at least rent it out?? This is a whole other subject that I will be bringing to your attention at some point. We have 6 homes that have not had anyone living in them for over 4 years and I want neighbors. 3 are used for business or storage. 2 sit empty, and we have one non owner occupied STR that has a 3 BR home plus a basement ADU and is basically a "mini hotel" (I like the owners, but I would like it more if it were long term renters or sold to a young family). ** Please do not allow non owner occupied STR's to infiltrate our housing stock, while crying for more housing for the 80,000 who want to "live" here. I WANT NEIGHBORS living in all six of these vacant homes.

My three questions today are:

****You are starting with the Eisenhower/State corridor now, and Alex made a comment at the last meeting about there being no homes adjacent to that corridor to worry about the 8 stories into neighborhoods. But what will happen when you apply this to the other corridors of Washtenaw, etc?**

****Second question, you once had the ordinance allowing T1 overlay up to 1/2 mile off the corridor. If this is still in the ordinance, please state this and explain how this will not impact viable**

neighborhoods on each transit corridor or bus route, especially where we have investors buying up parcels to join together? Will you be looking at all of this with an equity lens?

****Lastly, I have always seen Jackson on the list of future corridors, but then in the 2019 memo it was scratched out or lined through? Is Jackson Rd still on the list?**

I support the idea of "Gentle Densification" that could bring more neighbors gently and equitably.

Thank you for all the work you do for our city, and thank you for listening to me,

Best,

Beth Collins

3404 Porter Rd

Site 7 - Located at the southeast corner of Jackson and Wagner Roads, and bounded by Ferry Street on the south, this site is part of the Westover Hills neighborhood. Until recently, these two square blocks contained three single-family housing units which have been either relocated or demolished. Ferry Street, which is parallel with and south of Jackson Road, is a neighborhood street, and residential structures face this street, as well as Westover Street. The remaining three corners of this intersection contain intense commercial businesses: Automobile dealers.

In Scio Township, to the west along Jackson Road, the evolution of an intense commercial corridor continues, encouraged by the Township's Downtown Development Authority via the installation of a boulevard and infrastructure improvements. The Varsity Ford Dealership is located to the immediate north of the subject site, and further east are several hotels and a small strip center. The south side of Jackson Road easterly past the site is primarily residential, with the exception of an auto service station.

The conditions along Jackson Road at the Wagner Road intersection have changed sufficiently over the last several years such that the negative impacts of the existing automobile dealers have encroached upon the Westover Hills neighborhood. Light and noise from these adjacent businesses have diminished the quality of life within this subdivision. While commercial development continues along Jackson Road, to allow additional commercial uses adjacent to this neighborhood would not benefit the area. Further, this corner of the intersection is different from the other three in that it contains a neighborhood, and viable single-family neighborhoods continue to the east.

While it is acknowledged that the character of Jackson Road has changed significantly since the development of the Westover Hills neighborhood in the 1920s, this does not preclude a continuation of residential uses on Jackson Avenue. Although the negative impacts of increased traffic and commercialization of surrounding properties may reduce the quality of life for residences fronting Jackson Road,

residential uses remain the preferred land use.

Residential uses, particularly if oriented toward Ferry Street rather than Jackson Road, can provide alternative housing options as well as better neighborhood integration and should be considered the most desirable use for the sites. However the changed conditions also support low intensity uses other than residential, at least on the west portion of the site which directly faces the three auto dealerships. Here, office uses are also considered appropriate on the corner block (bounded by Westover, Ferry, Jackson and Wagner) to shield the neighborhood from the impacts such as light, noise and traffic, from the auto dealers. Further, an office building could provide needed neighborhood services such as small medical complex.

**ROBERT C. HORVATH
60 WESTOVER ST.
ANN ARBOR, MI 48103**

December 31, 2020

Ann Arbor City Council
Sent via email only to CityClerk@a2gov.com

Re: Notice of Public Hearing to Rezone 26 City-Initiated Annexed Properties

Dear Clerk,

In response to the above 12/17/2020 notice, I wish to file an objection to rezoning the listed lots that abut Wagner Rd. to single family dwelling district for the reasons, in part, stated below. With respect to the other noticed lots on Westover St., I do not object to rezoning them to R1D.

By way of background and familiarization with the area in question, I own the lots at 147 and 167 S. Wagner Rd., including the house at 157 S. Wagner and 60 Westover St. (the corner of Wagner Rd. and Jackson Ave.). I live at 60 Westover and have been there many years before the widening of Wagner Rd.

The lots on Wagner Rd., with particular attention to the lots I own, should not be rezoned to single family dwelling district, in part, because (1) it is directly across from the Suburban Chevrolet car lot where over 500 cars are parked for public viewing daily; (2) the Pal's pump station at Porter Ave. was just recently converted to a commercial structure; (3) there are 100s of asphalt trucks weighing more than 160,000 lbs. traveling daily south on Wagner Rd. that turn either east or west onto Jackson Rd. for entrance onto I-94; (4) these asphalt trucks leave Cadillac Asphalt onto Wagner Rd. and literally shake my house, as well as the other houses on Wagner Rd; and (5) the other lots on Wagner Rd. are also directly across from other industrial uses from Jackson Rd. south to Liberty St.

In closing, the highest and best use for the lots along Wagner Rd. is not for residential development but is more suited for zoning to a higher density to attract development and usage. As those that live in the area are aware, the reason why there has been no single-family development on the subject lots (hence the reason these lots are still vacant) or redevelopment of those houses on Wagner Rd. is, in part, because of the high costs attributable to the negative factors outlined above.

Respectfully submitted,

/s/ Robert C. Horvath
Attorney/Real Estate Broker
Office 248-858-5881 / Cell 248-835-5991

From: Jamie Fogel <jsfog@umich.edu>
Sent: Sunday, February 21, 2021 6:50 PM
To: Planning <Planning@a2gov.org>
Subject: Please expand the proposed T1 zoning district

Dear Planning Commission members,

I am writing to urge you to expand the scope of the proposed T1 zoning district. I believe that Ann Arbor would greatly benefit from the T1 zoning district for a number of reasons, including greater affordability, reduced traffic, increased use of public transit, and greater community inclusivity. The two currently-proposed areas are a good start, but I believe we can do more. Specifically, I urge the following:

1. Permit the uses allowed in C3 and M1, or at least the non-auto related uses.
2. Replace the mixed-use, transparency, and two-story requirements with design guidelines recommending these features. You could offer expedited review, or some other incentive for meeting the guidelines. Mandating these features in all cases would create hundreds of non-conformities and unintended consequences.
3. Eliminate the parking maximums, or at least raise them to a level that won't kill all housing development, like 1.5 spaces per dwelling unit.
4. Remove the open space requirement, as it does not serve the purpose of the district.

Thank you,
Jamie Fogel