

# **APPENDIX K**

TOC Parking and TDM Strategies



## MEMORANDUM

To: VTA BART Phase 2 TOD Project Team

From: Nelson\Nygaard Project Team

Date: June 21, 2019

Subject: Place Types, Ridership Potential Development Scenarios, and Parking/TDM Recommendations - DRAFT

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### Introduction

This memorandum provides a potential ridership analysis based on multiple factors, including updated development scenarios and the results of CHS's December 3<sup>rd</sup> Employment TOD and Residential TOD analyses. In particular, the analysis has been tailored based on the place types that apply most closely to the three Phase II TOD station areas and the unique attributes of Downtown San José, Alum Rock-28<sup>th</sup> Street, and Santa Clara Stations.

### Place Types

Metropolitan planners in the Bay Area recognize that there are different place types for each station area (and by extension, transit-oriented development). These place types are defined by a variety of parameters, including:

- heights of surrounding buildings;
- density of population and employment; and
- extent of mix in land uses.

Each place type has different implications for the amount of development which is attainable given the built environment context and market realities. Each place type also assumes different projections for transit ridership and parking demand at sites within that area. For Priority Development Areas (PDAs<sup>1</sup>) listed in Plan Bay Area 2040, local jurisdictions have assigned "Future Place Types<sup>2</sup>" based on planning activity at these sites intended to achieve aspirational regional performance targets for goals related to carbon emissions, housing, equitable jobs access, economic growth, open space preservation, and multimodal transportation conditions.

For this analysis, station areas in Phase II are also assigned a "MTC Station Area Place Type" according to these considerations and the precedents set by existing high-capacity transit station

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<sup>1</sup> Priority Development Areas (PDAs) are designated by the Metropolitan Transportation Commission (MTC) as "the principal geographies for accommodating new development and making strategic investments in infrastructure to enable TOD." ([http://files.mtc.ca.gov/pdf/Final-MTC-TOD-Policy-Update\\_2014.pdf](http://files.mtc.ca.gov/pdf/Final-MTC-TOD-Policy-Update_2014.pdf)).

<sup>2</sup> "Future Place Types" includes one of seven Station Area Place Types which were first developed in 2007 as part of the MTC Station Area Planning Manual Development Guidelines (<http://ctod.org/pdfs/2007MTCStationAreaPlanningManual.pdf>).

areas and transit-oriented developments. Additional details on the Station Area Place Type assigned to each Phase 2 station are summarized below. Comparisons of observed parking demand by Station Area Place Type from the GreenTRIP Parking Database of residential developments are presented in Figure 1.

**Downtown San José should be a Regional Center.**

- The GreenTRIP Parking Database<sup>3</sup> classifies two developments within Downtown San José as a “Regional Center.” They include
  - the 21% affordable development at 101 San Fernando (with a parking demand of 0.89 spaces per unit) and,
  - the 100% affordable Jeanne D'Arc Manor/Giovanni Center (with a parking demand of 0.10 per unit).

**Alum Rock/28<sup>th</sup> Street should be a Mixed-Use Corridor.**

- The Alum Rock/28<sup>th</sup> Street station area currently contains relatively small parcels and the area is currently designated as a Mixed Use Corridor.<sup>4</sup>

**Santa Clara should be a City Center or Mixed-Use Corridor.**

- The Santa Clara Station Focus Area has been designated as a City Center by the City of Santa Clara. There are, however, few “City Center” station areas in the GreenTRIP parking database for comparison purposes. The Redwood City Caltrain station area is one of the most relevant City Center station area designations.
  - Box developed a 347,000 square foot office building with a 900 space garage on a surface parking lot within ¼ mile of the downtown Caltrain station. Box has approximately 1,000 employees on-site and one tenant (Wealth Front) with 160 employees on-site. A small component of the development (52,000 square feet) is associated with retail, with approximately 20 retail employees.
  - A shared parking agreement with the city required that Box share 290 of the spaces on evenings and weekends. Ultimately, Box decided to open all of the spaces for public use during those periods due to difficulty separating the parking areas.
  - Occupancy count for a typical weekday was 488 spaces of 855 available (57% utilization). When including all 1,180 on-site employees for Box, Wealth Front, and the retail uses, this facility’s parking demand ratio is approximately 0.41 spaces per employee. If applied to the 399,000 square feet on site, the demand ratio is 1.22 spaces per 1,000 square feet.
- As an alternative, “Mixed-Use Corridor” would be the next reasonable designation. The El Camino Real corridor and “City Cores, Corridors, & Station Areas” within Santa Clara are Mixed-Use Corridor.

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<sup>3</sup> GreenTRIP’s Parking Database (<http://database.greentrip.org/>) is a free, searchable database of parking supply and demand ratios of transit-oriented developments. First made available in 2014, the database is hosted by TransForm (<http://www.transformca.org/>).

<sup>4</sup> <http://www.vta.org/sfc/servlet.shepherd/version/download/068A0000001FbMu>

Figure 1 Observed Parking Demand by Station Area Place Type<sup>5</sup>

Place Type	Observed Demand Spaces/Unit (All Developments)	Observed Demand Spaces/Unit (Developments 1/2 Mile From BART)
Regional Center	0.73	0.62
Mixed-Use Corridor	0.83	0.6
City Center	1.05	0.63

## Parking Policy Approach

Regardless of the designation for each place type, the policy goals are to maximize the TOD potential by minimizing parking demand in the station area, and maximizing the effectiveness of the transit investment, development yield, and vitality of the station area TOD. See below for several recommended parking demand management strategies to help achieve these policy goals.

### District-level Strategies

Because of the nature of the development, all off-street parking supply in the station areas is recommended to be shared and/or centralized. Therefore, developers should contribute to the centralized shared parking supply for the station area (district) via fees-in lieu of building a separate on-site parking supply. In turn, leadership at the city or district level will direct resources raised from fees towards transportation and parking improvements that are well-suited to each station area.

Shared parking creates value to the entire station area. An approach to pay in advance for construction of shared parking will need to be investigated. One alternative approach to this strategy is to partner with a developer to construct a parking facility based on district-approved plans and funds, then to be managed by the district.<sup>6</sup>

### Adjusted Parking Requirements (Concurrent with BART Passenger Operations)<sup>7</sup>

- Eliminating minimum parking requirements is a first step toward ensuring that parking is not overbuilt.
- By setting a maximum parking requirement instead of a minimum requirement, cities can provide context-sensitive and evidence-based guidance to developers which does not overbuild parking supply for new TOD while also meeting expected levels of parking demand at the district level.
- A maximum parking ratio of 0.8 spaces per residential unit is recommended, which exceeds the observed parking demand of residential developments located within a half-mile of BART stations and within all three aforementioned place types (see Figure 3).

<sup>5</sup> Transform, 2018, GreenTRIP Parking Database, <http://database.greentrip.org/>

<sup>6</sup> District-level parking and access approach is currently under consideration by the City of San Jose for Berryessa station.

<sup>7</sup> Note: Parking standards are presented in terms of square footage, as parking spaces are not assigned or guaranteed to a specific user.

- The City of San Diego found that 89% of 41 multifamily apartment sites located in within a half-mile of a major transit stop<sup>8</sup> had lower demand than the prevailing requirement ratio. Following the study, the City Council successfully voted in March 2019 to remove minimum parking requirements for multifamily residential uses in downtown San Diego and areas within a half-mile of a major transit stop.<sup>9</sup>
- For commercial uses, a maximum of 1 space per 1,000 square feet within a 5-minute walk and 1 space per 530 square feet between a 5- and 10-minute walk of gross floor area (with further reductions based on implementation of TDM measures described in this section and Figure 5). These rates are derived from office and retail parking requirements within mixed-use zones in Arlington, VA, one of the most successful implementations of multiple transit-oriented station areas in a suburban context. The final square footage number is “depending on the adequacy of the Transportation Demand Management plan in addressing the need for parking.”<sup>10</sup>
- Retail demand during weekday midday hours is predominantly generated by one component of longer trips or by users whose trips are internally captured within the development, therefore standalone parking for these trips are not recommended. Demand for these uses during evening and weekend periods can be accommodated through the office-based parking, which is underutilized during this time.
- For all uses in downtown San Jose, Sacramento provides a useful precedent. As California’s capital, Sacramento’s downtown generates heavy daytime parking demand from government and office uses. Historically, downtown Sacramento’s nighttime activity is limited, but major revitalization efforts, including a new multipurpose arena, have created increased nighttime and weekend demand. Even with higher demand, thousands of spaces are regularly unused. To facilitate ongoing revitalization and address these challenges, the City has made a well-rounded push towards better sharing of parking. As a core tenant of the program, the City is willing to take on the short-term expenses to avoid significant long-term costs to build and operate more public parking. A key step was an overhaul to the city’s parking code in 2012, which **eliminated parking minimums in the Central City**<sup>11</sup>, discouraged developers from building stand-alone parking, incentivized shared parking with a 25% reduction in parking for joint or complementary uses, and allowed shared parking to count toward minimum parking requirements across the city.

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<sup>8</sup> Defined as “rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service of 15 minutes or less during the morning and afternoon peak commute periods.” (City of San Diego, <https://www.sandiego.gov/sites/default/files/transit-priority-map.pdf>)

<sup>9</sup> D. Garrick, “San Diego council votes 8-1 to wipe out parking requirements in neighborhoods near transit,” San Diego Union Tribune, 2019, <https://www.sandiegouniontribune.com/news/politics/sd-me-parking-housing-20190304-story.html>

<sup>10</sup> Arlington Zoning Ordinance 7.15.7

<sup>11</sup> Sacramento City Code 17.608.030

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Figure 2 Proposed Parking Standards<sup>12</sup>

Station	Category	Multi-Family Residential	Office	Ground-Floor Retail
Santa Clara	Existing Standards	1 to 2 spaces per dwelling unit minimum (depending on zoning)	1 space per 300 square feet of gross floor area minimum	1 space per 200 square feet of gross floor area minimum
	Comparable Standards	No parking required (San Diego, CA)	1 space per 1,000 square feet minimum (Arlington, VA)	1 space per 1,000 square feet minimum (Arlington, VA)
	Recommended Standards	0.8 spaces per unit maximum; additional reductions for affordable and senior housing (on a case by case basis per combined development program)	1 space per 530 to 1,000 square feet of gross floor area maximum (depending on TDM plan)	No parking allowed
San José Downtown	Existing Standards	1 space per unit minimum	2.5 spaces per 1,000 square feet minimum	No parking required
	Comparable Standards	No parking required (San Diego, CA)	No parking required (Sacramento, CA)	No parking required (Sacramento, CA)
	Recommended Standards <sup>13</sup>	No parking required	No parking required	No parking allowed
Alum Rock-28th Street	Existing Standards	1.25 to 2 spaces per unit minimum <sup>14</sup>	1 space per 200-300 square feet of gross floor area minimum (exempt if use is street-level) <sup>15</sup>	Exempt from requirements unless demand for use under code would generate 2 spaces per 200 square feet of gross floor area <sup>16</sup>
	Comparable Standards	No parking required (San Diego, CA)	1 space per 1,000 square feet minimum (Arlington, VA)	1 space per 1,000 square feet minimum (Arlington, VA)
	Recommended Standards	0.8 spaces per unit maximum; additional reductions for affordable and senior housing (on a case by case basis per combined development program)	1 space per 530 to 1,000 square feet of gross floor area maximum (depending on TDM plan)	No parking allowed

<sup>12</sup> Standards are recommended to be concurrent with the BART Passenger Operations

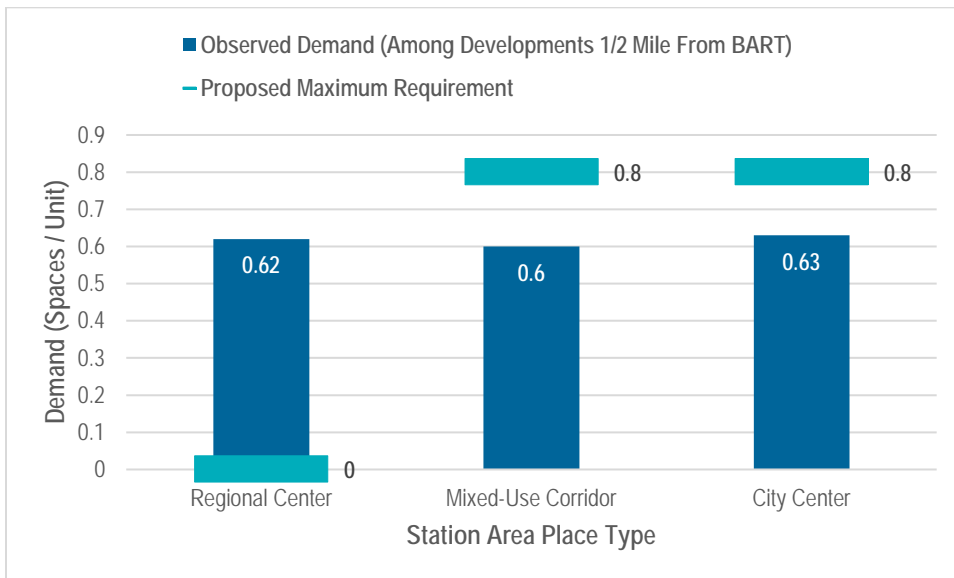
<sup>13</sup> The City of San José is undertaking a downtown transportation study and should consider evaluating a downtown-wide parking cap including the TOD study area and the wider district.

<sup>14</sup> As a pedestrian-oriented district, this may be reduced contingent on the development unbundling spaces, including car share spaces, and/or eliminates curb cuts onto “the Main Street” (San José Municipal Code 20.90.220)

<sup>15</sup> Non-residential uses must provide a certain amount of clean air vehicle spaces (San José Municipal Code 20.90.060, Table 20-215)

<sup>16</sup> San José Municipal Code 20.90.810

Figure 3 Comparison of Proposed Residential Ratios and Observed Demand by Station Area Place Type



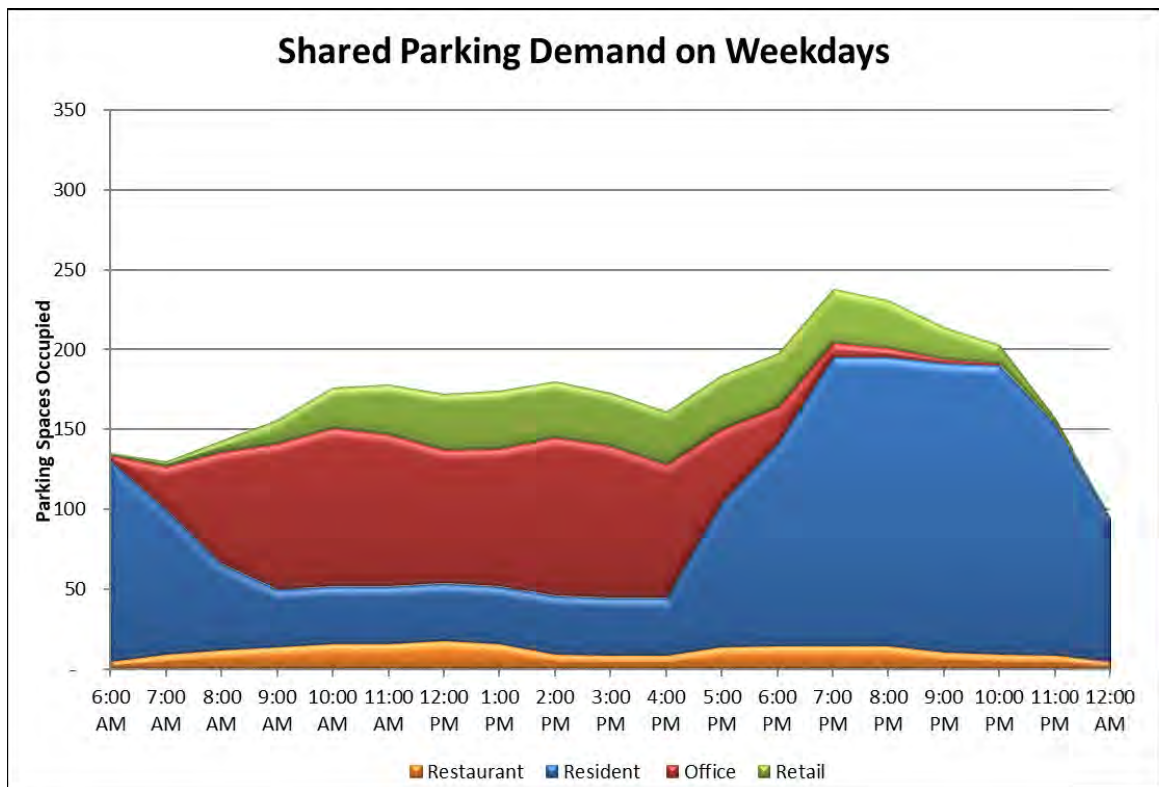
### Enhanced Access District

- City policies and codes can encourage parking to be provided and managed as an open, shared, public resource, resulting in more efficient use, and reuse, of parking spaces across shifting demand patterns.
- An Enhanced Access District would be established and supported via contributions to a shared parking fund which would be used to build, operate, and maintain its parking assets. The same organization would provide all land uses within the district with Transportation Demand Management programs.
- The parking supply developed in the districts are meant to meet all of the district's needs, and shared between all district uses. Depending on their options and means, residents will include people who do not have a car, use a car occasionally, and need a car for commuting. Note that residential parking is shared among residential tenants and their guests only, not with commercial/office supplies.
- Commercial tenant/lessees will ensure access to employees via daily permits, and to visitors via hourly public parking and validation programs discussed further below.
- The Enhanced Access District should also be empowered to negotiate with owners of underutilized parking supplies (including previously existing private supplies or BART commuter parking) for inclusion in the shared supply inventory.
- Options to manage each station's Enhanced Access District could include the following, provided policy direction and sufficient funding, though this would require expansion of existing responsibilities to include TDM programming<sup>17</sup>:

<sup>17</sup> Provision of TDM programming is not currently a designated responsibility within either city

- For San Jose Downtown and Alum Rock-28th Street: San Jose’s Department of Transportation.<sup>18</sup> Much of the proposed policy guidance has already been established by the City of San Jose’s Parking Rate Resolution<sup>19</sup> which sets policy guidance for: managing parking differently in different areas; allows for occupants of building without off-street parking to lease parking in public facilities; and delegates the authority to the DOT Director to implement demand-responsive pricing for certain types of parking, as well as charging different amounts for specific user groups (i.e.: San Jose State University students, Downtown merchants and their employees, and start-up companies).
- For Santa Clara: Santa Clara Department of Traffic or a Joint Powers Authority including representation from Santa Clara, San Jose, VTA, and BART (to account for the bi-jurisdictional nature of this station area).

Figure 4 Sample Graph Demonstrating Varying Parking Demand Periods by Land Use



### Shared Parking Fund

- Fee revenue is typically collected into a dedicated fund to pay for a public parking program, parking-related mobility improvements, and non-parking mobility

<sup>18</sup> San Jose Department of Transportation currently manages all publicly-owned off-street parking facilities which serve multiple uses, in both downtown and one facility in Alum Rock (near Alum Rock and Manning Avenues). ParkSJ provides external branding, but is not included here as they do not currently manage parking.

<sup>19</sup> San Jose Resolution No. 78787, Council Agenda September 18, 2018



improvements, particularly if the improvements are likely to help reduce parking demand.

- For on-going maintenance and management of the parking supply, the parking fund would be funded by parking fees and enforcement revenue.

### **Parking Management Programs/Services**

- Parking programs and services offered at each station area will be tailored to the specific needs of each location. At a minimum, each program should include:
  - An off-street public parking program that includes: a robust hourly, evening/weekend, and event rate adjusted to demand and a parking validation program to support local business.
  - A curb management program designed to support station access, high-turnover activities such as passenger pick-up/drop-off, and package delivery.
  - No monthly permits for business employees would be provided. Instead, employees of businesses in the station area will be able to apply for a daily rate flexible parking permit to park in the shared parking district. This program will allow employees to make the decision to drive on an as-needed basis taking the daily cost into their commute choice. Charging for parking by the day vs. monthly, is very impactful at reducing the drive alone mode share.

### **BART Commuter Parking**

- Prices for commuter parking should be in line with the market cost, to ensure it is utilized by commuters, and effective at mitigating potential spillover.
- Prices should also be set at a rate that covers the costs of safety, security, maintenance, and operation of the commuter parking supply.

### **Residential Parking Permits**

Modern Residential Parking Permit (RPP) programs operate by exempting permitted resident vehicles from the parking restrictions and time limits for non-metered, on-street parking spaces within a geographic area. The primary goal of an RPP program is to manage parking “spillover” into residential neighborhoods that are impacted by high parking demand from other uses. By managing parking spillover, RPPs can ensure that residential neighborhoods are not overwhelmed by transit commuters, employees, or visitors who may be parking during times in which residents are also accessing such spots.

There is a precedent of establishing RPP zones in response to transit commuters. In Oakland, an RPP zone was recommended for the MacArthur BART Transit Village “to reduce potential parking conflicts that may occur in the surrounding neighborhoods as a result of the reduction in BART parking and displaced BART parkers seeking to park in adjacent residential neighborhoods.”<sup>20</sup>

Both cities hosting Phase 2 stations currently have RPP programs, which should be considered for implementation at the three station areas.

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<sup>20</sup> <http://www2.oaklandnet.com/oakca1/groups/ceda/documents/report/dowd008976.pdf>

City of San Jose<sup>21</sup>

- **Permit Cost:** Free in 6 zones, \$35 each in 16 zones
- **Permit Limits:** Varies by zone; may be 1, 3, 4, and unlimited
- **Guest Permits:** Limit varies by zone, may be 1 or 2 allowed, free of charge
- **Petition Policy:** Simple majority (50% + 1) of residents

City of Santa Clara<sup>22</sup>

- **Permit Cost:** \$21 each
- **Permit Limits:** 1 per eligible resident or nonresident owner
- **Guest Permits:** A temporary guest permit may be issued to eligible residents
- **Petition Policy:** City Engineer evaluates conditions upon request by residents and makes recommendation to Council.

## Transportation Demand Management Strategies

For all Regional Center, City Center, and Mixed-Use Corridor developments in the GreenTRIP parking database, parking demand in buildings with three or more stated “trip reduction strategies”<sup>23</sup> was 8.8% lower than those which provided two or less strategies. Therefore, multiple transportation demand management strategies should be incentivized, reducing the cost burden of constructing and maintaining each developer’s cost burden for exclusive on-site parking. Transportation demand management strategies will help achieve the twin policy goals of minimizing parking demand in the station area and maximizing the effectiveness of the transit investment, development yield, and vitality of the TOD in station area.

Developments would be required or incentivized to commit to specific TDM investments, programs, and/or amenities, to both reduce parking/traffic impacts on the surrounding area and help activate local sidewalks, bike networks, and increase ridership on transit systems. Developments could provide these programs individually or required to contribute to the Access District to maximize efficiency of consolidated services. Figure 5 presents the recommended TDM programs, their range of impacts on transportation demand to support the proposed reduced parking supplies, and their applicability by development size and land use; citations are provided to identify sources for more information on site-specific TDM programming.

## Cash-Out Parking

- Where free parking is provided by an employer at no cost to the employee, also give employees the option to receive the cash value of free parking in lieu of a parking space. The City of Santa Monica Ordinance 1604 requires businesses with over 50 employees to submit an emissions reduction plan which mandates compliance with the California’s Cash-out law (AB2109).<sup>24</sup>

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<sup>21</sup> <http://www.sanjoseca.gov/index.aspx?NID=3386>

<sup>22</sup> <http://santaclaraca.gov/government/departments/police-department/community/residential-permit-parking>

<sup>23</sup> Strategies include bike parking, bike share, local shuttle, transit route information, free/discounted car sharing membership, car sharing (on-site or within a ¼ mile of the development), and unbundled parking.

<sup>24</sup> Smart Growth America, 2010, “Parking Cash Out,”

[http://www.smartgrowthamerica.us/documents/Parking\\_Cash\\_Out\\_Santa\\_Monica\\_Ordinance.pdf](http://www.smartgrowthamerica.us/documents/Parking_Cash_Out_Santa_Monica_Ordinance.pdf)

### **Unbundled Parking**

- When parking is “unbundled,” it is offered as an optional amenity at a separate cost from residential rents or commercial leases. The cost to lease or purchase the parking space is then listed separate from the cost to lease or purchase of a dwelling unit or non-residential space.
- For all Regional Center, City Center, and Mixed-Use Corridor developments in the GreenTRIP parking database, parking demand in buildings allowing unbundling was 11% lower than those which did not.

### **TDM Programs**

- It is important to provide a comprehensive package of multiple options catering to all ages, abilities, and chosen modes of transportation. As noted above, Figure 5 presents the recommended TDM programs, their range of impacts on transportation demand to support the proposed reduced parking supplies, and their applicability by development size and land use. Each of these TDM measures is for new development and all are appropriate for high functioning TOD's. The applicability for each program is determined by prototype sizes for each land use; sizes are classified as Small (“S”) and Medium/Large (“M/L”)<sup>25</sup>. Medium and Large were combined, as they both pass the same threshold for certain TDM programs that Small size developments do not (including requirements for a TDM program for employers in the Bay Area and the feasibility of installing car share spaces). Sizes are defined in Figure 6.

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<sup>25</sup> Note: There are no applicable Small size office development prototypes.

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Figure 5 Proposed TDM Programs and Impacts

	TDM Program	Description	Scale of Implementation	Range of demand reduction (source)	Residential Applicability		Office Applicability	
					S	M/L	S	M/L
1	Subsidized Transit Pass	Provide contributions or incentives towards the equivalent cost of a transit pass for employees and/or residents.	District-wide	As much as 20% in VMT in VMT (CAPCOA <sup>26</sup> )	X	X		X
2	Unbundle Parking	Parking costs are detached from residential rents or commercial leases. Residents and employees would have to pay separately for parking space access.	Site-specific	As much as 30% in parking (VTPI <sup>27</sup> )	X	X		X
3	Cash-Out Parking	Where free parking is provided, give employees the option to receive the cash value of free parking in lieu of a parking space.	Site-specific	0.6 to 7.7% in VMT (CAPCOA)				X
4	Price Parking	Charge for parking. This may include explicitly charging employees for parking, implementing market or dynamic rate pricing, and validating for invited guests only.	District-wide	0.1 to 19.7% in VMT (CAPCOA)				X

<sup>26</sup> A 2010 California Air Pollution Control Officers Association (CAPCOA) report presents a way to quantify the total impact of different TDM and site-design measures implemented together. The CAPCOA report is based on an extensive literature review on the effectiveness of TDM measures and other greenhouse-gas-reduction strategies, and the CAPCOA manual provides clear guidance on the assumptions and limitations of each measure. <http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf>

<sup>27</sup> The Victoria Transport Policy Institute (VTPI) provides an online resource combining best practices in TDM and trip reduction practices known as “The TDM Encyclopedia.” <http://www.vtpi.org/tdm/tdm28.htm>

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	TDM Program	Description	Scale of Implementation	Range of demand reduction (source)	Residential Applicability		Office Applicability	
					S	M/L	S	M/L
5	Car Share Vehicles	Designated parking for car share vehicles (accessible 24/7).	District-wide	0.4 to 0.7% in VMT (CAPCOA) when paired with #6		X		X
6	Car Share Memberships	Subsidized car share membership fees for development residents, tenants, and employees.	Site-specific	0.4 to 0.7% in VMT (CAPCOA) when paired with #5	X	X		X
7	Commuter Benefits Program	Employers with at least 50 employees required to enact 1) allowed pre-tax transit/vanpool expenses, 2) subsidies to employees to use transit/vanpool, 3) directly-provided transit services, or 4) an alternative benefit approved by MTC	Site-specific	4.2 to 21.0% in VMT (CAPCOA) if monitoring required; 1.0 to 6.2% if not.				X
8	Carpool and Vanpool Preferential Parking	Designate the most desirable parking spaces for employees who carpool or vanpool.	Site-specific	1.0 to 6.2% in VMT (CAPCOA) if part of a large group of commute strategies				X
9	End-of-Trip Bicycle Facilities	Provide secure storage for bikes, along with showers, lockers, and changing rooms.	Site-specific	1.0 to 5.0% in VMT for overall use of bicycles (CAPCOA)	X	X		X
10	TDM Marketing	Provide employees, residents, and/or guests with information on available travel options.	Site-specific	0.8 to 4.0% in VMT (CAPCOA)	X	X		X
11	Flexible Work Arrangement Programs	Provide work from home (aka telecommuting) and flexible schedule options.	Site-specific	0.1 to 5.5% in VMT (CAPCOA)				X

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	TDM Program	Description	Scale of Implementation	Range of demand reduction (source)	Residential Applicability		Office Applicability	
					S	M/L	S	M/L
12	Guaranteed Ride Home	Offer non-single occupancy commuters with free rides home in event of an emergency.	Site-specific	1.0 to 6.2% in VMT (CAPCOA) if part of a large group of commute strategies				X
13	Enhanced Walking Conditions	Providing streetscape improvements and a connected pedestrian access network that internally links areas of a project site to encourage people to walk (including walk to transit) instead of drive.	District-wide	0.5 to 2.0% in VMT (CAPCOA)	X	X		X
14	Carpool/Vanpool Matching	Facilitate carpooling and vanpooling by matching potential riders.	District-wide	1.0 to 6.2% in VMT (CAPCOA)	X	X		X
15	Affordable Housing	Provide affordable housing units on-site, which correlates to reduced vehicle ownership.	Site-specific	0.04 to 1.2% in VMT (CAPCOA)	X	X		

Note: According to CAPCOA, "When more and more measures are implemented to mitigate a particular source of emissions, the benefit of each additional measure diminishes." This means that one cannot simply add up all the demand reduction percentages when calculating the aggregate impact of all TDM programs.<sup>28</sup>

**Figure 6 Definition of Development Sizes by Land Use**

Development Size	Residential Ranges (Units)	Office (Building Area Square Footage)
Small	3 to 49	N/A
Medium	108 to 354	100,800 to 600,000
Large	385 to 667	190,000 to 587,400

<sup>28</sup> <http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf>, p. 56

## Ridership Model Results

### Scenarios and Inputs

The four scenarios (previously described) were analyzed at each of the three stations, for a total of 12 analyses. The analyses are presented in Figure 7.

Analysis for each scenario included projection of daily transit ridership generated by the development scenarios. This analysis utilizes BART's *Replacement Parking for Joint Development* model (updated 2017). The following inputs were included in the analyses:

- **Park-and-ride access to station mode share:** 36% (Alum Rock 28th Street), 0% (Downtown San José), and 16% (Santa Clara)<sup>29</sup>
- **Dedicated station parking:** 1,200 spaces (Alum Rock 28th Street), 0 spaces (Downtown San José), and 500 spaces (Santa Clara)<sup>30</sup>
- **Total developable parcel size (for Scenarios 1A and 1B):** 61.8 acres (Alum Rock – 28th Street), 58.3 acres (Downtown San José), and 142.5 acres (Santa Clara)
- **Trip generation rates and transit trip share:** The available literature on vehicle trip generation at TOD developments primarily identifies peak-hour trip rates. To accommodate daily trip generation rates, an estimated daily rate was developed based on the ratio between daily weekday and PM peak rates in the ITE Trip Generation Manual:
  - Residential trip generation = 3.18 per unit
  - Office trip generation = 5.48 per 1,000 square feet
- No other access improvements/programs are assumed (i.e., no new/improved bus or bike routes that would be attributed to this project).<sup>31</sup>

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<sup>29</sup>VTA's BART Silicon Valley Phase II Extension Project, Final Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report and Section 4(f) Evaluation, February 2018

<sup>30</sup> Ibid.

<sup>31</sup> While additional access improvements may be identified in other sections, these are not confirmed, so are not included in these calculations.

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Figure 7 Conceptual Development Scenarios<sup>32</sup>

Station	Scenario 1A (All residential within a 5-minute walk)	Scenario 1B (All residential in entire station area)	Scenario 2A (All office within a 5-minute walk)	Scenario 2B (All office in entire station area)
Alum Rock-28 <sup>th</sup> Street	• Residential: 1,423 dwelling units	• Residential: 6,599 dwelling unit	• Office: 479,450 sf	• Office: 479,450 sf
Downtown San José	• Residential: 843 dwelling units	• Residential: 8,758 dwelling units	• Office: 2,055,192 sf	• Office: 2,055,192 sf
Santa Clara	• Residential: 2,298 dwelling units	• Residential: 7,204 dwelling units	• Office: 367,725 sf	• Office: 4,205,484 sf

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<sup>32</sup> Development scenarios were modelled by Perkins + Will on February 27, 2019.



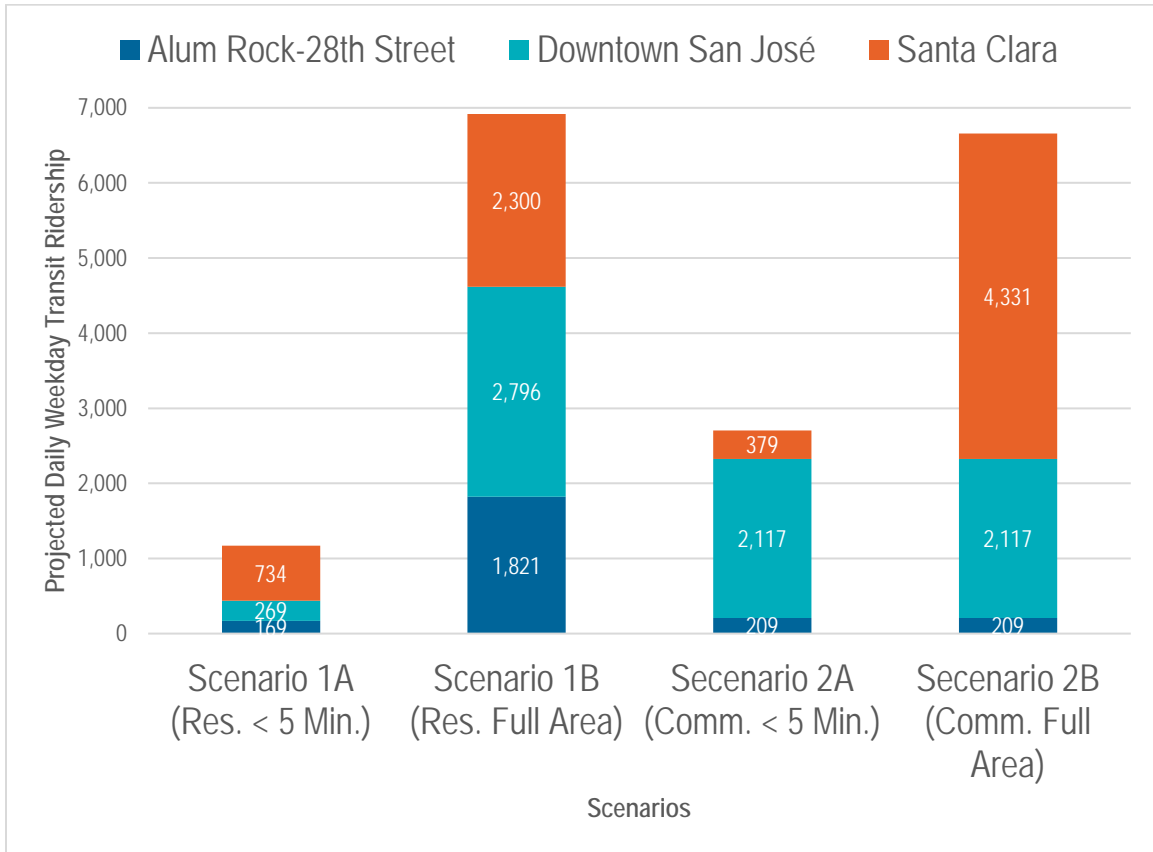
## Outputs

Successful TOD is encouraged in many ways, including: developing multiple land uses, locating those land uses close together, providing a walk- and bike-able environment so those land uses can be accessed easily, and serving the area with frequent and reliable transit. Combined, these components attract the most important factor in TOD: people. People to live, work, and play nearby, create a safe and active space, people who take advantage of transportation choices, and people who ultimately take ownership of the community.

Transit agencies support successful TOD by providing the transit service, serving ridership generated from those multiple land uses. Therefore, providing transit service that connects to the region, while creating a station area with access to local goods, services, and jobs, results in successful TOD's.

Figure 8 presents the analysis of the development scenarios, using examples of the transit ridership generated by buildout scenarios of residential use (in the case of Scenarios 1A and 1B) and office use (in the case of Scenarios 2A and 2B). This analysis utilizes BART's *Replacement Parking for Joint Development* model (updated 2017).

Figure 8 Comparison of TOD Potential in Terms of Projected Daily Weekday Transit Ridership



The model outputs<sup>33</sup> project substantial transit ridership gains with increases in both office space and residential units<sup>34</sup>. In all three stations, an increase in 1,000 square feet of office space nets approximately 1.03 additional riders, while an increase in one dwelling unit nets approximately 0.32 riders. For example:

- In Alum Rock-28th Street, the change from Scenario 1A to 1B increases residential units by 5,176 (with no change in office space), netting approximately 1,652 additional daily riders.
- In Downtown San José, the difference between Scenario 1A and Scenario 1B (7,915 dwelling units with no change in office space) is about 2,527 daily riders.
- In Santa Clara, an increase of 3,837,759 square feet of office space between Scenarios 2A and 2B (with no change in dwelling units) nets 3,952 daily riders.

The net modeled impact to ridership of 1,000 square feet of commercial spaces versus 1,000 square feet of residential spaces is demonstrated in Figure 9. Assuming a dwelling unit occupies approximately 1,200 square feet<sup>35</sup>, these model outputs support the idea that a station area

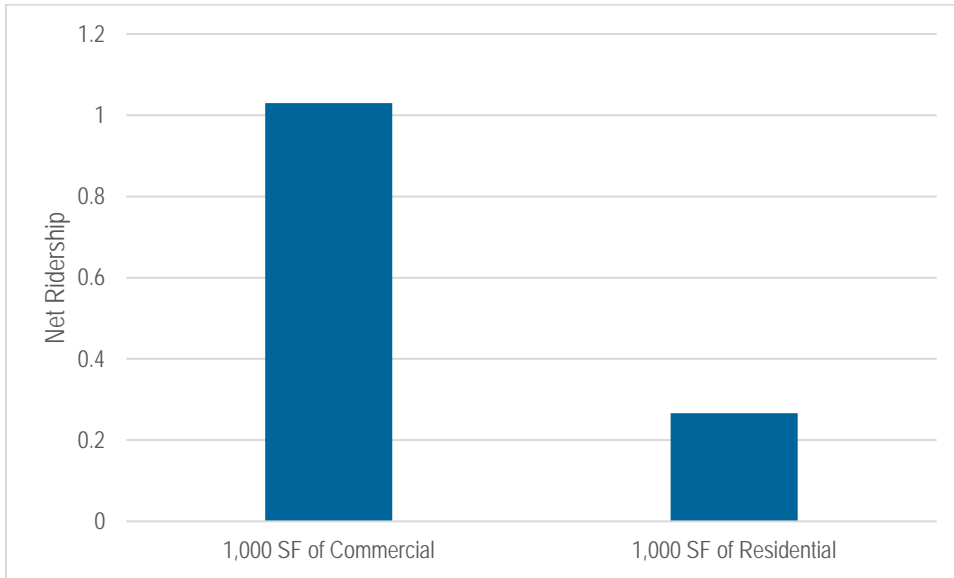
<sup>33</sup> Bay Area Rapid Transit, 2017, "Replacement Parking for Joint Development"

<sup>34</sup> Note: The model projects ridership to/from the proposed land use developments and does not include ridership to/from other of existing land uses.

<sup>35</sup> Per project-developed prototypes.

footprint filled with office uses supports more than space for residents<sup>36</sup>. Therefore, an emphasis on office development in the station area has the potential to generate significant additional riders.

Figure 9 Comparison of Net Ridership by Normalized Land Use



While additional development density has the potential to increase ridership, transit ridership is not based on development density alone; it also requires managing parking and providing TDM programming in the station areas so that the station area development pattern does not incentivize driving trips instead of other more space-efficient and sustainable travel modes. For the new stations to achieve the ridership identified in Figure 8, it will be critical to pair the land use plans (related to density, uses, and parking requirements), investments in multi-modal infrastructure and mode-shift programs, and components of the parking and TDM recommendations described above in order to realize the full benefits of "successful TOD."

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<sup>36</sup> Research on the subject of transit station catchments provides "some support" to narrowing the catchment for employees to a quarter-mile compared to a half-mile for residents. While there is not a clear "benchmark between distance and ridership," and sites will vary, the overall findings reveals a shorter distance in which employees are willing to walk from transit. (R. Cervero, E. Guerra, and D. Tischler, 2011, "The Half-Mile Circle: Does It Represent Transit Station Catchments?," Transportation Research Record Journal of the Transportation Research Board).