



Transportation Demand Management Toolkit

for Multi-Family
Residential
Development

July 2016





All toolkit image from Nelson\Nygaard, except as otherwise noted



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RTDM INTRODUCTION

WHAT IS RESIDENTIAL TRANSPORTATION DEMAND MANAGEMENT?

Transportation demand management (TDM) is the use of various strategies for reducing demand for travel by single-occupant vehicles.

Travel demand from residential developments is affected by location and land use factors such as proximity to high quality transit, and the presence of transit supportive land use densities and mixed land use patterns. Travel demand is also affected by programs or features such as on-site design of

pedestrian and bicycle amenities, transportation information kiosks, wayfinding information, rideshare matching, school transportation, bike train and walking groups, bike or car sharing, emergency ride home programs, reductions in parking requirements, unbundled parking, and other related strategies.



GOALS



This toolkit provides information to assist the City of Sunnyvale in considering and developing a Multi-Family Residential Transportation Demand Management (TDM) Program. Except in the case of mixed-use developments, this toolkit does not address TDM programs for commercial, industrial, and office developments.

The information provided in this toolkit includes some strategies that are not currently allowed or discussed in the Sunnyvale Municipal Code or existing City or Council policies. In order to create a robust toolkit for multi-family residential TDM, it is important that the toolkit list as many options and ideas as are relevant to the topic regardless of whether they are ultimately recommended as a part of the Multi-Family Residential TDM Program.

RATIONALE

There are a number of reasons for implementing a multi-family residential TDM program within the City of Sunnyvale:

Facilitating Economic Growth



Sunnyvale lies at the heart of Silicon Valley, the technological engine of the world. The city and surrounding region boasts numerous technology start-ups and some of the world's

most successful technology companies. With rapid growth of the economy, there is strong demand for new commercial, R&D and residential development throughout the city. A multi-family residential TDM program would allow economic and population growth to occur within the city while minimizing traffic-related impacts on the surrounding community.

Enhancing Livability



Population and economic growth has the potential to generate escalating transportation impacts and declining quality of life if existing travel patterns continue. On the other

hand, development, employment and population growth present tremendous opportunity for more livable patterns of urban form, more efficient and safe transportation options, and a more vibrant community. A multi-family residential TDM program is key to maintaining and enhancing quality of life for Sunnyvale residents by encouraging new trips to occur by modes other than single-occupant vehicles (SOVs).

Improving Transportation Efficiency



Transportation demand management (TDM) is a key element of encouraging and supporting more efficiency and sustainable forms of urban development and transportation. TDM strategies have important effects on the propensity

of people to walk, cycle, ride transit or drive cars for all sorts of trips including both home- and

work-based trips. With population and employment growth, shifting commute trips to alternative modes of transportation helps to reduce congestion on existing streets, highways, and freeways.

Complying with Laws and Policies



State legislation encourages communities to reduce travel demand and cities to better link transportation and land use development. Relevant legislation includes the following, with further explanation provided in Appendix A:

- ❖ California Global Warming Solutions Act of 2016 (AB 32);
- ❖ Sustainable Communities Act of 2008 (SB 375);
- ❖ Plan Bay Area, 2013;
- ❖ SB 743 Changes to Environmental Review;
- ❖ Draft New CEQA Guidelines, 2016; and
- ❖ AB 744 Planning and Zoning: Density Bonuses, 2015.

Current city policies also affect transportation demand management in both the positive and negative direction. Key policies are listed below and described in more detail in Appendix B:

- ❖ Municipal Code requirements that relate to bulk and density;
- ❖ Municipal Code provisions on minimum parking requirements for residential development, senior housing, and affordable housing;
- ❖ Municipal Code provisions for bicycle parking, mechanical lift parking, parking adjustments, and shared parking;
- ❖ Council Policy 1.1.15 on residential transportation demand management;
- ❖ Sunnyvale TDM requirements for commercial and industrial uses; and
- ❖ Sunnyvale Climate Action Plan.

STRUCTURE OF THE TOOLKIT

This toolkit document will serve to present TDM strategies that may be implemented at various stages of multi-family residential development to affect travel demand. The toolkit presents three main components to accomplish the goals of transportation demand management (TDM):

- ❖ City supportive policies;
- ❖ Development site design; and
- ❖ Ongoing TDM programs, operations and communication.

Under each component, TDM strategies will be described in terms of a program description, benefits, and best practice elements. In some cases, best practice elements have also been described under the GreenTRIP program—a certification program for residential projects that apply strategies to reduce vehicle trips, excessive parking and greenhouse gases, while making transportation more affordable.



CITY ACTIONS TO SUPPORT A MULTI-FAMILY RESIDENTIAL TDM PROGRAM



CITYWIDE
BICYCLE AND PEDESTRIAN FACILITIES



REDUCED MINIMUM PARKING REQUIREMENTS



CITYWIDE BICYCLE AND PEDESTRIAN FACILITIES

Improved city and regional bicycle facilities can reduce vehicular travel demand associated with residential development by making it safer, easier and more convenient for residents to use a bicycle.

Citywide bicycle and pedestrian facilities include networks of multi-use paths, bike lanes, and protected bike facilities, as well as auxiliary facilities such as parking and bike share programs.

Program Description

Non-Motorized Transportation Network Improvements

In Sunnyvale, low density land uses, auto-oriented street networks, and traffic conflicts are the most significant barriers to use of alternative modes. The City can increase the proportion of residents who use bicycles or walk by closing gaps in the local non-motorized transportation network and making existing facilities more appealing to bicyclists of all competencies. Over time, improved non-motorized transportation network facilities have escalating benefits because a wider range of destinations become accessible, and physical and cultural barriers to walking and cycling are overcome. Pedestrian friendly design also improves the performance of retail areas and the attractiveness of residential communities.

Residential developers may contribute to this program by providing improvements to adjacent facilities as part of their development or through in-kind contributions to non-motorized transportation improvements across the city. Key elements of this approach include the following:

- Complete streets design
- Bicycle lanes, buffered or protected bicycle lanes along arterials, and multi-use paths
- Intersection improvements such as shorter crossing distances, high visibility crosswalks, corner bulbouts, bike boxes, and protected intersections
- Sidewalk improvements to comply with ADA requirements such as corner curb ramps, sidewalk clearance, and improvements to ensure appropriate cross slopes at driveway
- In-lieu contributions to non-motorized transportation networks



Complete Streets implementation in Montreal, Canada.
Image from Nelson\Nygaard



Program Description

Citywide Bike Share

Citywide bike share programs make bikes available to any of their members for short term use between hubs located in different parts of the city. A third party provider periodically maintains the bikes and rebalances the system to make sure that bikes are available in the places where people

are most likely to need them. If a private or citywide bike share program is implemented, the City would most likely need to acquire the system in advance. Developers could then contribute the program or sponsor individual pods in the vicinity of their development.



CITYWIDE BICYCLE AND PEDESTRIAN FACILITIES



Bike share in Seoul, South Korea.
Image from Nelson\Nygaard



CITYWIDE BICYCLE AND PEDESTRIAN FACILITIES



Wide pedestrian crossings such as these in San Francisco help improve safety for both pedestrians and drivers.
Image from Nelson\Nygaard

Best Practice Elements

Citywide bicycle and pedestrian improvements should include the following elements:

- **Street design standards and programs** to increase street connectivity throughout the city and make all streets and intersections convenient, safe, and accessible by all modes of transportation;
- **Maximizing connectivity of publicly accessible walking and bicycling routes** (sidewalks, paths, and bike lanes) between neighborhoods and destinations that include transit stops and car share services;
- **Citywide plan and program to provide safe, high quality bicycle and pedestrian infrastructure** between all key destinations (housing, schools, transit stops, shops, work);
- **Standards and requirements for auxiliary bicycle facilities** including easily accessible short- and long-term bicycle storage and changing facilities (for mixed-use developments);
- **Establishment of a citywide bike share program;** and
- **Citywide and/or individualized marketing** of non-motorized transportation options.



REDUCED MINIMUM PARKING REQUIREMENTS

Reducing minimum parking requirements is an area the City could study as a strategy to foster a higher level of involvement in trip reduction through a TDM program. In an effort to evaluate as many strategies as possible, some of the items listed in this strategy are items that would require modifications to the existing Sunnyvale Municipal Code and are suggested as potential changes but not necessarily current recommendations.

High minimum parking requirements tend to serve a different purpose to transportation demand management. Standard municipal code parking requirements with minimum parking ratios may result in an oversupply of private off-street parking at transit-oriented development sites. Transit-oriented residential developments in Santa Clara County have been found to exhibit 30 percent lower parking demand than that required by minimum parking requirements, even in the absence of TDM strategies like unbundling.* Also, imposing high minimum parking requirements on otherwise transit-oriented developments undermines TDM performance and encourages higher rates of motor vehicle trip making.†

* Salazar, Dayana et al. **Parking Utilization Survey of Transit-Oriented Development Residential Properties in Santa Clara County**, San José State University and Santa Clara Valley Transportation Authority, 2010.

† Office of Planning and Research (OPR), "Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA: Implementing Senate Bill 743 (Steinberg, 2013)." 2016. https://www.opr.ca.gov/docs/Revised_VMT_CEQA_Guidelines_Proposal_January_20_2016.pdf



Image from Nelson Nygaard



REDUCED MINIMUM PARKING REQUIREMENTS



Modifying existing municipal code sections to reduce minimum parking requirements would help to support successful TDM programs that would be implemented by developers. Paired with TDM programs that promote the use of alternative modes of transportation, reducing excessive on-site parking can be an effective way to manage travel demand and avoid inadvertently undermining other TDM strategies. Reducing parking requirements may occur in a number of ways:

Program Description

Simplified and Reduced Minimum Parking Requirements

To be effective, transportation demand management and parking management strategies must be accompanied by low minimum parking requirements. Lower parking ratios reduce demand for single occupant vehicle (SOV) travel and encourage the use of transportation alternatives. Reduced minimum parking requirements also give greater freedom to developers to determine how much parking is actually needed for a project, which may improve the feasibility of higher quality urban design as well as affordable housing development. Where best practice TDM strategies are implemented, minimum parking requirements should be further reduced to reinforce rather than undermine these strategies. As is the case for mechanical lift and tandem parking in Sunnyvale, space saved as a result of lower minimum parking requirements could be reallocated for other related purposes such as on-site pathways, open space that increases connectivity, sidewalk dedications, and bicycle parking.

Elimination of Minimum Parking Requirements

In downtown settings, some cities have chosen to eliminate minimum parking requirements in order to protect the walkable character of the area, encourage appropriate development, and allow the market to determine the appropriate level of parking to be provided. This strategy has been used successfully in the Central Petaluma Specific Plan area, as well as the Rincon Hill, Market and Octavia Neighborhood Plans of San Francisco.

Introduction of Maximum Parking Requirements

Some cities have also introduced maximum parking requirements to ensure that excessive parking supplies do not damage the quality of urban form and undermine local transit or TDM strategies. For example, Sunnyvale has maximum parking requirements for non-residential developments. These requirements are particularly useful in downtown and transit-oriented areas where more clustered development is desired.



Program Description

In-Lieu Fee Programs

In-lieu fee programs provide developers with the flexibility of paying a fee in-lieu of providing all of the required parking on-site. An in-lieu fee program may encourage desirable development types (such as Santana Row-style pedestrian-oriented mixed-use development with restaurant and retail uses on the ground floor and housing on the upper floors) that may not otherwise be feasible under existing parking requirements. Revenue that is generated by the fee may be directed toward shared off-site parking resources, multimodal transportation, and neighborhood streetscape improvements. In-lieu programs are not intended to provide public parking equivalent to that that would otherwise be provided on-site. Instead, they facilitate more pedestrian-oriented development that may not be feasible under present parking requirements.

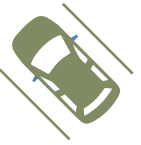
Unbundled or Unassigned Parking

In order to allow developers to implement best practice strategies such as unbundled parking and shared parking, modifications would need to be made to the Sunnyvale Municipal Code. In Sunnyvale, the format of the parking chapter of the Sunnyvale Municipal Code currently assumes that all units have at least one assigned parking space, which interferes with the ability to unbundle parking for multi-family residential developments.

Flexible Parking Provision Strategies and Technologies

Sunnyvale's Municipal Code allows for adjustments to standard parking dimensions if tandem parking, mechanical lifts, stackers or other similar means of mechanized parking are used. Under this strategy developers may be permitted to meet minimum parking requirements for a development by installing tandem, mechanical lift or automated parking technologies.* In conjunction with mechanical lift or automated parking, corresponding adjustments may be allowed to parking standards that relate to drive aisles, entrances, and stall dimensions. More flexible requirements would allow for more space efficient parking facilities and higher quality urban design within and around communities.

* The City of Sunnyvale defines tandem parking as placement of two parking spaces in such an arrangement where access to one or more parking spaces is dependent on moving another vehicle. Mechanical lifts, stackers, and other mechanized parking where spaces are not independently accessible are therefore part of this definition. (Sunnyvale Municipal Code § 19.46.020). Pairs of tandem parking spaces must be assigned to the same unit. Other forms of automated parking which are independently accessible are referred to as independent mechanized parking and are also permitted under the code. (Sunnyvale Municipal Code § 19.46.060 and Citywide Design Guidelines §3.H1)



REDUCED MINIMUM PARKING REQUIREMENTS



REDUCED MINIMUM PARKING REQUIREMENTS



Benefits

The benefits associated with each parking management program are shown in Figure 1.

Figure 1 Parking Management Programs

Program	Description	Benefits
Reduced or retracted parking minimums	City reduces the amount of parking required based on actual utilization or anticipated trip reduction	- Reduces demand for private motor vehicle trips and reinforces TDM strategies - Improves development feasibility and facilitates more walkable urban design
Introduction of maximum parking requirements for residential development	City introduces ordinance to cap the maximum allowable amount of parking to be provided with a development	- Reduces demand for private motor vehicle trips and reinforces TDM strategies - Facilitates improved amenity and more walkable urban design within the community
In-lieu fee program	City permits developers to pay a fee in-lieu of a portion of the otherwise required on-site parking	- Improves feasibility of development - Facilitates higher quality of urban design and provides funds for shared parking, multimodal transportation and streetscape improvements
Alternative parking provision	Developer is permitted to satisfy parking requirements through tandem, mechanical lift, and/or automated parking	- Allows communities to provide parking in a more space efficient manner - Space savings may be used for other purposes such as community open space or setbacks



Best Practice Elements

Reduced minimum parking requirements for new developments should encompass the following elements:

- ❖ **Reducing or retracting parking minimums and implementing parking maximums** in high density, transit rich neighborhoods and districts;
- ❖ **Implementing an in-lieu parking program** in areas to be targeted for pedestrian oriented retail or restaurant development; and
- ❖ **Make sure high quality, safe pedestrian and bicycle infrastructure** exists in areas where parking requirements will be reduced to promote active and alternative travel choices.



REDUCED MINIMUM PARKING REQUIREMENTS



Image from Nelson\Nygaard



Photo from Essex Apartments

Case Study

Verandas Apartments, Union City

Verandas Apartments is a residential transit-oriented development located within a close walk of Union City BART station—a station that is served by frequent BART services as well as a number of AC Transit lines. The development was constructed in 1989 and includes 282 units (330 bedrooms) along with 418 parking spaces. This parking provision is equivalent to a rate of 1.5 parking spaces per unit or 1.28 spaces per bedroom. The development represents market rate housing with an average asking rent of \$2,353 in 2015.

Three peak parking utilization studies have been conducted at Verandas Apartments over the past decade. The first study was conducted in 2009, shortly after the housing market crash. In this study, researchers found that peak overnight parking occupancy at Verandas was equivalent to 1.11 occupied spaces per unit, which is equivalent to a 26 percent oversupply of parking within the development.* After a return to more normal economic conditions, a 2014 GreenTRIP study of peak overnight parking measured a peak occupancy rate of 0.99 spaces per unit, which is equivalent to a 34 percent oversupply of parking. And finally in 2015, a Nelson\Nygaard study of peak overnight parking measured a peak occupancy rate of 0.83 spaces per unit, which is equivalent to a 44 percent oversupply of parking. Vacancy rates have remained low throughout this period, though household composition may have changed.

All three studies suggest that the apartment complex has a sizeable proportion of parking spaces (26 to 44 percent) that remain empty even at peak times—a pattern that was repeated at other residential developments observed in the 2009 and 2014 studies. Given the high cost of providing parking (approximately \$30,000 for each space in a structured parking facility), unused parking represents a substantial cost to developers and residents for which no benefit is gained if the resident does not utilize the parking space. The underutilization also suggests the minimum parking requirement in this transit-oriented location generates an oversupply of parking.

* Cervero, Robert, Arlie Adkins, and Cathleen Sullivan. "Are Suburban TODs Over-Parked?." *Journal of Public Transportation* 13.2 (2010): 3.

HOW TO DESIGN YOUR PROJECT



**LAND USE DENSITY, MIX AND
TRANSIT PROXIMITY**



AFFORDABLE HOUSING & PARKING SUPPLY



BICYCLE FACILITIES



LAND USE DENSITY, MIX AND TRANSIT PROXIMITY

The first aspect to be considered for TDM is site design. How a property is chosen and designed can influence the success of future TDM programs. Key attributes of site design are referred to as “the four Ds” and include Density, Diversity, urban Design, and transit access to regional Destinations.*

* Cervero, Robert and Kara Kockelman. “Travel Demand the Three Ds: Density, Diversity and Design” *Transportation Research D*, 1997.

High density and mixed-use development oriented around high quality transit are crucial to TDM strategies that complement other tools presented in this toolkit. Associated strategies encompass “the four Ds”: land use density (density), mixed land uses (diversity), transit proximity (destinations), and walkable urban design (design).

Program Description

Density

Higher density development will better support transit services and tend to generate fewer trips. Developments that facilitate *net* population densities of more than 45 people per acre will be supportive of high quality transit. Likewise, development-based densities of more than 35 units per residential acre are associated with a 5% trip reduction rate.

In addition to absolute density, developments that incorporate senior housing or affordable housing will perform even better from a trip reduction standpoint.

Diversity

Developments that facilitate a mix of land uses allow residents to do some of their daily activities without the need to drive. Mixed land uses include ground floor retail or corner store development (mixed-use developments or vertical mixed-use), as well as locating developments within a 10-minute walk of neighborhood, downtown or regional retail, commercial and employment opportunities. When horizontal mixed-use is proposed it is important to consider the quality of the pedestrian experience between the housing and the other uses as discussed in relation to urban design.

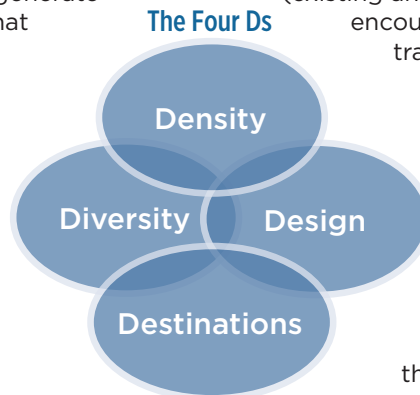
Destinations

Locating residential developments near major (existing and future) transit stops and stations encourages the use of alternative transportation modes by reducing geographic barriers to access. It also enhances household mobility options, reduces the demand for parking spaces, and reduces household costs. Preferably, new development should be located within a 10-minute walk of a rail station or at least two bus services that operate at 15-minute headways or better throughout the day.

Design

Perceived distance to transit and mixed-use opportunities may be affected by the quality of urban design and walkability in and around a development. The pedestrian experience is enhanced by the presence of continuous sidewalks, safe and narrow street crossings, buffering from high speed traffic, active and interesting street frontages, the lack of driveways, human scale lighting, attractive landscaping, and intermediate elements such as windows, seating or porches at eye height.

Developers can enhance these elements through site design as well as by closing gaps in the pedestrian network, widening sidewalks, improving crossing safety at key intersections, and calming traffic adjacent to the development. These design elements encourage walking trips and reduce the dependency on vehicles for short trips.





Basic Elements

Basic elements of land use density, mix and transit proximity are shown below.

Figure 2 Site Design and the Four Ds

Density and Diversity	Destinations	Design
- Increasing project density - Increasing the mix of uses within the project e.g. housing above retail - Locating the project within a 10-minute walk of groceries, daycare, schools, and employment locations	- Locating within 1-mile of a rail station or bus stop with two or more services operating at 15-minute frequencies or better throughout the day - Increasing connectivity or intersection density on the site - Providing internal pathways to minimize walking/biking distance to transit and other locations - Avoiding the use of neighborhood walls or gates that reduce visual access or non-motorized access to, from and through the site	- Orienting building entrances toward transit, pathways, and the street, and not parking lots - Incorporating human scaled elements such as pedestrian lighting, landscaping, seating, porches, and transparent windows - Contributing to traffic calming, crossing safety, bike lane and sidewalk improvements - Minimizing driveway interruptions along street - Avoiding the use of blank walls at eye height and ensuring that buildings meet the ground in an attractive manner - Keeping sidewalks and bicycle facilities open and accessible during construction

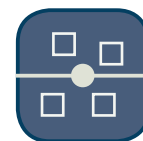


Transit Oriented Development (TOD) near Fruitvale Station in Oakland.
Image from Nelson\Nygaard

Best Practice Elements

Prior to implementation the following should be considered:

- ❖ **Developments should be located within a 10-minute walk of high quality bus, light rail, and/or commuter rail corridors** that provide fast, reliable transit service every 15 minutes throughout the day;
- ❖ **Transit adjacency is not the same as transit-orientation.** Developments in close proximity to transit are most successful in reducing vehicle trips when coupled with reduced on-site parking supply, safe and attractive urban form, a mix of land uses, and other TDM tools;
- ❖ **Developments should increase network connectivity** for pedestrians and bicyclists to, from and through the site;
- ❖ **Developments should minimize driveway interruptions** and avoid use of blank walls at eye level; and
- ❖ **Developers must be permitted to provide fewer parking spaces** in conjunction with a commitment to ongoing implementation and monitoring of TDM programs as well as penalties for failing to meet trip reduction or parking demand goals.



LAND USE DENSITY, MIX AND TRANSIT PROXIMITY



AFFORDABLE HOUSING & PARKING SUPPLY

Research has demonstrated the important effects of affordable housing and parking provisions on travel demand. Projects that incorporate affordable housing and lower supplies of parking have been found to have lower trip generation rates.

Program Description

Affordable Housing

The presence of Below Market Rate (BMR) housing as part of a residential development has demonstrated positive effects on the use of TDM strategies and lower travel demand. In particular, affordable housing that is located near transit performs particularly well in terms of transportation demand management.

Parking Supply

As outlined in the New CEQA Guidelines, the provision of more parking than what is required by the local jurisdiction undermines the potential benefits of transit proximity. Provisions of higher parking supplies than required are therefore inconsistent with TDM strategies that apply to a development.

Given the lower rates of trip and parking generation associated with affordable housing located near transit, AB 744 requires that cities do not impose a requirement of more than 0.5 spaces per unit for 100% affordable housing located within a 0.5 mile walk of a major transit stop.



Edwina Benner Plaza in Sunnyvale.
Image from David Baker Architects



Best Practice Elements

The following elements should be considered:

- ❖ **Affordable housing of all types** should be encouraged through density bonuses as well as reduced minimum parking requirements that relate to the percentage of below market rate units, proximity to transit and TDM implementation
- ❖ **Developments that feature robust TDM implementation** should have reduced parking requirements
- ❖ **Disincentives could be provided** for exceeding the City's minimum parking requirements



AFFORDABLE HOUSING & PARKING SUPPLY





BICYCLE FACILITIES

Investing in bicycle facilities at residential developments can reduce vehicular travel demand by providing amenities or tools that reduce some of the physical and cultural barriers to riding a bike.

Various types of bicycle facilities may be associated with residential developments. These are outlined below:

Program Description

Bicycle Access Improvements

Residential development should incorporate bicycle access in early stages of the site design. This includes ensuring that the site provides multiple pedestrian and bicycle entries and increases path connectivity by providing publicly accessible multi-use paths through the site. Residential developments should not favor automobile access over that of non-motorized transportation by orienting key entrances toward parking facilities rather than the street and sidewalk. As discussed previously, residential developers may also contribute to closing gaps in the wider local bicycle network through on-street bike facilities adjacent to their development, bicycle friendly intersection improvements, and in-lieu contributions to bicycle network improvements.*

Secure Bicycle Parking

Most residential development projects are required to provide motor vehicle parking on-site. Adequate bicycle parking encourages bicycle ridership by offering riders the same level of access and security as motorists. On-site bicycle parking should include bike lockers, bike cages, or indoor bicycle parking for long-term parking such as residents and on-site employees, as well as convenient short-term racks for visitors.

On-Site Bicycle Repair Facilities

On-site bicycle repair facilities range from a simple do-it-yourself bicycle stand with support tools including, tire gauges, air pumps, wrenches, and air compressors for tires, to a full service, staffed bicycle repair facility. Larger developments may include additional amenities such as bike supply vending machines, valet bike parking, and management and/or membership of an on-site bicycle fleet or bike share. Investments in bicycle repair facilities reduce barriers to owning and riding a bicycle and help keep bicycles in circulation.



Bike lockers provide secure parking for riders.
Image from Pali House, West Hollywood

* For more detail on types bicycle network improvements, please see the NACTO Urban Bikeway Design Guide.



Basic Elements

The following table summarizes types of investments that can be made by developers in bicycle facilities.



BICYCLE FACILITIES

Figure 3 Bicycle Facility Options

Program	Benefits	Cost Level	Implementing/Managing Party
Bicycle Network Improvements	Encourages use of bikes by improving perceptions of safety and reducing traffic impacts	High	Developer (initial build)
Secure Bicycle Parking	- Reduces the likelihood of theft or vandalism - Reduces barriers to owning and keeping a bike	- Low - Costs include the initial installation of secure bicycle parking facilities	Developer (initial build), property management (maintenance)
On-Site Bicycle Repair Facilities	Improves perceived obstacles to owning and maintaining a bike	- Low to high - Cost vary between a do-it-yourself station (low) or a staffed facility (high)	Developer (initial installation), property management (maintenance)
Locker Room Reciprocity for Mixed-Use Developments	Reduces barriers to relying on bicycling as a primary mode choice for commute trips by supplying showers, changing areas, and lockers.	- Low to high - Cost vary depending on the level of amenities provided on the site	Property management makes shower facilities associated with residential pool or gym available to commercial tenants who ride to the site



Bicycle share and repair facility in Chicago.
Image from Nelson\Nygaard

Best Practice Elements

Prior to implementation the following should be considered:

- ❖ **Bike parking and facilities** should be located in easily accessible, well-lit and attractive locations that are close to main entrances and experience high pedestrian traffic to promote active surveillance and safety;
- ❖ **Class II bike parking** such as inverted U racks or circular racks should be used as they provide the greatest combination of security, utility, ease-of-use and aesthetics for visitor parking; and
- ❖ **Class III long term bike parking** should be designed to be as secure as possible (e.g. bike lockers, bike cages, indoor bike parking, or locked bike stations).

Detailed guidelines on bicycle parking, both amount and configuration, can be obtained from the Association of Pedestrian and Bicycle Professionals "Bicycle Parking Guidelines" or the VTA Bicycle Technical Guidelines.



HOW TO DESIGN A TDM PROGRAM



TDM COORDINATION & COMMUNICATION



PARKING MANAGEMENT



TRANSIT PASS PROGRAMS



BIKE SHARE



CAR SHARE



TDM COORDINATION AND COMMUNICATION

Coordination and communication strategies are important in gaining support and maintaining ongoing functionality and participation in residential TDM strategies. TDM coordination and communication is particularly important within communities where there is steady turnover of residents (e.g. apartment complexes). Coordination and communication programs are supportive approaches that improve understanding and performance of other implemented trip reduction programs within a community.

Program Description

TDM coordination and communication efforts include outreach on available alternatives to driving alone, coordination of programs such as internal rideshare matching and bike share programs, and wayfinding strategies

associated with alternative transportation options. Elements of TDM coordination and communication are outlined in the following table.

Figure 4 TDM Coordination and Communication Approaches for Residential Developments

Approach	Benefit	Description
Marketing and distribution of materials for tenants	Improves attractiveness of the community for those interested in multimodal transportation choices; Educates new residents on available transportation options	- Marketing materials communicate household savings, health and environmental benefits associated with alternative transportation and car-free lifestyles - Upon move-in, residents receive a transportation package with details on nearby transit and bicycle facilities and TDM programs such as transit pass programs (see later section on this topic), walking/biking groups, and rideshare matching
Personalized commute coordinator	Provides guidance to those who need extra assistance or support	Having an on-site TDM coordinator provides an additional source of information for those who do not understand or have access to all potential alternatives
Rideshare or ride matching	Reduces single occupancy vehicle trips	- Interested residents submit travel preferences and are matched with partners who have similar schedules, origins, and destinations. - Most effective with large participation; may be a joint effort between multiple neighboring developments or programs such as 511 Rideshare.
Organized walk or bike groups	Promotes pedestrian and bicycle travel, raises an individual's comfort level with these modes of transportation, and improves the health of residents	- Those interested in biking or walking to nearby destinations can do so in a group, with an experienced group leader. - Often used for suburban bike to work journeys, school bike trains, and walking school buses
Updated transportation news and commuter alerts	Improves user experience and awareness, and reduces barriers to using alternative modes of transportation	Communicating information on transit schedules, transit and bike maps, important service changes, and real time transit arrivals are provided at key community exit points and community websites or apps
Wayfinding	Makes the surrounding area more navigable and encourages the use of alternative modes of transportation	Provide signage for clear directions and walk/bike time to key destinations such as major transit stops, downtown, shops, and major employers.



Best Practice Elements

To effectively communicate and promote TDM programs in residential developments, the property manager (or homeowners association) should designate a TDM Coordinator. Having a knowledgeable on-site coordinator greatly improves the effectiveness of getting travelers to use alternative modes of transportation. This person should have authority to implement TDM strategies and oversee the management and marketing of TDM programs. Responsibilities of this position should include, but are not limited to the following:

- ❖ **Developing and distributing information materials**, including websites or apps, and printed material
- ❖ **Managing transportation services offered as part of the TDM program**, including the distribution of transit passes, coordination of in-house rideshare matching, coordination of walking school buses and bike trains, and responding to resident/employee questions
- ❖ **Overseeing upkeep or transportation assets** such as secure bike parking, wayfinding signs, and notices
- ❖ **Monitoring TDM programs** and their impacts
- ❖ **Coordinating** with City staff and neighboring communities

The GreenTRIP program certifies residential projects that apply strategies to reduce vehicle trips, excessive parking and greenhouse gases, while making transportation more affordable. Best practice strategies that are outlined under the GreenTRIP program include the following efforts.*

- ❖ **Marketing** geared towards residents looking for car free living
- ❖ **Inclusion of information on household savings** from reduced parking and transit amenities
- ❖ **Annual transportation fairs** or local travel choice tours
- ❖ **Facilitated conversations with service providers** for residents to learn more about available trip reduction techniques

* Green Trip Certification Guide, 2015.



Los Angeles' Walk to School Day encourages students to walk and bike to school.

Image from LADOT



PARKING MANAGEMENT

Parking management strategies have been shown to be one of the most effective ways of encouraging households to own fewer cars and rely more on transit, walking and bicycling. Parking management strategies provide adequate parking without providing an oversupply, encourage more efficient use of the available parking, and require residents to weigh the costs and benefits of parking. Parking management strategies may include unbundled parking costs, shared parking allocations, and flexible parking provision strategies and technologies.

Program Description

Unbundled Parking

Providing parking free of charge or at highly subsidized rates encourages higher rates of car ownership and use, which undermines TDM efforts and results in more parking spaces to achieve the same rate of availability. The practice of automatically assigning a certain number of parking spaces to individual units, and including the cost of these spaces in the rental or purchase price, also reduces the feasibility of development and makes housing less affordable for those who prefer not, or cannot afford, to own a vehicle. Unbundled parking separates the cost of a parking space from the sale, lease or rental price of housing. When consumers receive the correct price signal for parking, they are more likely to consider living without a car or a second car. Property managers may also apply revenue from unbundled parking to other TDM strategies such as transit passes, car share and bike share membership.

Shared Parking

Mixed-use developments and mixed-use areas offer the opportunity to share parking spaces between multiple uses, thereby reducing the total number of spaces required compared to parking allocated to individual uses in stand-alone developments. Throughout the day and across the week, different uses have different peak demands. In Silicon Valley, there are many examples of residential developments and event venues that experience what is perceived as a shortage of resident or visitor parking on weekends, and yet they are surrounded by vast amounts of unused parking on neighboring commercial properties.



Shared parking agreements benefit the entire community by using the available parking supply efficiently to encourage more walkable places. This has the potential to make housing more affordable, improve traffic flow due to fewer driveways, reduce collisions, and reduce emissions from idling vehicles. Shared parking in medium-to-high density developments also reduces the need for vehicle trips by creating a park-once environment that allows people to “park once” and experience a pleasant walking experience as they go to various destinations such as restaurants and shopping.

Benefits

The benefits associated with each parking management program are shown in the following table:

Figure 5 Parking Management Programs

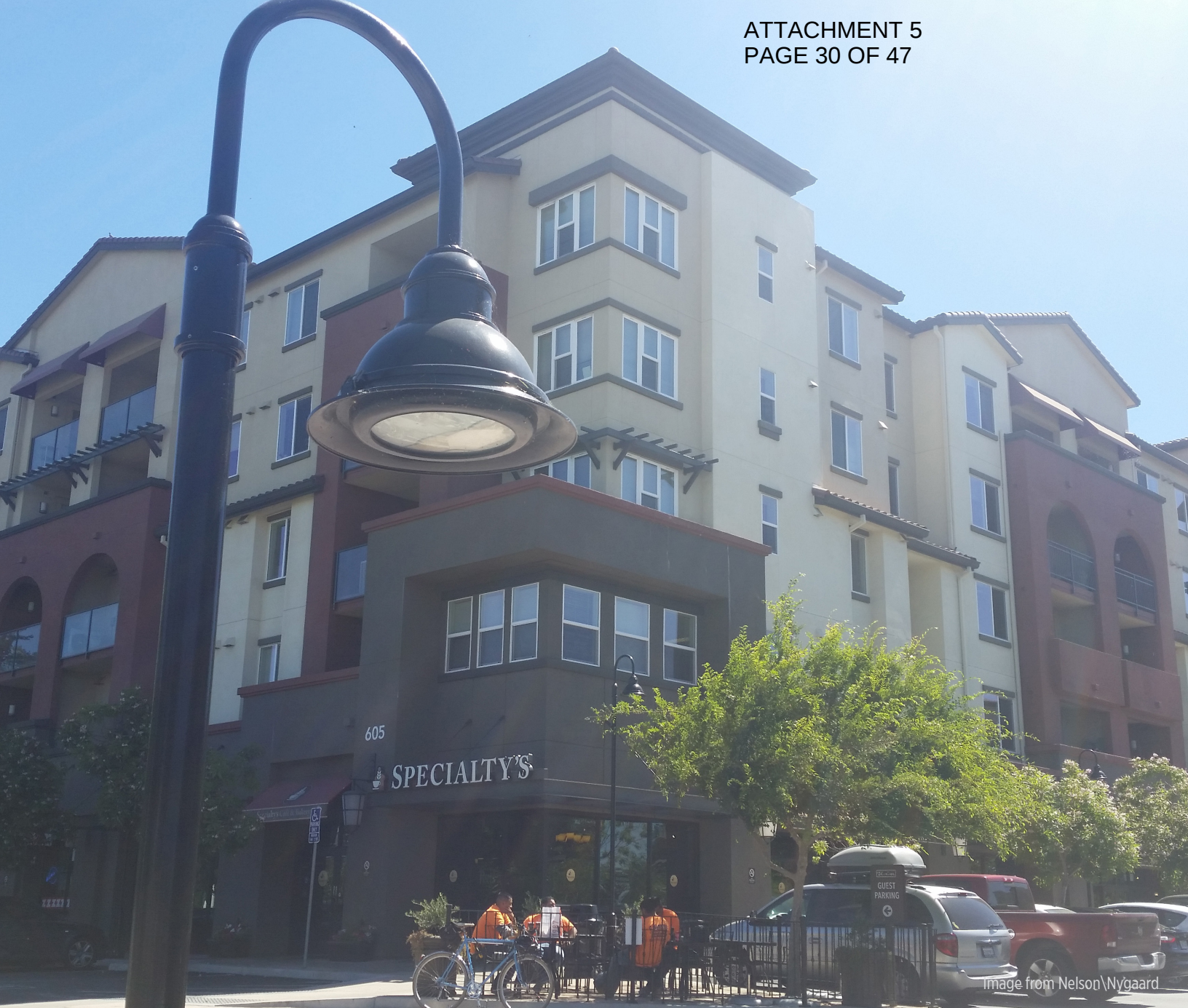
Program	Description	Benefits
Unbundled parking costs	- Property manager separates the cost of housing from the cost of parking so parking changes from a required purchase to an optional amenity - Partial implementation could unbundle only the second space	- Reveals true cost of parking to residents and reduces overconsumption of parking. - Reduces development costs if developers are permitted to reduce the supply of parking. - May improve housing affordability and housing choice if undertaken in a revenue neutral manner
Shared parking	Property manager reaches agreement to share parking resources with neighboring uses that experience peak demand at a different time	- Reduces total parking supply required - Improves walkability



Best Practice Elements

Prior to implementation, the following should be considered

- ❖ **Parking management strategies and programs** are most successful when coupled with other TDM measures—particularly those that facilitate other modes of transportation—in environments where transit, walking and bicycling facilities are present. This may be facilitated by applying unbundled parking revenues to other TDM related strategies.
- ❖ **Unbundled parking** is most effective when it applies to all parking spaces within the development and not just the second space.
- ❖ **Shared parking** arrangements should be continuously monitored to ensure that parking demand does not exceed the available shared parking supply.



Case Study

Via Development at Fair Oaks Station, Sunnyvale

The Via mixed-use development is located near Fair Oaks Station at Tasman Drive and N Fair Oaks Avenue. The development includes 284 units (400 bedrooms), with 15% affordable housing. As a mixed-use development built in 2011, several retail land uses are available on the ground floor including cafes and a neighborhood market. The mixed-use nature of the development means that residents are able to run errands and meet some of their daily needs without the use of a car.

The complex is also located adjacent to Fair Oaks station, which is served by VTA light rail and two VTA bus routes. Transit route information and schedules are provided on-site, as well as bike parking. The development includes 457 parking spaces at a rate of 1.61 parking spaces per unit, with 100% of parking “unbundled” from the cost of housing and offered for an additional \$300 per year. A recent study of peak parking demand found that 24% of spaces are unused during peak times, which represents a cost of \$8,610,200 for unused parking spaces over the life of the project.

* GreenTrip Parking Database Building Report: Via, Sunnyvale



TRANSIT PASS PROGRAMS

Transit pass programs offer discounted transit passes or prepaid unlimited transit passes for use by residents.

Implementing an effective transit pass program will have the following benefits:

- ❖ **Encouraging the use of public transportation** by reducing financial barriers to using transit or providing closer parity between the cost of public transit and the cost of parking
- ❖ **Improving transportation access, equity, and mobility options** for residents and employees who earn less than the median income by making transit more affordable
- ❖ **Reducing rates of vehicle ownership and demand for parking spaces** by making it easier for households to be car free or decreasing their need to buy a second or third car
- ❖ **Reducing the carbon footprint** of multi-family residential uses

There are two basic types of transit pass programs; both are described below.

Program Description

Universal Transit Pass Programs

Universal transit pass programs are established by local transit agencies, which allow multifamily residential communities to participate. These programs typically offer residents unlimited use of all regular services within the respective system. The transit agency may offer a significant discount on the cost of the annual pass, and in return the community must enroll and purchase passes for *all* residents. The property manager or Home Owners Association (HOA) would then distribute the transit passes to residents at or below the purchasing cost from the transit agency. Costs may then be recouped from rent, HOA dues, or other mechanisms such as unbundled parking fees. There are two universal transit pass programs currently available, the VTA EcoPass and Caltrain GoPass. These programs are subject to change by the transit agency.



Discount Transit Pass Programs

Discount transit pass programs require the property manager to provide residents a subsidy on the purchase of monthly passes that are offered by the transit agency. The program may also provide equivalent discounts on monthly express passes and on-demand public transit services. HOA fees or rental revenue may be used to cover the cost. As an in-house program, the community does not get the same level of discount but does not have to enroll every resident.

Residential Guaranteed Ride Home

A number of residential developments have offered guaranteed ride home programs similar to that offered by employers. Under this program, those who opt not to own and park a car are eligible for up to \$600 or 6 trips per year to get home in qualified emergencies. The subsidy may be used for rides on transit, on-demand transit, taxi, and/or transportation network company (TNC) services such as Lyft and Uber.



Available Options

For multi-family residential developments in Sunnyvale, available transit pass program options include those listed below.

Figure 6 Currently Available Transit Pass Options

Program	Qualified Participants	Distribution
VTA EcoPass^{1,2}	Communities of 25 or more dwelling units within a certain boundary are permitted to participate; residential programs require enrollment of all residents	Community management engages in a contract with VTA and distributes passes to participants at or below the purchase cost
Caltrain GoPass³	Any housing community or development is permitted to participate; residential programs require enrollment of all residents over 5 years of age	Community management purchases and distributes passes to all residents
In-house discount transit pass program⁴	Any resident in a residential community who does not opt out of the discount transit pass program	Community managers provide a subsidy for purchase of transit passes by participants; the discounted amount that residents contribute to the transit pass can be added to rent or HOA payment
Residential guaranteed ride home	Any resident in a residential community who opts not to rent a parking space	Community managers may provide a transit, taxi or TNC subsidy to those who do not rent a parking space and need to get home in a qualified emergency (cap at \$600 per year or 6 trips)

1 Valley Transportation Authority, <http://www.vta.org/getting-around/Fares/Eco-Pass-Residential-FAQ>.

2 Valley Transportation Authority, <http://www.vta.org/getting-around/Fares/Eco-Pass-Pricing>.

3 Caltrain, http://www.caltrain.com/Fares/tickettypes/GO_Pass.html.

4 Valley Transportation Authority, <http://www.vta.org/getting-around/fares>.

Best Practice Elements

Prior to implementation the following considerations should be considered.

- ❖ **Transit pass programs** work in many settings but are most effective in reducing travel demand in areas with fast, frequent, reliable, and high-capacity transit service.
- ❖ **Universal transit pass programs** are likely to be most attractive to residents located within close proximity of high quality transit hubs (1 mile of rail stations), but can also generate transit ridership in areas where there is significant unused capacity. Differences in utility are reflected to some degree in the pricing structure of the VTA Eco Pass program.
- ❖ **In less transit-oriented areas**, property managers may find discount transit pass programs to be more cost effective.
- ❖ **Where transit services are operating at or near capacity** (i.e. Caltrain), the transit agency could choose not to enroll further participants into universal transit pass programs. For this reason, a TDM point system rather than fixed requirements is recommended.

The GreenTRIP certification program has set the following standards for transit pass programs:

- ❖ **Providing at least a 50 percent discount** of the retail price of a monthly pass
- ❖ **Offering at least one pass per unit**, or two passes per unit for projects served by VTA
- ❖ **Structuring resident participation** on an “opt-out” basis



Photo source: Ria Hutabarat Lo

Case Study

Vendome Place Apartments, San Jose

Vendome Place Apartments is a residential transit-oriented development with 74 units (123 bedrooms) that was built in 2006. The development is located in the Japantown neighborhood of San Jose, within walking distance from bus and light rail stops and the downtown area. The local area context is highly walkable, with a mix of housing, retail, and commercial land uses. Bay Area Bike Share is also present in this neighborhood. In addition to its proximity to high quality transit and a walkable downtown, Vendome Apartments provides a range of transportation benefits to residents and has good bike and transit access.

Key features include:

- ❖ VTA EcoPass program with discounted passes provided to residents for a \$50 discount; and
- ❖ Bike parking for residents.

The development includes 109 parking spaces, none of which are unbundled. A 2014 survey revealed that during peak parking periods, 21% of parking spaces remained unoccupied.



BIKE SHARE

Bike share at residential and mixed-use developments can be an attractive building amenity for prospective residents and commercial tenants. A bike share program encourages the use of bicycles for short trips and reduces the dependency on vehicle travel.

Within Sunnyvale, many destinations are accessible within a reasonable biking distance of 2 to 3 miles, however, bicycle infrastructure such as bike parking and bike share options are still underdeveloped. Bike share programs help to reduce barriers to biking by offering the speed and convenience of biking without the need to own, maintain and locate parking for a personal bicycle. They also provide health benefits associated with physical activity, as well as reductions in traffic congestion and air pollution as a result of reduced car use.

Bike share programs operate in the following ways.

Program Description

Private Bike Share

Private municipal bike share programs operate in a similar manner to public bike share, but are provided by a private entity. Developers may also have the ability to sponsor an existing bike share program in exchange for bikes to be located outside their development. These programs could then be linked to nearby systems such as that operating at Santa Clara University.

Private Individual Bike Share

Individual private bike share programs may provide access to shared bikes for round trips or between a network of bike share pods that are only available to residents or employees affiliated with a particular developer or company, which may or may not have multiple holdings.

Loaner Bikes

A loaner bike program makes bicycle available for residents to rent or borrow for a certain period of time. These bicycles will generally come with a helmet and lock and require residents to return the bicycle within a designated time period.

Flexible Bike Share

Finally, flexible bike share integrate the technology from bike hubs (for payment, location, and locking) into “smart locks” within the bikes themselves. This allows users to drop up and pick up bikes from either designated bike share hubs or publicly accessible bike racks or poles anywhere in the city. To improve reliability, availability and rebalancing, a limited number of fixed hubs may be provided at strategic locations or bike corrals may be branded and geofenced as hubs. In contrast to fixed hubs, which require installation of a physical bike station, geofencing defines a space as a virtual bike share hub through global positioning systems (GPS) or radio frequency identification (RFID). This program could be linked to nearby systems planned in the area.



Available Options

The following table summarizes bike share options for development in the City of Sunnyvale.



Figure 7 Bike Share Options

System	System Provider	Benefits	Constraints	Costs to Residents and Employees
Private Municipal Bike Share	Developer or property manager outsources to third party (e.g., Zagster)	With each development, the network of available bikes and hubs expands	Most costs are associated with maintenance and operations such as system rebalancing	Costs vary depending on system characteristics
Flexible Bike Share	City acquires system via third party e.g. SoBi and sells sponsorships to developers	- Easily expanded as demand increases - Flexibility of parking location and access - Reduced visual clutter of bike hubs - More suitable for low density settings	Without any hubs, bikes may disperse, reducing reliability and availability	Costs depend upon system characteristics
Individual private bike share or loaner bikes	Property manager or third party (e.g., Apple and Google bikes)	Simple operations for smaller developments	- Loaner bikes are limited to round trip journeys - Programs are not open to other members of the community	

BIKE SHARE



A rider enjoys a protected bike lane in Salt Lake City, Utah. One of Salt Lake City's bike share stations is in the foreground. Image from Dave Iltis

Best Practice Elements

Prior to implementation the following should be considered.

- ❖ **Initial costs** may be needed to operate and maintain the program until it becomes financially sustainable and profitable.
- ❖ **Programs implemented in conjunction with developments** should include promotional assistance to residents, subsidized memberships for residents, and possibly sponsorship of an individual hub or group of bikes.
- ❖ **Bike share programs** have been found to be most successful in areas that have a mix of land uses, higher density, walkable urban form, low vehicle ownership rates, access to basic services and transit, and an on-site parking ratio of less than one space per unit.
- ❖ **In a lower density setting**, a flexible bike share model may be more suitable due the inability to provide a sufficiently dense network of hubs. Like regular bike share programs, system rebalancing is needed to ensure that bikes are always available at key hub locations such as transit stations and active commercial areas.



CAR SHARE

Car share facilities at residential and mixed-use developments act as both a transportation solution and an attractive building amenity for prospective residents and commercial tenants. Car share programs allow residents and employees to forgo the purchase of a personal vehicle by providing access to a reliable vehicle when needed.

Car sharing is viewed as a crucial component in a package of alternatives to the private automobile. Car sharing programs allow for 24/7, on-demand access to a shared fleet of vehicles on an as-needed basis. Car share programs function in the following way:

- ❖ System users must be members of a car-sharing organization, which may have application fees, refundable deposits or annual memberships fees; and
- ❖ The car-sharing organization sets usage fees at an hourly and/or mileage rate to emphasize short-term rentals rather than daily or weekly rentals.

At residential or mixed-use developments, car share may allow households to forego ownership of one or more cars by making vehicles accessible for occasional trips.

Arrangements typically involve the following:

- ❖ Developers provide designated, on-site parking spaces for car share vehicles in a location that is highly visible and publicly accessible;
- ❖ Property managers may subsidize application and annual membership fees for all eligible residents using revenue from unbundled parking fees;
- ❖ Reservations and access to vehicles are made by users on a self-service manner; and
- ❖ Users pay fees associated with their individual use of vehicles (such as mileage rates, tolls, late return fees, damage fees, or cancellation fees).

Program Description

Fleet-Based Car Share

Car share companies operate on either a peer-to-peer or fleet-based model. Fleet-based operators purchase, place and maintain a fleet of cars and may require a subsidy for operational costs from developers, property managers or municipalities.

Peer-to-Peer Car Share

Peer to peer operators rely on the cars of members for a fleet of available cars. The availability of a particular type of vehicle is dependent upon those who provide cars for the program.

One-Way Car Share

A third type of fleet based car share program is one-way car share, where a vehicle may be picked up in one location and dropped off at a different pod near the users destination.

In the Bay Area, car share programs have generated significant benefits to vehicle ownership and trips, including:

- ❖ City CarShare members have a ratio of 36 members per car;
- ❖ Bay Area roads have an estimated 600 to 2,800 fewer vehicles at any given time;
- ❖ Zipcar members drive 50% fewer vehicle miles than when they had a private vehicle; and
- ❖ After joining car share programs vehicles per household reduced on average from .47 to .24



CAR SHARE

Image from Nelson\Nygaard

Best Practice Elements

Prior to implementation the following should be considered.

- ❖ Fleet based programs may require initial or permanent subsidy for program operations until the program becomes financially sustainable and profitable.
- ❖ On-site spaces should be designated for car share program vehicles.
- ❖ In-kind services such as subsidized memberships for residents (and employees), dedicated advertising space or promotional assistance should be considered.
- ❖ People are willing to walk up to $\frac{1}{4}$ mile to access a car and therefore, car share locations can be off-site and still be effective in encouraging mode shifts, similarly on site car share vehicle should be made available to other car share members.
- ❖ Car share programs are most successful in areas that have a mix of land uses, higher density, walkable urban form, low vehicle ownership rates, access to basic services and transit, and an on-site parking ratio under 1:1.
- ❖ At least two spaces should be reserved for either fleet- based or peer-to-peer vehicles; small developments should be able to swap out at least one required space for a shared vehicle.

The requirements for GreenTrip certification for car share are:

- ❖ Provide 2 free car share memberships per unit for 40 years, eliminating the cost barrier to participation (residents must meet eligibility requirements of the car share provider); and
- ❖ Identify an existing car share pod within $\frac{1}{4}$ mile of the project or provide one on-site.



Photo source: Ria Lo Hutabaret

Case Study *Madera Apartments, Mountain View*

Madera Apartments is a residential transit-oriented development with 203 units (290 bedrooms) that was built in 2013. The development is located across the street from the Mountain View Transit Center which includes Caltrain Baby Bullet service to San Francisco and San Jose, as well as multiple bus lines, VTA light rail service, publicly accessible shuttles (Mountain View Community Shuttle and MVgo), and numerous private employer shuttles. The local area context is highly walkable, with a mix of housing, retail, and commercial land uses, and attractive urban design in historic Downtown Mountain View. Bay Area Bike Share also has a bike share pod across the street from the development and a farmers market operates within the Caltrain parking lot on Sundays.

In addition to its proximity to high quality transit and a walkable downtown, Madera Apartments provides a range of transportation benefits to residents and is marketed as eco-friendly living with good bike and transit access. Key features include:

- ❖ Two car share vehicles on-site that are available to residents who sign up for an unsubsidized membership.
- ❖ Transit Screen which provides a real-time feed of transportation arrivals and departures; and VTA EcoPass program with passes provided to residents for free.
- ❖ The development includes 279 parking spaces including one space per apartment, 48 unbundled second spaces at a rate of \$100 per month, and 30 commercial spaces. A 2014 survey revealed that during peak parking periods, 36% of parking spaces remained unoccupied.

APPENDIX A: RELEVANT LEGISLATION

The following legislation relates to transportation demand management:

California Global Warming Solutions Act of 2006 (AB 32)

The California Global Warming Solutions Act sets statewide targets to reduce greenhouse gas (GHG) emissions to 1990 levels by 2020, with ongoing reductions beyond 2020. The law also requires the monitoring and annual reporting of statewide greenhouse gas (GHG) emissions as well as the preparation of a Climate Change Scoping Plan.

Under the resulting Climate Change Scoping Plan, Sustainable Communities Strategies (SCSs) were designated as critical policy mechanisms for reducing GHG emissions in the transportation sector. Plan Bay Area is the Bay Area's SCS as required under both AB 32 and SB 375.

Sustainable Communities Act of 2008 (SB 375)

The Sustainable Communities and Climate Protection Act acknowledges that California will not be able to achieve the goals of AB 32 without integrated approaches to transportation, land use and housing. It therefore charged the California Air Resources Board (ARB) with establishing regional reduction targets for GHG emissions associated with passenger vehicle use, and required the California Transportation Commission (CTC) to develop guidelines for modeling regional travel demand and mode split, accounting for the relationship between land use density, household vehicle ownership and vehicle miles traveled (VMT).

The Sustainable Communities Act requires regional and local planning agencies to develop Sustainable Communities Strategies (SCSs) to meet GHG reduction targets as an integral part of federally-mandated Regional Transportation Plans (RTPs). The law also provides incentives for transit-oriented developments by exempting projects from full or partial CEQA review if they have the following characteristics:

- ❖ at least 50% residential uses (by total square footage);
- ❖ net density of at least 20 dwelling units per acre;
- ❖ FAR of at least 0.75 if the project contains non-residential uses;

- ❖ located within half a mile of a high quality transit corridor or major transit stop, which is defined as a rail transit station, or an intersection of two or more major bus routes with service headways of 15 minutes or less during the morning and afternoon peak periods;
- ❖ no net loss of affordable housing units and potential inclusion of 20% moderate income, 10% low income, or 5% very low income within the development; and
- ❖ other criteria related development size (less than 8 acres or 200 units), adequacy of utilities, habitat loss, absence of safety hazards, and energy efficiency.

As mandated by SB 375, the California Air Resources Board established GHG reduction targets for all regions within the state in 2010. The applicable targets for the Bay Area are a 7% reduction in GHG emission by 2020 and a 15% reduction by 2035.

Plan Bay Area, 2013

In response to these required targets, the Metropolitan Transportation Commission (MTC) and Association of Bay Area Governments (ABAG) adopted Plan Bay Area as the regional sustainable communities strategy. Plan Bay Area was estimated to achieve a 10% reduction in GHG emissions by 2020 and 16% reduction by 2035, and was accepted by the state as meeting GHG emission reduction targets.¹ These reductions are expected to result from meeting much of the Bay Area's housing needs within priority development areas (PDAs) with a mix of uses located within walking distance of frequent transit service. In Sunnyvale, PDAs areas include the El Camino Real corridor, Downtown/Caltrain station area, Lawrence station area, and Tasman/Fair Oaks area. While local governments are not required to comply with Plan Bay Area, there are incentives for doing so and for encouraging developments that reduce the demand for travel and capitalize on existing transit networks.

SB 743 Changes to Environmental Review

In September 2013, Governor Jerry Brown signed Senate Bill No. 743, which transforms the way that development-related transportation impacts

¹ Executive Order G-14-028 ABAG and MTC's Sustainable Communities Strategy: ARB Acceptance of GHG Quantification Determination

are analyzed and mitigated under the California Environmental Quality Act (CEQA). The law makes it no longer acceptable to use automobile level of service (LOS) as a measure of the transportation-related environmental impact of proposed projects. Instead, the environmental performance of projects will need to be assessed in relation to other criteria such as vehicle miles traveled (VMT) including induced travel demand effects.² These new metrics better reflect the State's goals of reducing greenhouse gas emissions, and more appropriately balancing congestion management with statewide goals related to promote infill development, public health, and sustainability. They will mean that past mitigation measures, such as roadway widening, intersection expansions, and locating projects in greenfield sites, will no longer be encouraged as a means of improving environmental quality.

CEQA Guidelines

Based on SB 743, the Governor's Office of Planning and Research (OPR) released Revised Proposal on Updates to the CEQA Guidelines was released in January 2016. These Guidelines indicate that the most appropriate measures of a project's transportation impacts are vehicle miles traveled (VMT), effects on transit and non-motorized travel, and safety of all travelers.

² SB 743, Chapter 386. 2013.

For residential developments tour-based VMT is most relevant and for retail projects total VMT is most relevant. The Guidelines also recognize that various project and program attributes affect travel demand as outlined in the following table:³

AB 744 Planning and Zoning: Density Bonuses, 2015

As noted above, excessive parking supplies negate the TDM benefits of transit-oriented development. AB 744 acknowledges the high cost of parking and the fact that affordable housing projects located near transit have lower than average travel and parking demand. The law states that cities cannot require developers to provide more than 0.5 per unit (inclusive of handicapped and guest parking) for 100% affordable housing developments located within an unobstructed 0.5 mile walk of a major transit stop. Major transit stops include rail station or the intersection of two bus routes with headways of 15-minute or better during the AM and PM peak commute periods.

³ Office of Planning and Research (OPR), "Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA: Implementing Senate Bill 743 (Steinberg, 2013)." 2016. https://www.opr.ca.gov/docs/Revised_VMT_CEQA_Guidelines_Proposal_January_20_2016.pdf

Figure A-1 Attributes Affecting Trip Generation as Outlined in the Proposed CEQA Guidelines (2016)

Project Alternatives that Reduce VMT	Project Attributes that Reduce VMT	TDM Measures that Reduce VMT	Project Attributes that Increase VMT
- Locating project in an area of the region that already exhibits low VMT - Locating project near transit (within 1-mile of a major transit stop or high quality transit presume no significant impact unless counteracted by excessive parking etc.) - Increasing project density - Increasing the mix of uses within the project or surrounding area e.g. locating project near employment and services - Increasing connectivity and/or intersection density on the project site - Deploying road or lane management e.g. pricing, HOV requirements	- Improving or increasing access to transit - Increasing access to common goods and services e.g. groceries, schools, and daycare - Incorporating affordable housing into the project - Orienting project toward transit, bike and pedestrian facilities, not parking supply - Improving pedestrian or bicycle networks, or transit service - Providing traffic calming	- Incorporating neighborhood electric vehicle network - Providing bicycle parking - Limiting or eliminating parking supply - Unbundling parking costs - Pricing parking or roadways or providing parking cash-out program - Implementing or providing access to a commute reduction program - Providing car-sharing, bike sharing, and ride-sharing programs - Providing transit passes	- Excessive parking (higher than City's minimum requirement disqualifies transit-proximate developments from presumption of insignificant impacts) - New roadway capacity (new lane miles increases VMT through induced travel demand)

APPENDIX B: CURRENT LOCAL REQUIREMENTS

In Sunnyvale, a number of policies currently relate to transportation demand management.

Municipal Zoning Code

Various provisions from the City's existing zoning code affect travel demand associated with residential development in a positive and negative way.

Land Use Zoning

One of the most important drivers of travel demand is land use density. The city's zoning ordinance outlines permitted land uses in all areas of the city. For each land use type, the zoning code specifies permitted land use intensities. In Sunnyvale, these intensities are presented in terms of maximum number of dwelling units (du) per acre, building height, lot coverage, and floor area ratio (FAR).

Densities may be marginally increased through the development of up to one accessory living unit per lot. Accessory living units must be accompanied by an additional on-site parking space that is not in tandem with parking for the primary dwelling unit (\$19.68.040). In addition,

medium and high density housing may be combined with Mixed-Use development, which is accompanied by an increased height limit of 1 story or 10 feet. Also, higher limits apply to the Downtown Specific Plan district and other specific plan areas. Downtown limits are provided on a block by block basis.

Minimum Parking Requirements

Sunnyvale has minimum parking requirements that are typical for Silicon Valley. The city's minimum parking requirements for multifamily residential developments are based on the type of parking that is provided and the land use. As seen in the following table, minimum parking requirements range from around 0.5 spaces per bedroom for a 4-bedroom apartment with carports or structured garages to 2.25 spaces per bedroom for a 1-bedroom unit with 2 assigned covered spaces. Different parking requirements apply to senior housing, affordable housing, single room occupancy accommodation and mobile homes. Please note, that 100% affordable housing developments are also subject to state law including AB 744 described previously.

Figure B-1 Density Limits for Residential Development in Sunnyvale

Zone	Description	Maximum Density	Maximum Height	Maximum Lot Coverage and FAR
R0 / R1	Low density residential	7 du / acre	2 stories or 30 ft	45%
R1.5	Low medium density residential	10 du / acre	2 stories or 30 ft	40% LC, 50% FAR
R1.7	Low medium density residential (PD)	14 du / acre	2 stories or 30 ft	40% LC, 50% FAR
R2	Low medium density residential	12 du / acre	2 stories or 30 ft	45% LC, 55% FAR
R3	Medium density residential*	24 du / acre	3 stories or 35 ft	40% LC
R4	High density residential*	36 du / acre	4 stories or 55 ft	40% LC
R5	High density residential and office (hotel)*	45 du / acre	4 stories or 55 ft	40% LC
R-MH	Residential mobile home	12 du / acre	2 stories or 30 ft	By block
	Downtown Specific Plan District		2-6 stories or 30-100 ft	

* May be combined with Mixed-Use (MU) if within 0.5 miles of expressway or major public transit stop

Source: Sunnyvale Municipal Code Section 19.18.020 (Residential), 19.18.220 (Mixed-Use), 19.32.020 (Building height, lot coverage and FAR)

Figure B-2 Multifamily Residential Parking Requirements in Sunnyvale

Bedrooms	Required as- signed spaces	Type of assigned spaces	Required unassigned spaces	Total per unit	Total per bedroom
1	1	carport, structured garage or downtown	0.5	1.5	1.50
	1	fully enclosed garage	0.8	1.8	1.80
	2	Covered	0.25	2.25	2.25
2	1	carport, structured garage or downtown	1	2	1.00
	1	fully enclosed garage	1.33	2.33	1.17
	2	Covered	0.4	2.4	1.20
3	1	carport, structured garage or downtown	1	2	0.67
	1	fully enclosed garage	1.4	2.4	0.80
	2	Covered	0.5	2.5	0.83
4	1	carport or structured	1.15	2.15	0.54
	1	fully enclosed garage	1.55	2.55	0.64
	2	Covered	0.65	2.65	0.66
5	1	carport or structured	1.3	2.3	0.46
	1	fully enclosed garage	1.7	2.7	0.54
	2	covered	0.8	2.8	0.56
6	1	carport or structured	1.45	2.45	0.41
	1	fully enclosed garage	1.85	2.85	0.48
	2	covered	0.95	2.95	0.49

Source: Sunnyvale Municipal Code Section 19.46.060 (parking requirements), 19.28.140 (downtown parking requirements)

**Figure B-3 Senior Housing, Affordable Housing, and Single Room Occupancy (SRO)
Parking Requirements in Sunnyvale**

Housing Type	Bedrooms	Room Size	Required spaces per unit	Total per bedroom
SRO	1	< 200 sf	0.25	0.25
	1	200-250 sf	0.5	0.5
	1	> 250 sf	1	1.0
Affordable to lower income households	1		1	1.0
	2		2	1.0
	3		2	0.67
	4		2.15	0.54
	5		2.15	0.43
	6		2.15	0.36
Standard housing with unit for senior citizens or persons with disabilities	Any size		0.6	0.6 or less
Assisted living	Any size		-	0.25 per resident
Mobile homes			2 spaces per unit plus 1 space per employee living off-site plus 1 space per special purpose vehicle	

Source: Sunnyvale Municipal Code Section 19.46.070, 19.46.080, 19.46.090

While high rates of required parking may lead to higher rates of travel demand,¹ there are number of provisions within the Sunnyvale parking code that allow for features that are consistent with transportation demand management:

- ❖ Required bicycle parking for multifamily uses with five or more units, at a rate of 1 space for every 4 units;
- ❖ Use of mechanical lift parking that varies from that of standard and compact spaces;
- ❖ Parking adjustment based on transit proximity, mixed uses with complementary peak hours, or parking management plan that includes valet parking, off-site employee parking, parking agreements, or other demand management tools;² and
- ❖ Provision for shared parking in non-residential uses.

It should be noted that parking adjustments and shared parking are not permitted by right, but require developers to go through the discretionary permit review process. In general, the Municipal Code specifies minimum dimensions for both the parking spaces as well as aisles, driveways and maneuvering area for facilities with more than fifteen (15) parking spaces. It also specifies landscaping and shading requirements for parking lots.

Design Guidelines from Sunnyvale Citywide Design Guidelines Document on Tandem Parking

The City of Sunnyvale allows for tandem parking, in accordance with Title 19 of the Municipal Code, when the development is located within half a mile of a major transit station, such as Caltrain or VTA Light Rail, or involves one or more of the following features:

- ❖ Increased on-site open space (or amenities) commensurate with the square foot reduction in the size of the parking area;
- ❖ Increased setbacks commensurate with the square foot reduction in the size of the parking area;
- ❖ Increased green point rating of at least 5% (above what would typically be required) with inclusion of other sustainable features, such as a green roof or photovoltaic system; or
- ❖ Inclusion of additional alternative transportation amenities, such as bikeshare, carshare, bike lockers or a residential TDM program that exceeds City requirements.

Council Policy 1.1.15 Residential Transportation Demand Management

City Council enacted a legislative policy that requires that practicable TDM techniques be incorporated in all high and very high density residential development throughout the city, and that TDM design techniques be implemented in all attached housing development within a 1/3 of a mile of a major transit stop.³ The policy identifies key transit-oriented development locations including the Caltrain station area (1/3-mile radius); the Downtown Specific Plan area; El Camino Real corridor (1/3-mile locus); Tasman / Fair Oaks Light Rail Corridor and Industrial to Residential (ITR) areas 7 and 8; and transit nodes including stations or high activity commute bus stops (1/3-mile radius).

Under this policy, required site development features may include:

- ❖ information kiosks on site or an adjacent right-of-way;
- ❖ on-site rideshare and carpool contact information;
- ❖ secured and guest bicycle parking as described in the VTA Bicycle Technical Guidelines; and
- ❖ designated exclusive pathway connections to sidewalks.

Optional site development features include:

- ❖ designated carpool loading area; and
- ❖ bus shelter improvements on adjoining streets.

TDM Requirements for Commercial and Industrial Uses

The City of Sunnyvale imposes TDM requirements as a condition of approval (COA) for new commercial development in the city. The Commercial TDM Ordinance applies to developments where a TDM Plan is identified as a mitigation measure. There are several steps required under the TDM Ordinance:

- ❖ Establish TDM trip reduction goals;
- ❖ Develop a draft and final TDM Plan;
 - Designate a TDM coordinator responsible for implementing the TDM Plan; and
 - Undertake post-occupancy monitoring based on AM and PM peak hour driveway counts.

¹ McCahill, Chris, Norman Garrick, Carol Atkinson-Palombo, and Adam Polinski. "Effects of Parking Provision on Automobile Use in Cities: Inferring Causality." *Transportation Research Board*, Washington, D.C., 2016.

² Sunnyvale Municipal Code §19.46.130(c)

³ Sunnyvale Council Policy 1.1.15 Residential Transportation Demand Management <http://sunnyvale.ca.gov/Portals/0/Sunnyvale/CodesAndPolicies/1.01.15.pdf>

In order to assist in development of TDM Plans, the city has provided a TDM Toolkit for Commercial Development. Key strategies outlined in the toolkit are summarized in the table below.

Figure B-4 Commercial TDM Toolkit Options

Planning / Design Measures	Programs / Service Measures
Building design and layout • Orient building entries toward plazas, parks, pedestrian oriented streets, and transit stops, not parking lots • Reduce building setbacks • Place passenger loading zones near entrances • Wire buildings with fiber optics to facilitate teleworking	Employment conditions • Develop a telecommute program for suitable employees • Develop an alternative work schedule program such as flextime, staggered work hours, and compressed work week
On site amenities and information • Provide on-site services that would otherwise require a separate trip e.g. cafeteria, ATM, gym, convenience retail, childcare, valet, post office, on-site transit pass sales • Locate and maintain permanent boards for TDM information	Transportation Coordinator • Designate an on-site Transportation Coordinator to actively promote TDM measures • Develop and implement promotional programs such as new employee orientations, flyers, posters, emails, newsletter articles, commuter information center, transit field trip, free trial rides, bike/transit riders guides, transportation fairs and bike to work day • Distribute information (bike maps, transit info, rideshare matching applications) to all new and existing tenants / employees annually • Maintain TDM information boards and kiosks • Implement a guaranteed ride home program • Liaise with transit agencies and transportation agencies • Spot check, monitor and evaluate all TDM programs
Parking design • Locate off street parking at the side or rear of building • Configure parking so it does not interrupt pedestrian routes or dominate pedestrian oriented streets • Designate 10% preferential spaces for carpools, vanpools, alternative fuel vehicles • Reduce parking spaces required with strong TDM • Reduce parking fees for preferential parking spaces	Parking programs • Reduced carpool/vanpool parking cost • Offer employees who forego parking to cash out the value of employer provided parking
	Carpool / Vanpool programs • Implement internal car/vanpool with address clusters • Participate in regional carpool matching service • Sponsor vanpool service with owned or leased vans • Subsidize or participate in third party vanpool service
Transit design • Design intersections to accommodate transit vehicles • Design streets to support weight of buses • Dedicate land for rail station / bus stops • Construct or pay for adjacent bus stop / shelter • Subsidize cost of land, constructing or maintaining bus center within ¼ mile or rail station within ½ mile	Transit programs • Subsidize transit pass programs such as Commuter Check and VTA Eco Passes • Provide on-site transit pass outlet • Sponsor an employee shuttle program
Pedestrian design • Minimize walking distances to transit stops • Provide pedestrian connections, lighting, landscaping and appropriate building orientation • Incorporate internal pedestrian walkways within project	Pedestrian programs • Establish, market and monitor a walking program including a walking club and walk information
Bicycle design • Provide employees showers and clothes lockers near bike storage • Provide secured bicycle parking (lockers, locked area) in well-lit, convenient areas near key entrances • Provide short term bicycle parking near entrances • Provide long term bicycle parking with security and 50% covered	Bicycle programs • Establish, market and monitor bicycle programs such as bike buddy program, bike to work day, and bicycle information

Planning / Design Measures	Programs / Service Measures
Implementation Mechanisms • Mechanisms to ensure perpetuity of TDM programs • Incorporate TDM program requirements into Covenants, Conditions and Restrictions (CC&Rs) of the property • Incorporate TDM program measures into tenant lease requirements	Monitoring and Evaluation • Monitor initial program implementation closely • Undertake annual monitoring • Conduct commute mode survey • Provide annual status report to the City

Source: Sunnyvale Transportation Demand Management (TDM) Tool Kit, December 1999; <http://www.pmcworld.com/client/sunnyvale/documents/4-11-11/TDM-Tool-Kit.pdf>

As indicated above, City of Sunnyvale requires that TDM programs are accompanied by monitoring and reporting. Where the development fails to comply with the trip reduction targets, non-compliance fees are imposed. Non-compliance fees are based on AM and PM peak hour trip generation and the level of deficiency of the program. Non-compliance fees from 2014 are set out below and would be indexed annually based on the ENR Bay Area Construction Cost Index:

Mixed-Use Toolkit

In July 2015, the City of Sunnyvale released a Toolkit for Mixed-Use Development that outlines principles and guidelines for mixed-use development.⁴ Many of the guidelines within the toolkit relate to travel demand as it is affected by pedestrian-oriented design such as human-scaled elements, visual interest, ground floor activity, transparency, balconies, and pedestrian lighting. Non-motorized transportation is also encouraged through guidelines for short blocks, midblock crossings, and interstitial pathways which increase connectivity around and through mixed-use developments. Shared parking and shared driveway facilities are also encouraged within mixed-use developments, and pedestrian-unfriendly elements such as blank walls.

⁴ City of Sunnyvale. *Live, Work, Play: A Toolkit for Mixed-Use Development in Sunnyvale*, July 2015. <http://sunnyvale.ca.gov/Portals/0/Sunnyvale/CDD/Planning/Planning%20Library/FinalToolkitforMixedUseWeb.pdf>

Figure B-5 Sunnyvale Mixed Use Toolkit Elements Related to Pedestrian Orientation and Travel Demand

TDM Element	Site Guidelines	Building Design Guidelines	Parking Guidelines and TDM Strategies
Transit access	• SS-1 Develop mixed-use development close to transit stops e.g. Caltrain and VTA light rail		• PK-2 Provide and maintain transit shelters, bike parking and amenities for pedestrians, transit riders, and cyclists • Consider providing free or discounted transit passes, information kiosks, and Caltrain shuttles
Street connectivity	• BP-1 Establish a street grid with block lengths of 300 feet • BP-2 Limit block lengths to 400-feet • BP-3 Provide midblock crossings for blocks longer than 300 feet • BP-4 Add publicly accessible pathways where street connectivity is limited • SP-4.5 Link compatible uses with access roads, walkways, landscaping, building orientation and unfenced property lines • SP-5.4 Encourage convenient, direct connections to retail uses and transit stops		• PL-1 Locate surface parking away from street edges or behind buildings with decorative screening or landscaping • PL-4 Accommodate pedestrian and bicycle traffic with pedestrian-only pathways and bicycle facilities through parking areas • PG-1 Provide mews where traditional street and block patterns are difficult to create • PS-1 Locate parking structures away from primary pedestrian access
Bicycle facilities			• PK-3 Locate bike parking racks near building entrances • PK-4 Ensure bicycle parking is secured, weather protected and located in a highly visible area • Provide short-and long-term bike parking in garages and near building entrances at a rate of 10-20 percent of required car parking spaces • Consider providing bike repair tools or services
Car and bike share			• Consider providing on-site car share • Consider providing bicycles for communal use

TDM Element	Site Guidelines	Building Design Guidelines	Parking Guidelines and TDM Strategies
Pedestrian-orientation	• SS-3/SA-2 Design contributes to sense of place and evolving character • SP-1.1 Maximize building frontage along streets (street orientation) • SP-1.2 Provide active ground floor uses and pedestrian scaled elements • SP-2.1 Include a transition zone for ground floor residential e.g. stoops • SP-2.2 Incorporate ground floor retail • SP-2.3 Locate pedestrian-friendly uses along frontage • SP-3.3 Reduce setbacks for ground floor retail and provide 15-foot sidewalks • SP-5.2 Design pedestrian-friendly private drives	• BMA-1/BD-1.1 Incorporate human scaled elements, human-scaled façade detail, visual interest, and identity • BD-1.2 Use architectural features to provide weather protection for pedestrians and highlight entries • BD-1.7/BO-1.3/BO-2.1 Provide a high percentage of windows and transparent ground floor façades and encourage clear, non-reflective ground floor storefronts • BD-2.1 Create modules 25 to 50 foot wide • BD-2.3 Use quality building materials and colors to provide visual interest • BD-3.2 Encourage upper floor balconies • BD-3.3 Encourage decorative lighting fixtures on commercial storefronts • BO-1.2/BO-3.2 Orient primary façades and entrances to the street or pedestrian-oriented circulation areas and locate grand entry lobbies on pedestrian-friendly streets • BO-1.8 Limit blank walls to less than 30 percent or 20 linear feet of a façade • BO-2.8 Include recessed seating space • OS-2.5 Ensure outdoor areas are visible from streets and accessible from buildings, streets, paths, bikeways • LS-7 Plant street trees in scale with street width and building height • LS-13 Create plazas that people can use for rest, congregating, recreation and dining	• PS-2 Wrap ground level of parking structures with activity uses along residential and pedestrian-oriented streets • PS-3 Design street-facing parking structured to reduce apparent bulk and create visual interest
Parking	• SA-5 Develop shared facilities such as driveways, parking, plazas, open space, walkways	• LS-8 Use permeable materials for parking areas, driveways and pathways that do not impede pedestrian access	• PK-1 Share access drives • Consider shared parking to allow more efficient use of land and lower development costs • Consider unbundled parking, especially in areas within walking distance of good transit service and allow developers to only provide the number of spaces occupants will be willing to pay for • Encourage GreenTrip certification and reduce parking requirements for certified developments