City of Carlsbad

CARLSBAD VILLAGE, BARRIO, AND BEACH AREA PARKING STUDY

DRAFT

Technical Memorandum #2:

Future Parking Scenarios

June 29, 2017

Kimley»Horn

List of Tables

List of Tables

List of Tables

Introduction

This Technical Memorandum was developed as part of the City of Carlsbad Village, Barrio, and Beach Area Parking Study. This Memorandum builds from the findings of the existing conditions analysis, which is summarized in Technical Memorandum #1. The intent of this memo is to evaluate future parking conditions based on anticipated development identified in the Village, Barrio and beach neighborhoods and evaluate parking management strategies to accommodate future parking needs in these areas (**Figure 1)**. Three parking management scenarios were evaluated, each of which reflect future parking demand with full build out of the study area:

- **Scenario 1** – represents impacts to the parking system associated with full build out of the study area if no parking management or demand management strategies are implemented.
- **Scenario 2** – evaluates the full build out of the study area and the impact of shared parking strategy to distribute and reduce the parking demand in the study area.
- **Scenario 3** – evaluates the full build out of primarily the Village portion of the study area and the impact of constructing a new garage facility that would provide public parking.

The Park+ model, a parking demand scenario planning tool which is described in greater detail later in this report, was used to evaluate each of the three scenarios. It is important to note that a parking system operates at optimum efficiency when operating below effective capacity, as described in the definitions section below. The concept of effective capacity will be used throughout the following scenarios to display the health of the parking system in the study area. This technical memorandum summarizes the modeling results of each of the scenarios to determine appropriate strategies for managing the parking system and achieving optimum efficiency.

Definitions

The following are terms that are used throughout this technical memorandum to describe the performance of the parking system or individual components of the parking system.

Effective Capacity – Effective capacity is an industry-accepted occupancy threshold for parking facilities that indicates the efficiency of the facility or system. Based on industry standards, the primary threshold is 85 percent of the total capacity of the parking system and/or certain areas within the system. This is the threshold that indicates whether the parking system is operating effectively – effective capacity. For example, when observed or projected occupancies are under this threshold, users can typically locate spaces easily. When this threshold is reached, changes need to be implemented to the parking system to ensure adequate parking space is available[1].

Met Demand – Met demand is the number of occupied parking spaces in a facility during an observed or projected period or of time.

Occupancy – Parking occupancy is the percentage of occupied spaces in a parking facility at a given time. Parking occupancy is calculated by dividing the number of observed or projected vehicles parked in a facility by the number of total spaces in the facility.

Parking Demand – this is the metric representing the vehicular demand generated by a business or use within the study area. Each business or land use generates a certain demand for parking spaces to accommodate the users. The total number of spaces generated at a given time is the parking demand. This demand is based on the land use intensity (building square footage or number of units) and the land use type (restaurant, office space, retail, residential, etc.).

Reasonable Walking Distance – An urban planning principle that recognizes if streets are safe, comfortable, and interesting, most people will walk a distance of about a quarter mile (about two to three blocks in the Village) or approximately five minutes before turning back or opting to drive or ride a bike instead[2].

Shared Parking – the concept that two or more uses can share a set of parking spaces because their peak demands occur at varying times of day. For example, an office and a restaurant could share a set of spaces because the office demand occurs during late morning and afternoon periods, while the restaurant demand occurs in evening periods.

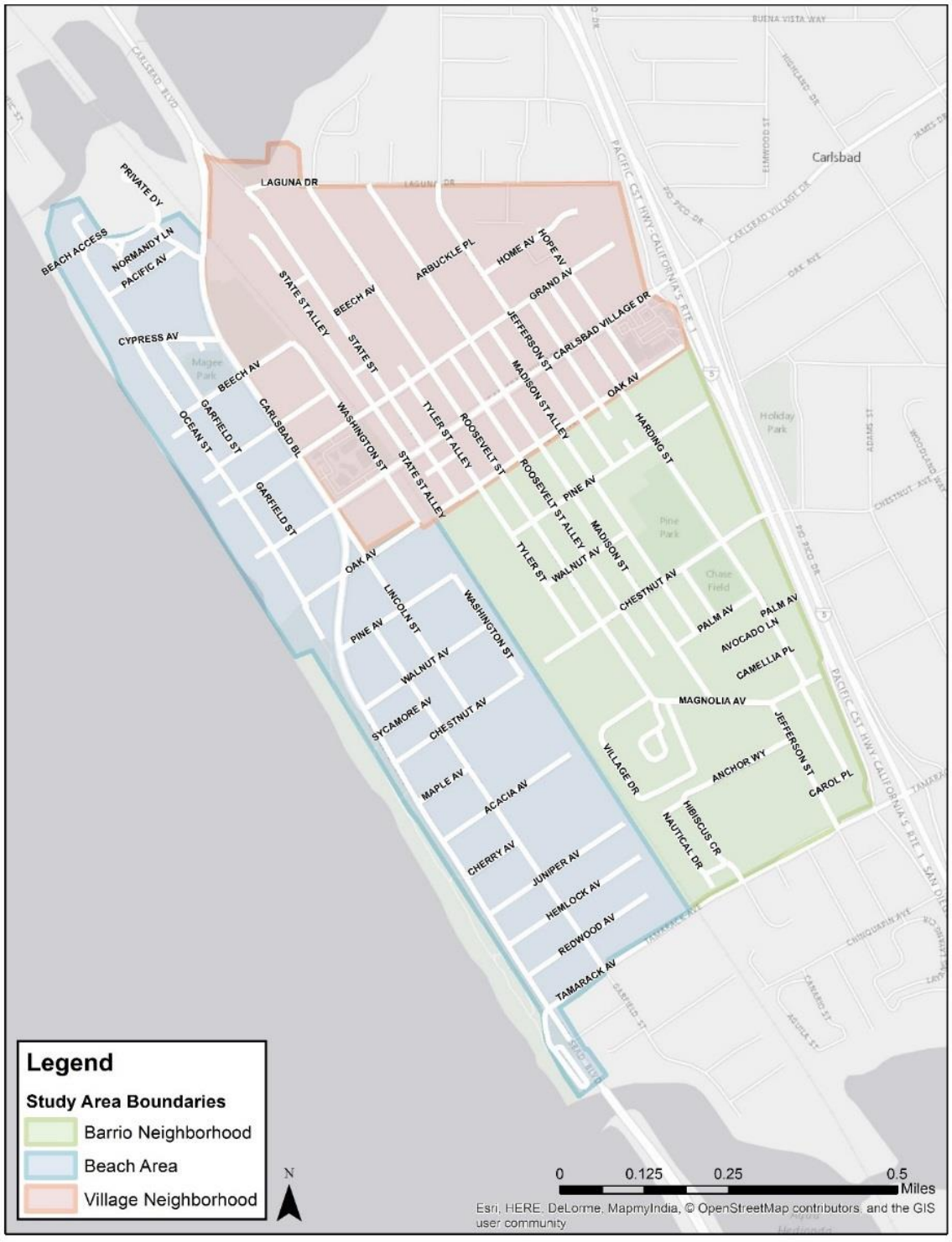
Transportation Demand Management Program (TDM) – A Transportation Demand Management (TDM) program is a set of policy, economic, programmatic, and other measures that seeks to reduce vehicle miles traveled, traffic congestion, and parking demand. TDM programs include measures that work to reduce single occupancy vehicle (SOV) trips, increase vehicle occupancy, and shift travel to other modes or to non-peak travel periods. This is achieved through employer actions, financial

[1] "Parking 101: A parking Primer: A Publication of the International Parking Institute", International Parking Institute, 2015; "Shared Parking, Second Edition", Urban Land Institute
[2] "Draft Village and Barrio Master Plan," April 2016; "New Urbanism: Best Practices Guide," New Urban News Publications, 2009.

incentives, or local infrastructure and land use policy that constrains parking supply, densifies uses, and provides a suite of transportation options including walking, bicycling, transit, and rideshare.

Unmet Demand – Unmet demand is parking demand generated by land uses within a parking system that cannot be accommodated by the nearby available parking supply. This can be due to specific parking restrictions, lack of available parking, lack of travel alternatives, or parking being unavailable within acceptable walking thresholds.

Figure 1: Study Area



Park+ Model

As the Village, Barrio, and beach areas continue to develop, it is essential that parking is provided in such a way to support the economic development of the area, while also accommodating parking demands of new development. To understand how future parking demand might actualize as the area intensifies, a Park+ parking demand model was developed, which is designed specifically to reflect the characteristics of the study area. This model was used to evaluate existing parking demand and predict future parking needs based on development projections through 2035.

The Park+ model evaluates observed data collected in the field, existing land use intensities, parking relationships to surrounding land uses, walking tolerances, transportation system attributes and community specific parking behaviors. As a result, the model is able to project occupancies for the parking resources in the study area, demands generated by the various land uses, and visually depict these characteristics on a heat map to illustrate the impacts to the system. The results of the demand model represent how much parking demand is being generated, where it is being generated, and where existing parking supplies can no longer meet demands. Additionally, model inputs can be changed to reflect various management techniques to predict parking patterns within the study area.

Scenario Development Assumptions

The scenarios presented in this technical memorandum were developed based on data provided by the City of Carlsbad and data collected in the field. The data used in this model includes:

- Land use information – provided by the city, representing the type of land use and its intensity (e.g. a 5,000 sf restaurant or 50-unit condominium).
- Parking information – Parking occupancy and duration data was collected in the field for peak and non-peak conditions. Technical Memorandum #1 of this study summarizes the data collection efforts and results.
- User information – assumptions were made based on survey data collected from residents, businesses, employees and visitors; inventory conducted during parking data collection, input gathered from stakeholder outreach, and feedback from city staff regarding the transportation system and travel behavior. These assumptions were used as input values in the model.
- Scenario information – including existing and future development intensities and locations, which was provided by the city and discussed in greater detail under section “Scenario 1: Master Plan Buildout (2035).

The scenarios are based on the existing conditions, the results of which are described in Technical Memorandum #1. Data was collected in the study area in May and July 2016, on both weekdays and weekends. The results of that analysis concluded that for the entire system in the study area, including the three NCTD lots (located along and west of State Street; see Figure 3), on-street, public off-street, and private off-street parking, the peak season, day, and time was July, on a weekend, at approximately 7 p.m. Therefore, the scenarios evaluated in this analysis are reflective of the same peak conditions.

The model accounts for general population growth that will occur between 2012 and 2035, the planning horizon identified for this study. SANDAG provided growth projections specifically for the study area within this time period. The result was a 1.4 percent annual average growth rate between 2012 and 2035[3]. This growth rate was applied to the model so that demands on existing businesses and uses would grow because of increased population growth in the area through the year 2035.The following sections describe the analysis and outputs from each model scenario.

Existing Conditions (2016)

Between May and July 2016, aspects of the parking system within the study area were documented and analyzed, representing existing conditions information that was used to assess how the parking system is currently operating, as well as establishing baseline conditions for projecting and evaluating future conditions. The information gathered between May and July 2016 consisted of the following:

- on-site surveys where pedestrians were asked to answer questions regarding how they parked in the system that day
- an online survey which was open to all users within the study area and focused on users' typical parking behaviors in the study area
- field data collection where parking occupancy and duration data were collected over four days, including a weekday and weekend in May and a weekday and weekend in July

The data obtained from the on-site surveys, online survey, and the field data were used to identify issues and opportunities regarding parking within the study area. **Table 1** summarizes the results of the field data collection for the peak conditions, which were found to occur on the July weekend at approximately 7 p.m.

Table 1 – Existing Conditions (2016): Parking Occupancy by Type at Peak (July, Weekend, 7 p.m.)

PARKING TYPE	PARKING SUPPLY	AVERAGE OCCUPANCY AT PEAK (7 p.m.)
On-Street	4,971	53 percent
Public Off-Street	730	51 percent
NCTD Lots	511	45 percent
Private Off-Street	5,445	36 percent
Total for Study Area	**11,657**	**54 percent**

[3] SANDAG Series 13 Regional Growth Forecast

Although this data suggests parking is available, further analysis of the parking system discovered that while some areas had available parking, there were other areas that were highly occupied, creating localized deficiencies. The highly-occupied facilities were located near the heart of the Village and near the beach. While users commented that they can find parking quickly and easily, many voiced frustrations that they were not able to park near the popular destinations in the study area. These two pieces of information indicate that there are imbalances within the system that could frustrate and discourage users because they are unable to find available parking near preferred destinations. Defining what the public views as near or close to their destination is somewhat subjective as the comments were made at the public meeting or as a free response in the online survey. Near or close to the destination could be adjacent to their destination or within a reasonable walking distance.

Appendix A - Technical Memorandum #1, developed earlier in this study, provides greater details on the factors included in the analysis, methodologies, and results of existing conditions for the parking system within the study area.

Scenario 1: Master Plan Buildout (2035)

The development intensities, type, and locations included in the Buildout scenario were provided by the City of Carlsbad and are based on four sources:

- The estimated new commercial and hotel development (to buildout) from the General Plan Environmental Impact Report[4].
- The distribution of commercial development in the Village and Barrio based on potential "opportunity" sites identified for the city's Envision Carlsbad process in 2012 and updated by Planning Division staff[5].
- The distribution of hotel development based on proposed or under construction projects and potential hotel locations identified by staff.
- The estimated residential dwelling unit buildout projections prepared as part of the city's Housing Element, updated in 2017[6].

These estimates call for the following, which were used to develop this scenario:

- 137,400 sf of commercial development
- 1,280 residential units

[4] General Plan Environmental Impact Report, Table 2.4-1, available at http://www.carlsbadca.gov/services/depts/planning/update/documents.asp.

[5] Envision Carlsbad "Land Use Concepts" report, Section 3.2, prepared January 2012 and available at http://www.carlsbadca.gov/search/default.asp?q=envision+carlsbad+working+papers

[6] City of Carlsbad General Plan Housing Element, available at http://www.carlsbadca.gov/services/depts/planning/general.asp.

- 260 hotel rooms

Of these estimates, 96 percent of the commercial development and all hotel construction is forecasted to occur in the Village area. The majority of residential development is anticipated to occur in the Village and Barrio with little residential growth in the beach area as well.

Parking associated with the future development in the buildout condition was not included in this scenario for several reasons. First is that it is likely that some of the existing parking will be replaced with either new parking or new development. However, the location and extent of parking space removal is not known and therefore arbitrarily removing and adding spaces to the system would reduce the effectiveness of the Park+ planning tool.

Secondly, it can be assumed that participation in the fee in-lieu program will continue. Based on the historical participation data provided by the city, approximately 10 spaces per year will not be constructed due to participation in the program. Understanding the parking conditions without assumptions made for additional private parking supply allows the city to change the stipulations of the program or suspend or terminate it to help the parking system as a whole function more effectively.

Third, and for reasons similar to the fee in-lieu program, it is also assumed that the current Village Master Plan and Design Manual provision that permits conversion of non-residential space from one approved use to another without the requirement to add parking beyond what a site can accommodate will continue and may be expanded into the Coastal Zone. This provision contributes to building reuse and Village vibrancy.

Lastly, the existing conditions analysis, discussed in Technical Memorandum #1, showed a surplus of total parking spaces system wide. However, these parking spaces are private and not accessible to the public. Therefore, users experienced frustrations finding available parking that was not private parking. The intent of using the Park+ model is to determine the impacts of implementing various parking management strategies so that the system operates more efficiently and investments to increase supply in the system are based on data. This could include new parking supply, and/or a more efficient use of existing supply within the system.

Even though new parking associated with the future development is not added into the model, for the reasons stated above, the city was able to provide gross estimates on the total number of spaces that could potentially be generated based on applying current parking standards to anticipated future growth. **Table 2** shows the estimated number of parking spaces generated based on development estimates provided by the city and compares that to the spaces generated based on the parking requirements recommended by the Park+ model.

Table 2 – Future Parking Estimate and Comparison

LAND USE	ESTIMATED NET NEW DEVELOPMENT	ESTIMATED NEW PARKING PER CURRENT PARKING STANDARDS	PARK+ MODEL PARKING ESTIMATES (SPACES)
Non-Residential*	137,500 sf	747	458
Residential	1,280 units	2,616	1,434
Total for Study Area	-	**3,363**	**1,892**

**Includes hotel*

The city also determined that of the total 747 spaces for non-residential uses, it is estimated that 224 spaces will be satisfied by in-lieu fee payments, leaving 523 spaces that will need to be built in the study area for non-residential uses. This estimate of spaces satisfied through in lieu fee payment, about 30 percent of the total non-residential spaces, results from an analysis of the parking requirements of past approved projects.

The parking estimates do not take into account the following:

- Parking requirement reductions that may occur for projects with affordability restrictions
- Reductions to parking requirements that current standards permit, such as a credit for existing uses on-site (Village), projects with a mix of daytime/nighttime uses that may benefit from joint use of parking, replacement of an existing approved use by a more parking-intensive approved use (Village), or as a result of a development standard modification (Village)
- Allowances for on-street guest parking (permitted in the Barrio for planned development, ownership projects only, which are typically condos)
- Parking associated with second dwelling units

Further review of the Park+ Model parking recommendations is provided in Appendix C - Technical Memorandum #3, in section “Reduced Parking Requirements”.

The following figures and tables summarize the results of the buildout scenario and the impacts the development has on the parking system. **Figure 2** illustrates the parcels that were identified by the city as being vacant or underdeveloped and having the potential to absorb the residential and commercial growth estimates the city has identified. It is important to note that many parcels in the Village accommodate both types of growth either as stand-alone residential, commercial, or as mixed use developments (e.g., commercial uses on a ground floor with residential above). **Figure 3** depicts the results of the model in a heat map that illustrates the projected occupancy for each parking facility in the study area based on graduated colors.

Figure 2 – Scenario 1 (2035): Parcels Identified for Future Growth for Master Plan Buildout

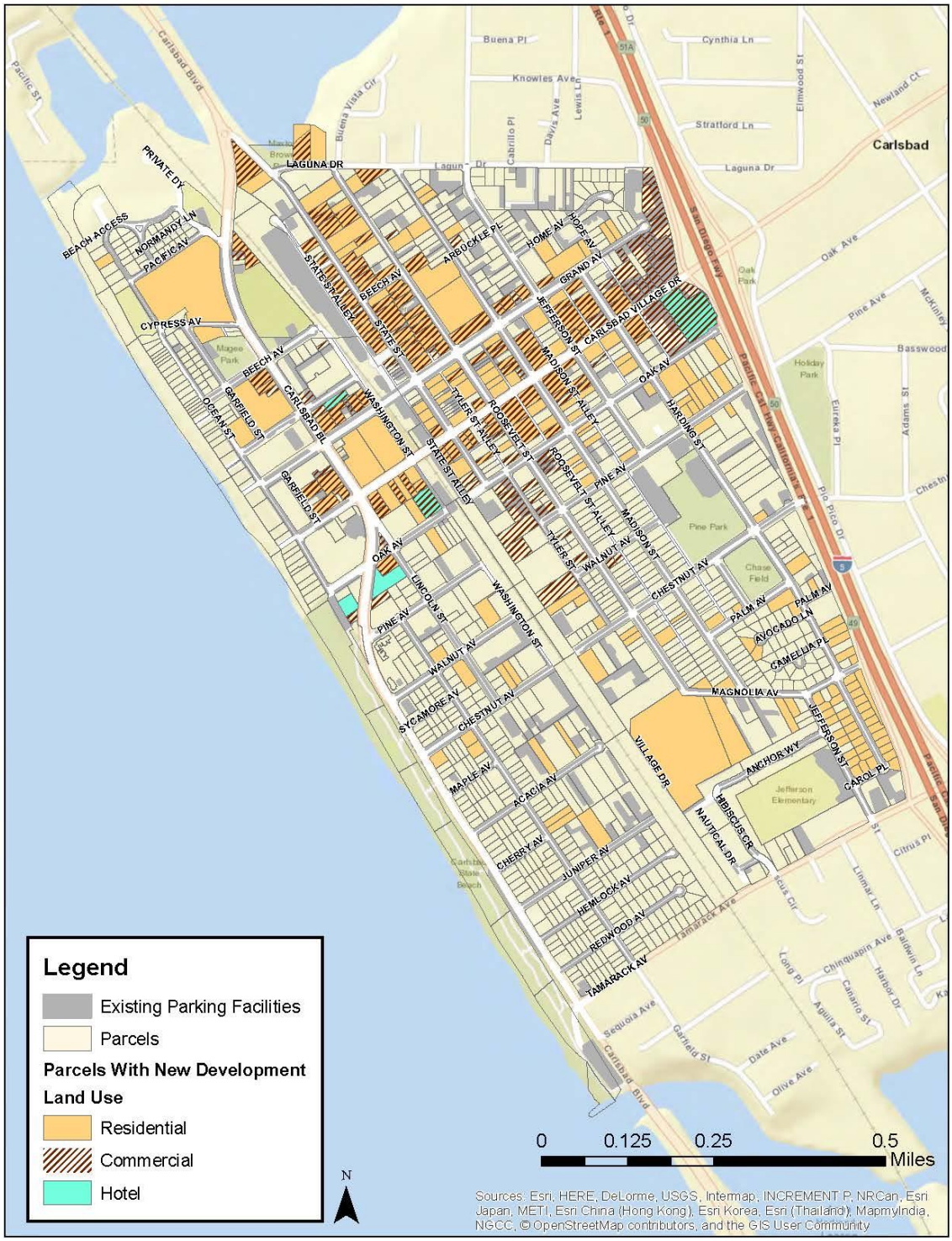
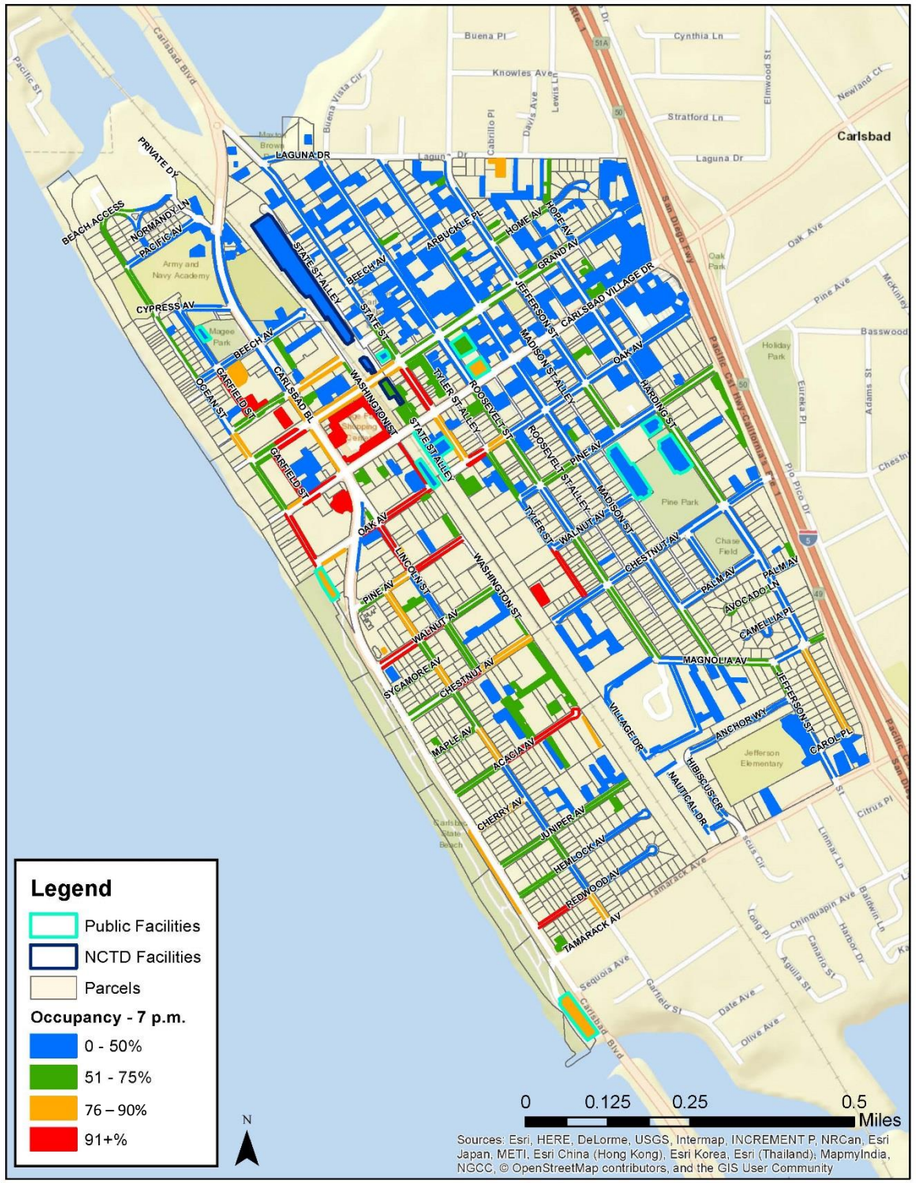
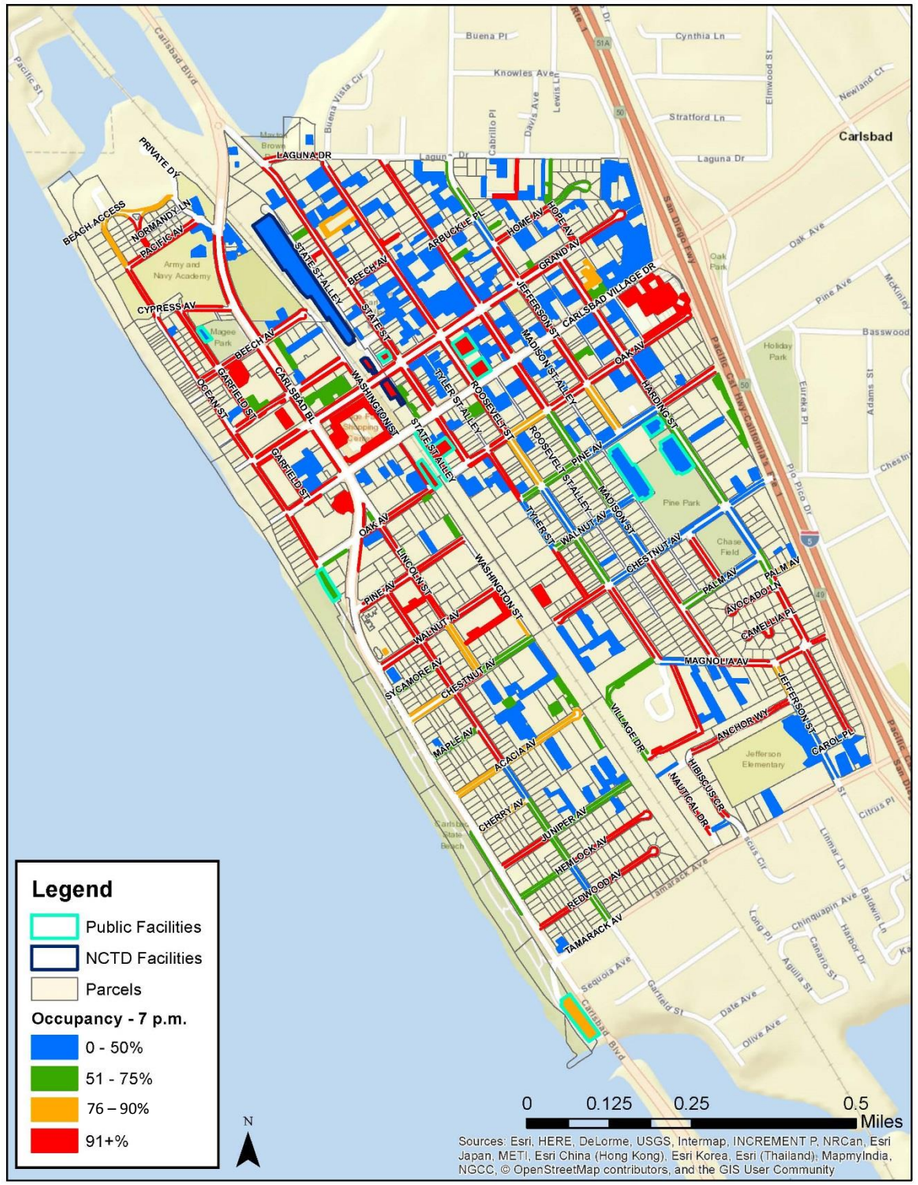


Figure 3 – Comparison of Existing Conditions and Scenario 1 (2035)

Existing Conditions Results



Scenario 1 Results: Full Buildout Peak Parking Occupancy (7 p.m.)



Overall, the 2035 study area has a met demand of 7,103 spaces with a supply of 11,657 spaces, resulting in a system-wide occupancy of 61 percent. This is an increase of 7 percent in system-wide occupancy from the existing conditions. However, there are 234 vehicles that are unable to find parking due to (1) lack of availability (parking facilities are full and the model cannot place more vehicles in them), (2) the inability to park in certain facilities because they are restricted (private parking), or (3) the parking facilities being beyond a reasonable walking distance from the land use generating the parking demand (more than a quarter mile walking distance around all land uses). Therefore, the unmet demand under this scenario is 234 spaces.

If uses within the study area are shown to have unmet demand it means that the parking demand being generated by those uses cannot be accommodated in proximate supply because of a lack of available parking or private parking restrictions. Even though the study area shows a surplus, these uses have a localized deficiency because insufficient parking is accessible to their patrons or employees.

The Park+ model allows for a greater analysis of the parking system within the study area, beyond simply looking at the overall, system-wide supply, met demand, and corresponding occupancy. The model was used to determine parking conditions for each of the three sub-areas within the study area (Village, Barrio, and beach areas), as well as examine how the types of facilities in the study area are operating. The following tables define the projected parking results to show how the various users and areas in the system are impacted. Occupancies over the 85 percent threshold are identified in red in each of the tables.

Table 3 shows met demand and occupancy for the study area as well as the three sub-areas within the study area (Village, Barrio, and beach areas).

Table 3 – Buildout Scenario (2035): Parking Occupancy by Neighborhood at Peak (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY
Village	5,251	2,920	56 percent
Barrio	2,952	1,561	53 percent
Beach	3,454	2,622	76 percent
Study Area Total	**11,657**	**7,103**	**61 percent**

Table 4 provides the met demand and occupancy by the type of parking facility, showing data for on-street, public off-street facilities, NCTD, and private off-street facilities.

Table 4 – Buildout Scenario (2035): Parking Occupancy by Type (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY
On-Street	4,971	4,288	86 percent
Public Off-Street	730	442	61 percent
NCTD	511	50	10 percent
Private Off-Street	5,445	2,323	43 percent
Study Area Total	**11,657**	**7,103**	**61 percent**

NOTE: The table represents the parking conditions during the system-wide peak hour. Individual facilities may peak at different times of the day.

Table 5 provides further analysis into how the public facilities are operating by showing the met demand and occupancy for only the public facilities (on-street and public off-street facilities) in each of the three sub-areas within the study area (Village, Barrio, and beach).

Table 5 – Buildout Scenario (2035): Parking Occupancy for Public Facilities by Neighborhood (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY
VILLAGE	*1,627*	*1,596*	*98 percent*
On-Street	1,353	1,322	98 percent
Off-Street	274	274	100 percent
BARRIO	*2,036*	*1,332*	*65 percent*
On-Street	1,784	1,312	74 percent
Off-Street	252	20	8 percent
BEACH	*2,038*	*1,801*	*88 percent*
On-Street	1,834	1,653	90 percent
Off-Street	204	148	73 percent
Study Area Total	**5,701**	**4,729**	**83 percent**

NOTE: NCTD parking facilities are intended for Coaster commuters; therefore, are not considered public facilities and are not included in this table.

Table 6 provides further analysis into how the private facilities are operating by showing the met demand and occupancy for only the private facilities (private off-street facilities) in each of the three sub-areas within the study area (Village, Barrio, and beach).

Table 6 – Buildout Scenario (2035): Parking Occupancy for Private Facilities by Neighborhood (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY
Village	3,113	1,274	41 percent
Barrio	916	229	25 percent
Beach	1,416	821	58 percent
Study Area Total	**5,445**	**2,324**	**43 percent**

The results of the model indicate that the parking system in the study area is polarized, with much of the public parking exceeding the effective capacity (occupancies over 85 percent) in the Village and beach area neighborhoods while the private parking remains underutilized (25-58 percent occupancies). Overall, the system has occupancy of 61 percent, which is well under the 85 percent threshold. However, the public users under this scenario have extremely limited parking options in the Village and beach area where public parking is unavailable during peak conditions.

With a supply of 11,657 spaces and a demand of 7,103 spaces, the parking problem experienced in the study area is not caused by a lack of parking spaces. Rather, the problem is the lack of public parking within a reasonable walking distance (approximately a quarter mile or two or three blocks in the Village) of the highest demand areas. More than half of the parking facilities in the study area are private and underutilized. There are opportunities within the parking system to share these private resources and reduce demands so that the system can be better balanced and used more efficiently without creating additional supply.

Scenarios 2 and 3 represent options for balancing the parking system and providing more parking for public users in areas of highest demand.

Scenario 2: Shared Parking (2035)

Scenario 2 is built using the same assumptions that were part of Scenario 1 so that it evaluates the full buildout of the Master Plan. However, Scenario 2 applies the concept of shared parking. Under this scenario, the Park+ model assumes that businesses in the study area will participate in shared parking.

Shared Parking Analysis

Shared parking is when multiple businesses can share common off-street parking resources. Shared parking also can mean public use of private facilities. The previous scenario indicates that the parking system as a whole has capacity to meet demands; however, the available parking is largely private and restricted. Shared parking allows these underutilized facilities to be used by more people, thus balancing the parking demands in the system. The intent is to efficiently use the existing resources in the system to reduce the need to unnecessarily invest in creating new parking supply

Businesses that are optimal for shared parking are those that don't have the same peak hours of operation. For instance, retail often peaks in the late afternoon and evening hours, whereas office uses peak during morning and early afternoon hours. The parking facilities identified for sharing were associated with commercial businesses, offices, and religious institutions. Residential and hotel uses remained restricted in the model to ensure that enough parking was maintained for residents and hotel visitors.

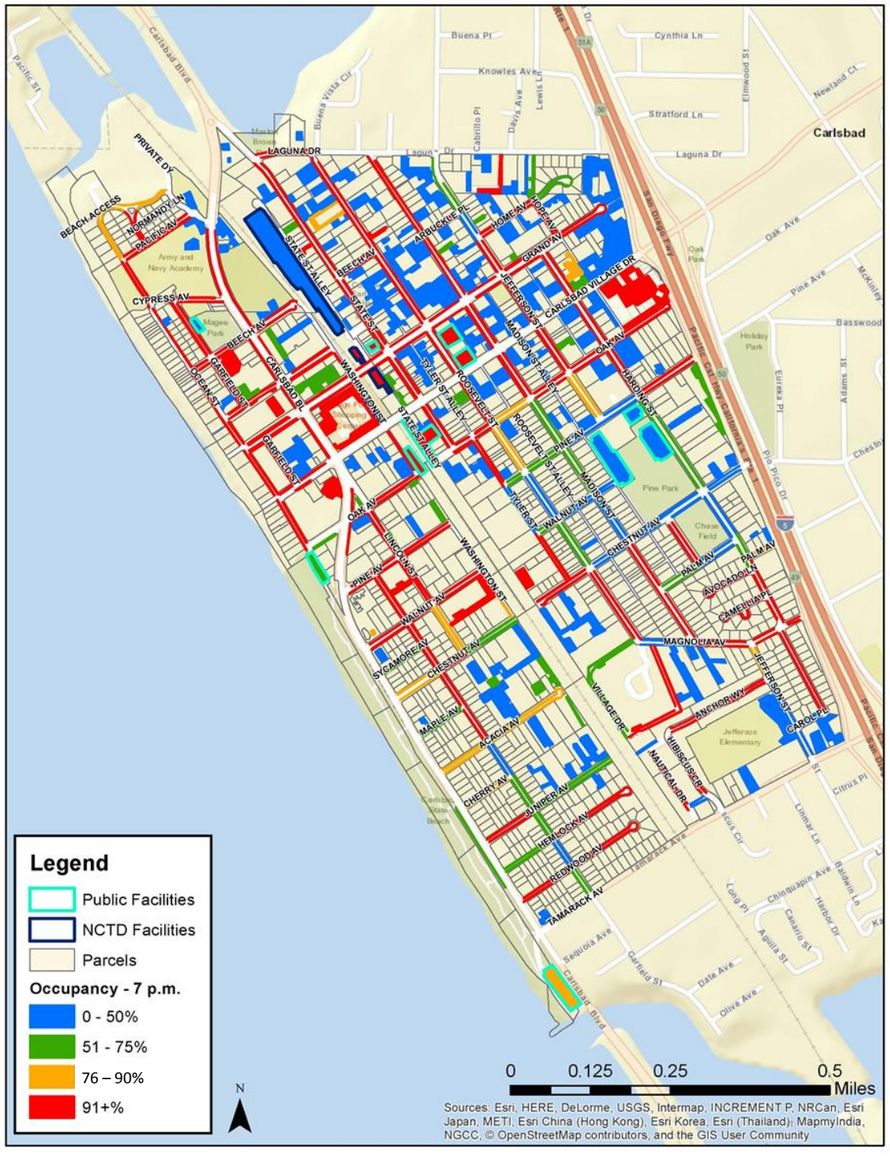
For the purposes of this study, the Village and a small portion of the beach area (primarily north of Carlsbad Village Drive and east of Garfield Street; see **Figure 4**) are the focus for sharing parking opportunities because this is where the parking occupancies are reaching or exceeding effective capacity. Additionally, the Village and beach areas have opportunities for shared parking given the combination of businesses and uses within their areas. Combined, the Village and beach areas have a total of 4,529 spaces that are designated as private (Village: 3,113 spaces, beach: 1,416 spaces) and demonstrate an average of 49 percent occupancy during the peak hour (refer to Tables 7 through 10 on the following pages for a complete look at the parking in the study area and neighborhoods). Between the two areas, this supply of private parking presents an opportunity for shared parking.

The following figures and tables summarize the results of implementing shared parking on the parking system. **Figure 4** illustrates the area ideal for shared parking. The area along the railroad tracks was included as an opportunity area because of its potential for public parking in the future by leasing NCTD's right-of-way; however, since this potential parking does not exist and is distant from much of the Village, it does not contribute to the results of implementing shared/leased parking. **Figure 5** depicts the results of the model in a heat map that illustrates the level of occupancy for each parking facility in the study area based on graduated colors.

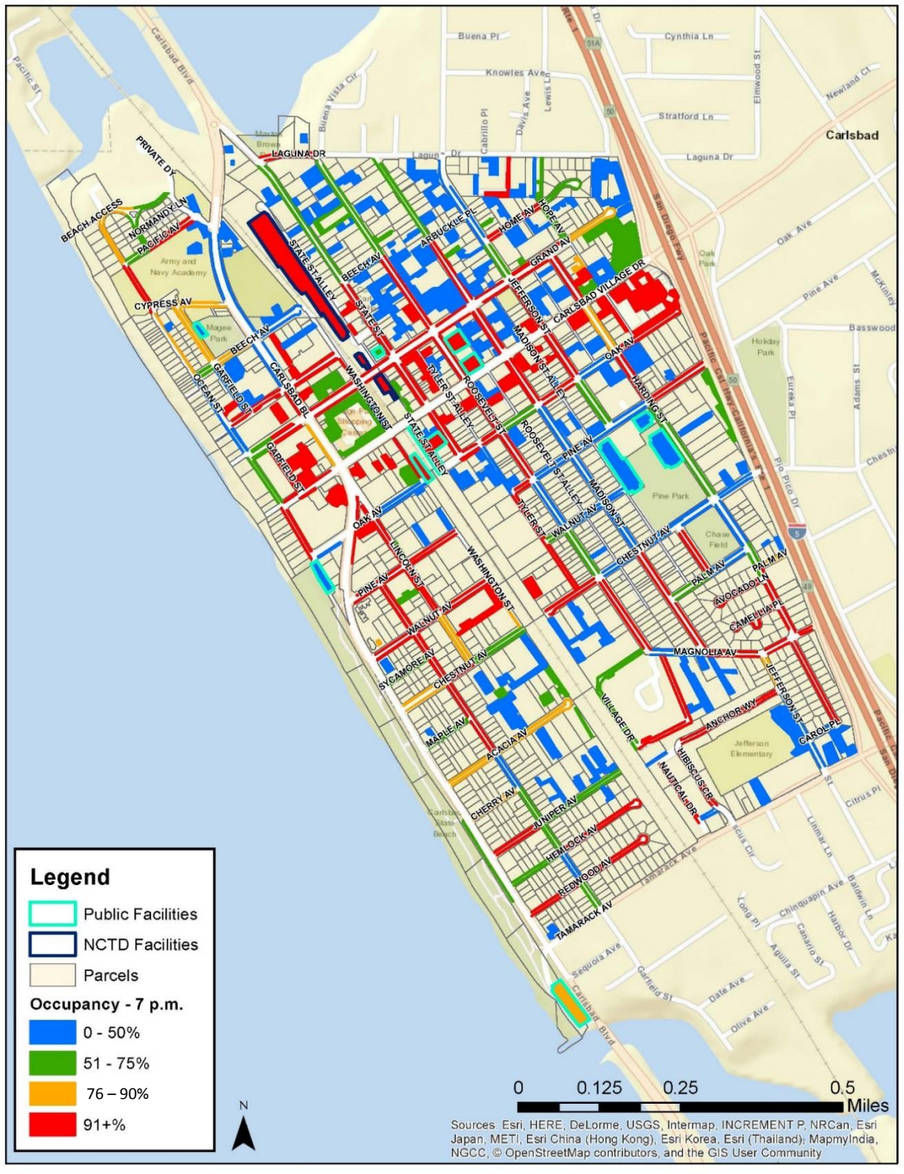
Figure 4 – Scenario 2 (2035): Shared Parking Opportunity Areas

Figure 5 – Comparison of Scenario 1 (2035 Buildout) and Scenario 2 (2035 Buildout with Shared Parking)

Scenario 1 Results



Scenario 2 Results: Peak Parking Occupancy (7 p.m.) for Shared Parking



NOTE: Implementation of TDM strategies is not incorporated into the occupancy results shown in this map

Under this scenario, the met demand increases to 7,212 spaces while the supply remains the same at 11,657 spaces. In Scenario 1, there was a met demand of 7,103 spaces. This indicates that 109 more vehicles can find parking in this scenario than in Scenario 1 without having to add additional supply to the system, indicating that shared parking is working towards balancing the public and private parking inefficiencies. This is due to the introduction of shared parking, making some underutilized private facilities available for public users. The following tables define the projected parking results to show how the various users in the system are impacted. Occupancies over the 85 percent threshold are identified in red in each of the tables. **Table 7** shows met demand and occupancy for the study area as well as the three sub-areas within the study area (Village, Barrio, and beach areas).

Table 7 – Shared Parking Scenario (2035): Parking Occupancy by Neighborhood (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY	CHANGE IN PEAK OCCUPANCY FROM SCENARIO 1
Village	5,251	3,332	63 percent	6 percent
Barrio	2,952	1,511	51 percent	-2 percent
Beach	3,454	2,369	69 percent	-7 percent
Study Area Total	**11,657**	**7,212**	**62 percent**	**1 percent**

Table 8 provides the met demand and occupancy by the type of parking facility, showing data for on-street, public off-street facilities, NCTD, and private off-street facilities. Under this scenario, it is assumed the NCTD lots are available for parking to not only Coaster commuters but the public at large as well; this explains the lots' substantial increase in met demand as compared to Table 4. Since, however, parking demand is dispersed throughout the study area, NCTD parking lot availability to the public satisfies only some, but not all, of the parking demand.

Table 8 – Shared Parking Scenario (2035): Parking Occupancy by Type (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY	CHANGE IN PEAK OCCUPANCY FROM SCENARIO 1
On-Street	4,971	3,826	77 percent	-9 percent
Public Off-Street	730	420	58 percent	-3 percent
NCTD	511	486	95 percent	85 percent
Private Off-Street	5,445	2,480	46 percent	3 percent
Study Area Total	**11,657**	**7,212**	**62 percent**	**1 percent**

NOTE: The table represents the parking conditions during the system-wide peak hour. Individual facilities may peak at different times of the day.

Table 9 provides further analysis into how the public facilities are operating by showing the met demand and occupancy for only the public facilities (on-street and public off-street facilities) in each of the three sub-areas within the study area (Village, Barrio, and beach).

Table 9 – Shared Parking Scenario (2035): Parking Occupancy for Public Facilities by Neighborhood (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY	CHANGE IN PEAK OCCUPANCY FROM SCENARIO 1
VILLAGE	*1,627*	*1,378*	*85 percent*	*-13 percent*
On-Street	1,353	1,108	82 percent	-16 percent
Off-Street	274	270	99 percent	-1 percent
BARRIO	*2,036*	*1,301*	*64 percent*	*-1 percent*
On-Street	1,784	1,281	72 percent	-2 percent
Off-Street	252	20	8 percent	0 percent
BEACH	*2,038*	*1,567*	*77 percent*	*-14 percent*
On-Street	1,834	1,437	78 percent	-12 percent
Off-Street	204	130	64 percent	-9 percent
Study Area Total	**5,701**	**4,246**	**74 percent**	**-9 percent**

NOTE: NCTD parking facilities are intended for Coaster commuters; therefore, are not considered public facilities and are not included in this table.

Table 10 provides further analysis into how the private facilities are operating by showing the met demand and occupancy for only the private facilities (private off-street facilities) in each of the three sub-areas within the study area (Village, Barrio, and beach).

Table 10 – Shared Parking Scenario (2035): Parking Occupancy for Private Facilities by Neighborhood (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY	CHANGE IN PEAK OCCUPANCY FROM SCENARIO 1
Village	3,113	1,469	47 percent	6 percent
Barrio	916	210	23 percent	-2 percent
Beach	1,416	801	57 percent	-1 percent
Study Area Total	**5,445**	**2,480**	**46 percent**	**2 percent**

The results of this scenario demonstrate that if the city were to encourage shared parking within the study area, a significant amount of the demand generated by the study area's businesses and other users could be absorbed by the currently underutilized private parking facilities. The public parking, particularly in the Village and Beach areas, are still experiencing high demands, although the projected occupancies are reduced from the demands projected in Scenario 1. Furthermore, the unmet demand under this scenario is 125 spaces, also a reduction from the 234 spaces of unmet demand of the previous scenario.

The increase in the amount of demand that can be met in the study area is due to the implementation of shared parking. Shared parking allows more vehicles to park in facilities that would otherwise be restricted. While there is still unmet demand under this scenario, the benefits of a more efficient system are numerous Benefits to implementing shared parking, for example, include that the greenhouse gases (GHG) and driver frustration associated with vehicles circling to find available parking could be reduced as the number of publicly available space is expanded and parking becomes easier to find. Reduction of GHGs is identified in the Mobility Element of the General Plan and the Climate Action Plan (CAP) as a goal for the city to meet sustainability goals. The city is also currently developing a formal TDM plan and ordinance, which can also guide parking strategies in the study area. The combination of additional shared parking to create more supply and TDM to reduce more demand is likely the ideal solution for mitigating potential parking issues in the study area.

TDM strategies were incorporated into the evaluation of future parking by using national averages to predict the level of impact on demands for different types of TDM strategies. The evaluation of TDM strategies and how they are incorporated into the model to determine how they could impact the study area are discussed below.

Scenario 3: New Public Parking Structure (2035)

Scenario 3 presents another approach to meet the parking needs that result from the full buildout of the Master Plan (Scenario 1). This scenario incorporates the same growth intensities and assumptions from Scenario 1 to evaluate the impact of additional parking supply at full buildout in the form of a parking garage. Shared parking and other TDM and parking management strategies are not considered in this scenario.

For the purposes of this scenario an additional 500 public parking spaces were added into the model to help mitigate the demands that are generated by the area's businesses and uses. New parking facilities are most effective if they are placed in areas where the demands are highest and can serve many users, which is in the Village and the Beach area north of Oak Avenue. For cost purposes in this study, it was assumed that these spaces would be constructed in an above-ground parking garage. The option to construct a garage underground is reliant upon other variables. For instance, if the City does not wish to build a garage on land that could otherwise serve a more desirable use in the study area, an underground garage may be the better option. The cost for estimating an underground garage is very localized and can vary greatly based on the specific location. Therefore, price estimates shown below are for an above ground garage, where the costs are better known approximates.

It is estimated that the cost of constructing an above ground parking garage is approximately $20,000 per

space[7]. Therefore, a facility with 500 spaces would cost approximately $10 million. The cost to build the 500 spaces is independent of the size or number of facilities, as it is based on a per space average cost. In addition, annual operation and maintenance costs range between $500 and $800 per space, or $250,000 to $400,000 total. A three-level facility with 500 spaces would require approximately 1.6 acres of land. The cost for construction, operation and maintenance is discussed in greater detail following the Scenario 3 analysis.

Figure 6 illustrates the opportunity area for constructing new parking supply. **Figure 7** depicts the results of the model in a heat map that illustrates the level occupancy for each parking facility in the study area based on graduated colors.

[7] "Parking Structure Cost Outlook for 2016", Carl Walker, http://www.carlwalker.com/press-releases/parking-structure-cost-outlook-for-2016/

Figure 6 – Scenario 3 (2035): New Parking Garage Opportunity Area

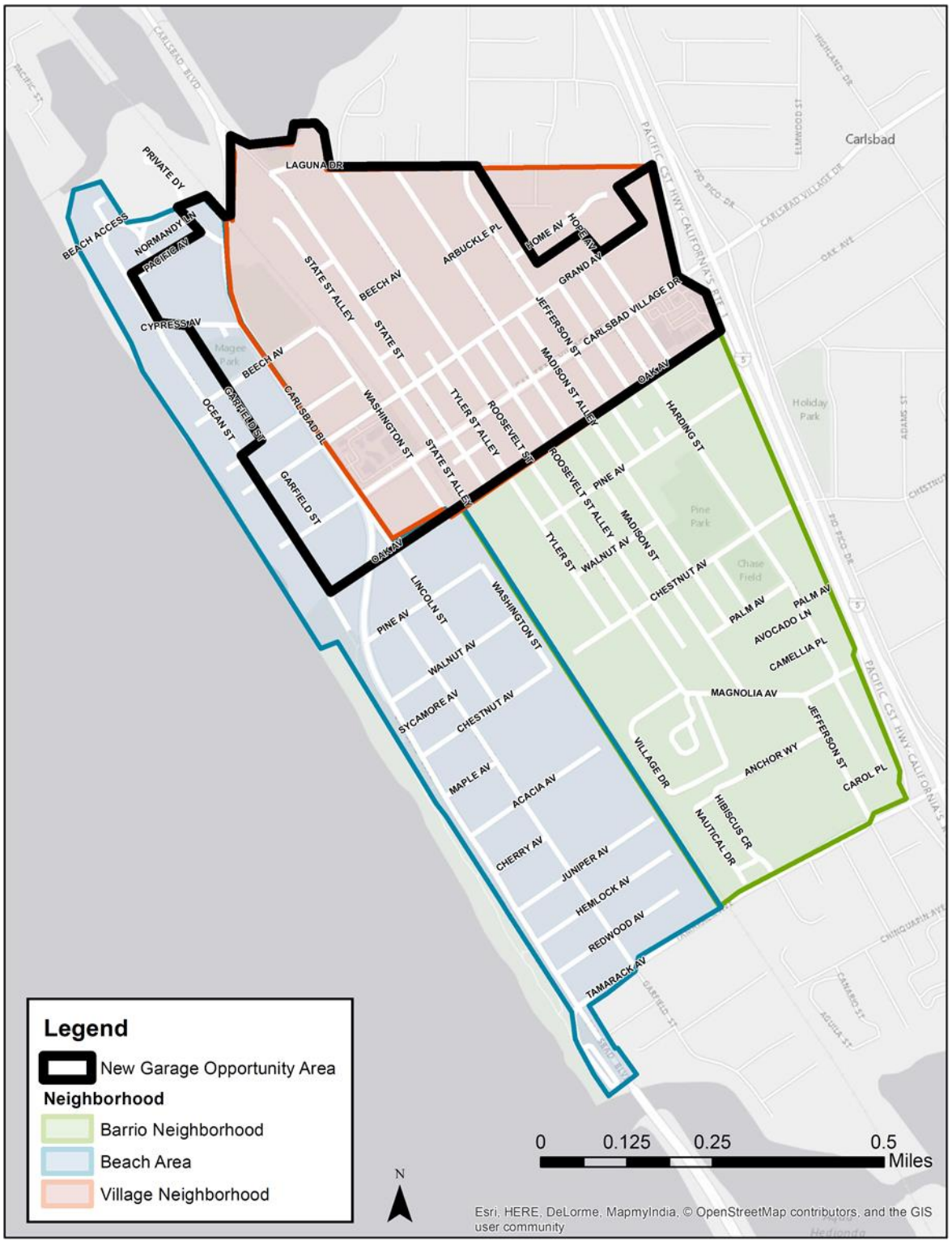
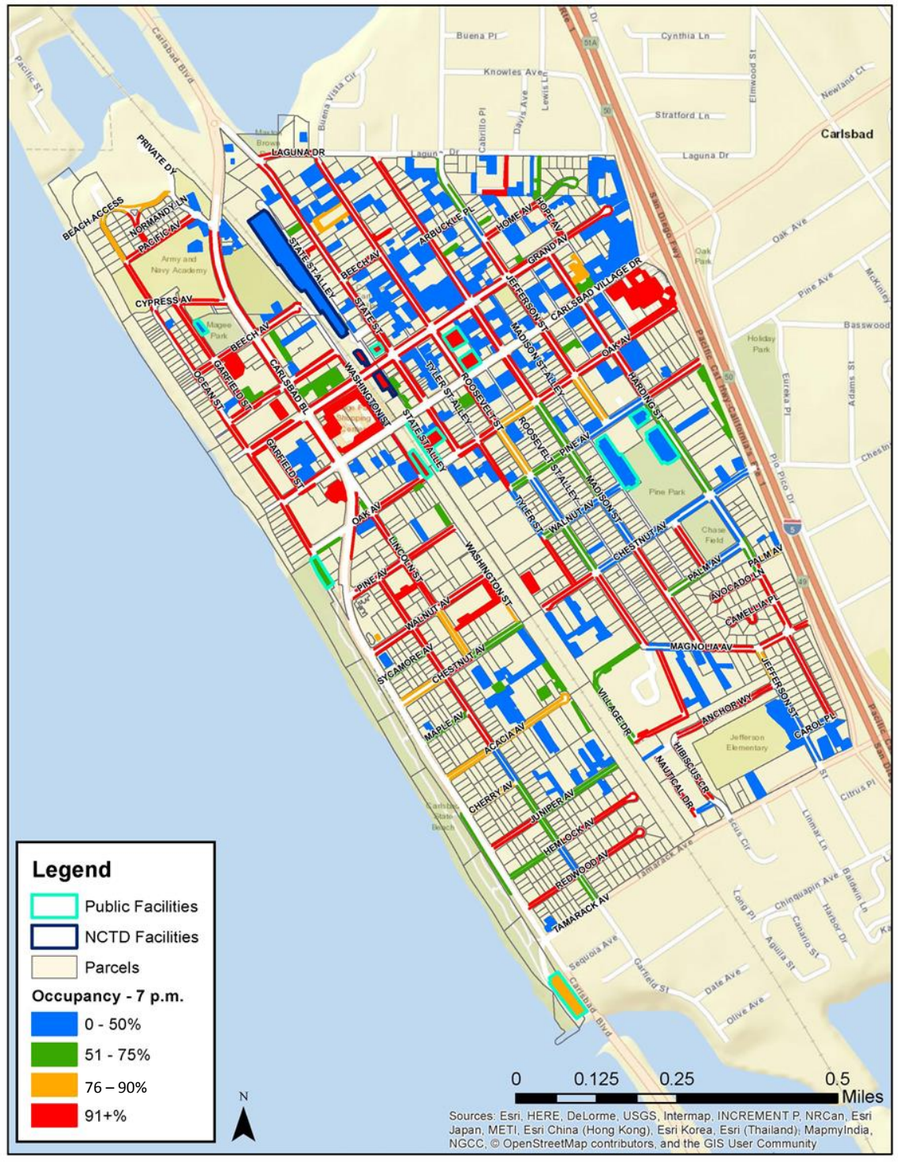
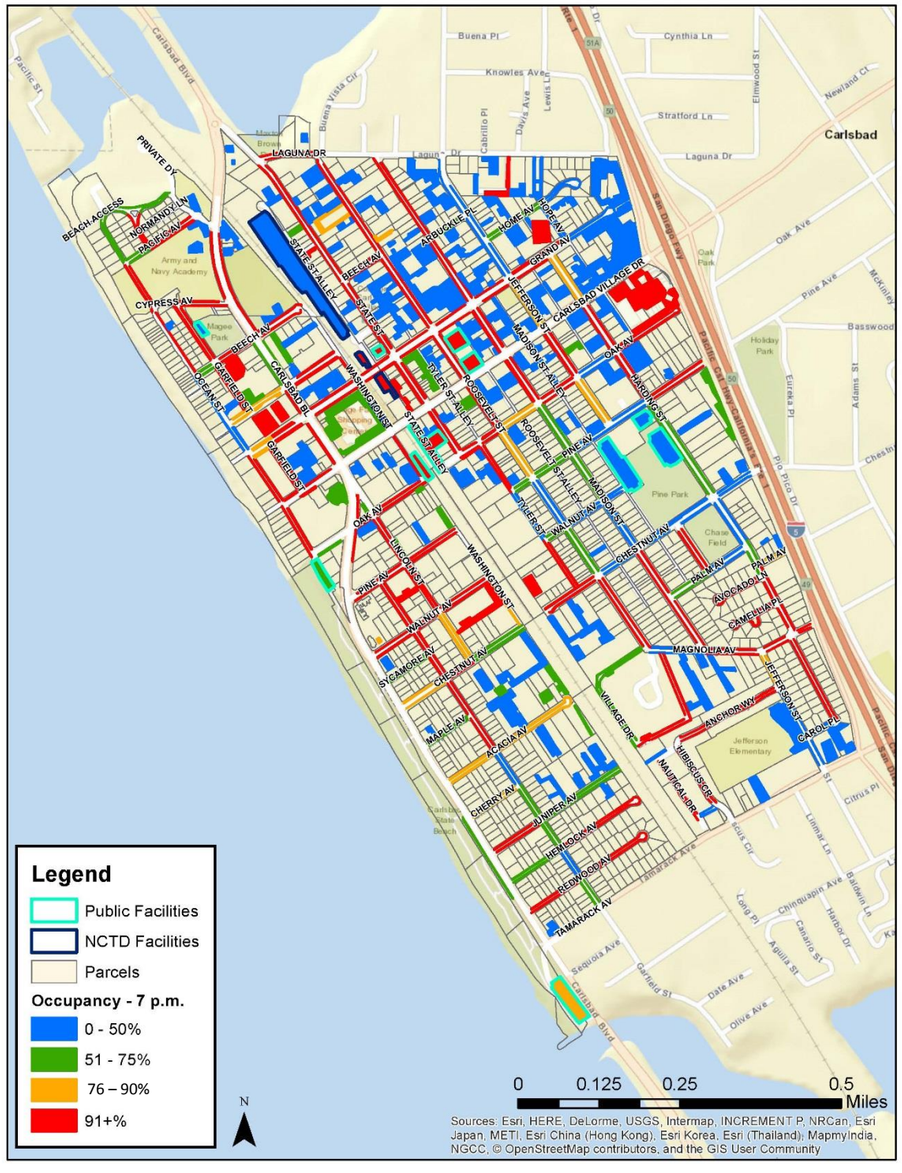


Figure 7 – Comparison of Scenario 1 (2035 Buildout) and Scenario 3 (2035 Buildout with New Public Parking)

Scenario 1 Results



Scenario 3 Results: Peak Parking Occupancy (7 p.m.)



Under this scenario, the met demand is 7,093 spaces and the parking supply increased to 12,157 spaces. The met demand in Scenario 1 was 7,103 spaces and in Scenario 2 it was 7,212 spaces. This indicates that in this scenario, 10 fewer cars will be parked than in Scenario 1 and 119 fewer cars than in Scenario 2. Overall, and despite the addition of 500 spaces, 243 cars still will be unable to find parking in Scenario 3.

The following tables define the parking results to show how the various users and areas in the system are impacted by the construction of the new parking spaces. Occupancies over the 85 percent threshold are identified in red in each of the tables. **Table 11** shows met demand and occupancy for the study area as well as the three sub-areas within the study area (Village, Barrio, and beach areas).

Table 11 – New Garage Scenario (2035): Parking Occupancy by Neighborhood (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY	CHANGE IN PEAK OCCUPANCY FROM SCENARIO 1
Village	5,501	2,812	51 percent	-6 percent
Barrio	2,952	1,562	53 percent	0 percent
Beach	3,704	2,719	73 percent	-3 percent
Study Area Total	**12,157**	**7,093**	**58 percent**	**-3 percent**

Table 12 provides the met demand and occupancy by the type of parking facility, showing data for on-street, public off-street facilities, NCTD, and private off-street facilities.

Table 12 – New Garage Scenario (2035): Parking Occupancy by Type (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY	CHANGE IN PEAK OCCUPANCY FROM SCENARIO 1
On-Street	4,971	4,073	82 percent	-4 percent
Public Off-Street	730	440	60 percent	-1 percent
New Public Garage	500	500	100 percent	-
NCTD	511	50	10 percent	0 percent
Private Off-Street	5,445	2,030	37 percent	-6 percent
Study Area Total	**12,157**	**7,093**	**58 percent**	**-3 percent**

NOTE: The table represents the parking conditions during the system-wide peak hour. Individual facilities may peak at different times of the day.

Table 13 provides further analysis into how the public facilities are operating by showing the met demand and occupancy for only the public facilities (on-street and public off-street facilities) in each of the three sub-areas within the study area (Village, Barrio, and beach).

Table 13 – New Garage Scenario (2035): Parking Occupancy for Public Facilities by Neighborhood (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY	CHANGE IN PEAK OCCUPANCY FROM SCENARIO 1
VILLAGE	*1,877*	*1,707*	*91 percent*	*-7 percent*
On-Street	1,353	1,183	87 percent	-11 percent
Off-Street	274	274	100 percent	0 percent
New Garage	250	250	100 percent	-
BARRIO	*2,036*	*1,333*	*65 percent*	*0 percent*
On-Street	1,784	1,313	74 percent	0 percent
Off-Street	252	20	8 percent	0 percent
BEACH	*2,288*	*1,974*	*86 percent*	*-5 percent*
On-Street	1,834	1,577	86 percent	-4 percent
Off-Street	204	147	72 percent	-1 percent
New Garage	250	250	100 percent	-
Study Area Total	**6,201**	**5,014**	**81 percent**	**-2 percent**

NOTE: NCTD parking facilities are intended for Coaster commuters; therefore, are not considered public facilities and are not included in this table.

Table 14 provides further analysis into how the private facilities are operating by showing the met demand and occupancy for only the private facilities (private off-street facilities) in each of the three sub-areas within the study area (Village, Barrio, and beach).

Table 14 – New Garage Scenario (2035): Parking Occupancy for Private Facilities by Neighborhood (7 p.m.)

	PARKING SUPPLY	MET DEMAND	AVERAGE PEAK OCCUPANCY	CHANGE IN PEAK OCCUPANCY FROM SCENARIO 1
Village	3,113	1,054	34 percent	-7 percent
Barrio	916	229	25 percent	0 percent
Beach	1,416	746	53 percent	-5 percent
Study Area *Total*	**5,445**	**2,029**	**37 percent**	**-6 percent**

The increase in supply from 11,657 spaces to 12,157 spaces does little to mitigate and distribute the demands that are occurring in the Village and Beach areas. In fact, even assuming 100 percent average peak occupancy of a new parking garage (see Table 12), the unmet demand is the highest of the three scenarios at 243 spaces. This is because the demand in the study area is greatly dispersed and therefore a garage is not an ideal approach to ensure those demands are met. If the demands were localized to a specific location, a garage might be a better approach. With the dispersed demands, and assuming people have a reasonable walking distance from their car to their destination, people may not choose to park in a garage because it cannot be located within two or three blocks from every destination within the study area. To meet demands in the study area, the city would have to invest in multiple (at least two), small garages.

Shared parking and TDM strategies, on the other hand, have a wider sphere of influence and can reduce parking demands throughout the study area, not just in a localized portion of the study area. The evaluation of Scenario 2 indicates that implementing shared parking alone could have the same impact as constructing a new parking garage. The unmet demand in Scenario 3 is 243 spaces, nearly double that of Scenario 2 (125 spaces). When TDM strategies are factored in as part of Scenario 2, the reduction of parking demands for Scenario 2 is even greater.

Transportation Demand Management and Parking Management Strategies

The impacts of implementing Transportation Demand Management (TDM) strategies were also evaluated as part of this analysis. The goal of TDM is to reduce single occupancy vehicle trips through a number of strategies. TDM encourages people to use alternative modes over a personal vehicle by making alternative modes easy to access and use. These TDM strategies also support the Park Once concept which focuses on creating parking areas that are well connected by bicycle and pedestrian facilities and part of a well-established parking system, can enable visitors to "park once" and visit a series of destinations.

For these reasons, when TDM strategies are implemented they have the potential to reduce parking demands to a certain extent. A maximum reduction factor is identified for each strategy presented in this section. The reduction factor is based on research conducted and compiled by the Victoria Transport Policy Institute (VTPI)[8], which bases its findings on various case studies throughout the country and some internationally, specifically for TDM and parking management strategies. Although the VTPI provides national and international research, it is the most readily available data of this kind. Most jurisdictions do not actively track or evaluate the impacts of their implemented TDM improvements. Without local data of this kind, the VTPI is an acceptable data source to determine reductions for implementing TDM strategies.

Implementation of TDM and parking management strategies have the potential to reduce parking demands as people opt to take alternative modes of transportation rather than their personal vehicle. This section presents TDM and parking management strategies that could potentially reduce the parking demands in the city if implemented. Each strategy can reduce parking demands to the extent identified.

- **Walking and Cycling** – Improve walking and cycling conditions in the city to make it easier for people to travel longer distances by bicycle or on foot. This can include safe, designated bike lanes and routes, wider sidewalks, improved streetscapes, crosswalks and curb ramps, lighting, wayfinding signage, bike lockers, racks, and/or cages, etc. The estimated parking demand reduction is 10 percent[9]. The city has installed over 100 bicycle racks in the study area and has already completed, or is currently constructing, some of these other improvements in the study area.
- **Mobility Management** – Implement operational improvements that encourage efficient travel to destinations. This can include improving timing and efficiency of alternative modes and the interaction between different modes of travel, improving facilities for all mobility modes and accommodating ride-sharing, providing for shuttle services, and improving transit frequency. The estimated parking demand reduction is 20 percent[6].
- **Financial Incentives/Disincentives** – Develop programs that encourage or discourage certain behaviors by making transportation options more or less expensive. Examples include the implementation of paid parking and/or permits for certain users. Similarly, disincentives can include making the option of driving a single occupancy vehicle more expensive while incentivizing

[8] Victoria Transport Policy Institute is an independent research organization with a focus on transportation and presenting free and accessible current research regarding various transportation problems, solutions, effectiveness, costs, and benefits.

[9] Victoria Transport Policy Institute, http://www.vtpi.org

the use of transportation alternatives. Parking cash-out is an example by which employers that subsidize parking for single occupant vehicles offer a cash incentive of the same value to employees that utilize transportation alternatives or higher occupancy modes. Financial incentives already exist today at the regional level. For example, SANDAG offers a subsidized vanpool program and a Guaranteed Ride Home service. The city could partner with SANDAG to promote these services. The estimated parking demand reduction is estimated at 20 percent[6].

- **Parking Regulations** – Implement parking regulations to promote efficient use of existing parking resources. Examples could include expansion of parking time limits into areas where they currently don't exist, adjustment of parking time limits, or parking permit programs. The estimated parking demand reduction is estimated at 20 percent[6].
- **User Information and Marketing** – Establish user information and marketing to create a consistently themed and easily recognizable parking system so that users know where they can park. This can include the use of branding, mobile apps, maps, websites, etc. Mobile apps, for example, could identify available parking spaces in real time as well as walking routes and bike racks. Furthermore, the branding and marketing messages and themes will be more effective if they are also used to identify and promote the various components of the TDM program. The estimated parking demand reduction is estimated at 10 percent[6].
- **Smart Growth Design** - Encourage more compact, mixed, multi-modal development. Develop parking standards that follow smart growth principles, such as reduced standards in areas well served by transit or for certain businesses that provide bicycle corrals. The estimated parking demand reduction is estimated at 20 percent[6].
- **Improved Enforcement** – Enforcement ensures that parking regulations are being followed and the system operates more efficiently. The estimated parking demand reduction is estimated at 10 percent[6].

Success of the various TDM strategies is contingent upon city outreach and the level of investment made to ensure that TDM programming is accessible and efficient for users. Furthermore, the effectiveness of each strategy increases as more TDM strategies are planned, implemented, and managed in conjunction with each other. Combined with shared parking, many of the frustrations experienced by users could be effectively managed.

Implementation of these TDM strategies can reduce overall parking demand in the study area by approximately 10-20 percent, depending on how extensively the strategies are implemented. If the strategies are implemented throughout the study area (and not just in isolated areas), are well connected, well-advertised, and well supported, these strategies have the potential to resolve the remaining parking demands that are not satisfied through shared parking.

Parking decisions are often made in isolation (for instance, the oversupply of new private parking for a new development, or investment in a new garage because the public expresses frustrations with finding available

parking). However, parking management practices should be coordinated with other initiatives to bring the most benefit to the area. An opportunity for combining programmatic strategies exists between the parking program and the TDM programs in the city. TDM includes any strategy that works to reduce the need to rely on a single occupancy vehicle, which in turn impacts parking demands. As stated above, the city is undertaking an effort to develop a citywide TDM plan and ordinance. The city should leverage a coordinated platform of parking management and TDM strategies to maximize the benefits for each program in the study area.

Parking Management Investment vs. Investing in New Parking Supply

Investing in structured parking is a common reaction when parking supply becomes constrained and users of the system voice their frustrations. However, it is not the only option available and often, is not the best option because constructing new parking is expensive and does not always provide the solution to fixing the parking problem. Managing the existing parking supply with shared parking, TDM strategies, and parking management strategies can often achieve greater results without having the large investment.

Investment in TDM strategies is critical to ensuring the success of parking management strategies. With portions of the existing parking supply currently at capacity, particularly near popular destinations in the study area, users are often frustrated with the difficulty of finding available parking quickly within one or two blocks of their destination. Thus, some users may think that constructing a new parking facility is the fastest and easiest way to remedy the situation. This is not necessarily the case. A garage will create additional parking supply; however, it often leaves cities with a debt service that lasts approximately 30 years. The debt service may be reduced if the city engages in public/private partnerships. Furthermore, recent proliferation of ridesharing and future implementation of autonomous vehicles suggest that in 10 to 20 years, single occupancy vehicle use and ownership could continue to decrease. Effectively reducing the parking demands in the city requires appropriate management and investment in TDM strategies so that mobility in the study area remains flexible and accommodates all modes of travel while maintaining adequate access to businesses.

To accomplish this, it is recommended that the city set aside money generated by the fee in-lieu program (whether a new fee is implemented or the original fee is maintained) for implementing TDM strategies or other improvements that would improve mobility and access in the study area. While this money would normally be invested in a new facility or parking infrastructure, it could be much better utilized for making improvements in several TDM programs and parking management strategies across the study area. It is likely more cost effective to improve the existing TDM programs and/or implement new ones rather than build more parking. The level of investment could be the same as that used to construct a garage; however, the investment could provide a greater benefit to the city over time. Some of these benefits are as follows:

- Broadens land use choices as sites slated for parking can be used for other uses
- Improves mobility, giving people various choices on how they can get around the area
- Is flexible, as strategies and techniques can be changed as conditions within the study area change, rather than investing in a multi-million-dollar parking structure, which is a fixed asset
- Saves users money because alternatives to driving a personal automobile are less expensive

- Saves the city and developers money by encouraging wiser investments and more improvements to the area
- Avoid potential aesthetic and community character issues that a parking garage can create

Structured Parking Costs

Typically, in the San Diego area, structured parking costs approximately $20,000 per space to construct for an above ground structure[10]. Underground structured parking costs approximately $30,000 to $50,000 per space. Operation and maintenance costs can range between $500 to $800 per space annually for an above ground facility. These costs do not include the cost of land acquisition, engineering fees, environmental evaluations, and other associated soft costs. Therefore, the city should expect to spend at least $10 million to construct a 500 space parking structure. This cost is on a per space basis and would be the same whether the 500 spaces are split between multiple facilities or are in one large facility. However, with multiple facilities, the soft cost will be attributable to each facility, making it more expensive to construct multiple facilities than a single facility. Additionally, construction costs can increase if the structure's appearance is improved with more attractive materials or if it is integrated with retail, office and other uses as part of a mixed-use development.

One option that many cities use is the fee in-lieu program to pay for structured parking. However, the city's current fee in-lieu program does not generate the funds necessary to cover the costs of structured parking. On average, 10 spaces a year are paid for with in-lieu fees, equating to approximately $112,400 annually. Since its inception in 2000, the fee in-lieu program has earned $1.9 million and has an approximate balance (as of October 2016) of $790,000. The revenue earned through the program is not substantial enough to pay for structured parking. The money from the fee in-lieu program could have a greater impact if it were invested back into the community in the form of TDM and parking management strategies.

TDM and Parking Management Costs

The potential savings that could be experienced if investing in TDM strategies are difficult to estimate because it depends on which programs are invested in and what type of improvements are made. All the TDM and parking management strategies evaluated as part of this study have a wide range of associated costs depending on how comprehensively they are implemented and managed.

[10] "Parking Structure Cost Outlook for 2016", Carl Walker, http://www.carlwalker.com/press-releases/parking-structure-cost-outlook-for-2016/

Summary of Park+ Evaluation Findings

Three scenarios were evaluated as part of this study to project future parking demands, evaluate the impacts to the parking system, and use this information to inform parking management decisions. **Table 15** compares the results of each of the three scenarios evaluated.

Table 15 – Scenario Comparison

	PARKING SUPPLY	SCENARIO 1		SCENARIO 2		SCENARIO 3*	
		Met Demand	***Average Peak Occupancy***	***Met Demand***	***Average Peak Occupancy***	***Met Demand***	***Average Peak Occupancy***
Village	5,251	2,920	56 percent	3,332	63 percent	2,812	51 percent
Barrio	2,952	1,561	53 percent	1,511	51 percent	1,562	53 percent
Beach	3,454	2,622	76 percent	2,369	69 percent	2,719	73 percent
Study Area Total	11,657	7,103	61 percent	7,212	62 percent	7,093	58 percent

**Parking supply for Scenario 3 differs from the other scenarios. Village = 5,501 spaces; Barrio = 2,952 spaces; Beach = 3,704 spaces; Total = 12,157 spaces*

The results of the Park+ evaluation conclude that the study area is not experiencing a lack of parking supply, but rather a lack of publicly available supply in the areas of highest demand. The modeling effort showed that constructing additional supply is not likely to resolve the parking issues experienced in the highest demand areas within study area. The new public parking structure (Scenario 3) had the least met demand even though it has the most number of total spaces of parking, showing that adding more parking to the study area does not mean more people are able to park because a structure is fixed and only those willing and able to walk to the structure will park there. This further indicates that supply is not the parking issue in the study area. A parking garage is not able to meet the parking demands because the parking demands are not concentrated in one part of the study area, but rather, are dispersed throughout the study area. The model shows that there is sufficient existing private supply to meet parking demands. However, making the underutilized parking available for general users and managing the system more effectively will require collaboration between the public and private sector.

In general, the results of this analysis indicate that focusing on shared parking and investment in parking management and TDM strategies are likely the best solution for the study area. The recommendation from this analysis is to use the money (from the fee in lieu program and other funding sources) that would be invested in a new parking facility and apply it to TDM and parking management programs as a first step. The following summarizes the findings of the three scenarios.

Scenario 1 – Village, Barrio and Beach Area Buildout 2035

- The majority of the parking spaces in the study area are private, meaning they are restricted to certain users. These private lots are generally underutilized with occupancies that are under 60 percent (Table 6). The on-street public parking facilities are over the effective capacity threshold with occupancies reaching upwards of 100 percent (Table 5). These on-street facilities, which are the most desirable due to their ease of access to surrounding businesses, experience the highest occupancies in all three parts of the study area.
- At a level of occupancy at or above 85 percent, users will have difficulty finding available on-street parking and may start to feel frustration.
- In the Village, parking for the public is at 98 percent for both the on-street and off-street public parking, where the private parking remains approximately 40 percent. Many of the streets in the study area are residential and with occupancies nearing 100 percent in the Village, the neighborhood streets adjacent to the Village will begin to experience spillover from Village users. Thus, the residents in those adjacent areas will increasingly compete with visitors and other non-resident users for on-street public parking (Table 5 and Table 6).
- With a supply of 11,657 spaces and a peak occupancy of 61 percent, the parking problem experienced in the study area is not caused by a lack of parking. Rather, the problem is the lack of available public parking. More than half of the parking facilities in the study area are private and underutilized. There are opportunities within the parking system to share these private resources and reduce demands so that the system can be balanced and can be used more efficiently.
- There is unmet demand of 234 spaces.

Scenario 2 – Shared Parking,

- Shared parking resulted in a 9 percent reduction in occupancy for public parking and an increase of 2 percent occupancy for private parking. The public parking in the Village experienced a decrease of 13 percent in occupancy (Table 9 and Table 10).
- At the facility level, the system becomes more balanced by utilizing the underutilized private facilities for public parking. This is shown in the maps where many of the private facilities in the Village and Beach areas increased in occupancy.
- Opening private parking to allow users to park in more facilities that are underutilized increases the met demand from 7,103 spaces in Scenario 1 to 7,212 spaces in Scenario 2 (Table 3 and Table 7).
- Although the occupancies for public facilities in the Village area decreased 13 percent, the occupancy rate is at the effective capacity threshold with occupancies projected to be at 85 percent. (Table 9)
- The public off-street parking in the Village remain largely unaffected, with occupancies at 99 percent (Table 9).

Even with shared parking, the public parking in the system continues to experience demands that are at the

effective capacity. For example, an unmet parking demand of 125 spaces remains. ***Scenario 3 – New Public Parking Structure***

- Five hundred new public parking spaces, in the form of an above ground parking structure, were added to the parking system and evaluated using the Park+ model. It was assumed that the location of these spaces would be in the Village and a portion of the Beach areas where the parking demands are highest and where land uses would be appropriate to accommodate public parking.
- New parking supply in the form of a single parking structure has little impact to the parking demands in the study area because the unmet demands (243 spaces) are spread throughout the study area and would instead require a series of smaller parking structures to effectively meet needs. Based on the location of the parking demands in the study area and walking tolerances, at least two or more structures would be needed to meet those demands.
- At $20,000 per space, an additional 500 spaces, whether it is in one facility or spread throughout multiple facilities, would cost approximately $10 million for construction alone. This does not include the cost of land or annual operation and maintenance; these latter two items would cost between $250,000 to $400,000 yearly. Since its inception in 2000, the fee in-lieu program has earned $1.8 million. This money alone is not substantial enough to pay for structured parking or its upkeep. An increase in the in-lieu fee and/or additional funding source would need to be identified to support the addition of structured public parking.
- The additional supply in the study area allows more people to park in the area; however, the model shows that it does little to alleviate the high occupancies experienced by the public facilities.
- Above ground parking structures may have aesthetic and land use implications.

Transportation Demand Management

- TDM and parking management strategies combined can reduce parking demands by 10 percent to 20 percent. The strategies evaluated in this study consisted of the following:
    - Walking and cycling improvements
    - Mobility management
    - Financial incentives and disincentives
    - Parking regulations
    - Improved user information and marketing
    - Improved Enforcement
    - Encouraging Smart Growth development

  Implementation of these strategies has the potential to reduce parking demands 10-20 percent. For the Village, where the parking demands for all public parking exceeds effective capacity, reducing the number of single occupancy vehicles, and ultimately parking demands, will reduce the

associated demand for parking since those people will be traveling by other means to come to the study area.

Recommendations for Implementation

The evaluation of the future parking conditions in the study area concluded that while there are certain areas of the *parking system* that experience constraints, overall the parking system in the study area was underutilized. This suggests that the city's parking system is not balanced. With proper management, the system could be more efficient and can create greater availability of existing parking in high-demand areas.

The evaluation, using the *Park+* model, showed that the use of shared parking could more efficiently distribute and absorb *demand*. Also, using the results from the model, coupled with the case study research, the evaluation determined that the shared parking strategy could be more effective at improving the parking conditions in the study area than construction of a new garage. Based on the results of the analysis, it is recommended that the city move forward with the shared parking approach under Scenario 2 and implement *TDM* and other parking management strategies to manage the *parking system* more effectively prior to constructing a new public parking structure. The following summarizes the reasoning for the recommendation of Scenario 2.

Scenario 2 can produce similar, if not better, results than constructing new parking without the substantial economic investment.

The frustrations with parking in the study area do not stem from a lack of parking supply, but rather how much of that supply is available for the public to use. Therefore, the investment in new parking is not necessary when a more cost-effective and beneficial solution is to manage the existing and planned parking supply. Scenario 2 evaluates the impacts of one parking management strategy, shared parking.

Sharing existing parking facilities is a management solution that could benefit the entire community by making better use of the existing parking supply, creating availability of more spaces, and relieving frustrations from those using the parking facilities. Shared parking could be encouraged in private, underutilized lots throughout the study area. These lots can meet their business demands and have available spaces for other users. Those extra spaces could be opened to the public. Specific recommendations regarding shared parking can be found in the Parking Management Strategies section.

The city should actively promote shared parking to move towards the creation of an integrated network of parking offerings that provides a benefit to private landowners as well as the parking users. Often, municipalities provide incentives to private parking facilities to open their lots to employees or visitors dependent on complementing each user group's peak demand hours or available supply. Incentives used in other communities include providing annual striping or other maintenance services for the facility, providing direct financial payment funded through in-lieu fees or revenues from the parking system, or provide marketing and advertising platforms that network participating businesses to promote cross-patronage.

This is a more cost-effective solution to balancing the parking demands in the study area than building new parking. For cost purposes in this study, it was assumed that these spaces would be constructed in an above-ground parking garage based on cost estimates for underground facilities that vary greatly dependent on the site. Since a specific site is not identified for this study, generalizations had to be made to consider the cost estimates. The city can explore the option of underground parking; however, it is more expensive than above-ground parking.

It is estimated that the cost of constructing an above-ground parking garage is approximately $20,000 per space[11]. Therefore, a facility with 500 spaces would cost approximately $10 million. The cost to build the 500 spaces is independent of the footprint or number of facilities, as it is based on a per space average cost. In addition to this cost, operation and maintenance costs range between $500 and $800 per space annually (approximately $250,000 to $400,000 per year for the facility). From a land perspective, a three-level facility with 500 spaces would require approximately 1.6 acres of land. The cost for construction, operation, and maintenance is discussed in greater detail in Appendix B – Technical Memorandum #2.

Furthermore, the future of vehicle ownership over the next 10 to 30 years is in question due to the rise of participation in rideshare options (Uber and Lyft) as well as the anticipated introduction of the autonomous vehicle. Many garage developers are considering adaptive design of garages. If the garage is no longer necessary in the future it can easily be converted to another use[12, 13]. The change to a car-light society will be gradual and there is no way of knowing when the impacts will affect the city. However, it should be considered as the parking program progresses because the way we park over the next 10 to 30 years will change and an investment in a garage, when it is not needed, may not be the best use of public funds.

Scenario 2 supports the city's initiatives to become more sustainable.

Construction of a new parking facility does not support the city's sustainability goal. A new parking facility reinforces and encourages the use of personal vehicles. It is not sustainable to invest long-term in auto-centric strategies, but rather to improve mobility across all modes of transportation.

For these reasons, it is recommended that the city not construct a new parking structure at this time, but rather strengthen and improve shared parking in the study area and implement other parking management and TDM strategies to create a more balanced and efficient parking system.

[11] "Parking Structure Cost Outlook for 2015", Carl Walker
[12] LA Times, *When Car Ownership Fades, This Parking Garage Will Be Ready for its Next Life*, April 16, 2017
[13] Road and Track, *A Big Makeover Is Coming to the Parking Garage of the Future Thanks to Autonomy*, July 16, 2016