SAN DIEGO ASSOCIATION OF GOVERNMENTS (SANDAG)

# 2022 REGIONAL PARKING INVENTORY AND BEHAVIORAL SURVEY STUDY

## FINAL REPORT

**October 2022**

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# 1 INTRODUCTION

In 2021, the San Diego Association of Governments (SANDAG) completed its Regional Plan update and introduced a transformative vision that revolves around 5 big moves—key mobility strategies for reimagining how people and goods are moved around the San Diego region. The 5 big moves are interrelated, and the vision of the Regional Plan can only succeed by implementing all five strategies in tandem:

- **Complete Corridors:** A variety of travel choices in a multimodal transportation system that reimagines how highways and major roads are managed and how space is allocated to different modes.
- **Transit Leap:** A network of high-speed and high-capacity transit services that connect major residential and employment centers and regional attractions, such that transit is convenient, fast, and an attractive alternative to driving.
- **Mobility Hubs:** Places of connectivity where different modes of travel converge and are located at concentrations of employment, housing, shopping, and recreation.
- **Flexible Fleets:** Flexible options for making first- and last-mile connections to transit or to a user's destination through shared vehicles, such as rideshare and microtransit, and last-mile delivery solutions, such as electric bikes (e-bikes), drones, bots, or automated vehicles.
- **Next OS:** Next Operation System (Next OS), which is the concept of connecting all devices and vehicles in the transportation system to improve efficiency and accessibility for people and goods to move throughout the region.

These strategies envision the expansion of transit and flexible fleet options; therefore, SANDAG's activity-based model (ABM) must be designed to help make informed planning decisions regarding parking and curb policies and strategies throughout the mobility hub network. The 31 designated mobility hubs in the network are envisioned to provide an integrated suite of mobility services and amenities in areas served by high-frequency transit throughout the region, such as downtowns, employment centers, universities, and beaches. While some mobility hub services and features will be integrated into existing high-density areas with limited parking supply (e.g., Downtown San Diego, Hillcrest, and North Park), others will be integrated into mid- to lower-density communities targeted for transit-oriented growth (e.g., La Mesa, Otay Ranch). Over time, the number of automobile parking spaces at mobility hubs is likely to decrease because of a decrease in demand and capacity due to alternative uses of curb space and new land uses.

SANDAG retained the WSP Team to develop a parking inventory and collect parking choice data that will provide the basis for updated ABM parking models that will more accurately represent parking choices now and in the future and can be used to measure the impact of pricing and parking demand management policies. The behavioral survey asked respondents about their actual parking choices and presented them with a stated choice exercise as part of which they were invited to choose between hypothetical parking scenarios based on cost, time, and parking egress mode available. Mobility hubs in the SANDAG region are classified based on characteristics related to land use, employment and population density, and travel functionality (e.g., origin, destination, transfer hub). This study focuses on parking across the range of SANDAG's mobility hub types, which include urban core, major employment center, gateway (entry point to the regional transportation network), and coastal.

SANDAG and the WSP Team (the project team) kicked off the Regional Parking Inventory and Behavioral Survey project in November 2021. Throughout the nearly year-long study, the project team met on a weekly or bi-weekly basis to collaborate on data collection plans, survey design, and implementation steps. The project team also met with a Project Development Team (PDT) at key points in the study process to obtain feedback and input on integration with SANDAG's ABM. The PDT included modeling staff and consultants who participate in SANDAG's weekly ABM meeting. PDT meetings were held in November 2021, April 2022 and June 2022.

This document provides an overview of the approach, process, and results of work conducted over the course of this project, as well as the team's preliminary conclusions. Section 2 of the report describes the parking inventory; Section 3 describes the behavioral survey, and Section 4 provides the conclusions.

# 2 PARKING INVENTORY

The parking inventory provides a comprehensive overview of spaces in parking-constrained areas throughout SANDAG's mobility hub network. This chapter describes the methodology for the parking inventory development and summarizes the inventory by mobility hub.

## 2.1 STUDY SCOPE

**Geographic Extent**

The parking inventory covers all areas throughout the mobility hub network where parking is constrained. More specifically, the geographic extent of the parking inventory is based on an overlay of two designations: (1) "Parking-constrained areas" defined by SANDAG as locations with existing paid and permitted parking, and (2) SANDAG's regional mobility hub network. Based on the most recent parking-constrained area designation by SANDAG, the majority of parking-constrained areas are clustered in Downtown San Diego as shown in Figure 1.

**Types of Facilities**

The parking inventory classifies facilities into the following four categories:

- On-street metered parking and on-street free parking
- Off-street public and private non-residential parking
- Off-street residential parking
- Shared micromobility parking, which is parking for shared e-scooters/bikes in the San Diego region

**Study Output**

The inventory includes the number of parking spaces as well as the parking cost for on-street and non-residential off-street parking. Because of uncertainty associated with the parking capacity estimates, the estimate for each on-street and non-residential off-street parking facility is classified by level of confidence. Higher levels of confidence are assigned to facilities that have been confirmed with aerial images or to facilities for which multiple sources had similar estimates.

The inventory is summarized by mobility hub. For the ABM, the inventory data are also summarized at the Master Geographic Reference Area (MGRA), the small-scale unit of geography used in SANDAG's ABM. There are 24,321 MGRAs (Regional Forecast Series 15) in the region, about 1,100 of which are at least partly within the area covered by the inventory.

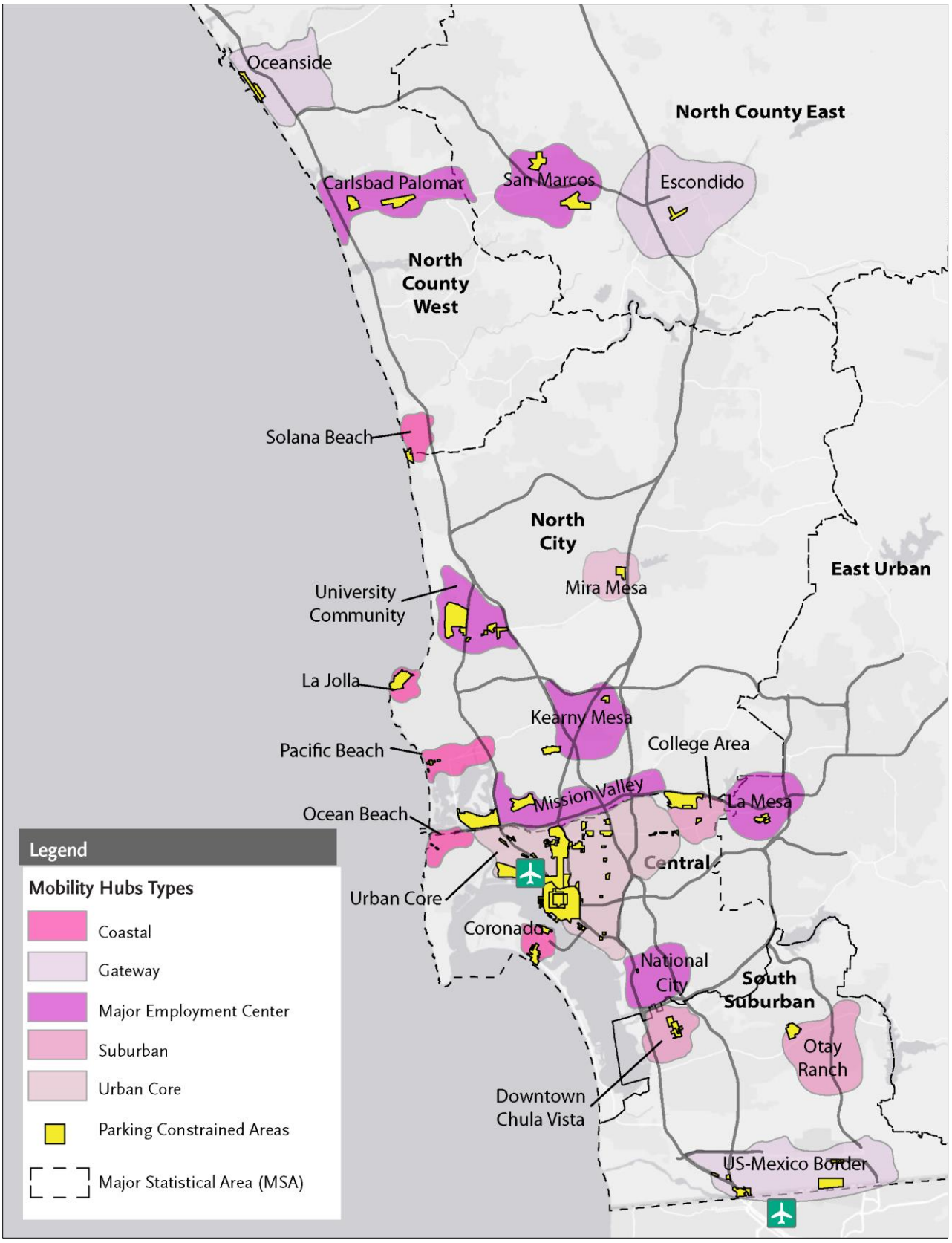


**Figure 1: Parking-Constrained Areas and SANDAG Regional Mobility Hubs**

## 2.2 DATA SOURCES

The inventory was developed using a wide range of sources. The key sources listed below were supplemented with GIS data from SANDAG and the SanGIS Regional GIS Data Warehouse including mobility hub boundaries, MGRA boundaries, and the road network file. More detail on the data elements included in each of the data sets is provided in Appendix A1.

**City of San Diego Parking Meter Data**

The City of San Diego maintains a database of the parking meters in the city. The most recently available database includes the longitude and latitude, fee structure, and parking duration limit for each metered space or pole. The database consists of data collected between November 2018 and October 2021.

**Parkopedia On-street Metered and Off-street Parking**

Parkopedia maintains a parking inventory to provide drivers looking for a parking space with parking information. The data used for this study were downloaded in January 2022. In the San Diego region, coverage is limited to areas where parking supply is somewhat constrained. Based on Parkopedia's website, the parking inventory is developed using proprietary software, computer vision, and artificial intelligence. Parkopedia works directly with parking operators and their payment providers and conducts in-person visits to parking locations to verify opening hours, prices, and other data elements. The data set includes the number of spaces, cost for 1-, 2-, 4-, and 8-hour periods on a Wednesday afternoon, monthly cost, and the longitude and latitude of each on-street parking meter and each parking lot or structure that is part of the database.

**CoStar Commercial Property Data**

CoStar is a real estate information and analytics provider. CoStar's data are obtained through field visits, aerial photography, data feeds, and public records research. CoStar's database includes 11 property types: office, multi-family, flex, hospitality, industrial, land, retail, shopping center, health care, specialty, and sports & entertainment. Each of these uses is expected to be associated with different parking needs. The "specialty" category includes parking garages, which are parking structures with multiple levels above or below ground, and parking lots, which are open surface parking lots used solely for paid parking. For other properties, the CoStar database also includes the number of parking spaces, the parking ratio (number of parking spaces per 1,000 square feet), or the number of parking spaces per multi-family residential unit. The data were extracted in March 2021.

**Replica Parking Data**

Replica is a web-based data analysis platform that provides information about transportation and land use, including on- and off-street parking data. For off-street parking, variables include facility location, number of parking spaces, rates, and hourly occupancy on weekdays and weekend days. The data were obtained in August 2022.

**UrbanFootprint**

UrbanFootprint is a web-based software platform that provides access to land use, socioeconomic, and environmental data sets. For this study, the project team downloaded parcel data shapefiles with attribute data, which included land use, parcel area, building area, population, and employment. Data were downloaded in August 2022.

**Nearmap**

Nearmap is an aerial imagery technology and location data web-based service that provides frequently updated, high-resolution aerial imagery. Nearmap was used to manually count the spaces for a random sample of parking facilities throughout the mobility hub network. The work was performed in the spring and summer of 2022.

**Google Street View**

Google Street View provides panoramic images of current streetscapes from Google and other contributors. Street View images were used to supplement the Nearmap analysis when verifying data accuracy. The work was also performed in the spring and summer of 2022.

### Previous Parking Inventory

The inventory is an update of the parking inventory included in the current version of the ABM. The previous parking inventory was based on a combination of sources, including parking meter data, a parking survey conducted in 2011, CoStar data, and assumptions about the number of stalls per linear foot of roadway. The previous parking inventory included the number of hourly, daily, and month stalls available for trips in the same MGRA and in other MGRAs.

# 2.3 ON-STREET PARKING

## 2.3.1 INTRODUCTION

On-street parking accounts for a small percentage of the parking spaces in the parking-constrained areas of the mobility hub network. On-street parking includes free and metered parking. Of the areas examined for this study, metered parking is available in the City of San Diego, the City of Chula Vista, the City of Oceanside, and the City of La Mesa.

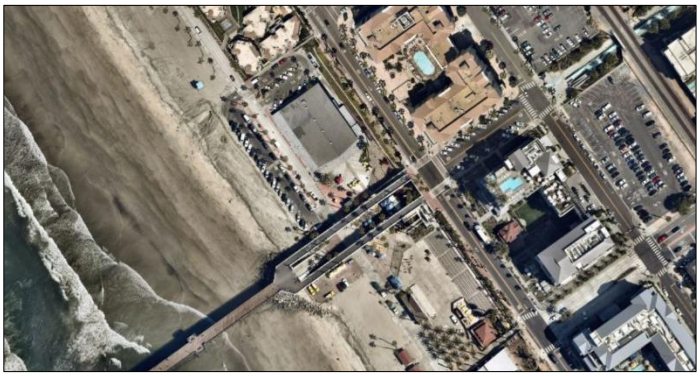

**Figure 2: Nearmap Aerial Photo (Oceanside)**

## 2.3.2 METHODOLOGY

The project team estimated on-street parking at the road segment level. Each parking meter was associated with the nearest road segment. For road segments without an associated parking meter, the project team developed a model to estimate the number of free spaces. Highways, entry and exit ramps, alleys, and other road classes where parking is not allowed were excluded from the analysis. Separate estimates were developed for the left and right sides of the road segments.

### ON-STREET CAPACITY

#### METERED PARKING

For the City of San Diego, the project team combined parking meter data from the city and Parkopedia. Some areas are covered by both data sources. Based on a review of the quality of the data, the team selected the Parkopedia data for the downtown area and the city data for the remainder of the City of San Diego. Metered parking information for the City of Chula Vista and the City of Oceanside were obtained from Parkopedia. Metered parking locations in the City of La Mesa were obtained from Google Street View.

#### FREE PARKING

The project team developed estimates of free parking capacity based on road segment length. In general, there are three types of on-street free spaces: parallel, diagonal, and perpendicular. For parallel spaces, the standard is 5 spaces per 100 linear feet of roadway while diagonal and perpendicular spaces tend to be 7 to 10 spaces per 100 linear feet. Other curb uses, including transit stops, drop-off zones, commercial loading zones, and other types of parking (i.e., metered parking, carshare parking, micromobility parking) and driveway access need to be considered when developing on-street parking estimates.


**Figure 3: Examples of On-street Parking**

Using aerial images from Nearmap and Google Street View, the project team manually counted the parking capacity of 329 unmetered road segments. The sample was developed by randomly selecting a number of road segments from each mobility hub and functional class. For the remainder of the road segments, two approaches (described below) were used to estimate on-street free parking capacity.

The **base approach** relies on the median space per car in the verified sample. In the verified sample, the median space per car is 35 feet on local roads and 43 feet on non-local roads. Thus, local roads are shown to have a higher proportion of alternative curb uses (e.g., transit stops, loading zones, and driveways) than non-local roads. The classification between local and non-local roads is based on the SanGIS roads layer. With this approach, the project team developed on-street free parking estimates by applying the applicable rate to the length of local and non-local roads.

The **alternative approach** creates two models with the verified sample: (1) a logistic regression that estimates whether a road segment has parking; and (2) for road segments with parking (based on the logistic regression), a linear regression that estimates the number of parking spaces. Before the start of the model estimation, the verified sample was split into training (80 percent) and testing (20 percent) sets. The models are estimated using the training set and are evaluated using the testing set. The models show the following:

- Local roads (as classified in the SanGIS Roads layer) are more likely to have parking than non-local roads, and local roads with parking tend to have less space per vehicle than non-local roads.
- Roads where the adjacent parcels include single-family residences are more likely to have on-street parking than roads without this adjacent land use.
- Major employment centers are less likely to have on-street parking than mobility hubs classified as urban, suburban, or gateway, while coastal mobility hubs are more likely to have on-street parking than these three mobility hub types.

The number of spaces on a road segment depends mostly on the length of the segment, with road segments in gateway mobility hubs having more space per car and road segments located in suburban, major employment, and coastal mobility hubs having less space per car than urban road segments. More information about the models can be found in Appendix A2.

### LEVEL OF CONFIDENCE

The project team assigned each capacity data point a level of confidence ranging from high to low, depending on the source.

**Table 1: On-street Confidence Level by Source**

| Level of confidence | Source |
|---|---|
| High | A count that was obtained by reviewing an aerial image and manually counting spaces |
| Medium/High | Parkopedia or city meter data |
| Low | An estimate developed using the base or alternative approach |

Source: WSP

## ON-STREET COST

The hourly cost for metered parking during and after business hours was obtained from the City of San Diego for meters located within the city. Outside the downtown area, Parkopedia was the source of the cost data for the other meters in the City of San Diego, the City of Chula Vista, and Oceanside.

## EXAMPLE

The following example (Figure 4) illustrates how aerial images were used to develop the inventory. On Juniper Street in San Diego between 5th Avenue and 6th Avenue, there are seven spaces on the north side of the street and five spaces on the south side.


**Figure 4: Nearmap Aerial Photo Example (City of San Diego)**

### *2.3.3 DATA OVERVIEW*

After excluding road classes where parking is not allowed, the road network in the parking-constrained areas within the mobility hub network measured 208 miles. Based on the metered data from the City of San Diego, the parking-constrained areas of the mobility hub network within the city contain 2,018 parking meters. The Parkopedia data set shows a total of 2,450 parking meters in the City of San Diego, Oceanside, and Chula Vista. Las Mesa includes an additional 126 meters. Combined, these meters cover an estimated 60 miles of roadway.

**Table 2: Miles of Road Network Included in the Study**

| | Miles |
|---|---|
| Free road network miles included in the study | 148 |
| Metered road network miles included in the study | 60 |
| Total road network miles included in the study | 208 |

Source: WSP analysis with SanGIS road network and data from the City of San Diego and Parkopedia.

### *2.3.4 RESULTS*

## ON-STREET CAPACITY

Using the methodology above, the project team estimates that there are between 25,100 and 36,900 free on-street parking spaces and 10,900 paid on-street parking spaces in the parking-constrained areas in the mobility hub network. Figure 5 and Figure 6 show the on-street capacity by MGRA.

### FREE PARKING

For about 9 percent of the 148-mile unmetered road network, the team manually counted the spaces, resulting in a high level of confidence (Table 3). The on-street free parking capacity for the remainder of the unmetered road segment was estimated and therefore was assigned a low level of confidence. The base and alternative estimates were combined into one single estimate of the free number of spaces of 31,000 by averaging the base and alternative estimate for each MGRA. The estimates are summarized by mobility hub in Table 4.

About 5 percent of the 60-mile metered road network was manually counted. The number of spaces for the remainder of the network were obtained from Parkopedia or the City of San Diego.

**Table 3: On-street Capacity by Level of Confidence**

| | Free | | | Paid | |
|---|---|---|---|---|---|
| Level of confidence | Miles of road segment | Number of spaces | | Miles of road segment | Number of spaces |
| | | Base method | Alternative method | | |
| High | 14 (9.4%) | 3,687 (10%) | 3,687 (14.7%) | 3.2 (5.3%) | 701 (6.4%) |
| Medium/High | | | | 57.1 (94.7%) | 10,208 (93.6%) |
| Low | 134 (90.6%) | 33,252 (90%) | 21,405 (85.3%) | | |
| Total | 148 (100.0%) | 36,939 (100.0%) | 25,092 (100.0%) | 60.3 (100.0%) | 10,909 (100.0%) |

Source: WSP analysis based on Parkopedia, City of San Diego data, and Nearmap and Google Street View images.
Note: To estimate the spaces that were not manually counted, the base method used the median space per car for local and non-local roads; the alternative method used logistic and linear regression models.

**Table 4: On-street Capacity by Mobility Hub (Average of Base and Alternative Methods)**

| Mobility hub | Free | Paid | Total |
|---|---|---|---|
| Carlsbad Palomar | 171 | - | 171 |
| College Area | 1,912 | - | 1,912 |
| Coronado | 2,493 | - | 2,493 |
| Downtown Chula Vista | 280 | 1,583 | 1,863 |
| Escondido | 705 | - | 705 |
| Kearny Mesa | 242 | - | 242 |
| La Jolla | 3,284 | - | 3,284 |
| La Mesa | 781 | 125 | 906 |
| Mira Mesa | 59 | - | 59 |
| Mission Valley | 654 | - | 654 |
| National City | 90 | - | 90 |
| Ocean Beach | 192 | - | 192 |
| Oceanside | 603 | 1,486 | 2,089 |
| Otay Ranch | 70 | - | 70 |
| Pacific Beach | 562 | - | 562 |
| San Marcos | 1,002 | - | 1,002 |
| Solana Beach | 240 | - | 240 |
| University Community | 915 | - | 915 |
| Urban Core | 15,870 | 7,715 | 23,585 |
| US-Mexico Border | 892 | - | 892 |
| Total | 31,017 | 10,909 | 41,926 |

Source: WSP analysis based on Parkopedia, City of San Diego data, and Nearmap and Google Street View images.

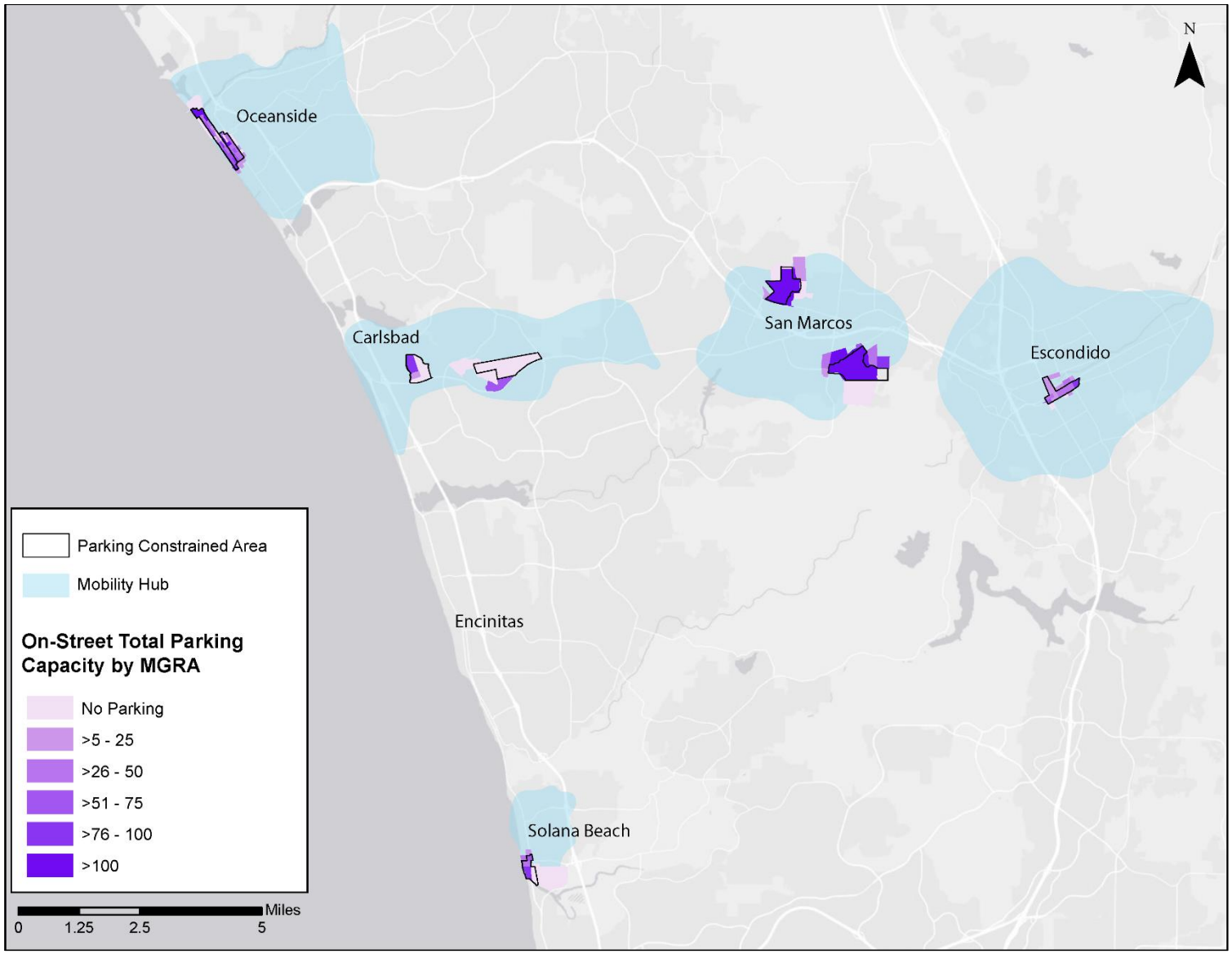


**Figure 5: On-street Parking Capacity (North County)**

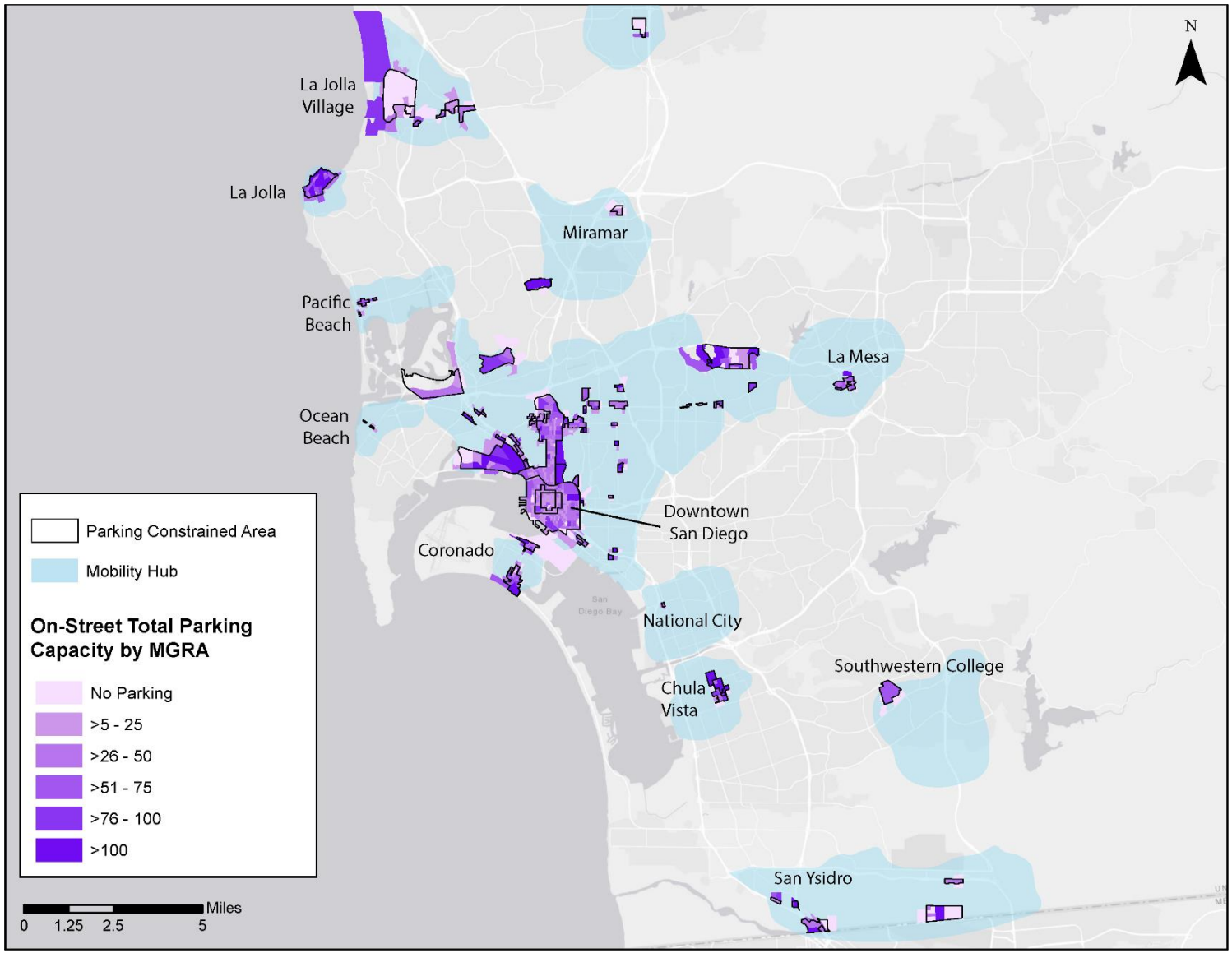


**Figure 6: On-street Parking Capacity (South County)**

## ON-STREET COST

The average hourly cost for the metered spaces before and after business hours by mobility hub is presented in Table 5. For most metered spaces, the parking duration limit is two hours or less.

**Table 5: Metered Parking Cost (in 2020 dollars)**

| Hourly cost | | |
|---|---|---|
| **Mobility hub** | **During business hours** | **After business hours** |
| Downtown Chula Vista | $ 0.21 | $ 0.21 |
| La Mesa | $ 0.75 | $ Free |
| Oceanside | $ 1.28 | $ 1.28 |
| Urban Core | $ 1.06 | $ 0.53 |

Source: WSP summary based on data from Parkopedia and the City of San Diego and online research.

# 2.4 OFF-STREET NON-RESIDENTIAL PARKING

## *2.4.1 INTRODUCTION*

Off-street, non-residential parking includes parking lots and structures that are publicly or privately owned. In some cases, these facilities are open to the public. In other cases, the facilities are reserved for customers, employees, patients, or other persons. (Off-street parking reserved for residents is presented in section 2.5.)

## *2.4.2 METHODOLOGY*

The parking-constrained areas in the mobility hub network cover 13 square mile across 10 jurisdictions and include 4,700 non-residential parcels. Because of limited resources, it was not feasible to collect primary data for an area of this size. Instead, the team relied on existing data from Parkopedia, CoStar, Replica, and UrbanFootprint and verified the capacity of a sample of the facilities with aerial images available through Nearmap and Google Street View. The team developed capacity and cost summaries at the parcel and MGRA level. To address the uncertainty of the capacity estimates, a level of confidence was assigned to each parcel and each MGRA.

### OFF-STREET NON-RESIDENTIAL CAPACITY

#### PARCEL-LEVEL ESTIMATES

The team reviewed capacity information for 324 randomly selected Parkopedia facilities, 97 randomly selected CoStar facilities, and 157 facilities located on parcels for which both data sources were available. About 200 of these facilities are lots and open-top structures for which aerial images were used to manually count the number of spaces.

For parcels with multiple data sources, the off-street capacity estimate is the average of the sources. For parcels with a single source, that source was used. When the number of spaces in a facility was manually counted using an aerial image, the manual count superseded all the other sources.

For parcels where Parkopedia, CoStar, and Replica do not include any parking capacity but for which UrbanFootprint indicates the land use as a parking lot, parking was estimated based on the parcel size and an assumption of 300 square feet per car. This method was used to estimate the capacity of 295 parcels.

In summary, for each parcel, capacity is based on one of the following:

- the manually counted number of spaces;
- if capacity data are available from more than one source (i.e., Parkopedia, CoStar, Replica), the average of the sources;
- if capacity data are available from one source, that source;
- if no capacity data are available but Urban Footprint shows that the parcel is a parking lot, an estimate of the number of spaces based on the parcel area.

#### MGRA-LEVEL ESTIMATES

Using the parcel-level estimates, base and alternative MGRA estimates were developed.

**Base estimate:** The base MGRA estimate is the sum of capacity estimates for each of the parcels located in the MGRA. A separate base estimate was developed for each of the three facility types: free, publicly owned paid, and privately owned paid.

**Alternative estimate:** The alternative MGRA estimate is the average of the capacity reported by Parkopedia, CoStar, and Replica for all parcels in an MGRA. The advantage of this approach is that it corrects for potential misalignment between the different data sources. For instance, capacity data from Parkopedia may be tied to a different parcel than capacity data from Replica even though the sources refer to the same facility. In such a case, the base approach would double count the parking, while the alternative approach would not. Misalignment can result from the fact that the different sources do not provide the same type of location information. Replica provides a polygon of the facility (see pink shaded areas in the example shown in Figure 7), while CoStar (see orange point on Figure 7) and Parkopedia (see yellow point on Figure 7) provide a single point. For Parkopedia, the point is the entrance of the facility. For CoStar, the point is closer to the centroid of the property. In some cases, the parking associated with the property may not be at the same location as the building. The disadvantage of the approach is that it does not consider the verified capacity and does not include the estimate developed based on UrbanFootprint data for parcels without parking capacity data from the three other sources.

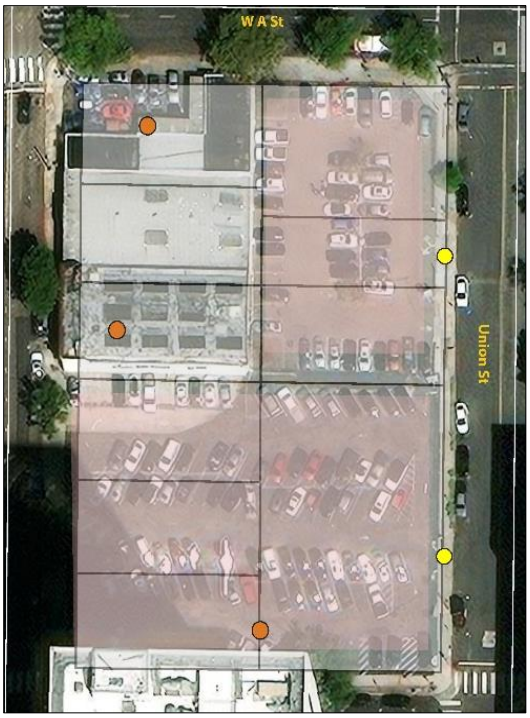


**Figure 7: Example Facility Location Data**

## LEVEL OF CONFIDENCE

To address the uncertainty around the capacity estimates, the base estimates for each parcel and MGRA are assigned a level of confidence. The six levels of confidence used are high, medium/high, medium, low/medium, low, very low.

First, ***each parcel*** is assigned a ***level of confidence*** based on the source of the capacity estimate as shown in Table 6. If the capacity estimate is based on more than one matching data point, the confidence increases by one level. For instance, if the capacity estimate for a parcel is the average of CoStar and Parkopedia data, and the CoStar and Parkopedia capacity data match, the level of confidence increases from medium/high to high. Matching sources are defined as sources between which the difference is no more than five parking spaces or 10 percent of the total parking spaces.

After each parcel is assigned a level of confidence, the ***MGRA level of confidence*** is calculated as the weighted average level of confidence of all parcels. The MGRA level of confidence is reduced based on the difference between the MGRA-level base and alternative estimate for all facility types combined, as follows:

- For a difference of 500 spaces or more, the level of confidence is reduced by two levels (e.g., from medium/high to low/medium).
- For a difference of 25 spaces or more and 100 percent or more, the level of confidence is reduced by two levels.
- For a difference of 25 spaces or more and between 50 and 100 percent, the level of confidence is reduced by one level.

This reduction adjusts for any potential error due to the misalignment of the different parcel-level sources within an MGRA as described above. (An example of the misalignment is provided in the second example below [MGRA 1094]).

**Table 6: Off-street Level of Confidence by Source**

| Source | Confidence level |
|---|---|
| Manually verified | high |
| Costar/Parkopedia/Replica | medium/high or, if at least two of the three sources match, high |
| Costar/Parkopedia | medium/high or, if both sources match, high |
| Costar/Replica | medium/high or, if both sources match, high |
| Parkopedia/Replica | medium/high or, if both sources match, high |
| Costar only | medium |
| Parkopedia only | medium |
| Replica only | medium |
| Estimate based on UrbanFootprint | low |

Source: WSP

## EXAMPLES

The following examples demonstrate the methodology used to develop base and alternative MGRA capacity estimates and confidence levels. The first example is MGRA 162 in the City of San Diego (Figure 8). The MGRA has four parcels, two which are residential (see Section 2.5 for residential parking). The remaining two parcels are a surface level parking lot and a parking garage. The project team classified both facilities as privately owned paid parking.

The parking lot in the northwest corner of the MGRA has 33 spaces based on Parkopedia and 32 spaces based on Replica. The lot was part of the sample that was manually counted, and the project team counted 33 spaces. Based on this information, the parcel's capacity estimate in the inventory is 33 spaces, and the estimate was assigned the highest level of confidence.

The large parcel on the eastern side of the MGRA is a six- story parking garage. Costar, Parkopedia, and Replica report similar capacity sizes – 580 (CoStar), 600 (Parkopedia), and 600 (Replica)—resulting in a capacity of 593 in the inventory, which is the average of the three sources. Because it is based on matching sources, the capacity estimate received the highest level of confidence.

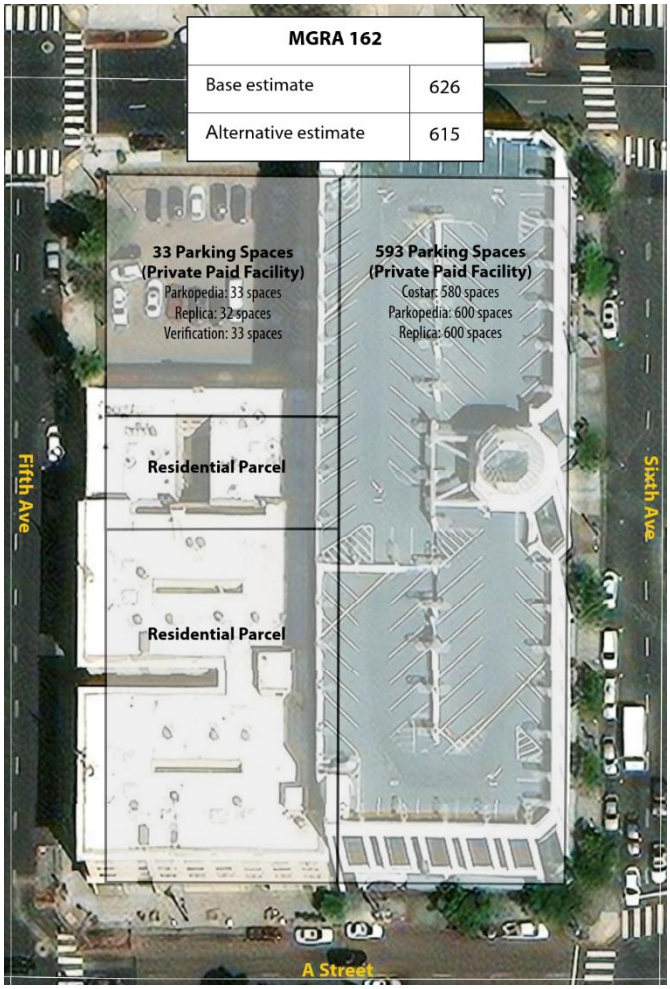


**Figure 8: MGRA Base and Alternative Capacity Calculations - Example 1**

The ***base estimate*** of the MGRA capacity is 626, which is calculated as the sum of the capacity the of two parcels in the MGRA (33 +593) (Table 7). The ***alternative estimate*** is 615, which is calculated as the average of the MGRA-level capacity from each of the three sources. Based on Parkopedia, the MGRA includes 633 spaces (33+600); based on Replica, it includes 632 spaces (32 + 600); and based on CoStar, the MGRA includes 580 spaces. The alternative estimate of 615 is the average of 633 (Parkopedia), 632 (Replica), and 580 (CoStar). In this example, the base and alternative estimates are similar and therefore, the high level of confidence in the capacity estimate is maintained.

**Table 7: MGRA Base and Alternative Capacity Calculations – Example 1**

| Source | Parcel 1 | Parcel 2 | MGRA total |
|---|---|---|---|
| Parkopedia | 33 | 600 | 633 |
| Replica | 32 | 600 | 632 |
| CoStar | | 580 | 580 |
| Verified | 33 | | |
| **Combined** | **33** | **593** | **BASE: 33+593 = 626 /ALTERNATIVE: average of 633, 632, 580 = 615** |

Source: WSP analysis of CoStar, Parkopedia, and Replica data.

The second example is MGRA 1094, which is also located in the City of San Diego (Figure 9). Unlike the first example, the difference between the base and alternative MGRA estimate in this example is large, with the base being twice the alternative estimate. MGRA 1094 has six small parcels in the southern half of the MGRA and one large parcel in the northern end. Two of the seven parcels have buildings. Costar reports that there are four spaces associated with the building on the large parcel and three spaces with the building on the smaller parcel. The remaining five parcels are all part of the same parking lot located in the southern half of the MGRA. Costar reports 2 facilities with 50 spaces each. Parkopedia reports 1 facility of 78 spaces. Because the Replica facility is represented by a polygon, the Replica capacity is divided among the three parcels with which it intersects. The parcel-level capacity estimates developed based on these sources are shown on Figure 9. The level of confidence assigned to the parcels is "medium/high."

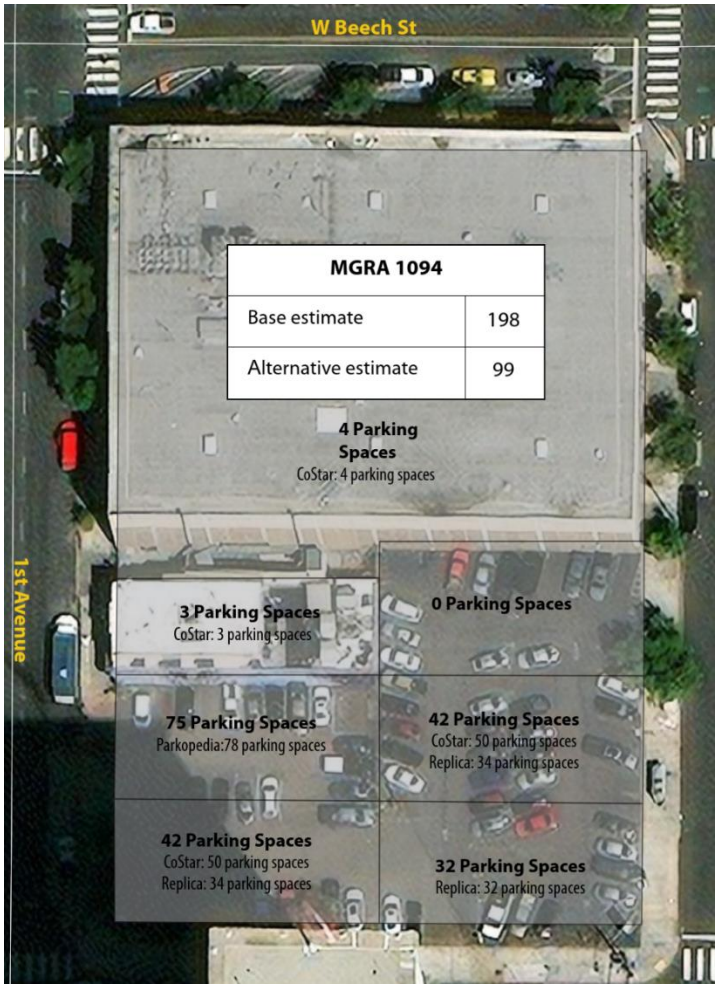


**Figure 9: MGRA Base and Alternative Capacity Calculations - Example 2**

The ***base MGRA approach*** results in a total of 198 spaces, calculated as the sum of all parcel-level capacities. Because the same parking lot is associated with a mix of different parcels in the three data sets, the same spaces are counted more than once with the base approach. The ***alternative MGRA approach*** results in 95 spaces, which is calculated as the average of the MGRA total from CoStar, Parkopedia, and Replica. CoStar reports a total of 107 spaces; Parkopedia reports a total of 78 spaces; and Replica reports a total of 100 spaces. The difference between the base and the alternative estimate for the MGRA is 103 spaces, which corresponds to more than 50 percent of the base estimate and more than 100 percent of the alternative estimate. Because of this large difference, the MGRA level of confidence, which is calculated as the weighted average level of confidence of all parcels in the MGRA, is reduced by one level from "medium/high" to "medium."

## OFF-STREET NON-RESIDENTIAL COST

Parking costs were obtained for Parkopedia and Replica. Parkopedia reports cost for 1-, 2-, 4-, and 8-hour periods on a Wednesday afternoon. Parkopedia does not distinguish between business hours and after business hours. Parkopedia also reports monthly parking rates. Replica data provide cost information including hourly, daily, and monthly rates. For some facilities, Replica indicates that rates vary by time of day. The project team translated the cost into the following four categories: hourly during business hours, hourly after business hours, daily, and monthly. Where cost data were available for multiple parcels within a MGRA, a capacity-weighted average cost was developed at the MGRA level. For MGRAs where costs were available from both sources, the average of the sources was used.

### *2.4.3 DATA OVERVIEW*

Based on the parcel data set from UrbanFootprint, there are 4,699 non-residential parcels in parking-constrained areas in the mobility hub network (Table 8). The total number of off-street parking spaces in these parcels is 91,600 based on CoStar, 74,700 based on Parkopedia, and 96,600 based on Replica. The CoStar data set provides parking capacity data for 2,042 of the non-residential parcels; Parkopedia provides data for 283 parcels; and Replica provides data for 496 parcels. Urban Footprint classifies the primary land use of 576 of these parcels as parking but does not provide any parking capacity information. Of these 576 parcels, there are 295 parcels for which the 3 other sources provide no capacity data. A total of 2,161 parcels do not have any parking information. Parking for the users of these parcels may be located on nearby parcels.

**Table 8: Off-street Parking Data Availability**

| Mobility hub | Number of non-residential parcels | Number of parcels with CoStar data | Number of parcels with Parkopedia data | Number of parcels with Replica data | Number of parcels with parking based on Urban Footprint | Number of parcels without parking information |
|---|---|---|---|---|---|---|
| Carlsbad Palomar | 27 | 3 | 2 | 0 | 1 | 22 |
| College Area | 94 | 23 | 4 | 13 | 9 | 55 |
| Coronado | 194 | 57 | 5 | 5 | 1 | 131 |
| Downtown Chula Vista | 215 | 115 | 0 | 2 | 3 | 99 |
| Escondido | 227 | 149 | 7 | 1 | 5 | 67 |
| Kearny Mesa | 18 | 1 | 4 | 1 | 0 | 12 |
| La Jolla | 335 | 107 | 23 | 24 | 29 | 206 |
| La Mesa | 166 | 62 | 3 | 0 | 2 | 100 |
| Mira Mesa | 2 | 0 | 0 | 0 | 0 | 2 |

| Mobility hub | Number of non-residential parcels | Number of parcels with CoStar data | Number of parcels with Parkopedia data | Number of parcels with Replica data | Number of parcels with parking based on Urban Footprint | Number of parcels without parking information |
|---|---|---|---|---|---|---|
| Mission Valley | 29 | 0 | 1 | 4 | 0 | 25 |
| National City | 9 | 1 | 0 | 0 | 2 | 6 |
| Ocean Beach | 21 | 2 | 0 | 1 | 1 | 19 |
| Oceanside | 173 | 56 | 9 | 30 | 12 | 76 |
| Otay Ranch | 12 | 0 | 0 | 2 | 0 | 10 |
| Pacific Beach | 77 | 31 | 15 | 12 | 17 | 33 |
| San Marcos | 24 | 1 | 2 | 2 | 0 | 21 |
| Solana Beach | 25 | 1 | 1 | 0 | 1 | 23 |
| University Community | 67 | 33 | 18 | 20 | 1 | 29 |
| Urban Core | 2,817 | 1,354 | 186 | 366 | 484 | 1,111 |
| US-Mexico Border | 167 | 46 | 3 | 13 | 8 | 114 |
| Total | 4,699 | 2,042 | 283 | 496 | 576 | 2,161 |

Source: WSP analysis of CoStar, Parkopedia, Replica, and UrbanFootprint data.

Table 9 compares the parcels with multiple data sources. Matching sources are defined as sources between which the difference is five spaces or fewer, or 10 percent or less. The capacity estimates match for about one-third of the private paid facilities with CoStar and Parkopedia data. For parcels with Replica data and one of the other sources, the percent with matching sources ranges from 22 percent to 52 percent. There are fewer than five parcels with free facilities based on CoStar and Parkopedia data or Parkopedia and Replica data, and fewer than five parcels with public paid facilities based on CoStar and Parkopedia or CoStar and Replica.

**Table 9: Comparison of Sources by Facility Type**

| Source A | Source B | Facility type | Number of parcels with both data sources | Number of parcels with matching sources | Percent of parcels with matching sources |
|---|---|---|---|---|---|
| CoStar | Parkopedia | Private Paid | 89 | 29 | 33% |
| CoStar | Replica | Free | 27 | 14 | 52% |
| CoStar | Replica | Private Paid | 106 | 26 | 25% |
| Parkopedia | Replica | Public Paid | 18 | 4 | 22% |
| Parkopedia | Replica | Private Paid | 167 | 64 | 38% |

Source: WSP analysis of CoStar, Parkopedia, Replica, and UrbanFootprint data.

As an example, Figure 10 shows the off-street capacity reported by the different sources in the Coronado mobility hub. The capacity shown combines the three facility types (free, public paid, private paid).

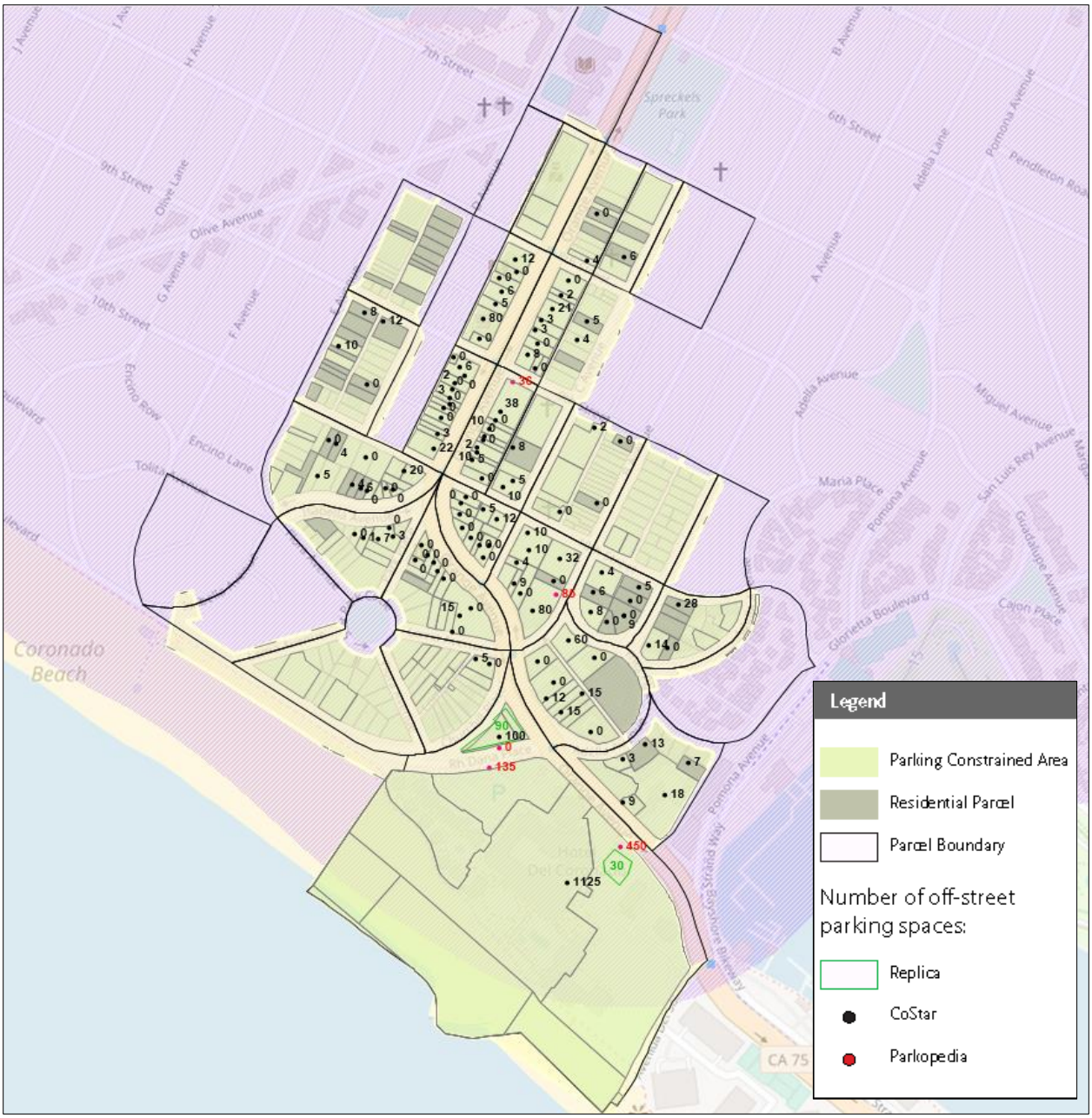


**Figure 10: Coronado Mobility Hub Off-street Parking Based on CoStar, Parkopedia, and Replica**

### *2.4.4 RESULTS*

## OFF-STREET NON-RESIDENTIAL CAPACITY

Based on the methodology above, the project team estimates between 150,500 and 175,500 off-street, non-residential spaces. The number of free spaces and paid spaces in public and privately owned facilities using the base and alternative methods, as well as the average between these two estimates, is shown in Table 10. The average was calculated at the MGRA level.

**Table 10: Off-street Capacity Base and Alternative Estimates by Facility Type**

| Facility type | Base estimate | Alternative estimate | Average base and alternative |
|---|---|---|---|
| Off-street free | 35,997 | 31,209 | 33,607 |
| Off-street paid, public | 20,930 | 21,805 | 21,365 |
| Off-street paid, private | 118,533 | 97,456 | 107,990 |
| Total | 175,460 | 150,470 | 162,962 |

Source: WSP analysis of CoStar, Parkopedia, Replica, and UrbanFootprint data.

Table 11 presents the base and alternative capacity estimates by mobility hub and facility type.

**Table 11: Off-street Capacity by Mobility Hub**

| | Base estimate | | | | Alternative estimate | | | |
|---|---|---|---|---|---|---|---|---|
| Mobility hub | Off-street free | Off-street paid, publicly owned | Off-street paid, privately owned | Total off-street non-residential | Off-street free | Off-street paid, publicly owned | Off-street paid, privately owned | Total off-street non-residential |
| Carlsbad Palomar | 1,181 | 1,053 | 1,510 | 3,744 | 1,181 | 1,053 | 1,510 | 3,744 |
| College Area | 1,112 | 5,624 | 2,469 | 9,205 | 698 | 5,299 | 2,469 | 8,466 |
| Coronado | 434 | - | 2,144 | 2,578 | 434 | - | 1,132 | 1,566 |
| Downtown Chula Vista | 1,423 | - | 1,817 | 3,240 | 922 | - | 1,817 | 2,739 |
| Escondido | 3,431 | 150 | 535 | 4,116 | 2,274 | 150 | 535 | 2,959 |
| Kearny Mesa | - | 1,349 | 2,610 | 3,959 | - | 1,349 | 1,305 | 2,654 |
| La Jolla | 1,196 | - | 3,898 | 5,094 | 772 | - | 2,643 | 3,415 |
| La Mesa | 1,296 | 143 | 580 | 2,019 | 1,296 | 142 | 580 | 2,018 |
| Mira Mesa | - | - | - | - | - | - | - | - |
| Mission Valley | - | 552 | 6,900 | 7,452 | - | 732 | 6,900 | 7,632 |
| National City | 181 | - | - | 181 | 181 | - | - | 181 |
| Ocean Beach | 56 | - | 42 | 98 | 56 | - | 42 | 98 |

| | Base estimate | | | | Alternative estimate | | | |
|---|---|---|---|---|---|---|---|---|
| Mobility hub | Off-street free | Off-street paid, publicly owned | Off-street paid, privately owned | Total off-street non-residential | Off-street free | Off-street paid, publicly owned | Off-street paid, privately owned | Total off-street non-residential |
| Oceanside | 2,767 | 1,323 | 245 | 4,335 | 2,423 | 1,128 | 245 | 3,796 |
| Otay Ranch | 46 | - | 4,280 | 4,326 | 46 | - | 4,280 | 4,326 |
| Pacific Beach | 374 | - | 902 | 1,276 | 250 | - | 600 | 850 |
| San Marcos | 34 | 2,013 | 100 | 2,147 | 34 | 3,228 | 100 | 3,362 |
| Solana Beach | 19 | - | 24 | 43 | 20 | - | 24 | 44 |
| University Community | 2,248 | 3,907 | 12,953 | 19,108 | 1,703 | 3,907 | 9,263 | 14,873 |
| Urban Core | 18,309 | 4,816 | 74,012 | 97,137 | 16,364 | 4,817 | 61,099 | 82,280 |
| US-Mexico Border | 1,890 | - | 3,512 | 5,402 | 2,555 | - | 2,912 | 5,467 |
| Total | 35,997 | 20,930 | 118,533 | 175,460 | 31,209 | 21,805 | 97,456 | 150,470 |

Source: WSP analysis of CoStar, Parkopedia, Replica, and UrbanFootprint data.

Figure 11 and Figure 12 are maps of the total off-street capacity by MGRA.

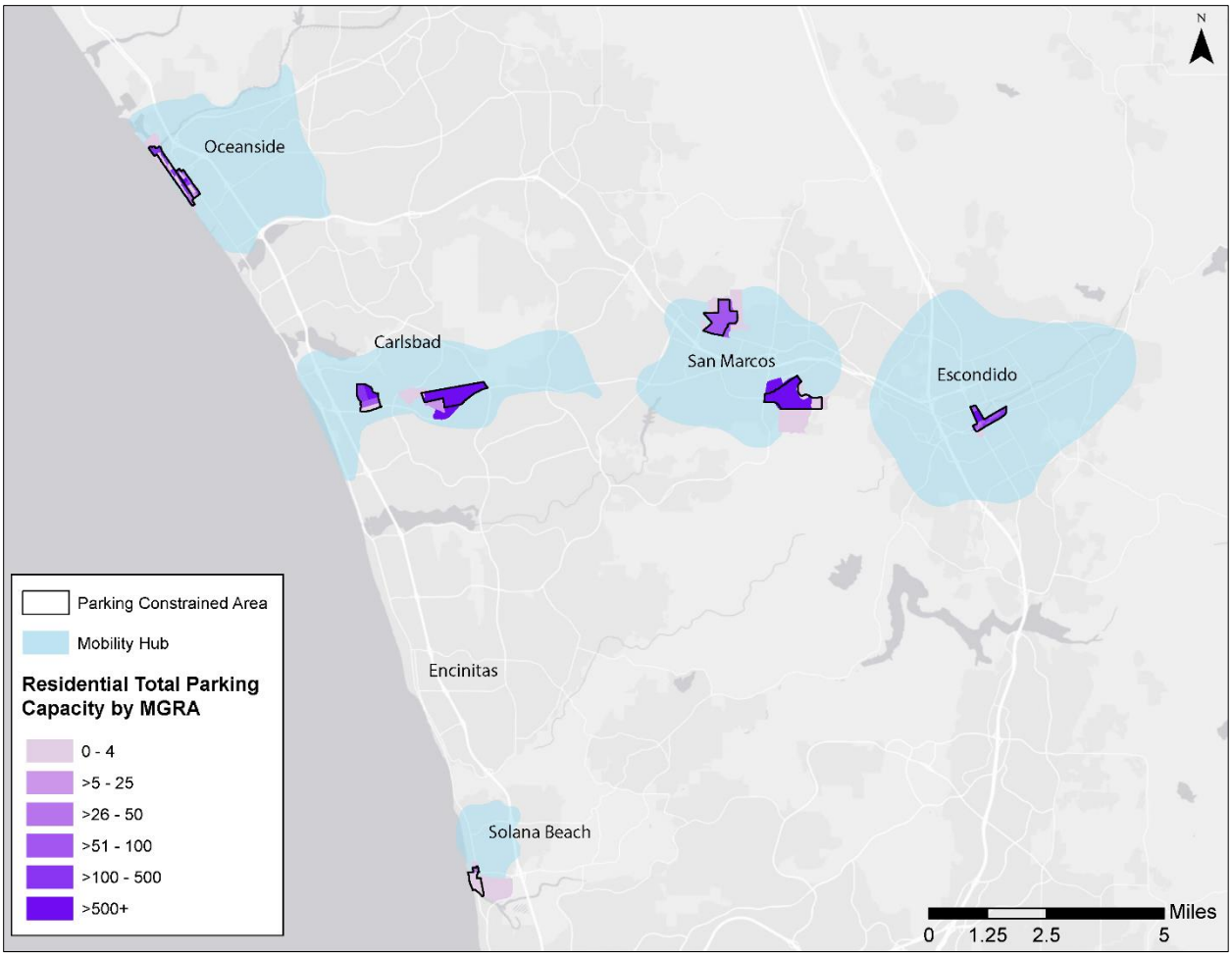


**Figure 11: Off-street Parking Capacity North County**

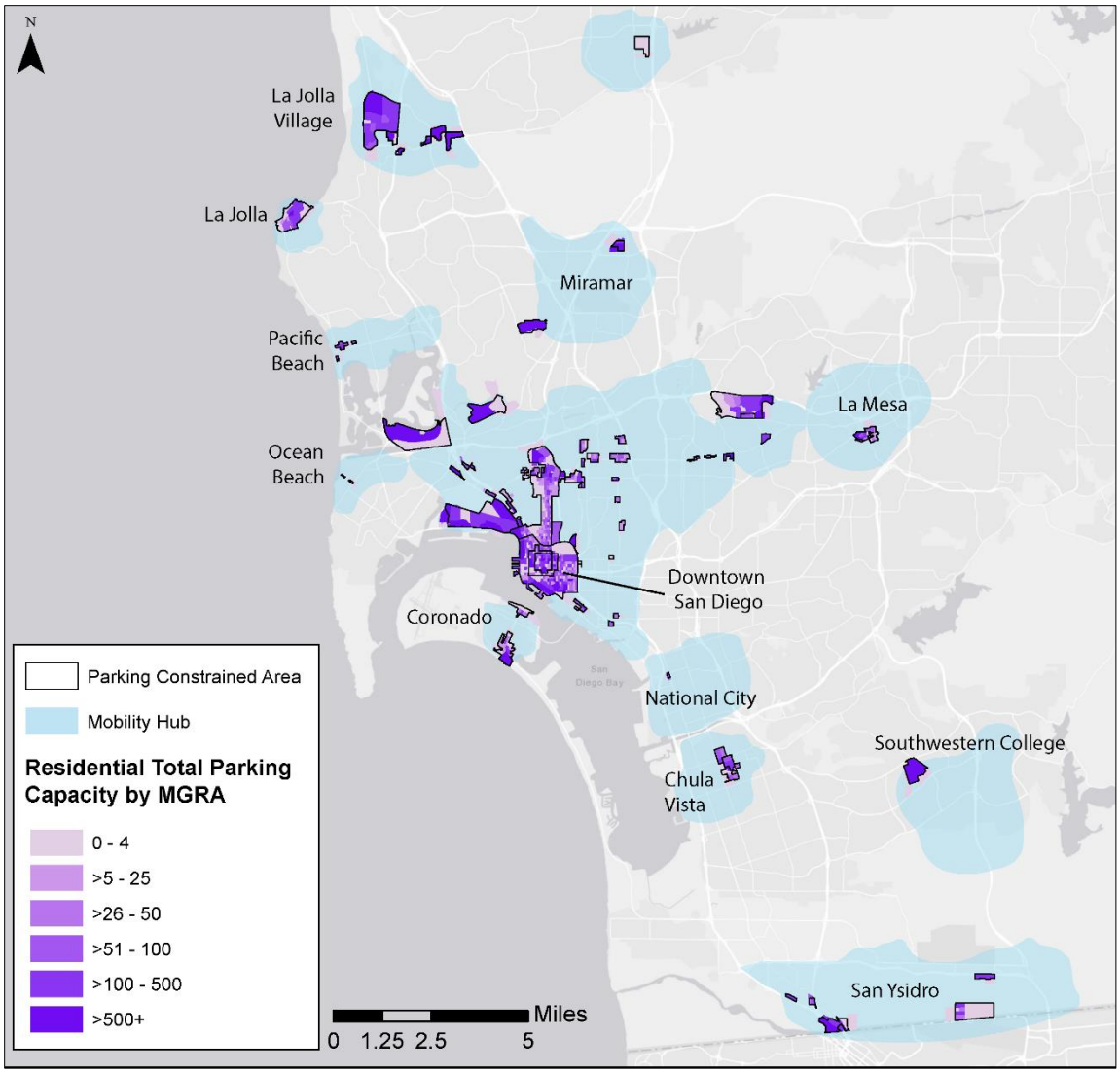


**Figure 12: Off-street Parking Capacity South County**

The team assigned a medium level of confidence or higher to 80 percent of the estimated capacity (Table 12). The level of confidence is assigned to each MGRA based on the sources used to develop capacity estimate and the difference between the base and alternative estimates as explained above in 2.3.2.

**Table 12: Off-street Capacity (Base Estimate) by Level of Confidence**

| | Level of confidence | | | | | | |
|---|---|---|---|---|---|---|---|
| **Facility type** | High | Medium/ high | Medium | Low/ medium | Low | Very low | Total |
| **Off-street free** | 1,028 | 1,938 | 20,636 | 4,990 | 5,412 | 1,993 | 35,997 |
| **Off-street paid, public** | 4,101 | 3,452 | 12,058 | 807 | 512 | - | 20,930 |
| **Off-street paid, private** | 20,007 | 30,021 | 47,718 | 12,882 | 7,905 | - | 118,533 |
| **Total** | 25,136 | 35,411 | 80,412 | 18,679 | 13,829 | 1,993 | 175,460 |
| **Percent of total** | 14% | 20% | 46% | 11% | 8% | 1% | 100% |

Source: WSP analysis of CoStar, Parkopedia, Replica, and UrbanFootprint data.

## OFF-STREET NON-RESIDENTIAL COST

Table 13 summarizes the off-street parking cost by mobility hub for publicly owned facilities; Table 14 provides the same information for privately owned facilities.

**Table 13: Average Cost (in 2022 Dollars) of Off-street Parking in Publicly Owned Facilities**

| Mobility hub | Hourly cost during business hours | Hourly cost after business hours | Daily cost | Monthly cost |
|---|---|---|---|---|
| College Area | $ 3.00 | $ 3.00 | $ 8.60 | |
| La Mesa | $ 0.67 | $ 0.67 | | |
| Mission Valley | $ 1.50 | $ 1.50 | $ 8.00 | |
| Oceanside | $ 3.38 | $ 3.38 | $ 5.42 | |
| San Marcos | $ 3.96 | $ 3.96 | $ 9.54 | $ 75.00 |
| University Community | $ 2.93 | $ 2.93 | $ 5.80 | $ 92.66 |
| Urban Core | $ 2.32 | $ 2.32 | $ 10.00 | |

Source: WSP analysis based on Parkopedia and Replica data.

**Table 14: Average Cost (in 2022 Dollars) of Off-street Parking Cost in Privately Owned Facilities**

| Mobility hub | Hourly cost during business hours | Hourly cost after business hours | Daily cost | Monthly cost |
|---|---|---|---|---|
| Carlsbad Palomar | $ 5.00 | $ 5.00 | $ 5.00 | |
| College Area | $ 3.00 | $ 3.00 | $ 15.00 | |
| Coronado | $ 8.63 | $ 8.63 | $ 21.79 | $ 75.00 |
| Kearny Mesa | $ 1.00 | $ 1.00 | $ 5.00 | |
| La Jolla | $ 3.40 | $ 3.58 | $ 13.38 | $ 43.33 |
| Mission Valley | | | $ 25.00 | |
| Ocean Beach | $ 5.00 | $ 5.00 | | |
| Otay Ranch | $ 0.83 | $ 0.83 | $ 3.00 | |
| Pacific Beach | $ 3.37 | $ 3.41 | $ 12.21 | $ 82.58 |
| University Community | $ 2.76 | $ 2.76 | $ 15.26 | |
| Urban Core | $ 9.24 | $ 9.13 | $ 22.85 | $ 149.49 |
| US-Mexico Border | $ 12.38 | $ 12.38 | $ 12.96 | $ 250.00 |

Source: WSP analysis based on Parkopedia and Replica data.

# 2.5 OFF-STREET RESIDENTIAL PARKING

## *2.5.1 INTRODUCTION*

Off-street residential parking refers to parking designated for residents on private property. Over the last decade, cities throughout California have been reducing or eliminating off-street parking minimums for new development projects. Studies have shown that setting parking minimums can contribute to higher development costs and promote reliance on automobiles. In 2019, the City of San Diego adopted zero minimum parking regulations for multi-family developments in Transit Priority Areas, many of which overlap with this project's study area, in an effort to reduce development costs and encourage residents to walk, bike, and take transit for daily transportation needs. The City of San Diego defines Transit Priority Areas (Figure 13) as areas within one-half mile of a major transit stop that is scheduled to be completed within the planning horizon included in a Transportation Improvement Program, in accordance with Senate Bill 743. Many other cities in the San Diego region are exploring options to reduce or eliminate parking minimums in downtowns, transit centers, and other areas targeted for residential developments. This section provides the methodology and results for development of the off-street residential parking inventory.

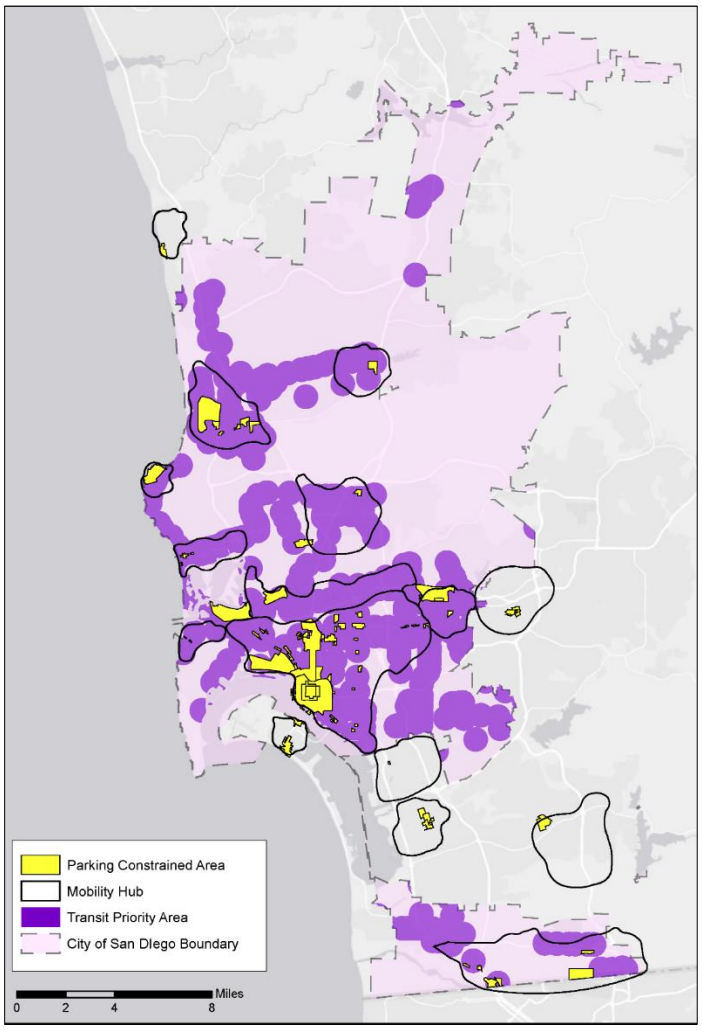


**Figure 13: City of San Diego Transit Priority Areas**

### 2.5.2 METHODOLOGY

To develop estimates for residential off-street parking, the project team (1) used parking space estimates at multi-family residential buildings from CoStar, and (2) applied local parking standard ratios for single-family homes. Where CoStar multi-family parking data were not available for all units, an average local parking standard ratio for multi-family units was applied to the remaining units. The sources are discussed below.

## COSTAR MULTI-FAMILY BUILDING DATA

CoStar provides parking data for 1,001 multi-family properties in the study area. For these buildings, CoStar reports 19,551 units and 20,617 parking spaces. The project team summarized the spaces by mobility hub and MGRA, using the MGRA Series 15 boundaries.

## LOCAL PARKING STANDARDS

In 2020, SANDAG compiled single- and multi-family residential off-street parking standards for jurisdictions in the San Diego region in the form of a summary table. The project team reviewed and revised the table accordingly to ensure that parking standards were up to date as of May 2022. Table 15 details information for the jurisdictions that fall within the project study area:

**Table 15: Off-Street Residential Parking Jurisdictions and Regulations**

| Jurisdiction | Regulation |
|---|---|
| Carlsbad | City of Carlsbad, California Municipal Code Title 21 Zoning Chapter 21.44.020 |
| Chula Vista | City of Chula Vista Municipal Code Title 19 Chapter 19.62 |
| | Urban Core Specific Plan Overlay- City Council Ordinance No. 3070, April 2007 |
| Coronado | City of Coronado Municipal Code Title 86 Chapter 86.58 |
| Del Mar | City of Del Mar Title 30 Chapter 30.80 |
| Escondido | City of Escondido Municipal Code Chapter 33 Article 39 Section 33-765 |
| La Mesa | City of La Mesa Municipal Code Title 24 Chapter 24.04 |
| Oceanside | City of Oceanside Comprehensive Zoning Ordinance Part IV Article 31 |
| San Diego | City of San Diego Municipal Code Article 2 Division 5 |
| San Marcos | City of San Marcos Title 20 Chapter 20.340.040 |
| Solana Beach | City of Solana Beach Municipal Code Title 17 Chapter 17.52 |

The SANDAG summary table includes the jurisdiction, data source (municipal code), and parking standards by land use type, including single-family and multi-family (studio, 1 bedroom, 2 bedroom, 3 bedroom and 4+ bedroom) residential units. The table also notes any exceptions to these rules and regulations. The project team added parking standards for single- and multi-family housing specific to overlays (e.g., Transit Priority Areas, specific plan areas) within the study area. Numerous jurisdictions provide multiple rates for multi-family housing per number of bedrooms or number of dwellings. Where needed, the team averaged the ratios to provide one multi-family ratio per jurisdiction. For single-family units, the rates range from two parking spaces per unit to three parking spaces per unit. For multi-family units, rates range from 1.25 to 2.25 spaces per dwelling unit.

These rates were applied to the number of housing units in each MGRA to estimate the number of off-street residential parking spaces by MGRA based on the standard for single-family units and for multi-family units not included in the CoStar database. The number of housing units by MGRA was obtained from the SANDAG Series 15 Regional Growth Forecast.

### 2.5.3 RESULTS

The project team estimated a total of 173,800 off-street residential parking spaces in the parking-constrained areas of the mobility hub network (Table 16).

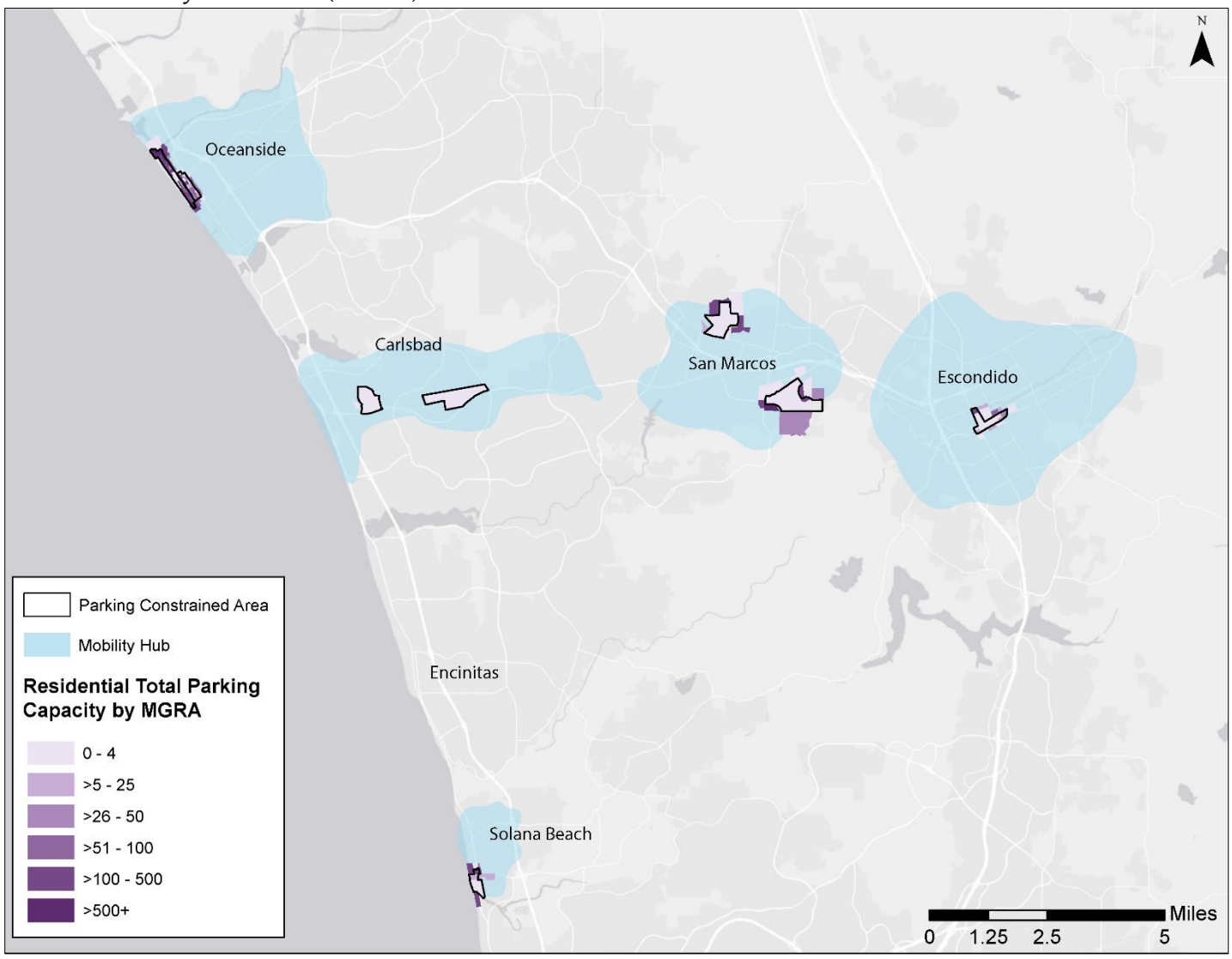


Figure 14 and Figure 15 show maps of these spaces by MGRA.

**Table 16: Number of Residential Off-street Parking by Mobility Hub (in MGRAs with Parking-constrained Areas)**

| Mobility hub | Number of single-family units | Number of required parking spaces for single-family units | Number of multi-family units | Number of parking spaces for multi-family units from CoStar | Number of additional required parking spaces for multi-family units | Total number parking spaces for multi-family units | Total number off-street residential parking |
|---|---|---|---|---|---|---|---|
| Carlsbad Palomar | 1 | 2 | - | - | - | - | 2 |

| Mobility hub | Number of single-family units | Number of required parking spaces for single-family units | Number of multi-family units | Number of parking spaces for multi-family units from CoStar | Number of additional required parking spaces for multi-family units | Total number parking spaces for multi-family units | Total number off-street residential parking |
|---|---|---|---|---|---|---|---|
| College Area | 667 | 1,334 | 961 | 506 | 1,259 | 1,765 | 3,099 |
| Coronado | 858 | 1,716 | 3,217 | 140 | 5,438 | 5,578 | 7,294 |
| Downtown Chula Vista | 1,807 | 3,614 | 4,256 | 2,575 | 4,107 | 6,682 | 10,296 |
| Escondido | 38 | 114 | 257 | 138 | 37 | 175 | 289 |
| Kearny Mesa | 183 | 366 | - | - | - | - | 366 |
| La Jolla | 694 | 1,388 | 1,892 | 286 | 3,064 | 3,350 | 4,738 |
| La Mesa | 919 | 2,301 | 1,062 | 581 | 1,728 | 2,309 | 4,607 |
| Mira Mesa | - | - | 959 | - | 1,529 | 1,529 | 1,529 |
| Mission Valley | 1,027 | 2,054 | 495 | - | 826 | 826 | 2,880 |
| National City | 33 | - | 181 | - | - | - | - |
| Ocean Beach | 70 | 140 | 125 | 14 | 185 | 199 | 339 |
| Oceanside | 606 | 1,519 | 2,473 | 688 | 3,451 | 4,139 | 5,653 |
| Otay Ranch | 557 | 1,114 | - | - | - | - | 1,114 |
| Pacific Beach | 223 | 446 | 816 | 94 | 1,362 | 1,456 | 1,902 |
| San Marcos | 365 | 913 | 790 | - | 1,027 | 1,027 | 1,940 |
| Solana Beach | 76 | 183 | 440 | - | 880 | 880 | 1,063 |
| University Community | 511 | 1,022 | 6,209 | - | 11,095 | 11,095 | 12,117 |
| Urban Core | 8,075 | 16,150 | 65,986 | 21,574 | 74,663 | 96,237 | 112,387 |
| US-Mexico Border | 221 | 442 | 1,043 | 60 | 1,730 | 1,790 | 2,232 |
| Total | 16,931 | 34,818 | 91,162 | 26,656 | 112,381 | 139,037 | 173,847 |

Source: WSP analysis, CoStar data, and municipal standards from jurisdictions in Table 15.

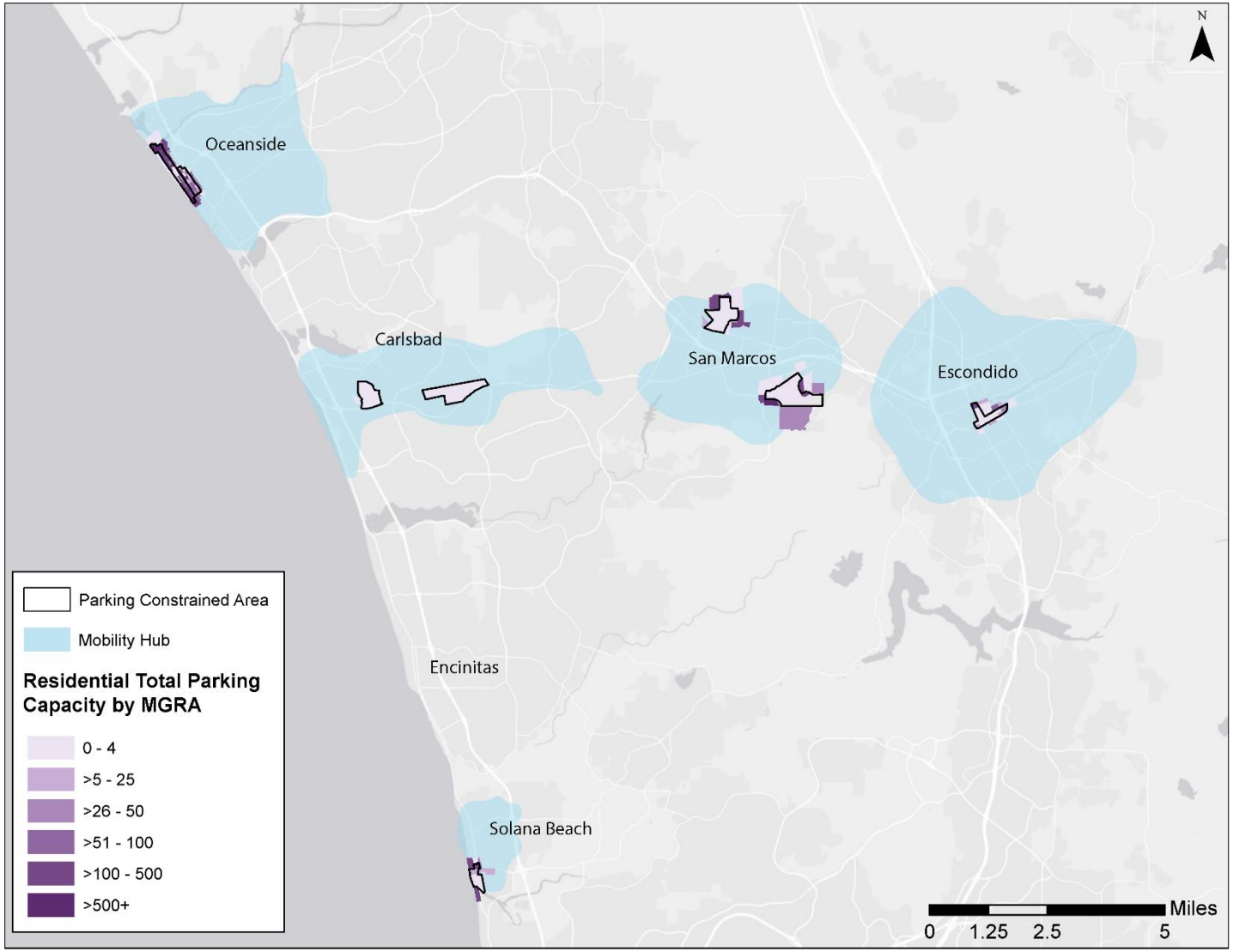


**Figure 14: Residential Parking Capacity North County**

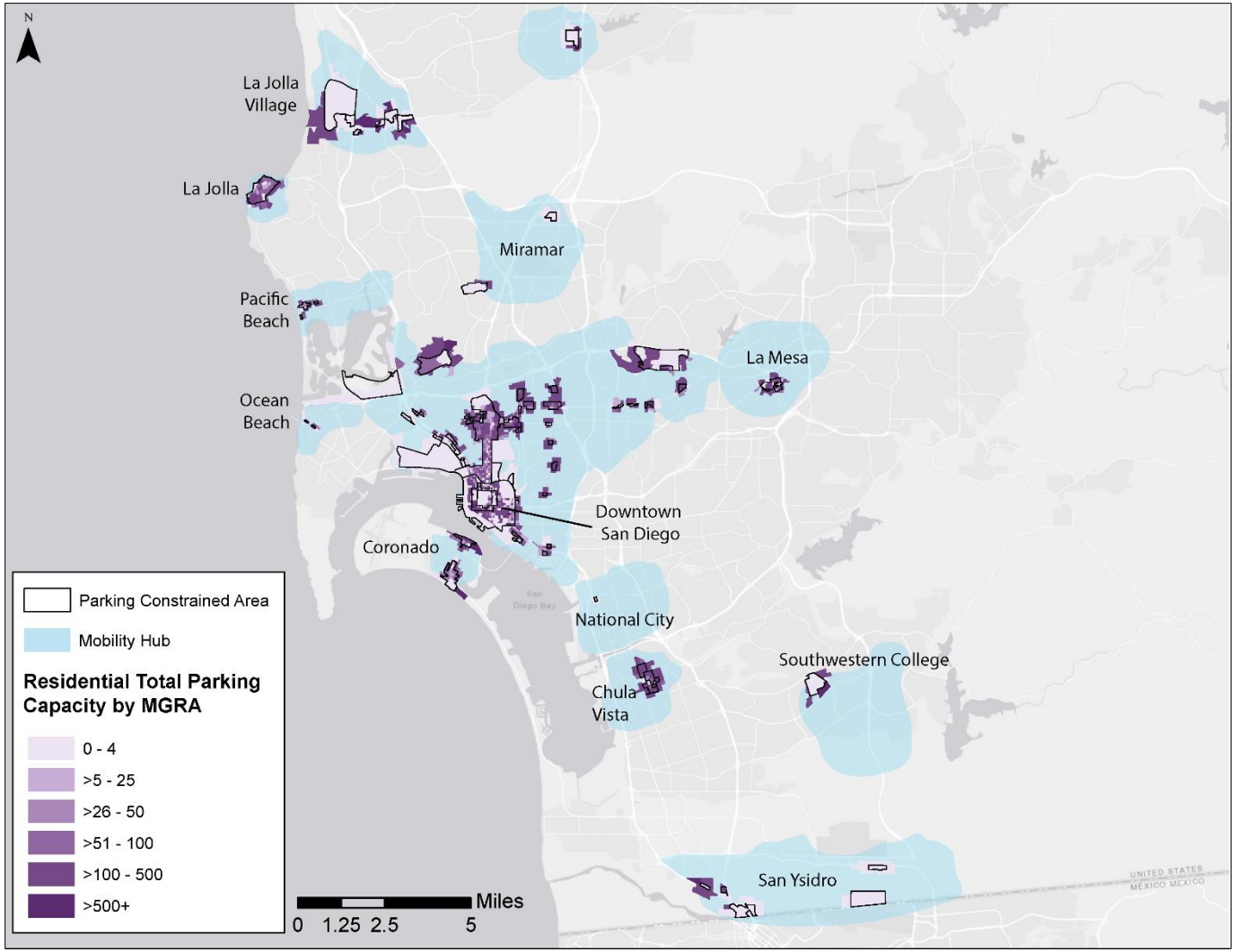


**Figure 15: Residential Parking Capacity South County**

## 2.6 MICROMOBILITY

Micromobility refers to small, low-speed human- or electric-powered transportation devices, including bicycles, scooters, e-bicycles, and e-scooters among others. These vehicles are usually for single-rider use. The inventory focuses on parking spaces designated for shared micromobility services, which is when the vehicles are being used as a shared resource between multiple users. As of August 2022, shared mobility providers in the San Diego region included Bird, BCycle, Link, Lyft, Spin, Veo, and Wheels. The project team obtained data on the location and size of the scooter corrals from the City of San Diego. Shared mobility devices, according to San Diego municipal code §83.0310, must be parked within a corral, except for shared use bikes or e-bikes that can lock to existing city bike racks. The City of San Diego has 536 corral, and 361 of these are within parking-constrained areas of the mobility hub network within the City of San Diego (Figure 16). Of those, the majority of the corrals are located within the urban core mobility hub (Table 17). Assuming an average of 8 square feet per scooter, the total number of spaces is estimated as 3,450.

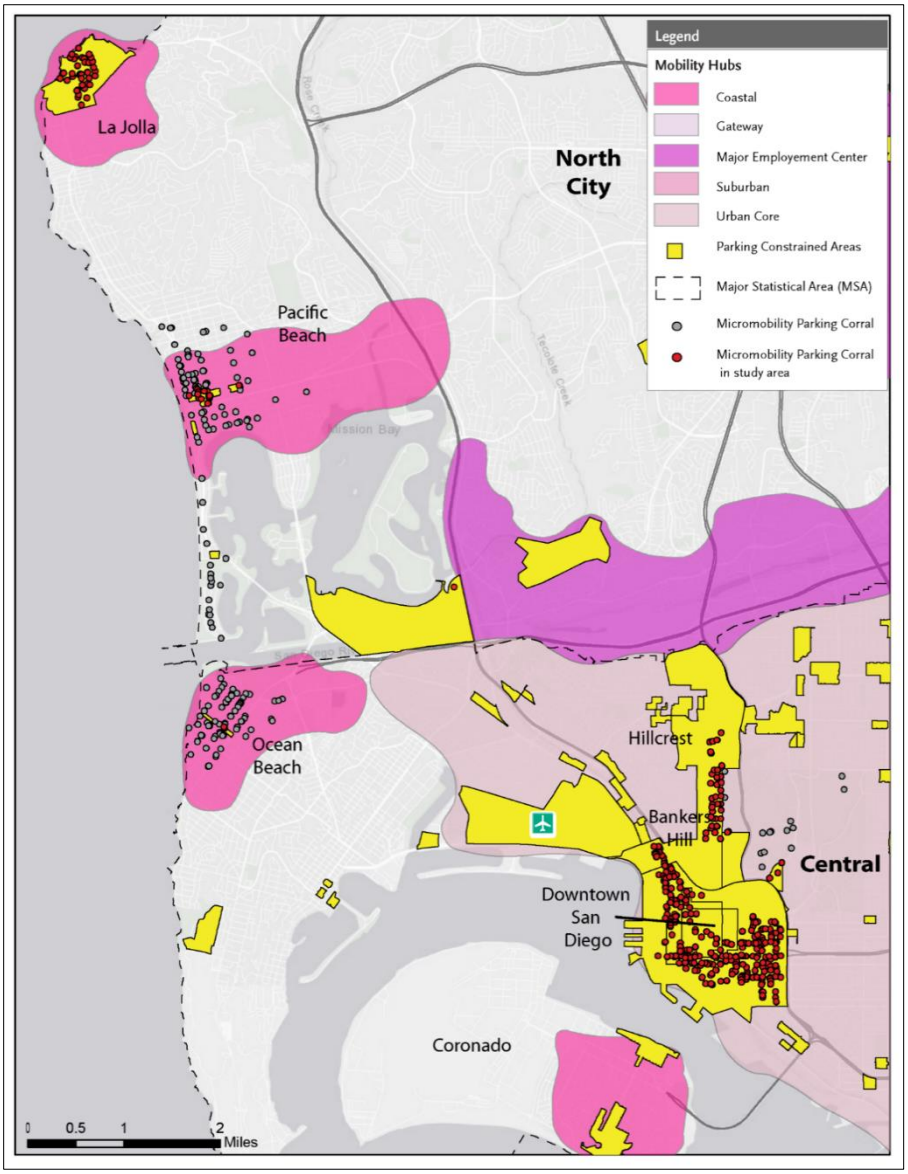


**Figure 16: Micromobility Parking Corrals**

**Table 17: Micromobility Parking Corrals in Mobility Hubs**

| Mobility hub | Number of corrals | Number of spaces |
|---|---|---|
| Ocean Beach | 2 | 15 |
| Pacific Beach | 15 | 136 |
| La Jolla | 37 | 289 |
| Urban Core | 307 | 3,010 |
| Total | 361 | 3,450 |

Source: WSP

## 2.7 SUMMARY

Based on the inventory, the number of parking spaces in parking-constrained areas in the mobility hub network include 41,900 on-street spaces, 163,000 non-residential off-street spaces, and 173,800 residential off-street spaces (Table 18). The on-street and off-street non-residential estimates are the average base and alternative estimates. An estimated 3,450 micromobility parking spaces are available in corrals.

**Table 18: Overview of Parking Inventory**

| Mobility hub | On-street | Off-street non-residential | Off-street residential | Micromobility |
|---|---|---|---|---|
| Carlsbad Palomar | 171 | 3,744 | 2 | |
| College Area | 1,912 | 8,835 | 3,099 | |
| Coronado | 2,493 | 2,072 | 7,294 | |
| Downtown Chula Vista | 1,863 | 2,990 | 10,296 | |
| Escondido | 705 | 3,539 | 289 | |
| Kearny Mesa | 242 | 3,307 | 366 | |
| La Jolla | 3,284 | 4,254 | 4,738 | 289 |
| La Mesa | 906 | 2,018 | 4,607 | |
| Mira Mesa | 59 | - | 1,529 | |
| Mission Valley | 654 | 7,542 | 2,880 | |
| National City | 90 | 181 | - | |
| Ocean Beach | 192 | 98 | 339 | 15 |
| Oceanside | 2,089 | 4,065 | 5,653 | |
| Otay Ranch | 70 | 4,326 | 1,114 | |
| Pacific Beach | 562 | 1,062 | 1,902 | 136 |
| San Marcos | 1,002 | 2,754 | 1,940 | |
| Solana Beach | 240 | 44 | 1,063 | |
| University Community | 915 | 16,991 | 12,117 | |
| Urban Core | 23,585 | 89,706 | 112,387 | 3,010 |
| US-Mexico Border | 892 | 5,434 | 2,232 | |
| Total | 41,926 | 162,962 | 173,847 | 3,450 |

Source: WSP analysis with CoStar, Parkopedia, Replica, and UrbanFootprint data.

# 3 PARKING BEHAVIORAL SURVEY

## 3.1 INTRODUCTION

To learn about resident and visitor preferences for parking, the project team intercepted more than 2,500 drivers after they parked their car in a parking-constrained area in the mobility hub network. Respondents were asked questions about their current trip and parking choices; employed respondents were asked about employee parking benefits. The revealed preference section of the survey was supplemented with a stated preference section.

## 3.2 SURVEY PLANNING

Survey planning refers to all survey activities that occur before the full launch of the survey. Survey planning activities include survey location selection, sampling plan, questionnaire design, interviewer recruitment and training, and survey testing.

### *3.2.1 SURVEY LOCATION SELECTION*

The selection methodology for survey locations included two primary criteria: mobility hub type and Major Statistical Areas (MSAs) for the San Diego region. The project team used these data sets as a guide to capture a variety of location types and ensure coverage across the region. Additionally, the project team considered average median household incomes (based on American Community Survey [ACS] 2019 5-year estimates) and CalEnviroScreen 3.0 scores within each parking-constrained area to ensure inclusion of a range of incomes and of state-designated disadvantaged communities (Table 19).

**Table 19: Survey Location Selection Matrix**

| Survey location | Mobility hub typology | MSA | Median household income | CalEnviroScreen 3.0 (CES) disadvantaged community |
|---|---|---|---|---|
| La Jolla | Coastal | North City | $91,000 | No |
| Coronado | Coastal | Central | $109,000 | No |
| Pacific Beach | Coastal | North City | $66,000 | No |
| Solana Beach | Coastal | North City | $126,000 | No |
| Oceanside | Gateway | North County West | $83,000 | Yes |
| Escondido | Gateway | North County East | $29,000-$60,000 | Yes |
| San Ysidro | Gateway | South Suburban | $46,000 | Yes |
| San Diego Mesa College | Major employment center | North City | $61,000 | Yes |
| La Mesa | Major employment center | East Suburban | $46,000-$88,000 | Yes |
| University of California, San Diego Campus | Major employment center | North City | $43,000 | Yes |

| Survey location | Mobility hub typology | MSA | Median household income | CalEnviroScreen 3.0 (CES) disadvantaged community |
|---|---|---|---|---|
| Westfield University | Major employment center | North City | $75,000 | Yes |
| Carroll Canyon | Suburban | North City | $55,000 | No |
| Chula Vista 1 | Suburban | South Suburban | $53,000 | Yes |
| Chula Vista 2 | Suburban | South Suburban | $53,000 | Yes |
| Downtown Core | Urban core | Central | $62,000-$103,000 | Yes |
| North Park | Urban core | Central | $68,000-$87,000 | Yes |

Source: WSP, SANDAG, ACS 2015-2019, and CalEnviroScreen 3.0.

The median household incomes noted in the location selection matrix reflect the average of the median household incomes of all census tracts that fall within the selected sites. By comparison, the median household income in San Diego County was $79,000 based on the 2015-2019 ACS. The CalEnviroScreen column represents whether the census tracts within each site score in the top 25 percentile of all census tracts statewide (meeting CalEPA's definition of a "disadvantaged community"). The availability of existing parking inventories was also considered, giving preference to locations for which parking data were available.

The project team assembled a list of 16 initial locations for consideration; at least one site was selected for each mobility hub type and MSA. East Suburban and East County were merged into one MSA because areas east of the Cleveland National Forest do not contain any parking-constrained areas. The locations were selected to be representative of the diversity of the San Diego region in terms of land use and demographics, including areas with large minority populations.

Through discussion with PDT members, the project team further refined the list of locations. The final selection included eight parking-constrained areas, or clusters of parking-constrained areas, that fell within the following mobility hubs:

- Oceanside
- Escondido
- US-Mexico Border (San Ysidro)
- La Mesa
- University of California, San Diego (UCSD) Community (UCSD Campus)
- Downtown Chula Vista
- Urban Core (Downtown and North Park)

Two locations are in the urban core, two are in the major employment centers, two are in the gateway, and one is in the suburban mobility hub types. One gateway selection, Oceanside, is classified as such because it is an entrance into the region via Interstate-5, although it also serves as a coastal mobility hub typology.

Within each of the selected parking-constrained areas, the project team selected specific parking facilities with the goal to obtain a mix of facility types overall and by mobility hub type. The five parking facility types that were selected included: public paid lots/structures, private paid lots/structures, free off-street parking, on-street metered parking, and on-street free parking. The selection process also considered logistics including whether permissions to conduct the survey at the facility were obtained during the data collection by the field supervisors or in advance by SANDAG. Facilities where people are frequently coming and going throughout the day were included in the mix to maximize the project team's opportunities for interception. In the absence of the full inventory, the team relied on existing parking inventory studies, SANDAG's ABM, and aerial imagery from Google

Street View and Nearmap to understand available parking facilities at each selected location. The list of the 92 facilities where the survey was conducted is presented in Appendix A3.

### 3.2.2 SAMPLE SIZE

The overall sample size target of this survey was 2,500. The sampling plan included sample size targets at three levels: mobility hub, facility type, and facility type within mobility hub. The total number of usable surveys collected was 2,461. The samples sizes (target and actuals) and associated margin of error for a 95 percent level of confidence are presented in Table 20. In addition to collecting data at the four parking facility types determined in the plan (i.e., paid public lot/structure, privately owned lot/structure, on-street free, on-street metered), the project team also collected 87 surveys at park and ride lots.

**Table 20: Sample Size by Segment**

| | Target | | Actual | |
|---|---|---|---|---|
| **Segmentation** | **Sample size** | **Margin of error** | **Sample size** | **Margin of error** |
| Overall sample | 2,500 | +/- 2% | 2,461 | +/- 2% |
| Sample for each of the eight survey locations (mobility hubs) | 200 | +/- 7% | 199 to 699 | +/- 7% or less |
| Sample for each of the five parking facility types (on-street free, on-street paid, off-street free, off-street paid private, off-street paid public) | 400 | +/- 5% | 328 to 710 | +/- 5% or less |
| Sample for each parking facility type by location* | 30-70 | +/- 18% or less | 35 to 301** | +/- 18% or less |

Source: WSP
Note: * for parking facility types that are present at that location; **only 13 surveys were collected on off-street paid public lots in major employment centers and in paid private lots in suburban mobility hubs.

### 3.2.3 QUESTIONNAIRE

The survey instrument included questions about respondents' actual parking choices (revealed preference) as well as a choice exercise as part of which respondents are asked to choose between hypothetical parking scenarios based on time, cost, and parking egress mode (stated preference). During the development of the draft instrument, the project team met with the SANDAG modeling team to understand shortcomings of the existing parking models. Another key consideration during the survey instrument design process was balancing analytical requirements with respondent fatigue. The questions are summarized below. The complete questionnaire is provided in Appendix A4.

#### REVEALED PREFERENCE

**Origin and destination**: The survey included questions about the origin and destination of the current trip. Respondents who indicated that they were employed were asked whether work was or will be one of the stops in their current tour. The questions included address and type of place (i.e., home, work, business, school/college classes, shopping, eating/dining out, recreation medical services). The place type information was used to determine the trip purpose.

**Time:** The survey included a question about the departure time at the starting location as well as a question about the estimated duration to get from the parking location to the destination. The arrival time at the parking facility was recorded automatically.

**Party size:** The respondents were asked how many people in each of the following categories traveled in their vehicle with them to the parking lot: members of their household 18 years and older, members of their household under 18 years old, and non-members of their household of any age.

**Employer parking provision:** Respondents who were employed were asked if their employer provides free on-site parking and/or fully or partially reimburses parking cost, and/or provides pre-tax commuter benefits.

**Parking payment:** Respondents who indicated that they pay for parking were asked how much they pay hourly, daily, weekly, monthly, or annually, and whether they pay via a mobile app. They were also asked how much of the payment is reimbursed by their employer or by another party.

**Parking egress mode**: The following modal options were presented in the survey:

- Walk
- Wheelchair
- Public Transit – San Diego Metropolitan Transit System (MTS)
- Public Transit – North County Transit District (NCTD)
- Uber, Lyft (private)
- Uber, Lyft (pool or shared)
- Taxi
- E-scooter (shared)
- E-scooter (personal)
- Be picked up by someone going someplace else
- Bike (shared)
- Bike (personal)
- E-bike (shared)
- E-bike (personal)
- Skateboard
- Electric vehicle shuttle

**w**

**Demographic questions:** Respondents were asked about their age, gender, household income, household size, car availability, and occupation.

## STATED PREFERENCE

To provide a data set that can be used to estimate new parking models for the ABM, revealed preference data were combined with stated preference data to mitigate some of the key limitations of revealed preference data that may affect the accuracy of the models estimated only with revealed preference data:

- Model estimation based on revealed preference data assumes that travelers have perfect information on where parking is available and how much it costs. In reality, respondents may not be aware of all parking options available to them.
- Key factors of a parking decision, such as time to search for parking, time and/or distance to destination, and price, may be highly correlated. For instance, parking spaces that are close to major attractions may also be more expensive. These correlations may make it difficult to disentangle the impacts of each factor or attribute on the choice in isolation.
- Actual choices may have insufficient variation in terms of the attributes (e.g., cost) to be able to estimate the effect of the attribute on the choice.


**Figure 17: Choice Exercise Example**

- The effect of some aspects of emerging or currently non-existing options, such as connected and automated vehicles, may not be quantifiable using revealed preference data.

In a stated preference survey, the choice set presented to the respondent is controlled as part of the experimental design, which diminishes existing correlations between variables of interest. Furthermore, the choice exercise can include scenarios and attribute levels that extend beyond existing conditions currently faced by respondents to test the effect of emerging options and future options on parking behavior. To ensure that the stated preference exercise is relevant to the respondent and that the respondent is engaged in the exercise, the actual trip described in the revealed preference section of the survey is used to frame the subsequent choice exercise.

The stated choice exercise consisted of 12 choices, presented as 6 screens with 2 choices each. The following attributes were included in the choice exercise: cost of parking, time to search for parking, time to travel from parking location to destination, parking egress mode (the mode to travel from parking location to destination), and cost of parking egress mode. An example screen is shown in **Error! Reference source not found.**. Parking e gress modes considered in the choice exercise included walking, bicycle (shared), e-scooter or e-bike (shared), transit, shuttle or microtransit; rideshare/taxi, and driverless shuttle.

### 3.2.4 INTERVIEWER RECRUITMENT AND TRAINING

Applicants who passed preliminary interviews and reference and background checks were invited to attend a 10-hour training session conducted in three parts: a classroom training, field training, and, if needed, follow up training. The goal of the training sessions included but was not limited to ensuring applicants understood sampling procedures, how to properly use the interviewing equipment, how to conduct the survey depending on respondent's availability or willingness, and debriefing procedures.

### 3.2.5 SURVEY TESTING

To evaluate the clarity of the wording of questions and response options, and overall functionality of the survey instrument, the project team tested the survey in-house. In addition, an in-field pre-test was conducted, which replicated all tasks that were conducted for the administration of the intercept survey. The pre-test of the stated preference questions tested whether respondents were completing the choice exercise appropriately and if the implied willingness to pay for parking was reasonable. The pre-test served as an opportunity to conduct training of all field supervisors who were overseeing the survey and allowed the project team to assess all aspects of the proposed methodology for conducting the survey.

A total of 113 respondents were asked to participate across the different types of parking facilities. Of those 113 respondents approached, 34 (31 percent) refused. Of the 79 who agreed to complete the survey, 51 (64.5 percent) respondents fully completed the survey with the interviewer; 2 respondents (2.5 percent) provided unusable survey data (i.e., survey that is less than 99 percent complete); and 26 (32.9 percent) respondents dropped off prior to completing the entire survey. Of the 26 respondents who did not fully complete the survey (dropped off early), most completed the trip-related questions.

Following the completion of the pre-test and report, the project team updated the questionnaire and survey methodology where needed to ensure that problems identified during the pre-test were corrected.

## 3.3 SURVEY ADMINISTRATION

This section provides an overview of the survey administration methods and procedures including the quality control procedures that were used during the survey administration.

### 3.3.1 DISPATCH

The project team focused on one corridor per day with multiple teams comprising both data collectors and field supervisors. The field supervisors were responsible for scheduling interviewers to target specific locations throughout the day and collect establishment data related to cost to park, etc. Each interviewer carried the authorization letters written and signed by SANDAG. The project team moved from area to area within each hub until the goals for number of respondents by facility type were met. The team monitored the types of parking that were captured in real-time to ensure an adequate mix of data was being collected.

### 3.3.2 SURVEY TIMING

Data collection began in early March 2022 and concluded in early April 2022. The survey was administered between the hours of 6AM and 8PM, Monday through Thursdays, when schools were in session. Because of the COVID-19 pandemic, all surveys were conducted outside.

### 3.3.3 ADMINISTRATION METHOD

The survey was administered as personal interviews with responses recorded using tablets that accessed the online survey instruments. This method allowed for accurate real-time geocoding of survey data as the survey was taken. The geocoded data included home location, work location, origin, and destination. At each survey location, interviewers randomly selected respondents to intercept and continued to intercept until the sampling goals were met.

### 3.3.4 SURVEY LANGUAGE

The survey instrument was available in English and in Spanish. At least one English-Spanish bilingual interviewer was available at each interview location. An attempt was made to include interviewers who spoke other foreign languages in communities with a high prevalence of persons with limited English and Spanish proficiency. If an interviewer intercepted a person who did not speak English (or Spanish, for bilingual English-Spanish interviewers), the respondent would be shown a message on the tablet in their language that requested a phone number so another interviewer could call them to complete the survey by phone in their preferred language.

### 3.3.5 QUALITY CONTROL

The following quality control measures were employed during survey collection:

- The project team used proprietary mapping software to ensure reported origin, home address, work address, and destination locations were reasonable and consistent with reported sequences and mode. Geocoding was completed in real-time and included visual confirmation by the respondent on a map. The software allowed the entire trip to be mapped and reviewed for each portion of the trip.

- Field supervisors compared interviewer data in real-time and provided on-the-spot training when flags occurred. If an interviewer's data were flagged, they came out of the field for additional training. If their data were flagged twice, the interviewer was removed from the project, and all data collected by the interviewer were purged or removed from the final database. Three separate trained "secret shoppers" were also deployed to the field to ensure interviewers were following selection procedures and collecting accurate information from respondents. Over the course of one collection week, the secret shopper observed each interviewer at least twice. Field supervisors and secret shoppers watched interviewers' demeanor, overall behavior, and adherence to protocols during interviews.

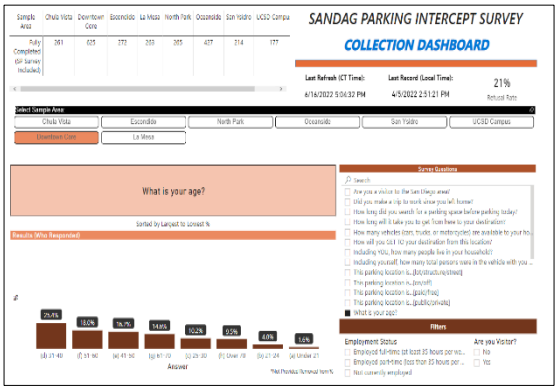


**Figure 18: Data Collection Dashboard**

- Field supervisors also monitored the survey goals via a real-time dashboard that populated progress toward cell-level goals (Figure 18). For example, within each of the mobility hubs selected in the final sampling plan, the team could see how usable surveys were allocated over the levels of sampling (i.e., mobility hub, facility type). As survey goals were met in certain cells, the project team shifted resources to other areas to ensure proper sampling. Only usable surveys were used to meet cell-level goals. A usable survey is defined as a survey that is 99 percent complete, has all locational elements geocoded (i.e., home, work, school, origin and destination locations), and passes internal quality assurance/quality control (QAQC)/logic checks.

## 3.4 DATA CLEANING AND QAQC

After field collection, the data team reviewed 100 percent of the records through a custom platform that allowed the visual review and confirmation off all trip data collected. If any required information was missing or incomplete, the data reviewers forwarded the survey record and corresponding name and phone number of the survey respondent to WSP Team member ETC Institute's in-house call center. Call center interviewers tried following up with respondents who provided their name and phone number to retrieve missing information by phone.

In addition to trip visual confirmation to ensure the trip provided by the respondents seemed logical, the project team also ran survey data through a series of "edit checks." Distance ratios and time checks were two of the primary trip-related checks to ensure the origin, destination, modes, and distances were logical. If a trip did not appear to be logical (e.g., the distance reported did not match with time traveled), the project team attempted to call the respondent to confirm. If the call back was unsuccessful, the project team did not count the record. The project team also researched parking facilities and recorded a range of fees and frequencies associated with each facility. Based on trip data, the team imputed the parking facility associated with each record and checked that the responses were reasonable.

The next step involved the application of a series of QAQC checks on information not pertaining to the respondent's trip (i.e., non-trip checks). These included ensuring the time of day of survey completion, survey duration, and any demographic information was consistent and within a reasonable range. Once all records completed the in-field and post-processing QAQC checks, records that were deemed complete and usable were used to update a completion report. A codebook containing metadata was created to explain data fields.

The final sample by survey location is presented in Table 21.

**Table 21: Cleaned Survey Records by Mobility Hub**

| Survey location | Number of surveys | Percent of surveys |
|---|---|---|
| Downtown Core | 699 | 29% |
| Oceanside | 352 | 14% |
| Escondido | 266 | 11% |
| North Park | 264 | 11% |
| La Mesa | 239 | 10% |
| Chula Vista | 235 | 10% |
| San Ysidro | 199 | 8% |
| UCSD Campus | 200 | 8% |
| **Total** | **2,454** | **100%** |

Source: WSP

## 3.5 DATA WEIGHTING AND EXPANSION

The project team used the parking inventory to expand the survey data. Expansion factors were applied to ensure that the survey results represent the entire inventory. An expansion factor was calculated for each mobility hub type–facility type combination. For the expansion, the gateway and coastal mobility hub types were combined. Oceanside, one of the survey locations, is classified as a gateway mobility hub but is also a coastal community. The survey responses by mobility hub type–facility type combination are shown in Table 22.

**Table 22: Parking Inventory by Facility Type**

| Mobility hub type | On-street free | On-street paid | Off-street free | Off-street public paid | Off-street private paid | Total |
|---|---|---|---|---|---|---|
| Urban core | 132 | 149 | 226 | 152 | 304 | 963 |
| Gateway/coastal | 157 | 74 | 301 | 98 | 187 | 817 |
| Major employment center | 64 | 70 | 100 | 192 | 13 | 439 |
| Suburban | 56 | 35 | 83 | 16 | 45 | 235 |
| **Total** | **409** | **328** | **710** | **458** | **549** | **2,454** |

Source: WSP

Because the sample size of off-street privately owned paid facilities in major employment centers and the sample size of off-street public paid facilities in suburban mobility hubs were below 30 and to avoid large expansion factors, the project team also combined the public and privately owned paid facilities in one category for major employment centers, suburban, and gateway/coastal mobility hubs. The expansion factors are presented in Table 23.

**Table 23: Expansion Factors**

| | Facility type | | | |
|---|---|---|---|---|
| Mobility hub type | On-street free | On-street paid | Off-street free | Off-street paid |
| Gateway/Coastal | 57.1 | 20.1 | 31.5 | 103.4 |
| Major Employment Center | 60.2 | 1.8 | 46.7 | 103.4 |
| Suburban | 41.4 | 45.2 | 25.6 | 103.4 |
| Urban Core | 120.2 | 51.8 | 76.7 | 158.7 |

Source: WSP

# 3.6 SURVEY RESULTS

An overview of some key survey findings is provided below. Detailed tabulations can be found in Appendix A5.

## *3.6.1 SOCIOECONOMIC CHARACTERISTICS*

Of the 2,454 respondents who participated in the survey, 29 percent were visitors to the San Diego area. Forty-two percent of respondents identified as female, 56 percent identified as male, 1 percent identified as other, and fewer than 1 percent identified as more than one gender. The remaining respondents preferred not to answer. The median age was between 35 and 44. About 48 percent of respondents identified as belonging to a minority group. Respondents reported a median household income between $75,000 and $99,999. About two-third (67 percent) of respondents were employed. (However, only 17 percent were going to work when intercepted.)

**Table 24: Employment Status (All Respondents)**

| Employment status | Number of responses | Percent of responses |
|---|---|---|
| Employed full-time (at least 35 hours per week) | 1,268 | 54% |
| Employed part-time (less than 35 hours per week) | 383 | 15% |
| Not currently employed | 803 | 31% |
| **Total** | 2,454 | **100%** |

Source: WSP

A comparison of some of the key characteristics of the respondents with San Diego is provided below.

- Visitor/Resident split - The project team estimates that during the data collection period (March and April 2022), an average of 120,000 to 130,000 people visited San Diego every day. This estimate is based the total number of day trippers (0.9 million in March and 1.1 million in April) and the total number of overnight visitors (1.4 million in March and in April) in San Diego according to the San Diego Tourism Authority and assumes that an overnight visitor stays two days. Based on the data collection period of 10 days, 1.2 to 1.3 million people visited San Diego during the data collection period. With 3.3 million San Diego residents, the visitor share of the sample (29 percent) is similar to that of the population (27 to 28 percent).
- Household income – Based on the 2016-2020 ACS, the median household income in San Diego County is $82,426, which is similar to the median household income of residents in the sample (between $60,000 and $74,999).

- Age – Based on the 2020 Census, the median age in San Diego County is 36. The median age of residents in the sample is 38.
- Race/Ethnicity – Based on the 2020 Census, 56 percent of San Diego County residents either self-identify as Hispanic or Latino or as not white. By comparison, 53 percent of residents in the sample self-identify as Hispanic or Latino or as not white.
- Employment status – Based on the Bureau of Labor Statistics, 1.5 million people are employed in San Diego County in 2022, and monthly unemployment rates are below 4 percent. Based on the 2016-2020 ACS, 63.1 percent of the population of age 16 and above is part of the civilian labor force. In the sample, 67 percent of residents were employed, which is somewhat higher than the proportion of employed residents in the region. This difference may be due to employed persons traveling more than persons who are not part of the labor force or who are unemployed. Part of the difference may also be attributed to the fact that several of the survey locations were in employment centers.

### *3.6.2 REVEALED PREFERENCE*

The revealed preference section of the survey provides data on drivers' actual parking decisions.

#### ORIGIN AND DESTINATION

Because respondents were intercepted as they were leaving the parking facility and most (87 percent) surveys were conducted before 3PM, most of the respondents started their trip at home (62 percent) or at their hotel or other place of lodging (20 percent) (Table 25). Three percent were coming from their workplace.

Destinations included "Recreation," selected by 21 percent of respondents followed by "Shopping" at 17 percent, usual workplace at 17 percent, and sightseeing at 11 percent (Table 26) ). Overall, 20 percent of the respondents were intercepted when they were going to work or a work-related destination.

**Table 25: Location Type of Origin**

| Origin | Number of respondents* | Number of parking spaces** | Percent of parking spaces |
|---|---|---|---|
| Home | 1,743 | 134,824 | 66% |
| Hotel or lodging | 368 | 42,704 | 21% |
| Usual place of work | 88 | 6,034 | 3% |
| Shopping | 40 | 2,397 | 1% |
| College / university (students only) | 36 | 3,425 | 2% |
| Eating / dining out | 35 | 3,207 | 2% |
| Recreation | 27 | 2,240 | 1% |
| Personal business (bank, post office) | 27 | 1,671 | 1% |
| Other*** | 90 | 8,386 | 4% |
| **Total** | **2,454** | **204,888** | **100%** |

Source: WSP
Notes:
*The number of respondents refers to the number of survey participants.
**The number of parking spaces refers to the number of spaces represented by the locations where the respondents were intercepted. As shown in Section 3.5, the sample was expanded based on mobility type and facility type of the survey location.
*** The residual category, "other," includes sightseeing, social visits, airport, medical appointment and picking-up/dropping-off someone.

**Table 26: Type of Destination**

| Destination | Number of respondents | Number of parking spaces | Percent of parking spaces |
|---|---|---|---|
| Recreation | 481 | 43,847 | 21% |
| Shopping | 472 | 34,944 | 17% |
| Usual place of work | 373 | 34,089 | 17% |
| Sightseeing | 191 | 22,052 | 11% |
| Eating / dining out | 317 | 19,757 | 10% |
| College / university (students only) | 169 | 17,736 | 9% |
| Personal business (bank, post office) | 164 | 10,523 | 5% |
| Medical appointment / doctor's visit | 102 | 6,815 | 3% |
| Other work-related place | 50 | 4,414 | 2% |
| Home | 56 | 4,225 | 2% |
| Social visits (friends/relatives) | 33 | 2,630 | 1% |
| Other* | 46 | 3,856 | 2% |
| **Total** | **2454** | **204,888** | **100%** |

Source: WSP
Note: * The residual category, "Other," includes picking-up/dropping-off someone, airport access, and sporting event.

## PARTY SIZE

More than half of spaces (52 percent) were occupied by drivers traveling alone; 29 percent were occupied by cars with two persons, with the remainder occupied by cars with three or more persons. Twelve percent of spaces were used by cars with household members under 18, while 8 percent included at least one passenger that was not part the driver's household.

## TIME SEARCHING FOR PARKING

Seventy-two percent of spaces were occupied by drivers who spent 5 minutes or less to find the parking space, while 11 percent were occupied by drivers who spent between 6 and 10 minutes to find a spot (Table 27).

**Table 27: Time Spent Searching for Parking Spot**

| Time (in minutes) | Number of respondents | Number of parking spaces | Percent of parking spaces |
|---|---|---|---|
| 0-5 | 1,878 | 148,276 | 72% |
| 6-10 | 220 | 22,939 | 11% |
| 11-15 | 68 | 5,844 | 3% |
| 16-20 | 12 | 1,186 | 1% |
| 21-25 | 3 | 119 | 0.1% |
| 26-30 | 4 | 319 | 0.2% |
| More than 30 minutes | 269 | 26,205 | 13% |
| **Total** | **2,454** | **204,888** | **100%** |

Source: WSP

## TIME AND MODE TO DESTINATION

Most drivers (91 percent) walk from their parking spot to their destination (Table 28). Two percent stated they were planning to take an Uber or Lyft, while skateboard, personal bike and transit, each accounted for 1 percent. Most drivers park close to their destination—78 percent estimated that it would take 5 minutes or less to get from the parking spot to their destination (Table 29). An additional 14 percent estimated it would take 6 to 10 minutes.

**Table 28: Mode to Get From Parking to Destination**

| Mode | Number of respondents | Number of parking spaces | Percent of parking spaces |
|---|---|---|---|
| Walk | 2,184 | 185,612 | 91% |
| Uber, Lyft, etc. (private) | 81 | 3,781 | 2% |
| Bike (personal) | 23 | 2,353 | 1% |
| Skateboard | 27 | 2,233 | 1% |
| Public transit - MTS | 31 | 2,003 | 1% |
| Other | 108 | 8,906 | 4% |
| **Total** | **2,454** | **204,888** | **100%** |

Source: WSP

**Table 29: Time to Get from Parking to Destination**

| Time (in minutes) | Number of respondents | Number of parking spaces | Percent of parking spaces |
|---|---|---|---|
| 0-5 | 1,975 | 160,367 | 78% |
| 6-10 | 303 | 29,626 | 14% |
| 11-15 | 90 | 8,142 | 4% |
| 16-20 | 39 | 3,097 | 2% |
| 21-25 | 11 | 896 | 0.44% |
| 26-30 | 35 | 2,728 | 1% |
| More than 60 | 1 | 31 | 0.02% |
| **Total** | **2,454** | **204,888** | **100%** |

Source: WSP

## PARKING COST

The inventory showed that 68 percent of parking spaces in the study area are paid spaces. Among respondents going to work, 81 percent paid for parking (Table 30). Thus, the survey showed that drivers are generally more likely to pay for parking when going to work than when parking for other purposes. When looking at parking by mobility hub type, paid parking for work trips is most common in the urban core (88 percent of drivers who drive to work pay for parking) and in the suburban mobility hub type (84 percent of drivers who drive to work pay for parking).

The average cost in paid private and public facilities, regardless of mobility hub type, is presented in Table 31 and Table 32, respectively. The average hourly cost is $3.1 at private facilities and $2.5 at public facilities. Respondents who paid a daily rate paid on average $16.7 and $12, for private and public facilities, respectively. The average monthly cost for private facilities was $103.7. For all other payment frequencies, the sample size was less than 10.

About 4 percent of respondents who paid for parking made the payment via a mobile app.

**Table 30: Paid Parking by Mobility Hub Type**

| | Percent of paid parking | |
|---|---|---|
| Mobility hub type | All purposes | Work trips |
| Gateway/coastal | 63% | 67% |
| Suburban | 64% | 84% |
| Major employment center | 71% | 69% |
| Urban core | 71% | 88% |
| **Total** | **68%** | **81%** |

Source: WSP

**Table 31: Average Cost Private Facilities (in 2022 Dollars)**

| Frequency | Number of respondents | Average cost |
|---|---|---|
| Per hour | 50 | $3.1 |
| Per day | 241 | $16.7 |
| Per month | 51 | $103.7 |
| Per 10 days | 7 | $41.0 |
| Per year | N/A | N/A |

Source: WSP

**Table 32: Average Cost Public Facilities (in 2022 Dollars)**

| Frequency | Number of respondents | Average cost |
|---|---|---|
| Per hour | 269 | $2.5 |
| Per day | 122 | $12.0 |
| Per month | 2 | $175.0 |
| Per 10 days | 2 | $7.0 |
| Per year | 6 | $640.1 |

Source: WSP

## EMPLOYEE PARKING BENEFITS

Thirty-three percent of employees received free parking from their employer (Table 33). Very few employees reported that they receive a parking discount. A potential explanation for this low percentage is that employees may not be aware that their employer subsidizes their parking cost. Employee parking is often negotiated as part of the office space lease, and employees are informed about their share of the parking cost only. To better understand, the project team collected data on parking prices at some of the facilities where the survey was collected from respondents going to work. Comparing the prices advertised by the facilities with the cost reported by the respondents indicated that there are some facilities where the advertised parking fee is higher than the fee reported by the respondent, indicating a potential employee discount. However, the advertised parking fee was lower than the fee reported by respondents for several records.

**Table 33: Employee Parking Benefit**

| Employee parking benefit | Percent of employed |
|---|---|
| My employer provides free parking or fully reimburses my parking cost | 33% |
| My employer provides a discount or partially reimburses parking cost | 1% |
| My employer provides pre-tax commuter parking benefits | 3% |
| No parking benefits | 64% |
| **Total** | **100%** |

Source: WSP

Respondent occupation at the time of the survey was used to understand whether any occupations are more likely to receive parking benefits. Of the occupations reported in Table 34, Table 34employees in the legal field are most likely to receive free or fully reimbursed parking (64 percent) followed by Building and Grounds Cleaning and Maintenance (54 percent); Life, Physical and Social Sciences (46 percent); and Management (44 percent) occupations. Pre-tax commuter parking benefits are most likely for those with jobs related to "Transportation and Material Moving" (16 percent) and "Computer and Mathematical" (14 percent).

**Table 34: Employee Parking Benefit by Occupation**

| Occupation | Sample size | My employer provides free parking or fully reimburses my parking cost | My employer provides a discount or partially reimburses parking cost | My employer provides pre-tax commuter parking benefits |
|---|---|---|---|---|
| Architecture and Engineering | 57 | 37% | 3% | 3% |
| Arts, Design, Entertainment, Sports, and Media | 34 | 17% | 3% | 2% |
| Building and Grounds Cleaning and Maintenance | 49 | 54% | 0% | 8% |
| Business and Financial Operations | 167 | 27% | 2% | 2% |
| Community and Social Service | 40 | 42% | 3% | 0% |
| Computer and Mathematical | 55 | 28% | 0% | 14% |
| Construction and Extraction | 46 | 27% | 1% | 2% |
| Educational Instruction and Library | 103 | 26% | 1% | 1% |
| Farming, Fishing, and Forestry | 11 | 23% | 0% | 0% |
| Food Preparation and Serving Related | 120 | 21% | 0% | 3% |

| Occupation | Sample size | My employer provides free parking or fully reimburses my parking cost | My employer provides a discount or partially reimburses parking cost | My employer provides pre-tax commuter parking benefits |
|---|---|---|---|---|
| Healthcare Practitioners and Technical | 65 | 32% | 1% | 3% |
| Healthcare Support | 44 | 37% | 0% | 5% |
| Installation, Maintenance, and Repair | 28 | 40% | 0% | 0% |
| Legal | 64 | 64% | 7% | 3% |
| Life, Physical, and Social Science | 34 | 46% | 1% | 0% |
| Management | 130 | 44% | 0% | 8% |
| Military Specific | 39 | 43% | 0% | 4% |
| Office and Administrative Support | 66 | 40% | 0% | 0% |
| Other | 178 | 25% | 1% | 0% |
| Personal Care and Service | 74 | 35% | 2% | 0% |
| Production | 31 | 14% | 0% | 2% |
| Protective Service | 33 | 28% | 0% | 0% |
| Sales and Related | 151 | 32% | 1% | 2% |
| Transportation and Material Moving | 32 | 35% | 4% | 16% |

Source: WSP

More than one-third of employees with annual household incomes of $35,000 or more receive free parking (Table 35). Employees with lower household incomes are less likely to receive this benefit.

**Table 35: Employee Parking Benefits by Income**

| Household income | Sample size | My employer provides free parking or fully reimburses my parking cost | My employer provides a discount or partially reimburses parking cost | My employer provides pre-tax commuter parking benefits |
|---|---|---|---|---|
| $14,999 or less | 40 | 22% | 0% | 0% |
| $15,000–$19,999 | 34 | 20% | 9% | 4% |
| $20,000–$24,999 | 34 | 36% | 4% | 7% |
| $25,000–$29,999 | 50 | 28% | 0% | 4% |
| $30,000–$34,999 | 56 | 26% | 4% | 3% |
| $35,000–$39,999 | 51 | 37% | 1% | 4% |

| Household income | Sample size | My employer provides free parking or fully reimburses my parking cost | My employer provides a discount or partially reimburses parking cost | My employer provides pre-tax commuter parking benefits |
|---|---|---|---|---|
| $40,000–$44,999 | 81 | 33% | 0% | 4% |
| $45,000–$49,999 | 75 | 50% | 4% | 9% |
| $50,000–$59,999 | 115 | 35% | 0% | 4% |
| $60,000–$74,999 | 157 | 31% | 2% | 3% |
| $75,000–$99,999 | 206 | 41% | 2% | 3% |
| $100,000–$149,999 | 200 | 35% | 1% | 4% |
| $150,000 or above | 190 | 35% | 2% | 0% |
| Prefer not to answer | 362 | 25% | 0% | 1% |

Source: WSP

### 3.6.3 STATED PREFERENCE

The stated preference exercise provides information about the trade-offs that drivers are making between time and cost when choosing a parking space, distinguishing between the different aspects of time and cost and different modes to travel between the parking facility and the destination. Because the exercise presented time spent searching for parking (i.e., search time) separately from time getting from the parking spot to the destination (i.e., egress time), the data also provide insight into the trade-offs that drivers are making between time spent looking for parking and time spent getting to the destination after having parked the car.

The data were used to estimate a multinomial logit parking egress mode choice model (Table 36). Prior to the model estimation, the per person cost data e.g., public transit fare to travel from the parking location to the destination) was converted to a total cost for the travel party based on the travel party size. (For instance, the public transit fares shown in the choice exercise are for one person, while the ride share fares are per vehicle. For travel parties of more than one, per person fares were multiplied with the number of persons in the travel party to obtain a total cost for the travel party. For rideshare, everyone in the travel party is assumed to share the same vehicle.) The model recognizes the panel structure (i.e., more than one choice per respondent) of the data. The model supports the following findings:

- If offered multiple parking options that have the same cost (i.e., parking cost plus any egress mode cost) and take the same time (i.e., time searching plus time to get from their parking location to their destination), drivers will choose the option from which they can walk to their destination. If none of the options are within walking distance, the model suggests the following order of preference (from most preferred to least preferred): rideshare, transit, autonomous vehicle, micro transit, bicycle and e-scooter.
- As expected, drivers prefer parking that is closer to their destination over parking that is farther away, even if that means spending more time looking for parking. Regardless of the mode that they use to get from the parking facility to the destination, drivers consider time searching for parking as less onerous than time traveling from the parking location to their destination.
- The model shows that drivers are more sensitive to parking cost than to egress cost, which is less intuitive than the previous two findings. Thus, if offered two parking options that have the same overall cost (i.e., parking cost plus any egress mode cost) and take the same amount of time using the same mode but parking accounts for a smaller share of the total cost in one of options, that option is preferred.

**Table 36: Multinomial Logit Model**

| Constants/coefficients | Estimate | Robust standard error | Robust t-ratio |
|---|---|---|---|
| Walk | 0 | NA | NA |
| Bicycle | -0.650 | 0.072 | -9.069**** |
| E-scooter | -0.933 | 0.074 | -12.624**** |
| Transit | -0.453 | 0.075 | -5.999**** |
| Microtransit | -0.572 | 0.072 | -7.961**** |
| Rideshare | -0.173 | 0.089 | -1.942** |
| Autonomous vehicle | -0.513 | 0.080 | -6.427**** |
| Search time | -0.002 | 0.002 | -0.740* |
| Egress time | -0.007 | 0.003 | -2.928*** |
| Parking cost | -0.022 | 0.003 | -8.593**** |
| Egress cost | -0.010 | 0.005 | -1.871** |

Source: WSP
Note: ****p< 0.001, ***p<0.01, **p<0.05, *p<0.25

## MODAL PREFERENCES

Each respondent was shown 1 of 300 different versions of the choice exercise. The choice exercise consisted of 6screens, each presenting 2 options, which means that each respondent saw 12 modes. Table 37 shows how often each mode was shown and how often it was chosen. When the option of walking from the parking facility to the destination was provided, it was chosen 61 percent of the time. Except for e-scooters, other modes were selected between 44 and 53 percent of the time they were shown.

**Table 37: Mode Choices**

| | Walk | Bicycle | E-scooter | Transit | Microtransit | Rideshare | Autonomous Vehicle |
|---|---|---|---|---|---|---|---|
| Times available | 7,110 | 3,442 | 3,360 | 3,381 | 3,395 | 4,695 | 3,393 |
| Times chosen | 4,336 | 1,523 | 1,204 | 1,605 | 1,567 | 2,371 | 1,782 |
| Percentage chosen when available | 61 | 44 | 35.8 | 47 | 46 | 50 | 53 |

Source: WSP

Unlike the egress mode choice model presented above, these results do not control for the differences in time and cost presented in the choice exercise for these different modes. The model shows respondents rank the modes as follows (from highest preference to lowest):

- Walk
- Rideshare
- Transit
- Autonomous vehicle
- Microtransit

- Bicycle
- E-scooter

## COST AND TIME SENSITIVITIES

The model's implied value of time (VOT) is $17, which means that drivers are willing to spend an average of $17 to save one hour of travel time. In the context of this study, it means that drivers are willing to spend an additional $17 on parking and parking egress to save one hour of search and egress time. To assess if a model's VOT is reasonable, it is often compared to hourly income in the region. A reasonable VOT for local travel is expected to fall between 35 percent and 60 percent of hourly income for personal trips, which includes both leisure and commute trips. Based on the 2016-2020 American Community Survey, the median household income in San Diego County is $82,426, which translates into an hourly income of $40 and into a VOT between $14 and $24. The model's VOT falls within this range.

When looking at the individual components of time—search time and egress time, which is the time spent to get from the parking location to the destination—the model shows that drivers are more than four times as sensitive to an increase in egress time than to an increase in search time. In other words, according to the model, drivers would consider a 5-minute increase in egress time slightly more onerous than a 20-minute increase in search time. The model also shows that drivers are more than twice as sensitive to an increase in parking cost as to an increase in egress cost. For example, drivers would consider a $5 increase in parking cost slightly more onerous than a $10 increase in egress cost.

# 4 CONCLUSION

Based on the inventory, parking-constrained areas in the San Diego mobility hub network provide 41,900 on-street spaces, 163,000 non-residential off-street spaces, and 173,800 residential off-street spaces. The survey showed that most drivers currently park at locations within walking distance from their destination and do not spend a lot of time searching for a parking space. This may be in part due to employer work from home policies and decreased visitation due to COVID-19. A stated preference survey provided insight in how drivers would react when parking becomes scarcer, parking prices increase, and new modal options become available.

The data provided through this study will help SANDAG, regional partners, and jurisdictions develop and implement innovative, context-sensitive parking strategies to help reduce solo driving and congestion and meet vehicle miles traveled and greenhouse gas-reduction targets. These inputs will allow SANDAG to test the impacts of various parking price and supply scenarios at mobility hubs through ABM2+. The following Regional Plan strategies, among others, are supported through the updated Parking Inventory and Behavioral Survey:

- **Curb management plans and pilots:** Proactively managing competing needs for parking and curb space at transit hubs, enabling more people to access places using alternatives to driving.
- **Flexible fleets:** Balancing the supply of parking and pricing strategies in coordination with the provision of more transportation choices, services, and infrastructure at mobility hubs including car sharing, electric vehicle chargers, ridesharing, micromobility, and complete streets.
- **Transit-oriented communities:** Reducing or eliminating minimums for off-street parking for housing and commercial uses near transit to reduce development costs and encourage walking, biking, and transit.
- **Commuter programs:** Offering cash, transit passes, or other incentives in lieu of parking spaces to encourage choosing alternative or shared-commute options.

The inventory was created based on multiple existing data sources as well as an online review of aerial photos. If, in the future new parking counts become available, whether through field research, online research, updates of existing data sources, or new data sources, the system created for this report can be used to develop an updated inventory.