Sorrento Valley Skyway Feasibility Study

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Chapter 1: Introduction

The Sorrento Valley Skyway Feasibility Study was initiated to evaluate the feasibility of an aerial cableway or “Skyway” technology for connecting the future Mid-Coast Light Rail Transit (LRT) line in the University City area and the Sorrento Valley/Sorrento Mesa employment areas, including a connection with the existing Coaster commuter rail service in Sorrento Valley. This initial technical feasibility study includes the evaluation of potential markets, assessment of technology applications for aerial cableway systems, development of order-of-magnitude capital and operating costs, and outline of potential community and environmental issues. Figure 1 illustrates the regional vicinity. Figure 2 shows the project study area.

Convenient transit connections from both the future Mid-Coast line to the Sorrento Valley/Sorrento Mesa employment center and from the existing Coaster service to Sorrento Mesa and University City area are challenging given the topography separating these areas from one another. Improved first mile-last mile connections in this area are desired to maximize transit access and ridership, especially during congested peak travel periods.

A high-capacity transit connection between the northern terminus of the future Mid-Coast LRT extension and a COASTER station in Sorrento Valley—two points separated by significant changes in topography are included in San Diego Forward: The Regional Plan. The ability of aerial cableway technology to traverse steep terrain and its potential to provide cost-effective first mile-last mile connections to regional transit make it a possible solution to making this connection. SANDAG undertook this study to evaluate the feasibility of skyway technology for this area. No recommendations are made on whether to pursue a skyway project on a preferred alignment and station locations.
Figure 1 Regional Vicinity
Figure 2 Project Study Area
1.1 Study Objectives

Key objectives for the Sorrento Valley Skyway Feasibility Study include:

- Evaluate market demand for a new transit connection or connection(s) within the study area;
- Identify the appropriate form of aerial cableway technology to be implemented;
- Develop ways to integrate aerial cableway with existing and proposed regional transit services;
- Identify potential system options/alternatives;
- Estimate system-wide ridership for potential options/alternatives;
- Identify potential funding sources for both capital and operations and maintenance (O&M) costs; and
- Identify key challenges and solutions such as topography, utility conflicts, and regulatory requirements.

Project study alternatives were developed with each of these objectives considered, and is discussed in greater detail in Chapter 5.

An overview of the project schedule is provided in Figure 3.

1.2 Relevant Studies

Several prior and current studies were considered in the development of transit concepts for Sorrento Valley, including:

- **PACIFIC BEACH CORRIDOR STUDY**: The Pacific Beach Corridor Study (PB Study) is evaluating the feasibility of an aerial cableway system as an alternative to light rail between the future Balboa Avenue LRT station and Pacific Beach. While the Sorrento Valley study is considered to be independent of the PB Study, the project team collaborated with members of the PB study team to ensure basic assumptions for each study were consistent. These included assumptions related to capital and O&M costs, guideway design, system sizing, and station design. A more detailed overview of the assumptions that were coordinated amongst the two studies is included in Appendix C.
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- **Bay to Balboa Skyway Feasibility Study:** An unconnected but recent study for an aerial cableway system between downtown San Diego and Balboa Park was previously completed.
- **Mid-Coast Corridor Transit Project Final Design:** Design elements of the completed Mid-Coast LRT project were taken into consideration by the project team.

### 1.3 Study Process

To address the study objectives as stated in Chapter 1.1, a process was undertaken by the consultant team under the direction and guidance of SANDAG and San Diego Metropolitan Transit System (MTS) staff. As detailed below and graphically depicted in **Figure 4**, the following key study steps were undertaken:

- Development of **system goals and objectives** to serve as guiding principles;
- Development of a **market assessment and identification of potential station locations** based on projected residential and employment activity and achievement of study goals and objectives;
- **Screening of alternative operating concepts** encompassing a multi-faceted evaluation process focusing on the benefits, impacts, and trade-offs associated with select network operating concepts; and
- **Evaluation of alternative operating concepts**, including projected capital and O&M costs, ridership, travel time, and community and environmental considerations.

**Figure 4 Study Process**

Project team meetings were held over an eight-month period, from October 2015 to May 2016, with key stakeholders at various points to help guide the development of the study. Input was collected from stakeholders both individually and as part of a series of Project Development Team (PDT) meetings. The PDT consisted of the following stakeholders:

- SANDAG;
- City of San Diego;
- San Diego MTS;
- Caltrans;
- North County Transit District (NCTD);
- Marine Corps Air Station (MCAS) Miramar; and
- University of California San Diego (UCSD).
Chapter 2: Identified Conditions & Needs

The Identified Conditions and Needs section outlines the existing conditions in the study area and describes various reasons why a skyway system would enhance mobility throughout the study area.

2.1 Study Area Geography, Land Use, and Key Activity Centers

The project study area is located in northern San Diego within portions of the University City, Torrey Pines, and Mira Mesa communities. The study area is generally bounded by the UCSD campus to the west, northern University Towne Center (UTC) to the north, the Westfield UTC Mall to the south, and Sorrento Mesa to the east. The eastern and western portions of the study area are bisected by Sorrento Valley, which includes a prominent escarpment running north to south just west of I-805. This steep natural feature creates a natural boundary between UCSD/UTC and Sorrento Mesa, an impediment to additional surface transportation connections.

UCSD

UCSD has over 33,000 students and 29,000 faculty/staff members on campus¹. The campus includes several different types of land use, including institutional education and research facilities, medical centers, and student housing. I-5 bisects the university campus, creating two distinct subareas. The western half of the campus primarily consists of student-based activity centers, including education facilities and on-campus housing. The eastern portion of UCSD is a center for medical facilities and research on campus and includes Scripps Memorial Hospital and the soon to be completed Jacobs Medical Center, among others. UCSD is also home to several event centers which host a variety of musical- and art-based performances, attracting visitors from across the region throughout the year. Key activity centers include the RIMAC Arena and the La Jolla Playhouse, among others.

An additional 15,000 employee’s work at the Scripps Research Institute and other nearby employment centers adjacent to UCSD.²

University Towne Centre

The University Towne Centre area is located just east and north of UCSD within the University City Community. The area includes a mix of commercial retail and office uses, as well as several single- and multi-family residential developments. The presence of several high-density commercial office buildings combined with the Westfield UTC Mall makes the UTC area a key

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regional activity center in the San Diego region. Additional expansions that include residential, retail, and office space are also under development.

Sorrento Valley

Sorrento Valley is located just east of the UTC area and includes a mix of light industrial, commercial office, open space land use, and medical facilities. I-805 runs parallel to the valley and creates a physical boundary between Sorrento Valley and Sorrento Mesa to the east.

Sorrento Mesa

Located just east of Sorrento Valley, Sorrento Mesa primarily consists of commercial retail and office space, with small pockets of residential and retail land use scattered throughout the mesa. The mesa is home to many science- and technology-based businesses which attract employees from locations throughout the region. Approximately 40,000 employees work in Sorrento Mesa for Qualcomm and other major employers.

Existing land use and key activity centers within the study area are shown in Figure 5.

Existing typical traffic conditions are shown in Figure 6 and Figure 7.
Figure 5 Existing Land Use and Key Activity Centers
Figure 6 Typical AM Peak Hour Roadway Traffic Conditions

Source: Google Maps (2016)
**Figure 7** Typical PM Peak Hour Roadway Traffic Conditions

Source: Google Maps (2016)
2.2 Existing and Planned Transportation Facilities

A description of the existing transportation system within the study area is provided in this section.

Existing Freeways
I-5 and I-805 provide regional access to destinations within the study area. I-5 provides access throughout San Diego County and into Orange County and Los Angeles as well. I-805 connects to I-5 within the study area and runs south to a connection with I-5 just north of the Mexican border. I-5 and I-805 carry approximately 180,000 and 220,000 vehicles per day, respectively, through the study area. As shown above in Figure 6 and Figure 7, freeways in the study area experience high levels of congestion, specifically in the PM peak. Congestion along each of the freeways results in increased peak hour travel times to and from activity centers within the study area.

Existing Roadways
Several major arterial roadways exist within the study area and provide connections between regional freeways and local destinations. Due to the topography and development patterns, the majority of roadways within the study area tend to follow circuitous routes. Large blocks with setbacks and large parking lots abound. The combination of these characteristics creates an auto-centric and somewhat pedestrian unfriendly environment which may create impediments to non-auto circulation. Key roadways include Genesee Avenue, La Jolla Village Drive/Miramar Road, Torrey Pines Road, and Mira Mesa Boulevard. A map of existing and planned roadways is shown in Figure 8.

In addition to circuitous routing and limited connectivity, arterial roadways in the study area also experience high levels of congestion (as shown in Figure 6 and Figure 7 above). The combination of limited connectivity and high levels of congestion limits mobility within the study area.
Figure 8 Existing and Planned Roadways
Existing and Planned Transit Service

Existing and future transit services are shown in Figure 9. The study area is served by several different types of transit service, including:

- **MTS RAPID BUS SERVICE**: MTS operates Routes 201 and 202, which together are known as the Super Loop. The Super Loop provides daily rapid bus service within the UCSD/UTC area, connecting activity centers including the UTC Transit Center, UCSD, Scripps Memorial Hospital, and others. MTS Route 204 also provides daily rapid service within the UTC area. MTS Route 237 provides weekday service between UCSD and the Rancho Bernardo community via Mira Mesa Boulevard.

- **MTS EXPRESS BUS SERVICE**: MTS Routes 50, 60 and 150 provide express bus service between UCSD/UTC and several communities south of the study area.

- **MTS AND NCTD LOCAL BUS SERVICE**: The UCSD/UTC area is served by MTS routes 30, 31, 41, 105, and 921, which provide connections to several communities outside of the study area. NCTD Route 101 provides service between the UCSD/UTC area and the coastal communities north of San Diego.

- **UCSD SHUTTLES**: UCSD operates eight shuttle routes which provide connectivity within the UCSD campus, Scripps Institute of Oceanography campus, and the UTC area. The Hillcrest/Campus Shuttle provides service between the main UCSD campus and the UCSD Medical Center’s Hillcrest campus. The COASTER Shuttle, Hillcrest/Campus Shuttle, and Sanford Consortium Shuttle routes operate on weekdays year-round, while all other routes operate during academic quarters only.

- **COASTER**: NCTD operates the COASTER, which provides daily commuter rail service between Oceanside and Downtown San Diego. Within the study area, the COASTER currently provides service at its existing Sorrento Valley station. COASTER service could potentially be relocated to a new station location, either just north or south of the current location.

- **SORRENTO VALLEY COASTER CONNECTION SHUTTLES**: MTS operates Routes 972, 973, 978, and 979, which provide connections between the existing Sorrento Valley COASTER station and the Sorrento Mesa area on weekdays only.

The efficiency of transit service in the study area varies. While transit service is provided by several routes within the study area, and the Super Loop provides good connectivity within UTC. Gaps in transit connectivity exist, particularly in the Sorrento Mesa area. Auto-oriented design of roadways and congestion along arterial roadways and highways further reduces the efficiency of transit. The COASTER provides high-capacity transit service to and from the study area, but the Sorrento Valley station is in an isolated location, not served by high-frequency shuttle service to help complete first- and last-mile connections.

The following planned high-capacity transit services will enhance transit service connectivity within the study area in the future:

- **MID-COAST LRT**: The Mid-Coast Corridor Transit Project is scheduled to open for service in the year 2021 and will provide a connection between UCSD/UTC and the regional LRT network.
FUTURE LRT SERVICE (PURPLE LINE): The most recent RTP, San Diego Forward, includes a planned LRT line that would run from San Ysidro to Carmel Valley via Mid-City, Kearny Mesa, and Sorrento Valley. Within the study area, this planned LRT line would likely include a connection to the COASTER in Sorrento Valley.

OTHER ENHANCEMENTS TO BUS SERVICES: The most recent RTP, San Diego Forward, includes the provision of several rapid bus lines within the study area.
Figure 9 Existing and Planned Transit Service
Bicycle and Pedestrian Circulation

Bicycle and pedestrian networks generally follow the existing arterial roadways. Travel ways within the study area are primarily designed for auto use. The combination of high-speed roadways, large lot development, and topographic variability creates a generally pedestrian- and bicycle-unfriendly environment. However, there may be opportunities to improve connections, particularly in the Sorrento Mesa area. A map of existing and future pedestrian and bicycle facilities is shown in Figure 10.
Figure 10 Existing and Future Bicycle and Pedestrian Facilities

Legend
- Existing Bicycle Facilities
- Future Bicycle Facility
  (per City of San Diego Bike Master Plan)
- Project Study Area

Note: pedestrian sidewalks existing along the majority of arterial roadways. Extensive pedestrian connections are present on the UCSD campus.
2.3 Physical Features

Physical features within the study area are described in this section.

Topography

Topography within the study area varies depending on location. The UCSD and UTC areas are primarily situated on top of a series of mesas. Portions of both the UCSD campus and commercial business parks within UTC are situated on plateaus that extend out from the mesa and are separated by canyons of varying depths.

Sorrento Valley is separated from the UCSD/UTC area by a prominent escarpment just west of I-805. This land feature rises approximately 300 feet above Sorrento Valley and acts as a natural barrier between the two areas. To the east, Sorrento Mesa rises gradually from Sorrento Valley and features a relatively level surface on which the existing commercial business parks are located.

Geology

A preliminary geologic assessment was performed as part of this study to evaluate the relative bearing capacities of soils along potential alignments and identify any active seismic faults or recorded landslides. In general, soils within the study area hold load bearing capacities at a variety of levels ranging from low to high. Load bearing capacities would need to be evaluated further and in more detail during the design phase of a potential system. A more detailed summary of soil load bearing capacities is included in Appendix A.

Based on the preliminary geologic assessment, it is anticipated that two to three potentially active faults intersect potential cableway alignments. Additionally, a landslide is highly suspected along the escarpment to the east of Towne Centre Drive. The potential location of transit system infrastructure (i.e. stations and towers) would need to be carefully evaluated at a later stage in order to avoid active faults and recorded landslides. A map of active faults and recorded landslides is included in Appendix A.

An evaluation of the proposed aerial cableway system's ability to operate within the physical constraints of the study area is included in Chapter 6.
2.4 Project Needs

As outlined above, the need for potential transit improvements in the study area is warranted for a variety of reasons, including:

- **Growth in Activity**: There are currently approximately 125,000 employees, 50,000 residents, and 34,000 university students within the study area. Strong growth is expected to continue in the University City area and an additional two million square feet of mixed-use development could potentially occur in retail centers and at UCSD and the adjacent research institutes.

- **Improved Transit Connectivity**: As noted above, existing transit services are constrained by topography and auto congestion. Continued growth in the study area will result in an increase in congestion along highways and local roadways that serve the area. Transit improvements will be needed to provide travelers with an efficient mode of transportation to, from, and within the study area.

- **Preservation of Environmentally Sensitive Areas**: The study area includes visible open space areas, flood zones, coastal areas, cultural resources, and biological resource areas within slopes and canyons. Transit enhancements that are implemented would need to minimize impacts to environmentally sensitive areas within the study area.

- **Improved Regional Connectivity**: In addition to the existing COASTER, the study area will be served by the Mid-Coast LRT extension in the future. A connection between these two high-capacity lines is considered an important link that would improve connectivity within the study area and region.

- **Conformance with Regional and State Policies**: San Diego Forward: The Regional Plan and Sustainable Communities Strategy integrate transportation and land use policy to achieve greenhouse gas (GHG) emission reductions consistent with California State requirements. A new high-capacity transit connection could provide opportunities for smart growth at station areas, helping to achieve regional and state GHG reduction targets.

- **Provision of Skyways as High-Frequency First-Mile/Last-Mile Connectors**: San Diego Forward: The Regional Plan references the potential use of skyways to improve first-mile/last-mile connections for short-distance trips in the region, specifically in dense urban environments. Skyways are well-suited to traversing freeways, canyons, hills, and other man-made obstacles that exist within the study area.
Chapter 3: Aerial Cableway Technology

3.1 Aerial Cableway Overview

Urban applications of aerial cableway technology have been successfully integrated into transit networks in various cities around the globe. These systems offer an additional transit option to overcome obstacles in the built or natural environment such as, freeways, water bodies, or significant changes in topography (e.g. canyons and valleys) to improve “first-mile/last-mile” connections to major regional transit lines. Other potential benefits in urban aerial cableway systems include low capital cost, minimal footprint, low energy consumption and reduced emissions, and the ability to bypass congested roadways.

The success of this type of system as a high-capacity transit mode can be seen in other cities internationally, including the Singapore Cable Car expansion in 2015; Rio de Janeiro’s cableway launch in 2013; and the expansion of La Paz, Bolivia’s cableway system with six new urban lines. While aerial cableway has enjoyed a high level of success in other countries, a multi-point urban cableway system in the United States has not yet been implemented.

3.2 Technology Considerations

Aerial cableway has been used as a form of transportation for decades, but is relatively new to urban areas in the United States. Aerial cableway has been used mostly for limited markets including ski areas and amusement parks. Recently, however, several cities throughout the country have shown interest in how the technology could be applied in their respective urban areas. Internationally, extensive aerial cableway systems have evolved and carry large volumes of commuters as a viable alternative to traditional urban transit methods such as buses and rail.
Large systems exist throughout South America, Asia, and Europe. Examples from several South American cities, London and Singapore are presented in Table 1.

Table 1: Worldwide Aerial Cableway Systems

<table>
<thead>
<tr>
<th>Location (date built)</th>
<th>System Length (mi)</th>
<th># of Stations (system wide)</th>
<th>Operational Capacity</th>
<th>Integrated with Transit Network?</th>
<th>Why technology was chosen?</th>
</tr>
</thead>
<tbody>
<tr>
<td>La Paz, Bolivia &quot;Mi Teleferico&quot; Built 2014-2015</td>
<td>6.1</td>
<td>11</td>
<td>3,000 pph</td>
<td>Yes</td>
<td>Overcome steep topography and traffic congestion, reduce pollution</td>
</tr>
<tr>
<td>Caracas, Venezuela &quot;Metrocable de Caracas&quot; Built 2007-2012</td>
<td>4.1</td>
<td>7</td>
<td>2,000 pph</td>
<td>Yes</td>
<td>Overcome steep topography and provide social services at stations</td>
</tr>
<tr>
<td>Medellin, Colombia &quot;Metrocable Medellin&quot; Built 2004-2010</td>
<td>5.8</td>
<td>10</td>
<td>30,000 p/day</td>
<td>Yes</td>
<td>Overcome steep topography and connect barrios to rest of city</td>
</tr>
<tr>
<td>Rio de Janeiro, Brazil &quot;Teleferico do Alemão&quot; Built 2011</td>
<td>2.2</td>
<td>6</td>
<td>Approx. 2,000 pph</td>
<td>Yes</td>
<td>Build tourism, improve social conditions in the “favelas” (settlements of urban poor) on hillsides by connecting residents to rail network</td>
</tr>
<tr>
<td>London, United Kingdom &quot;Emirates Air Line&quot; Built 2012</td>
<td>0.7</td>
<td>2</td>
<td>2,500 pph</td>
<td>Yes</td>
<td>Connect exhibition areas for Olympic Games over the Thames River and to the subway system</td>
</tr>
<tr>
<td>Singapore &quot;Singapore Cable Car&quot; Built 1974, extended to Sentosa 2015</td>
<td>1.1</td>
<td>3</td>
<td>1,400 pph</td>
<td>No</td>
<td>Tourist attraction from Mount Faber spanning Keppel Harbour and steep topography to Sentosa resort island</td>
</tr>
</tbody>
</table>

pph = persons per hour  
p/day = passengers per day

In the United States, recent urban cableway projects include:

- Portland Aerial Tram: Opened in 2006, this system provides service between Portland’s the city’s South Waterfront district and the main Oregon Health & Science University campus;
- Roosevelt Tram, New York: The first urban mass transport application of aerial tramways in the United States was completed in 1976 on Roosevelt Island in New York City.
Aerial cableway technology tends to be utilized in lieu of traditional modes of transit when some or all of the following conditions are present:

- Natural or man-made obstacles exist, which make implementation of traditional transit applications, such as a light rail, difficult or impractical;
- Congested roadway and/or poor roadway connectivity that impact bus transit travel times and reliability;
- Opportunities for future expansion exist.

Aerial cableway systems offer several potential advantages over traditional modes of transit, including:

- Construction impacts are typically minimized by the smaller system footprint and shorter construction duration;
- May have lower capital costs (on a per mile basis) compared to other fixed-guideway technologies;
- Environmental impacts can be minimized as aerial cableway systems typically have a smaller footprint.

Disadvantages of aerial cableway systems include the following:

- System expansion can be limited and/or costly;
- Requires transit operator to develop operations & maintenance expertise with a new technology, though it can potentially be contracted out;
- Depending on the specific aerial cableway technology used, it is more sensitive to inclement weather, as high winds and electrical storms that could require a temporary shutdown of the system;
- Traditional system evacuation procedures have been developed for resort-based systems, while urban-based evacuation procedures are in the process of being developed;
- Insurance premiums are typically higher than traditional modes of transit due to the high elevation of operations, and newer technology application.
Aerial cableway systems generally utilize one of three system technologies: aerial tramway, mono-cable detachable gondola (MDG), and tri-cable detachable gondola (3S).
The MDG technology is proposed for this study for the following reasons:

- It is the most widespread technology used worldwide;
- It is more versatile and can be utilized in an urban, multiple-station system in a more cost-effective manner;
- It would likely provide the capacity to handle the passenger loads estimated within the study area;
- It is typically used in areas with low and moderate wind speeds.

3.3 Operations and Capacity

The typical travel speed for the aerial cableway systems would be 1,200 feet per minute (13.6 mph). While unloading and loading passengers at stations, cabins would travel at a slower speed of sixty (60) feet per minute and take approximately one minute to pass through each station. A cabin capacity of eight (8) passengers was assumed for the purpose of this study. Assuming 8-passenger cabins, at maximum operation an aerial system could serve up to 2,400 persons per hour (pph) per direction.
3.4 System Components

This section provides a summary of system specifications. Details for each component are discussed below. Aerial cableway technology specifications are shown in Table 2.

Stations

Aerial cableway stations would vary in size, depending on passenger throughput and location within the system.

**END STATION:** Overall, an end station footprint would be approximately 50 feet by 110 feet in size. The width can increase if an end station is elevated to provide vertical access features such as elevators and stairs.

At one end station, more room would be required for cabin storage and maintenance facilities. Specific storage requirements would vary based on ridership demands. The cabin storage area would be located either adjacent to the station platform or placed under a station, depending on constraints at the station site. A typical end station is shown below in Figure 11.

**INTERMEDIATE STATION:** An intermediate station would be approximately 50 feet by 180 feet in size, and would require more room to incorporate elevators and stairs. Intermediate stations require more length due to both the boarding and alighting occurring on one side for each direction, whereas at the end station the boarding takes place on one side and the alighting occurs on the other side of the station platform. A potential intermediate station is shown in Figure 12.

**TURN TERMINALS:** Aerial cableway systems are sometimes required to turn corners due to constraints in the natural or built environment. This can be achieved with either turning towers, or more commonly, turning terminals. At turning terminals, passenger cabins slow

### Table 2 Aerial Cableway System Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Operations</strong></td>
<td></td>
</tr>
<tr>
<td>Access Speed (ft/min)</td>
<td>60</td>
</tr>
<tr>
<td>Operating Speed (ft/min)</td>
<td>1200</td>
</tr>
<tr>
<td>System Power (hp)</td>
<td>500</td>
</tr>
<tr>
<td>Maximum Allowable Grade</td>
<td>100% (45°)</td>
</tr>
<tr>
<td><strong>Stations</strong></td>
<td></td>
</tr>
<tr>
<td>Drive Station (with cabin storage)</td>
<td>50' x 110'</td>
</tr>
<tr>
<td>Return Station</td>
<td>50' x 70'</td>
</tr>
<tr>
<td>Intermediate Station</td>
<td>50' x 180'</td>
</tr>
<tr>
<td><strong>Towers</strong></td>
<td></td>
</tr>
<tr>
<td>Tower Height</td>
<td>45' - 150'</td>
</tr>
<tr>
<td><strong>Cabin</strong></td>
<td></td>
</tr>
<tr>
<td>Cabin Capacity (persons)</td>
<td>8</td>
</tr>
<tr>
<td>Cabin Frequency (maximum)</td>
<td>12 seconds</td>
</tr>
<tr>
<td>Maximum Passenger Throughput</td>
<td>2,400 pph</td>
</tr>
<tr>
<td>Cabin Dimensions (8-passenger)</td>
<td>6.5' x 6' x 7'</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td></td>
</tr>
<tr>
<td>Motor Size</td>
<td>500 hp</td>
</tr>
<tr>
<td>Power Usage</td>
<td>360 kW/hr</td>
</tr>
</tbody>
</table>

Source: Doppelmayr

---

Mi Teleférico, La Paz, Bolivia (Source: Doppelmayr)
down to a speed of approximately 300 feet per minute in order to transfer from one cable loop to another and change course.

At a minimum, turn terminals require the same electromechanical components as an intermediate station, but do not require the same ancillary components, such as elevators and ticketing machines, that are required at stations where passengers board and alight. Turn terminals can be designed to allow for passenger access where necessary. Turn terminals that do not allow for passenger access would be approximately 50 feet by 130 feet in size. Turn terminals that allow for passenger access would be similar in size to an intermediate station at approximately 50 feet by 180 feet, as additional length is needed to allow for boardings and alightings to occur on each side of the terminal.

System attendants would be present at all stations where passengers board and alight the system. Each station would include two attendants, one on each platform, who would group passengers together and assist them in boarding and alighting the system. In order to improve security, station attendants would be responsible for grouping passengers together in a manner that would reduce the chances of a security incident on board. A more detailed overview of fire, life, and safety regulations is included below in Section 3.5.
Figure 11 Typical End Station Plan
Figure 12 Typical Station Section with Connection to LRT
**Towers**

Between stations, an aerial cableway would be supported by several vertical towers. Generally, the towers would be spaced approximately 370–380 feet apart, dependent on characteristics in the built environment. Where necessary, the distance between towers would vary.

For the purpose of this study, single “t-shaped” towers were assumed at each tower location. The vertical component of towers would vary depending on tower height. Relatively shorter towers would have a tubular conical shape, whereas taller towers would utilize a lattice structure for support. Examples of each tower type are shown below.

![T-Shaped Tower](Source: Doppelmayr) ![Lattice Tower](Source: Doppelmayr)

The height of the aerial cableway towers is dependent on the following:

- **Minimum Vertical Clearance**: Depending on the environment below the system, the height of towers would vary to ensure minimum vertical clearance thresholds are met.
- **Spacing of the Towers**: In general, the greater the horizontal distance between towers, the higher the towers themselves would need to be.
- **Cable Sag**: The cable guideway itself experiences sag between towers due to downward gravitational forces on the cable and individual cabins. The cable guideway would sag 3.5 percent of the horizontal distance between the towers. This sag would need to be taken into consideration when determining the size of towers.
Sorrento Valley Skyway Feasibility Study

Cabins and Cable
For the purpose of this study, passenger cabins were assumed to be about 6.5 feet by 6 feet by 7 feet in size, accommodating a maximum of eight (8) passengers at a time (see Appendix B). The cabins could be modified to include features designed to enhance the overall passenger experience, such as enhanced ventilation, air conditioning, and internet access (Wi-Fi). Cabins could also be fitted with bicycle racks on the exterior of the cabins, making them a more attractive option for cyclists and as a first- and last-mile option. The cabins would be connected to a woven steel cableway, which would run in a continuous loop throughout the system.

Cabins could be equipped with on-board one-or two-way communication systems. Systems could be used to communicate with passengers in the event of an emergency or for security reasons. A more detailed overview of fire, life, and safety regulations is included below in Section 3.5.

Power
The cableway would be powered by one 500-horsepower motor, resulting in a power usage of 360 kilowatts (KW) or about 0.15 KW/pph. This would allow for the system to function at a maximum operating capacity (2,400 pph). Though many systems typically do not initially operate at maximum capacity, designing the power system to handle the maximum operating capacity eliminates the need to expand the system in order to serve increases in passenger demand.

3.5 Fire, Life, Safety
Fire, life and safety regulations would need to be taken into consideration when designing a skyway system, and are described in more detail below. These issues were also taken into consideration when developing system alternatives and calculating capital costs.

Fire
Fire safety is taken into account both in the design of aerial cableway system components, as well as how the system is routed through urban areas. Aerial cableway systems are designed in order to reduce the risk of serious harm to passengers and employees, as well as the system itself. Fire smoke detectors are included in all station and mechanical facilities, and all of the materials within each passenger cabin are fire resistant.

The most critical system component that could be affected in the event of a fire is the cableway itself, as prolonged exposure to excessive heat could compromise the structural integrity of the cable. This issue can be mitigated by keeping the system in motion, thus reducing the amount of time any one portion of the cable is exposed to.
excessive heat. In the event of a fire that impacts the cable, passengers would unload at the next downstream station, and passengers would be prohibited from boarding the system. More detailed procedures would need to be identified in a system operating plan.

Additionally, California state code requires a vertical envelop be maintained over the top of any existing structures to allow for firefighting access to the structure itself. This would need to be taken into consideration during the design phase of a system.

Furthermore, it is usually required that any buildings or structures in close proximity to an aerial cableway system be equipped with fire alarms that notify the cableway operators of a fire event, allowing for proper emergency procedures to be followed.

Life and Safety

Aerial cableway system operation would be possible at wind speeds of up to 60 mph, although full speed operation is only possible up to wind speeds of around 40 mph. In the event wind speeds increase to 40-60 mph, the system can operate at slow speeds, which would typically be done with the purpose of unloading the system. System evacuation measures would need to be established before operations begin, and would require coordination with local emergency services departments.

During operations, an attendant would be present at each station to monitor the safety and security of aerial cableway passengers as they board and alight the system as well as pass through the station.

In the event of an electrical failure, aerial cableway systems are designed to allow for cabins to be manually circulated into the next downstream station in order to allow passengers to safely alight from the system. Doppelmayr is currently exploring options for a more robust safety system that would allow for a full system evacuation in the event of a major mechanical failure. Costs for a more robust safety system were included in the capital cost estimate for each of the alignment alternatives.
Chapter 4: Market Assessment

The Market Assessment at this stage of the process entailed identifying travel patterns within the study area and the region, conducting estimates of potential market demand using the regional travel demand forecast model to test potential demand for transit connections in the region, and assessing aerial cableway transit for this study area, a large number within the region.

4.1 Travel Patterns

Based on an evaluation of the travel patterns, there are strong attractors within the study area compared to the San Diego Region. The Sorrento Mesa employment center is the second largest trip attractor in the region. UCSD, Scripps, the Torrey Pines Mesa, and UTC are also major destinations. The study area is forecasted to attract approximately 420,000 daily trips in 2035.

Figure 13 displays the density of origins and destinations within the study area.

Table 3 shows a quantitative summary of trip activity within the study area.

As a result of large employment centers, forecast employment is estimated at over 125,000 and existing employment is high relative to the region. Population is primarily concentrated at the west end of the study area near the UCSD campus. The UCSD activity center also contains multi-family residential areas, with plans for midrise residential in the future.

<table>
<thead>
<tr>
<th>Study Area Activity Center</th>
<th>Population</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSD Activity Center</td>
<td>15,000</td>
<td>43,400</td>
</tr>
<tr>
<td>UTC Activity Center</td>
<td>33,500</td>
<td>30,600</td>
</tr>
<tr>
<td>Sorrento Mesa Activity Center</td>
<td>700</td>
<td>41,500</td>
</tr>
</tbody>
</table>

This data shown above illustrates that highly concentrated nodes of trip attraction, including employment, would be well served by a frequent transit circulator service during peak periods, with efficient connections to regional transit services.
Figure 13 Distribution of Study Area Trip Origins and Destinations
4.2 Market Demand Testing

Sensitivity tests were conducted by SANDAG during the first phase of the study utilizing the Series 13 regional travel demand model. Objectives of the sensitivity tests included determining what type of trip markets would be attracted to a new transit circulator in the corridor with the characteristics of an aerial cableway technology, testing of mode choice coefficients available within the model, and testing of comparative demand between connections to major activities within the study area.

Figure 14 presents the mode of access for the sensitivity tests. The predominance of trip attractions during the am peak for educational and employment activities is illustrated by the large percentage of projected access to study area via connections from regional transit.

Key findings include the following:

- An LRT coefficient was utilized to allow the model to treat the systems as high-capacity, high-frequency transit service for premium service attraction;
- A majority of potential users of the system transfer from other regional transit services including the future Mid-Coast LRT, COASTER, and bus services; and
- Connections between both Sorrento Mesa employment centers and UTC, as well as connections between Sorrento Mesa employment centers and UCSD, show a potentially strong ridership attraction.

Figure 14 Mode of Access for Corridor Model Sensitivity Tests
4.3 Aerial Cableway Markets

The market for aerial cableway technology is untested in the San Diego region. However, it is a potential solution for first and last mile connections. This technology can be used as a major trunk-line transit service or a local circulator. Aerial cableway could be attractive to both choice riders and transit-dependent passengers due to its high-frequencies, reliability, and ability to provide efficient first-mile/last-mile connections.

For this study, aerial cableway solutions were identified to serve as local circulators given the need for connections to regional transit services and between large activity centers in close proximity to each other.

Several urban aerial cableway systems have been implemented or are under study in the United States, as shown in Table 4. Both the Roosevelt Tramway and Portland services were envisioned to serve daily commuter needs and integrate with regional transit services. Both have done this successfully as ridership exceeds 5,000 daily trips in New York, and 3,300 daily trips in Portland.

Table 4 Urban Cableways in the United States

<table>
<thead>
<tr>
<th>System</th>
<th>Status</th>
<th>System Inception</th>
<th># of Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roosevelt Tramway, New York</td>
<td>Operational</td>
<td>1976</td>
<td>2</td>
</tr>
<tr>
<td>Shoreline, Chicago</td>
<td>Under Study</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Brooklyn/Manhattan, New York</td>
<td>Under Study</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Georgetown, DC</td>
<td>Under Study</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Portland, OR</td>
<td>Operational</td>
<td>2006</td>
<td>2</td>
</tr>
<tr>
<td>Long Beach, CA</td>
<td>Under Study</td>
<td>-</td>
<td>2-3</td>
</tr>
<tr>
<td>Telluride, CO</td>
<td>Operational</td>
<td>1996</td>
<td>4</td>
</tr>
<tr>
<td>Clearwater, FL</td>
<td>Under Study</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Branson, MO</td>
<td>Under Study</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Baton Rouge, LA</td>
<td>Under Study</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

A common objective amongst the existing and planned systems listed in the above, including planned services, is that they are envisioned for commuter services like the Roosevelt and Portland systems. This makes them distinct from scores of ski services throughout the nation. The use of aerial skyway systems for public transit is relatively small but proven. As the list illustrates, it is an idea that is catching on in many regions of the United States as a cutting edge solution to provide urban transport solutions in a frequent and cost effective way.

The attraction of choice riders is anticipated for the application of aerial skyway technologies. The routing of a circulator with minimal impediments and services
characteristics was estimated to provide a high level of trip attraction from the region, similar to urban rail technologies. The novelty of aerial skyway has also been proven internationally to attract choice riders at a higher rate compared to other premium transit services such as urban rail and BRT. In the United States, additional projects will provide more evidence regarding this trend.

One key trend that is established within the San Diego region and other similar metropolitan areas in the United States is that travel time reliability is the number one factor in attracting choice riders. With the frequency of trip availability (approximately 30 seconds) and the high reliability of aerial skyway technologies compared to conventional transit technologies, aerial cableway is able to serve the primary need of choice riders, in addition to serving desired travel patterns. In addition, the privacy of individual or select group vehicles may enhance the experience of transit users.

Providing service that fills the gap of first and last mile connections through aerial skyway applications could also enhance transit attractiveness in the region for both captive and choice riders by providing efficient and cost effective connections.
Chapter 5: Study Alternatives

5.1 Alternatives Development

Several factors were taken into consideration when developing the study alignment alternatives. These factors are discussed in greater detail below.

Provide Service to UCSD

One of the factors guiding the development of alternatives was to provide a direct connection to UCSD. A connection would provide travelers with access to the many education and research facilities, medical centers, and student housing on the UCSD campus.

The future Voigt Drive LRT station was identified as the preferred connection location on the UCSD campus because it is the closest point to Sorrento Mesa, which minimizes travel times for passengers connecting to and from the Mid-Coast LRT extension.

Provide Service to UTC

As noted above, the UTC area includes several activity centers, including the Westfield UTC Mall and several residential and commercial land uses. Providing a skyway connection to the UTC area would allow travelers access key activity centers within the study area.

Additionally, the UTC Transit Center is a regional transit hub, currently served by 12 local, express, and rapid bus services, and the future terminus of the Mid-Coast LRT extension. Providing a connection to the UTC Transit Center would connect the skyway system to each of the existing and planned transit services, as well as providing high-capacity service to the UTC Transit Center itself.

Connect to Sorrento Valley COASTER Station

As outlined in Section 2.2, the existing Sorrento Valley COASTER station is in an isolated location and the efficiency of existing circulator shuttle service is hindered by circuitous roadways, gaps in connectivity, and congested arterial roadways. Additionally, rail grade crossing operations at the existing COASTER station cause an increase in traffic congestion near I-5 and Sorrento Valley Road. As such, the feasibility of relocating the existing Sorrento Valley COASTER station was evaluated in the Project Report for I-5/Sorrento Valley Road Interchange Improvements (City of San Diego, 2015). One of the relocation locations identified in the study is just south of the intersection of Carroll Canyon Road and Sorrento Valley Road.

For the purpose of this study, each of the system alternatives assumes a connection to the COASTER in Sorrento Valley would occur at a relocated station location near...
the intersection of Carroll Canyon Road and Sorrento Valley Road. This is due to the fact that 1) the feasibility of relocating the Sorrento Valley COASTER station south from its existing location has been evaluated and found to be feasible, 2) relocating the station is listed as a capital improvement project in the current SANDAG expenditure plan, and 3) routing skyway service north to serve the existing COASTER station would both increase the capital cost required as well as decrease ridership as a result of increased end-to-end travel times.

**Connect to Future LRT Service**

*San Diego Forward: The Regional Plan* includes plans for an additional LRT extension, The Purple Line, within the study area. Within the study area, the Purple Line would roughly follow the I-805 corridor and connect with the commuter rail system at the Sorrento Valley COASTER station. Providing a skyway station at a relocated Sorrento Valley COASTER station would allow for an additional connection to the regional LRT system.

**Provide Service to Sorrento Mesa**

Sorrento Mesa contains a large concentration of employment. Due to topographic constraints, arterial roadways serving the Sorrento Mesa generally follow circuitous routes, and access to the area is limited. The combination of a large concentration of employment and circuitous roadways results in congested arterial roadways, especially during peak commute times. The provision of skyway stations in Sorrento Mesa would allow travelers the option of using a high-frequency circulator service to access jobs in the area.

The provision of a park-and-ride lot at the easternmost station would provide an option for auto access for residents of Mira Mesa and communities east and north of Sorrento Mesa.

**Additional Objectives**

In addition to the factors listed above, the following objectives were used to help guide the development of alignment alternatives:

- Minimize impacts to existing infrastructure, specifically buildings.
- Provide passenger access at locations where significant infrastructure is required to turn the system (i.e. turn terminals).
- Achieve each of the aforementioned objectives while minimizing potential capital expenditures for the potential build project.
- Overcome topographic constraints.
5.2 Transit Propensity and Station Siting

Transit propensity implies the tendency of a person to use transit as a form of transportation, and is based on a number of factors, including proximity of housing and employment to transit stations. In order to maximize potential ridership, maximizing walk access to station sites is critical, especially in the Sorrento Mesa area dominated by auto-oriented street patterns.

Using SANDAG Series 13 modeling data, the project team evaluated transit accessibility for residents and employees. The project team evaluated access to adjacent development at the individual building level to assess where existing pedestrian connections could be enhanced and where opportunities exist for creating new pedestrian connections. This information was used to determine where best to site individual stations in order to maximize walk access.

Through the analysis described above, the project team sited stations in Sorrento Mesa in order to serve the most densely developed areas within the mesa itself. Stations were sited in locations that also would afford the opportunity to use potential pedestrian enhancements as shown in Figure 15. Additionally, stations were sited in locations in order to minimize out of direction travel for the skyway system itself, as well as to avoid taller buildings.

A quantitative summary of the number of residents and employees within a 5- and 10-minute walkshed of select stations is shown below in Table 5.

Figure 15 below displays accessibility to and from select stations.

Table 5 Quantitative Summary of Accessibility

<table>
<thead>
<tr>
<th>Station</th>
<th>Morehouse Drive</th>
<th>North Sorrento Mesa</th>
<th>East Sorrento Mesa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing/Employment within 5-Minute Walk</td>
<td>2,600</td>
<td>4,000</td>
<td>4,200</td>
</tr>
<tr>
<td>Housing/Employment within 10-Minute Walk</td>
<td>5,700</td>
<td>10,600</td>
<td>9,500</td>
</tr>
</tbody>
</table>

Note: numbers are rounded to the nearest 100 persons.
Figure 15 Accessibility at Select Passenger Stations
5.3 Alignment Alternatives

The UCSD and UTC alternatives were developed based on the alignment objectives described above. An overview of both the UCSD and UTC alignment alternatives is provided below.

**UCSD Alternative**

The UCSD alternative begins at the **East UCSD/Voigt Drive** station, near the intersection of Voigt Drive and Campus Pointe Drive on the east side of the UCSD campus. This station would include a connection to the Mid-Coast LRT extension at the future Voigt Drive station, simultaneously providing service to UCSD and tying into the regional LRT system. Moving east, the alignment traverses two canyons between Genesee Avenue and Towne Center Drive and down the escarpment just south of the existing LOSSAN rail corridor, and above the LOSSAN rail tracks to a connection with a potential relocated **Sorrento Valley COASTER** station near Sorrento Valley Road and Carroll Canyon Road. A skyway station at a relocated Sorrento Valley COASTER station could also tie in to the potential Purple Line LRT service at this location.

Continuing east, the alignment passes over both I-805 and the existing electric transmission and distribution lines just east of I-805. The system would likely require tall towers in order to achieve minimum clearance thresholds above existing transmission and distribution lines. The system would continue east over low-rise commercial office buildings into Sorrento Mesa where a station would be provided just north of **Morehouse Drive**.

The system would then continue north over low-rise commercial office buildings to a station at **North Sorrento Mesa**, near the intersection of Pacific Heights Boulevard and Barnes Canyon Road. The system would then move east over several low- and mid-rise commercial office buildings, ultimately terminating at a station at **East Sorrento Mesa**, near the intersection of Mira Mesa Boulevard and Sequence Drive. The East Sorrento Mesa station could include a park-and-ride lot to allow for improved auto access for residents to the east.

**UTC Alternative**

The UTC alternative begins at the **UTC Transit Center**, which would include a connection to the Mid-Coast LRT extension at the future UTC Transit Center station, connecting the skyway system to nearby commercial employment, retail, and residential activity centers, as well as several other local and high-capacity bus lines.

Moving northeast, the system would include an intermediate station at the intersection of Eastgate Mall and Towne Centre Drive. The project team determined...
that the skyway system requires turns in order to avoid several tall buildings in the area. The intersection of Eastgate Mall and Towne Centre Drive was identified as a location for the system to turn. Additional infrastructure would be required to turn the system, which increases capital costs. Providing passenger access at a location where a turn is needed requires a minimal amount of additional capital investment. Given the presence of nearby commercial office and retail activity and a relatively low additional investment needed to provide access to passengers, it was determined that providing a station at Eastgate Mall and Towne Centre Drive would be beneficial.

Moving north from Eastgate/Towne Centre, the alignment would traverse over low-rise commercial office buildings and down the escarpment just west of the existing LOSSAN rail corridor, and above the LOSSAN rail tracks to a connection with a potential relocated Sorrento Valley COASTER station near Sorrento Valley Road and Carroll Canyon Road.

The UTC Alternative is identical to the UCSD alternative east of the Sorrento Valley COASTER station, with stations at Morehouse Drive, North Sorrento Mesa, and East Sorrento Mesa. Similar to the UCSD Alternative, the East Sorrento Mesa station could include a park-and-ride lot to allow for improved auto access for residents in Mira Mesa and communities to the east and north.

The alignment alternatives are shown in Figure 16. A detailed evaluation of the alignment alternatives is included in Chapter 6.
Figure 16 Alignment Alternatives
Chapter 6: Evaluation of Alternatives

Chapter 6 provides concept level evaluation two primary alignment alternatives. One alternative provides service to UCSD; and another provides service to UTC. The detailed evaluation includes projected capital and operation and maintenance (O&M) cost estimates, projected ridership, community and environmental considerations, and regulatory requirements.

A more detailed assessment of each alternative is included below.

6.1 System Cost Estimates

Cost estimates were prepared to provide an estimate of both the capital costs to construct each alternative and the annual O&M costs to support the on-going operation of each proposed system.

Capital Costs

Capital costs for each of the alternatives have been prepared at a conceptual level, but the estimates utilized a detailed build-up cost model developed specifically for this project. Cost categories are summarized using the Federal Transit Administration's (FTA) Standard Cost categories rolled up into the following components:

- Aerial guideway and elements;
- Station infrastructure;
- Cabin maintenance facilities;
- Site work and special conditions;
- Systems;
- Right-of-way (ROW), land and existing improvements;
- Cabins; and
- Professional services.

Construction costs associated with each of the above components for both UCSD and UTC alignment alternatives are itemized in Table 6. As shown in Table 6, the capital cost would range from $127 million to $172 million; depending on the alternative. A detailed cost breakdown for each of the alternatives is provided in Appendix C.
Table 6 Estimated Capital Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Capital Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UCSD Alternative</td>
</tr>
<tr>
<td>Aerial Guideway and Elements</td>
<td>$19,000,000</td>
</tr>
<tr>
<td>Stations Infrastructure</td>
<td>$39,000,000</td>
</tr>
<tr>
<td>Cabin Maintenance Facilities</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Site Work and Special Conditions</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>Systems</td>
<td>$6,000,000</td>
</tr>
<tr>
<td>ROW, Land, Existing Improvements</td>
<td>$7,000,000</td>
</tr>
<tr>
<td>Cabins</td>
<td>$4,000,000</td>
</tr>
<tr>
<td><strong>Total Capital Cost</strong></td>
<td><strong>$82,000,000</strong></td>
</tr>
<tr>
<td>Professional Services (39%)</td>
<td>$27,000,000</td>
</tr>
<tr>
<td>Unallocated Contingency (30%)</td>
<td>$33,000,000</td>
</tr>
<tr>
<td><strong>Total System Cost</strong></td>
<td><strong>$141,000,000</strong></td>
</tr>
<tr>
<td>Potential Low Cost (-10%)</td>
<td>$127,000,000</td>
</tr>
<tr>
<td>Potential High Cost (+10%)</td>
<td>$155,000,000</td>
</tr>
</tbody>
</table>

Note: Costs in Appendix C may not match due to rounding.

**O&M Costs**

O&M costs were developed based on the alignment alternatives presented in Chapter 5.2. In order to provide a range of costs, O&M costs were estimated for both “weekday + weekend” and “weekday only” service options. As the travel market in the study area is primarily commute-based, it may be beneficial to operate the system on weekdays only.

Cost estimates for each alternative include a long list of line items that were be grouped into one of the following broad cost categories for summary purposes:

- **Labor Costs**: staff wages and burden costs
- **Energy Costs**: costs associated with powering the system
- **Miscellaneous Annual Costs**: staff uniforms, office supplies, and other items
- **Reserve Costs for Major Repairs and Replacements**: tower and station mechanical components, etc.

Table 7 provides a summary of estimated annualized costs for operating and maintaining each alternative. As shown, annualized O&M costs would range from $4.9 million to $7.0 million depending on both the alternative and system operating plan. A detailed breakdown of O&M costs for each alternative is provided in Appendix C.
6.2 Ridership

Modeling Methodology

Travel demand model runs were performed using the SANDAG Series 13 regional forecast model for each of the alignment alternatives in order to estimate potential ridership. Aerial cableway is not included in the mode choice model. As a result, an LRT coefficient was utilized to allow the model to treat the systems as high-capacity, high-frequency transit service. The travel demand modeling was conducted using similar model settings as those used in the model sensitivity testing as described in Chapter 4. These include:

- System headway: 3 minutes (to simulate frequent smaller cabs compared to LRT coefficients in the mode choice model)
- One-way fare price: $2.50
- System modeled using an LRT attractiveness coefficient
- Park-and-ride lot included at the East Sorrento Mesa station, with unconstrained parking
- Enhanced pedestrian connectivity in Sorrento Mesa as shown in Figure 17.

Modeling Results

Table 8 below shows projected ridership by station for each of the alignment alternatives. As shown, the UCSD option/alternative could generate approximately 4,900 daily boardings, whereas the UTC option/alternative could generate approximately 6,900 daily boardings. Figure 17 shows passenger boarding’s for each of the alignment alternatives.
### Table 8 Estimated Daily Ridership by Station

<table>
<thead>
<tr>
<th>Station</th>
<th>Daily Boardings¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UCSD Alternative</td>
</tr>
<tr>
<td></td>
<td>UTC Alternative</td>
</tr>
<tr>
<td>East Sorrento Mesa</td>
<td>1,200</td>
</tr>
<tr>
<td>North Sorrento Mesa</td>
<td>900</td>
</tr>
<tr>
<td>Morehouse Drive</td>
<td>750</td>
</tr>
<tr>
<td>Sorrento Valley COASTER</td>
<td>540</td>
</tr>
<tr>
<td>East UCSD/Voigt Drive</td>
<td>1,500</td>
</tr>
<tr>
<td>Towne Centre/Eastgate</td>
<td>-</td>
</tr>
<tr>
<td>UTC Transit Center</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total Daily Boardings</strong></td>
<td><strong>4,890</strong></td>
</tr>
</tbody>
</table>

¹ Daily boardings are rounded to the nearest 10.
Figure 17 Estimated Daily Boardings and Passenger Loads

Legend

- 1,500 Passenger Boardings (UCSD)
- 2,300 Passenger Boardings (UTC)
- 1,500 Passenger Load (UCSD)
- 2,300 Passenger Load (UTC)
- Passenger Station
- Project Study Area

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6.3 Cost Effectiveness

To illustrate the effectiveness of each of the alternatives, average O&M cost per boarding was calculated. Average weekday passenger boardings from the travel demand model were annualized by a factor of 315, which is equal to the annualization factor for the entire MTS transit system. The annual O&M costs above were then divided by the projected annual boardings to estimate the average cost per boarding. Annualization factors are calculated assuming daily service; O&M costs for the “weekday + weekend” service option were used to calculate overall cost-effectiveness.

In Table 9 shown below, the average cost per boarding is slightly lower for the UTC system ($3.23 per boarding) than the UCSD Alternative ($3.83 per boarding).

Table 9 Average O&M Cost per Boarding

<table>
<thead>
<tr>
<th>Item</th>
<th>UCSD Alternative</th>
<th>UTC Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual O&amp;M Cost</td>
<td>$5,900,000</td>
<td>$7,000,000</td>
</tr>
<tr>
<td>Annual Passenger Boardings¹</td>
<td>1,540,400</td>
<td>2,170,400</td>
</tr>
<tr>
<td>Projected O&amp;M Cost per Boarding</td>
<td>$3.83</td>
<td>$3.23</td>
</tr>
</tbody>
</table>

¹ Annual passenger boardings calculated by using an annualization factor of 315, which is the average of the entire MTS transit system. Projected ridership numbers are rounded to the nearest 100 boardings.

A summary of each alternative is shown in Figure 18.
**Figure 18 Summary of Alignment Alternatives**

<table>
<thead>
<tr>
<th>Alignment Segment</th>
<th>UCSD Full Operating Segment</th>
<th>UCSD Minimum Operating Segment</th>
<th>UTC Full Operating Segment</th>
<th>UTC Minimum Operating Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>East Sorrento Mesa to East UCSD/Voigt Drive</strong></td>
<td>East Sorrento Mesa to East UCSD/Voigt Drive (Relocated COASTER Station)</td>
<td>North Sorrento Mesa to East UCSD/Voigt Drive (No COASTER Station) Does not preclude future COASTER Station</td>
<td>East Sorrento Mesa to UTC (Relocated COASTER Station)</td>
<td>North Sorrento Mesa to UTC (Interim turn towers to accommodate future stations)</td>
</tr>
<tr>
<td><strong>Daily Boardings</strong></td>
<td>4,900</td>
<td>2,200</td>
<td>7,000</td>
<td>2,500</td>
</tr>
<tr>
<td><strong>Capital Cost</strong></td>
<td>$127 - $155 Million +</td>
<td>$84 - $103 Million</td>
<td>$141 - $172 Million +</td>
<td>$103 - $126 Million +</td>
</tr>
<tr>
<td><strong>Annual O&amp;M Cost</strong></td>
<td>$4.9 - $5.9 Million</td>
<td>N/A*</td>
<td>$5.7 - $7.0 Million</td>
<td>N/A*</td>
</tr>
<tr>
<td><strong>System Length</strong></td>
<td>2.9 Miles</td>
<td>2.2 Miles</td>
<td>3.2 Miles</td>
<td>2.5 Miles</td>
</tr>
<tr>
<td><strong># of Stations</strong></td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td><strong>End-to-End Travel Time</strong></td>
<td>16 min</td>
<td>11 min</td>
<td>19 min</td>
<td>14 min</td>
</tr>
</tbody>
</table>

**Design Features**
- Provides direct access to UCSD & Mid-Coast
- High towers required
- Park & Ride lot provided at east end
- Provides direct access to UCSD & Mid-Coast
- High towers required
- Park & Ride lot provided at east end
- Provides direct access to UTC Mall & Mid-Coast
- High towers required
- Park & Ride lot provided at east end
- Provides direct access to UTC Mall & Mid-Coast
- Requires turn towers at interim station locations
- High towers required
- Park & Ride lot provided at east end
- Additional funds required for COASTER Station relocation
- Provides service to the existing COASTER would increase system capital cost by $30-40 Million
- Ridership would increase with planned increases in development intensity at UCSD
- Ridership could increase with planned increases in development intensity at UCSD
- Additional funds required for COASTER Station relocation
- Provides service to the existing COASTER would increase system capital cost by $30-40 Million
- System cost for service to existing COASTER would be $80.4 Million; travel time is approximately 33.5 minutes
- O&M costs were not calculated for the minimum operating segments as part of this study

**Notes**
- Additional funds required for COASTER Station relocation
- Provides service to the existing COASTER would increase system capital cost by $30-40 Million
- Ridership could increase with planned increases in development intensity at UCSD
- Ridership would increase with planned increases in development intensity at UCSD
- System cost for service to existing COASTER would be $80.4 Million; travel time is approximately 33.5 minutes
- O&M costs were not calculated for the minimum operating segments as part of this study
6.4 Community and Environmental Considerations

An initial high-level environmental evaluation was undertaken as part of this study to determine key items that would need to be taken into consideration in future studies. The evaluation addresses potential environmental issues within the study area at a generalized level based on existing data sources, including aerial imagery, existing geospatial (SanGIS) data, and on information available in documentation of other ongoing projects within the study area (e.g. the Mid-Coast Corridor Transit Project).

For purposes of this initial environmental evaluation, generalized corridors for both the UCSD and UTC alternatives were divided into four segments from west to east, as follows:

- **SEGMENT 1**: UCSD campus from project start through I-5 (UCSD only)
- **SEGMENT 2**: UCSD campus from I-5 through Genesee Avenue (UCSD only)
- **SEGMENT 3**: Genesee Avenue through I-805
- **SEGMENT 4**: I-805 to project terminus

**UCSD Alternative**

An overview of the UCSD alternative is shown in Table 10. As shown, the majority of items that identified for further consideration are within Segment 3 (Genesee Avenue to I-805).
Sorrento Valley Skyway Feasibility Study

Table 10 Environmental Considerations for the UCSD Alternative

<table>
<thead>
<tr>
<th>Environmental Considerations</th>
<th>Segment 1 (UCSD campus from project start through I-5)</th>
<th>Segment 2 (UCSD campus from I-5 through Genesee Ave)</th>
<th>Segment 3 (Genesee Ave through I-805)</th>
<th>Segment 4 (I-805 to project terminus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual impacts to UCSD</td>
<td>◇</td>
<td>◇</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bio resource impacts at Pepper Canyon</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bio resources impacts in canyons and on slopes, including CSS and birds</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative land use impacts to UCSD combined with Mid-Coast Transit facilities</td>
<td>◇</td>
<td>◇</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilities likely not within Coastal Zone for Segments 1 and 2</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal Zone encompasses Sorrento Valley Road at Mira Mesa Blvd.</td>
<td>◇</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal Zone encompasses Lusk and Pacific Center Blvd.</td>
<td>◇</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caltrans encroachments and permits for I-5</td>
<td>◇</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caltrans encroachments and permits for I-805</td>
<td>◇</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual concerns for La Jolla Vista Townhome residents</td>
<td>◇</td>
<td>◇</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural resources concerns near Village of Yitagua site in Sorrento Valley</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impacts within City MHPA lands</td>
<td>◇</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction noise impacts to breeding birds may affect scheduling</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland impacts would require permits from USACE, RWQCB and USFWS/CDFW</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carroll Canyon Creek and flood zone impacts from construction</td>
<td>◇</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerial LOSSAN rail crossing</td>
<td>◇</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual concerns for workers/drivers</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Hazard planning issues for Marine Corps Air Station Miramar</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Potential intersection with SDG&amp;E transmission line corridor</td>
<td>○</td>
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</tr>
</tbody>
</table>

Note: Shaded circles indicate the level of challenge to address each item

- Low
- Med
- High
UTC Alternative
An overview of the UTC alternative is shown in Table 11.

Table 11 Environmental Considerations for the UTC Alternative

<table>
<thead>
<tr>
<th>Environmental Considerations</th>
<th>Visual Resources</th>
<th>Biological Resources</th>
<th>Cultural Resources</th>
<th>Land Use Impacts</th>
<th>Noise Impacts</th>
<th>CA Coastal Commission Permitting</th>
<th>Hydrology and Water Quality Impacts</th>
<th>Cumulative Traffic</th>
<th>Shadow Effects on Rooftop Solar</th>
<th>Agency Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual impacts throughout corridor</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Bio resources impacts in canyons and on slopes, including CSS and birds</td>
<td>○</td>
<td>●</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Coastal Zone encompasses Sorrento Valley Road at Mira Mesa Blvd.</td>
<td>○</td>
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<tr>
<td>Caltrans encroachments and permits for I-805</td>
<td>○</td>
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<td></td>
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</tr>
<tr>
<td>Cultural resources concerns near Village of Y斯塔qua site in Sorrento Valley</td>
<td>●</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impacts within City MHPA lands</td>
<td>●</td>
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<tr>
<td>Construction noise impacts to breeding birds may affect scheduling</td>
<td>○</td>
<td>●</td>
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<tr>
<td>Wetland impacts would require permits from USACE, RWQCB and USFWS/CDFW</td>
<td>○</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Carroll Canyon Creek and flood zone impacts if construction is within corridor</td>
<td>○</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Aerial LOSSAN rail crossing</td>
<td>○</td>
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<td></td>
</tr>
<tr>
<td>Visual concerns for workers/drivers</td>
<td>○</td>
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<td></td>
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<tr>
<td>Creating shadow effects that interfere with rooftop solar installations</td>
<td>○</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Cumulative impacts, including traffic, with Mid-Coast Corridor Transit Project</td>
<td>○</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coordination with Mid-Coast Transit project facilities at Westfield UTC including drop off planned along Genesee Avenue south of La Jolla Village Drive</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Note: Shaded circles indicate the level of challenge to address each item

Low  Med  Hi
6.5 Additional Routing Options

Each of the alignment alternatives listed above could be modified based on budget constraints or the need to expand a system. Options for each are described in more detail below. Each additional option is shown in Figure 19. Cost estimates are included in Appendix C.

Minimum Operating Segments

A set of minimum operating segments (MOS) were identified as optional system routing configurations. These MOS could be constructed in a scenario where capital funds are constrained. Both of the MOS are routed in a manner that would not preclude the ability to expand each system in the future.

The following feasible MOS have been identified. They have been evaluated for cost, ridership, and feasibility:

- UCSD MOS (North Sorrento, Morehouse, Voigt Drive); and
- UTC MOS (North Sorrento, Morehouse, UTC).

As shown above in Figure 18, the capital cost for the UCSD and UTC MOS would range from $84 million to $126 million, depending on the alternative.

System Expansion

The following expansion options could be implemented if the opportunity to expand the system arose, however expansion capabilities would need to be accommodated in the initial system design:

- Expansion farther west into UCSD; and
- Expansion to East Sorrento Mesa (from MOS).

Expansion farther into UCSD would cost approximately $50 million, and expansion to East Sorrento Mesa would cost approximately $30 million.
Figure 19 Alignment/Station Options
Chapter 7: Regulatory Requirements

This early review of regulatory requirements was initiated given the potential implementation of aerial cableway, which would be a new technology to the San Diego region. All of the regulatory requirements were taken into consideration when developing each of the system routing options/alternatives as described above in Chapter 6. Regulatory requirements were also included in determining system capital costs. More detailed information is included in Appendix D.

7.1 General Regulatory Requirements

The design of an aerial system would likely require adherence to regulations from several different governing bodies as identified below.

**California Transportation Agency (Caltrans):** Coordination with Caltrans would be necessary for clearance and permitting requirements to ensure construction of the skyway would not cause any adverse effects within Caltrans rights-of-way.

**California Division of Occupational Safety and Health (Cal/OSHA):** Cal/OSHA is the primary agency in charge of permitting aerial passenger tramways. The design and operation of an aerial system would require conformance with several statues and standards.

**California Public Utilities Commission (CPUC):** The CPUC has jurisdiction over light rail transit corridors, which includes potential intersections with the planned Mid-Coast Corridor LRT extension on the UCSD campus. An aerial system would need to be designed in a manner that conforms to minimum clearance thresholds as defined by the CPUC.

**California Coastal Commission:** Portions of each of the proposed skyway alignments are located in the California Coastal Zone, which generally requires a Coastal Development Permit (CDP) for new development. The City of San Diego would be the permitting agency, as it has delegation authority from the California Coastal Commission (CCC) to issue CDPs through its certified Local Coastal Program (LCP). However, because a cableway is a major public works project, the City’s issuance of a CDP most likely will be appealable to the CCC. If an appeal hearing uncovers any substantial issues pertaining to the project’s consistency with either the LCP or the California Coastal Act of 1976, the ultimate permit decision will be elevated to the CCC. A cableway could be a strong candidate for a CDP due to its consistency with the broad policy goals of both the LCP and the Coastal Act, which include enhancing coastal access, reducing greenhouse gas emissions, and promoting public transit and non-automobile circulation.

**Federal Transit Administration (FTA):** Should an aerial system qualify as a federal funds recipient from the FTA, it would be subject to environmental review under the National Environmental Policy Act (NEPA).
MARINE CORPS AIR STATION (MCAS) MIRAMAR: Portions of each alternative are located within the Federal Aviation Administration (FAA)’s Height Notification Area for MCAS Miramar airspace, and are subject to development height restrictions. The height of skyway structures would need to be carefully evaluated in order to ensure that they do not encroach into the navigable airspace for MCAS Miramar.

Alternatives developed during this study were evaluated at a preliminary level to meet the restrictions and requirements specified in the aforementioned resources. MCAS Miramar also provided a review of acceptable vertical profiles for cableway elements and towers, and they provided input to the study team through meetings and analysis provided by their engineering team.

UCSD MEDICAL HELICOPTER AIR OPERATIONS: Two of the medical facilities on the east side of the UCSD campus, Scripps Memorial Hospital and the soon to be completed Jacobs Medical Center, have helicopter landing pads that are used for medical helicopter operations. The height of system structures would need to be carefully evaluated in order to ensure that they do not encroach into the existing or planned helicopter flight paths.

AMERICAN WITH DISABILITIES ACT (ADA): A skyway system would by necessity be ADA compliant. Level-access boarding would enable boardings for passengers with mobility challenges. An attendant would be available at each station platform to assist passengers, if needed. Elevators would be present at each station, providing passengers with access to the station platform. Most aerial cableway systems can accommodate ADA requirements, or be modified through design specifications to meet required standards for public transport operations.

VERTICAL CLEARANCE REQUIREMENTS: Portions of each operating system alternative have the potential to traverse over existing infrastructure at various points throughout the study area. Any potential system would need to be designed in order to ensure that minimum vertical clearance thresholds are met. Potential vertical clearance thresholds include:

- Existing roadways: 25 feet
- Existing freeways: 18 feet
- Existing Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor right-of-way: 25 feet
- Existing buildings: varies based on land use (coordination with fire department would be needed)
- Existing electric transmission and distribution lines: 6-12 feet
- LRT overhead catenary wires: 3-4 feet

More detailed information regarding the regulatory requirements and sources listed above is included in Appendix D.
Chapter 8: Potential Funding Sources

This section describes some of the possible funding and financing opportunities available for the Sorrento Valley Skyway Project. As with many transit projects, a combination of unique and more traditional funding sources would likely be required. There is a wide array of potential funding options for the skyway project as discussed in the following subsections.

8.1 Unique Funding Sources

P-3 and Joint Development Opportunities

A variety of potential public/private partnership and value capture opportunities would be available for the project. The scale, value, and productivity of aerial cableway projects can be attractive for P3 arrangements. These can range from equity partnerships to full Design Build Operate Maintain (DBOM) arrangements. In addition, proprietary systems in some cases and specialized maintenance requirements often make P3 arrangements essential to both the construction and operations of systems.

Public/Private Partnership Opportunities: An aerial cableway system could be a candidate for a public/private partnership (P3). Through P3, a private entity would invest its own money through borrowing or equity and assume much of the risk associated with construction of the system. P3 has been utilized on several large-scale transportation projects across the United States, many of which require a multi-billion dollar investment from a private entity. The relatively low capital investment on an aerial cableway system could be appealing to private entities. SANDAG/MTS would likely be the owner of an aerial system, as it is envisioned as a link within the regional transit network.

Opportunities for P3 for the proposed Sorrento Valley aerial cableway should be explored based on the following:

- International experience shows a broad level of private investment in this technology;
- Ridership projections are robust;
- Major activity centers can be served;
- San Diego is a large draw for tourist trips in addition to daily commute trips within the study area;
- Joint development opportunities may exist within proposed station areas; and
- The Design-Build-Operate-Maintain project delivery method is common for this type of technology, especially with the limited amount of expertise for the operations and maintenance (although, over time, the resources can be built up by an agency operator).

Value Capture Opportunities: Value capture includes a variety of techniques to extract value or fees due to the value a transit project brings to the community. These techniques include joint development at station sites, assessment districts and tax increment financing (TIF).
With the elimination of redevelopment agencies in California, there is a new approach to TIF. Incremental property taxes can now be captured through a Joint Powers Authority (JPA). Details include the following:

- JPA participants would include cities, counties, and possibly school districts;
- Powers would be limited to tax sharing only for the transit activities (either to fund the system or to support Transit Oriented Development (TOD) for designated transit areas);
- Percentage of shared taxes available would be negotiated among the JPA participants.

Another financing technique is a Community Facilities District or other assessment district. A new assessment district for the project could be formed or the project could be funded through expanding an existing assessment district or districts. In order to implement these financing techniques, SANDAG could take the following actions:

- Work with the City of San Diego and other stakeholders to develop support for a corridor based Community Facilities District or other assessment district;
- Determine an assessment rate that would not place a particular burden on the property owners;
- Use its own land and resources to create transit-oriented land uses around stations;
- Capitalize on joint development opportunities; and/or
- Evaluate air rights sale or long-term lease.

Commercial Sponsorship and Advertisement Revenue

An aerial cableway system could secure funding from commercial sponsorship and/or advertisement revenue, including the following:

- **System Naming Rights**: An aerial system could secure sponsorship and naming rights, similar to the agreement in place with Emirates Airlines and the London Underground in London, United Kingdom.
- **System and Station Naming Rights**: Naming rights could be sold for each station location, similar to the planned agreement between MTS and UCSD to name each of the future LRT stations along the Mid-Coast Corridor Transit Project.

### 8.2 Traditional Funding Sources

**Federal Funding**

The Federal Transit Administration (FTA)’s Small Starts program offers an opportunity to acquire funding for the capital cost of constructing an aerial cableway system. Each of the alternatives would meet the basic eligibility requirements as a fixed guideway, with an anticipated capital cost of less than $300 million. The Small Starts program could provide up to $100 million in funding.
Small Starts is a discretionary program with a unique set of procedures, FTA approval steps, and project evaluation criteria. Figure 20 illustrates the process. In addition, the New Starts program could provide funding, but given the relatively small scale of the project, only the Small Starts process is discussed.

Challenges and issues associated with securing federal funding include the following:

- The procedural steps are shown in Figure 20, with FTA engagement at critical approval steps.
- There is no certainty of receiving a grant until the grant is actually awarded; all of the pre-grant steps are carried out “at risk.” Federal funding also brings with it other federal requirements, such as the National Environmental Policy Act, that are overlaid on the Small Starts process.
- The project would need to get at least a medium rating on FTA’s project justification and local financial commitment criteria. The justification criteria are mobility improvements, environmental benefits, congestion relief, land use, economic development, and cost effectiveness. At this stage of project planning, it is unclear how well the project would rate on these criteria.

The system would also be eligible for other federal funding, including the following options:

- Grants for Transportation Investment Generating Economic Recovery (TIGER) program offers another discretionary program where SANDAG might compete for funds. TIGER might be a good fit for an aerial cableway system, as the program seeks to help projects that do not naturally fit into the regular funding programs. Grants tend to be no more than $20 million.
- FTA formula program (Section 5307) and the flexible funding programs under the Federal-Aid Highway Program (Surface Transportation Program, CMAQ) are other potential sources of federal funding for the system. As formula programs, they do not have the benefit of bringing new money to the San Diego region. Although eligible for these funds, the system would compete with other San Diego MTS and SANDAG priorities.
State Funding

The following public and private sources could be used for implementation of the system or for annual O&M:

- **California Cap and Trade Sustainable Communities Grants:** This relatively new program was initiated in 2015. Some facts are:
  - The State has allocated 20 percent of auction proceeds under the State Cap & Trade program
  - The program allocated $120 million in FY 2015 and $200 million in FY 2016
  - Two eligible Project Area Types are TOD and Integrated Connectivity Projects (ICP)
  - Eligible projects are TOD Neighborhoods, Districts or Corridors
  - This program ties together transit, affordable housing and infrastructure
  - TOD Area loans/grants are $1 million to $15 million
  - ICP Area loans/grants are $500,000 to $8 million

- **California Cap and Trade Transit and Intercity Rail Capital Program (TIRCP):** Initiated in 2015, this program provides grants from the Greenhouse Gas Reduction Fund to projects that will help reduce greenhouse gas (GHG) emissions by reducing vehicle miles traveled. Some details are:
  - Allocated 10 percent of auction proceeds under the State Cap & Trade program
  - $100 million allocated in FY 2016
  - Competitive process run by the California State Transportation Agency (CalSTA)
  - Projects would improve/expand rail service/ridership, focus on integrating with other rail and transit (including high-speed rail), improve rail safety, and prioritize disadvantaged communities
  - Eligible applicants are public agencies (including Joint Powers Authorities) that operate existing or planned intercity rail, commuter passenger rail, urban rail transit service, bus services

Local Funding

**SANDAG Funds:** The system could be eligible for the discretionary SANDAG grant, the Smart Growth Incentive Program, which is a part of the SANDAG TransNet sales tax measure program.

**Transportation Infrastructure Finance and Innovation Act (TIFIA) Direct Loan Program:** Administered by US Department of Transportation (DOT), a TIFIA loan typically finances up to 33 percent of project cost for projects valued at $50 million or more. The project also has to be eligible for federal funding. If the project were to require financing that is not available or preferred from SANDAG or the private sector, then a TIFIA loan might be an option.
Other Revenues: Other revenues possibly available to support the operations and maintenance of an aerial cableway system include the following:

- **Fare Revenues:** Based upon ridership, the system would generate fares that would, in part, fund the operations of the system.
- **Transient Occupancy Tax (TOT):** SANDAG could request a share of existing TOT fees or an increased allocation to the system.
Chapter 9: Summary of Findings

The initial phase of this transit study has provided an assessment of several key factors regarding the applicability of aerial cableway technology, and design elements for several alignment options/alternatives. Findings of the study reveal the following:

- Based on travel demand estimates using the regional forecast model, high potential ridership with good per mile trip productivity is apparent for urban circulator options, as studied, with multiple stops. This finding applies to connections between UTC and Sorrento Mesa, and connections between the UCSD area and Sorrento Mesa.
- Options/alternatives with a connection to a relocated COASTER Station, or not, both show feasibility in terms of potential users of a new service to provide regional connections within the study area.
- System components such as aerial cableway, tower heights, and station configurations have been identified that are feasible and cost effective, including potentially acceptable vertical and horizontal envelopes that minimize impacts, especially as related to residential impacts, since there are few residential uses in the corridor.
- The aerial cableway technology poses few physical impacts to the land surface given the small footprint of towers, stations, and ancillary facilities.
- Aerial cableway solutions can be designed to effectively accommodate transfers to regional transit services and local transit services, both operationally and physically.
- Safety and regulatory considerations, many of which are unique to an aerial technology, have been identified as well as potential proven safeguards and mitigations.
- An initial review of community and environmental issues reveals that some issues will need to be addressed in greater detail, but no fatal flaws have been identified.
- Agency stakeholders within the study area and region are generally supportive of concepts shown and the potential for additional evaluation of aerial cableway concepts identified in this study.

Although this study does not provide an official recommendation of alignment and technology, it frames many of the key issues related to the potential of aerial cableway concepts, if considered in the future. Based on the overall analysis, this technology, and the alignment concepts (or variations thereof) show viability to serve mobility and community objectives. These concepts should be evaluated against other feasible transit technologies and concepts in the next phase of study and should incorporate community input through future outreach activities.