Downtown to Airport Skyway Feasibility Study

Prepared for:

Prepared by:

FINAL REPORT:
SEPTEMBER 2018
Acknowledgements

County of San Diego

Ron Roberts – County Supervisor
Adrian Granda – Policy Advisor, Office of Supervisor Ron Roberts
Tim McClain – Communications Director, Office of Supervisor Ron Roberts

SANDAG

Richard Chavez, P.E. – Project Manager
Cheryl Mason – Senior Research Analyst
Mike Calandra – Senior Researcher and Modeler

WSP USA

Rex Plummer – Principal-in-Charge
Chris Wahl, AICP – Project Manager
Dave Schumacher – Senior Planning Manager
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Executive Summary</td>
<td>1</td>
</tr>
<tr>
<td>2.0 Introduction</td>
<td>2-1</td>
</tr>
<tr>
<td>2.1 Study Objectives</td>
<td>2-1</td>
</tr>
<tr>
<td>2.2 Report Structure</td>
<td>2-1</td>
</tr>
<tr>
<td>3.0 Existing Conditions</td>
<td>3-1</td>
</tr>
<tr>
<td>3.1 Land Use</td>
<td>3-1</td>
</tr>
<tr>
<td>3.2 Corridor Mobility Features</td>
<td>3-1</td>
</tr>
<tr>
<td>3.3 Right-of-Way</td>
<td>3-2</td>
</tr>
<tr>
<td>3.4 Utilities</td>
<td>3-3</td>
</tr>
<tr>
<td>3.5 Topography</td>
<td>3-3</td>
</tr>
<tr>
<td>3.6 Planned and Future Facilities</td>
<td>3-3</td>
</tr>
<tr>
<td>4.0 Aerial Cableway Technology</td>
<td>4-1</td>
</tr>
<tr>
<td>5.0 Skyway Alignment Concept</td>
<td>5-1</td>
</tr>
<tr>
<td>5.1 Skyway Development</td>
<td>5-1</td>
</tr>
<tr>
<td>5.2 Skyway Alignment Concept</td>
<td>5-1</td>
</tr>
<tr>
<td>5.3 Additional Routing Option</td>
<td>5-3</td>
</tr>
<tr>
<td>6.0 Market Assessment and Ridership</td>
<td>6-1</td>
</tr>
<tr>
<td>6.1 Identification of Market Segments</td>
<td>6-2</td>
</tr>
<tr>
<td>6.2 Potential Skyway Trips</td>
<td>6-3</td>
</tr>
<tr>
<td>6.3 Skyway Ridership Propensity</td>
<td>6-5</td>
</tr>
<tr>
<td>6.4 Preliminary Skyway Ridership Forecasts</td>
<td>6-6</td>
</tr>
<tr>
<td>7.0 Skyway Costs, Financing, and Project Delivery</td>
<td>7-1</td>
</tr>
<tr>
<td>7.1 System Order of Magnitude Cost Estimates</td>
<td>7-1</td>
</tr>
<tr>
<td>7.2 Potential Funding Sources</td>
<td>7-3</td>
</tr>
<tr>
<td>7.3 Project Delivery Options</td>
<td>7-9</td>
</tr>
<tr>
<td>7.4 Project Operational Options</td>
<td>7-10</td>
</tr>
<tr>
<td>8.0 Environmental and Community Issues</td>
<td>8-1</td>
</tr>
<tr>
<td>8.1 General Regulatory Requirements</td>
<td>8-1</td>
</tr>
<tr>
<td>8.2 Potential Environmental Regulations</td>
<td>8-3</td>
</tr>
<tr>
<td>9.0 Next Steps</td>
<td>9-1</td>
</tr>
</tbody>
</table>
List of Tables
Table 4-1 Worldwide Aerial Cableway Systems .................................................................................. 4-1
Table 4-2. Summary of Common Aerial Cableway Technologies .................................................. 4-5
Table 6-1. Projected Tourist Activity within the Study Area ............................................................... 6-3
Table 6-2. Candidate Skyway Trips by Market Segment and Day Type (Year 2030) .......................... 6-5
Table 6-3. Skyway Propensity Factors ............................................................................................... 6-5
Table 6-4. Annual Ridership Summary .............................................................................................. 6-7
Table 7-1. Estimated Capital Costs .................................................................................................. 7-2
Table 7-2. Estimated O&M Costs for Alignment Alternatives ........................................................... 7-3

List of Figures
Figure E-1. Skyway Alignment Concept ............................................................................................ 2
Figure 2-1 Project Study Area ............................................................................................................ 2-3
Figure 5-1. Skyway Alignment Concept ............................................................................................ 5-2
Figure 6-1. Market Assessment Process ........................................................................................... 6-1
Figure 6-2. Potential Ridership Subareas ........................................................................................... 6-2
Figure 6-3. Potential Trip Origin/Destination Zones ......................................................................... 6-4
Figure 7-1. New Starts and Small Starts Processes ......................................................................... 7-4

List of Appendices
Appendix A: Geologic Assessment
Appendix B: System Component Information
Appendix C: Cost Estimate Information
1.0 Executive Summary

STUDY OVERVIEW AND PURPOSE

The Downtown to Airport Skyway Feasibility Study was initiated to evaluate the feasibility of an aerial cableway (referred to as “Skyway”) system for connecting Downtown San Diego with San Diego International Airport with potential intermediate stations serving Santa Fe Depot, Seaport San Diego, the Embarcadero, and the San Diego Convention Center. This feasibility study includes the evaluation of potential markets and ridership, 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.

The study has been prepared by WSP with funding provided by the County of San Diego, Office of Supervisor Ron Roberts. Transportation modeling and project management services were provided by SANDAG.

AERIAL CABLEWAY TECHNOLOGY

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 mostly used at ski areas and amusement parks. Recently, however, several cities throughout the country have shown interest in using the technology as a first mile/last mile connection to regional transit.

Aerial cableway systems are comprised of stations, towers, and cabins. Aerial cableway stations, depending on the architectural treatments, are usually the costliest capital component. Stations not only allow for passengers to board and alight a system, but they can also contain power systems and storage area for the cabins.

Aerial cableway systems are supported by vertical towers between stations. Towers are typically 80 to 90 feet tall and spaced between 300 and 400 feet apart but can adapt to the characteristics of the built environment.

Depending on the size of the cabin selected, capacity ranges from 8 to 12 passengers. Cabin arrival and departure is adjustable based on loading demand. Headway spacing can be as frequent as 12 seconds with the Skyway moving up to 2,400 persons per hour per direction. This is equivalent to a freeway lane or a bus leaving the station every minute.

SETTING AND ALIGNMENT

The study area for the Skyway includes some of the most densely developed land uses in the San Diego region; as well as some of the most diverse. On the eastern and central (Downtown) sections of the corridor, land uses include higher density multi-family residential units, commercial retail and office space, and land use dedicated to tourism and entertainment. On the western (Airport) end of the corridor, land uses include San Diego International Airport, hotels, marinas, entertainment, and land that is projected to be developed into a mix of commercial, retail, and hotel use.

Several goals were identified that helped guide the development of the study alignment:

- Provide service between Downtown San Diego and San Diego International Airport
- Provide high-capacity transit service to San Diego International Airport
- Provide access to key destinations in the study area
- Avoid or minimize impacts

An overview of the alignment evaluated for the Skyway system is shown in Figure E-1. Passenger stations would be located adjacent to several key destinations throughout the corridor, including the Convention Center, Seaport San Diego, Santa Fe Depot, the Embarcadero, and San Diego International Airport.
MARKET ASSESSMENT AND RIDERSHIP POTENTIAL

The market for Skyway trips would consist of work, recreation, visitors and hotel patrons, and trips made to and from San Diego International Airport. It is anticipated that between 1.1 million and 1.6 million trips will be made on the Skyway annually (between 3,600 and 4,900 daily) in the year 2030.

COST ESTIMATES

Order of magnitude cost estimates were prepared to provide an estimate of both the capital costs to construct the system and the annual operations and maintenance (O&M) costs to support the ongoing operation. Capital costs were prepared for two levels of investment: basic and enhanced. The Basic System costs assumes standard stations and towers. Enhanced System costs assume stations and towers would have enhanced architectural features – such as unique structural designs or finishes – that make the system more iconic.

The capital cost would range from $230 million to $300 million depending on the level of investment. Annualized O&M costs would range from $11 million to $12 million.
ENVIRONMENTAL AND COMMUNITY ISSUES

The design of the Skyway would require input from several different governing bodies including the San Diego County Regional Airport Authority, San Diego Unified Port District, City of San Diego, the California Coastal Commission, and others. It will also be necessary to coordinate with the United States Coast Guard and their existing air operations from their Harbor Drive location. Potential conflicts with the Port of San Diego Holiday Bowl Parade would also need to be evaluated in more detail in future studies.

FINDINGS AND NEXT STEPS

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

- The Downtown to Airport Skyway as presented can be built with existing aerial cableway technology.
- The Skyway can effectively and efficiently provide a transportation connection between Downtown land uses and the San Diego International Airport including a direct link between the Airport and Amtrak, COASTER, trolley, and bus services at Santa Fe Depot.
- Given the current plan to construct a new Terminal 1 at San Diego International Airport, there is an immediate opportunity to fully integrate a Skyway station with the design of the new Terminal 1.
- Given the relatively small footprint of the towers and stations, aerial cableway technology poses fewer impacts to existing land uses and a lower cost than connecting light rail transit (LRT) to the Airport. While more analysis is needed, these findings are consistent with the findings of the Pacific Beach Corridor Study.1
- Agency stakeholders within the study area and region have been generally supportive of concepts shown in this study.
- Community and environmental issues will need to be addressed in greater detail.

This study frames many of the key issues related to the potential of aerial cableway and its ability to enhance mobility in the project area. Recommended next steps include:

1. Identify the appropriate lead agency to further develop the project.
2. Pursue the available funding sources outlined in Section 7.2.
3. Conduct an alternatives analysis to compare the Skyway to other transportation options (e.g. light rail, bus, and others).
4. Commence analysis per California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) requirements.

---

2.0 Introduction

The Downtown to Airport Skyway Feasibility Study was initiated to evaluate the feasibility of an aerial cableway (herein referred to as “the Skyway”) technology for connecting the San Diego Convention Center with San Diego International Airport via the waterfront, with potential intermediate stations serving Santa Fe Depot, Seaport San Diego, the Embarcadero, and other locations.

This initial technical feasibility study includes the evaluation of potential markets and ridership, assessment of technology applications for Skyway systems, development of order-of-magnitude capital and operating costs, and outline of potential community and environmental issues.

2.1 Study Objectives

Key objectives for the Downtown to Airport Skyway Feasibility Study include:

- Investigate a potential alignment and key station locations including, but not limited to, Santa Fe Depot, Seaport San Diego, the Embarcadero, and San Diego International Airport;
- Assess potential markets and ridership potential;
- Estimate capital and annual operations and maintenance (O&M) costs;
- Identify potential regulatory and environmental issues including avoidance of flight operations at San Diego International Airport and the United States Coast Guard Sector San Diego;
- Identify potential funding sources for both capital and O&M costs; and
- Identify key challenges including compatibility with future land uses, major utility conflicts, and other environmental issues and regulatory requirements.

2.2 Report Structure

Following this Introduction section, this Report is divided into the following sections:

- **Section 2: Existing Conditions** provides an overview of the corridor features, facilities, regulatory, and associated environmental issues that could influence the implementation and operation of the proposed Skyway.
- **Section 3: Aerial Cableway Technology Overview** provides an overview of aerial cableway technology and details of system features including stations, towers, and cabins.
- **Section 4: Skyway Alignment Concept** describes the considerations used to develop the alignment concept and provides an overview of the system itself.
- **Section 5: Market Assessment** identifies likely market segments (commuters, residents, and tourists), likelihood of utilization or ridership propensity, and presents a preliminary range of ridership projections for near-term operations.
- **Section 6: Skyway Implementation Costs, Financing and Project Delivery** provides estimates of the costs to construct and operate the proposed Skyway projects and reviews options for funding and implementing the project.
- **Section 7: Environmental and Community Considerations** summarizes potential environmental items for consideration and regulatory requirements that would need to be addressed in subsequent phases of the project development process.

- **Section 8: Skyway Next Steps** outlines the next steps and design considerations necessary to carry the proposed Skyway project forward.

Figure 2-1 shows the project study area.
3.0 Existing Conditions

The skyway alignment investigated with this study would begin adjacent to the Gaslamp Quarter trolley station near the intersection of Harbor Drive and 5th Avenue in downtown San Diego. The system would roughly follow Harbor Drive, Kettner Boulevard, Broadway, and Harbor Drive again until it approaches San Diego International Airport. The alignment would then turn northwest and terminate at the San Diego International Airport passenger terminals.

This Existing Conditions section explores the many features, facilities, and regulatory and environmental issues that could influence the implementation and operation of a Skyway system in this location.

3.1 Land Use

The study area for the Skyway includes some of the most densely developed land uses in the region; as well as some of the most diverse. On the eastern and central sections of the corridor, land uses include higher density multi-family residential units, commercial retail and office space, and land use dedicated to tourism and entertainment. On the western end of the corridor, land uses include San Diego International Airport, hotels, marinas, entertainment, and land that is projected to be developed into a mix of commercial, retail, and hotel use.

3.2 Corridor Mobility Features

3.2.1 Roadways

Within the study area, Harbor Drive operates under several different roadway classifications. Classifications range from a two-lane collector street between Broadway and Pacific Highway, to an eight-lane major arterial roadway near San Diego International Airport. Intermittent on-street parking is available both the east and west side Harbor Drive between Pacific Highway and the Laurel Street.

Average daily traffic (ADT) along Harbor Drive ranges from approximately 20,000-22,000 vehicles near Seaport Village and the Gaslamp Quarter, to between 55,000-85,000 vehicles in the area between San Diego International Airport and the North Embarcadero.

3.2.2 Transit Service

The study area is served by several different types of transit service, including:

- **MTS LRT Blue Line**: The Blue Line provides daily service between the United States-Mexico border at San Ysidro and downtown via Chula Vista, National City, and other communities south of downtown. Beginning in 2021, the Blue Line will be extended north of downtown to Old Town, UC San Diego, and University City via the Mid-Coast Corridor. Direct connections between the Blue Line and the Skyway would be available at Santa Fe Depot/America Plaza.

- **MTS LRT Green Line**: The Green Line provides daily service between downtown and Santee via Old Town, Mission Valley, La Mesa, El Cajon and other communities. Direct connections between the Green Line and the Skyway would be available at the Santa Fe Depot, Gaslamp Quarter, Convention Center, and Seaport Village stations.

---

- **MTS Rapid Bus Service**: MTS Rapid bus routes provide high-frequency, limited stop service between Downtown San Diego and points east and north. Connections between the Skyway and MTS Rapid service would be available at Santa Fe Depot/America Plaza.

- **MTS Local Bus Service**: Numerous local bus routes provide service between Downtown San Diego and various points throughout the region. Connections between the Skyway and local bus routes 83, 923, and 992 would be available at Santa Fe Depot/America Plaza.

- **COASTER Commuter Rail**: The COASTER provides daily commuter rail service between Downtown San Diego and Oceanside. Connections between the Skyway and the COASTER would be available at Santa Fe Depot.

- **Amtrak Intercity Rail**: Amtrak provides intercity rail service between Downtown San Diego and San Luis Obispo via the Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor. Connections between the Skyway and Amtrak would be available at Santa Fe Depot.

- **MTS Silver Line**: The Silver Line operates as a downtown circulator four days per week, providing one-way rail service in a clockwise loop that connects several districts within the downtown area. Direct connections between the Silver Line and the Skyway would be available at the America Plaza, Gaslamp Quarter, Convention Center, and Seaport Village stations.

### 3.2.3 Bicycles and Pedestrians

The North Harbor Drive Bike Path provides a separate path for use by cyclists and pedestrians along Harbor Drive between Pacific Highway and Harbor Drive. Class II bike lanes are present on the south/west side of Harbor Drive between Harbor Island Drive and Ash Street. Class III “sharrows” are also present on Harbor Drive between Broadway and Ash Street.

The Martin Luther King Jr. Promenade runs parallel to Harbor Drive between Market Street and 5th Avenue, providing a separate path for cyclists. Class II bike lanes exist along Harbor Drive south of 5th Avenue. Several other multi-use paths, striped bike lanes, and signed bike routes exist along other roadways throughout the study area.

Pedestrian sidewalks are in place along most roadways near each of the potential Skyway stations and throughout the study area.

### 3.3 Right-of-Way

Existing roadway right-of-way varies slightly throughout the study area and can be divided into the following segments:

- **Harbor Drive from 5th Avenue to Kettner Boulevard**: The right-of-way ranges between 60 and 90 feet wide, with between four and six general-purpose lanes separated by a raised median. On-street parking is not available on either side of the roadway. Sidewalks typically exist on both sides of the roadway.

- **Kettner Boulevard from Harbor Drive to Broadway**: The right-of-way is typically 45 to 50 feet wide, with a total of two general-purpose lanes. Intermittent on-street parking is available on both the east and west sides of the roadway. Sidewalks typically exist on both sides of the roadway.

- **Broadway from Kettner Boulevard to Harbor Drive**: The right-of-way is typically 80 to 85 feet wide, with four general-purpose lanes separated by a raised concrete median. On-street parking is not available. Sidewalks exist on both sides of the roadway.

- **Harbor Drive from Broadway to Grape Street**: The right-of-way ranges from 70 to 100 feet wide, with a total of four general-purpose lanes separated by a striped median. Angled, on-street parking is available on
both sides of the roadway and at times is separated from the travel lanes by either a striped or raised buffer. Sidewalks are present on both sides of the roadway for approximately 700 feet north of Broadway. North of that point, a sidewalk exists on the east side of Harbor Drive, and pedestrians can use the North Harbor Drive Multi-Use Path on the west side of the roadway.

- **Harbor Drive from Grape Street to Harbor Island Drive**: The right-of-way ranges from 90 to 125 feet wide, with between six and eight general-purpose lanes separated by a raised median. Angled, on-street parking is available on the west/south side of the roadway. Pedestrians can use the North Harbor Drive Multi-Use Path on the west/south side of Harbor Drive.

### 3.4 Utilities

Utility constraints within the Skyway study area could affect the design of the Skyway system, particularly with regards to tower location. Underground utilities within the corridor primarily include water, sewer, and electrical, as well as storm drains. Additional information is included below.

3.4.1 Sewer

Sewer lines within the study area generally run beneath Harbor Drive on one side of the roadway, as well as underneath some of the roadways that intersect it.

3.4.2 Water

Water lines within the study area generally run directly beneath Harbor Drive, as well as the roadways that intersect it. West of Hawthorne Street, two water lines run parallel to each other, directly below Harbor Drive.

3.4.3 Storm Water

Storm water pipes exist parallel to Harbor Drive between 5th Avenue and Market Street. Storm water pipes also intersect with Harbor Drive at several locations within the study area, including at or adjacent to the following roads: 5th Avenue, 1st Avenue, Broadway, Grape Street, Hawthorne Street, and Laurel Street.

3.4.4 Electrical

Electrical lines are located underground throughout the study area, and City of San Diego engineering staff report that these lines are typically buried on both sides of roadways, adjacent to each curb. More detailed information regarding utility locations would need to be requested from the San Diego Gas and Electric Company in subsequent studies.

### 3.5 Topography

The proposed Skyway alignment is located on a relatively flat area of San Diego, with existing elevation varying between 5 and 25 feet above sea level. No significant changes in elevation exist.

### 3.6 Planned and Future Facilities

Several planning documents include plans for improvements to facilities within the study area. Specific improvements are described in more detail below.
3.6.1 SANDAG Regional Transportation Plan (RTP)

The use of skyways, or similar technologies, are identified in the SANDAG Regional Transportation Plan, San Diego Forward: The Regional Plan as follows:

As we look to the future, we can learn about new modes of transportation and mobility that are being studied and in some cases implemented around the world. Some of these ideas may work for our region. Skyways, often referred to as “aerial trams” or “aerial gondolas,” offer one example. Our region is beginning to research the feasibility of adding Skyways for short-distance trips – those first-mile, last-mile connections that could improve access to our regional transit system. Existing Skyways work well in dense urban environments, and they’re well-suited to traversing freeways, canyons, hills, and other obstacles. They also may be more cost-effective than other transit infrastructure investments. Future studies will assess the feasibility of Skyways as alternatives to ground-based transportation routes in several corridors.

The use of aerial cableway technology shown by the proposed Skyway would be consistent with the RTP.

3.6.2 SANDAG Regional Bike Plan Early Action Program

The SANDAG Regional Bike Plan Early Action Program includes plans for several bicycle facilities within the study area, both adjacent to Harbor Drive as well as along Front Street, which intersects Harbor Drive. Consideration would need to be taken to ensure that Skyway system features do not cause an impact on the proposed facilities.

3.6.3 City of San Diego Bicycle Master Plan

The City of San Diego Bicycle Master Plan includes plans for several new facilities within the study area, most notably a Class II facility along Harbor Drive between Pacific Highway and 5th Avenue.

Improvements to the bicycle network are included along several other roadways that would intersect the Skyway alignment, including 5th Avenue, 1st Avenue, Front Street, G Street, Broadway, Ash Street, and Laurel Street. Consideration would need to be taken to ensure that Skyway towers do not cause an impact on the proposed facilities.

3.6.4 San Diego Downtown Community Plan

The San Diego Downtown Community Plan has identified several new roadway connections between Harbor Drive and Pacific Highway between G Street and Ash Street. Consideration would need to be taken to ensure these new connections would not be adversely affected by the construction of the Skyway.

3.6.5 Downtown San Diego Mobility Plan

The Downtown Mobility Plan includes a system of one- and two-way cycle tracks throughout the Downtown area. Several of these planned cycle tracks would be located along roadways that would either intersect or run adjacent to the Skyway alignment, including: 6th Avenue, J Street, Pacific Highway, Broadway, Grape Street, and Hawthorne Street. Consideration would need to be taken to ensure elements of these networks would or uses not be adversely affected by the construction of the Skyway.

3.6.6 Port of San Diego Master Plan Update and North Harbor Drive Mobility Study

The Port of San Diego is currently in the process of updating its Master Plan. Several transportation improvements within the study area have been identified as part of the update. One proposed improvement involves constructing a new roadway.

---

4 Downtown Mobility Plan. City of San Diego, Civic San Diego, 2016.
within San Diego International Airport property that would provide a connection for inbound airport vehicular traffic to access the airport without traveling along Harbor Drive.

Consideration would need to be taken when designing the Skyway to ensure the system doesn’t conflict with any proposed improvements, including the aforementioned roadway improvement.

3.6.7 San Diego County Regional Airport Authority

The San Diego County Regional Airport Authority is in the process of developing the Airport Development Plan (ADP); an effort to redevelop portions of San Diego International Airport. The ADP includes plans to both redevelop Terminal 1, and additional improvements to Terminal 2. Implementation of the ADP would allow for the airport to accommodate an increase in commercial air arrivals and departures. The development of the ADP presents an opportunity for the integration of the Skyway into future Airport facilities to be considered. At the same time, it will be important to ensure the design of the Skyway does not preclude key components of the ADP.
4.0 Aerial Cableway Technology

Aerial cableway has been used as a form of urban 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 as first mile/last mile connections to regional transit.

In the United States, urban cableways 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 Island Tram**: The first urban mass transport application of aerial tramways in the United States was completed in 1976 and connects Roosevelt Island to Manhattan in New York City.

Internationally, aerial cableway systems carry large volumes of commuters as a viable alternative to traditional urban transit methods such as buses and rail for short-distanced trip making and tie-ins to regional transit lines. Large systems exist throughout South America, Asia, and Europe, 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. Many of these systems have one or more intermediate stations and provide service throughout densely populated and topographically challenging environments.

While aerial cableway has enjoyed a high level of success in other countries, an urban cableway system with intermediate stations in the United States has not yet been implemented. Both the Portland Aerial Tram and Roosevelt Island Tram are point-to-point systems with no intermediate stations. The Skyway evaluated in this study would have intermediate stations, some of which would have transfer connections with existing regional transit services, such as via an elevated pedestrian connection between the Convention Center Skyway station and Gaslamp Quarter Trolley station. Transfer connections to the Santa Fe Depot station serving Amtrak, COASTER, trolley and bus services would require a 1/4 mile walk.

Examples from several South American cities, London and Singapore are presented in Table 4-1.

**Table 4-1 Worldwide Aerial Cableway Systems**

<table>
<thead>
<tr>
<th>Location (date built)</th>
<th>System Length (mi)</th>
<th># of Lines</th>
<th># of Stations (system wide)</th>
<th>Annual Ridership (passengers)</th>
<th>Integrated with Transit Network?</th>
<th>Why technology was chosen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Aerial Tram</td>
<td>0.6</td>
<td>1</td>
<td>2</td>
<td>1,350,000 (2013)</td>
<td>Yes</td>
<td>Overcome steep topography, provide connection between South Waterfront and the main Oregon Health &amp; Science University campus</td>
</tr>
<tr>
<td>Roosevelt Island Tram</td>
<td>0.6</td>
<td>1</td>
<td>2</td>
<td>2,400,000 (2013)</td>
<td>Yes</td>
<td>Overcome existing waterway, connect new low- and middle-income residential development on Roosevelt Island to Manhattan in New York City</td>
</tr>
<tr>
<td>La Paz, Bolivia &quot;Mi Teleferico&quot; Phase 1 Built 2014</td>
<td>18.7</td>
<td>9</td>
<td>27</td>
<td>23,600,000 (2015)</td>
<td>Yes</td>
<td>Overcome steep topography, traffic congestion, and reduce pollution</td>
</tr>
<tr>
<td>Location (date built)</td>
<td>System Length (mi)</td>
<td># of Lines</td>
<td># of Stations (system wide)</td>
<td>Annual Ridership (passengers)</td>
<td>Integrated with Transit Network?</td>
<td>Why technology was chosen</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------</td>
<td>------------</td>
<td>-----------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Caracas, Venezuela &quot;Metrocable de Caracas&quot; Built 2007-2012</td>
<td>4.1</td>
<td>2</td>
<td>7</td>
<td>2,800,000 (2013)</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>3</td>
<td>9</td>
<td>17,000,000+ (2013)</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 Alemao&quot; Built 2011</td>
<td>2.2</td>
<td>1</td>
<td>6</td>
<td>4,000,000 (2013)</td>
<td>Yes</td>
<td>Improve social conditions in the &quot;favelas&quot; (settlements of urban poor) on hillsides by connecting residents to rail network, build tourism</td>
</tr>
<tr>
<td>Singapore &quot;Singapore Cable Car&quot; Built 1974, extended to Sentosa 2015</td>
<td>1.1</td>
<td>1</td>
<td>3</td>
<td>900,000 (2013)</td>
<td>No</td>
<td>Tourist attraction from Mount Faber spanning Keppel Harbour and steep topography to Sentosa resort island</td>
</tr>
</tbody>
</table>

pphp = persons per hour, per direction. Ridership source: Creative Urban Projects, Inc.

Aerial cableway systems are typically comprised of stations, towers, cabins, and other components. Details for key components are discussed below.

### Stations

Aerial cableway stations are the most complex component within aerial cableway systems and are usually the costliest capital component. Stations not only allow for passengers to board and alight a system, but they also contain key components that power a system. The aerial cableway systems relevant to this corridor include the following station types:

- **Drive Station**: usually located at one end of a system, the drive station houses the system motor and other key components used to power the system. Drive stations can often include more space for cabin storage and maintenance. Specific storage requirements vary based on ridership demands. Cabin storage areas can be located either adjacent to the station platform or placed under a station, depending on constraints at the station site.

- **Return Station**: located on the opposite end of a system from a drive station, return stations include necessary mechanical components required to return cabins back to the drive station. Return stations have the same electromechanical components as a drive station, but do not include components to power the system.

- **Intermediate Station**: located at one or more points between the two end points of a system, intermediate stations provide additional opportunities for passengers to board and alight a system. Intermediate stations can also be constructed in a manner that allows for the system to turn at key locations. Cabin storage and maintenance facilities can also be included within intermediate stations.

Aerial cableway stations vary in size depending on passenger throughput and location within the system. Station footprints are typically 50 feet by 110 feet for a drive station (with cabin storage), 50 feet by 70 feet for a return station, and 50 feet by 180 feet for an intermediate station. Elevated stations typically require a wider footprint to provide for elevators and stairs.
TOWERS
Between stations, aerial cableway systems are supported by several vertical towers. Towers are typically spaced between 300 and 400 feet apart (distances can vary within the project) depending on characteristics in the built environment.

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.
- **Tower Spacing**: 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 sags 3.5 percent of the horizontal distance between the towers. This sag needs to be taken into consideration when determining the size of towers.

Towers are usually t-shaped, lattice, or cantilever. T-shaped towers are most commonly used, though other tower types may be necessary due to tower heights, constraints within a built/natural environment, or architectural preferences.

Aerial cableway systems are required to turn corners where needed based on constraints in the natural or built environment. This can be achieved with turning towers. Turning towers contain electromechanical components that transfer cabins onto a separate track, slowing down to a speed of approximately 300 feet per minute, ultimately transferring them from one cable loop to another and change course.

Turning towers are used at non-station locations. They 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.


**Passenger Cabins**

Passenger cabin sizes vary depending on which type of aerial cableway technology is used as well as ridership. Typical cabin capacity would range from 8 to 12 passengers per cabin. Cabin arrival and departure spacing can be varied to as close as 15 second headways or greater spacing and less frequent headways depending on loadings. Cabins can be modified to include features designed to enhance the overall passenger experience and safety, such as air conditioning, internet access (Wi-Fi), and on-board one- or two-way communication systems that could be used to communicate with passengers in the event of an emergency. 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. Cabins provide level boarding to meet Americans with Disabilities (ADA) requirements and to enable boarding and alighting for passengers with mobility devices.

**Cabin Storage and Maintenance Facility**

A separate facility is required to store cabins overnight and to perform routine maintenance. These facilities vary in size and are dependent on the number of cabins in the system fleet. Cabin storage facilities can be integrated into passenger stations or constructed as a standalone facility so long as passenger cabins can be put into or taken out of service. The location of the Skyway cabin storage facility is not identified in this study, though the capital and operations and maintenance (O&M) costs for a facility are included.

**Cables**

Aerial cableway systems operate using woven steel cables that operate in loops. There are two types of cable: propulsion and track. A propulsion cable is used to propel and guide cabins throughout a system. Track cables remain stationary and provide additional support for larger cabins, as well as additional stability in high winds. Passenger cabins are guided along track cables by wheels that are connected to each cabin’s grip. Systems can operate using only a propulsion cable, or with both propulsion and track cables.

**Grips**

Passenger cabins are connected to the cable by a grip. There are two types of grips: detachable and fixed. Upon entering a station, cabins with detachable grips will detach themselves from the cable and move through the station using a conveyor system. This enables cabins to slow to a speed that allows for passengers to board and alight the system without disrupting cabins that are traveling between stations. This feature can significantly increase the capacity of a system and allows for systems to include intermediate stations or turn terminals.

Fixed grips are permanently attached to the cable. Due to this, the entire system must be slowed and/or stopped when a cabin arrives at a station. Intermediate stations and turn towers are not typically feasible in fixed-grip systems.

Urban aerial cableway systems generally utilize one of three key system technologies: aerial tramway, mono-cable detachable gondola (MDG), and tri-cable detachable gondola (3S). Key characteristics of each type are included below in Table 4-2. MDG is assumed for this study.
Table 4-2. Summary of Common Aerial Cableway Technologies

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Aerial Tramway</th>
<th>Mono-cable Detachable Gondola (MDG)</th>
<th>Tri-cable Detachable Gondola (3S)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Aerial tram systems usually include one or two cabins fixed to the same cable loop, and travel back and forth.</td>
<td>The most commonly used type of aerial cableway technology, the MDG utilizes one cable to both support and guide cabins through the system.</td>
<td>The 3S is faster, has a higher per-cabin capacity, and can operate in higher wind speeds than the MDG. It is also one of the most expensive types of aerial cableways.</td>
</tr>
<tr>
<td><strong>Passenger Carrying Capacity (pphpd)</strong></td>
<td>2,000</td>
<td>4,000</td>
<td>6,000+</td>
</tr>
<tr>
<td><strong>Cabin Capacity</strong></td>
<td>50-250</td>
<td>8-15</td>
<td>20-38</td>
</tr>
<tr>
<td><strong>Maximum Operating Speed (kilometers/hour)</strong></td>
<td>45 (~28 mph)</td>
<td>25 (~16 mph)</td>
<td>30 (~19 mph)</td>
</tr>
<tr>
<td><strong>Access Speed (for boarding and alighting at intermediate stations)</strong></td>
<td>N/A</td>
<td>60 feet per minute</td>
<td>60 feet per minute</td>
</tr>
<tr>
<td><strong>Maximum Wind Speed During Operation (kilometers per hour/miles per hour)</strong></td>
<td>80 kph (~50 mph)</td>
<td>70 kph (~43 mph)</td>
<td>100 kph (~62 mph)</td>
</tr>
</tbody>
</table>

Pphpd: passengers per hour, per direction
Data source: Doppelmayr
5.0 Skyway Alignment Concept

5.1 Skyway Development

Several objectives were identified that helped guide the development of the study alignment. These objectives include:

1. Provide service between Downtown San Diego and San Diego International Airport
2. Provide high-capacity transit service to San Diego International Airport
3. Provide access to key destinations in the study area
4. Avoid or minimize impacts

Alternative routing configurations were evaluated at the onset of the study. Routing the Skyway along Pacific Highway was evaluated but ultimately eliminated from consideration due to concerns about impacts to residential units, and because having the alignment set back from the Bayfront would reduce the passenger experience. Additionally, an alignment traversing San Diego Bay from the Embarcadero to Harbor Island was evaluated, but eliminated due to potential conflicts with United States Coast Guard operations.

5.2 Skyway Alignment Concept

The Skyway system would begin at the Convention Center station, near the intersection of Harbor Drive and 5th Avenue. This station would include a connection to the existing Gaslamp Quarter Trolley station via an elevated pedestrian walkway over the existing railroad tracks, tying into the regional trolley system. Moving northwest, the alignment would follow Harbor Drive towards Seaport Village. Stations near the intersection of Harbor Drive and First Avenue and near Harbor Drive & Kettner Boulevard would provide access to major hotels, Seaport Village, and other land uses, as well as provide additional connections to the trolley system at the Convention Center and Seaport Village stations.

The passenger station at the intersection of Harbor Drive and Kettner Boulevard would allow for the system to turn north onto Kettner Boulevard and continue towards Santa Fe Depot/America Plaza. A passenger station at the intersection of Kettner Boulevard and Broadway would provide direct access to regional transit, commuter rail, and intercity rail service at Santa Fe Depot/America Plaza.

Turning west, the alignment would head west along Broadway towards Harbor Drive. A station at the intersection of Broadway and Harbor Drive would provide access to the USS Midway, the north side of the Navy Broadway Complex, the Cruise Ship Terminal, the North Embarcadero, and Broadway Pier.

The system would then continue to follow the Harbor Drive alignment, heading north and then turning west near the Solar Turbines property between Grape Street and Laurel Street. The system would roughly follow the Harbor Drive alignment, using multiple turning towers to make the turn leading to the airport.

The system would then continue west, roughly following Harbor Drive. An additional turning tower near the intersection of Harbor Drive and Winship Lane would allow for the system to turn northwest and continue towards Terminal 1 at San Diego International Airport. Stations would be located within the San Diego International Airport property at Terminal 1 and Terminal 2. The exact location of the stations within San Diego International Airport property would need to be determined in future studies. As noted in Section 2.6.7, the redevelopment of Terminal 1 and portions of Terminal 2 present an opportunity to integrate a Skyway station (or stations) into future Airport facilities.

A conceptual map of the Skyway alignment is included below in Figure 5-1.
Figure 5-1. Skyway Alignment Concept

Legend
Downtown - Airport Skyway
- Potential Skyway Corridor
- Passenger Station
- Turning Tower
- Potential Alternative Skyway Corridor

Existing Services
- Existing Rail Alignment
- Trolley Station
- Trolley/COASTER/Amtrak Station
5.3 Additional Routing Option

The Skyway system could also be routed solely along Harbor Drive. Instead of turning north on Kettner Boulevard, the system could continue west along Harbor Drive towards the Tuna Harbor. A turning tower near Ruocco Park would allow the system to continue north along Harbor Drive towards the USS Midway. Though this is a potential alternative, it would not allow for a direction connection to regional transit, commuter rail, local/rapid bus, and intercity rail services at Santa Fe Depot/America Plaza.
6.0 Market Assessment and Ridership

This section provides a preliminary indication of the ridership potential of the proposed system. In general, system ridership would be a function of two primary factors: 1) the utility of the system in serving localized travel needs and patterns; and 2) the novelty or ultimate popularity of the system itself to attract new and additional tourist activity. The market assessment focused on the year 2030 as the near-term planning horizon.

Ridership potential is typically estimated using the SANDAG Series 13 travel demand model. While the Series 13 travel demand model is helpful in estimating the total activity within an area, as well as the distribution of activity throughout, using the model to estimate Skyway ridership is difficult. This is because aerial cableway technology as a mode of urban transportation is limited in the United States, historical ridership and other data that would normally be used to inform a travel demand forecast is scarce.

Given this, a different approach was used to estimate ridership data for the Skyway system. This approach includes an initial identification of market segments based upon trip purpose, developing estimates of low to high propensity or likelihood of using the Skyway by market segment, leading to an annualized estimate of Skyway ridership incorporating peak seasonal utilization by residents as well as increased levels of tourist activity. The market assessment process included several key steps as depicted in Figure 6-1.

**Figure 6-1. Market Assessment Process**

- **Define Market Segments and Catchment Area**: the types of trips and the area that could potentially generate Skyway ridership, including Downtown San Diego, San Diego International Airport, and Harbor Island.
- **Identify Candidate Trips**: trips with origins and destinations that would logically be served by the Skyway alignment and station locations
- **Estimate Skyway Ridership Propensity Factors**: the likelihood of people to use the Skyway
- **Develop Planning-level Ridership Estimate**: The number of candidate trips multiplied by ridership propensity factors
6.1 Identification of Market Segments

Market segments – or types of trips – were identified to provide an estimate of potential Skyway ridership. The process used to identify the study areas, as well as the market segments, is outlined in more detail below.

6.1.1 Assessment Study Area

The Study Area represents the functional activity area that would be served by the system, thus servicing as the source of ridership. The identified Study Area includes the City of San Diego community planning area of Centre City, as well as a portion of land controlled by the Port of San Diego. The Study Area, as shown below in Figure 6-2, was subdivided into 31 subareas to facilitate a more detailed review of activity and travel patterns.

![Figure 6-2. Potential Ridership Subareas](image)

6.1.2 Study Area Activity

The identified study area for the Skyway includes some of the most densely developed land uses in the region, as well as some of the most diverse. Land uses within the study area include higher density single- and multi-family residential units, commercial retail and office space, and a variety of other land uses.

Recreation and tourism account for a significant amount of activity within the study area. Downtown San Diego is home to several major tourist destinations within the region, including the historic Gaslamp District, Seaport Village, and the USS Midway Museum. Annual attendance information for the major visitor and tourist destinations within the study area is summarized below in Table 6-1.
### Table 6-1. Projected Tourist Activity within the Study Area

<table>
<thead>
<tr>
<th>Tourist Attraction</th>
<th>Annual Attendance (Year)</th>
</tr>
</thead>
</table>
| SD Convention Center                   | 899,000 (2017)
| Petco Park (Padres games)              | 2,100,000 (2017)
| USS Midway Museum                      | 1,400,000 (2017)
| Gaslamp District                       | 6,800,000 (2008)
| Seaport Village/Embarcadero            | 4,100,000 (2014)

1. [https://visitsandiego.com/sites/default/files/SDCCC_AR-FY17.pdf](https://visitsandiego.com/sites/default/files/SDCCC_AR-FY17.pdf)

### 6.1.3 Skyway Market Segments

Both residents and tourists alike are drawn to the study area due to a wide range of activities and attractions, providing a source of potential trip activity for the Skyway. The market for Skyway trips can be broken down into individual segments as follows:

- **Resident Commuter Trips**: commute trips made by residents who work within the study area
- **Resident Non-Work Trips**: trips made by residents for non-work related activities, such as shopping, personal business, and for purposes of recreation
- **Tourist/Visitor Trips**: trips made by residents and out-of-town visitors to attractions such as the Embarcadero and the U.S.S. Midway
- **Airport Trips**: trips made by residents and tourists/visitors that originate from or are destined to the airport.

Travel data for the 2030 forecast year was derived from the SANDAG Transportation Model (Series 13), including the number of daily person-trips within the study area. The study area person-trips were then aggregated and summarized based on associated trip types and market segments, including whether they were internal (trips beginning and ending within) or external (trips beginning or ending within) to the study area.

### 6.2 Potential Skyway Trips

A multi-tiered screening process was undertaken to produce an estimate of candidate trips; trips that would potentially utilize the Skyway. The initial screening assumed any potential trips would be internal, with both origin and destination within the study area. Using this approach, the number of internal trips in the study area is projected to be approximately 463,300. It is anticipated that some Skyway trips would come from outside of the study area; however those trips are not included in this estimate.

The second-level screening involved estimating from the internal study area trips, the number of trips that have origins and destinations that would logically be served by the Skyway alignment and station locations. For example, a trip from the Gaslamp Quarter to San Diego International Airport could logically be made via the system, whereas a trip from Little Italy to Gaslamp would not likely use the system. **Figure 5-3** displays those subareas of the study area, which would logically be served by the system. Trip interchanges between these subareas were identified as viable system trip interchanges.
The SANDAG Series 13 model data is generally used to model bus and rail transit modes, and has only recently been used to model an aerial cableway system. To estimate ridership, the Skyway was modeled with similar characteristics (fare price and overall passenger experience) as light rail transit (LRT).

The Series 13 model data represents an average weekday condition, and does not account for fluctuations in travel activity on weekends or peak seasonal (June through August) activity. Since the objective in preparing an annualized ridership estimate is to account for all levels of trip activity during a year, a series of “day types” based upon peak and off-peak conditions were established, and candidate trip activity was estimated for each. The different day types that were used are:

- **Non-Peak Weekday**: this is the day type that is modeled by the Series 13 model and represents an average weekday.
- **Non-Peak Weekend**: these represent weekend days during non-peak months. Resident based trips (both work and non-work) tend to be lower than weekdays, whereas visitor/tourist trips tend to increase.
- **Peak Weekday**: represents a weekday during peak seasons. Resident work activity is similar to a non-peak weekday, whereas resident non-work and visitor/tourist activity tend to increase.
- **Peak Weekend**: represents a weekend day during peak seasons. Resident work and non-work activity is similar to a non-peak weekend. Visitor/tourist activity is the highest of all day types.

Historic visitor attendance data from the USS Midway museum was used to estimate the variations in visitor/tourist travel activity throughout the year. Data from the Midway shows the highest attendance occurs during the months of June, July...
and August. Attendance increases by approximately 30 percent between May and June, and again by approximately 30 percent from June to July. Attendance decreases significantly (35 percent) between August and September.

The Transit Cooperative Research Program (TCRP) Report 73: Characteristics of Urban Travel Demand (Transportation Research Board, 2002) was used to estimate the changes in resident based activity (work and non-work) for weekends versus weekdays.

The resulting number of candidate trips for the Skyway (internal/viable trip interchanges), based on the SANDAG Series 13 forecast and incorporating estimates for each of the additional day types, is shown below in Table 6-2 by market segment.

<table>
<thead>
<tr>
<th>Table 6-2. Candidate Skyway Trips by Market Segment and Day Type (Year 2030)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market Segment</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Resident Work</td>
</tr>
<tr>
<td>Resident Non-Work</td>
</tr>
<tr>
<td>Visitor/Tourist</td>
</tr>
<tr>
<td>Total Trips</td>
</tr>
</tbody>
</table>

**6.3 Skyway Ridership Propensity**

Propensity factors account for likelihood of utilization based upon such considerations as travel patterns and accessibility, distance and travel time, and cost. A range of propensities were derived for each market segment based upon knowledge of typical transit services and likely utilization, and are summarized below in Table 6-3. In general, the assumption is that, compared to the tourist/visitor trip, the resident based trips would have a lower propensity to use the Skyway. This is because the system serves the important function of providing trips between the Airport and Downtown.

<table>
<thead>
<tr>
<th>Table 6-3. Skyway Propensity Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market Segment</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Resident Work</td>
</tr>
<tr>
<td>Resident Non-Work</td>
</tr>
<tr>
<td>Visitor/Tourist</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
6.4 Preliminary Skyway Ridership Forecasts

Preliminary Skyway ridership forecasts were estimated using a multi-step process, which is described in more detail in the following section.

6.4.1 Annualized Base Estimates

As trip activity fluctuates throughout the year, it is important to view activity on an annual basis. To do so, the following steps were undertaken:

- Ridership propensities (as noted above) were applied to daily trips to estimate trips by market segment for each day type
- Trips were annualized by multiplying “low” and “high” propensities by the number of calendar days in a year for each corresponding day type
- A “Base Ridership” range was calculated by summing “low” and “high” annualized trips for each day type, for each corresponding market segment

A summary of annualized base estimates is included below in Table 6-4. As shown, the Skyway is projected to produce between 590,000 and 880,000 base annual trips.

6.4.2 Special Event Trips

While general visitor and tourist activity can be accounted for by the Series 13 forecast, it does not consider special event activity. Events such as Comic Con, Padres games, and the arrival of large cruise ships at the Cruise Ship Terminal can cause a surge in visitor and tourist activity within the study area, as well as demand for Skyway use.

Using this approach, it is estimated that an additional 136,000 Skyway trips could be generated during special events annually.

6.4.3 Transfer Trips at Santa Fe Depot/America Plaza

The Skyway system did not initially connect to Santa Fe Depot when performing the ridership forecasting model run. Several existing and planned transit lines provide service to Santa Fe Depot and the areas immediately adjacent to the station, including the Blue Line and Green Line trolleys, several MTS local and Rapid bus lines, COASTER commuter rail, and Amtrak intercity rail. Due to the presence of these services, it is anticipated that passengers would utilize the Skyway as a first- and last-mile connection from regional transit services to/from the Airport or other key destinations.

To estimate the potential demand for Skyway trips at and adjacent to Santa Fe Depot, the San Diego Bay to Balboa Park Skyway Feasibility Study (Bay to Balboa Skyway)\(^5\) was examined to evaluate the relationship between transit boardings at the 6th & B Street Bay to Balboa Skyway station. It is assumed that many Skyway boardings at the 6th & B Street Bay to Balboa Skyway station would occur as the result of transfers from these MTS trolley and bus services. The 6th & B Street station was used for comparison because it would be located adjacent to both regional and local MTS transit services, including the Orange Line and Blue Line trolleys, as well as several local and Rapid bus lines.

---

When comparing the number of MTS and Bay to Balboa Skyway boardings near the 6th & B Street station, it was determined that the number of Bay to Balboa Skyway boardings at this location would be approximately 20 percent of all MTS boardings on trolley and bus lines adjacent to the 6th & B Skyway station⁶.

To estimate of potential Skyway boardings that would result from transfers at Santa Fe Depot, it was assumed that approximately 15 percent of all transit boardings in the areas adjacent to Santa Fe Depot would ultimately use the Skyway. This is a lower percentage than what was forecasted at the 6th & B station of the Bay to Balboa Skyway Study, and was chosen to provide a more conservative estimate of transfers between the Skyway and other transit services.

Using this assumption, it is anticipated that between approximately 320,000 and 400,000 annual Skyway trips would be made at Santa Fe Depot.

6.4.4 Additional Trips

Another type of trip not accounted for by the Series 13 forecast would be additional riders attracted because of the uniqueness of the Skyway system. To account for this, an additional factor of 10 percent was applied to the base ridership and special events trips, which would generate between approximately 105,000 and 142,000 additional annual trips.

A summary showing the total annual trips is included below in Table 6-4. As shown, when factoring in trips for special events, transfer trips at Santa Fe Depot, and those attracted by the uniqueness of the system, it is estimated that between approximately 1,151,000 and 1,558,000 annual Skyway trips would be made.

<table>
<thead>
<tr>
<th>Skyway Ridership</th>
<th>Annual Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Base Annual Trips</td>
<td>590,000</td>
</tr>
<tr>
<td>Total Special Event Trips</td>
<td>136,000</td>
</tr>
<tr>
<td>Transfer Trips at Santa Fe Depot</td>
<td>320,000</td>
</tr>
<tr>
<td><strong>Annual Trips with Special Events</strong></td>
<td><strong>1,046,000</strong></td>
</tr>
<tr>
<td>Additional Trips (10%)¹</td>
<td>105,000</td>
</tr>
<tr>
<td><strong>Total Annual Trips (Daily Trips)</strong></td>
<td><strong>1,151,000 (3,600)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>1,558,000 (4,900)</strong></td>
</tr>
</tbody>
</table>

¹ Trips not accounted for by the Series 13 forecast due to the uniqueness of the Skyway.

---

⁶ MTS boardings by stop (2017)
7.0 Skyway Costs, Financing, and Project Delivery

This section provides a concept-level cost evaluation of the Skyway system. The evaluation includes projected capital, and operations and maintenance (O&M) cost estimates, and potential funding sources and project delivery options.

7.1 System Order of Magnitude Cost Estimates

Order of magnitude cost estimates were prepared to provide an estimate of both the capital costs to construct the system and the annual O&M costs to support the ongoing operation. Capital costs were prepared for two levels of investment: basic and enhanced. The Basic System costs assumes standard stations and towers. Enhanced system costs assume stations and towers would have architectural features – such as unique structural designs or finishes – that make the system more iconic. Additionally, the enhanced system costs include added contingency.

7.1.1 Capital Costs

Capital costs for the system has 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 the Basic and Enhanced alignment options are itemized in Table 7-1. As shown, the capital cost would range from $232 million to $299 million depending on the alternative. A detailed cost breakdown for each of the alternatives is provided in Appendix C.
Table 7-1. Estimated Capital Costs

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Capital Cost (Basic System)</th>
<th>Capital Cost (Enhanced System)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial Guideway &amp; Elements</td>
<td>$16,000,000</td>
<td>$22,000,000</td>
</tr>
<tr>
<td>Station Guideway Infrastructure</td>
<td>$87,000,000</td>
<td>$118,000,000</td>
</tr>
<tr>
<td>Support Facilities: Yards, Shops, Admin. Buildings</td>
<td>$6,000,000</td>
<td>$6,000,000</td>
</tr>
<tr>
<td>Site Work &amp; Special Conditions</td>
<td>$3,000,000</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>Systems</td>
<td>$8,000,000</td>
<td>$8,000,000</td>
</tr>
<tr>
<td><strong>CONSTRUCTION SUBTOTAL</strong></td>
<td><strong>$120,000,000</strong></td>
<td><strong>$157,000,000</strong></td>
</tr>
<tr>
<td>Cabins</td>
<td>$11,000,000</td>
<td>$11,000,000</td>
</tr>
<tr>
<td>Professional Services (39%)</td>
<td>$47,000,000</td>
<td>$61,000,000</td>
</tr>
<tr>
<td><strong>SUBTOTAL WITHOUT CONTINGENCY</strong></td>
<td><strong>$178,000,000</strong></td>
<td><strong>$229,000,000</strong></td>
</tr>
<tr>
<td>Unallocated Contingency (30%)</td>
<td>$53,000,000</td>
<td>$69,000,000</td>
</tr>
<tr>
<td><strong>TOTAL PROJECT COST WITH CONTINGENCY</strong>¹</td>
<td><strong>$232,000,000</strong></td>
<td><strong>$299,000,000</strong></td>
</tr>
</tbody>
</table>

¹ Costs may not total due to rounding

7.1.2 Annual O&M Costs

Annual O&M costs were developed based on the alignment and stations. Cost estimates for both the Basic System and Enhanced System include a long list of line items that were 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 7-2 provides a summary of estimated annualized costs for operations and maintenance for both the Basic System and Enhanced System alternatives. As shown, annualized O&M costs would range from $11.6 million to $12.0 million depending on the alternative. The difference in costs is the reserve for major repairs and replacement. This assumes that capital costs for the Enhanced System would be higher, meaning replacement costs would be higher as well. A detailed breakdown of O&M costs for each alternative is provided in Appendix C.
Table 7-2. Estimated O&M Costs for Alignment Alternatives

<table>
<thead>
<tr>
<th>Item</th>
<th>Total O&amp;M Costs1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic System</td>
</tr>
<tr>
<td>Labor Cost</td>
<td>$6,000,000</td>
</tr>
<tr>
<td>Energy Cost</td>
<td>$300,000</td>
</tr>
<tr>
<td>Miscellaneous Annual Cost</td>
<td>$600,000</td>
</tr>
<tr>
<td>Reserve for Major Repairs/Replacement</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$8,900,000</td>
</tr>
<tr>
<td>Unallocated Contingency (30%)</td>
<td>$2,700,000</td>
</tr>
<tr>
<td>Total O&amp;M Cost</td>
<td>$11,600,000</td>
</tr>
<tr>
<td>System Length</td>
<td>3.3 mi</td>
</tr>
<tr>
<td>Number of Stations</td>
<td>7</td>
</tr>
</tbody>
</table>

1 Represents gross O&M costs and does not factor in fare revenue or other means of offsetting costs

7.2 Potential Funding Sources

This section describes potential funding and financing opportunities available for the Convention Center to Airport Skyway Project. A combination of unique and more traditional funding sources may be combined to cover the project’s capital costs and its operating and maintenance costs.

7.2.1 Traditional Funding Sources

A wide range of more traditional public funding and financing options are also available to help cover the cost of the Skyway. This section outlines these options.

Federal Grants and Financing

At least four sources of federal grant funding are available for projects of this type: Section 5309 Capital Investment Grants, Section 5307 formula funds, TIGER, and Title 23 Flexible Funding. Federal loans are also available through the Transportation Infrastructure Finance and Innovation Act (TIFIA) program. Wherever federal funding or financing are used, both program specific and cross-cutting federal grant requirements apply which can add to the time and cost of project delivery.

Section 5309 Capital Investment Grants

The Federal Transit Administration (FTA)’s Capital Investment Grants (CIG) program offers discretionary funding for fixed guideway transit projects and other eligible investments. The FAST Act authorized $2.3 billion per year for the program through FY2020.

The total capital cost of the Downtown-Airport Skyway is projected to be less than $300 million, meaning the project could be potentially eligible for up to $100 million within the Small Starts category of the CIG program. Small Starts funding is capped at $100 million, whereas New Starts funding can be provided up to 50 percent of the total capital cost.

Though the capital cost is not projected to exceed $300 million, it should be noted that if it does, the project could receive funding within the New Starts category. The New Starts program would potentially result in a higher level of federal
funding. However, the more onerous New Starts process compared to that for the Small Starts program should be taken into account.

Both New Starts and Small Starts have unique sets of procedures, FTA approval steps, and project evaluation criteria. **Figure 7-1** illustrates the process for each program.

**Figure 7-1. New Starts and Small Starts Processes**

Challenges and issues associated with New Starts a Small Starts funding include:

- CIG funds are awarded on a discretionary basis. There is no certainty of receiving a grant until the grant is awarded; all the pre-grant steps are carried out “at risk.”

- 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 Trump Administration has recommended that the CIG program be phased out. Future funding is uncertain, although Congress has continued to appropriate funds and in FY2018 made $2.6 billion available - more than twice the Administration request and more than the amount authorized in the Fixing America’s Surface Transportation (FAST) Act.

**Federal Transit Administration Pilot Program for Expedited Project Delivery**

The Pilot Program for Expedited Project Delivery is authorized under the FAST Act. The Pilot Program for Expedited Project Delivery is aimed at faster delivery of new transit capital projects that by law must utilize public-private partnerships, be operated and maintained by employees of an existing public transportation provider, and have a federal share not

---

7 https://www.transit.dot.gov/funding/grant-programs/capital-investments/project-development-process-map-21-cig-program-0
exceeding 25 percent of the project cost\(^8\). The Skyway could be a candidate project to receive federal funding through this program.

**Section 5307 and 5340 Urbanized Area Formula Funds**

The FTA’s Urbanized Area Formula Funding programs (49 U.S.C. 5307 and 5340) make federal resources available to urbanized areas like San Diego for transit capital and operating assistance. For urbanized areas with 200,000 in population and over, funds are apportioned and flow directly to a designated recipient selected locally to apply for and receive Federal funds. SANDAG is this region’s designated recipient. In 2017, the region’s share of 5307 and 5340 formula funds totaled $68.4 million.

Capital investments in new and existing fixed guideway systems including rolling stock are eligible for Section 5307 funding. However, a skyway project would need to compete for funding with other regional projects and priorities.

**Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants**

Formerly known as the Transportation Investment Generating Economic Recovery (TIGER) grant program, the Better Utilizing Investments to Leverage Development, or BUILD Discretionary Grant program, provides funding for road, rail, transit and port projects that promise to achieve national objectives. The program is administered by USDOT using an annual solicitation for project applications. The program is competitive, and USDOT uses a rigorous merit-based process to select projects. In the latest round of selections, DOT selected 41 recipients to receive a total of 500 million (average grant size was approximately $12 million). Congress has appropriated $1.5 billion for FY2018 grants.

The eligibility requirements of BUILD allow project sponsors at the State and local levels to obtain funding for multi-modal, multi-jurisdictional projects that are more difficult to support through traditional DOT programs. BUILD can provide capital funding directly to any public entity, including municipalities, counties, port authorities, tribal governments, MPOs, or others in contrast to traditional Federal programs which provide funding to very specific groups of applicants (mostly State DOTs and transit agencies). DOT tends to favor applicants that exceed eligibility criteria and demonstrate significant non-Federal commitment.

**Title 23 Flexible Grant Funding**

Federal funding is available through the Federal-aid highway programs authorized in Title 23 of the United States Code. Surface Transportation Program (STP) funding may be used for projects to preserve and improve the conditions and performance of surface transportation, including highway, transit, intercity bus, bicycle and pedestrian projects. The Congestion Mitigation and Air Quality (CMAQ) program provides funding to areas in nonattainment or maintenance for ozone, carbon monoxide, and/or particulate matter. Funds may be used for any transit capital expenditures otherwise eligible for FTA funding if the expenditure has an air quality benefit.

STP and CMAQ funds are apportioned to states and metropolitan areas on a formula basis. Projects then compete for funding based on procedures and criteria established by state and local entities, including SANDAG.

As formula programs, STP and CMAQ do not have the benefit of bringing new money to the San Diego region. The Skyway would compete with other San Diego MTS and SANDAG priorities.

---

\(^8\) https://www.transit.dot.gov/funding/grants/pilot-program-expedited-project-delivery-3005b
Transportation Infrastructure Finance and Innovation Act (TIFIA) Direct Loan Program

Administered by U.S. Department of Transportation (DOT), a TIFIA loan typically finances up to 33 percent of project cost for projects valued at $50 million or more. TIFIA-financed projects must also be eligible for federal funding. If the Skyway were to require financing that is not available or preferred from SANDAG or the private sector, then a TIFIA loan might be an option.

State Funding

At least four California programs could help fund the capital costs of the Skyway: Solutions for Congested Corridors, Local Partnership, Transit and Intercity Rail Capital Program (TIRCP), and Affordable Housing and Sustainable Communities (AHSC) Grants.

Solutions for Congested Corridors Program

California’s Road Repair and Accountability Act of 2017, or Senate Bill (SB) 1, created the Solutions for Congested Corridors Program (Congested Corridors Program) and continuously appropriates two hundred and fifty million dollars ($250,000,000) annually to be allocated by the California Transportation Commission (Commission) to projects designed to achieve a balanced set of transportation, environmental, and community access improvements within highly congested travel corridors throughout the state. The primary objective of the Congested Corridors Program is to fund projects that make specific improvements and are part of a comprehensive corridor plan designed to reduce congestion in highly traveled corridors by providing more transportation choices while preserving the character of the local community and creating opportunities for neighborhood enhancement projects.

The Commission sought applications for the first four years of funding, or $1 billion, in early 2018. No match was required, but the Commission considered funding leverage in the evaluation of projects. Future solicitations are anticipated.

Local Partnership Program

Senate Bill [SB] 1 also created the Local Partnership Program and continuously appropriates two hundred million dollars ($200,000,000) annually to be allocated by the California Transportation Commission (Commission) to local or regional transportation agencies that have sought and received voter approval of taxes or that have imposed fees, which taxes or fees are dedicated solely for transportation improvements. Half of the $200 million will be awarded competitively and the balance by formula.

The Commission sought applications for the first three years of competitive funding, or $300 million, in early 2018. Future solicitations are anticipated.

The Local Partnership Program requires at least a one-to-one match of private, local, federal, or state funds, except that jurisdictions with a voter approved tax or fee which generates less than $100,000 annually need only provide a match equal to 50% of the requested Local Partnership Program funds.

Transit and Intercity Rail Capital Program (TIRCP)

The Transit and Intercity Rail Capital Program (TIRCP) was created by Senate Bill (SB) 862 (Chapter 36, Statutes of 2014) and modified by Senate Bill 9 (Chapter 710, Statutes of 2015) to provide grants from the Greenhouse Gas Reduction Fund to fund transformative capital improvements that will modernize California’s intercity, commuter, and urban rail systems, and bus and ferry transit systems to reduce emissions of greenhouse gases by reducing congestion and vehicle miles traveled throughout California. CalSTA estimates $1 billion from the existing continuous appropriation based on 10 percent of the Cap-and-Trade auction proceeds during the programming period plus an estimated $1.4 billion of Senate Bill 1 revenues
directed to the Transit and Intercity Rail Capital Program for new programming in this cycle. In total, approximately $2.4 billion is expected to be available for project awards during this five-year program.

Projects eligible for funding under the program include, but are not limited to: (a) rail capital projects, including the acquisition of rail cars and locomotives, and the facilities to support them, that expand, enhance, or improve existing rail systems and connectivity to existing and future transit systems, including the high-speed rail system; (b) intercity, commuter, and urban rail projects that increase service levels, improve reliability, or decrease travel times; (c) rail, bus, and ferry integration implementation; and (d) bus rapid transit and other bus and ferry transit investments (including vanpool services operated as public transit) to increase ridership and reduce greenhouse gas emissions, including capital investments, as a component implementing transit effectiveness studies, that will contribute to restructured and enhanced service.

Applications were sought in early 2018 for a five-year program of projects starting with State Fiscal Year (FY) 2018-19 and ending with 2022-23. Future solicitations are anticipated.

There is no minimum match requirement for this funding source. However, funding leverage is desired and is considered in the evaluation of expected project benefits. Emphasis is placed on projects that leverage funding from other greenhouse gas reduction programs.

Affordable Housing and Sustainable Communities (AHSC) Grants

The AHSC program has a broad set of goals - reduce air pollution, improve conditions for disadvantaged communities, improve public health, improve connectivity and accessibility to jobs, housing, and services, increase options for getting around, increase transit ridership, preserve and develop affordable housing, and protect agricultural land. To the extent that the Skyway connects residents of affordable housing to jobs at the airport, it could be a candidate for AHSC funding.

$255 million was available in the last round of applications. Funds were to be awarded in three categories: 35 percent for affordable housing in areas well served by frequent transit, 35 percent to improve transit or active transportation infrastructure near affordable housing, and ten percent to improve mobility for residents of affordable housing in more remote areas of the state.

Eligible projects include the development of affordable housing, housing related infrastructure, sustainable transportation infrastructure such as bike lanes, pedestrian paths, crosswalks, signals, and sidewalks, transportation-related facilities (bus stops, shelters, etc.), and certain kinds of encouragement and education programs to increase transit ridership and use of active transportation.

Regional and Local Funding

Regional and local funding sources could be used for the capital cost of the Skyway and for meeting the system’s operating and maintenance costs.

SANDAG/MTS Smart Growth Initiative

The Skyway 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 or future SANDAG or MTS sales tax measure programs.

Airport Funds

The Skyway could be eligible for funding with Airport Improvement Grant (AIG) funding – the primary source of Federal Aviation Administration funding for airports – and for revenues generated by Passenger Facilities Charges (PFC). PFC and AIP funds must be used on airport-owned property and must be used exclusively for facilities that help people get to/from
the airport. An airport station and any construction on airport property would be eligible, and it may also be possible to find a way to fund the cost for connecting to the nearest off-airport station. General airport revenues could also be available.

To receive funding from any of these sources, the Skyway would need to compete with other San Diego County Regional Airport Authority needs.

**Other Revenues**

Other revenues possibly available to support the operations and maintenance of the Skyway system include fare revenues and the transient occupancy tax. Based upon ridership, the system would generate fares that would, in part, fund the operations of the system. A premium fare is often charged for transit connections to airports. SANDAG/MTS could request a share of existing Transit Occupancy Tax (TOT) revenues or an increased allocation to the system.

### 7.2.2 Unique Funding Sources

A variety of potential public/private partnership and value capture opportunities could be available for the project. The value of quick access to the airport might be monetized through a variety of value capture techniques. The scale, value, and productivity of the Skyway may also be attractive for public-private partnerships (P3) arrangements, ranging 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 aerial cableway systems.

**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 another 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. 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 another assessment district;
- Determine an assessment rate that would not place an undue burden on 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.
Public/Private Partnership Opportunities

The Skyway 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 required for a Skyway system could be appealing to private entities.

Opportunities for P3 for the Skyway 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 airport access trips within the study area;
- Joint development opportunities may exist within proposed station areas;
- A direct connection between downtown and the airport could be attractive enough to support a premium fare for occasional users; 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).

Commercial Sponsorship and Advertisement Revenue

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

### 7.3 Project Delivery Options

There are several types of project delivery methods feasible for implementing the Skyway. An important decision in the case of any large complicated transit project is to select an appropriate process that will best secure the project and minimize the initial investment and future operation and maintenance cost. The following are examples of possible delivery methods for the Skyway.

**Construction Manager/General Contractor**

Using the Construction Manager/General Contractor (CM/GC) method, the project owner hires a contractor to provide feedback during the design phase before construction begins. The CM/GC process is broken down into two contract phases. The first contract phase, the design phase, allows the contractor to work with the designer and the project owner to identify risks, provide costs projections and refine the project schedule. Once the design phase is complete, the contractor and project
owner negotiate on the price for the construction contract. If all parties on costs then the second contract phase, the construction phase, is initiated.  

**Design/Bid/Build**

In the Design/Bid/Build method, the design and the construction phases are separately and sequentially bid.

**Design/Build**

Using the Design/Build method, a consultant team would have one contract to design and build the project.

**Design/Build/Finance**

Another variation is to add financing to the contractor, which would allow the contractor to front the funding for the project in exchange for later payment by the owner.

**Design/Build/Operate/Maintain**

A Design/Build contract could include both operations and maintenance. Alternatively, the owner could separately contract out the operations and maintenance of the system.

### 7.4 Project Operational Options

At the completion of the project there would be several methods the Skyway project could be turned over for operations and maintenance. The following examples include:

**SANDAG/MTS:** Per Senate Bill 1703, SANDAG could implement the Skyway as a regional mobility improvement. Once completed, the Skyway could be turned over to MTS for operations and maintenance as part of the MTS transit system.

**Port of San Diego/MTS**

Per Policy No. 120, the Port of San Diego could implement the Skyway as an improvement to public access to the waterfront. Once completed, the Skyway could be turned over to MTS for operations and maintenance as part of the MTS transit system.

**Public/Private:** Under a franchise agreement, the Skyway could be implemented, operated, and maintained by a private entity. Based on the cost estimate for the Downtown to Airport Skyway, it is not likely that the project could be one-hundred percent financed by a private entity and a public contribution would be required. The franchise agreement could be structured in many different ways. For example, it could have a duration of 30 years at which time the Skyway could be turned over to MTS for operations and maintenance, or dismantled, or a new franchise agreement negotiated. The franchise agreement could be between MTS and the private entity.

---

8.0 Environmental and Community Issues

This early review of regulatory requirements was initiated given the potential implementation of the Skyway, which would be a new technology to the San Diego region. Regulatory requirements were considered when developing the system routing as described above in Chapter 4. Regulatory requirements were also included in determining system capital costs.

8.1 General Regulatory Requirements

The design of the Skyway would require adherence to regulations from several different governing bodies. An overview of these groups and their associated regulations is included in the following sections.

8.1.1 California Division of Occupational Safety and Health (Cal/OSHA)

The California Division of Occupational Safety and Health (Cal/OSHA) is the primary agency in charge of permitting aerial passenger tramways, which is how the Skyway would be categorized. Functions of the department include:

- Reviews official plans prior to issuing permit
- Oversees initial testing
- Retains as-built plans
- Inspects all facilities twice annually

The design and operation of the Skyway would require conformance with several statues and standards, including:

- **California Labor Code, Sections 7340-7357**: Legislative statute delegating Cal/OSHA with regulatory authority over aerial passenger tramways
- **California Code of Regulations, Sections 3150-3191**: Design and operational regulations issued by Cal/OSHA. Largely refers to ANSI B77.1
- **ANSI B77.1, Aerial Tramway Standards**: Large volume of specific standards, including design (height, approach path, load points, stations, electrical, etc.), operation, evacuation, personnel training, etc. Mostly written for ski areas and most recently updated in 2011.

8.1.2 California Public Utilities Commission

The California Public Utilities Commission (CPUC) regulates and registers energy, communications, rail (freight, intercity, and commuter), passenger and moving carriers, and water. While the CPUC does not regulate and/or register aerial passenger tramways, it does have jurisdiction over rail corridors, which includes the Skyway’s planned crossings along Kettner Boulevard and Broadway. It is recommended that coordination occur with CPUC regarding this technology and the alignment during design and permitting in anticipation that CPUC may have authority over this technology at a later date.

8.1.3 California Coastal Commission

The Downtown to Airport Skyway alignment would be located within the Coastal Commission Zone. The City of San Diego’s Local Coastal Program (LCP) guides development and improvements in the coastal zones under the jurisdiction of the California Coastal Commission (CCC). The overarching goals of the Local Coastal Program are to protect public
shoreline access, coastal resources, and views, and ensure sufficient visitor-serving and recreational uses (City of San Diego, 2016).

A Coastal Development Permit (CDP) would likely be required for construction of the Downtown to Airport Skyway alignment. The City of San Diego would be the permitting agency, as it has delegation authority from the CCC to issue CDPs through its certified LCP, for which one has been approved for Downtown San Diego. 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.

8.1.4 Federal Transit Administration

Should the Skyway qualify as a federal funds recipient from the Federal Transit Administration (FTA), it would be subject to environmental review under the National Environmental Policy Act (NEPA). As such, the Skyway would have to conform to federal regulations including Section 4(f), which applies to parklands and historic properties, if any such resources occur in proximity to the alignment.

8.1.5 San Diego International Airport Operations

Due to its proximity to San Diego International Airport (SAN), the Skyway would be subject to development restrictions issued by the Federal Aviation Administration (FAA), the City of San Diego, and the San Diego County Regional Airport Authority (SDCRAA). Each agency conducts independent evaluations of developments near SAN, with the City of San Diego issuing development permits for projects that comply with regulations.

Development regulations for each agency are described in more detail below.

**Federal Aviation Administration**

Per the City of San Diego Municipal Code, the Skyway would be subject to review by the FAA. The FAA issues national regulations on airspace. The FAA does not issue development permits, but rather evaluates permit applications for compatibility with airport operations, and issues a “Determination of No Hazard to Air Navigation” for compatible projects.

Compatibility is evaluated using an imaginary surface to determine whether developments would be considered obstructions to air navigation near airports (per Code of Federal Regulations Part 77). Near SAN, the “Part 77” surface generally follows a 7:1 slope south of Runway 27 (along the southern edge of the airport).

**City of San Diego Airport Approach Overlay Zone**

The Skyway study area is within the City of San Diego Airport Approach Overlay Zone (AAOZ) boundary. As such, City review would be required to ensure the Skyway conforms to the AAOZ restrictions. In particular, the Skyway would need to be constructed in a manner that maintains the minimum vertical buffer between the Part 77 surface established by the Federal Aviation Administration (FAA).

The approach surface is similar to the Part 77 surface; however, it is considered more restrictive as it starts 50 feet west of the east end of Runway 27 at SAN. The maximum allowable height for new structures at a given point is the elevation of the FAA Part 77 surface, minus the ground elevation.

It should be noted that any structure that has a maximum height of 40 feet or lower is exempt from the AAOZ regulations, provided that the FAA has issued a “Determination of No Hazard to Air Navigation” as described above.
Per the City of San Diego Municipal Code, the Skyway would be subject to review by the SDCRAA. The SDCRAA operates the San Diego International Airport and manages the surrounding airspace. The SDCRAA serves as the Airport Land Use Commission and adopts the Airport Land Use Compatibility Plan (ALUCP). It does not issue development permits, but rather evaluates permit applications from the local municipalities for compatibility with the ALUCP.

The ALUCP uses an approach surface that is similar to the FAA Part 77 surface—named the “Threshold Sighting Surface”—to determine whether or not structures would be considered an obstruction.

### 8.1.6 United States Coast Guard

The Bay area south of Harbor Drive between Hawthorn Street and Laurel Street is within the typical arrival path for helicopters operated by the United States Coast Guard (USCG). Additionally, the area along Harbor Drive between the USCG Sector San Diego and SAN is used for “hover taxi” maneuvers during low-visibility search and rescue operations.

Through coordination with USCG, it was indicated that the presence of a Skyway system could cause the helicopters to maintain a higher altitude before final descent. The USCG expressed concern that this may require landings to be steeper, which can be more challenging. USCG also noted that helicopter rotors can create very strong winds, and that these winds would need to be taken into consideration for a Skyway project.

### 8.1.7 San Diego Unified Port District

The majority of the waterfront to the west of Pacific Highway and south of Harbor Drive is under the jurisdiction of the San Diego Unified Port District and subject to the Port Master Plan. The mission of the Port of San Diego is to provide “economic vitality and community benefit through a balanced approach to the maritime industry, tourism, water and land recreation, environmental stewardship and public safety.” Approval of the alignment would be subject to the Port of San Diego. Potential conflicts with the Port of San Diego Holiday Bowl Parade would also need to be evaluated in more detail in future studies.

### 8.2 Potential Environmental Regulations

The following sections provide potential environmental regulations that could affect the implementation of the Skyway. The complete list of environmental and construction permits is not represented in this feasibility study report.

#### 8.2.1 National Environmental Policy Act

If federal funding is received from FTA, environmental clearance pursuant to NEPA would be required. This process would begin with scoping during which the project sponsor would request comments from the public and stakeholders related to mode, alignment, station locations, and environmental topics of consideration. The purpose and need of the project would also need to be defined. The process would continue with the relevant engineering, environmental analyses, and preparation and circulation of a draft and final Environmental Impact Statement.

#### 8.2.2 California Environmental Policy Act

Regardless of whether federal funding is obtained or clearance under NEPA is required, the project sponsor would need to obtain environmental clearance pursuant to the California Environmental Quality Act (CEQA). Similar to NEPA requirements, CEQA requires scoping, environmental analyses, and preparation and circulation of a draft and final Environmental Impact Report. If NEPA is also required, the project sponsor could prepare a combined Environmental Impact Statement/Environmental Impact Report.
Appendix G of the CEQA Guidelines provides an environmental checklist and recommended thresholds that can be used to
determine if the Skyway results in significant impacts under various disciplines (e.g., visual, air quality, biological
resources). Similarly, the City of San Diego has outlined significance determination thresholds as documented in the
*California Environmental Quality Act Significance Determination Thresholds* (City of San Diego, 2016). The project
sponsor could follow the thresholds outlined in either of these resources if the sponsor agency does not have established
CEQA significance thresholds.

### 8.2.3 Historic Districts/Landmarks

The Skyway alignment is not located within any designated historic districts. Nonetheless, the alignment would be adjacent
to the Gaslamp Quarter, which is included on the National Register of Historic Places. The Skyway alignment would also
be located in proximity to several properties listed on the National Register of Historic Places, including but not limited to
the Star of India (North Harbor Drive) and the City of San Diego Police Headquarters, Jails and Courts (Kettner Boulevard
and West Harbor Drive). Consideration would be required as to whether the introduction of the Skyway alignment in
proximity to these properties and the district could have impacts, particularly in terms of visual impacts.

### 8.2.4 Visual Impacts

A more detailed assessment would need to be performed to determine whether the Skyway would cause adverse visual
impacts. The assessment would consider:

- View of the guideway looking towards the Bay
- View of the guideway looking from the Gaslamp Quarter
- Views of stations, bulk and mass in relation to the Bay
- Various downtown view corridors, as defined by the Downtown Community Plan (City of San Diego, 2016)
  and Port Master Plan, which is being updated at this time.

The FTA has not developed a methodology for assessing and mitigating visual impacts associated with transit projects.
Instead, FTA applies the Federal Highway Administration Guidelines as defined in the *Guidelines for the Visual Impact
Assessment of Highway Projects* (FHWA 2015). The guidelines outline the process of defining the existing visual
setting/character, inventorying natural, cultural, and project environments, evaluating the impacts of the project on the
setting, and types of mitigation.

### 8.2.5 Noise Impacts

While noise from aerial operation would likely be minor, noise levels at stations from the slowdown and the acceleration of
the cabins could result in noise impacts. Noise, either created at the stations or along the cableway would need to be
evaluated to ensure no adverse effects are created by the Skyway to adjacent land uses. If the project were to seek FTA
funding, it is anticipated that the *Transit Noise and Vibration Impact Assessment* (FTA, 2006) would apply to the NEPA
evaluation. The criteria specify screening distances for different modes of transit, however, Skyway is not an identified
technology. Coordination would likely be required with FTA to determine the appropriate screening criteria.

Pursuant to CEQA, the noise evaluation would likely require compliance with requirements of the San Diego Unified Port
District as that agency has jurisdiction over the area where the alignment is proposed. However, if the lead agency under
CEQA were a different entity (e.g., SANDAG), then the relevant criteria could be determined through coordination with
the other CEQA responsible agencies.
8.2.6 Air Quality/Greenhouse Gas Emissions

Air pollutant and greenhouse gas (GHG) emissions from the Skyway are anticipated to be minimal and could be reduced with increased Skyway utilization and a corresponding reduction in automobile travel. The all electrical system supporting the cableway would have a low energy demand, in the range of 2.5 million kilowatts per year. This demand is for operating the Skyway only and does take other station elements, such as station elevators and lighting, into account. By providing an alternative mode of transportation for trips that would otherwise be made by automobile, the Skyway could cause a mode shift away from automobile trips, which would result in a reduction in air pollutant and GHG emissions. This supports the regional efforts to reduce overall carbon output. Further assessment would be required to determine the extent of air pollutant and GHG emissions.

8.2.7 Biological Resources and Permitting

The Skyway is proposed along the Bay and could require coordination with, and/or permits from, the U.S. Army Corps of Engineers, U.S. Department of Fish and Wildlife, Regional Water Quality Control Board, and California Department of Fish and Wildlife. Surveys would be required to determine if sensitive wildlife are located within the study area. Jurisdictional delineations would also be required to determine if the Skyway is within the areas under the jurisdiction of U.S. Army Corps of Engineers, Regional Water Quality Control Board, and/or California Department of Fish and Wildlife.
9.0 Next Steps

The design of the Skyway would require input from several different governing bodies including the San Diego County Regional Airport Authority, San Diego Unified Port District, City of San Diego, the California Coastal Commission, and others. It will also be necessary to coordinate with the United States Coast Guard and their existing air operations from their Harbor Drive location. Potential conflicts with the Port of San Diego Holiday Bowl Parade would also need to be evaluated in more detail in future studies.

FINDINGS AND NEXT STEPS

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

- The Downtown to Airport Skyway as presented can be built with existing aerial cableway technology.
- The Skyway can effectively and efficiently provide a transportation connections between Downtown land uses and the San Diego International Airport including a direct link between the Airport and Amtrak, COASTER, trolley, and bus services at Santa Fe Depot.
- Given the current plan to construct a new Terminal 1 at San Diego International Airport, there is an immediate opportunity to fully integrate a Skyway station with the design of the new Terminal 1.
- Given the relatively small footprint of the towers and stations, aerial cableway technology poses fewer impacts to existing land uses and a lower cost than connecting light rail transit (LRT) to the Airport. While more analysis is needed, these findings are consistent with the findings of the Pacific Beach Corridor Study10.
- Agency stakeholders within the study area and region have been generally supportive of concepts shown in this study.
- Community and environmental issues will need to be investigated in greater detail.

This study frames many of the key issues related to the potential of aerial cableway and its ability to enhance mobility in the project area. Recommended next steps include:

1. Identify the appropriate lead agency to further develop the project.
2. Pursue the available funding sources outlined in Section 7.2.
3. Conduct an alternatives analysis to compare the Skyway to other transportation options (e.g. light rail, bus, and others).
4. Commence analysis per California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) requirements.