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## EXECUTIVE SUMMARY

The City of Anaheim, in coordination with the Orange County Transportation Authority (OCTA), has completed the Anaheim Rapid Connection (ARC) Fixed-Guideway Alternatives Analysis (AA) study. The ARC AA study explored opportunities to provide an east-west transit connection between the planned Anaheim Regional Transportation Intermodal Center (ARTIC) and the activity centers of the Platinum Triangle and The Anaheim Resort®. The AA study was a cooperative effort with the participation of the City of Anaheim, OCTA, and the Federal Transit Administration (FTA).

Located in the center of the City of Anaheim in Northern Orange County, the approximate five square mile Study Area attracts national and international visitors, and includes a diverse cross-section of what makes Anaheim unique – from the Disneyland Resort and Anaheim Convention Center, and more than one-third of Orange County’s hotels in The Anaheim Resort, to the fast-growing, mixed-use Platinum Triangle area, which is also home to the Angel Stadium of Anaheim and Honda Center.

The initial goals of the project were defined some 18 years ago, when a people mover system connecting major attractions in Anaheim was first envisioned. Over the past four years, interest in a transit connection has gained momentum with the renewal of Measure M, the initiation of OCTA’s *Go Local* funding program, and the expansion of Metrolink to serve as Orange County’s “backbone” commuter rail system. In 2007, the City of Anaheim adopted the *Go Local Transit Master Plan* which included the ARC Fixed-Guideway project. The ARC project is envisioned to provide transit access for trips within the Study Area as well as a convenient “last mile” connection between the Study Area’s activity centers and Metrolink, Amtrak, local fixed-route bus, Stationlink bus, and future California High-Speed Rail (CHSR) at ARTIC, which is under construction and will be open in 2014.

On September 22, 2008, the OCTA Board approved a Cooperative Agreement with the City of Anaheim for detailed planning, alternatives analysis, conceptual engineering, and state and federal environmental clearance for the proposed Anaheim Rapid Connection (ARC) Fixed-Guideway Project. On March 14, 2011, the OCTA Board approved a second cooperative agreement with the City, which was amended on January 12, 2012, to provide funding for ARC pre-preliminary engineering activities, including preparation of an application for federal New Starts funding and preliminary engineering efforts.

Initiated in February 2009, the ARC Fixed-Guideway AA study sought to answer the following questions:

- Why does Anaheim need new transit service?
- What travel markets will benefit?
- What technologies are appropriate?
- What are the best alignment and the best location for stations?
- What are the costs, benefits, and impacts of various transportation alternatives?

The ARC AA study has answered these questions through a three-step study process that developed and assessed a full range of transportation alternatives to identify the alternative that best meets the



identified project goals and mobility challenges defined in the purpose and need effort. Each study phase incorporated technical and environmental analyses, along with stakeholder and community input. The third and last AA study evaluation phase assessed a final set of four alternatives based on conceptual-level engineering and related technical and environmental assessment efforts, along with community and agency outreach input. The resulting information, presenting the benefits and challenges of each of the proposed project alternatives, is documented in this AA report and provides the basis for informed decision-making in identifying the recommended Locally Preferred Alternative (LPA) presented here. (The LPA will be added to this section following City Council action.)

## **ES.1 Project and Study Area Description**

The ARC project is envisioned to provide transit access for trips both within the Study Area and beyond by providing a transit connection that will link Orange County's "backbone" Metrolink commuter rail system to Anaheim's major employment and activity centers and visitor destinations in the Platinum Triangle and The Anaheim Resort. The project is needed to accommodate existing and projected future demand for local and regional travel in a unique visitor/recreational market in the heart of Central Orange County's sports and entertainment district. Connecting Anaheim activity centers with a new and highly visible transit option to the planned ARTIC and regional transit systems would address deficiencies in the City's transportation system. The project would also address Anaheim's development plans and would be expandable to serve local and region-wide travel needs.

### **ES.1.1 Activity Centers and Destinations**

The ARC Study Area is home to numerous activity centers, community nodes, and regional attractions as illustrated in Figure ES.1. Currently, there are 51,600 jobs and 25,300 residents within the five square mile Study Area. In addition, Study Area destinations attract approximately 20 million annual visitors from all over the U.S. and the world. Several of the largest tourist attractions and event centers in Southern California are located in Anaheim, and the visitor market is a major driver of the local and regional economy, creating jobs and revenue for the City of Anaheim and Orange County. The Study Area activity centers are summarized below and shown in Figure ES.1.

**The Anaheim Resort** – The approximate 1,100-acre area known as The Anaheim Resort encompasses the Anaheim Convention Center, theme parks, numerous hotels and motels (over 30 percent of the hotel rooms in Orange County), retail space, restaurants, and other visitor attractions. As shown in Figure ES.1, the four major components of The Anaheim Resort are:

- **Anaheim Convention Center** – The Anaheim Convention Center (ACC) is the largest convention center on the West Coast, hosting exhibitions, conferences, and meetings of national and international scope. The ACC includes 815,000 square feet of exhibition space and 100,000 square feet of meeting and ballroom space, and draws more than one million convention attendees annually. An expansion project underway to provide additional outdoor convention space will be completed in 2013. In 2010, the ACC hosted more than one million conference and



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meeting attendees who spent more than \$1.1 billion in the region as identified by the Anaheim-Orange County Visitor and Convention Bureau.

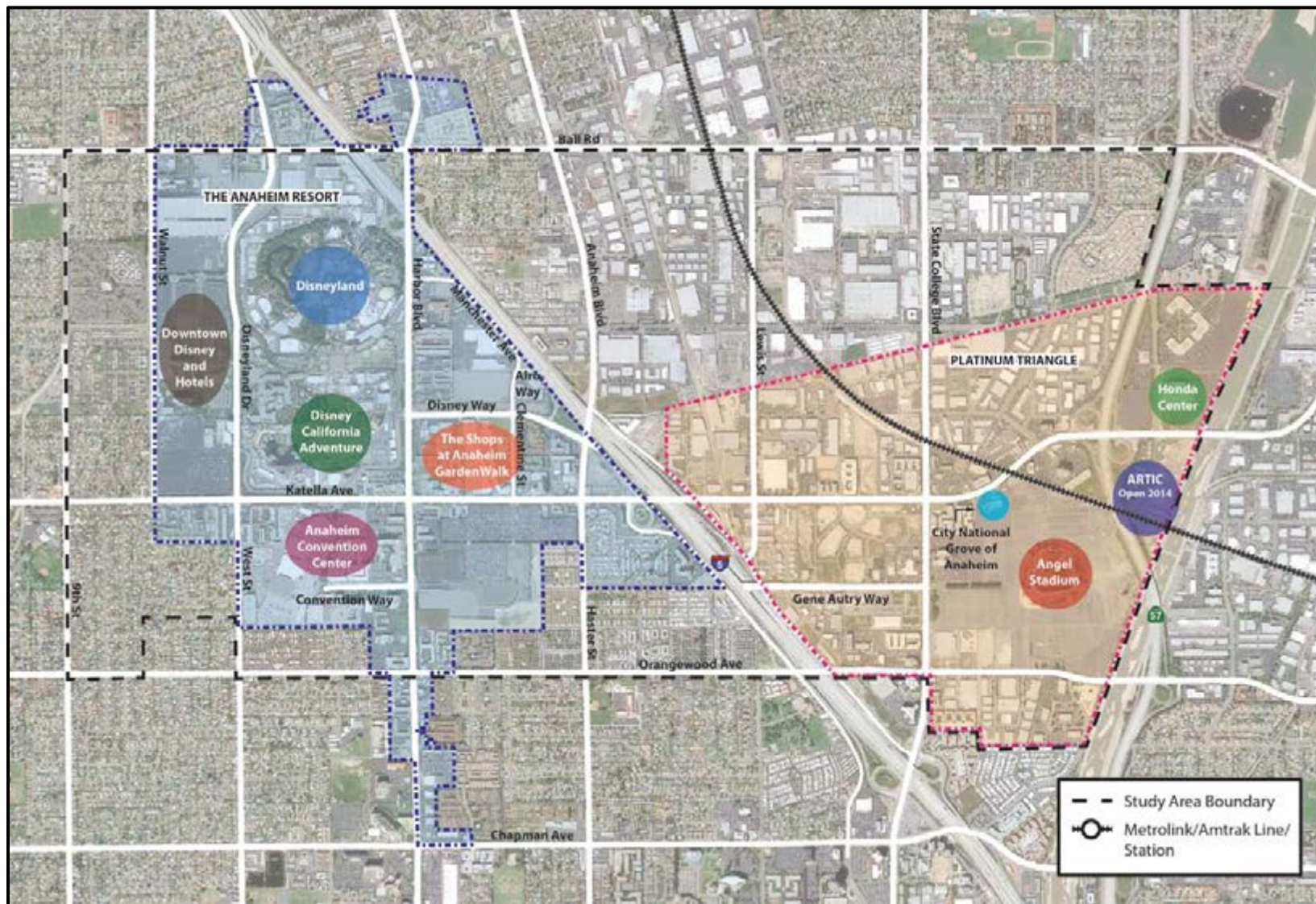
- **Disneyland Resort** – The Disneyland Resort is a top tourist attraction in Southern California, hosting millions of visitors annually. It is also Anaheim’s largest employer providing approximately 23,000 jobs. The Disneyland Resort includes Disneyland Park, Disney California Adventure, Downtown Disney District, and several resort hotels. These interrelated destinations generate approximately \$4.7 billion annually for the Southern California economy. There are also related parking facilities located east of Harbor Boulevard and south of Katella Avenue.
- **The Shops at Anaheim GardenWalk** – Anaheim GardenWalk, a major lifestyle retail center, opened in 2008, and encompasses 440,000 square feet of retail, restaurant, and entertainment uses. The final project phase will include two additional hotels (866 rooms) and a 400-unit timeshare. A bus depot, which accommodates 15 bus bays, has been constructed as part of the Anaheim GardenWalk.

**Platinum Triangle** – A major transformation is occurring in this district of the City which was created through an update to the *City of Anaheim General Plan* in 2004, and which already includes Angel Stadium, Honda Center, and the City National Grove of Anaheim. New land use designations were implemented in the area generally bounded by I-5 and SR-57 between Katella and Orangewood Avenues to provide for the transition from existing industrial uses to mixed-use, residential, office, and commercial uses. Current zoning allows for 18,909 residential units in the Platinum Triangle, of which over 8,000 units are in various stages of approval or completion. The Platinum Triangle can accommodate up to 14.3 million square feet of office space and 4.9 million square feet of retail space. Industrial and institutional uses also are permitted. The four major components of the Platinum Triangle are shown in Figure ES.1 and described below.

- **Anaheim Station/ARTIC** – The current Anaheim Station, which links bus transit, taxi, and commuter and intercity rail service, is located off Katella Avenue adjacent to Angel Stadium. It will be converted into the City’s planned intermodal transportation hub, ARTIC, and will serve as the City’s regional transportation gateway for visitors and those who live, work, and visit in the region. The *Platinum Triangle Master Land Use Plan* allows development of a mix of high-density retail, office, housing, and visitor-oriented facilities adjoining ARTIC. Given plans to integrate Metrolink, Amtrak, and high-speed rail service at ARTIC, this multi-modal transit hub and activity center will be the principal anchor for the ARC Fixed-Guideway project, and will be an iconic transportation hub in the Southern California region when the station opens in 2014.
- **Angel Stadium** – Home to the Angels, a Major League Baseball team, Angel Stadium is a major sporting and event center in Southern California with seating for just over 40,000 spectators and attracts more than 3.4 million annual attendees. Approximately 80 home games occur annually



Figure ES.1 – Study Area





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at Angel Stadium along with other major events and concerts throughout the year. The stadium site is integral to the Platinum Triangle.

- **Honda Center** – Honda Center is a major sports and event center, with seating for over 17,000 spectators. It serves as the home of the Anaheim Ducks National Hockey League team. Events at Honda Center attract approximately 1.7 million annual attendees.
- **City National Grove of Anaheim** – This indoor venue hosts more than 250 events annually ranging from concerts to corporate and private events. The 5,000-seat facility is owned by the City of Anaheim and managed by Nederlander Concerts.

The City of Anaheim has developed and initiated implementation of Study Area land use and economic development plans to create higher density, mixed-use development incorporating housing, office, commercial, hotels and related amenities. Relevant studies and plans, include the *City of Anaheim Go Local Transit Master Plan*, *City of Anaheim General Plan*, the *Anaheim Regional Transportation Intermodal Center (ARTIC) Project*, the *Platinum Triangle Master Land Use Plan*, *Anaheim Resort Specific Plan*, *Disneyland Resort Specific Plan*, *Hotel Circle Specific Plan*, *Metrolink Service Expansion Program*, *California High-Speed Rail Environmental Impact Statement/Environmental Impact Report (EIS/EIR)* and other improvement plans and studies. These studies and plans provided the background and context for the ARC Fixed-Guideway Transit Corridor AA Study.

## **ES.2 Mobility Challenges and Purpose and Need**

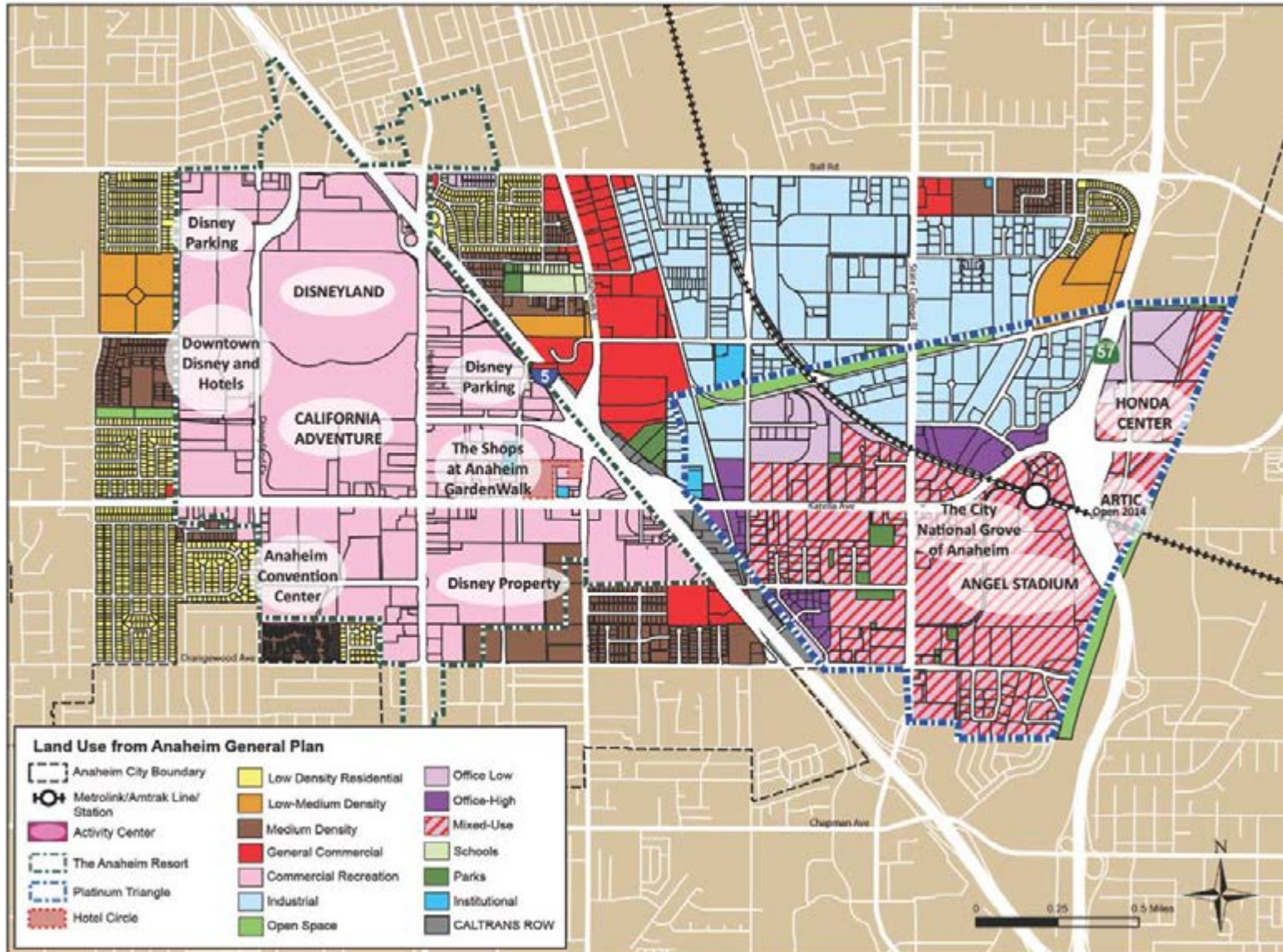
The existing and future demographic, land use, and transportation setting, along with the definition of the mobility challenges and opportunities to be addressed by the proposed ARC Fixed-Guideway project have been identified and documented in the *Mobility Problem Definition/Purpose and Need Report (Appendix A)*. The following discussion highlights the key current and future mobility factors in the Study Area.

**Demographics** – Based on the Orange County Projections for 2010 as reflected in the Southern California Association of Governments (SCAG) *Regional Transportation Plan (RTP 2012) Forecasts*, between 2010 and 2035, population in the Study Area is expected to increase by approximately 62 percent from 25,300 to 41,100 residents, while employment is projected to grow by approximately 46 percent from 51,600 jobs today to more than 75,200 jobs over the same time period. These are higher growth rates than those identified for the City and County as a whole (approximately 21 and 14 percent respectively for population, and 9 and 21 percent respectively for employment). Actual future Study Area population and employment numbers may be higher as the City moves forward with implementation of its land use and economic development plans.

**Land Use** – The Study Area has diverse land uses with a growing residential community, expanding employment opportunities, and numerous activity centers and destinations that attract national and international visitors. This visitor market is a major driver of the local and regional economy, creating jobs and revenue for the City of Anaheim and Orange County. Due to the high number of both service



Figure ES.2 – Planned Land Uses in the Study Area





professional and service industry jobs within the Study Area, the employment attraction is regional in nature.

**Travel Markets** – The Study Area’s diverse land uses generate a variety of travel markets many of which are unique. Each of the markets currently exists, with the exception of the high-speed rail riders, which are forecast to utilize ARTIC under future conditions. Implementation of high-speed rail introduces a significant market that will benefit from an efficient transit system to connect ARTIC to attractions and destinations throughout the Study Area. The following seven key markets could benefit from an east-west connection between ARTIC and the activity centers of the Platinum Triangle and The Anaheim Resort:

- Metrolink access and egress trips;
- Resort Area Guests (including Disneyland and Anaheim Convention Center guests using transit to access resort destinations from their hotels);
- California High-Speed Rail (CHSR) access and egress trips;
- Amtrak access and egress trips;
- Trips Within the Corridor (Intra-corridor travel that may use transit);
- Disneyland remote parking trips; and
- Angel Stadium and Honda Center event trips.

**Existing Transportation Network** – The Study Area highway system consists of primary, secondary, and major roads with the major east-west arterials being Ball Road, Katella Avenue, and Orangewood Avenue; and the north-south arterials are Harbor Boulevard and State College Boulevard. Freeways serving the Study Area are the I-5, which bisects the Study Area at a diagonal, and the SR-57 which is located on the eastern edge. Existing transit service is provided by a wide range of modes, including commuter rail (Metrolink), intercity rail (Amtrak), fixed-route bus provided by OCTA, Stationlink bus routes between destinations in and beyond the Study Area and the Anaheim Station/ARTIC (under construction), and local circulator shuttle (Anaheim Resort Transportation or ART).

Existing transit linkages between the Anaheim Station and major Study Area destinations are not seamless or frequent. In addition, not all of the current services enter the station and require long walks to transfer between rail and bus modes. The current ART service that provides Study Area connections to and from the station has vastly different travel times in making the approximately three-mile trip between the Anaheim Station and Disneyland – 10 minutes westbound in non-peak hour conditions to Disneyland, and 20 minutes eastbound. The time difference is due to the variation in the number and location of hotels and stops along each route. Service travel times are unreliable during peak periods for all bus and circulator service due to congested roadway conditions. There is no ART route that directly connects the Anaheim Station/planned ARTIC with the Anaheim Convention Center. The ARC project is envisioned to provide improved transit access for trips within the Study Area as well as a convenient “last mile” connection between the activity centers and visitor destinations and Metrolink, Amtrak, local fixed-route bus, future BRT, and CHSR services at the Anaheim Station/ARTIC.









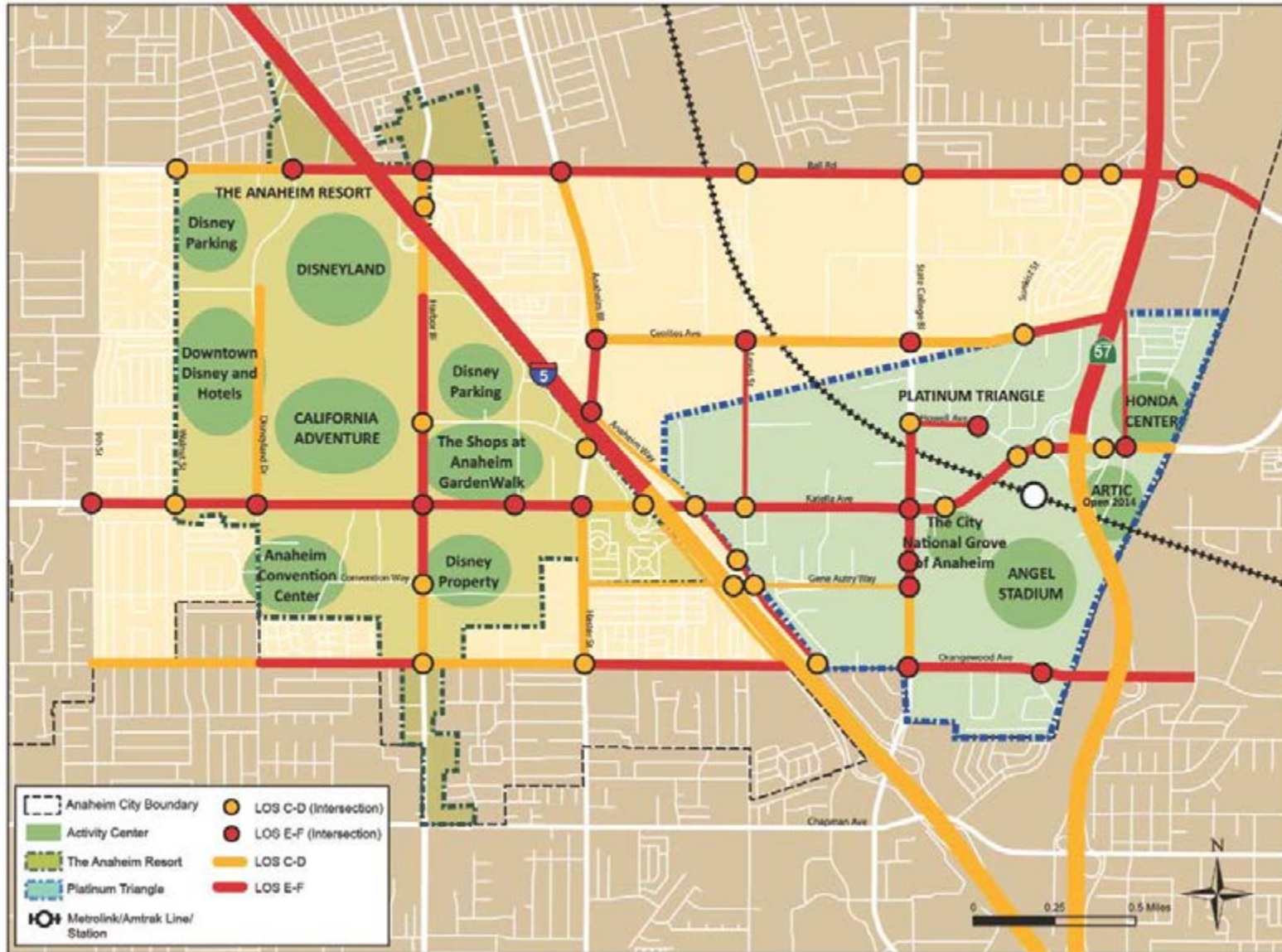
**Transit Demand** – Based on 2005 and 2010 information from the Orange County Transportation Analysis Model (OCTAM), the transit mode share (the percentage of people using transit) in the Study Area is approximately 2.0 percent (i.e., 98 percent of Study Area is made in other ways – primarily by automobile, but also by walking or bicycling). According to OCTAM, the proportion of work trips using transit is higher, with work transit shares being equal to 4.0 percent for Orange County and 5.7 percent for the region as a whole. As estimated from the *2004 Metrolink Passenger Survey*, 36 percent of arriving Anaheim passengers transfer to public transit including local bus and ART service, 38 percent drive or are picked up by a vehicle, and 26 percent walk to their destination. Approximately 90 percent of Disney employees drive to work and of the remaining, seven percent arrive by bus, three percent walk or bicycle and one percent use Metrolink or Amtrak (equals more than 100 percent due to rounding). According to 2011 ART ridership data, there were approximately 5.3 million annual or 20,400 daily weekday boardings, 1.2 million annual or 23,100 daily Saturday boardings, and 1.1 million annual or 21,200 daily Sunday boardings.

**Transportation System Operating Conditions** – On an average weekday, several Study Area arterial segments currently operate at unacceptable service levels based on City standards. Under future conditions, arterial traffic volume growth will reduce speeds throughout the Study Area. Currently, average freeway peak hour speeds range from 25 to 30 miles per hour in the peak travel directions. During event conditions, numerous streets in the Study Area, (primarily those east of the I-5 Freeway) are affected by traffic from events at Honda Center and Angel Stadium. Combined, these two facilities host over 235 events per year, including days when events are hosted at both locations. Based on future land use plans and population and growth projections, without significant improvement in transit services and connections, the existing highway system will become increasingly strained.

As described above, the current transit system serves all of the identified travel markets with the exception of the future high-speed rail system, but does not provide frequent, convenient or well-coordinated service. Transit operates in mixed-flow conditions and tends to be slow and unreliable. With the substantial growth projected for the Study Area, performance of the existing transit system will be further impacted by roadway congestion. Future population and employment growth, along with the introduction of high-speed rail arriving at ARTIC, is likely to result in transit system capacity constraints. Provision of a frequent, reliable, high-capacity transit connection would address the Study Area’s future travel needs.

**Parking Conditions** – Currently, major parking facilities supply approximately 35,600 publicly accessible paid parking spaces in the Study Area. Although visitors for the major attractions can generally be accommodated within their dedicated parking facilities, patrons tend to seek less expensive or more easily accessible parking. Since parking fees are not consistent within the Study Area, traffic, circulation, and other transportation and mobility issues can occur. This could be better coordinated with improved parking oversight and management. In the future, provision of a frequent, reliable transit connection could encourage Study Area visitors to “park once” reducing both the need to provide large-scale parking facilities and to reduce street system operational impacts.

Figure ES.4 – Future Roadway and Intersection Deficiencies in the Study Area (2035)





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**Pedestrian and Bicycle Conditions** – The Study Area has varying types of pedestrian facilities and crossings. Based on field observations and evaluations, the majority of the Study Area arterials have good overall walkability as the current sidewalk widths and robust crossing facilities help offset the lack of buffers (not including The Anaheim Resort and some locations in the Platinum Triangle where landscaped parkways are provided); high vehicle speeds; and long crossing distances. Bicycle activity within the Study Area is limited to a Class I Bikeway along the Santa Ana River Trail in the eastern part of the Study Area and Class II Bikeways on two segments of Orangewood Avenue and a bikeway on 9<sup>th</sup> Street between Katella Avenue and Chapman Avenue. The City has developed plans to introduce more bicycle facilities throughout major corridors and rights-of-way within the Study Area, and has recently launched a bike-share program with bike-lending kiosks proposed at Anaheim Station/planned ARTIC, the Anaheim Convention Center, the City National Grove of Anaheim, Honda Center, and The Shops at Anaheim GardenWalk.

## **Mobility Challenges**

The Study Area is continuing to grow as both a residential and employment center for Anaheim and as one of the region's major recreation and tourist destinations. This growth will place continuing pressure on a transportation system that will become increasingly stressed as travel demand within and into the Study Area increases. As documented in the *Mobility Problem Definition/Purpose and Need Report*, the following key Study Area mobility challenges have been identified:

### **Lack of Convenient Transit Access between Anaheim Station/planned ARTIC, the Platinum Triangle, and The Anaheim Resort**

While there are OCTA local and express bus routes and ART services that traverse the Study Area, convenient and direct east-west connections from the Anaheim Station/planned ARTIC to major Study Area attractions and activity centers do not exist. ART and OCTA provide limited service between Anaheim Station/planned ARTIC, the Platinum Triangle, and The Anaheim Resort. The connectivity between OCTA local bus routes and the Anaheim Station are not seamless as transfers require a long walk through an office/retail development to access Katella Avenue and an on-street bus stop. Other services require at least one transfer to complete the transit trip from Metrolink to Anaheim activity centers. Another difficulty in service is that existing transit runs in mixed-flow traffic with automobiles, which subjects it to peak-period congestion and delay-causing incidents.

With future expansion of Metrolink and Amtrak service, and development within the Platinum Triangle and The Anaheim Resort, there are limitations to what the existing Study Area transit service can provide. While ART bus routes have been recently redesigned for more frequent service to Anaheim Station, routes do not meet every train and the route, service frequency and travel times vary significantly. Also, direct service to the Anaheim Convention Center from Anaheim Station is not provided. In terms of mobility, existing transit service would not effectively serve future high levels of activity associated with ARTIC, or to serve projected visitor, employee, and resident populations in the Study Area.





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## **Increased Travel Demand Due to Planned and Programmed Study Area Development**

Substantial growth in Study Area population and employment is forecast due to planned high-density, mixed-use development in The Anaheim Resort and the Platinum Triangle. As previously noted, per the SCAG 2012 RTP forecast, population is expected to increase by approximately 62 percent from 2010 to 2035, and employment is projected to grow approximately 46 percent over the same period. This magnitude of growth will result in a substantial increase in local and inter-area travel demand. More than 500,000 daily vehicle trips are projected to be added to roadways within and bounding the Platinum Triangle and another 100,000 daily new vehicle trips are anticipated to be added in the vicinity of The Anaheim Resort. Today, the I-5 and SR-57 – the freeways bounding the Platinum Triangle – are subject to severe congestion. In 2035, arterials within the Study Area are forecast to operate at unacceptable levels of service, with traffic volumes at or exceeding roadway capacity.

With Study Area freeways and arterials already operating at unacceptable levels of service, the economic development and livability of the Study Area and its activity centers will be impaired by further increases in traffic congestion. Convenient, dependable, and attractive transit connections from the Anaheim Station/planned ARTIC to major Study Area destinations would increase transit mode share and accommodate increasing travel demand while minimizing the numbers of vehicles that would be added to an increasingly congested highway system. A new transit connection that serves ARTIC and major area attractions would substantially improve Study Area mobility, livability, and economic development potential.

## **Limited Availability of Flexible, Cost-Effective Parking**

In the Study Area, parking must serve high demand events and tourist seasons. During peak visitor seasons and when events occur at the same time the parking demand for the major attractions, such as the Disneyland Resort (including Disneyland, Disney California Adventure, and Downtown Disney), the Anaheim Convention Center, Angel Stadium, and Honda Center, becomes competitive as easily accessible and low cost parking is valued. Employee parking during these high demand periods also becomes difficult to manage given the increased value of available spaces.

To maximize circulation system efficiency, consideration should be given to the development of parking that is oriented to highly visible, frequent, and easy to use transit. These connections enable visitors and employees entering the area by car to park once in a location from which they can easily access any and all of the area's major venues. A system of parking locations that is recognizable and that uses a single fee and proof-of-payment document to enable users to board transit to access all of their Anaheim area destinations relatively seamlessly will address this primary travel demand segment. Eliminating auto trips between major area venues will reduce demand for local streets and arterials. It would also reduce parking demand, improve overall Study Area mobility, and reduce vehicular travel within the Study Area.

## **Lack of Visible, “User-Friendly” Transit Services for Residents, Employees, and Visitors**

Transit routes and schedules are not readily apparent to those who are unfamiliar with the local transit system, and the location of major activity centers and destinations. The Study Area is currently served



by multiple local providers with routes that are not highly visible or “user-friendly” for area visitors and first-time or infrequent riders, such as area residents and employees. There are no distinctly apparent transit corridors and stations/stops or fare payment mechanisms, and transit information is not readily available, recognizable, or self-guided. The ARC Fixed-Guideway project offers a unique opportunity to develop and market an easy-to-use, recognizable, and visible transit service that will accommodate a variety of transit markets.

### **Lack of Inter-Area Transit Connections for Employees**

Currently, commuters traveling to Anaheim via Metrolink do not have a direct connection to employment centers in the Study Area. All connecting travel requires a walk to a bus stop, and the bus service at that stop is slow, infrequent and unreliable. Conversely, residents currently living in the Study Area do not have a direct connection to the Anaheim Station/planned ARTIC. Future residents forecast to live in the Study Area will not have a direct connection to ARTIC for travel to jobs in other locations. Improving transit connections within the Study Area for employees who live outside the city limits would enable these workers to get to work, or make lunchtime trips, without a car.

### **Need to Serve the Future High-Speed Rail Market**

Implementation of high-speed rail service at ARTIC is forecast to generate a market of approximately 23,500<sup>1</sup> daily trips in each direction resulting in large numbers of people arriving at one time. Current transit service is incapable of effectively serving this future market. The Study Area needs an efficient transit system to seamlessly link the CHSR market with area activity centers and destinations.

### **Purpose and Need**

The purpose of the ARC transit project is to substantially increase transit ridership to, from, and within the five square mile Study Area containing ARTIC, the mixed-use Platinum Triangle development area, and The Anaheim Resort. The Study Area currently has approximately 51,600 jobs and 25,300 residents. By 2035, employment is expected to grow by 46 percent to approximately 75,100 jobs, while the number of residents is projected to grow by 62 percent to approximately 41,100 residents. The Study Area’s theme parks, major league sports facilities, and the Anaheim Convention Center attract approximately 20 million annual visitors from all over the U.S. and the world.

Less than two percent of trips made to and from the Study Area are currently made on transit. The ARC project will give residents, workers, and visitors an attractive “last mile” connection to ARTIC, now under construction, where they can easily transfer to and from Metrolink, Amtrak, local fixed-route bus, bus rapid transit, and future high-speed rail. (With ARC and planned increases in Metrolink, Amtrak, and bus service, ARTIC is expected to have approximately 19,000 daily boardings and alightings by 2035. This will rise to approximately 50,000 daily boardings and alightings when California High-Speed Rail arrives at ARTIC.) ARC will also improve transit service for short trips within the Study Area, allowing those who arrive by car to park once and circulate by transit. By offering an attractive new service that is convenient, frequent, and easy-to-navigate, ARC will attract additional riders to transit, support planned

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<sup>1</sup> Travel Demand Forecasting Results Report, August 2012.



growth, and enhance livability within the Study Area, the City of Anaheim, Orange County, and Southern California.

### ES.3 Alternatives Considered

During the AA efforts, possible transportation alternatives were identified and evaluated through a three-step screening process incorporating technical and environmental analysis, along with community and stakeholder input. The AA screening efforts were based on project goals identified by the Project Development Team<sup>2</sup> (PDT) and feedback received from the public and stakeholders during the initial project development phase. The following screening and evaluation process was used to identify the final set of alternatives:

- **Step 1: Preliminary Screening** – An initial set of nine technologies and 12 alignments was identified during the project initiation process.
- **Step 2: Secondary Screening** – Alternatives identified in the first study step were assessed based on a comparative evaluation of technical and environmental benefits and impacts along with additional stakeholder and public feedback. This evaluation step resulted in the identification of the proposed final set of alternatives, which included three “Build” (or provide a new transit system) alternatives and a No Build Alternative.
- **Step 3: Final Screening** – The final set of alternatives was refined and studied through conceptual-level engineering design, related technical and environmental analyses, along with additional community and stakeholder input, to identify a Locally Preferred Alternative.

#### ES.3.1 Final Set of Alternatives

The final set of alternatives is summarized below, and each of the Build alternatives is then presented in more detail. An overview of the engineering, technical analysis, and environmental assessment results is presented below and is documented in the AA report. The final set of alternatives included:

- **No Build** – A baseline alternative comprised of the planned and programmed Study Area improvements that are included in the financially-constrained project list of the OCTA *2010 Long Range Transportation Plan* and the SCAG *2012 RTP*, excluding the ARC project. The identified projects are anticipated to be implemented by 2035, but are subject to funding availability and completion of any required analytical documentation and related agency decision-making. The No Build option provided a comparative basis for the three build alternatives.
- **Enhanced Bus** – Enhanced bus service providing a similar level of service to that provided by a street-running fixed-guideway system. This alternative included branded, limited stop bus service with some dedicated bus lane operations and signal priority.

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<sup>2</sup> The PDT included agency representatives from the OCTA, the City of Anaheim, Caltrans, and Southern California Regional Rail Association (SCRRA).



- **Streetcar** – An at-grade rail system operating in a mixed-flow configuration primarily in the existing street right-of-way. This alternative included some signal priority to improve street-running operations.
- **Elevated Fixed-Guideway** – An elevated, automated system that operates on a fixed-guideway structure on columns, located primarily in the existing street right-of-way. This alternative would use one of the following automated technology options: rubber tire, low-speed magnetic levitation, or monorail.

### ES.3.1.1 Enhanced Bus Alternative

The Enhanced Bus Alternative includes the provision of new branded, limited stop bus service connecting ARTIC to the Platinum Triangle and The Anaheim Resort. The new bus service would generally run on existing streets in mixed-flow operations, with dedicated lane operations and signal priority, where possible to improve this option’s operational performance over existing fixed-route bus service, and provide a level of service similar to that of a street-running fixed-guideway system. This alternative would operate at-grade in several configurations: in dedicated lanes on Disney Way where sufficient roadway traffic capacity exists to dedicate a lane to bus operations, while maintaining the required level of service for traffic operations; and in mixed-flow traffic where future traffic service conditions would not allow for dedicated lane operations. Operational signal priority was evaluated to identify possible locations. Figure ES.5 illustrates the typical proposed cross-section for mixed-flow operations for this alternative.

**Figure ES.5 – Enhanced Bus Alternative: Typical Cross-Section**



Figure ES.6 – Enhanced Bus Alternative Alignment





Minor property acquisition (approximately 0.50 acres) would be required for the Enhanced Bus Alternative. Six partial takes are required adjacent to four of the stations identified below – Convention, Resort (at Disney Way), Haster, and Triangle (at State College Boulevard).

### Alignment and Stations

As shown in Figure ES.6, the Enhanced Bus Alternative alignment starts at the ARTIC facility and travels along the following streets to the Anaheim Convention Center: Katella Avenue, State College Boulevard, Gene Autry Way, across the I-5 Freeway to Haster Street (which is named Anaheim Boulevard north of Katella Avenue), Disney Way, Harbor Boulevard, and south to a terminus on Harbor Boulevard at Convention Way near the Anaheim Convention Center. Five proposed stops along this alignment would serve the Study Area’s activity centers: ARTIC, Triangle, Haster, Resort, and Convention.

**Table ES.1 – Summary of Enhanced Bus Alternative Service Characteristics**

| Characteristic           | Description  |
|--------------------------|--|
| Service Information      | 18 hour daily service span with 10 minute peak headways; possibly expanded to 24 hour service in the future. |
| Travel Time <sup>1</sup> | 20:16 (20 minutes and 16 seconds).   |
| Maintenance Facility     | Utilize existing OCTA bus maintenance facilities.  |

Note: <sup>1</sup> End-to-end, one way travel time

### ES.3.1.2 Streetcar Alternative

The Streetcar Alternative is a rail-borne technology that would use vehicles that are typically smaller than a Light Rail Transit (LRT) system. This alternative is proposed to operate at-grade on embedded steel rail tracks, typically operating in mixed traffic on existing city streets. In consideration of the streetscape and urban design goals adopted by the City of Anaheim as part of various specific plans for The Anaheim Resort and Platinum Triangle, the Streetcar Alternative under consideration will seek to minimize the use and visual obtrusiveness of overhead catenary wires to the extent possible. This may be achieved through the use of a ground-level power supply, on-board battery power to allow for catenary-free operation for some or all of the alignment, or the use of trolley wire rather than the more visually obtrusive multi-wire catenary systems that are typically used for LRT systems. Additionally, the vehicles under consideration would allow for a small turning radius that could be accommodated within the existing street right-of-way. Curbside, level boarding would comply with the American with Disabilities Act (ADA). Figure ES.7 presents a typical cross-section of a catenary-free streetcar operating within a shared curbside lane.

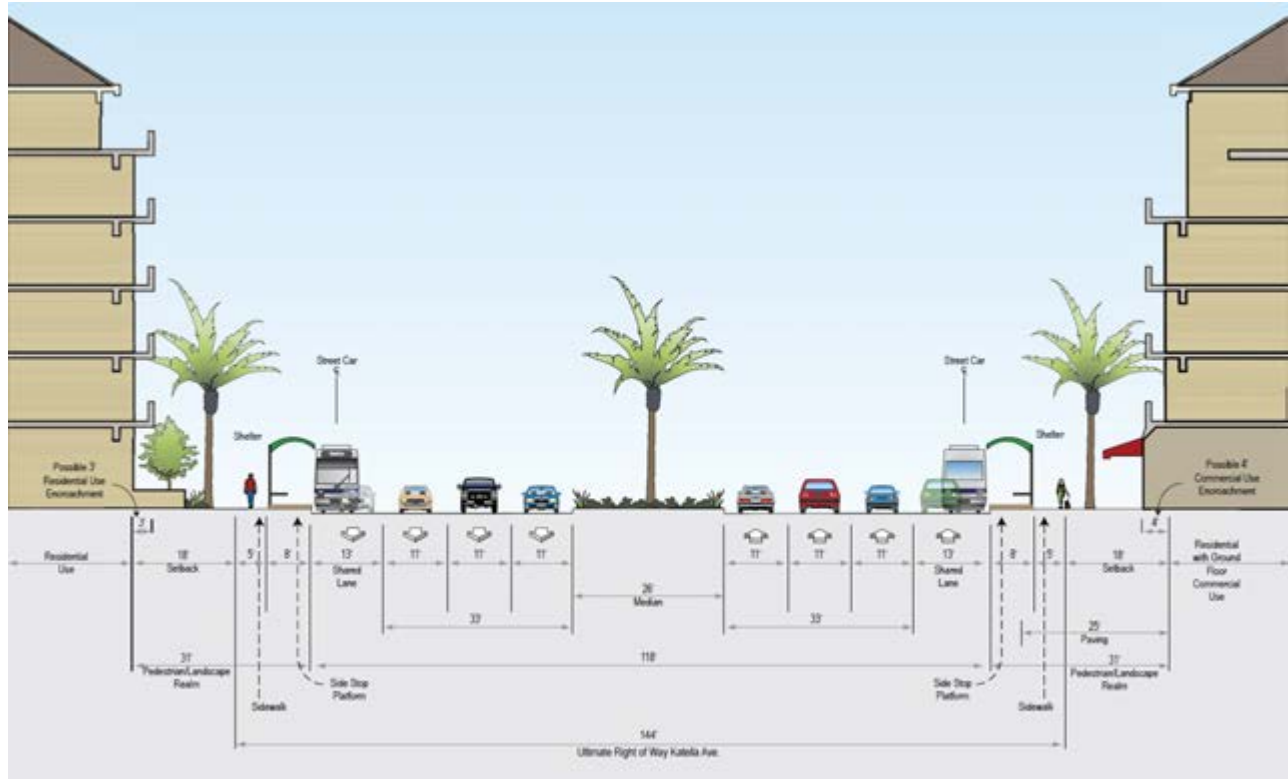
### Alignment and Stations

As illustrated in Figure ES.8, the Streetcar Alternative alignment starts at ARTIC in the surface parking lot north of Angel Stadium adjacent to the Metrolink/Amtrak platforms, travels west parallel to the Metrolink/Amtrak tracks, then between Katella Avenue and The City National Grove of Anaheim to



Katella Avenue, where it enters the street at a signalized intersection. The Streetcar would operate along the following streets to the Anaheim Convention Center: Katella Avenue, crossing under the I-5

**Figure ES.7 – Streetcar Alternative: Typical Cross-Section**



Freeway to Clementine Street, where the alignment turns north (Clementine Street becomes Manchester Avenue) to Alro Way, where it turns west towards Harbor Boulevard, then south on Harbor Boulevard to Convention Way, where a terminus station would be located west of Harbor Boulevard.

The alignment terminus at ARTIC could be extended eastward as a single-track alignment under the SR-57. However, this extension would remain in service only until the proposed CHSR project is implemented as the CHSR improvements would occur in this same area. This connecting alternative would primarily travel within the Angel Stadium parking lot, crossing under the SR-57 Freeway and over a lowered Douglass Road to City-owned right-of-way bounded by the SR-57 Freeway, OCTA/MetroLink railroad right-of-way, and the Santa Ana River.

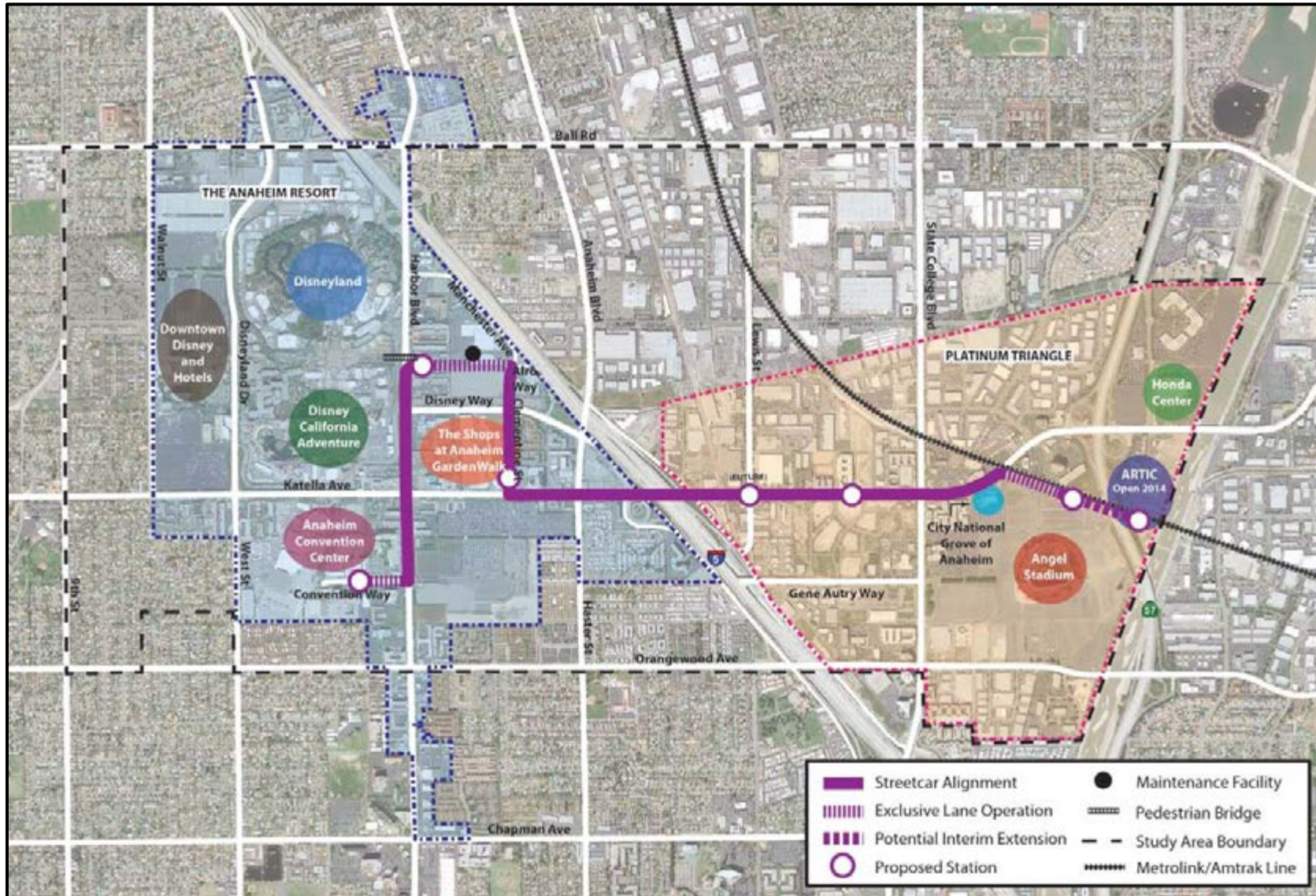
As illustrated in Figure ES.8, six proposed Streetcar stations would serve the Study Area's major activity centers:

- ARTIC – center platform station in the surface parking lot north of Angel Stadium and in close proximity to the Metrolink/Amtrak platforms. If the alignment were extended as a single-track eastward under the SR-57 Freeway, a station would be located east of the freeway on an interim basis until the CHSR project is implemented.
- Triangle – curbside station on Katella Avenue between State College Boulevard and Lewis Street.



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- Lewis (optional) – curbside station on Katella Avenue at the Lewis Street intersection.
  - Clementine – median station on Clementine Street just north of Katella Avenue.

Figure ES.8 – Streetcar Alternative Alignment







- Resort – center platform station on the east side of Harbor Boulevard opposite the main entrance of the Disneyland Resort theme parks (approximately 800 feet north of Disney Way). The station would incorporate many of the transit functions currently handled by the Disneyland Resort Transportation Center on the west side of Harbor Boulevard. Depending on the area available in the transit center and future system design information, the station will include bus bays for Anaheim Resort Transportation (ART) and OCTA, and possibly Los Angeles Metro Line 460, as well as taxi and passenger drop-off. This station would include a pedestrian bridge across Harbor Boulevard to connect the Resort station to the Disneyland and Disney’s California Adventure theme parks.
- Convention – center platform station on the south side of Convention Way west of Harbor Boulevard.

Minor acquisition (approximately 9.8 acres) would be required to provide station facilities and a transit center in the Resort station area, and an operations and maintenance facility in the area just west of the I-5 Freeway at approximately the northwest corner of the Manchester Avenue/Alro Way intersection. There would also be some acquisition along the street right-of-way in The Anaheim Resort, and on the south side of Katella Avenue between Clementine Street and Haster Street.

**Table ES.2 – Summary of Streetcar Alternative Service Characteristics**

| Characteristic           | Description   |
|--------------------------|---|
| Service Information      | 18 hour daily service span with 10 minute peak headways; possibly expanded to 24 hour service in the future.    |
| Travel Time <sup>1</sup> | 18:07 (18 minutes and 7 seconds).   |
| Maintenance Facility     | Proposed maintenance facility to be located at northwest corner of the Manchester Avenue/Alro Way intersection. |

Note: <sup>1</sup> End-to-end, one way travel time

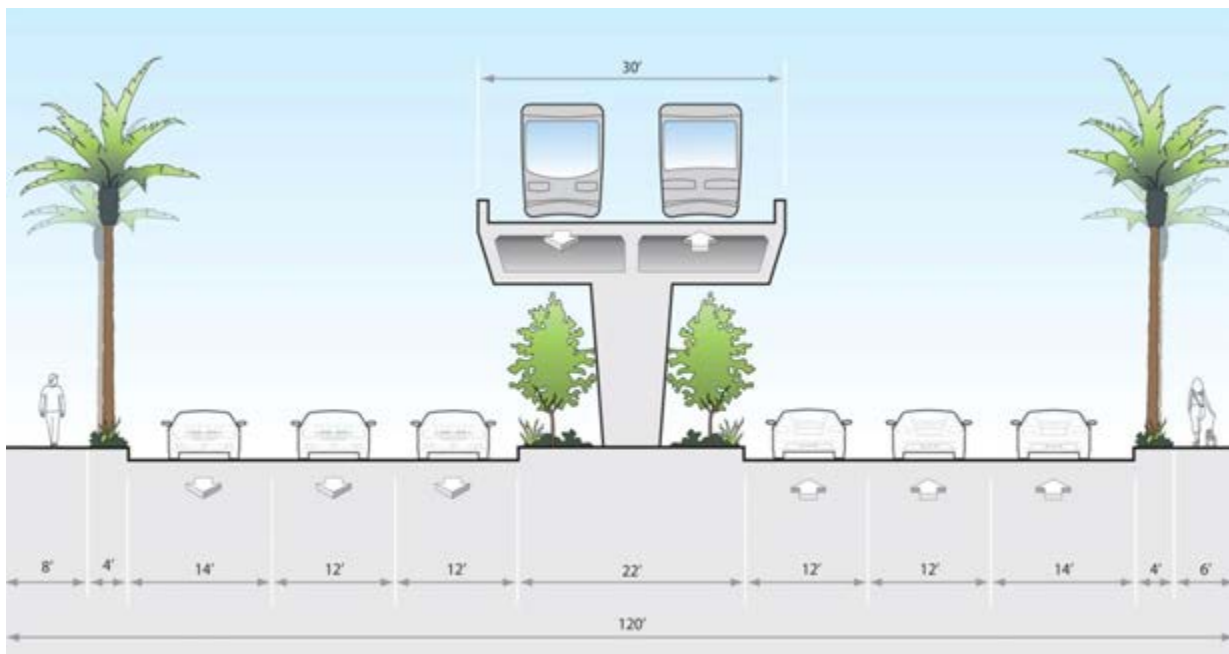
### ES.3.1.3 Elevated Fixed-Guideway Alternative

The Elevated Fixed-Guideway Alternative is a fully grade-separated alternative that would operate on a guideway structure on columns located primarily in the existing street right-of way using one of the following three automated technology options: rubber-tire, low-speed magnetic levitation (maglev), or monorail. This alternative would travel primarily on columns located within existing city street right-of-way, either in a side-running alignment or in the median, and the Angel Stadium surface parking area. The Elevated Fixed-Guideway Alternative would operate in an elevated structure ranging from 18 feet to 40 feet above street level depending on the station type and location. The aerial structure would be a minimum of 32 feet wide, but would widen near stations (with center platforms) and at switches or cross-over locations to a maximum width of 72 feet. Figure ES.9 shows typical cross sections for the Elevated Fixed-Guideway Alternative.

Property acquisition is required (approximately 16.0 acres) to accommodate the system structure adjacent to the I-5 Freeway and connecting west to Harbor Boulevard, to provide station and related

facilities in the Resort station area and for an operations and maintenance facility in the area located at the northwest corner of the Manchester Avenue/Alro Way intersection. For the alignment variation discussed below, acquisition of approximately 17.7 acres, of which 3.75 acres is owned by Caltrans, would be required to accommodate the maintenance facility and Disney Way portion of the alignment.

**Figure ES.9 – Elevated Fixed-Guideway Alternative: Typical Cross-Sections**





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## Alignment and Stations

As illustrated in Figure ES.10, the Elevated Fixed Guideway Alternative alignment starts north of Angel Stadium adjacent to the Anaheim Metrolink/Amtrak platforms, traverses the Angel Stadium parking lot, proceeds west across the intersection of State College Boulevard/Gene Autry Way, and then operates along the following streets to the Anaheim Convention Center: Gene Autry Way, Haster Street (which is named Anaheim Boulevard north of Katella Avenue), travels north on Haster Street, travels north parallel to the I-5 Freeway, turns west at the intersection of Manchester Avenue/Alro Way towards Harbor Boulevard, and runs south on Harbor Boulevard to a terminus station south of the intersection of Harbor Boulevard and Convention Way. A tail track extension would be located on Harbor Boulevard south from Convention Way to just north of West Orangewood Avenue to provide train layover space.

A proposed alignment variation would proceed north from the Anaheim Boulevard/Katella Avenue intersection, turn west on Disney Way, and run south on Harbor Boulevard. The Resort station would be located on Disney Way just east of Harbor Boulevard, and no transit center is proposed for this alignment option. The maintenance yard for this alternative would be located on a site west of the I-5 Freeway in the area bounded by the I-5, Anaheim Boulevard, and Katella Avenue.

As show in Figure ES.10, there are five proposed Elevated Fixed-Guideway stations:

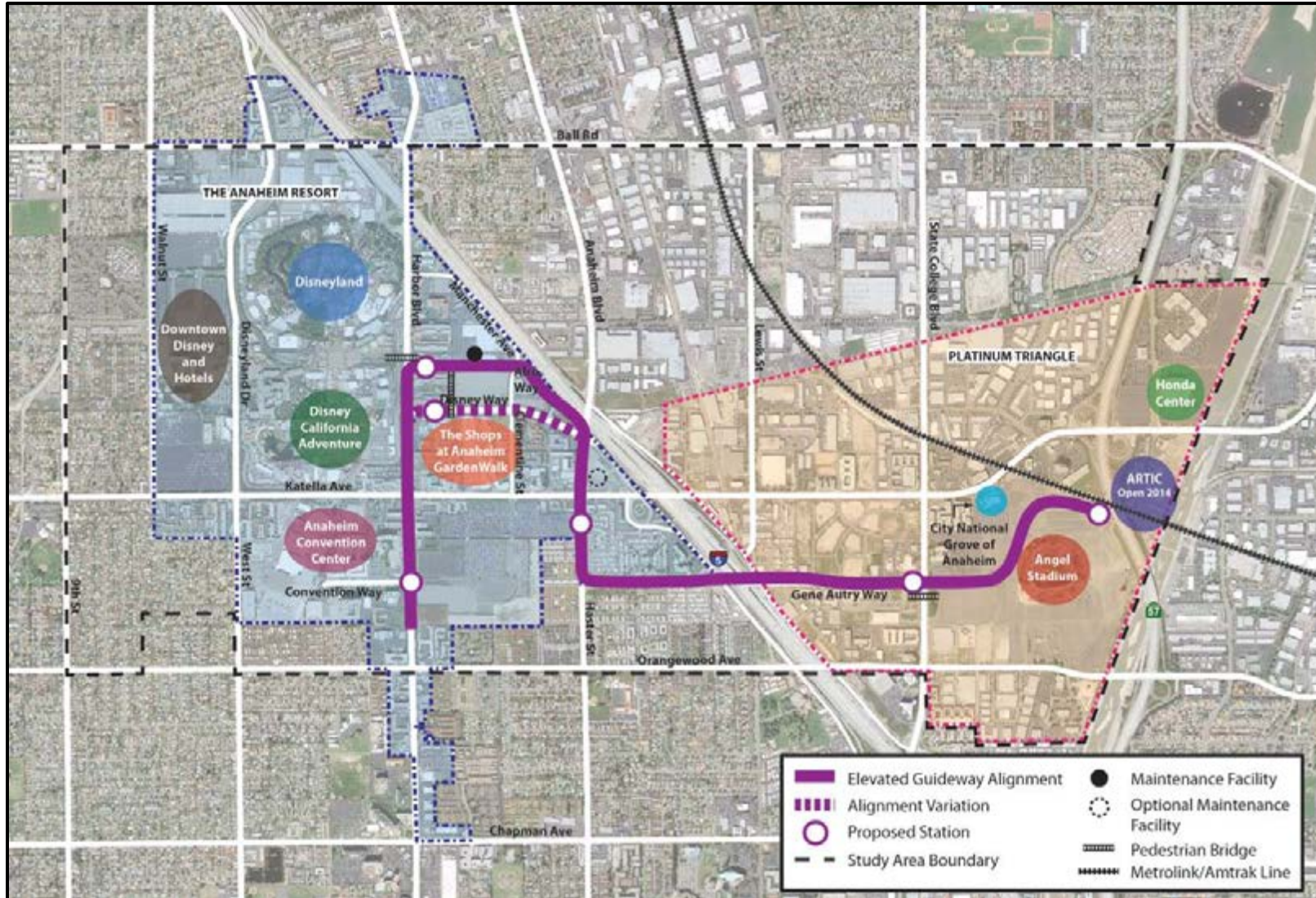
- ARTIC.
- Triangle – on Gene Autry Way west of the State College Boulevard intersection.
- Haster – on Haster Street between Katella Avenue and Gene Autry Way.
- Resort – on the east side of Harbor Boulevard opposite the main entrance of the Disneyland Resort theme parks (approximately 800 feet north of Disney Way). This station would incorporate many of the transit functions currently handled within the Disneyland Resort Transportation Center on the west side of Harbor Boulevard; depending on the area available within the transit center and future design information, the station will include bus bays for ART, OCTA, and possible Los Angeles Metro, bus service as well as taxi and passenger drop-off. This station includes a pedestrian walkway across Harbor Boulevard to connect the Resort station to the Disneyland and Disney's California Adventure theme parks.
- Convention – on Harbor Boulevard just south of the Convention Way intersection.

Grade-separated pedestrian access would be provided across roadways where the elevated stations are located in the street median. For example, the pedestrian connections across Harbor Boulevard at Convention Way are required to provide access to the elevated station in the median, and so are integral to the station design. The same case exists at Haster Street. The Triangle station, which is located in a median, has a grade-separated pedestrian connection across Gene Autry Way that is required to provide station access. Three pedestrian connectors linking stations to Study Area activity centers are also proposed for this alternative:

1. Triangle station across State College Boulevard east to Angel Stadium;
2. Resort station south across Disney Way to The Shops at Anaheim GardenWalk; and



Figure ES.10 – Elevated Fixed-Guideway Alternative Alignment





3. Resort station west across Harbor Boulevard to the Disney theme parks' entrance on the west side of Harbor Boulevard.

**Table ES.3 – Summary of Elevated Fixed-Guideway Service Characteristics**

| Characteristic           | Description  |
|--------------------------|--|
| Service Information      | 18 hour daily service span with 10 minute peak headways; possibly expanded to 24 hour service in the future.   |
| Travel Time <sup>1</sup> | 9:26 (9 minutes and 26 seconds).   |
| Maintenance facility     | Proposed maintenance facility to be located at the northwest corner of the Manchester Avenue/Alro Way intersection; or, for the alignment variation, west of the I-5 Freeway in an area bounded by the I-5 Freeway, Anaheim Boulevard, and Katella Avenue. |

Note: <sup>1</sup> End-to-end, one way travel time

## ES.4 Evaluation Results

Conceptual-level engineering and related technical analysis, including cost and ridership evaluations, and an environmental assessment, were used to provide a comparison of the final set of alternatives. The evaluation results were consolidated into the following four categories in order to provide a focused understanding of the benefits and impacts of each of the proposed project alternatives:

1. **Mobility Benefits and Impacts** – Assessing how the alternatives improve local and regional mobility, and travel reliability and safety for residents, workers, and visitors, while improving access to and from the Study Area's residential, employment, visitor destinations, and other activity centers.
2. **Environmental Effects** – Identifying the challenges to and benefits for the Study Area's natural and built environment with implementation of the proposed transit modes, alignments, and stations.
3. **Economic Development and Land Use Support** – Evaluating how the project alternatives support the City's economic development and land use goals and policies.
4. **Cost and Cost-Effectiveness** – Identifying what the alternatives will cost to build and operate, and which options maximize the cost-effective use of public funds and are financially feasible.

The resulting information is discussed below and summarized in Table ES.4 for consideration in identifying the Locally Preferred Alternative that best meets the project goals and the Study Area's mobility challenges.



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## Mobility Benefits and Impacts

Implementation of all of the transit system alternatives would result in improved Study Area and regional mobility to varying degrees. All of the alternatives would provide increased transit ridership and remove daily auto trips from the Study Area's street system. The differences in the resulting mobility benefits and impacts provided by each alternative are discussed below.

The grade-separated **Elevated Fixed-Guideway Alternative** would provide the fastest average speed and shortest end-to-end trip times, and attract the highest number of corridor linked transit trips, and project boardings. It would remove the highest number of daily auto trips from the Study Area's street system, and would have minimal impacts on the operations of the Study Area's highway system.

Of the two at-grade operating alternatives, the **Enhanced Bus Alternative** would have the highest number of impacts on the Study Area's highway system capacity and operations. It would have the lowest average speed, and would attract and serve the lowest number of corridor linked transit trips and project boardings.

The **Streetcar Alternative** would have minimal impacts on the Study Area's street system capacity and operations, and with a faster average speed than the Enhanced Bus Alternative due to higher number of possible signal priority treatments, result in higher corridor linked transit trips and daily project boardings. While the Elevated Fixed-Guideway Alternative was identified as having a higher level of project boardings, the Streetcar Alternative would attract and serve a larger base of internal trips with a significant share of ridership coming from Anaheim Resort guests. This alternative's ability to attract and serve a higher level of Anaheim Resort trips is primarily due to the Convention and Clementine stations being more pedestrian-friendly and better located to serve internal trips than similar stations identified for the other alternatives. It should be noted that a comparison of the total project boardings with the other alternatives is a bit misleading as the Streetcar Alternative has a shorter alignment (0.2 to 0.3 miles shorter), and when looking at project boardings per mile, the Streetcar Alternative provides strong ridership potential.

## Environmental Effects

An assessment of each alternative's ability to preserve and enhance the Study Area's natural and built environment was prepared and the results are summarized below. Given the urban, built out nature of the Study Area, the environmental benefits and challenges were related more to areas such as displacement, air quality emissions, visual, and noise impacts. The proposed project alternatives rank fairly closely with the Streetcar Alternative having fewer impacts than the other two project options.

- **The Enhanced Bus Alternative** was identified as providing a poor level of support for the Study Area's land use and economic development plans based on regional and national experience. This alternative would also have possible impacts related to noise and Environmental Justice groups, and would only result in minor reductions to air quality and greenhouse gas emissions. It would result in the highest level of impacts to Study Area pedestrian and vehicular safety. The





benefits of the Enhanced Bus Alternative were the lowest level of property acquisition and displacement requirements, and minor visual and aesthetic impacts.

- **The Streetcar Alternative** was identified as having no major environmental impacts. While it would have a higher level of property acquisition and related displacement than the Enhanced Bus Alternative, it should be understood that the bus option would be able to utilize an existing OCTA bus storage and maintenance facility reducing its property needs. Also, while the Streetcar Alternative would provide a lower level of reduction of pollution emissions than the Elevated Fixed-Guideway Alternative, implementation of this alternative would result in significant emission reductions over No Build conditions. Operation of the Streetcar Alternative would result in some impacts to pedestrian and vehicular safety. In addition, this alternative would provide strong support for the City's land use and economic development plans, and would have minimal noise, vibration, visual, aesthetic, and environmental justice impacts.
- **The Elevated Fixed-Guideway Alternative** would have the highest level of property acquisition needs and related displacement impacts, along with possibly major visual, aesthetic, and noise impacts due to its elevated guideway structure and stations. This alternative would provide the highest level of reduction in pollution emissions, and strong support for land use and economic development plans. It would have minimal impacts to pedestrian and vehicular safety, but may have some security impacts due to its elevated stations.

### **Economic Development and Land Use Support**

Based on national and regional experience, implementation of the **Streetcar and Elevated Fixed-Guideway Alternatives** would provide the strongest support for City land use and economic development policies and plans. National and regional experience has shown that the **Enhanced Bus Alternative** would provide minimal support for local land use and development plans. The at-grade **Streetcar Alternative** has a demonstrated ability to be easily integrated into pedestrian-oriented development as shown in Portland, and would provide a high level of support for mixed-use development. The Streetcar Alternative could provide strong future pedestrian connectivity with stations located on Study Area sidewalks, with new stations that could be easily added as needed to respond to future development patterns and needs. Pedestrian connectivity would be more challenging for the **Elevated Fixed-Guideway Alternative** due to the need for passengers to circulate via escalators and elevators to grade-separated stations. Adding future grade-separated stations to serve future development would be costly, but may be accommodated within future plans with developer-support.

### **Cost and Cost-Effectiveness**

Technical efforts identified the cost to build and operate the proposed alternatives, along with a cost-effectiveness analysis for each option. Transit projects that seek federal New Starts funding are evaluated in a number of categories, including cost-effectiveness. This is a measure of the hours saved by riders of the project compared to the annual cost to provide the service, and is based on a comparison of a proposed project's annual cost (combined annualized capital cost and annual operations and maintenance cost) to the annual hours saved by passengers using the project. The cost-



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effectiveness results are ranked by federally-established breakpoints. The cost-effectiveness information presented below is preliminary as FTA is in the process of revising their evaluation criteria and related ratings, especially how cost-effectiveness is identified and rated. The following cost and cost-effectiveness findings have been identified for each of the proposed project alternatives:

- **Enhanced Bus** – This alternative would have the lowest total and per mile capital cost. When evaluating cost-effectiveness, while the Enhanced Bus Alternative would perform well based on current and anticipated federal rating system for New Starts funding, this category of funding is not typically provided for enhanced bus service, but it could be funded through other federal funding sources. While this alternative has a low capital cost, the resulting forecast daily boardings show that the Enhanced Bus Alternative does not have the demonstrated attractiveness to encourage auto drivers to use transit to make Study Area trips, and may primarily serve existing bus riders better.
- **Streetcar** – This alternative would have the second lowest total and per mile capital cost. When evaluating cost-effectiveness for federal funding, the Streetcar Alternative will rate significantly higher under the anticipated revised New Starts criteria than under the former rating system. Federal funding has become increasingly supportive of this modal option, which has been shown to be successful in encouraging auto drivers to use and developers to build transit oriented projects. This alternative would provide a fixed-guideway system at less than half of the capital cost identified for the Elevated Fixed-Guideway Alternative, and is anticipated to have a cost-effectiveness rating that would allow it to compete well nationally for federal funding.
- **Elevated Fixed-Guideway** – This alternative would have the highest total and per mile capital cost due to the elevated guideway structure, stations, and maintenance facility, along with the highest level of property acquisition. From a cost-effectiveness perspective, the Fixed-Guideway Alternative would have major challenges competing for federal funding both under the former and anticipated rating systems.

## Conclusion

The Streetcar Alternative was recommended for consideration as the Locally Preferred Alternative based on the following:

- The Streetcar Alternative would have minimal impacts on the operation of the Study Area's highway system, and with implementation of signal priority treatments, would result in a strong corridor and project ridership performance. This alternative would attract and serve a larger base of internal trips, with a significant share of ridership coming from Anaheim Resort guests. Its ability to attract and serve a higher level of Anaheim Resort trips would allow this transit system option to best meet the identified project goals and purpose and need. Streetcar service has a demonstrated ability to attract and serve a wide variety of trips as demonstrated in cities such as Portland.
- The Streetcar Alternative was identified as having fewer environmental impacts than the other two proposed project options, and a higher level of total benefits. This alternative would have



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minimal noise, vibration, visual, aesthetic, and environmental justice impacts. It would provide a significant level of reduction in criteria pollution and greenhouse gas emissions over No Build conditions.

- Based on national and regional experience, implementation of the Streetcar Alternative would provide the strongest support for City land use and economic development policies and plans. The at-grade Streetcar Alternative has a demonstrated ability to be easily integrated into pedestrian-oriented development, and would provide a high level of support for mixed-use development. The Streetcar Alternative would provide strong future pedestrian connectivity with stations located on Study Area sidewalks. New stations could be easily added as needed to respond to future development patterns and needs.
- The Streetcar Alternative would have a capital cost that is within local funding parameters, and the operating and maintenance cost is at a level that possibly could be covered by identified local funding resources. Under the revised New Starts criteria, federal funding has become increasingly supportive of this modal option, which has been shown to be successful in encouraging auto drivers to use and developers to build transit oriented projects. This alternative would provide a fixed-guideway system at less than half of the capital cost identified for the Elevated Fixed-Guideway Alternative, and would have a cost-effectiveness rating that would allow it to compete well nationally for federal funding.

### **ES.5 Locally Preferred Alternative**

Text to be added following City Council selection of the LPA.





**Table ES.4 – Summary of Alternative Benefits and Impacts**

| Criteria   | Enhanced Bus | Streetcar | Elevated Fixed-Guideway |
|--|--------------|-----------|-------------------------|
| <b>Alignment Length (Miles)</b>  | 3.5          | 3.2       | 3.4                     |
| <b>Number of Stations</b>  | 5            | 6         | 5                       |
| <b>Average Speed (miles per hour)</b>  | 13           | 14        | 22                      |
| <b>Arterial Intersection Operation Impacts (Over No Build)</b>                   | 2            | 1         | 0                       |
| <b>Daily Trips Removed From Study Area Highway System (With CHSR)</b>            | 630          | 730       | 1,000                   |
| <b>Daily Auto Vehicle Miles Removed From Regional Highway System (With CHSR)</b> | 9,800        | 15,200    | 31,520                  |
| <b>Daily Project Boardings (2035, Daily Equivalent Before CHSR)</b>              | 3,200        | 4,200     | 5,300                   |
| <b>Daily Project Boardings (2035, Daily Equivalent After CHSR)</b>               | 6,300        | 7,700     | 10,800                  |
| <b>Daily Project Boardings Per Mile (2035, Daily Equivalent Before CHSR)</b>     | 914          | 1,312     | 1,559                   |
| <b>Daily Project Boardings Per Mile (2035, Daily Equivalent After CHSR)</b>      | 1,800        | 2,406     | 3,176                   |
| <b>Cost to Build (\$2012*, millions)</b>   | \$55.3       | \$318.7   | \$679.0                 |
| <b>Cost to Build Per Mile (\$2012*, millions)</b>                                | \$15.8       | \$99.7    | \$200.0                 |
| <b>Annual Cost to Operate (\$2012*, millions)</b>                                | \$2.6        | \$4.3     | \$10.0                  |

Sources: AECOM; RSG, Inc.

Notes: \* 2012 project costs escalated to year of expenditure

Shading indicates ridership information reflecting implementation of CHSR service