



Uptown Streetcar

Feasibility Study
May 2014



Kimley»Horn



EXECUTIVE SUMMARY

Why Streetcars? San Diego merits a well-balanced and multi-modal transportation system that supports the city's efforts to sustain and enhance the quality of life and to stimulate future economic growth in neighborhoods. This requires integrating land use and transportation by building transportation projects that enhance intermodal connectivity, livability, and community vitality. The City seeks infrastructure investments that reinforce vibrant neighborhoods, rebuild retail corridors, attract new jobs to the city, and promote sustainable development patterns. The Uptown Streetcar could be the first of many community transportation projects that meets these goals.

Objectives of this Study Based on input from the Project Development Team, public meetings, and previous studies prepared in the area, the following objectives were established for this feasibility study:

- Discuss the purpose and need for streetcars in the Uptown community;
- Provide information on general streetcar requirements;
- Evaluate pros and cons of different route alternatives;
- Recommend an alternative to be incorporated into the Community Plan Update;
- Estimate costs associated with building and maintaining streetcar infrastructure, facilities, and vehicles;
- Document opportunities for obtaining funding; and
- Define the next steps for implementation of the streetcar.





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STUDY AREA

While this study focuses on the Uptown community itself, it is important to note that connections further south beyond the community boundary provide the potential for access to existing rail line on C Street, access to the existing MTS maintenance and storage facility, and connections with the downtown community that could prove beneficial to the Uptown Streetcar. The study area also connects with other potential streetcar lines on University Avenue and Park Boulevard that have been previously evaluated.





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Evaluation Process Through the existing and planned transportation infrastructure, the Uptown community offers a variety of mobility options to both residents and visitors. To have a successful streetcar line, it is important to look at the street system as a whole and understand that changes to one mode of transportation can have strong effects on all other modes. The bus, vehicle, pedestrian, and bicycle traffic must be able to operate as efficiently and safely as it does currently when there is a streetcar system in place. Each potential route was considered for the following streetcar elements:

- Vehicle Aesthetics and Functionality
- Power Supply Aesthetics and Location
- Station Locations and Interface with Streetcar Vehicle
- Track Location and Interface with Streetcar Vehicle
- Roadway Cross-section with a Streetcar
- Topography of the Route
- Utility Conflicts
- Interactions with Automobiles, Buses, Bicycles, and Pedestrians
- Intersection Control
- Parking Interactions and Losses
- End-of-Line Maneuvers
- Ability to Expand to Additional Phases
- Storage and Maintenance Facility Options

Evaluation Findings Streetcar routes consistent with the historic network and places of interests identified in the community were grouped into three phases for evaluation in this study. Each route was evaluated using how well different elements of a streetcar can be implemented into the existing and planned infrastructure.





PHASE 1: NORTH-SOUTH CONNECTION

- Fourth and Fifth Avenue couplet
(northbound on Fifth Avenue and southbound on Fourth Avenue)
- Fifth and Sixth Avenue couplet
(northbound on Fifth Avenue and southbound on Sixth Avenue)
- Sixth Avenue only
(northbound and southbound on Sixth Avenue)

The “**Fourth and Fifth Avenue Couplet**” alignment provides the most potential for economic development, providing routes along two of the major commercial roadways in the Uptown community that have potential for higher density. **It is the recommended option for a north-south alignment.** Extending the line further north to Washington Street adds another block of potential economic development and associated funding opportunities, including potentially tapping into the adjacent Medical Complex area. It also creates a less constrained end-of-line treatment. As a result, it is recommended to extend the alignment to Washington Street to maximize funding opportunities.



Northern End of Recommended North-South Alignment on Fourth and Fifth Avenues





The “**Fifth and Sixth Avenue Couplet**” alignment provides a combination of economic development opportunities and exposure to Balboa Park. It would provide access through the community and have potential to easily expand on University Avenue. It is a strong option for a north-south alignment.

With the purpose of the streetcar being to spur economic development, the “**Sixth Avenue Only**” alignment stands out as providing the least amount of potential for meeting this purpose. With residential units on one side of the street and Balboa Park on the other, there would be little room for economic development along the streetcar line.

PHASE 2: EAST-WEST CONNECTION

- University Avenue (eastbound and westbound on University Avenue)
- ~~Robinson Avenue (eastbound and westbound on Robinson Avenue)~~

During the public input process and through discussions with the PDT, it was determined that the Robinson Avenue alignment would not be a valuable alternative to carry further.

The University Avenue alignment is feasible to implement, even with other planned roadway improvements, and the addition of Phase 2 would be advantageous in continuing to spur economic development opportunities and providing greater connectivity through the Uptown community. **It is recommended to implement Phase 2 of the streetcar network when financially feasible. As part of that recommendation, it is recommended to have the eastern end of the route terminate at Normal Street, and not to extend to Park Boulevard at this time.**



Eastern end of Recommended East-West Alignment on University Avenue





PHASE 3: PARK BOULEVARD CONNECTION

- Park Boulevard (northbound and southbound on Park Boulevard, from University Avenue to Zoo Place)

The addition of Phase 3 would not provide many economic development opportunities and would primarily be used to connect with Balboa Park. The Park Boulevard alignment is feasible to implement, but comes with some safety concerns or need for additional right-of-way. **It is not recommended that Phase 3 be implemented as part of the Uptown streetcar efforts.**

Vehicle Types There are several types of streetcar vehicles that could be for service:

- Historic vehicles are aesthetically appealing and provide the community with a sense of its historic nostalgia. Community input showed that if all vehicles were made equally, historical vehicles would be preferred. However, the constraints of a historic vehicle (one-directional operations) can limit the alignment and station options.
- Replica vehicles are capable of two-directional operations with features that remind users of historical vehicles. These vehicles are relatively new to the industry but are being used in other cities and outreach to those operators could provide insight on their maintenance requirements. Replica vehicles are smaller than modern vehicles and can navigate turns with a sharper radius.
- Modern vehicles are larger, two-directional vehicles. Due to their size, they require additional room for turns but also provide additional capacity for ridership. The existing San Diego LRT system uses modern vehicles.

For ultimate flexibility in determining the alignment of the tracks and station locations use, **it is recommended that a bi-directional (double-sided, double-ended) vehicle be used.** If the ultimate track alignment provides a loop system, historic vehicles could be used on special occasions. **It is recommended that modern cars be used to provide**





easier integration with the existing system and flexibility for future expansion. The streetcars can have a vehicle design scheme that separates its identity from the existing trolley cars and can provide a historical feel of a streetcar but utilize modern technologies. The decision on which modern vehicle would ultimately depend on the operator of the system (yet to be determined).

Storage and Maintenance Facility Having a storage and maintenance facility along the streetcar route is required to be able to provide service. Identifying the location of this facility is critical to getting the streetcar implemented. MTS has a storage and maintenance facility for their LRT vehicle fleet near the intersection of 12th and Imperial Avenues that could be accessed from the Phase 1 alignments via C Street in downtown. However, MTS has expressed capacity concerns with both C Street rail and the storage and maintenance facility as they are heavily used by the LRT system and further expansion is planned. Use of the existing storage and maintenance facility may be possible via a different route through downtown and additional capacity upgrades at the facility itself. Another possibility is the use of the existing City of San Diego Central Operations Station at the intersection of B Street and 20th Street. Use of this facility would require a connection to downtown.

Should a connection to downtown not be provided (access to the existing MTS storage and maintenance facility, specifically), a new maintenance and storage facility would need to be constructed within the Uptown Community along the streetcar route. This would require finding a site large enough to house a facility and providing the upfront costs to construct the facility. A benefit of pursuing a new facility within Uptown is that it would alleviate the need for crossing Interstate 5 and the associated cost of bridge improvements. However, finding a location within the Uptown community to develop a new streetcar storage and maintenance facility may be difficult, and most likely will require combination with another development or creative adaption to existing space, such as:

- Utilizing future redevelopment opportunities to create a mixed-use development that houses the storage and maintenance facility; or
- Use existing parking areas to create a shared parking and streetcar facility structure.





Capital Cost Estimates The total combined capital costs for Phase 1 of the project (3.6 miles of track) are estimated to be about **\$130 million**. The estimate does not include any costs for modifications or replacement of the bridges over Interstate 5, or costs associated to acquire, design or build a new vehicle maintenance and storage yard. Based on previous studies, this cost could be an additional **\$40 – 50 million** regardless of the way forward (either two bridge modifications or a new facility).

The total combined capital costs for Phase 2 of the project (0.74 miles of roadway, 1.48 miles of track) are estimated to be about **\$40 million**. The estimate does not include any costs for modifications or replacement of the bridges over State Route 163. Based on previous studies, this cost of the bridge crossing could be an additional **\$15 – 20 million**.

Operation and Maintenance Cost Estimates The resulting annual operation and maintenance costs for both phases of the project is estimated as **\$3.4 million for Phase 1** with **an increase of \$1.1 million after the addition of Phase 2** using cost data in current (2014) dollars.

Next Steps The next steps include determining the means to pay for the construction and operation of the streetcar and completion of the planning and phasing of the entire streetcar system vision for the City, specifically connection between Uptown and downtown. Once these critical efforts are completed, the City can advance into conceptual engineering, which provides detailed engineering designs and refined cost estimates. After this step the environmental documents will be completed along with an extensive public outreach effort. Final design and construction will follow.

Implementing the Uptown Streetcar project over the next five to ten years requires the following tasks:





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- **Planning & Phasing:** This next step will advance the conceptual planning work that has been completed in this report and would lead into and support the conceptual engineering and environmental document preparation. This could be focused on just the segments addressed in this study and completing the missing pieces of information, such as storage and maintenance facility locations and connections to downtown. Ideally, it requires a comprehensive overview of the streetcar system for the City of San Diego and the supporting facilities. As part of that system-wide study, each streetcar line should be planned to ensure that it is fully integrated into the existing urban fabric and supports the multi-modal objectives of the corridor, and that they are coordinated with the other streetcar corridors as proposed in the 2050 RTP.
- **Action:** Complete a study of the entire streetcar system vision for the City of San Diego. Determine the alignments with the highest potential of integration and location of supporting facilities (storage, maintenance, power).
 - **Timing:** Complete this in 2015
- **Funding Analysis:** SANDAG indicates it would support up to ten percent of the streetcar project cost, therefore the City must fully explore all other funding options to secure the remaining 90 percent. The City should conduct an analysis of project funding by evaluating the likelihood of winning FTA support, and researching the local real estate market to estimate the potential economic impacts and potential revenue generation of the streetcar system. The strategy and analysis will involve industry experts in the areas of public-private partnerships and joint development, real estate investment, economic and market feasibility, and assessment and fee-based funding strategies. It will also need to discuss that the ten percent from SANDAG would require board approval and how to approach obtaining those funds.
- **Action 1:** Prepare a funding feasibility analysis to determine the feasibility of obtaining adequate funding for the corridors with the highest potential of integration. Evaluate federal v. non-federal funding opportunities, and





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specific route funding opportunities using land use policies as a metric for redevelopment and new development opportunities.

- **Action 2:** Prepare a financing strategy that converts the findings of the funding feasibility study to specific actions that need to be taken to secure funding.
 - **Timing:** Complete this in 2015 once the planning and phasing study is completed
- **Conceptual Engineering:** The City should begin conceptual engineering for the streetcar system once the planning and funding analysis are completed and a way forward has been determined. This task will support the environmental document preparation and include an updated capital cost estimate for the project. The City can decide on the delivery method (design-bid-build or others). Traffic studies should be completed to evaluate the impacts to the operations in the corridor. Conceptual design for the streetcar will define in more detail the routing, stations, site designs, and related infrastructure, including potential access to the determined storage and maintenance facility as it relates to serving the streetcar operations.
- **Action:** Complete conceptual engineering of the streetcar system.
 - **Timing:** Complete this in 2016-2017 once the planning and funding tasks are completed.
- **Environmental Document Preparation:** The environmental document preparation step could include both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) document preparation and clearances. NEPA would only be required if federal funds were included in the project. Environmental analysis to support the environmental document and preparation will include all technical studies, including modeled ridership forecasts.
- **Public Outreach:** As part of and during the environmental document preparation, a comprehensive public outreach program will be undertaken to obtain stakeholder and community input and concurrence during development of the modern streetcar.





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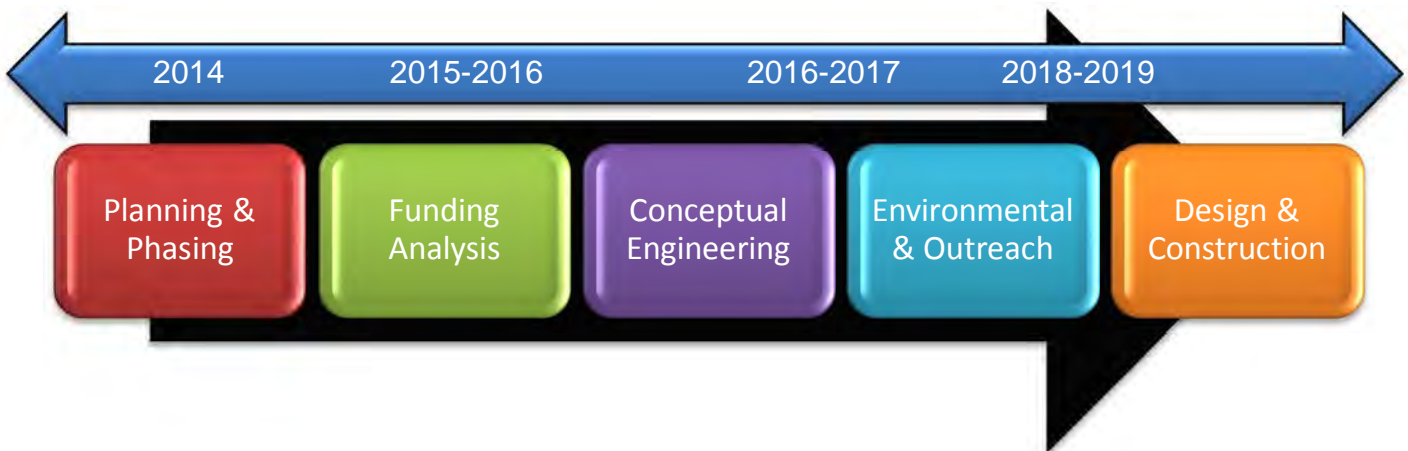
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The input will be used to guide the project definition, address potential project impacts, and assess the feasibility of local funding strategies.

- **Action:** Complete the environmental documents and public outreach for the streetcar system.
- **Timing:** Complete this in 2018-2019 once the conceptual engineering is completed.

→ **Design and Construction:** Once the environmental analyses are completed the next steps would include completing the final design of the project and advancing it into bid and construction. The delivery methods selected by the City will drive the timing, but it will require a minimum of two or more years to complete the task. This includes delivery of the selected streetcar vehicles and testing the system.

- **Action:** Complete the design for the streetcar system. Obtain bids for construction. Award the construction contract and monitor the completion of the project.
- **Timing:** Begin design in 2020 once the environmental documents are completed. Construction would occur approximately one to two years after design is completed.



Timeline of Next Steps to Implementing the Uptown Streetcar System





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1 | INTRODUCTION

Streetcars are a unique mode of transit that historically has been integrated into communities to spur economic development and complement other modes of travel. Lately there has been resurgence in interest for streetcars across the United States. In many areas, streetcar systems have proven effective not just as mobility solutions, but also as investment-generating infrastructure that can catalyze urban economic revitalization. The City of San Diego and the Uptown Community are pursuing the feasibility of a streetcar line to increase and expand economic development throughout the Uptown Community. This feasibility study documents opportunities and constraints of integrating a streetcar system into the Uptown community and provides operating and implementation plan information to assist future decisions on the topic.

Streetcar:



Portland Modern Streetcar



San Francisco Historic Streetcar

Designed for short-distance trips with station spacing every few blocks or every quarter-mile on average. Examples include the Portland Modern Streetcar, Seattle Streetcar, and San Francisco Historic Streetcar.

- Electric-powered rail vehicles.
- Typical speed: speeds up to the speed limit of the street they operate on, generally averaging 12 mph (with stops).
- Designed for dense urban areas, such as downtown areas.
- Integrates well with street traffic, signals, and pedestrians.
- Operates either in mixed-traffic with automobiles or on a dedicated right-of-way.
- Typical passenger capacity: up to 100 seated and standees per car (vehicles generally provide few seats due to short distance nature of trips). Operate as single vehicles.
- Typical length of line: 2-6 miles.

Source: SANDAG 2050 Regional Transportation Plan





DOCUMENT ORGANIZATION

This study is organized as follows:

Chapter 1 of this study, **Introduction**, provides context as to why this study was performed and who was involved in the process.

Chapter 2, Why Streetcar in Uptown, provides information on the Uptown community and the opportunities and constraints that implementing a streetcar would have.

Chapter 3, Streetcar System Requirements, provides general streetcar requirement information and a “tool box” of applications.

Chapters 4, 5, and 6 each provide specific information on the three potential phases of the project.

Chapter 7, Operations and Costs, provides information on operating and maintenance costs.

Chapter 8, Next Steps, provides a road map of what the next steps would be to further pursue a streetcar system.





STUDY PURPOSE

Streetcars are seen by communities, residents, and visitors as a permanent investment that attract new development and improve the character and liveliness of local neighborhoods. By combining the comfort of rail with street level aesthetic appeal, streetcars have the distinct ability to enhance a community. They are designed for short trips with stations placed every few blocks; primarily functioning as urban circulators and pedestrian accelerators. The typical streetcar trip is not the commute to work but rather off peak trips for social activities, shopping, and tourism.

From a mobility perspective, adding a streetcar line to an existing transit network allows for a diverse set of transportation choices; giving citizens the ability to live, work, and play without relying solely on the automobile.

From an economic perspective, a streetcar system in the Uptown community can add value to adjoining properties by encouraging a dense pedestrian environment, connecting adjacent communities, and creating a sense of place and character, extending the benefits of a streetcar system beyond solely transportation.

THE ECONOMIC DEVELOPMENT OPPORTUNITIES ASSOCIATED WITH DEVELOPING A STREETCAR SYSTEM IS THE PRIMARY PURPOSE OF PURSUING STREETCAR IN UPTOWN.

With the large investment necessary upfront to build streetcar infrastructure and facilities and a continued financial need to maintain and operate the network, it is important to understand and evaluate the engineering and financial needs of streetcar systems before pursuing implementation.

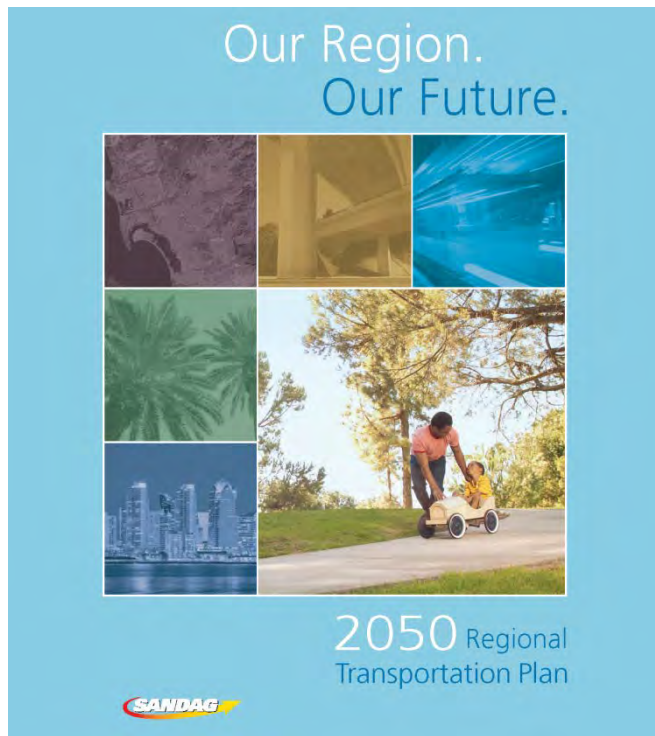




STUDY SPONSORSHIP AND SUPPORT

Seen as a hot spot for commercial activity and economic expansion, the Uptown Community has been identified by the City of San Diego as a desirable area for a streetcar line. In partnership with the City of San Diego, the Uptown Community Parking District (UCPD) has funded this study to better inform the residents and city officials on the recommended route, design considerations, financial feasibility, and the next-steps in the implementation of a streetcar line in Uptown.

The Uptown (“Hillcrest/Balboa Park/downtown”) streetcar loop was included in the 2050 Regional Transportation Plan (2050 RTP) prepared by the San Diego Association of Governments (SANDAG). The 2050 RTP showed lines from downtown to University Avenue and across to Park Avenue, through the historic “streetcar suburbs” of the Uptown



community. This alignment is just one segment of an urban streetcar network planned in the 2050 RTP which calls for several future streetcar lines in San Diego. While the streetcar network is included in the 2050 RTP, it is noted that 90 percent of funding would need to be provided by others. This could include federal grants, local agencies and public/private partnerships. It should be noted that it would require board approval to acquire the 10 percent of funding from SANDAG.



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Within the UCPD's 2014 Annual Plan, the district agreed to support the San Diego Trolley/streetcar extension between Center City and Hillcrest via Bankers Hill including partial funding of the streetcar study as part of the Uptown Community Plan Update to promote alternative forms of transportation and reduce parking demand. Thus, in concurrence with the Uptown Community Plan Update and as part of the City's initiative to provide a tool for economic redevelopment, the 2050 RTP-identified loop has been advanced to this initial planning level study due to strong interest from the Uptown Community residents and business and parking districts.

The City of San Diego has worked closely with SANDAG, San Diego's Metropolitan Transit System (MTS), and other key stakeholders and local residents through the preparation of this study to ensure that the Uptown streetcar line would be complimentary to the current and future community plans. To monitor the progress of the study, solicit feedback, and address key issues a Project Development Team (PDT) was created for this study. The PDT was comprised of key contributors from the City of San Diego, UCPD, SANDAG, MTS, and Kimley-Horn.

The PDT meetings were useful in identifying challenges and constraints from previous studies and outreach efforts, understanding and supporting planned improvements from each agency, and helping shape how the streetcar could integrate into the network with the other demands on the roadways. Each of the agency representatives in the PDT provided information on near-term and long-term plans that may be affected by streetcar. Adding streetcar systems are intended to enhance the available transit, pedestrian, and bicycle systems and not be a hindrance to the other modes. Coordinating plans for various modes of travel in the community is an important aspect of streetcar planning. Representatives

The Uptown Community Parking District is a corporation that coordinates and resolves parking and traffic related issues within the Uptown Community with the goal of enhancing the quality of life in the Uptown neighborhoods. The UCPD is made up of elected directors of both Uptown residents and business owners.

Each year, the UCPD publishes an overall program concept plan that addresses parking inventory/supply, uniformity of parking allocation, traffic circulation, public information, public transit and comprehensive system management.





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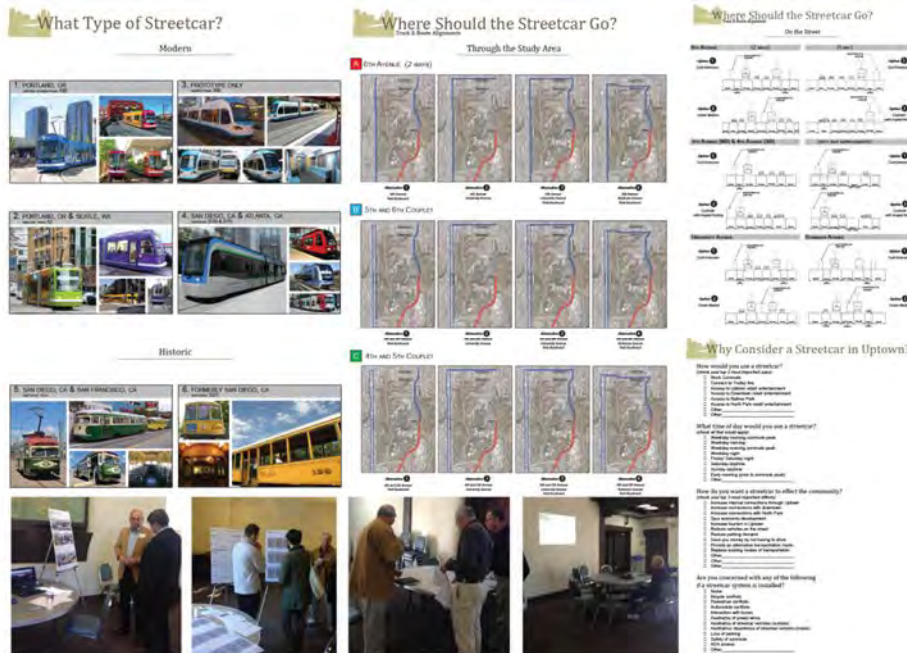
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from the UCPD provided valuable input on the vision and need for this streetcar study and how it plays a role in the Uptown neighborhoods.

In addition to the PDT meetings, three public workshops were held to solicit feedback on the vehicle type, route alignment, and station locations. The workshops were used to orient the public to the study area and characteristics of streetcars to generate ideas on the purpose and need of the streetcar and its potential effects on the Uptown Community. The workshops gave the public a chance to express their opinions on the streetcar as it related to vehicle type, route and track alignment, and station locations. Details on the public workshops are provided in **Appendix A**.

PROJECT DEVELOPMENT TEAM

- ❖ City of San Diego
- ❖ Uptown Parking District
- ❖ San Diego Metropolitan Transit System
- ❖ San Diego Association of Governments (SANDAG)
- ❖ Kimley-Horn and Associates





STUDY OBJECTIVES

Based on input from the PDT, public meetings, and previous studies prepared in the area, the following objectives were established for this feasibility study:

- Discuss the purpose and need for streetcars in the Uptown community;
- Provide information on general streetcar requirements;
- Evaluate pros and cons of different route alternatives;
- Recommend an alternative to be incorporated into the Community Plan Update;
- Estimate costs associated with building and maintaining streetcar infrastructure, facilities, and vehicles;
- Document opportunities for obtaining funding; and
- Define the next steps for implementation of the streetcar.





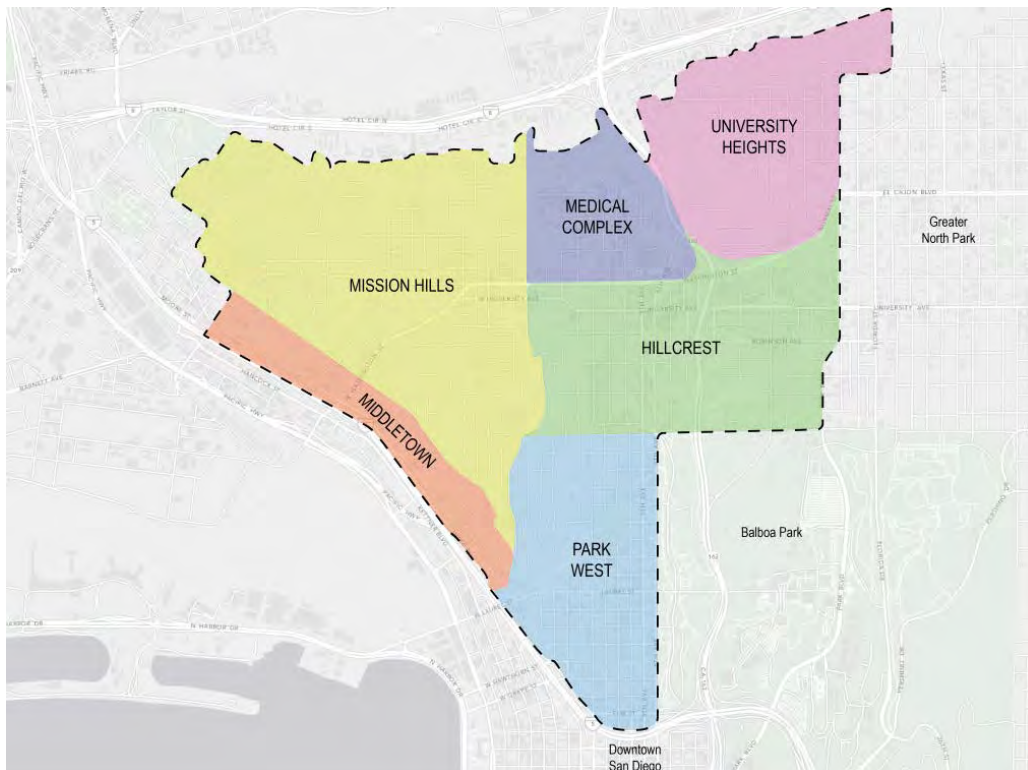
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2 | WHY STREETCAR IN UPTOWN

The Uptown community is located just north of the Downtown area; bounded by the hills of Mission Valley on the north, Park Boulevard and Balboa Park on the east and Interstate 5 on the west and south. The Uptown community is located within a series of canyons and borders Presidio and Balboa Parks, giving the community a unique feel compared to the downtown and beachfront areas. Within the community are six subareas that house some of the oldest neighborhoods in San Diego.

Within the Uptown community is a combination of neighborhood-oriented retail and region-wide areas of interest. Adjacent to the community are several other areas of region-wide interest, such as Balboa Park, downtown and Greater North Park.



Revealed in the public workshops, Uptown community residents are looking for a transportation mode to generate income, promote more active forms of transportation to





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help reduce parking and vehicle congestion, and provide connections throughout the community and to adjacent communities. The streetcar is viewed by the public as a way to attract tourists into the community by providing additional connectivity to and from Balboa Park and Downtown, specifically, as well as other future connections. Residents also view the streetcar as a way to contribute to the transformation of Uptown into a community where people can get around without an automobile. By effectively incorporating the streetcar into the existing transit system, connections to Uptown can be further strengthened between entertainment areas around the community and in adjacent communities, providing new income opportunities and exposure to tourism.

As the community looks towards future investments in their roadways to support various modes of transportation, streetcar presents a unique opportunity to preserve Uptown's historic qualities while adding onto the multimodal options that keep the community connected. The community voiced concerns with conflicts between different investments, specifically between proposed bicycle improvements and the streetcar. As a result, the feasibility of the streetcar system accounted for planned improvements in the area to determine potential conflicts and interactions between modes. Using other cities as examples and looking at the specific plans in Uptown, it was determined that both streetcar and bicycle facilities could be implemented as planned, sharing the same street, as long as appropriate design was prepared to allow safe interactions and crossings.

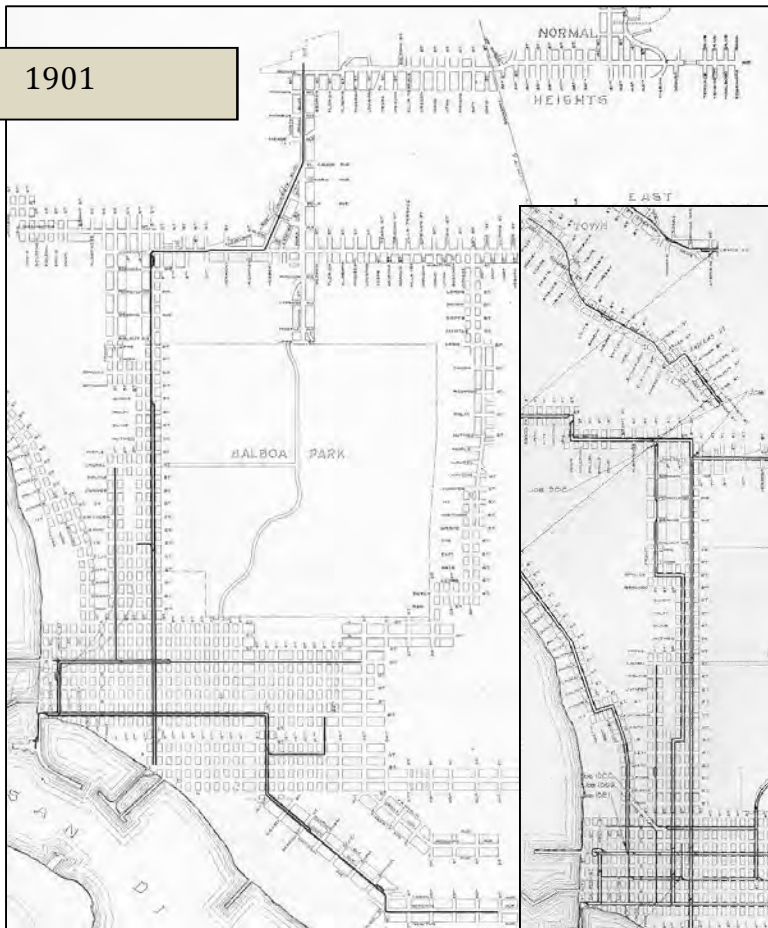




HISTORY OF STREETCARS IN SAN DIEGO

The San Diego suburbs, specifically the Uptown community, have a rich past with streetcars. Early in the 20th century an extensive streetcar system existed in San Diego. The San Diego Electric Railway Company had expanded service to encompass most of San Diego; extending as far north as Old Town, as far west as the beach communities, and as far east as Normal Heights. At the center of this streetcar network was the Uptown community, with streetcar service along Fifth, Fourth, and Third Avenues, University Avenue, Washington Street, and Park Boulevard.

1901



1918



Source: San Diego Historic Streetcars
 San Diego Electric Railway Co. Employee
 E.A. McRoy





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When streetcar systems were first implemented in the early 20th century, they were planned, funded, built and operated by developers wanting to attract residents and businesses to their subdivisions located outside of walking distance from downtown. As real estate in downtown San Diego continued to increase in value, investors and retailers looked towards the suburbs to develop on cheaper lands. However, the further the suburbs expanded the more difficult access to downtown became. Correspondingly, the development of San Diego's suburban communities was directly proportional to their accessibility to the San Diego Electric Railway system.

The streetcars were seen as an investment and means for growth and redevelopment. Written in response to the opening day of the San Diego Cable Railway a San Diego Union writer wrote;

“... an enterprise that would be permanent and one that would rebound to the benefit of the entire city and do much to spread its fame abroad. It is a magnificent piece of work and has cost an immense sum of money.”

Source: The Journal of San Diego History. Spring 1969, Volume 15, Number 2

The expansive rail network connected suburban areas to downtown, making the daily commute to work for passengers easy and efficient. Additionally, streetcar companies and other business owners developed historic, natural scenic and amusement park attractions near stations promoting off-peak and weekend trips. Advertising was used to promote the pleasures of riding the streetcar out to the beaches and other activity-filled and attractive destinations.

The San Diego streetcars also played an important role in the 1915 and 1916 Panama-California Exposition held in Balboa Park. The San Diego Electric Railway company introduced their Class I and Class II at the exposition carrying thousands of visitors and workers to and from the park. The Fifth and Fourth Avenues lines dropped riders at Laurel Street where they could walk or rent electric-powered “golf carts” to travel into Balboa Park. There was even a “Park Line” established specifically for the occasion to take people





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along Laurel Street between Fourth and Fifth Avenues and the eastern terminus of Laurel Street in the heart of Balboa Park.

Streetcars played an important role in the growth of San Diego and the Uptown community. However, as suburban development sprawled further and the automobile industry became more popular, the widespread rail system including tracks, depots, and car barns were all destroyed, sold, or paved over. The last streetcar route in San Diego was replaced by buses around 1949.





UPTOWN AREAS & PLACES OF INTEREST

Within the Uptown Community there are many neighborhood-oriented commercial areas as well as larger service, medical, entertainment, and recreation areas that attract both residents and visitors. This section describes each of the subareas of Uptown and notable places of interest. Each area of the Uptown community has different characteristics that were considered in evaluating the streetcar alignment.

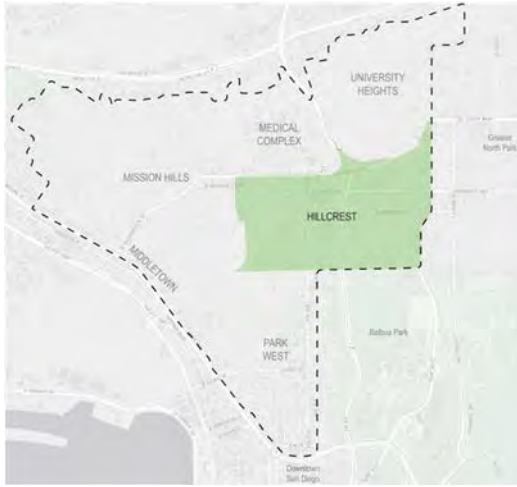
- The Uptown Community includes:**
- **Mission Hills**
 - **Middletown**
 - **Hillcrest**
 - **The Medical Complex**
 - **University Heights**
 - **Park West**



PARK WEST / BANKER'S HILL

Park West / Banker's Hill is located in the southwestern portion of the Uptown community and a major gateway to Balboa Park via Laurel Street and connections to Downtown. This neighborhood covers a large footprint, occupying the area from I-5 north to Upas Street, between Balboa Park and Reynard Way. It is over a mile length north-south between I-5 and Upas Street, and approximately half-mile length east-

west between Reynard Way and Sixth Avenue. The area is characterized by its grid street pattern and unique historic buildings and homes. Neighborhood commercial centers are located on Reynard Way, First Avenue, and at the intersection of Fifth Avenue and Laurel Street. These locations function as central nodes of the neighborhood with grocery stores, dry cleaning, dining, and entertainment establishments. A variety of offices and retail are also located along Fifth and Fourth Avenues. Parking in the area is predominately unregulated street parking, with metered parking along both sides of Fourth and Fifth Avenues, and along First Avenue south of Juniper Street.

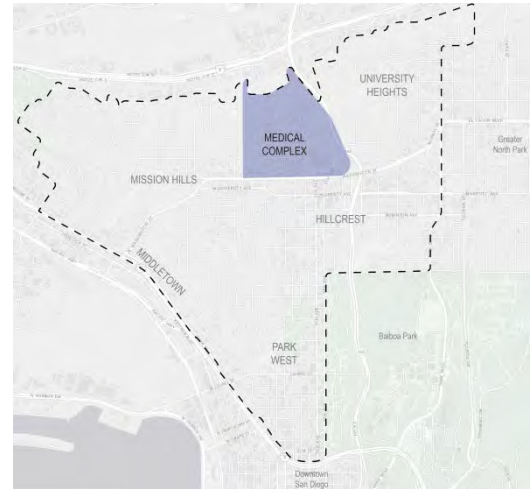


HILLCREST

Hillcrest is situated at the center of the Uptown community. The Hillcrest commercial core constitutes the most predominant commercial district in Uptown and attracts visitors from adjacent neighborhoods and beyond the community boundary. In particular, University Avenue provides a wide variety of shopping, cultural, and entertainment facilities and is a primary entertainment and artisan district with many nightclubs, restaurants, and bars. It also acts as the central node for community activities with a variety of special events including a farmers market on Sundays. Fourth and Fifth Avenues also provide several restaurant and retail facilities in the neighborhood.

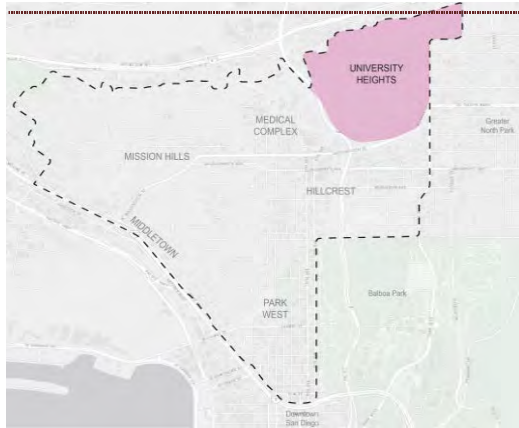
THE MEDICAL COMPLEX

The Medical Complex area is situated at the northern end of the study area, encompassing the land north of Washington Street between Dove Street and Sixth Avenue. Medical uses account for more than half of this area, with retail and commercial uses occupying a small portion along Washington Street and the remaining land being residential. Mercy Hospital and Medical Center is located in the southeast quadrant of the medical complex area, just north of Washington Street; UCSD Medical Center is located in the northwest portion of the medical complex area; and several other medical facilities are scattered around the area. Together, the Medical Complex area offers a wide range of health services including acute and ambulatory care, and provides teaching and research facilities, drawing staff, patients, and visitors from within the community and outside of community boundaries.





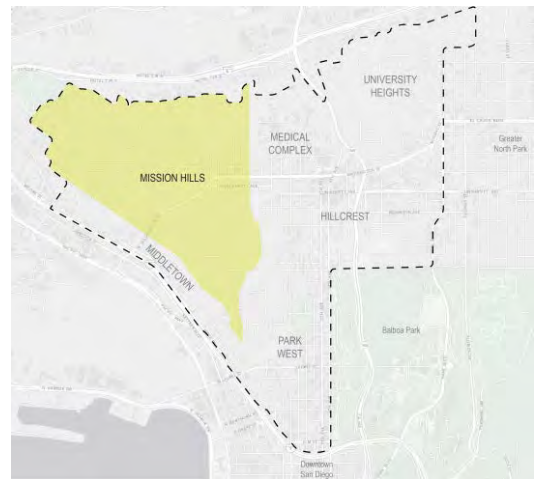
UNIVERSITY HEIGHTS



University Heights is situated at the northeast corner of the Uptown community and is primarily a residential area, offering patches of office and commercial areas near Washington Street and Park Boulevard. The area provides a core residential area adjacent to Hillcrest and the Greater North Park community.

MISSION HILLS

Mission Hills is situated at the northwest corner of the Uptown community. It is primarily a single-family housing residential community, offering small office and commercial areas that primarily serve the surrounding residents. It is a large residential area that helps populate the retail and workplaces in the surrounding areas.



MIDDLETOWN



Middletown is a small area situated between I-5 and Mission Hills. India Street and San Diego Avenue are the primary streets that make up the area, with small residential neighborhoods in the adjacent hillside. The restaurants and entertainment options in Middletown draw visitors from outside of the community, primarily from I-5.





SURROUNDING AREAS OF INTEREST

Just outside the neighborhoods of Uptown are Balboa Park, Greater North Park, and Downtown San Diego. Implementing the proposed streetcar system in the Uptown Community may also influence these surrounding areas, and potentially could become areas of expansion for the streetcar network.

BALBOA PARK

Balboa Park is home to many public, recreational, historical, educational, and employment destinations. It attracts approximately 14 million visitors a year, making it the nation’s fourth-most-visited city park. The western part of the park is extensively landscaped and devoted to various forms of recreation. The center of the park contains the major developed areas. The Prado and Palisades areas; scattered with museums, performing arts centers, gardens and restaurants. The San Diego Zoo, Carousel, Miniature Railroad, and Spanish Village Art Center are all also within the center. The eastern portion of Balboa Park contains a golf course and Morley Field Sports Complex. Vehicle access to Balboa Park attractions is primarily from Park Boulevard, but there are also connections from Laurel Street and Upas Street in the Uptown community. Pedestrian and bicycle access to the attractions and open space throughout Balboa Park is much easier, with Sixth Avenue, Upas Street, and Park Boulevard all fronting a side of the park. Parking in the numerous parking lots throughout Balboa Park is free.



Source: Balboa Park Online Collaborative





Source: Greater North Park Community Plan

GREATER NORTH PARK

The Greater North Park community abuts Uptown to the east and has similar characteristics and land uses as the Uptown community. Similar to Uptown, it is primarily residential with a core commercial area that attracts visitors from outside of the community and several smaller retail areas that serve the surrounding residents. The core commercial area is located near University Avenue and 30th Street, about two miles east of the core commercial area for Uptown, also located along University Avenue. Interactions between Uptown, Greater North Park, and Balboa Park are an important aspect of planning efforts for these areas, as changes to one area may have direct or indirect effects to the others.

DOWNTOWN SAN DIEGO

Downtown San Diego is located just south of Uptown and is home to some of San Diego’s largest attractions and employment centers. Attractions such as the Gaslamp Quarter, Petco Park, Seaport Village, and the Convention Center bring visitors from the greater San Diego area and tourists from across the world to the downtown area. First, Fourth, Fifth, and Sixth Avenues provide access from the southern limits of Downtown to the northern limits of Uptown, with several other streets connecting portions of the two communities together. As the Uptown and Downtown communities both continue to thrive and establish new origins and destinations, the interaction between the communities becomes more of an opportunity to capture larger coverage areas from mobility and economic viewpoints.





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DEFINING THE STUDY AREA

Potential alignments for streetcar routes through the Uptown community were determined prior to initiation of this study and include Fourth, Fifth, Sixth, University, and Robinson Avenues.



These routes are consistent with the historic network and places of interests identified in the community, and are along popular travel routes.





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Using the study area boundaries determined in previous efforts, the streetcar route options were grouped into phases for evaluation in this study.

PHASE 1: NORTH-SOUTH CONNECTION

- Fourth and Fifth Avenue couplet
(northbound on Fifth Avenue and southbound on Fourth Avenue)
- Fifth and Sixth Avenue couplet
(northbound on Fifth Avenue and southbound on Sixth Avenue)
- Sixth Avenue only
(northbound and southbound on Sixth Avenue)

During the public input process and through discussions with the PDT, it was determined that each of these alternatives would be feasible and of interest to carry forward into further evaluation.

PHASE 2: EAST-WEST CONNECTION

- University Avenue (eastbound and westbound on University Avenue)
- ~~➤ Robinson Avenue (eastbound and westbound on Robinson Avenue)~~

During the public input process and through discussions with the PDT, it was determined that the Robinson Avenue alignment would not be a valuable alternative to carry further. The opportunities for economic development were found to be much smaller than University Avenue, the roadway is primarily two lanes and streetcar could potentially create congestion and safety concerns, and it does not provide access beyond Park Boulevard for potential extension of the route. Therefore, Robinson Avenue was not carried further in the study.





PHASE 3: PARK BOULEVARD CONNECTION

- Park Boulevard (northbound and southbound on Park Boulevard, from University Avenue to Zoo Place)

During the public input process and through discussions with the PDT, this route was determined to be a feasible alternative to carry forward. A study was prepared by MTS to evaluate Park Boulevard from Zoo Place south to downtown, which may influence the feasibility and potential ridership of this connection.

PLANNED IMPROVEMENTS IN THE STUDY AREA

Several transportation-related studies have been performed that have proposed improvements within the study area. The roadways defined in the study area are in high demand for all mode users, as described in this section.

The City of San Diego implemented a road diet on Fourth and Fifth Avenues between Date Street and Laurel Street in May 2014, repurposing one lane of traffic for exclusive bike treatments. While just a restriping application, the implementation narrowed both Fourth and Fifth Avenues from three to two vehicle travel lanes and added buffered bike lanes along the left side of these one-way streets. Existing on-street parking was not removed.

Complimentary, SANDAG, as part of the Uptown Regional Bike Corridor Project, plans to implement a protected bikeway adjacent to the left side curb on Fourth and Fifth Avenues from Downtown to Washington Street. These plans would fit within the existing City of San Diego's painted treatments but would feature more permanent facilities with elevated buffers between bicyclists and automobiles.





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Another section of the SANDAG Uptown Regional Bike Corridor Project includes a potential for protected bikeways on both sides of University Avenue from Washington Street to Normal Street. The design would be integrated with existing bus stops, utilizing bulb outs for station waiting areas. These projects are expected to be implemented in the next couple of years and would influence the design of the streetcar alignment and stations.

The 2050 RTP provides a short-term and long-term vision for the region for all modes of travel, and is further supplemented by City-specific documents. Based on these documents, there are several other projects in Uptown and the surrounding communities that are planned to be in place in the next ten years, and visions for additional projects beyond that time frame.

Bicycle improvements identified in the 2050 RTP and the City of San Diego Bicycle Master Plan have include several potential improvements to the bicycle facilities in the Uptown community and additional linkage to Old Town and Centre City. Specific to the study area are bicycle lanes along Fourth Avenue from Juniper Street to Washington Street and Fifth Avenue from Elm Street to University Avenue, such as those implemented by the City, and along Park Boulevard.

Studies that were reviewed include:

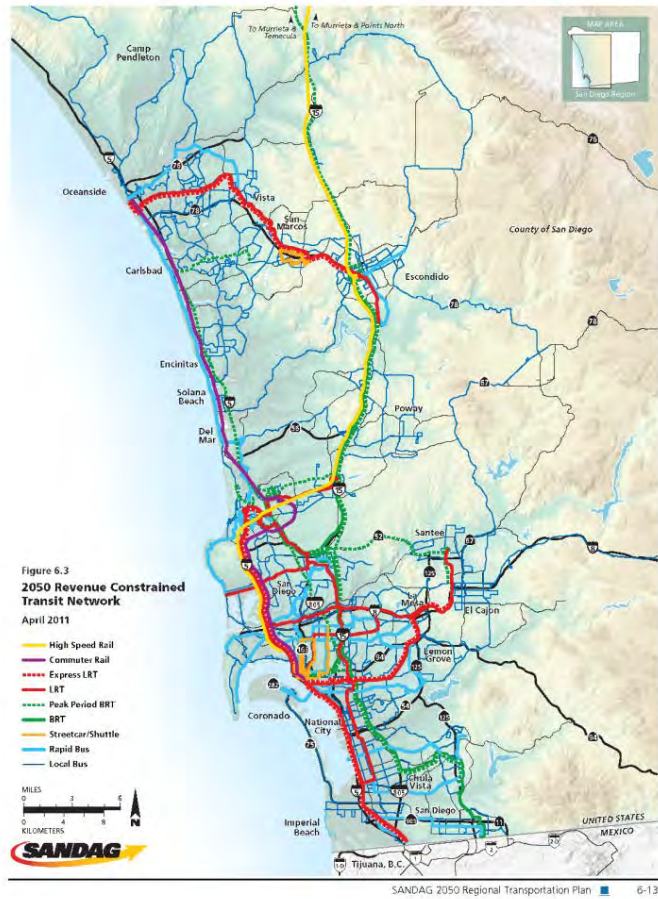
- City/Park Streetcar Feasibility Study
- 2050 Regional Transportation Plan
- University Avenue Mobility Plan
- Fourth, Fifth, and Sixth Avenue Traffic Calming Project
- Downtown Circulator Shuttle Strategic Implementation Plan
- City of San Diego Bicycle Master Plan
- City of San Diego Pedestrian Master Plan
- Uptown Regional Bike Corridors Project
- Uptown Community Parking District 2014 Annual Plan
- Central Hillcrest Parking Study





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Short-term transit projects identified in the RTP along the study area corridors primarily would not materially change the characteristics of the roadways but still would improve the type of service, frequency of service, and areas served. One exception is the Mid-City Bus Rapid Transit (BRT) project, which is under construction at the time of this report. This project would provide a new transit option between downtown and SDSU via Broadway, Park Boulevard, El Cajon Boulevard, and College Avenue. Improvements include intersection and median modifications at University Avenue and Park Boulevard.



Source: SANDAG 2050 Regional Transportation Plan

The Downtown Circulator Shuttle Strategic Implementation Plan was commissioned by the Downtown San Diego Partnership and Civic San Diego to enhance the growth and development of Downtown, help reduce the demand for parking, and provide more choices for travel within Downtown. The plan is still being considered and may potentially include a line that would run between downtown and Uptown via Little Italy. Initial service is planned to be implemented by December 2014.

Longer-vision plans in the RTP include additional bus services, trolley service on Park Boulevard, and a streetcar network extending beyond the limits of this study into the downtown community. The MTS identifies a Hillcrest/Balboa Park/downtown loop that





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this project would be a part of. It also identifies a downtown: Little Italy to East Village line and 30th Street line that connect North Park, Golden Hill, and downtown. While these improvements ultimately will affect transportation options in the community, the details of the plans have not been pursued and timing of these improvements is unknown.

One study that provides more specific recommendations that may directly affect the study area but is not currently funded or planned for implementation is the University Avenue Mobility Plan (UAMP). The final result of the UAMP was a Refined Concept Plan of the University Avenue corridor between Park Boulevard and Boundary Street. While the corridor is east of the Uptown community, the refined concept integrated many traffic calming features that aimed to slow traffic and create a more pedestrian friendly environment as well as improve transit travel times with stop reductions and lanes dedicated to shared transit and bicycle use. Similar concepts could be applied to University Avenue in the Uptown community.



Source: City of San Diego University Avenue Mobility Plan

LEGEND

PEDESTRIAN IMPROVEMENTS	TRANSIT IMPROVEMENTS	STREET IMPROVEMENTS	SIGNAL IMPROVEMENTS
SYMBOL	SYMBOL	SYMBOL	SYMBOL
DESCRIPTION	DESCRIPTION	DESCRIPTION	DESCRIPTION
RESTRIPE EXISTING CROSSWALK OR NEW CROSSWALK MODIFIED EXISTING CROSSWALK NEW ENHANCED SIDE STREET CROSSING NEW ENHANCED MID-BLOCK CROSSWALK REMOVE CROSSWALK	TRANSIT STOP TRANSIT ONLY LANE POTENTIAL TRANSIT ONLY LANE (ALT. 3)	PROPOSED CURB EXISTING CURB NEW STOP SIGN NEW TRANSIT ONLY LANE AHEAD MERGE LEFT SIGN NEW RIGHT TURN ONLY LANE BUSES EXEMPT SIGN PAINTED MEDIAN WITH LANDSCAPE REPAIR EXISTING STOP SIGN & SYMBOL STRIPE RIGHT TURN ARROW	STRIPE LEFT TURN ARROW & INSTALL NEW PROTECTED LEFT TURN ARROW NEW TRAFFIC SIGNAL REMOVE EXISTING TRAFFIC SIGNAL

Not to Scale

16-100148-001 - June 2004 ES-11

REFINED CONCEPT PLAN

EXHIBIT ES-2
SHEET 1 OF 3

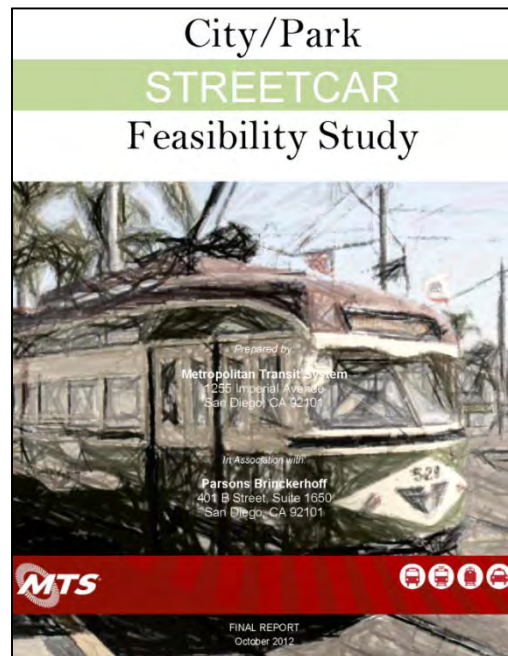
As part of the UAMP study, the feasibility to implement historic streetcar service on University Avenue based on the preferred concept was analyzed. The study determined that it is possible to implement and operate the streetcar within the curb-to-curb width of University Avenue throughout the study area. The reintroduction of the historic streetcar



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was ranked as the most popular feature for the corridor at the first community meeting and was suggested to run along the University Avenue corridor to Park Boulevard and south on Park Boulevard, ending near the intersection of 12th Avenue and C Street. The study did also note that although implementation is feasible, the Historic Streetcar would require a consistent effort by both private and public investors to see the line through to realization, and estimated that the streetcar line from 32nd Street to Park Boulevard could exceed \$25 million without including the maintenance and storage facility.

A streetcar feasibility study has also been prepared for the City/Park Streetcar, proposed to run on Park Boulevard between the City College Trolley Station at the intersection of 12th Avenue and Broadway and the San Diego Zoo at the intersection of Park Boulevard and Zoo Place. Based on the findings of that study, the streetcar would run along the right curbside and have seven stations on Park Boulevard, with vehicles every 15 minutes daily from 8:00 am to 6:00 pm.



Other recommendations within the study area identified in previous studies include:

- Narrowing of travel lanes along Fourth, Fifth, and Sixth Avenues;
- Extension of sidewalks at major street corners in the study area;
- Introducing more diagonal on-street parking in the central Hillcrest area;
- Reduction of the number of lanes on Sixth Avenue south of Robinson Avenue;
- Diversion of freeway-bound traffic to Washington Street from the north, Sixth Avenue from the south, and 10th Avenue from the east;





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While the above findings from studies are useful in exploring possible improvement opportunities and their effects on the existing street network; no designs have been finalized and no improvements have been funded.

Parking is important to the Uptown community; a comprehensive parking utilization survey was performed in the central Hillcrest area in 2005 to evaluate the parking usage in the neighborhood and its corresponding future conditions. The survey indicated that the highest parking demand was about 75% of the parking supply during a typical month, and completely full on summer weekend nights and during the month of December. It was concluded that, under the 2005 conditions, the study area would need at least an additional 100 parking spaces to meet the parking demand during December and summer weekends. Furthermore, it was determined that the central Hillcrest study area would begin to experience a parking shortage of 200 to 275 spaces in five years (2010) and a parking shortage of 450 to 750 parking spaces in 20 years (2025). It was concluded that a new 450 net parking space structure should be pursued to address central Hillcrest's parking shortage. The block east of 4th Avenue and north of Robinson Avenue was identified as the most suitable site for construction of a parking garage to meet the mid-term needs of the district. That parking structure was not implemented and parking continues to be an issue for the community.

The 2014 UCPD Annual Plan addresses parking inventory/supply, uniformity of parking allocation, traffic circulation, public information, public transit and comprehensive system management. It also supports the Uptown streetcar. Although the actual implementation of any projects proposed is contingent upon the further approval of the City, UCPD has developed strategies to increase parking, such as:

- adding angle parking wherever feasible;
- removing redundant curb cuts;
- painting or repairing curb within or close to the metered zones;
- providing additional valet parking and curb-side pick-up options





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- use of the old Blood Bank site at the south east corner of the intersection of Upas Street and Third Avenue for public parking;
- adding metered parking at locations close to Balboa Park;
- establishing shuttle or other circulatory systems to encourage visitors to park at one location and travel within the neighborhoods;
- installing bicycle and electrical vehicle infrastructure; and
- working with Hillcrest in analyzing financing sources focusing on the benefits of public/private partnership for a new mixed-use parking structure.





ADDING STREETCAR IN UPTOWN: OPPORTUNITIES

Through the existing and planned transportation infrastructure, the Uptown community offers a variety of mobility options to both residents and visitors. Introduction of a streetcar system adds another option to the existing system; further enhancing the synergy between transit and active transportation modes. To have a successful streetcar line, it is important to look at the street system as a whole and understand that changes to one mode of transportation can have strong effects on all other modes. The bus, vehicle, pedestrian, and bicycle traffic must be able to operate as efficiently and safely as it does currently when there is a streetcar system in place to.

STRENGTHENING THE TRANSIT NETWORK

The Uptown Community has a strong history of transit use and streetcars present an opportunity to strengthen the community's transit presence. The Uptown community currently is served by multiple bus routes operating at frequent intervals (see next page for bus routes). Routes 1, 3, 10, 83, and 120 all have stops in the core Hillcrest commercial area on University Avenue near Fourth, Fifth, and Sixth Avenues. Together these routes provide access throughout the Uptown community and connections to key areas throughout San Diego such as:

- Downtown
- Grossmont Transit Center in La Mesa
- Euclid Avenue Trolley Station
- Old Town Transit Center
- Santa Fe Depot
- Fashion Valley Transit Center
- Kearny Mesa Transit Center

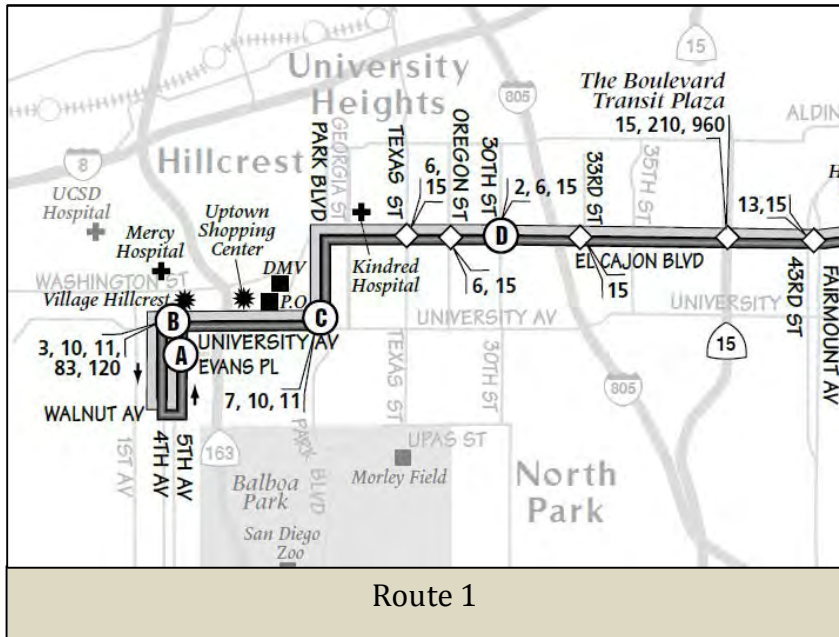
(Detailed maps and timetables are provided in Appendix B)

In addition, UCSD provides shuttle service to the Medical Complex area and a neighborhood shuttle provides service during special events such as the Farmer's Market.

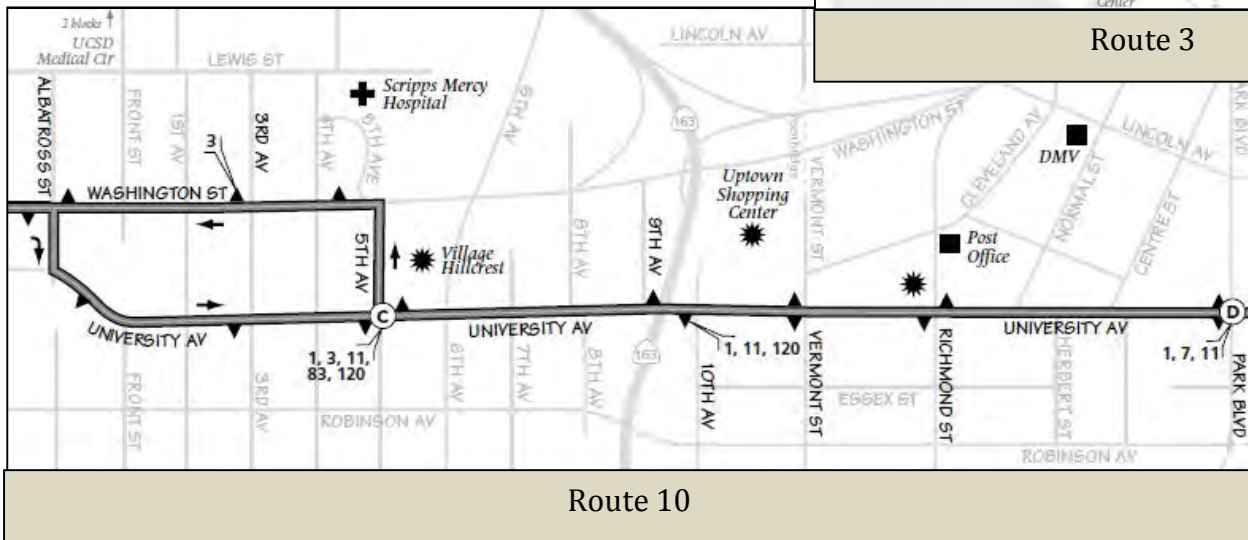
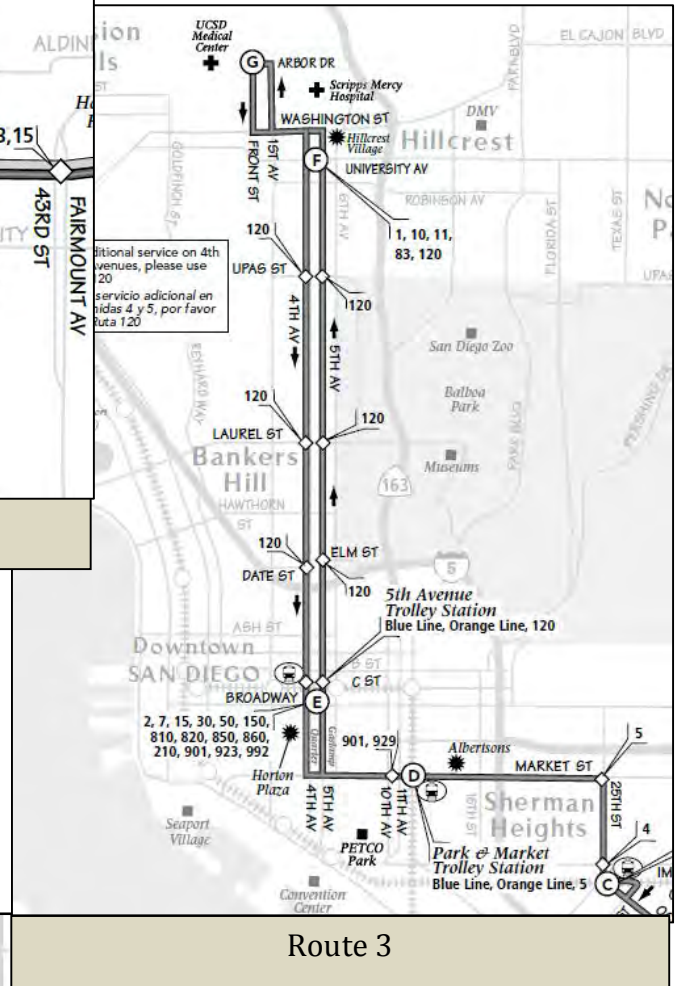




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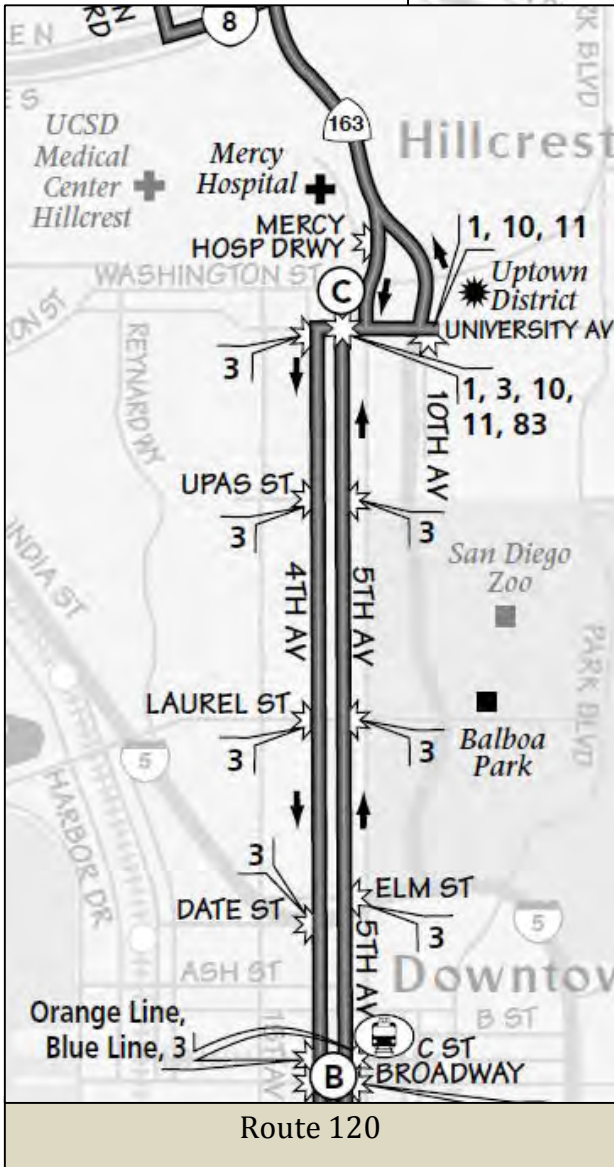
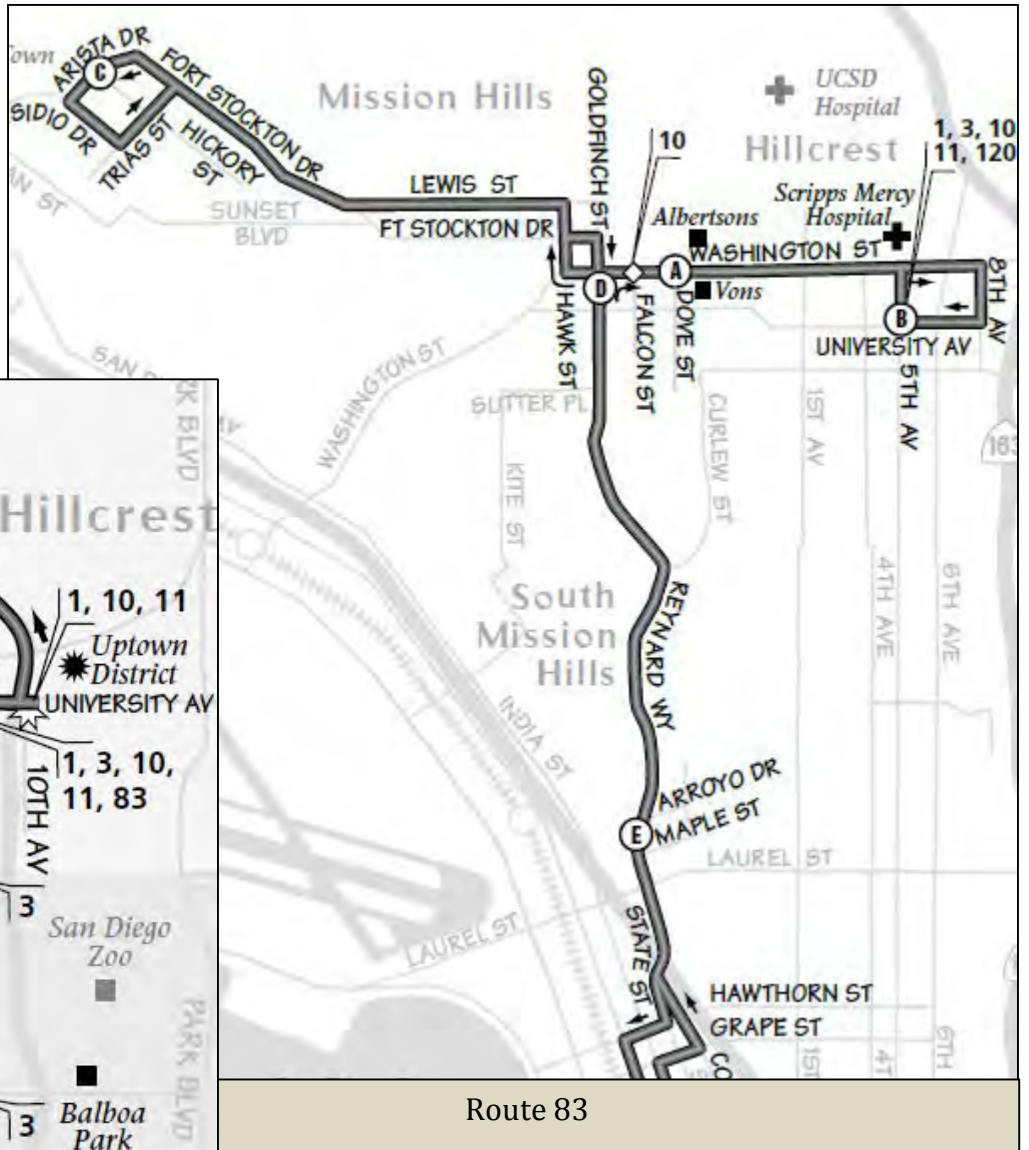
Source: San Diego MTS





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Streetcars will share travel lanes with private vehicles and other transit vehicles; this provides an opportunity to share stations. Specifically on University Avenue, where platform space is a concern, sharing stops can offer a lot of benefits by reducing cost, saving space, and improving passenger convenience. However, implementing shared stops can also add challenges in determining the size and location of these station platforms and meeting the frequency needs of both systems.

Through public involvement, it was been determined that the Uptown residents desire a transit option focused on local, intra-community circulation. It is anticipated that adding a streetcar line in the Uptown community would result in increased transit use. With successful integration, both the community and transit system can be enhanced by improving access and opportunities for transit-dependent populations, especially tourists and visitors. There clearly is an opportunity for streetcar to share space, share ridership, and strengthen synergy of transit and other modes of travel in the Uptown community.

ACCOMMODATING BICYCLISTS AND PEDESTRIANS

The land uses within and surrounding the Uptown community encourage the use of bicycle activity for recreational trips, light errands and work trips. The Uptown community also has many characteristics that make the community attractive to pedestrians. A healthy mix of uses near retail corridors and recreational destinations create a large amount of pedestrian activity. Along the streets in the study area, sidewalks are the foundation of a well-connected pedestrian network. With people already using alternative modes of travel, implementing a streetcar can supplement those modes, providing options to travel further without the need for an automobile.

The installation of painted bicycle lanes on Fourth and Fifth Avenues places bicyclists on the left side of the two streets, opposite of where the streetcar would run. Therefore, those changes to the street being made should not create any constraints or conflicts with the proposed streetcar alignments along Fourth and Fifth Avenues. Similarly, if additional bicycle lanes proposed in the City Bicycle Master Plan are implemented, those





improvements would be expected to also use the left side of the street and not conflict with proposed streetcar alignments.

University Avenue and Park Boulevard pose more challenges in terms of incorporating all planned transportation facilities; however, integrating bicycle lane improvements with existing bus stops is being looked at through the Uptown Regional Bicycle Corridor project. Using the design techniques planned to be set place in those efforts, potential streetcar alignments could also be incorporated into the network with little constraints or conflicts.

To capture the full potential ridership from pedestrians and bicyclists, the streetcar vehicle, stations, and interactions along the street need to be considered and accounted for. For example, streetcars can be customized to accommodate bicycles on-board instead of a limited bicycle rack on the outside of the vehicle, providing the ability to transfer a larger number of bicyclists as well as allowing for easier loading and unloading. More information on station design and techniques for handling interactions with pedestrians and bicyclists is provided in **Chapter 3** of this report.

INFLUENCING NEIGHBORHOOD CHARACTER

A streetcar line has the ability to directly affect the character of the area of which it passes through. While the core of the Uptown community has a lot to offer for residents and visitors, the north-south connectors of Fourth, Fifth, and Sixth Avenues tend to act as barriers against pedestrians due to the wide roads and higher speeds. This can result in people visiting a certain destination and not feeling comfortable walking around and exploring other parts of the community, whether it is adjacent retail or entertainment options, other neighborhoods, or Balboa Park. In addition, the challenges finding parking spaces near a destination tend to leave people circling the streets looking for the perfect spot, being frustrated with the experience of getting to their desired destination, or foregoing the trip altogether and leaving the area. By providing a local circulatory system, a streetcar can change the street environment which in turn can change, create, or enhance





the neighborhood character. A streetcar brings several factors to the street environment that result in this impact to character:

- Slowing speeds on the roadways with frequent stops and slower speeds in the shared travel lane;
- Integrating with bicyclists with predictable movements;
- Improving pedestrian facilities at intersections;
- Expanding the area pedestrians have access to by providing a short-trip transit option;
- Opportunities for aesthetic enhancements at streetcar stations; and
- Easing parking demand.

A “sense of place” can be created when the community of Uptown as a whole is seen as the destination and not just a specific address or shop within Uptown. Further appeal can be captured by using streetscapes and station designs to connect Balboa Park in with the community. While simply adding a streetcar may not change the neighborhood, the surrounding improvements that naturally accompany a streetcar system present the opportunity for creating that sense of place and enhancing neighborhood character.

ADDING STREETCAR IN UPTOWN: CONSTRAINTS

There are constraints and challenges to implementing a streetcar in the Uptown community. Two major constraints are determining where and how to cross the freeways that bisect the community, and how to incorporate a maintenance and storage facility into the system.

FREEWAY CROSSINGS

The Uptown community is bisected by two major freeways: Interstate 5 and State Route 163. Interstate 5 is the southern and western boundary of the community and separates the Uptown community from Downtown San Diego. Access across the freeway within the study area is provided by three bridges on Sixth, Fifth, and Fourth Avenues. All three





bridges were built in 1962 and are three lanes with room for parking on both sides (52 feet wide). State Route 163 travels north and south through the Uptown community and Balboa Park and through the heart of Hillcrest. Access across this freeway within the study area is provided on University Avenue and Robinson Avenue. The University Avenue bridge was built in 1947 and is four lanes (60 feet) wide. The Robinson Avenue bridge was built in 1942 and is a two lane (26 feet) wide bridge.

All bridges are inspected and maintained by the California Department of Transportation (Caltrans). However, the bridges will not accommodate rail transit vehicles because the existing load-bearing standards and grounding elements of the bridges poses problems for the implementation of a streetcar system. Improvements beyond standard maintenance would be necessary to the bridge infrastructure to carry the streetcar. As a result, these bridges are constraints to the implementation of a streetcar system and would require a significant investment in infrastructure improvements.

Alternate routing to avoid crossing bridges into downtown would require detours into other communities, lengthening the streetcar route and impacting several additional roadways. There are no alternate routes to cross SR-163 in the Uptown community that does not involve a bridge overpass.

MAINTENANCE AND STORAGE FACILITY

In order for a streetcar system to maintain operations and function properly, there must be a designated facility to both maintain and store the streetcar fleet. The size and capacity of this type of facility is mostly dependent on the number of vehicles needed to serve the preferred alignment. The location of the maintenance facility is important to allow for the expansion of the streetcar line. The maintenance and storage facility needs to be located along the route and should include additional tracks for storing vehicles and room for maintenance buildings, shop areas, parts storage, offices, and other support features. The facility must be able to accommodate the initial streetcar vehicle fleet and should also provide additional space for expansion of the fleet. If space is limited to provide a single





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facility, the maintenance and storage facilities can be separated or multiple storage facilities can be provided to reduce the required footprint of a single facility.

There is an existing MTS maintenance and storage facility at 12th and Imperial Avenues that serves the Light Rail Transit (LRT) fleet. While the existing MTS facility currently has some available capacity, capacity issues may arise as the LRT network expands. Additionally, access to the maintenance and storage facility is a challenge; C Street is currently running near or at capacity with its existing LRT service and there is limited opportunity to add streetcar service along C Street en route to the maintenance and storage facility.

A possible facility location identified in the UAMP streetcar feasibility study mentioned the idea of finding space along University Avenue to house a maintenance and storage facility. While no site-specific location was proposed, the study mentioned it may be in the best interest for the overall system to locate the storage yard in an area near Boundary Street between University Avenue and Lincoln Avenue. This is in the general area for the future streetcar's "end of the line," at the edge of the community and bordered on one side by the freeway. This is outside of the study area, but should be considered as decision-makers continue to explore where appropriate maintenance facilities would be feasible.

Another possibility is the use of the existing City of San Diego Central Operations Station at the intersection of B Street and 20th Street. Use of this facility would require a connection to downtown. This is outside of the study area, but should be considered as decision-makers continue to explore where appropriate maintenance facilities would be feasible.





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3 | STREETCAR SYSTEM REQUIREMENTS

This section provides information on general streetcar system requirements. Guidelines presented in this chapter should be considered as tools to be applied as appropriate to specific alignments being evaluated. They are meant to be refined during preliminary engineering and final design. The proposed alignments are discussed in general here, while more specific details are discussed in later chapters of this study.

THE SYSTEM AS A WHOLE

Streetcar lines must be planned as a comprehensive integrated system. Special considerations must be given to the other modes of transportation that currently use the street, as well as potential upgrades to the street planned for the future. Other transit, vehicle, pedestrian, and bicycle traffic must still be able to operate as efficiently and safely as it currently does. Furthermore, careful consideration should be given to the location of the tracks relative to traffic lanes, bicycle lanes, parking lanes, and station platforms. Subsequently, it is important to understand these relationships and the implications one decision can have on the entire system. Design considerations must be made for the efficient interchange of passengers to and from all transportation modes.

To provide citizens with the optimal benefits of the streetcar line, design decisions should be made on the basis of providing safe, convenient, comfortable, and cost-effective transit system that is also environmentally acceptable and attractive.

The inherent nature of a streetcar line existing within the framework of the street allows for variable systems in terms of form and function. The benefit of an in-street track alignment is that it can follow the existing physical features of the roadway within the





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street right-of-way. This is specifically beneficial in Uptown, where street widths and land boundaries have been in place for many years. The concern of in-street alignments is that they present demanding conditions compared to typical rail systems that have separate, dedicated right-of-way.

By providing basic guidelines to facilitate the development of preliminary designs and addressing core technical and operational issues, the tools presented in this study can be used as a uniform basis for design to successfully (re)introduce a streetcar system into the Uptown community.





VEHICLE TYPES

The entire Uptown community will interact with the streetcar vehicle more than any other part of the system. The general appearance of the streetcar vehicle, the selected vehicle's size and configuration, and the operation will play an important role in how the streetcar integrates into the Uptown community. The selected vehicle will become the "face" of the Uptown streetcar project; it will be a permanent mode of transportation for Uptown residents and visitors and will become an identifiable community feature.

The vehicle is often the major focus of any streetcar operation. Navigating the process of selecting a specific vehicle begins with the understanding of the core technical and operation components. From there, a vehicle should be selected that is compatible with the infrastructure while fulfilling the needs and goals of the project. There are many variations to streetcar vehicles and their associated requirements. Legacy systems exist throughout the world that adapt to the unique conditions of their specific streetcar corridors. Correspondingly, modern streetcar vehicle companies are developing product lines that permit multiple configurations and design elements based around standard products. Historic vehicles can also be renovated to adhere to modern standards and guidelines.

Each vehicle comes with its own set of advantages and drawbacks in terms of system design, operation, and integration into the existing Uptown street network. The MTS City/Park Streetcar Feasibility Study evaluated seven different models across three broad types of vehicles on which enabled the most design flexibility. Since conditions and constraints are similar along Park Boulevard and the Uptown streetcar corridors, and ultimately would be part of the same fleet, the same vehicle types will be used. The following is a summary of the findings from the MTS report.

STREETCAR VEHICLE TYPES

The streetcar vehicles currently used in the United States generally fall under three basic types: Modern, Historic, and Replica. The most notable differences among these types are the vehicle floor height and its effect on boarding characteristics and customer service.





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Modern streetcar vehicles have low floors, allowing for level or nearly level boarding, while renovated historic streetcars and their replicas generally have higher vehicle floors, requiring special provisions to meet accessibility requirements.

Modern Streetcar Vehicles

Modern streetcar vehicles are fundamentally very similar to light rail vehicles. However, the primary difference between the two comes with the degree of integration into the urban street environment required for streetcar vehicles. Modern streetcars are shorter and weigh less than their light rail counterparts. The modern vehicles included in the evaluation are listed below. The list does not include CAF USA streetcar vehicles that are currently being used for the Charlotte, NC and Cincinnati, OH.

1. United Streetcar 100 – currently used in Portland
2. Inekon Trio-12 – currently used in Seattle and Portland and planned for procurement in Dallas, Tucson, and Washington, D.C.
3. ameriTRAM 300
4. Siemens SD8 – expected to be in exclusive operation on the San Diego Trolley by 2014, can serve as both a LRT vehicle and a streetcar



Sources: Portland Streetcar, Seattle Streetcar, ameriTRAM, Siemens, Atlanta Downtown Improvement District, Atlanta Streetcar

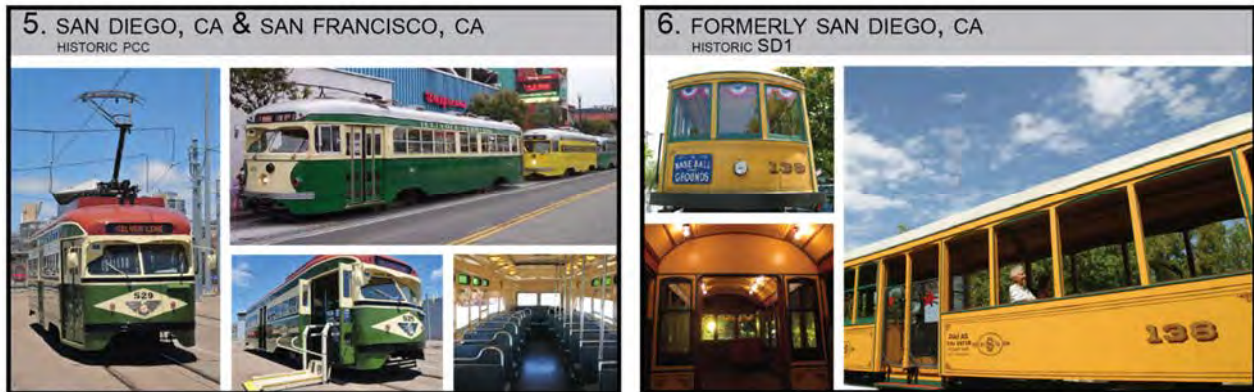




Historic Streetcar Vehicles

Historic streetcar vehicles are existing vehicles from original streetcar systems. Specific to San Diego, these vehicles originally ran on the San Diego Electric Railway Company tracks throughout the City. The historic vehicles included in the evaluation are listed below:

5. President's Conference Committee (PCC)
6. San Diego Class 1 (SD1)



Sources: San Diego MTS, San Diego Vintage Trolley, San Diego Historic Streetcars

There is currently one historic PCC-class streetcar vehicle that operates on the MTS Silver Line service in Downtown San Diego. To accommodate mobility-impaired riders, the vehicle is equipped with an on-car lift that functions smoothly bringing passengers from the platform to the vehicle. On-car lifts present the most cost effective and versatile solution compared to station elevators or ramps, as they are built into each vehicle separately. Additionally, having equipment in each car greatly decreases the number of devices needed as compared to having devices at each station.

Replica Streetcar Vehicles

Replica streetcar vehicles are new vehicles that are built to look like old designs. These vehicles are a fuse between the two other vehicle types; visually emulating historic streetcar vehicles while equipped with the same features as modern vehicles. Replica streetcars comply with all current standards (ADA requirements) but can be customized to match original vehicle specifications (including seating style and arrangement, windows,





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and exterior paint schemes). Replica streetcars can also be built to meet existing streetcar and light-rail power requirements. The replica vehicle included in the evaluation is listed below:

7. Gomaco Birney – replica vehicles manufactured by the Gomaco Trolley Company currently used in Tampa and Little Rock



Sources: Tecoline Streetcar, Arkansas Department of Parks and Tourism

DETERMINING THE BEST VEHICLE TYPE FOR UPTOWN

Given the different constraints of the Uptown streetcar corridors, maximum design flexibility will be achieved with an alignment that utilizes multiple boarding sides, allows for bi-directional travel, and features minimal track installation. Below summarizes the relative advantages and disadvantages of each vehicle type in relation to these components.

Vehicle Specifications

The vehicle specifications include track and power, dimensions, curve radius, capacity, weight, and crashworthiness requirements. All of these specifications must be balanced with passenger comfort and the ability to fit within the existing Uptown street network to achieve a cohesive streetcar line through the Uptown community.

- All streetcar vehicles under consideration will be able to integrate with the existing MTS LRT system.





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- The historic and replica vehicles are considerably smaller (shorter and lighter) than the modern vehicles, making them able to negotiate curves with radiuses 10 feet shorter than the modern vehicles.

Directional and Access Capabilities

The directional and access capabilities extend to the cab and door design and can affect the operational flexibility of the streetcar line.

- The historic PCC vehicles have a single-ended cab and doors on only one side, requiring additional track or turntables to be able to turn the vehicle around and stations to only be placed on the right (curb) side. This greatly limits the track alignment. All of the other vehicles under consideration are bi-directional with double-ended cabs and doors on both sides, allowing for maximum operational flexibility.
- Compared to historic and replica vehicles, modern vehicles generally have wider doors and low-floors, allowing for greater accessibility and easier integration into an existing transit system with similar vehicle features.
- Historic and replica vehicles require either on-car lifts or high station platforms to meet ADA access requirements.

Compatibility, Availability, and Reliability

The ability to acquire and maintain vehicles should be part of the discussion when considering the longevity and required maintenance of the vehicles.

- The modern Siemens vehicle would integrate best with the current MTS LRT system as MTS is currently phasing that same vehicle into exclusive use throughout San Diego.
- Both modern and replica vehicles are available for order from their manufacturers, but the two historic vehicles have limited availabilities.





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- The modern ameriTRAM vehicle is a relatively new prototype and does not have any vehicles currently operating.
- MTS owns one working PCC model that is currently used on its weekend-only Silver Line service. Five additional vehicles are available from a local preservation group but are in need of full restoration before they can be deployed. The historic SD1 vehicle is in even shorter supply, with only one partially restored and two unrestored vehicles available locally.
- Backed by manufacturer warranties, modern vehicles generally have high levels of reliability.
- Maintenance times for replica and historic vehicles are much greater than modern vehicles because parts must be custom ordered and made. This requires additional cars in the fleet to maintain the same coverage and headways.
- While historic vehicles generally pose greater risk of mechanical problems than modern vehicles, they still can be operated reliably with proper care.

Cost

- The four modern vehicle types will generally cost \$3-4 million per vehicle but typically have less expensive annual maintenance costs.
- While historic vehicles are often cheap to purchase, they can be costly to restore. In 2011, it cost MTS around \$850,000 to refurbish the restored PCC model for the Silver Line service.
- The cost of replica vehicles can vary depending on specific design features. Gomaco Trolley Company recently produced its Birney-class streetcars for the Tampa and Little Rock systems at a cost of approximately \$900,000 per vehicle. The annual maintenance costs are typically higher than modern vehicles.





Summary: The Best Vehicle for Uptown

Historic vehicles are aesthetically appealing and provide the community with a sense of its historic nostalgia. Community input showed that if all vehicles were made equally, historical vehicles would be preferred. However, the constraints of a historic vehicle (one-directional operations) can limit the alignment options.

Replica vehicles are capable of two-directional operations with features that remind users of historical vehicles. These vehicles are relatively new to the industry but are being used in other cities and outreach to those operators could provide insight on their maintenance requirements. Replica vehicles are smaller than modern vehicles and can navigate turns with a sharper radius. However, the maintenance time and annual costs are higher than modern vehicles and the station designs become more complicated for access.

Modern vehicles are larger, two-directional vehicles. Due to their size, they require additional room for turns but also provide additional capacity for ridership. Maintenance times and annual costs are typically lower and more reliable than other vehicle type options. The existing San Diego LRT system uses modern vehicles.

For ultimate flexibility in determining the alignment of the tracks and station locations use, **it is recommended that a bi-directional (double-sided, double-ended) vehicle be used.** If the ultimate track alignment provides a loop system, historic vehicles could be used on special occasions. While replica cars seem to fit the community desire, they come with extra costs for both the system design and annual maintenance that more than offset the benefits of the look. **It is recommended that modern cars be used to provide easier integration with the existing system and flexibility for future expansion.** The streetcars can have a vehicle design scheme that separates its identity from the existing trolley cars and can provide a historical feel of a streetcar but utilize modern technologies. The decision on which modern vehicle would ultimately depend on the operator of the system (yet to be determined).





POWER SUPPLY

The traction power system for streetcars is comprised of two main elements: the Traction Power Substations (TPSS) and the Overhead Contact System (OCS). The TPSS consists of all the substations and related connections, while the OCS consists of the overhead wires and their support structures. The TPSS is necessary for the conversion of power supplied by the utility to the proper operating power used by the overhead system. The location, size, and general amount of power equipment will vary depending on the track plan and profile, operations, climate, and vehicle type. As technologies advance, alternative power options are being developed to provide flexibility in design for gaining and maintaining power charges for the streetcar vehicle.

OVERHEAD CONTACT SYSTEM

OCS is the most widely used power distribution method for streetcar systems. However, aesthetic appeal and economic limitations must be considered. The principle objection to OCS is its effect on the aesthetic appeal of a corridor. The physical support system for catenary systems may consist of concrete footings that are part of the elevated support structure, tapered tubular steel poles, hinged cantilevers, and cross-span wires. The system structures should be as lightweight as possible, within the mechanical and structural design constraints. The height of the OCS is dependent on the pantograph and the height of existing overhead obstructions.

STREETCAR POWER IS TYPICALLY SUPPLIED BY TWO MAIN ELEMENTS: TRACTION POWER SUBSTATIONS (TPSS) AND OVERHEAD CONTACT SYSTEM (OCS).

THE TPSS CONVERTS POWER SUPPLIED FROM THE UTILITY AND TRANSMITS IT TO THE OCS, WHICH THEN POWERS THE VEHICLE THROUGH A CONTACT WIRE CONNECTION WITH A VEHICLE-MOUNTED PANTOGRAPH.





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Two Ends of the Spectrum of OCS Aesthetics



At left, a heavily built catenary type overhead that overwhelms a street setting. At right, minimalist overhead optimized for urban application, in this case incorporating anchor points on adjacent buildings in order to minimize pole count.

Source: American Public Transportation Association (APTA) Modern Streetcar Vehicle Guidelines

Options are available to minimize the OCS apparatuses within the historic urban neighborhoods of the Uptown community. Poles can be omitted in certain locations by using buildings and other structures/utilities as anchor points, including street lights and traffic signals. Underbridge attachments can also be explored where low-clearance overhead structures are encountered. Additionally, a single contact wire (instead of a multi-wire catenary arrangement) can be used to lessen the visual impact.

There are several considerations when it comes to OCS electrical currents, structure and foundation design, and safety measures that can be explored in more detail in the preliminary design phase. OCS design will include, but not be limited to, the following applicable codes and standards:

- National Electrical Code (NEC)
- Uniform Building Code (UBC)
- American Concrete Institute (ACI)
- American Institute of Steel Construction (AISC)
- American Railway Engineering and Maintenance of Way Association (AREMA)
- American Society for Testing and Materials (ASTM)





TRACTION POWER SUBSTATIONS

Substations are a vital component to the streetcar power system. They provide a base of constant power that is fed to the overhead wires. Two power sources must be used to supply power to the Traction Power Substation (TPSS) so that if one power source is out of service, a back-up source can continue to supply traction power. Substations consist of pre-fabricated units equipped with high-voltage switchgear, surge arresters, transformer-rectifier units, and DC power switchgear. The substations operate unattended but are equipped with local control switches for operation of all switchgear.

The typical substation unit is under 200 square feet. Substations must be housed in a totally integrated, climate controlled, outdoor and weatherproof unit with sufficient space to enclose the traction power substation equipment and provide access for equipment installation and maintenance.

Generally, substations are spaced every mile within 300 feet from the streetcar tracks. However, substation location requirements will depend on the size and frequency of the power equipment. When determining substation locations, space requirements must be considered to accommodate initial installation of the structure, as well as future access and maintenance needs. Initial construction will require a crane to unload and place the substation, and future maintenance needs will require close vehicle access to the site. The traction power substation locations will be optimized with respect to safety, efficiency, access, availability of land, stray current control, and minimum life cycle costs.

The power supply system must be designed to support the operational requirements of the streetcar system and must be coordinated with the requirements of the designated utility company. Measures must also be made to minimize electromagnetic interference to and by the signalization and communication systems as well as control stray current. Computer simulation and modeling can be used to design the overall traction power systems and provide a network analysis of the wayside traction power system considering the





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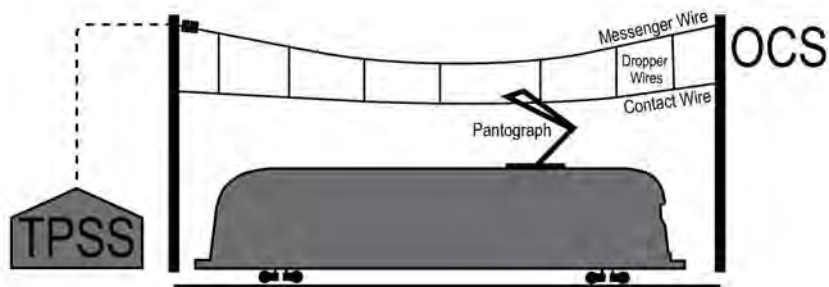
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impedances/resistances of utility services, transformer/rectifier units, DC feeders, catenary/messenger, and running rails. To account for potential upgrades to the line in the future, the operating voltage and system infrastructure should reflect that of the MTS network.

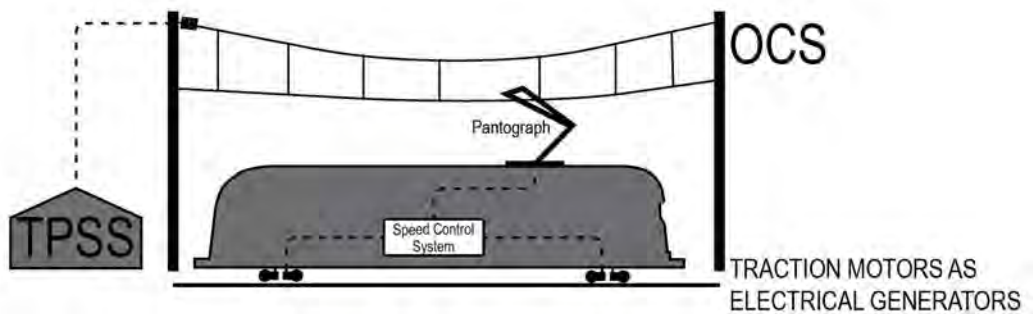
ALTERNATIVE POWER CAPABILITIES

With high performance propulsion systems, air conditioning, and other contemporary amenities, modern streetcars consume substantially more power than historic vehicles. Energy costs are a significant component of the overall operating costs. New technologies are being developed to lessen the impact of the streetcar on both the environment and the aesthetic appeal of the streetcar corridors.

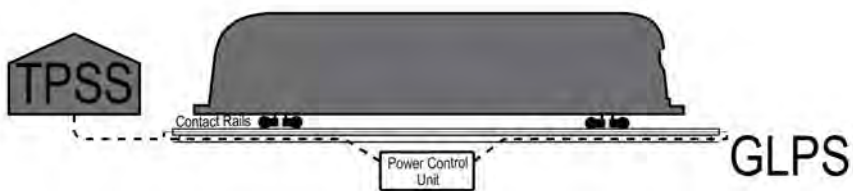
Conventional System:
OCS as primary power source.



Regenerative Braking:
OCS as primary power source. Recharging via Traction Motors.

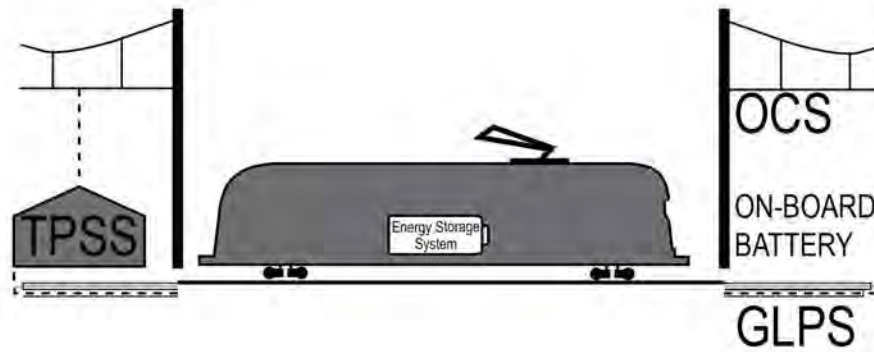


Ground Level Power System (GPLS):
GPLS as primary power source.





Off-Wire Capable Vehicles:
 On-Board Battery as primary power source. Recharging via intermittent OCS and/or GLPS.



Regenerative Braking

New technology being applied to streetcar vehicles enables them to capture and reuse power generated during the braking cycle. This technology acts like a generator; collecting power produced while the vehicle is braking and redistributing it back into the OCS, making it available to that same vehicle or other vehicles nearby. The nature of a streetcar line having frequent stops makes for ample opportunities to recover energy using this strategy.

Ground Level Power Systems (GLPS)

GLPS are a new and specialized technology that relocates the traditional overhead power source to the ground. Different to the OCS systems, the power must be switched on and off, adding a significant amount of complexity. Ground power is located at stations and other stop locations as well as over segments requiring high power demand (like areas demanding acceleration and climbing). Like the OCS systems, the GLPS still requires power substations and other electrical distribution infrastructure. Ground level power systems typically require significantly more challenging track engineering.

Off-Wire Capable Vehicles

Also known as hybrid vehicles, off-wire capable vehicles can operate both from OCS as well as from an internal power supply. With this technology, vehicles can run “off wire” for short





distances at a time. These vehicles can be used to eliminate the need for overhead wires in particularly dense or sensitive areas. The “off-wire” portion is accomplished through some form of onboard battery or super-capacitor.

This technology is becoming more common not just due to its aesthetic benefits but also due its reduction in energy costs. These batteries can be recharged on route using regenerative braking (discussed above) or by stationary charging stations that can be placed in conjunction with station stops. The range in which a vehicle can operate “off-wire” depends on the specific technology onboard as well as the power requirements of the vehicle within the streetcar line. In the United States, a few hybrid vehicles operate experimentally, mostly for tourist-oriented trips and lines. Other experimental hybrid rail vehicles also operate in Europe.

Technology Benefits and Costs

Through the use of regenerative technology, in-ground power, and/or on board batteries, new streetcar technologies can conserve power and eliminate the need for invasive structures in particularly dense or historical areas. Additionally, some capital and maintenance costs can be saved with the use of these alternative capabilities, as less infrastructure is required. However, while infrastructure may become less costly to build and maintain, the opposite will happen to the vehicle. Vehicles using these techniques become more technically complex and more costly to purchase and maintain. It is important to remember that these technologies are evolving rapidly; the costs and capabilities are continuously changing. The costs of these new technologies are expected to decrease as the market expands and technology alternatives continue to improve. Decisions whether or not to use these types of technologies will most likely be influenced by the available funding to support upfront costs of purchasing vehicles and additional infrastructure required to support the special technology capabilities.





STATIONS

Streetcar stations are either provided along the outer travel lane (curbside) or along the inner travel lane adjacent to the median.

CURBSIDE STATIONS

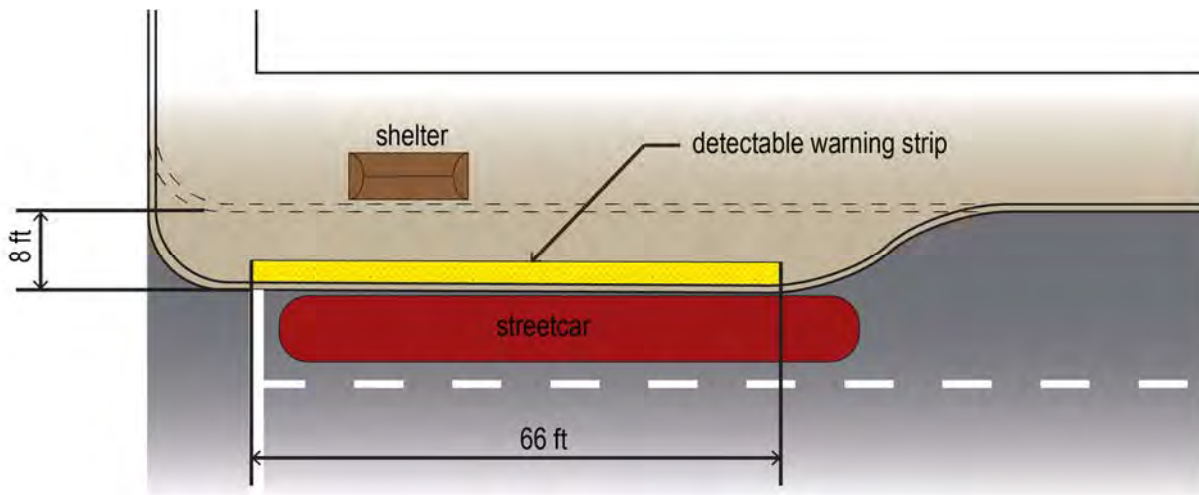
Curbside stations are typically proposed when the following conditions are encountered:

- Single track on the roadway (in a couplet or single track operation)
- Wide roadway with multiple lanes in each direction
- Enhanced pedestrian activity and streetscape is desired

Curbside stations can either be incorporated into the existing sidewalk or be extended out into the street as a bump out. Curbside bump outs are best used on streets with on-street parking. Curbside stations are an extension of the sidewalk and will therefore interact with the existing pedestrian spaces. The length of the platform at a curbside station should match the low-floor boarding area of the streetcar between doors. For discussion purposes, the average length of a curbside platform is 66 feet, which is roughly equivalent to the loss of three parallel parking spaces. The 66-foot length allows for ample space for a boarding platform, access ramps, and a basic level of amenities. For comparison purposes, platforms in San Diego have typically been at least 100 feet long to accommodate the San Diego Trolley LRT vehicles.

The minimum width of a curbside streetcar stop is 8 feet to provide for the required ADA access pad and the minimum sidewalk width. However, this does not include the inclusion of other elements.





Typical Curbside Station

MEDIAN STATIONS

Median stations are typically proposed when the following conditions are encountered:

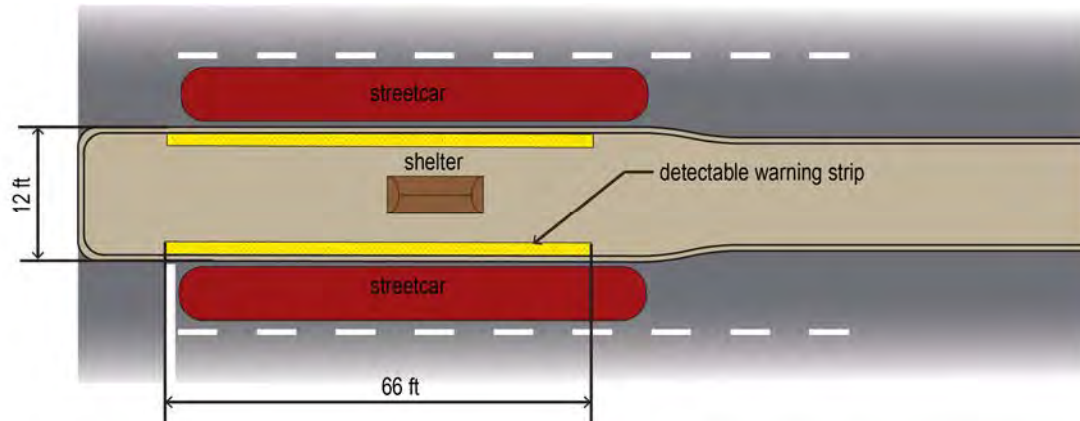
- Bicycle lane and/or heavy bicycle traffic exists along the curbside
- Dual streetcar tracks (one track in each direction)
- Angled parking at the curbside
- Curb side features that cannot be removed

Median stations are best used for wide two-way streets. For median stations, the streetcar must run on the inside travel lanes. Center medians stations have the potential to accommodate streetcars traveling in both directions, greatly reducing the number of stations required. Since constructed in the median, these stations have little to no impact on the existing pedestrian spaces. However, when passengers are forced to cross the street to access the station safety is a concern. Median stops serving two tracks should be a minimum of 12 feet wide to accommodate the ADA required detectable warning strip on both sides. In Uptown, median stations are an option where two-way streetcar service is being considered. Median stations require vehicles with doors on both sides to allow for boarding on both the left and right side. However, the historic PCC vehicles have a single-ended cab with doors on only one side.





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Typical Median Station

Historically, streetcars boarded in the middle of the street, with passengers entering into the street when the streetcar arrived. As streets began to get more crowded, center median boarding islands were introduced to increase safety and better traffic operations. There are still some cities in the United States (including San Francisco, Toronto, and Boston) that still utilize boarding islands and traditional in-street loading. However, modern streetcar lines now emulate bus routes; loading and unloading passengers at the curbside. Regardless of where the stations are placed, the stations must be compatible with existing sidewalk and roadway conditions in Uptown and not interfere with the current streetscape, pedestrian, bicycle, and bus facilities.





VEHICLE AND STATION PLATFORM INTERFACE

The streetcar stations, platforms, and passenger loading areas will become a key element of the Uptown street environment. These areas are the gateway to the Uptown streetcar system for the rider. Streetcar platforms come in a variety of shapes, sizes, and placements and are highly dependent on the interface with the streetcar vehicle. In addition, the stations must be designed to emulate the character, scale, and style of the Uptown community neighborhoods.

The layout and design of a streetcar platform is dependent on a number of factors:

- *Location of the stop in the roadway*
- *Location of the stop with respect to an intersection*
- *Dimensions and configuration of the streetcar vehicle*
- *Availability of space behind the street curb*
- *Type of shelter to be provided at the station*
- *On-street parking at or adjacent to the station*

PLATFORM SHAPE AND HEIGHT

A platform's size is highly dependent on the selected vehicles and the existing conditions of the curbside. The space and platform height must be compatible with the vehicles' dimensions, specifically the locations of the accessible doorways and wheelchair ramps on all of the vehicles that will use the stop.

BOARDING OPTIONS

The relationship of the vehicle and the station platform is one of the most fundamental interface features in any rail transit system. Horizontal and vertical gaps between the platform edge and vehicle step determine the ease of passenger boarding. Station platforms must be placed within close proximity of the vehicle to permit safe and practical passenger movement on and off the streetcar. If bridge plates are used; appropriate horizontal and vertical platform offsets will be determined based on the operational requirements for the bridge plates.





Fully Level Boarding

Fully level boarding provides the best and safest passenger boarding experience. With fully level boarding the vertical step from the platform into the vehicle is eliminated. This is done by having the vehicle floor and platform at the same height. A 14-inch floor height is generally required for level boarding. However, sidewalks are often less than 14 inches high; this extra platform height can add additional space requirements due to the transitional area needed to reach the level-boarding platforms from the existing sidewalk grade. The higher the platform becomes, the longer the ramps become and the more modifications to the existing sidewalk and streetscape required. In addition, a 14 inch platform is generally not compatible with buses and any other vehicles with outward folding doors and other step-entry vehicles (like historic streetcars). In short, fully level boarding does provide the best passenger boarding and operational experience; narrowing dwell times and eliminating the need for vehicle-mounted bridge plates. However, it does add to the platform and track construction and can become more costly.



Source: APTA Modern Streetcar Vehicle Guidelines

Nearly Level Boarding

Nearly level boarding requires a small step (3 to 6 inches) to board the vehicle from the platform. This boarding type is less demanding on the curbside, as platforms do not need to be raised as high as fully level boarding and can be accomplished with a minimum platform height of 8 inches. In addition, the lower platform height is easier to blend into the existing sidewalks. With nearly level boarding access, bridge plates are



Source: APTA Modern Streetcar Vehicle Guidelines



needed for mobility impaired passengers to board. The need for and use of vehicle-mounted bridge plates can add complexity to streetcar door systems and will increase the time needed at each station. Nearly level boarding allows for platform heights to vary and for stations to be placed along curved street segments, making it a lot easier to be compatible with both streetcars and buses. This flexibility can be translated into cost and space savings. However, the variance in platform design and vehicle heights can affect the overall homogeneity of the streetcar line.

Accessibility

Every station must follow the ADA accessibility regulations and accommodate all mobility-impaired riders. Discussed in detail above, low-floor and level boarding make the boarding process for mobility-impaired passengers significantly faster and easier than other boarding options. Historic streetcars require additional equipment to board mobility-impaired passengers. Most historic streetcars have multiple steps at each doorway, requiring the need for elevators, ramps or lifts. These devices will add additional cost and will add significant time to the boarding process, impacting the overall operations of the streetcar line.

Standards and Codes

In addition to the ADA Standard for Accessible Design, the station designs must comply with Uniform Building Code, National Fire Protection Association (NFPA) Standards (NFPA 130, NFOA 72, NFPA 70, NFPA 101), and state/local codes and regulations.





FULLY LEVEL BOARDING

Advantages:

- Eliminates any vertical step(s)
- Eliminates bridge plates
- Facilitates faster boarding times

Disadvantages:

- Requires more room for platform space
- 14-inch platform is not compatible with buses without special measures
- Difficult to place platforms on curves
- Active suspension on vehicles is required

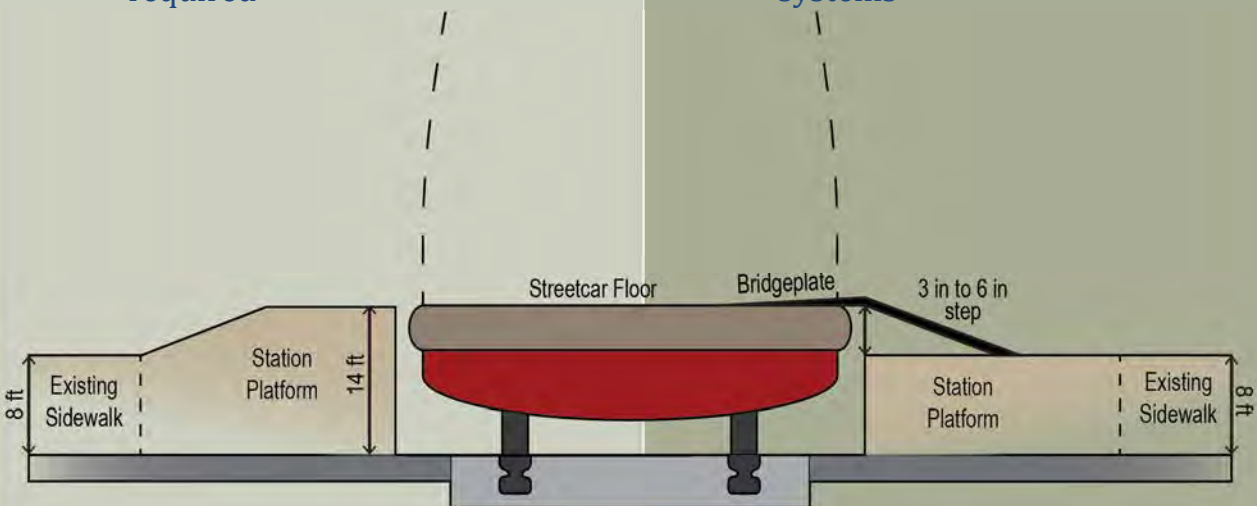
NEARLY LEVEL BOARDING

Advantages:

- Requires less room for platform space
- Able to have shared streetcar/bus stops
- Easier to transition to sidewalks
- Easier to place platforms on curves

Disadvantages:

- Requires bridge plates
- Longer boarding times
- More complicated door systems





VEHICLE AND TRACK INTERFACE

Rail or track work systems are composed of a number of elements, all of which interact with one another. The relationship of the track to the other components of the streetcar system is important in the overall safety and operations of the streetcar line. Vehicle control, traction power, drainage, and turning radii all must be accommodated for in the track work system and can depend on the type of vehicle. In addition, maintainability and reliability of the track are important to minimize interruptions to streetcar operations.

If federal funding is pursued, the rail selected must meet the "Buy America" requirements.

Track and Rail Types

Embedded track is a necessary component in order to be compatible with rubber-tire vehicles traveling on the track way. Other types of tracks (such as ballasted or direct fixation) may only be used where streetcars will operate in an exclusive right of way. Therefore, all tracks in the Uptown line must be embedded with continuous welded rails. Yard tracks and ballasted deck bridges may use ballasted tracks.

Embedded track for streetcars consists of two rails set in a concrete slab. The design of embedded track must ensure the proper gauge and alignment as well as the proper protection of the rail and fastener components from exposure to corrosive elements, specifically unfavorable weather conditions. Easy access to the rail components is necessary for normal maintenance, repair and replacement.

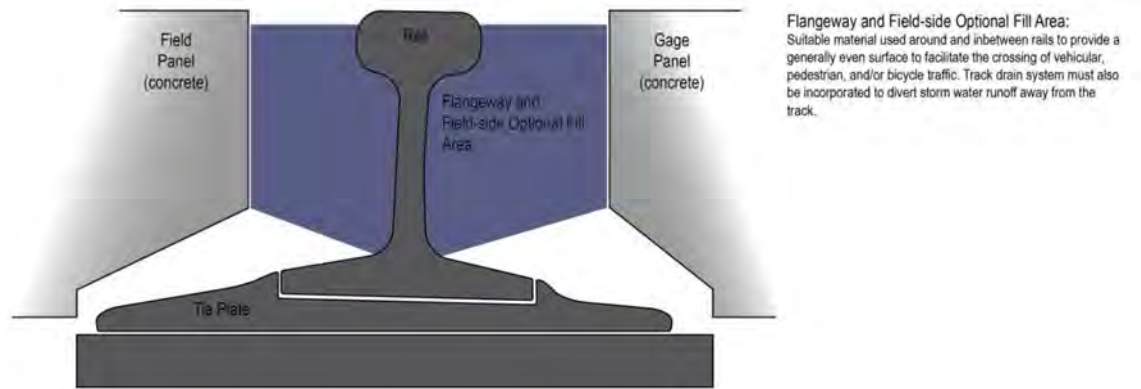
Electrical isolation is typically provided along the rails by means of an elastomeric boot design or by filling a trough surrounding the rails with a polyurethane material. The design of the concrete track slab is based on the streetcar vehicle, its weight, and geotechnical conditions. Flangeways in embedded track sections form natural conduits for storm water runoff. To prevent overflow along flangeways, a track drain system must be designed to





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effectively divert storm water runoff away from the embedded track. At a minimum, track drains should be located at the low points of vertical curves and upstream of special trackwork.



Embedded Track Components

There are two basic types of rail for streetcar systems, tee rail and grooved (or girder) rail. Tee rail is the most readily available and commonly used type of rail. It comes in different sizes and can be used for both open and embedded track systems. The second type of rail, grooved rail, is specifically designed for use in embedded track applications. Grooved rail includes a built-in small flangeway that is a significant advantage in the street environment where compatibility with pedestrians, wheelchairs and bicycles is required.

"Special trackwork" is required anywhere tracks converge, diverge, or cross one another. Embedded special trackwork includes turnouts and rail-to-rail crossing diamonds that vary in design and size from conventional railroad designs. The embedded special trackwork must be enclosed with an insulating material (such as concrete with an insulating liner or preformed fiberglass), or encapsulated in a rubber boot or other isolating materials.

Turning Radius

The urban nature of streetcar systems often requires sharper curve radii and steeper gradients than light rail systems (eg. MTS Trolley). The Uptown Streetcar alignment would follow the existing roadways through constrained urban areas. Each vehicle has its own turning radius constraints, so ultimate configuration depends on the vehicle type selected.





For purposes of this study, a turning radius of 82 feet was specifically used to evaluate possible end-of-line maneuvers.

MINIMUM TURNING RADIUS

82 feet: LRT standard (used for this study)

- Essentially unlimited vehicle selection
- May not always be practical for streetcar alignment

66 feet: Most commonly used for streetcars

- Wide range of vehicle choices

59 feet: Minimum threshold

- Smaller range of vehicle choices

Anything smaller than 59 feet requires custom vehicles

Horizontal and Vertical Alignment

The horizontal alignment of mainline tracks will be composed of a series of tangents joined together by spiral or circular curves. Superelevation will be used only when necessary. Similarly, the vertical alignment of mainline tracks will be composed of a series of tangents joined together by vertical curves. At streetcar stops, it is desired for the horizontal and vertical alignment to be tangent for the entire length of platform, and ideally extend at least 40 feet beyond the boarding area in each direction. This may be economically infeasible when following existing street profiles and special station platform studies will need to be performed. More specific design parameters relating to horizontal and vertical track layout would be identified in the preliminary design phase.

Standards and Codes

The track alignment for an urban, in-street system will generally follow standards and specifications established by local rail agencies and rail transit industry standard practice documents and specifications. Local standards and specifications provide a familiar source of design details and specifications that can aid designers and contractors. Industry standard practice documents include, but not limited to:





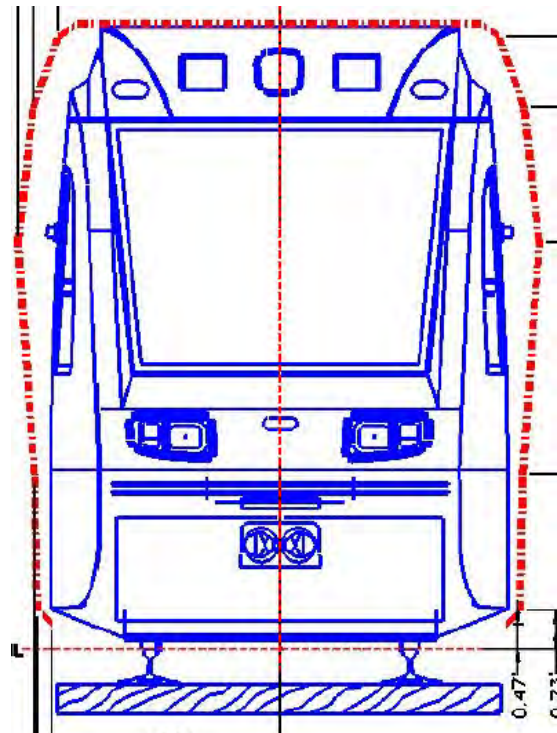
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- AREMA Manual for Railway Engineering and Portfolio of Track Work Plans
- TCRP Report 57 “The Track Design Handbook for Light Rail Transit”
- APTA Guidelines for Design of Rapid Transit Facilities

As part of the track design, clearances are required and must be established based on the dynamic outline of the streetcar system. A running clearance provides separation between permanent structures and the streetcar outline so that the vehicle has clear passage as it moves on its track. Safety spaces must also be provided to allow for emergency evacuation of streetcar passengers and to provide maintenance personnel an area to safely stand during passage of trains in restricted right-of-way areas.

TYPICAL CROSS SECTIONS

As streetcars are introduced into a roadway, it is important to provide enough width in the travel lane to not influence other lane maneuvers. For in-street tracks within a shared lane, the dynamic outline of the vehicle is used to establish traffic striping and lane lines. The desired minimum lane width is 12 feet with an absolute minimum of 11 feet. The dynamic outline of the streetcar vehicle includes the anticipated dynamic movement of the vehicle during operation and factors to account for wear of both vehicle and track components during the life of the system. The actual extents to which these factor affect the total design envelope is based on the specific vehicle selected and should be acknowledged during preliminary design.



Source: UTA Streetcar Design Criteria

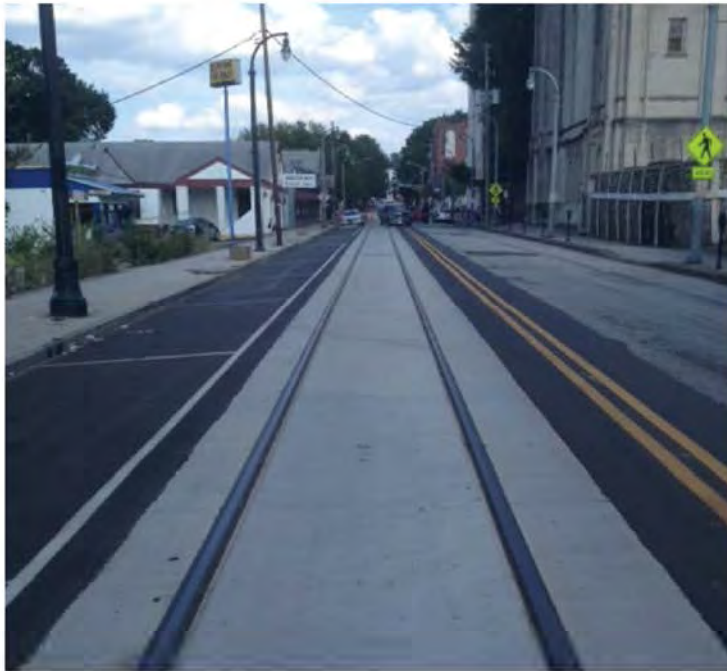
Example of Streetcar Dynamic Outline



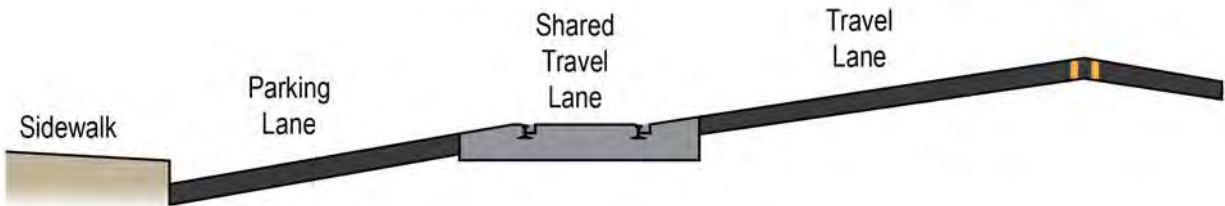


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Source: G.W. Peoples Contracting Co., Inc.



*Typical Cross Section:
Track slabs must be designed to provide a flat slope
between rails to prevent uneven rail and wheel wear.*





TOPOGRAPHY

The topography of the study area can impact the operations of a streetcar system. The maximum gradient (or slope of a hill) that streetcars can travel depends on its propulsion and braking systems. The number of wheels and the weight of the vehicle on those wheels affect the adhesion of the vehicle on the rails and in turn can affect how the vehicle operates on steep grades. While it is possible for streetcars to climb and descend considerably steep hills, challenging vertical alignments can increase vehicle and maintenance costs. Steeper grades can cause streetcar vehicles to overshoot stations as they descend hills, and create congestion as loaded vehicles struggle to travel uphill, affecting the overall quality of service of a streetcar line.

Most modern vehicles are limited to eight percent (8%) grades or less (an eight feet rise over 100 feet of horizontal distance equals an eight percent grade). On the other hand, heritage vehicles require grades of seven percent (7%) or less. Depending on the vehicle type selected and the length of the steep grade along the route, verification must be made that the vertical geometry will not impede the streetcar vehicular performance.

In San Francisco and Boston, streetcars are able to operate along grades as steep as 9%.

Major utilities include:

- Water
- Sewer
- Storm Drain
- Gas
- Cable
- Electrical
- Fiber Optic
- Telephone

UTILITIES

Streetcars operate on tracks placed in the streets which often contain active utility systems above and below the surface. Underground utilities can be installed anywhere within the right of way including under the street pavement, sidewalks, or landscaped areas. Consequently, streetcars introduce stray electric currents that could come in contact with metallic pipes buried in the ground. A major cost in placing tracks is the need to relocate or buffer existing underground utilities, depending on their





accessibility and impact from stray currents. Overhead utilities can also conflict with the overhead catenary lines that provide power along the streetcar route.

Within the Uptown streetcar corridors, underground utilities such as water, sewer, storm drain, electrical, and fiber optic lines are found. Water mains are generally 12 or 16 inches in diameter and required by City standards to be buried at depths of three to five feet. Electric lines service adjacent homes and business as well as other street facilities. Electrical lines are typically buried on the sides of the roadway adjacent to the curb about 30 to 42 inches beneath the surface.

The City of San Diego, through its Utilities Undergrounding Program, is currently relocating overhead utility lines underground throughout the City. This program moves the existing overhead utility system to a new underground system. As the streetcar moves into design along specific alignments, it will be necessary to obtain more details on proposed locations for future underground power lines and vaults and timing of improvements in the design area. Utility relocation will have a major impact to the project cost.

INTERACTING WITH AUTOMOBILES

Streetcars share a travel lane with automobiles and influence speed and capacity along the roadway. Automobiles are able to travel directly behind, in front of, or beside a streetcar, and use the lane with the tracks when no streetcar is present. In order to minimize automobiles driving directly on the rails, the track should be offset to keep the rails out of the wheel path of cars driving in the lane. The tracks must be placed in a way such that vehicle tires are wider than any gap on the tracks to ensure vehicles' tires won't get trapped. This applies to all rubber-tired vehicles, including motorcycles.

Streetcars can be placed either in the curbside traffic lane or in the lane adjacent to a median. Passengers

Streetcars share a travel lane with rubber tired vehicles and are generally subject to the same traffic control measures.





can board on the left or right side of the car and most vehicles are bi-directional so the placement of the tracks is based more on interactions with existing uses than limitations of streetcar operations.

Streetcars are generally subject to the same traffic control measures as automobiles (stop-signs, signals, free movements), with the exception of at end-of-line or transition maneuvers that require crossing conflicting traffic. Where streetcars require crossing other lanes of traffic or performing a left or right hand turn at intersections, special signals may be required to control streetcar movements. These signals must be designed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) to be distinctive to the streetcar and separated from general traffic signals.

With stops every few blocks and slower speeds than automobiles, streetcars function as a traffic calming measure but do not reduce the number of travel lanes on the roadway. The effect that streetcars have on the speeds and capacity of a roadway depends on the frequency and size of streetcar vehicles. Streetcars typically have a higher frequency during non-commute times and less frequency during high commute times, as they are not intended to be used for commuter trips. This allows automobiles to have less delay caused by streetcars during the heavy commute times.

INTERACTING WITH BUSES

Similar to automobiles, streetcars may also share a travel lane with buses. Where bus routes and streetcar routes overlap, there is potential to share facilities for loading and unloading passengers. Sharing stops with buses can be advantageous; it can reduce costs and save space as well as improve passenger convenience. However, implementing shared stops can also add challenges in determining the size, location and height of these station platforms to meet the needs of both users. Coordination is required to ensure that the height of the platform is compatible with both the streetcar and buses. At shared curbside stops the platform height and configuration must be designed to provide access to the front





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and rear doors for both a standard bus and streetcar. The average platform height for shared stops is 10 inches.

Shared Bus/Streetcar Platform; Near-Level



Having multiple vehicle types sharing a platform impacts both platform height and length. This image shows a bus sharing a 10 in. near-level streetcar platform in Portland.

Shared Bus/LRT Platform; Fully Level



Buses and light rail sharing a 14 in. platform in Seattle, where special mitigations have been applied (pavement ramp adjacent to platform edge and larger tires on bus).

Source: APTA Modern Streetcar Vehicle Guidelines

Shared stops should be considered for the streetcar within the Uptown community to minimize the impacts to parking and costs. However, as station locations are developed and evaluated, split stops or adjacent stops may be more appropriate than shared stops depending on specific area constraints, traffic congestion, and bus route capacity. This will be evaluated during preliminary engineering.

INTERACTING WITH BICYCLES

Embedded streetcar tracks present potential hazards to bicyclists crossing or riding along the streetcar corridors. In general, the Uptown streetcar infrastructure must be designed to minimize the number of situations in which a bicyclist must cross the streetcar tracks at an unsafe shallow angle. Right-side running tracks and locations in which streetcar tracks curve are the most problematic. Signs and pavement markings can be used to assist cyclists in maneuvering around these problematic areas. Separating bicycle and streetcar travel is recommended whenever possible and can be accomplished by strategies such as:

- developing a parallel bikeway facility along an adjacent corridor;
- placing bikeways on the left side of the street along one way corridors;





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- having marked bikeways adjacent to the tracks with platforms that are designed such that bicyclists can bypass the pedestrian zones without encountering waiting pedestrians; and
- offering 90 degree track crossings whenever possible.

Although there are no formal design guidelines for bicycle accommodation related to streetcar lines, successful practices currently exist. The City of Portland's Lloyd District Transportation Management Association (LDTMA) prepared a document in 2008 titled "Bicycle Interactions and Streetcars, Lessons Learned and Recommendations". This document presents integration treatments and practices currently in use throughout the world and can be used to help develop safe bicycle and streetcar facilities throughout the Uptown community. Notable treatments from the document include Nottingham, England and Switzerland.

In Nottingham, the primary focus has been on creating an alternative low-traffic bicycle route paralleling the streetcar line. Prominent signage has been installed to direct cyclists to the alternate route and to help them find the best crossing opportunities. In Switzerland, sidewalk detours are used at curbside streetcar stations. However, it is suggested that this practice only be installed in uphill stretches where cyclists' speeds are low.



Bern, Switzerland: Bicycles are routinely routed onto the sidewalk to bypass tram stops, but policy states that this is only appropriate on uphill grades.

Source: City of Portland's Lloyd District Transportation Management Association (LDTMA) "Bicycle Interactions and Streetcars, Lessons Learned and Recommendations".

Throughout most other European cities, the streetcars are center running with separate bicycle facilities curbside. This treatment gives a great degree of separation between the two modes. At intersections, bicycle left-turn movements are made with box turns (also known as Copenhagen/Melborne left turns or jughandles) whereby cyclists turn right into a receiving box where they are repositioned parallel to the crossing street and just have to continue straight. These facilities help facilitate right-angle turns for the bicyclists and are





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easy to incorporate into signalized intersections. Other, less universally used solutions include color pavement to highlight conflict areas and pavement markings at tracks to indicate where bicyclists should yield to streetcars.



Troisdorf, Germany: Bicyclist directed to right to make a "box left" turn.



"Melbourne left" – Bicyclists directed to right in order to make left turn in Vancouver, BC.



Bicyclists are directed off the street and onto a separated bike path in order to cross the tracks at a right angle at this Portland MAX stop.



After bicyclists have been directed off street they cross the tracks at a right angle at this North Interstate MAX stop.

Source: LDTMA "Bicycle Interactions and Streetcars, Lessons Learned and Recommendations".

INTERACTING WITH PEDESTRIANS

Pedestrian interactions with a streetcar are similar to pedestrian interactions with a bus or other rubber-tired vehicle on the roadway since the streetcar operates in mixed-flow traffic





and follows the same traffic control features as other vehicles. To minimize the risk of pedestrian conflicts, streetcar systems generally come with pedestrian facility improvements at crossings along the route to enhance pedestrian visibility if appropriate features are not in place. Further, other pedestrian facility improvements are typically implemented to provide enhanced station access.

Pedestrian crossing locations at intersections should be controlled by an all-way stop control or traffic signal and accompanied by a striped crosswalk. The streetcar would follow the stop or signal control the same as other vehicles. At pedestrian crossing locations away from intersections, crosswalks may be supplemented by passive or active signs, flashing beacons, or movable gates; as approved by the City. Crosswalks away from intersections should be placed where there is adequate stopping sight distance for the streetcar to slow down and stop prior to reaching the crosswalk when a pedestrian is present.

One feature of installing an in-street track that needs to be considered when discussing pedestrians is that the track's flangeway gap must comply with ADA standards at crosswalks and other locations where pedestrians can be expected to cross the tracks.

INTERSECTION CONTROL

The streetcar must follow standard roadway traffic laws and obey traffic signals as any other vehicle. It is the responsibility of the streetcar operator to maintain a proper speed and be in accordance with all local traffic laws and operation rules. At intersections, streetcar movements can be controlled by normal traffic signal operations. At locations where the streetcar must make a left-turn movement, transition into another lane, or perform another special movement, special transit-only signals must be provided. These transit signals must be physically separated from the existing traffic signals and use transit-only display indications consistent with the MUTCD. Further, the streetcar must have a way to get to and cross the intersection when all other vehicles are stopped. Often times this is accomplished by placing a station at the intersection so that the streetcar stops at the





intersection to board and alight and then can activate the streetcar-only phase of the signal from the station and proceed. This is not always feasible and other means of signal and lane layouts are used. Examples include:

- Separated right-of-way through the intersection
- Providing a transit only queue jump area
- Sharing space with a turn lane

Where a pedestrian and bicycle crossing is part of a signalized street intersection, control can be provided by the standard vehicle, pedestrian, and bicycle traffic signals.

PARKING

Parking impacts from a streetcar system vary depending on the location of the streetcar alignment within the street and the stations along the route. The Uptown community has a high parking demand and any potential loss of parking spaces is a sensitive issue that needs to be addressed. In addition, there are special considerations for parking next to a travel lane that hosts a streetcar track.

Median-running streetcar routes have the least impact to parking, using the median for stations and typically being separated by another travel lane from curbside angled or parallel parking. Curbside streetcar routes can either remove all street parking (if placed directly adjacent to curb) or remove parking at station locations (if placed in the travel lane adjacent to a parking lane). In the Uptown community, curbside routes in the travel lane adjacent to parking fit the roadway cross-sections best, except on portions of University Avenue where median-running can be considered.

PARKING SPACES ALONG THE ROUTE

Median-running alignments do not typically affect parking along the route, as parking is usually curbside and does not conflict with the streetcar.





Curb-running alignments that are truly adjacent to the curb typically result in removal of parking for the entirety of the route. This is usually applicable in areas with confined cross-sections or where parking can be consolidated on the opposite side of the street.

Curb-running alignments that use the travel lane closest to the curb but are separated from the curb by a parking lane are able to keep parallel parking along the route, with special provisions applied. This alignment is most applicable to the Uptown community, especially along Fourth, Fifth, and Sixth Avenues. With integration of a streetcar in this set-up, parallel parking spaces can remain in place, but need to be regulated such that parked cars do not interfere with the streetcar track. While parallel parking spaces may or may not be marked along a standard roadway, it is essential that limits are defined when a streetcar is in the adjacent travel lane. Should a car park in a way such that they extend beyond the set limits, it could impede on the streetcar's outline and create a barrier and potential hazard to the streetcar. Since streetcars are on a fixed route, they are not able to maneuver around a vehicle that impedes on their space. To maintain streetcar flow and avoid potential incidents between a parked car and streetcars, parking needs to be heavily regulated and instant towing should be applied to vehicles that extend beyond the set parking limits.

Accessing parallel parking adjacent to a streetcar mixed-flow lane is no different than accessing parallel parking in standard travel lane. Streetcars have the ability to slow down and wait for a car that is parking or leaving a parking space, similar to any rubber-tired vehicle.

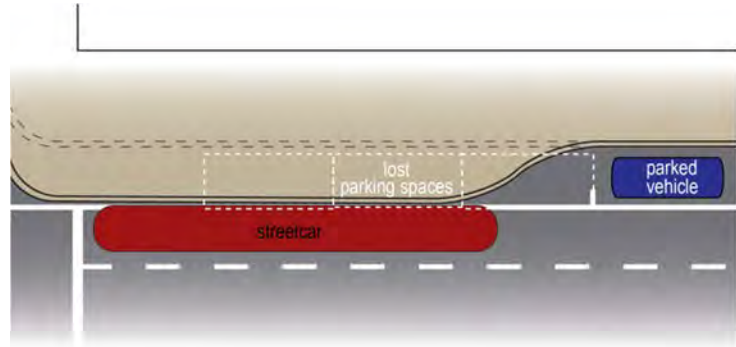
For safety reasons, angled parking is not permitted directly adjacent to a streetcar route. The ability to see oncoming streetcars prior to backing up (or pulling out if reverse angle parking) is impaired by the adjacent cars. Vehicles would need to encroach into the streetcar track space before being able to see if a streetcar is approaching, which creates safety concerns for both parties.





PARKING LOSS AT STATION LOCATIONS

For streetcar alignments that use the travel lane closest to the sidewalk but separated by a parking lane, bump outs are used at each station location to extend the sidewalk to reach the streetcar vehicle. For discussion purposes, it is assumed the average length of a bump out is 66 feet, which is roughly equivalent to the loss of three parallel parking spaces.



*Typical Curbside Station:
Loss of 3 parallel parking spaces*

While streetcars do attract riders that may otherwise be driving and using the parallel parking space, there is typically a latent demand for parking spaces that does not equate to a direct offset between streetcar ridership and the need for a parking space. As a result, the parking spaces being removed at each station are still in demand. Adjacent property owners may be hesitant to support placing stations directly outside of their business due to the associated parking loss. However, the visibility from streetcar riders that a business directly in front of a station gets can be seen as a benefit that may outweigh the parking loss (i.e exposure to the people loading and unloading at the station, those on the streetcar, and those waiting for the next vehicle).

Parking loss is an important aspect of choosing station locations and should be considered in each instance and discussed with the adjacent property owners. Whenever possible, streetcar stations may share space with bus stops to minimize the impacts to parking.





PARKING STRATEGIES

There are several parking strategies that can be applied to offset parking losses or encourage streetcar use.

Convert Parallel Parking to Angled Parking

To accommodate for parking spaces lost with streetcar implementation, several jurisdictions have found areas along the route or on side streets adjacent to the route where they are able to convert parallel parking to angled parking. Angled parking provides the opportunity to fit more parking spaces along a curb line, but requires additional room in the roadway cross-section. This strategy is most effective if the converted parking is in the immediate area where parking was lost, either across the street from the streetcar or along an adjacent side street.

Park-and-Rides

Streetcars can create a demand for new parking for those not living within walking distance of a streetcar station. People from outside of the area may still drive to the area and use the streetcar for circulation once in the community. This presents an opportunity to have park-and-ride lots where people can park their automobile and use the streetcar to get to their ultimate destination. While new parking lots can be created near stations to promote this idea, existing parking lots and structures provide the easiest implementation. Existing pay-to-park parking lots can provide incentives for parking for those that ride the streetcar to encourage use of the parking lot and the streetcar. This strategy is easy for the user as well, providing them a destination to park their car without having to search through the community. The Uptown community has several under-utilized parking areas that could be adapted to park-and-ride lots to compliment the streetcar service. Lots could provide 24-hour access or limited after-hour and weekend access for streetcar users.

Share Space

When placing stations, look for opportunities to share space with a bus stop, bikeshare program, or other designated non-parking areas that currently take up curb space.





END OF THE LINE

The turnaround design depends on the vehicle type. A double-ended, double sided vehicle presents different options than a single-ended, single-sided vehicle.

If a single-sided, single-ended vehicle is used (such as the historic PCC model), it is necessary to build turnaround locations at each end of the line which can add significant cost to the line and added complications. Turnaround operations typically are accomplished using either a turntable or a track loop. A turntable allows for a streetcar to pull onto a dais platform, rotate 180 degrees, and then proceed in the opposite direction. A track loop requires additional track space to allow the vehicle to turn around and proceed in the opposite direction.

If double-sided, double-ended vehicles are used (all other studied vehicles), a far-side station can be used to “lay-over” and switch directions. Signal priority treatment most likely will be required at the nearby intersection to allow for the change in direction to occur.

In 1996, Dallas opened its new Light Rail system and began an expansion project connecting both ends of their vintage 1980 trolley service. This expansion opened in June of 2002, connecting the Arts District near Downtown Dallas with the shops and nightlife of the Uptown neighborhood with a free weekly shuttle service known as the “M-Line Streetcar.” Most notable feature of the line extension is an operating turntable at the end of the line, used to turn the single-ended ex-Toronto PCC cars.





STORAGE AND MAINTENANCE FACILITY

A storage and maintenance facility is required to support and house the streetcar vehicle fleet. There can be one large facility or several smaller facilities, depending on the available area to place a facility and the size of the proposed fleet. As the facility location(s) is evaluated, the ability for future expansion must be considered.

Facility Location

The streetcar storage and maintenance facility must be located along the streetcar route so that it is accessible by the streetcar vehicles for storage every night. Typically facilities are placed at the end-of-line to create a natural ending and beginning place for streetcar operations. Facilities are also typically placed at the end-of-line where there are potential expansion opportunities so that the expanded line can also easily utilize the facility. Ideally there are available sites that meet these criteria, but with built out areas the location of the facility may be placed anywhere along the route that there is available space. As long as the site provides suitable facility access, grades that can be navigated by the streetcar vehicles, and adequate space to house the streetcars and provide maintenance, it has potential to house a facility.

The most conventional way to site a facility is to find a vacant lot or an industrial site, buy the land, and build the facility. In a community such as Uptown, these sites may not exist, therefore other strategies need to be considered.

Mixed-use developments can provide an option for integrating a facility into the community without taking exclusive real estate space. Offering financial incentives to private developers to incorporate a facility into their site may be a feasible option in areas where there is limited vacant space.

Redefining existing unused spaces can provide non-traditional options for placing a facility. For example, placing the facility under an existing bridge or freeway ramp





redefines the space currently seen as unusable. This approach requires creative thinking to determine potential location options and the challenges that go with them, but can prove to be beneficial in built out areas.

Using public facilities can provide opportunities to build within existing jurisdiction right-of-way. Combining the facility with a public parking garage, public school, library, or park/open space are options that should be considered.

- In Seattle, the maintenance and storage facility is part of a mixed-use development
- In Portland, the facility was placed in unused space below a freeway overpass
- In Tucson, the facility was created as a visible landmark identifying the importance of the system and its integration into the community

Facility Size

The potential size of the facility will need to be known before potential locations are evaluated. There can be storage-only facilities to house the vehicles at night and provide employees services and parking, or there can be combination storage and maintenance facilities that also provide storage bays and space for maintenance of the vehicles, including room to store extra track and parts.

Storage-only facilities can be placed on parcels about one-acre in size. This size of facility can store about 20 streetcar vehicles and provide necessary amenities.

Combined storage and maintenance facilities typically need about four acres of land. This assumes storage of up to 50 streetcars and room for the necessary maintenance services.





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4 | PHASE 1: NORTH-SOUTH CONNECTION



Phase 1 of the Uptown Streetcar would be a north-south connection using Fourth, Fifth, or Sixth Avenues between the community boundary to the south and University Avenue to the north.

While this study focuses on the Uptown community itself, it is important to note that connections further south beyond the community boundary provide the potential for access to existing rail line on C Street, access to the existing MTS maintenance and storage facility, and connections with the downtown community that could prove beneficial to the Uptown Streetcar.





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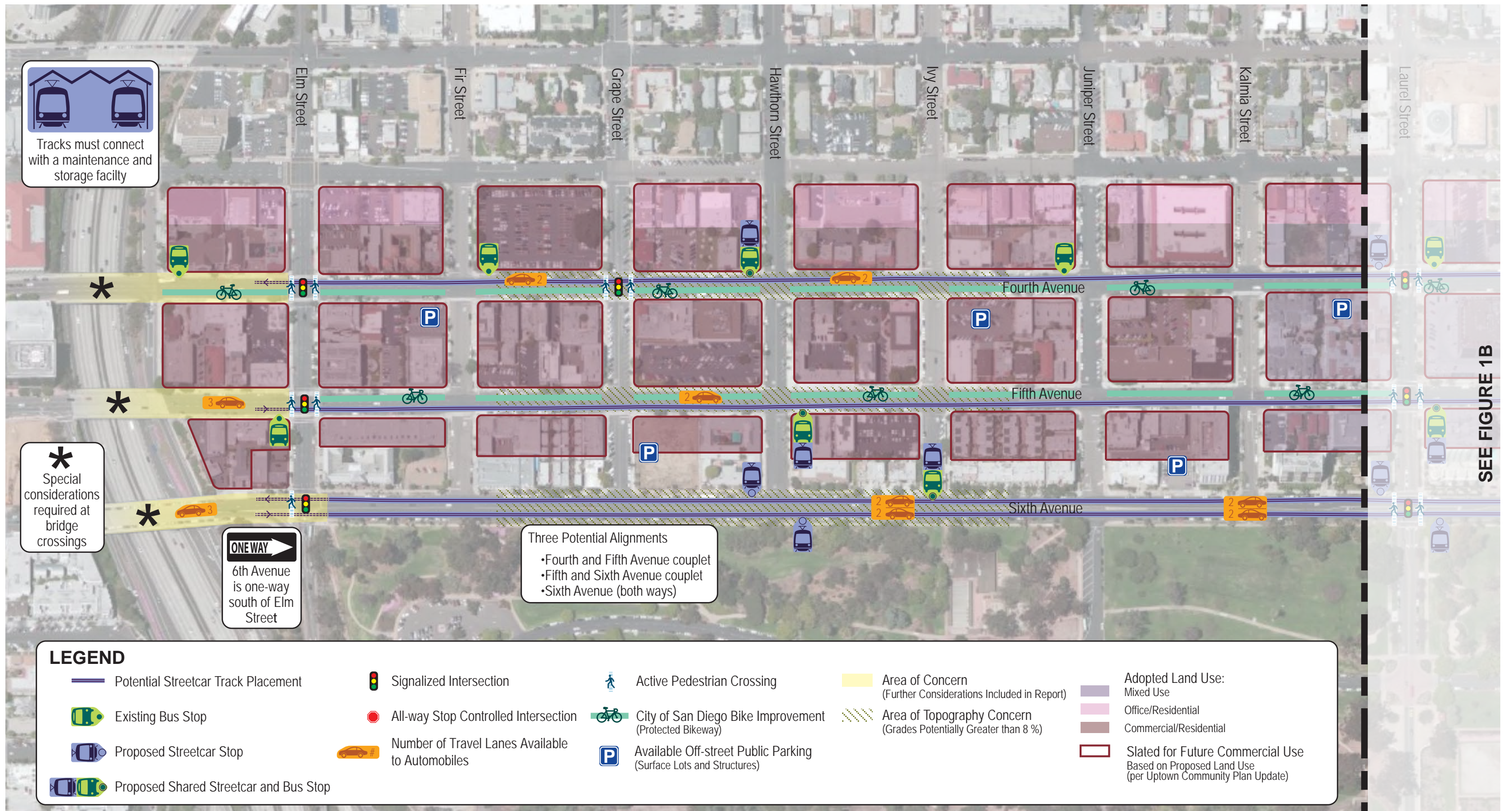
There are three potential alignments for Phase 1:

- Fourth and Fifth Avenue couplet
(northbound on Fifth Avenue and southbound on Fourth Avenue)
- Fifth and Sixth Avenue couplet
(northbound on Fifth Avenue and southbound on Sixth Avenue)
- Sixth Avenue only
(northbound and southbound on Sixth Avenue)

Figures 1A, 1B, and 1C present the following information on the Phase 1 alternatives:

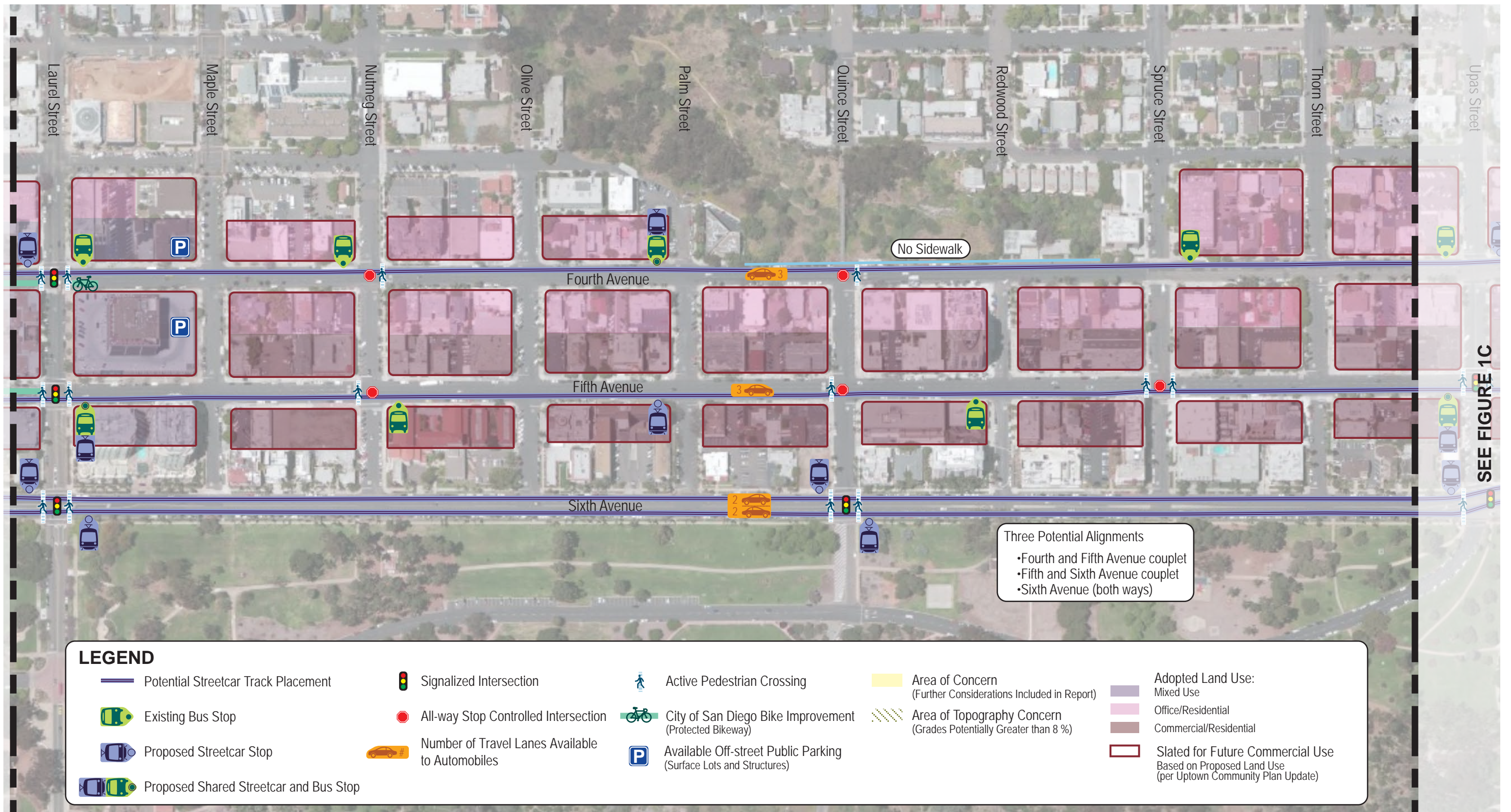
- Existing traffic control
- Existing bus stops
- Existing pedestrian crossings
- Existing land uses
- Existing bicycle facilities
- Number of travel lanes
- Proposed land use redevelopment areas
- Proposed streetcar in-street alignment
- Proposed streetcar station locations
- Identified areas of concern (bridges, steep grade, lack of access to storage and maintenance facility)







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SEE FIGURE 1C



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Storage and Maintenance Facility

Having a storage and maintenance facility along the streetcar route is required to be able to provide service. As part of Phase 1, the location of this facility is critical to getting the streetcar implemented.

MTS has a storage and maintenance facility for their LRT vehicle fleet near the intersection of 12th and Imperial Avenues that could be accessed from the Phase 1 alignments via C Street in downtown. However, MTS has expressed capacity concerns with both C Street rail and the storage and maintenance facility as they are heavily used by the LRT system and further expansion is planned. Use of the existing storage and maintenance facility may be possible via a different route through downtown and additional capacity upgrades at the facility itself.

Another possibility is the use of the existing City of San Diego Central Operations Station at the intersection of B Street and 20th Street. Use of this facility would require a connection to downtown. While the location identified is outside of the Uptown study area, this potential option should be considered as decision-makers continue to explore where appropriate maintenance facilities would be feasible.

Should a connection to downtown not be provided, a new maintenance and storage facility would need to be constructed within the Uptown Community along the streetcar route. This would require finding a site large enough to house a facility and providing the upfront costs to construct the facility. A benefit of pursuing a new facility within Uptown is that it would alleviate the need for crossing Interstate 5 and the associated cost of bridge improvements.

Finding a location within the Uptown community to develop a new streetcar storage and maintenance facility may be difficult, and most likely will require combination with another development or creative adaption to existing space such as:





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- Utilizing future redevelopment opportunities to create a mixed-use development that houses the storage and maintenance facility.
- Use existing parking areas to create a shared parking and streetcar facility structure.



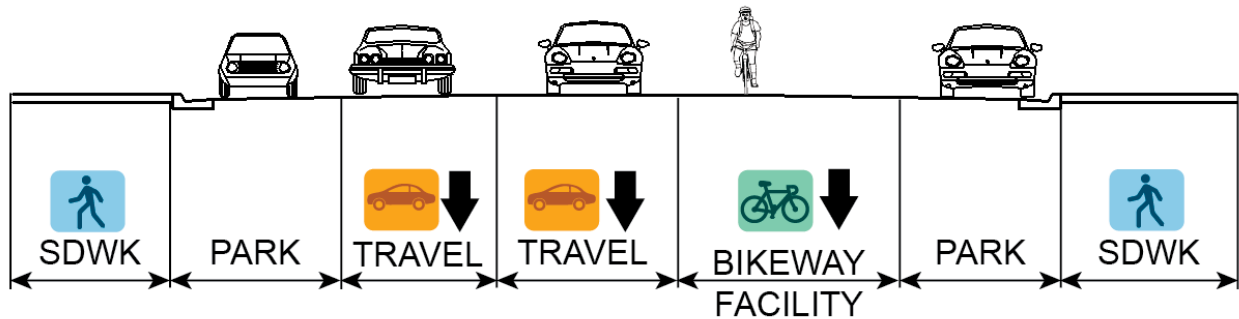


FOURTH AND FIFTH AVENUES COUPLET

This potential alignment would have the streetcar travel northbound on Fifth Avenue and southbound on Fourth Avenue, using the right-most travel lane on each road.

Roadway Cross-sections

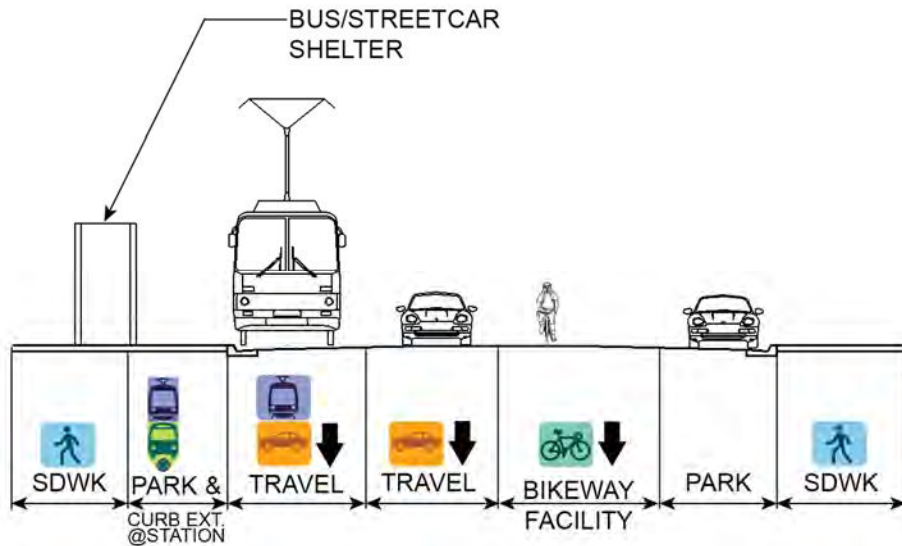
The planned bicycle improvements implemented this year reduced the vehicle travel lanes from three to two on sections of Fourth and Fifth Avenues to provide dedicated space for bicyclists. The resulting cross-sections and the proposed cross-section with addition of the streetcar line are shown below. Users of each portion are also presented on the cross-section to help correlate the cross-section with Figure 1.



*Fourth and Fifth Avenues
 Existing Cross-section with Planned Bike Improvements*



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*Fourth and Fifth Avenues
Proposed Cross-section with Streetcar*

As shown, the streetcar would use the farthest right travel lane, separated from the curb by the existing parking lane.

Intersection Control

The streetcar would not be required to change travel lanes except at end-of-line treatments. Intersections outside of the end-of-line maneuvers would not require special considerations or improvements unless warranted for traffic priority or other purposes.

End-of-Line Treatments

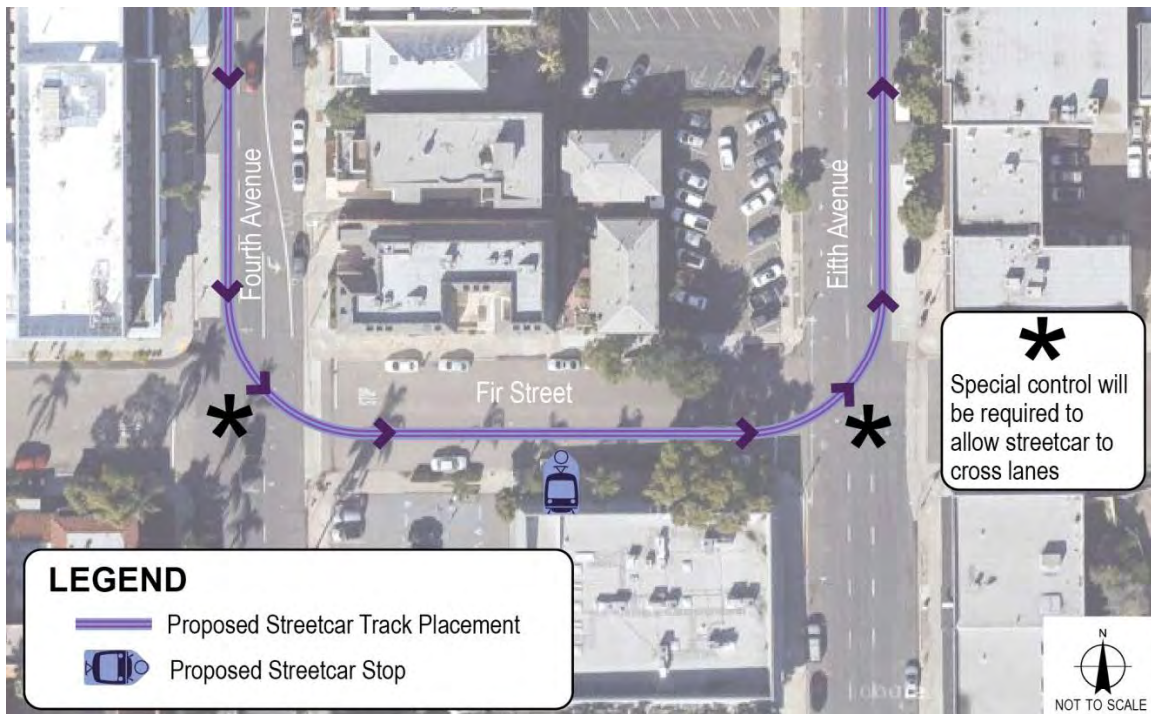
The end-of-line at the southern end of the route is heavily dependent on whether or not a connection to downtown is provided. If a connection to downtown is provided, end-of-the line concerns would be outside of the study area. However, one possibility is the use of Park Boulevard to loop between A Street and B Street. In this possibility, the route would extend southbound on Fourth Avenue to A Street, run eastbound on A Street, loop at Park Boulevard, and then run westbound on B Street to Fifth Avenue and north to the study area. With this, connections can be made to a possible storage and maintenance facility at the intersection of B Street and 20th Street and the City/Park streetcar line.





Possible Downtown Connection

If a connection to downtown is not provided and facilities are kept within Uptown, the streetcar could use Fir or Grape Street to loop between Fourth Avenue and Fifth Avenue. Use of either of these streets would require intersection modifications to allow the streetcar to cross traffic. Grape Street would lose its angled parking on the south side.

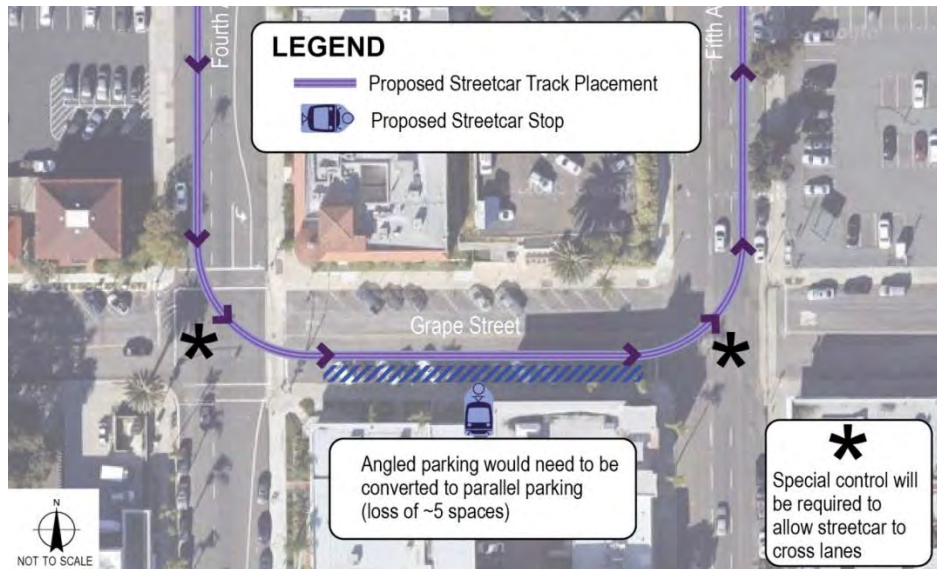


Potential End-of-Line using Fir Street



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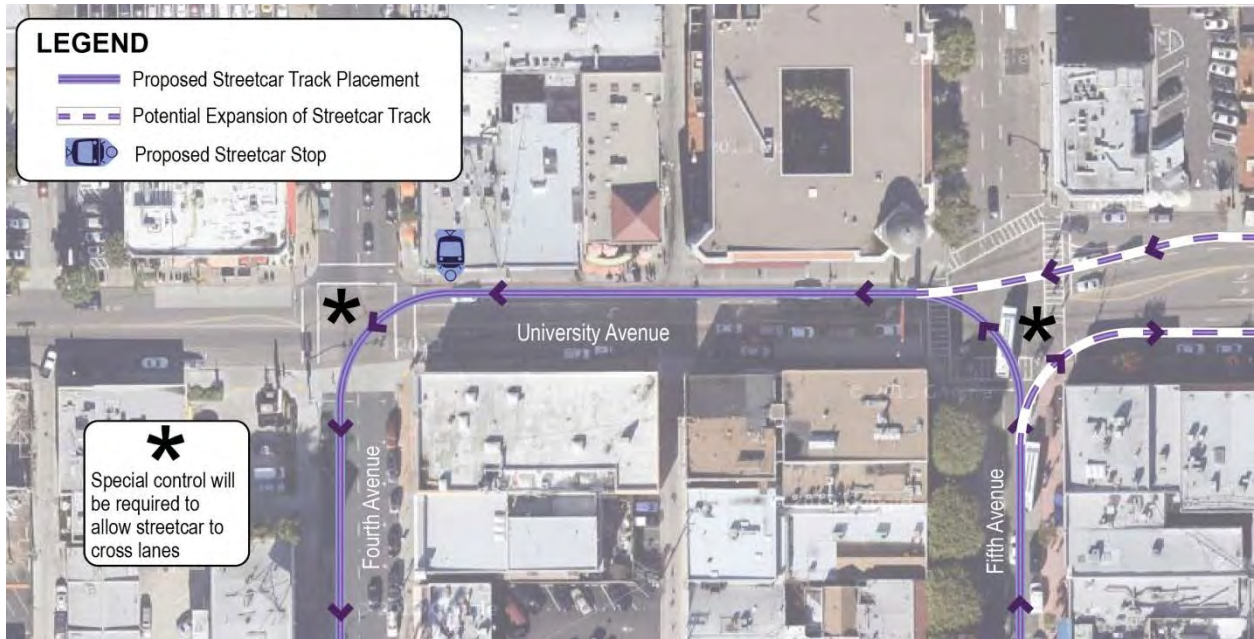


Potential End-of-Line using Grape Street

The end-of-line at the northern end of the route could be accomplished using University Avenue to loop between Fifth Avenue and Fourth Avenue. This section of University Avenue is narrow compared to the areas east of Fifth Avenue, with approximately 40 feet curb-to-curb. The streetcar would be in the far right travel lane of Fifth Avenue and travel through the signalized intersection of at University Avenue to join the far right lane on University Avenue. From there, it would travel a single block and travel through the signalized intersection at Fourth Avenue to join the far right travel lane on Fourth Avenue. Since the streetcar is making left turns at both intersections, there is adequate room to maneuver; however, the signals would need to be modified to provide streetcar-only phases to avoid conflicts with vehicles, bicyclists, and pedestrians.

With this alignment there is potentially room for a streetcar station on University Avenue between Fourth and Fifth Avenues. There is an overhead “Hillcrest” sign along that block that could prove to be challenging for the overhead catenary system design. Future expansion of the streetcar along University Avenue (Phase 2) could be accomplished by having the streetcar turn right from northbound Fifth Avenue to eastbound University Avenue, and utilize the tracks from this phase for westbound University Avenue to turn south onto Fourth Avenue.





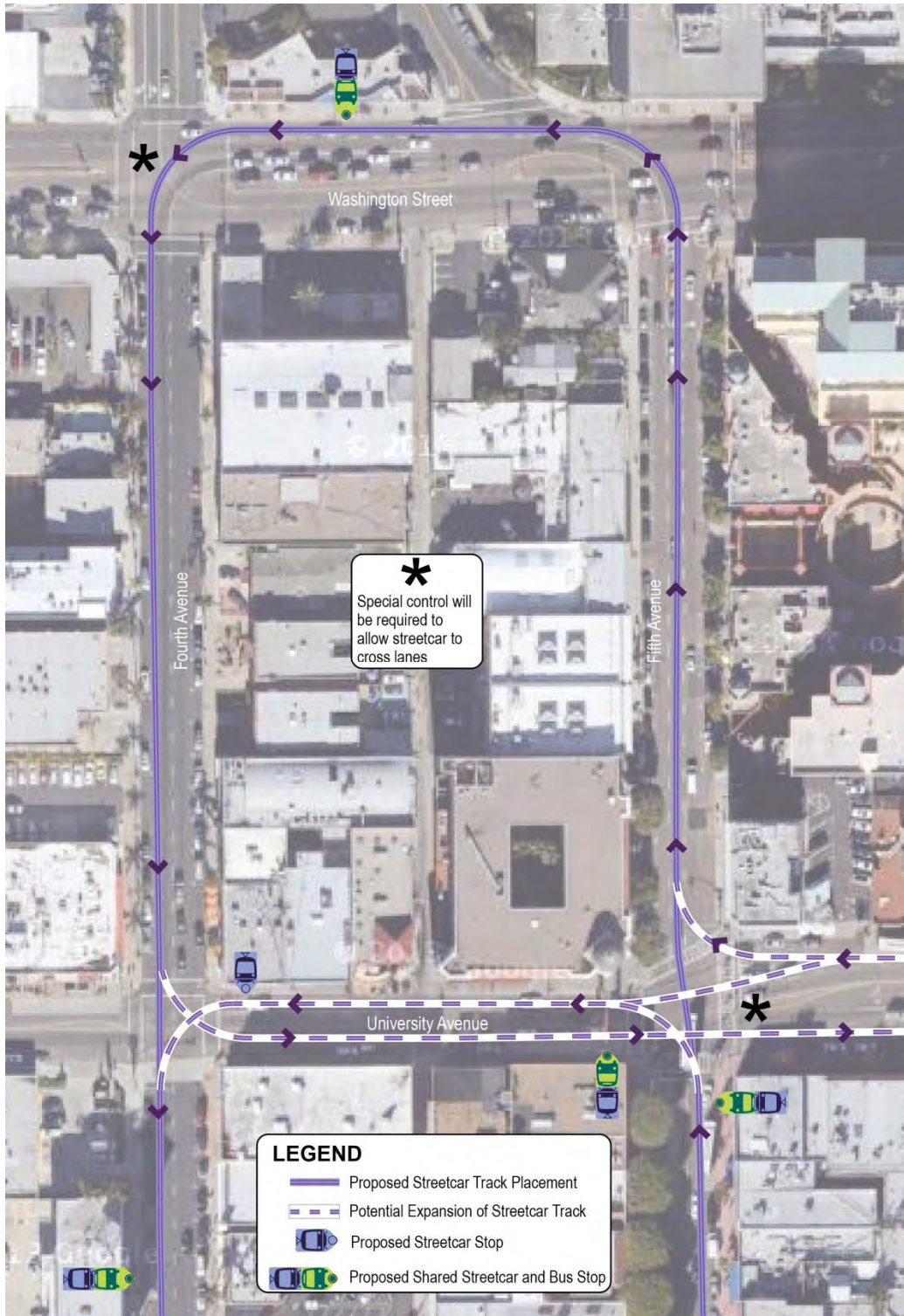
Potential End-of-Line using University Avenue and Future Phase Expansion

As an alternative to using University Avenue to turn around, the streetcar route could extend farther north to Washington Street to loop between Fourth and Fifth Avenues. The streetcar would have a similar path of travel as it would for the University Avenue loop, making two left turns at signalized intersections. There is an existing bus stop on this block of Washington Street that could potentially be shared with the streetcar. One benefit of extending the route to Washington Street is providing access to the Medical Complex area and an additional block of commercial uses along Fourth and Fifth Avenues.



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Potential End-of-Line using Washington Street and Future Phase Expansion





ADVANTAGES OF THIS ALIGNMENT

Project Goals

- Maximizes economic development opportunities by providing tracks along commercial redevelopment areas on Fourth and Fifth Avenues

Bicycle and Pedestrian Interactions

- Buffered bike lanes on the left side of Fourth and Fifth Avenues do not interfere with streetcar tracks
- Intersections are all at 90 degrees, facilitating perpendicular bicycle crossings
- Route is along two one-way streets, making pedestrian crossings easier with less conflict points and only one direction of traffic to cross

Intersection Treatments

- End-of-the-line treatments are at existing signals and include two left turns, minimizing impacts to existing street network
- Potential use of Washington Street provides more room and options for end-of-line at north end

Parking

- Most potential to share space with existing bus stops, reducing the amount of parking lost

Future Connections

- Fourth and Fifth Avenues continue to C Street with similar roadway layout, providing an easy-to-integrate connection to downtown





DISADVANTAGES OF THIS ALIGNMENT

Intersection Treatments

- There are seven all-way stop controlled intersections (more than other potential alignments)
- End-of-line treatments at Fir Street or Grape Street require intersection modifications to allow the streetcar to cross traffic
- End-of-line treatment at University Avenue or Washington Street would require modification to existing signals to provide streetcar-only phases to avoid conflicts with vehicles, pedestrian, and bicyclists

Parking

- If Grape Street is used for end-of-line turnaround, angled parking on the south side of Grape Street would be lost

Future Connections

- Potentially need to cross two bridges (to access downtown)
- Must connect to a storage and maintenance facility



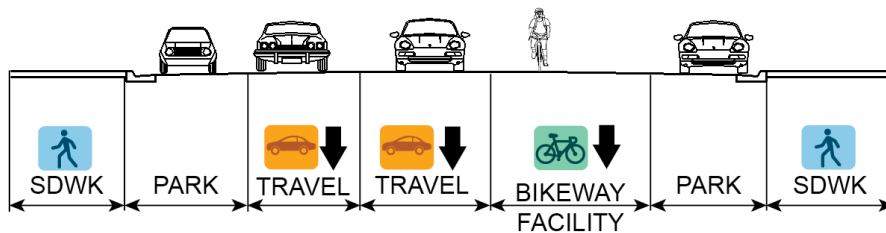


FIFTH AND SIXTH AVENUES COUPLET

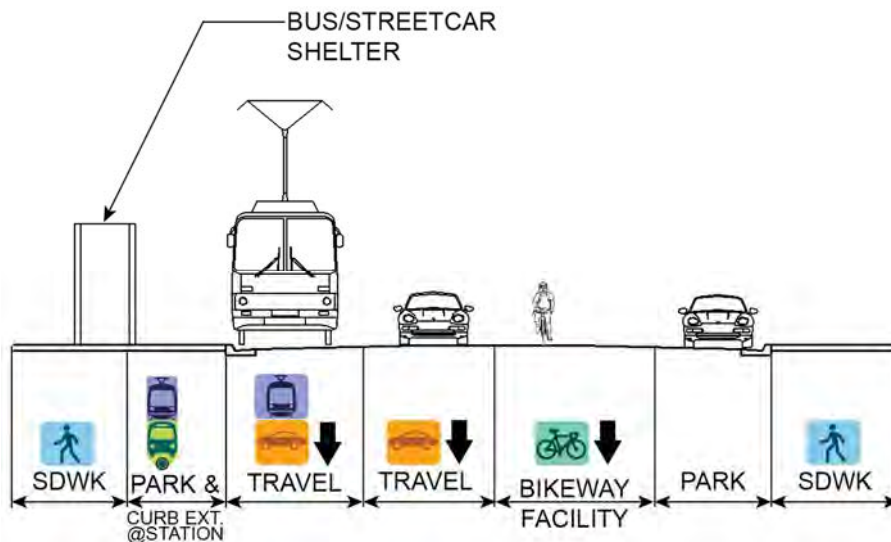
This potential alignment would have the streetcar travel northbound on Fifth Avenue and southbound on Sixth Avenue, using the right-most travel lane on each road.

Roadway Cross-sections

The existing with planned bicycle improvements and proposed with streetcar cross-sections for Fifth Avenue are shown below. Users of each portion are also presented on the cross-section to help correlate the cross-section with Figure 1.



Fifth Avenue
Existing Cross-section with Planned Bike Improvements



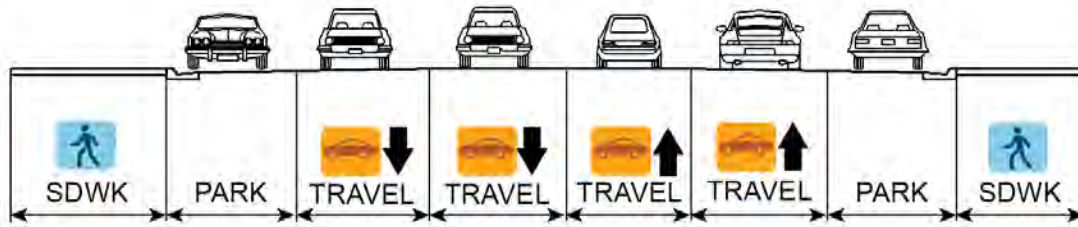
Fifth Avenue
Proposed Cross-section with Streetcar



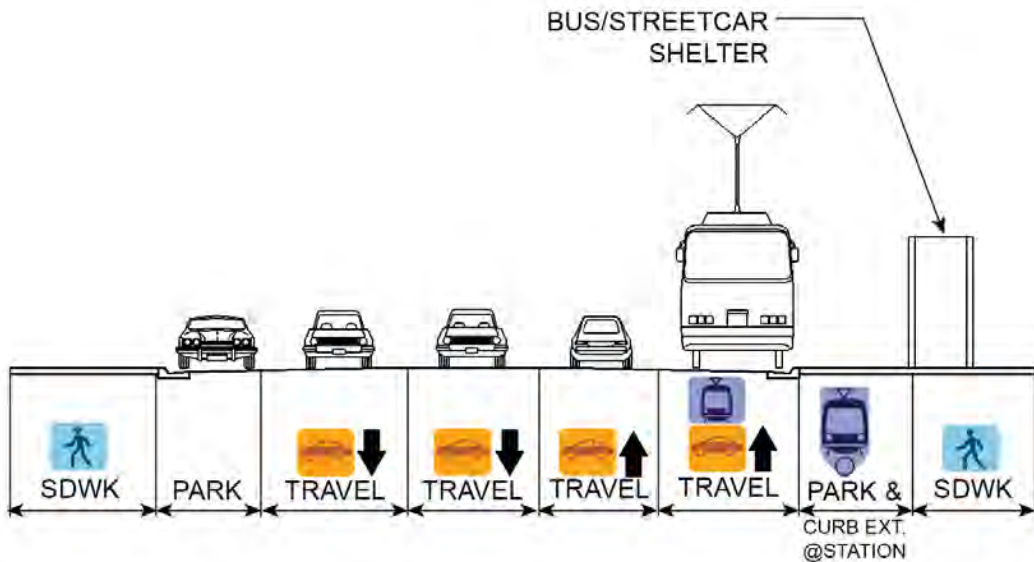
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As shown, the streetcar would use the farthest right travel lane and be separated from the curb by the existing parking lane.

The existing and proposed cross-sections for Sixth Avenue are shown below. The streetcar would use the farthest right travel lane, separated from the curb by the existing parking lane.



*Sixth Avenue
Existing Cross-section*



*Sixth Avenue
Proposed Cross-section with Streetcar*

As shown, the streetcar would use the farther right travel lane and be separated from the curb by the existing parking lane.



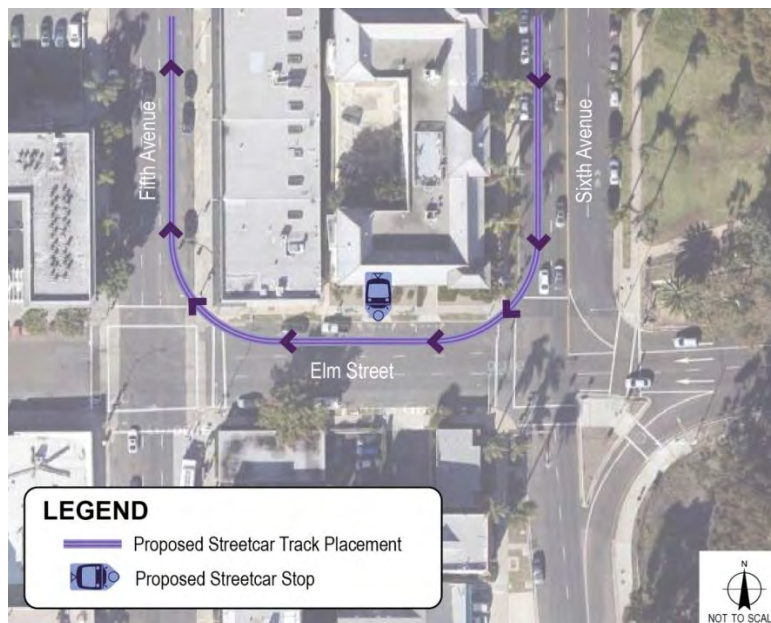


Intersection Control

The streetcar would not be required to change travel lanes except at end-of-line treatments. Intersections outside of the end-of-line maneuvers would not require special considerations or improvements unless warranted for traffic priority or other purposes.

End-of-Line Treatments

The end-of-line at the southern end of the route is heavily dependent on whether or not a connection to downtown is provided. If a connection to downtown is provided, end-of-the line concerns would be outside of the Uptown community and correspondingly outside of the study area; so details are not provided in this study. If a connection to downtown is not provided and facilities are kept within Uptown, the streetcar could use Elm Street to loop between Sixth Avenue and Fifth Avenue. This would require two right turns at the signalized intersections on Elm Street.



Potential End-of-Line using Elm Street

The end-of-line at the northern end of the route could be accomplished using University Avenue to loop between Fifth Avenue and Sixth Avenue. This would require two right turns at the signalized intersection on University Avenue. With this alignment there is

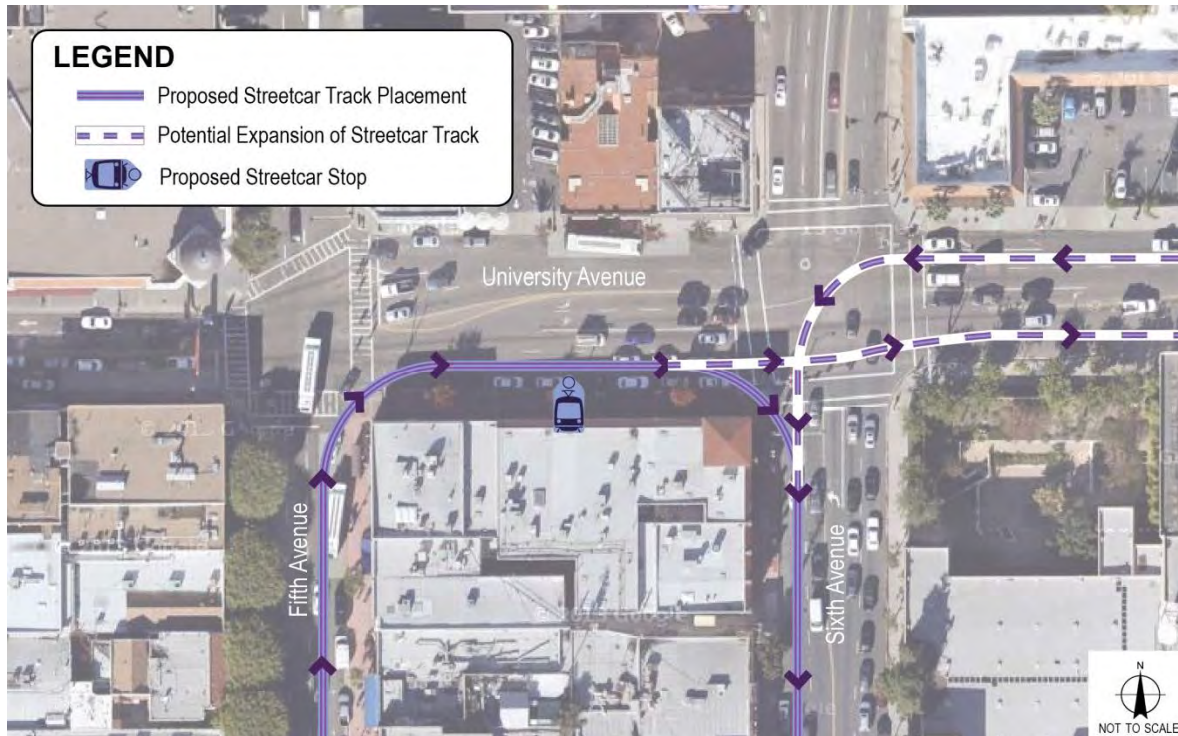




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potentially room for a streetcar station on University Avenue between Fifth and Sixth Avenues. Future expansion of the streetcar along University Avenue (Phase 2) could be obtained by having the streetcar continue eastbound on University Avenue after turning from Fifth Avenue, and by connecting with the tracks on Sixth Avenue from a westbound left turn from University Avenue.



Potential End-of-Line using University Avenue and Future Phase Expansion





ADVANTAGES OF THIS ALIGNMENT

Project Goals

- Improved economic development opportunities by providing tracks along two roadways
- Sixth Avenue fronts Balboa Park, which is a major attraction

Bicycle, Pedestrian, and Vehicle Interactions

- Buffered bike lanes on Fifth Avenue are on the left side of the street and do not interfere with streetcar tracks
- No designated bicycle facility on Sixth Avenue
- Intersections are all at 90 degrees, facilitating perpendicular bicycle crossings

Intersection Treatments

- End-of-the-line treatments are at existing signals





DISADVANTAGES OF THIS ALIGNMENT

Project Goals

- Sixth Avenue has primarily residential land uses on one side and Balboa Park on the other side; minimal redevelopment opportunity

Bicycle, Pedestrian, and Vehicle Interactions

- Higher volumes on Sixth Avenue than Fourth Avenue
- Sixth Avenue is a two-way street, making pedestrian crossings longer, with more conflict points and two directions of traffic to cross

Parking

- All stations on Sixth Avenue would be new, increasing the amount of parking lost

Intersection Treatments

- End-of-line treatment at University Avenue would require modification to existing signals to provide streetcar-only phases to avoid conflicts with vehicles, pedestrian, and bicyclists

Future Connections

- Potentially need to cross two bridges (to access downtown)
- Must connect to a storage and maintenance facility



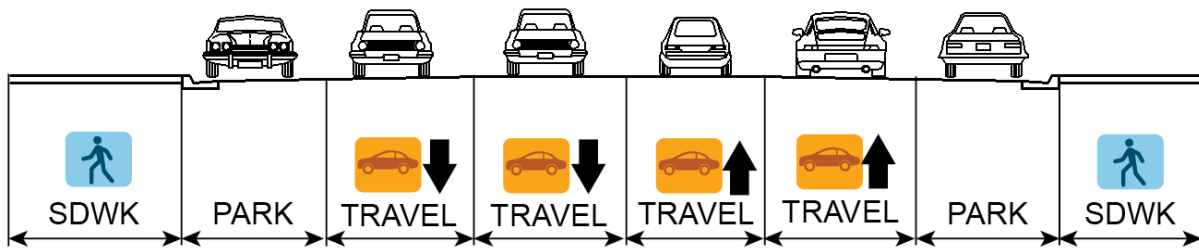


SIXTH AVENUE ONLY

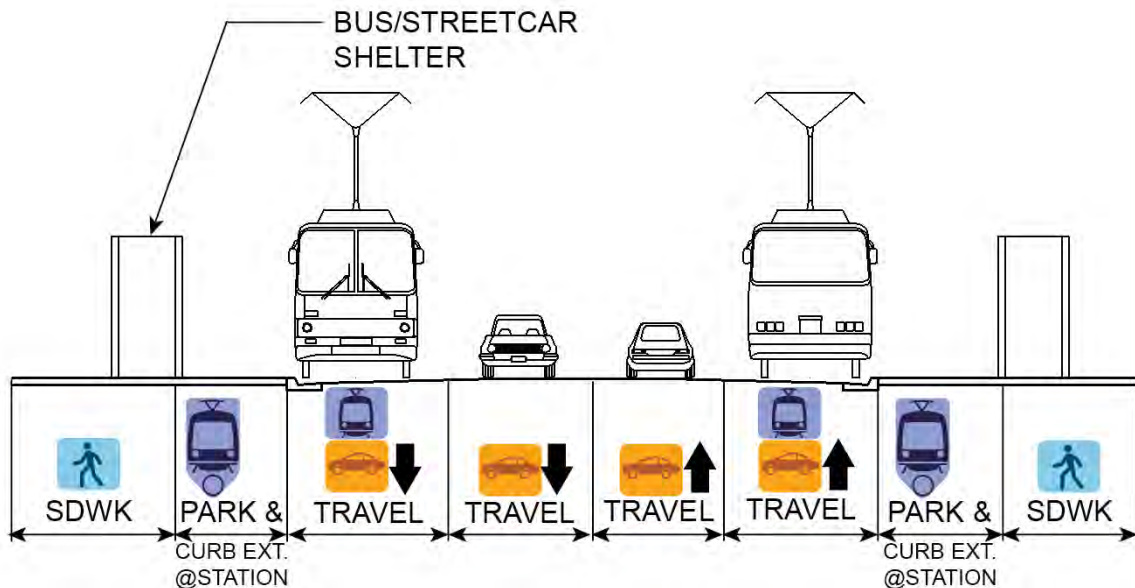
This potential alignment would have the streetcar travel northbound and southbound on Sixth Avenue, using the right-most travel lane in each direction.

Roadway Cross-sections

The existing and proposed cross-sections for Sixth Avenue are shown below. Users of each portion are also presented on the cross-section to help correlate the cross-section with Figure 1.



*Sixth Avenue
Existing Cross-section*



*Sixth Avenue
Proposed Cross-section with Streetcar*





As shown, the streetcar would use the farthest right travel lane in each direction, separated from the curb by the existing parking lane.

Intersection Control

The streetcar would not be required to change travel lanes except at end-of-line treatments. Intersections outside of the end-of-line maneuvers would not require special considerations or improvements unless warranted for traffic priority or other purposes.

End-of-Line Treatments

The end-of-line at the southern end of the route is heavily dependent on whether or not a connection to downtown is provided. If a connection to downtown is provided, Sixth Avenue presents additional end-of-the line concerns as Sixth Avenue converts to a one-way southbound street south of Elm Street. This would require either a contra-flow lane to be installed on Sixth Avenue, or for the streetcar to find another northbound option to connect (such as Fifth Avenue). Further investigation on end-of-the line treatments with a downtown connection would be outside of the Uptown community and correspondingly outside of the study area; so details are not provided in this study. If a connection to downtown is not provided and facilities are kept within Uptown, the streetcar could use the signalized Elm Street intersection (with modifications) to stop and change directions. The final stop would be on the southwest corner of the intersection, along Sixth Avenue.

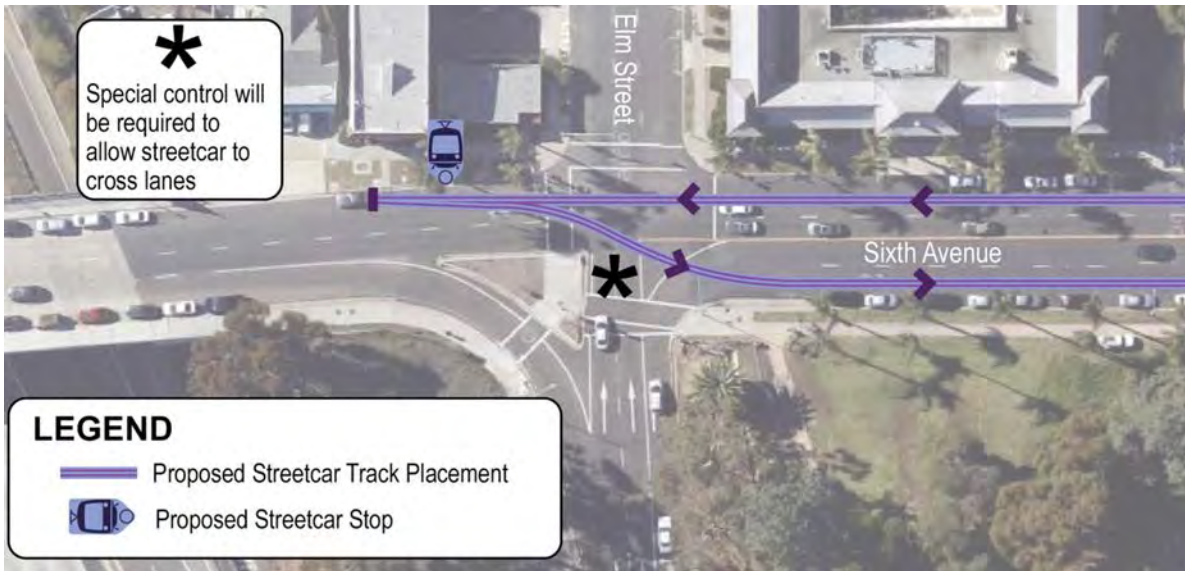
The end-of-line at the northern end of the route could be accomplished using the signalized University Avenue intersection (with modifications) to stop and change directions. The final stop would be on the northeast corner of the intersection, along Sixth Avenue. This option is only possible with a double-sided, double-ended vehicle.



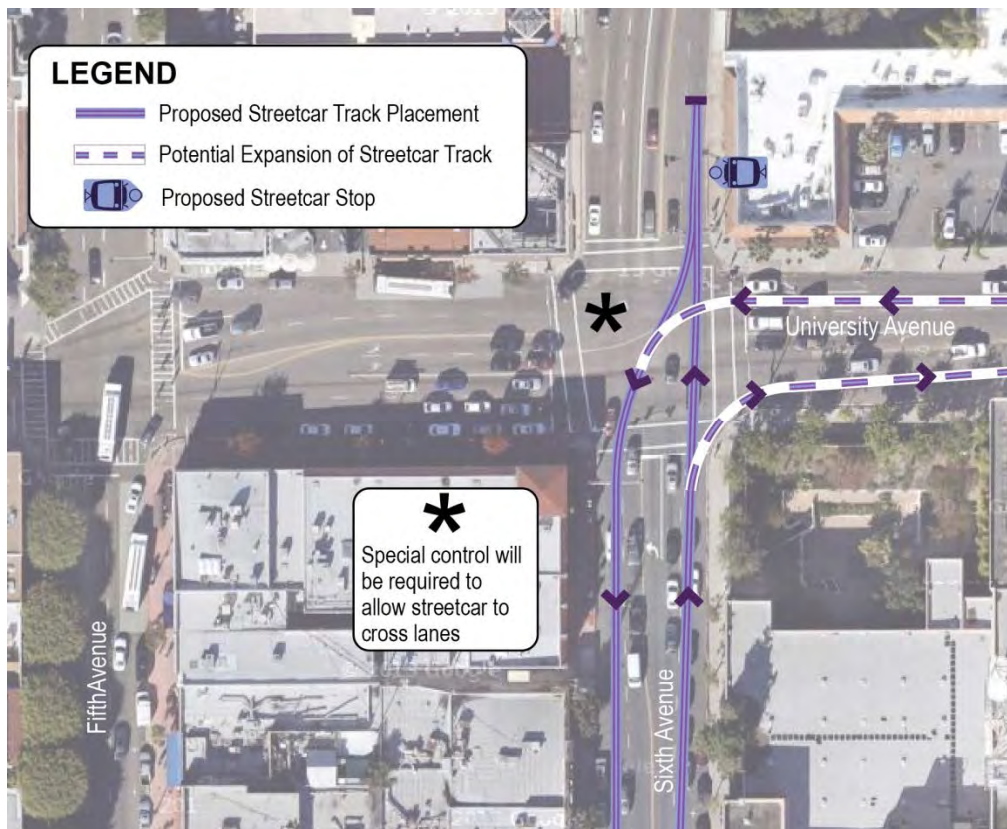


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Potential End-of-Line using Elm Street



Potential End-of-Line using University Avenue and Future Phase Expansion





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Future expansion of the streetcar along University Avenue (Phase 2) could be obtained by having the streetcar turn eastbound on University Avenue from Sixth Avenue and connecting with the tracks on Sixth Avenue from a westbound left turn from University Avenue, eliminating the need for a turnaround location at the intersection of Sixth Avenue and University Avenue.

ADVANTAGES OF THIS ALIGNMENT

Project Goals

- Sixth Avenue fronts Balboa Park, which is a major attraction

Bicycle, Pedestrian and Vehicle Interactions

- No designated bicycle facility on Sixth Avenue

Intersection Treatments

- End-of-the-line treatments are at existing signals





DISADVANTAGES OF THIS ALIGNMENT

Project Goals

- Streetcar exposure to only one street
- Sixth Avenue has primarily residential land uses on one side and Balboa Park on the other side; minimal redevelopment opportunity

Bicycle, Pedestrian and Vehicle Interactions

- Higher volumes on Sixth Avenue than Fourth Avenue
- Sixth Avenue is a two-way street, making pedestrian crossing harder with more conflict points and two directions of traffic to cross

Parking

- Minimal park-and-ride opportunities
- All stations would be new, increasing the amount of parking lost

Intersection Treatments

- End-of-line treatments at Elm Street require intersection modifications to allow the streetcar to change direction
- End-of-line treatment at University Avenue would require modification to existing signals to provide streetcar-only phases to avoid conflicts with vehicles, pedestrian, and bicyclists

Future Connections

- Potentially need to cross two bridges (to access downtown)
- Must connect to a storage and maintenance facility
- Sixth Avenue becomes on-way southbound south of Elm Street, requiring the installation of a contra-flow lane or another northbound track option to connect to downtown

Vehicle Choice

- Option is only possible with a double-sided, double-ended vehicle since it does not create a loop network





CONCLUSIONS & RECOMMENDATIONS

As presented in this chapter, each of the three alternatives has their advantages and disadvantages. While each alignment would face unique engineering challenges, all are feasible.

The “**Fourth and Fifth Avenue Couplet**” alignment provides the most potential for economic development, providing routes along two of the major commercial roadways in the Uptown community that have potential for higher density. **It is the recommended option for a north-south alignment.** Extending the line further north to Washington Street adds another block of potential economic development and associated funding opportunities, including the adjacent Medical Complex area. It also creates a less constrained end-of-line treatment. Thus, it is recommended to extend the alignment to Washington Street. On the southern end, it is recommended to work with the downtown community to continue the alignment into downtown.

The “**Fifth and Sixth Avenue Couplet**” alignment provides a combination of economic development opportunities and exposure to Balboa Park. It would provide access through the community and have potential to easily expand on University Avenue. It is a strong option for a north-south alignment.

With the purpose of the streetcar being to spur economic development, the “**Sixth Avenue Only**” alignment stands out as providing the least amount of potential for meeting this purpose. With residential units on one side of the street and Balboa Park on the other, there is little room for economic development along the streetcar line.

The recommend route and details on the station locations are presented in **Figure 1D**.





Fourth Avenue at Hawthorn Street
 • Shared Streetcar and Bus Station
 • Utilize Existing Bus Stop Shelter

Fifth Avenue at Hawthorn Street
 • Shared Streetcar and Bus Station
 • Utilize Existing Bus Stop Bench

Fourth Avenue at Laurel Street
 • New Streetcar Station
 • Lose 3 Parking Spaces

Fifth Avenue at Laurel Street
 • Shared Streetcar and Bus Station
 • Utilize Existing Bus Stop Bench

Fourth Avenue at Palm Street
 • Shared Streetcar and Bus Station
 • Utilize Existing Bus Stop Bench

Fifth Avenue at Palm Street
 • New Streetcar Station
 • No Loss of Parking

Fourth Avenue at Upas Street
 • New Streetcar Station
 • Lose 2 Parking Spaces

Fifth Avenue at Upas Street
 • Shared Streetcar and Bus Station
 • Utilize Existing Bus Stop Shelter

Fourth Avenue at University Avenue
 • Shared Streetcar and Bus Station
 • Utilize Existing Bus Stop Shelter

Fifth Avenue at University Avenue
 • Shared Streetcar and Bus Station
 • Utilize Existing Bus Stop Shelter



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5 | PHASE 2: EAST-WEST CONNECTION



Phase 2 of the Uptown Streetcar would be an east-west connection using University Avenue between the north-south connection determine in Phase 1 and the community boundary at Park Boulevard.

While this study focuses on the Uptown community itself, it is important to note that connections further east beyond the community boundary provide the potential for access to the Greater North Park area. Extension of the streetcar further east was mentioned in the UAMP study and included in the 2050 RTP.





UNIVERSITY AVENUE

Figures 2A and 2B present the following information on University Avenue (Phase 2):

- Existing traffic control
- Existing bus stops
- Existing pedestrian crossings
- Existing land uses
- Existing bicycle facilities
- Number of travel lanes
- Proposed land use redevelopment areas
- Proposed streetcar in-street alignment
- Proposed streetcar station locations
- Identified areas of concern (bridges, steep grade, lack of access to storage and maintenance facility)

Between the north-south connection (Phase 1) and Tenth Avenue, the streetcar would run in the lanes closest to the curb, separated by parking from the sidewalk. Between the intersections of Tenth Avenue and Normal Street, the streetcar would be median-running. Between Normal Street and Park Boulevard, the streetcar would be curbside, separated by parking. The signalized intersections of Tenth Avenue and Normal Street would be modified to provide the streetcar an opportunity to transition between curbside and median-running.

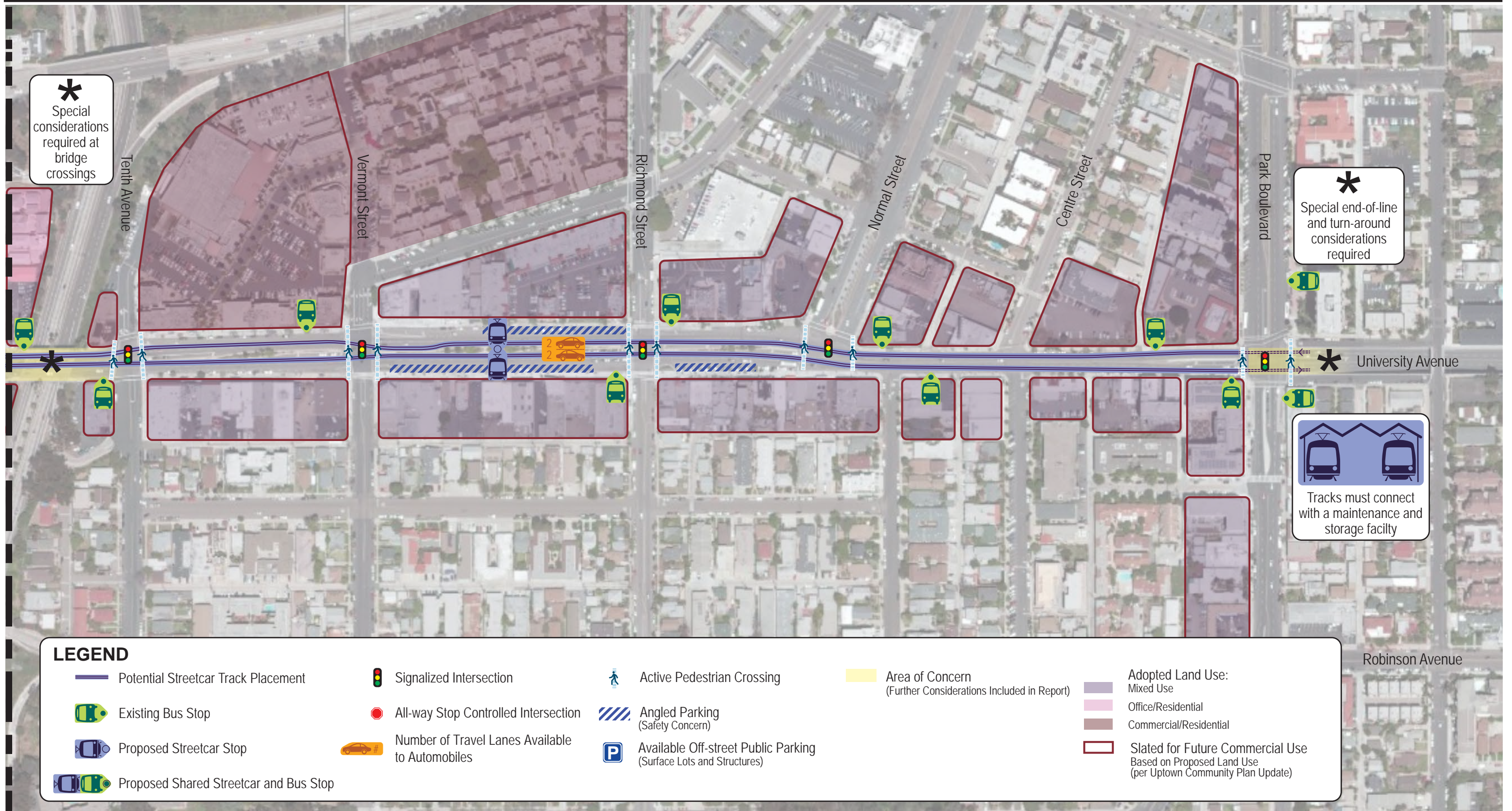




SEE FIGURE 2B



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Storage and Maintenance Facility

As discussed in Phase 1, having a storage and maintenance facility along the streetcar route is required to be able to provide service. If Phase 2 truly does come after Phase 1, a storage and maintenance facility should already be determined and hopefully provides room for expansion into Phase 2.

If Phase 2 is developed concurrently with or before Phase 1, a new maintenance and storage facility could be considered along the streetcar route within the Uptown Community. This would require finding a site large enough to house a facility and providing the upfront costs to construct the facility, or multiple sites that collectively serve the system.

The UAMP streetcar feasibility study mentioned the idea of finding space along University Avenue to house a maintenance and storage facility and considered an area near the future streetcar's "end of the line," at the edge of the community and bordered on one side by the freeway. While the location identified in that study is outside of the Uptown study area, all potential options along University Avenue should be considered as decision-makers continue to explore where appropriate maintenance facilities would be feasible.

Roadway Cross-sections

The streetcar would need to change between curbside and median-running along University Avenue to avoid conflict with angled parking. West of Tenth Avenue the streetcar would use the farthest right travel lane in each direction, separated from the curb by the existing parking lane. Between Tenth Avenue and Normal Street the streetcar would use the travel lanes adjacent to the median. East of Normal Street to the community boundary, the streetcar would return to the curbside lanes separated by parking.

The streetcar would be median-running during the portions of University Avenue that have angled parking to avoid losing parking spaces. Existing medians are present in these areas that can be utilized, but improvements will be required to add appropriate station access.

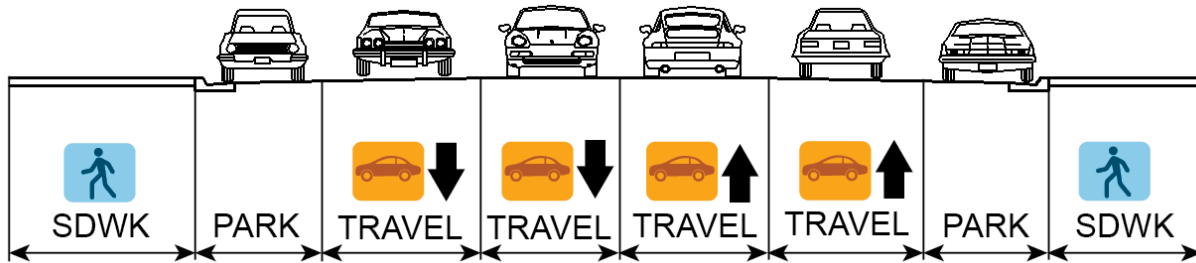




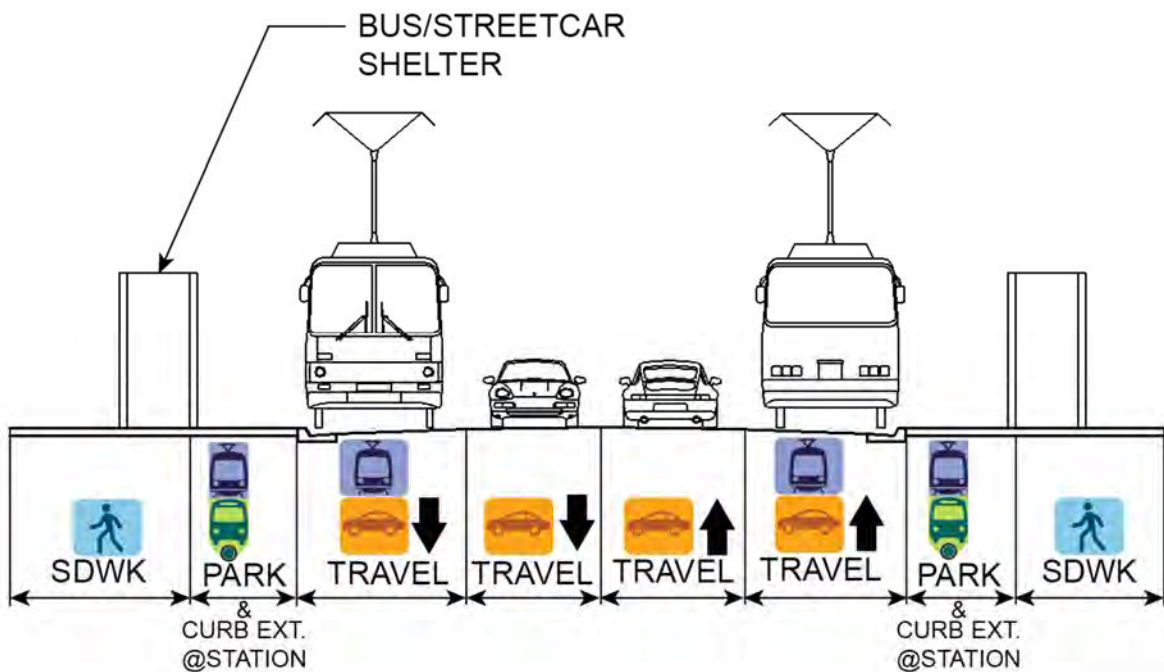
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The existing and proposed cross-sections for University Avenue are shown below. Users of each portion are also presented on the cross-section to help correlate the cross-section with Figure 2.



*University Avenue
Existing Cross-section*

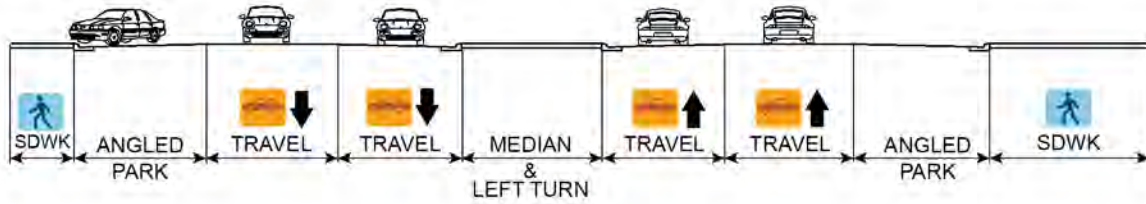


*University Avenue
Proposed Cross-section with Curbside Streetcar*

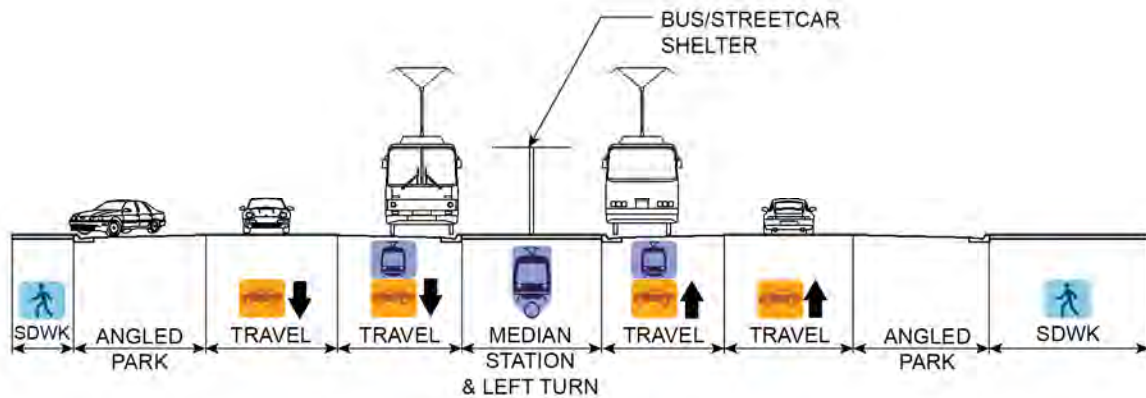




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*University Avenue
Existing Cross-section*



*University Avenue
Proposed Cross-section with Median-Running Streetcar*

Bicycle Interactions

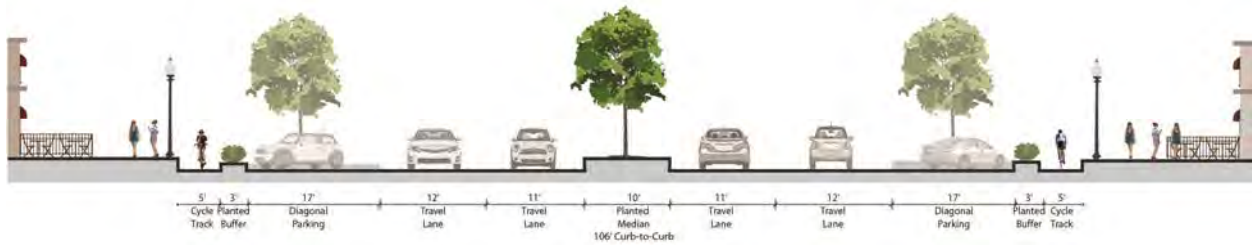
As part of the Uptown Regional Bike Corridor project, protected bikeways with landscaped bulb outs are proposed along University Avenue between First Avenue and Normal Street. Associated improvements would shift the parking along University Avenue away from the sidewalk and provide a protected bikeway between the parking and the sidewalk with curbs on each side of the bikeway. These proposed bicycle improvements would only create conflict with the streetcar at station locations. The stations require a platform area for loading and unloading that would interfere with the protected bikeway area. To mitigate this conflict, the protected bikeway would need to weave around the station platform on the sidewalk side as described in **Chapter 3**. As a result, pedestrians going to/from the streetcar station would need to cross the protected bikeway. This strategy is being planned for the existing bus stops along University Avenue and can be applied to streetcar stops in the future.





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*University Avenue: Vermont to Normal
Uptown Regional Bike corridor project Potential Cross-section Design*

Intersection Control

The streetcar would need to change travel lanes to be able to access both curbside and median-running stations as proposed:

- For the eastbound alignment, it is proposed that the streetcar would change lanes at the Seventh Avenue intersection. A station is proposed just west of the intersection, which the streetcar would stop at to board and alight. The signal at Seventh Avenue would need to include a streetcar-only phase that can be activated when the streetcar is ready to depart the station, stopping all vehicles and allowing the streetcar to maneuver from the curbside lane to the lane adjacent to the median.
- For the westbound alignment, it is proposed that the streetcar would change lanes at the Vermont Street intersection. A station is proposed along the median just east of Vermont Street. From there, the streetcar would go into the westbound left-turn lane at the Vermont Street intersection. The signal would need to provide a phase that exclusively has the westbound left-turn green, stopping all other movements at the intersection. This will allow the streetcar to maneuver from the left-turn lane to the curbside lane on University Avenue. Vehicles wanting to make a westbound left-turn would also be able to make a left-turn with this phase.

Intersections at the end-of-line would also require special considerations. Otherwise, all other intersections along University Avenue are currently signalized and would not need special improvements unless warranted for traffic priority or other purposes.





End-of-Line Treatments

It is assumed that the western end of the route connects with the Phase 1 improvements. The potential expansion was discussed in Phase 1 and presented again here. If the University Avenue route were to run separately than the Phase 1 route, then a loop route using a combination of Fourth, Fifth, or Sixth Avenues (north-south) and Washington or Robinson Street (east-west) could be used, potentially sharing tracks with the Phase 1 route at times.

If Phase 1 is not in place prior to Phase 2 then the western end of the streetcar route could utilize one of the existing signalized intersections to stop and change direction, or make a loop using a combination of Fourth, Fifth, or Sixth Avenues (north-south) and Washington or Robinson Street (east-west).

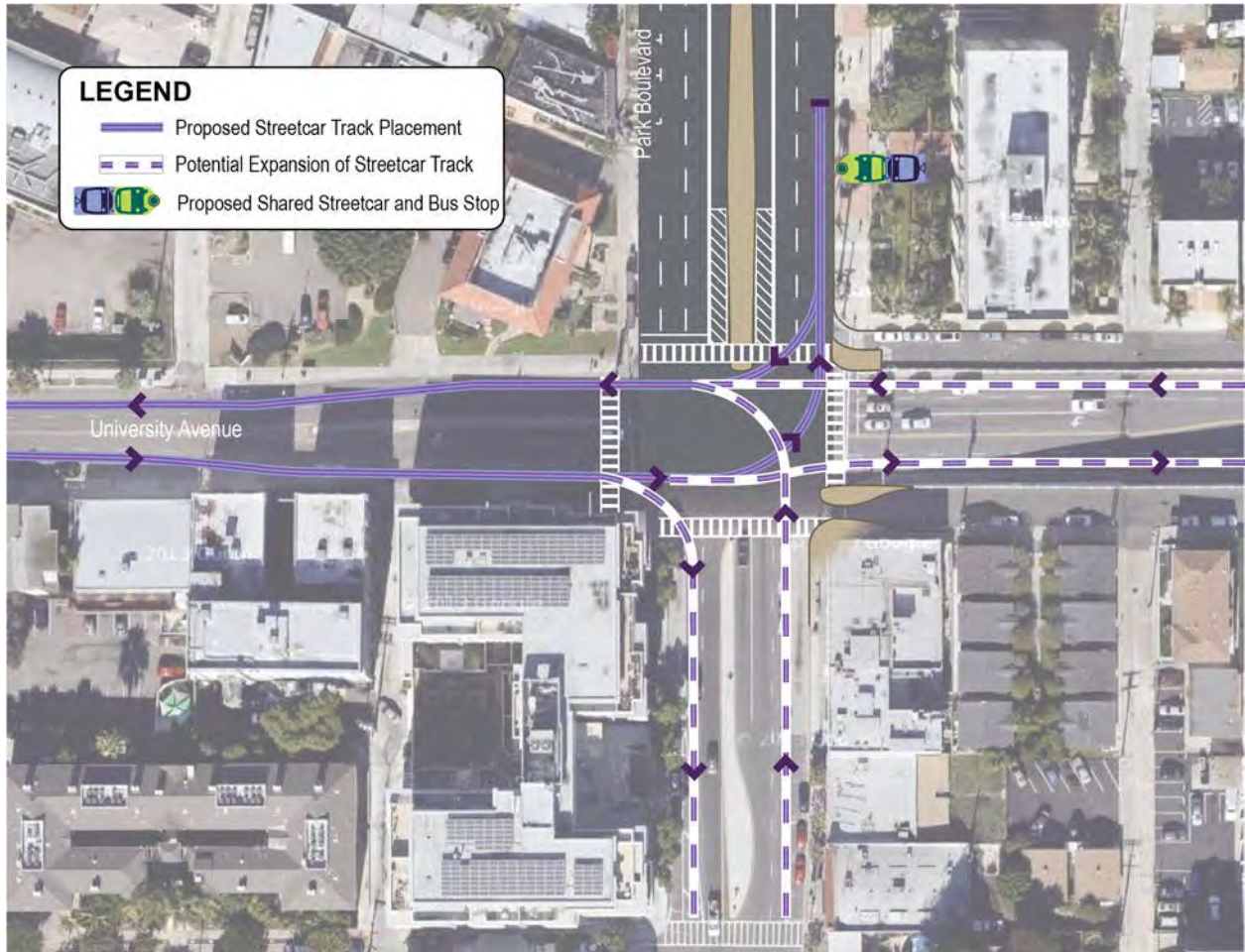
The end-of-line at the eastern end of the route could be accomplished using the existing signalized intersection at Park Boulevard to stop and change directions. The final stop would be located at the northeast corner of the intersection, along Park Boulevard. This does not preclude an opportunity for expansion further east on University Avenue or south on Park Boulevard. This option is only possible with a double-sided, double-ended vehicle.





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Potential End-of-Line using Park Boulevard and Future Phase Expansion

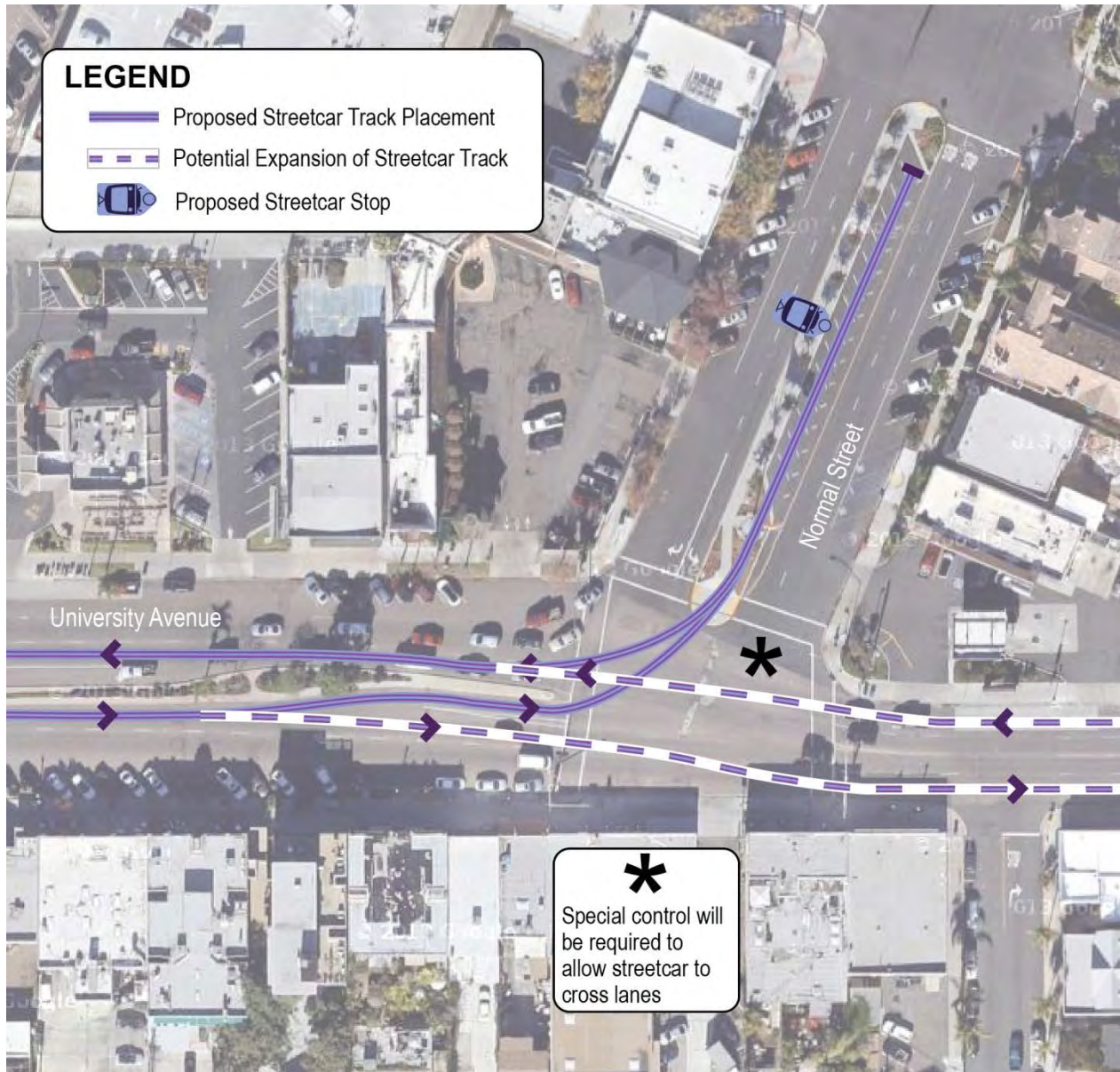
As an alternative, the streetcar route could use Normal Street as a final stop and change in direction location. While this does not extend services to Park Boulevard, it makes for a better turnaround experience and provides additional benefits. With this alternative, the streetcar would be median-running eastbound approaching Normal Street and would make a left-turn to head north at the signalized intersection. There is an existing median along Normal Street just north of University currently being used for parking that could be converted to a streetcar station. The streetcar could pull into this median to stop at the station, and then begin in the other direction (southbound) to again cross through the signalized intersection and head westbound on University Avenue. This option is only possible with a double-sided, double-ended vehicle.





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Potential End-of-Line using Normal Street and Future Phase Expansion

Stopping the route at Normal Street does not preclude further expansion on University Avenue or Park Boulevard. Tracks could be continued from the Normal Street intersection east on University or north on Normal Street which has a large median and connects with El Cajon Boulevard/Park Boulevard.





ADVANTAGES OF PHASE 2

Project Goals

- Extends economic development opportunities by providing tracks along commercial areas on University Avenue

Intersection Treatments

- No all-way stop-controlled intersections

Parking

- A lot of potential to share space with existing bus stops, reducing the amount of parking lost
- Median running prevents the loss of angled parking

Future Connections

- Opportunity to connect to future tracks along University Avenue, Park Boulevard, and/or Normal Street and El Cajon Boulevard





DISADVANTAGES OF PHASE 2

Bicycle and Pedestrian Interactions

- Median stations can pose safety concerns for pedestrians
- Special treatment and considerations will be required to integrate with the proposed Uptown Regional Bike Corridor project protected bikeways at station locations

Intersection Treatments

- The signalized intersections of Tenth Avenue, Vermont Street, and Normal Street would need to be modified to provide the streetcar an opportunity to transition between curbside and median-running

Future Connections

- Requires crossing bridge over SR-163
- Must connect to a storage and maintenance facility

Vehicle Choice

- Option is only possible with a double-sided, double-ended vehicle

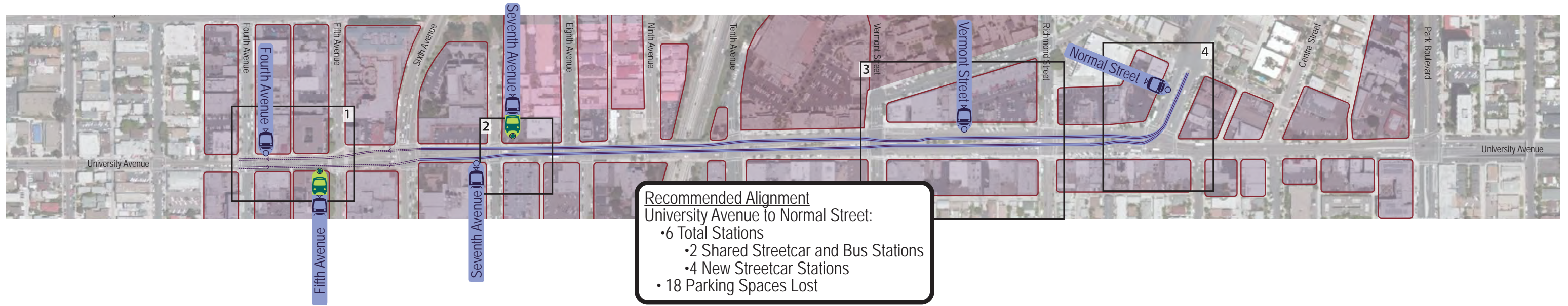




CONCLUSIONS & RECOMMENDATIONS

As presented in this chapter, the addition of Phase 2 would be advantageous in continuing to spur economic development opportunities and providing greater connectivity through the Uptown community. The University Avenue alignment is feasible to implement, even with other planned roadway improvements. **It is recommended to implement Phase 2 of the streetcar network when financially feasible.** As part of that recommendation, **it is recommended to have the eastern end of the route terminate at Normal Street, and not to extend to Park Boulevard at this time.**

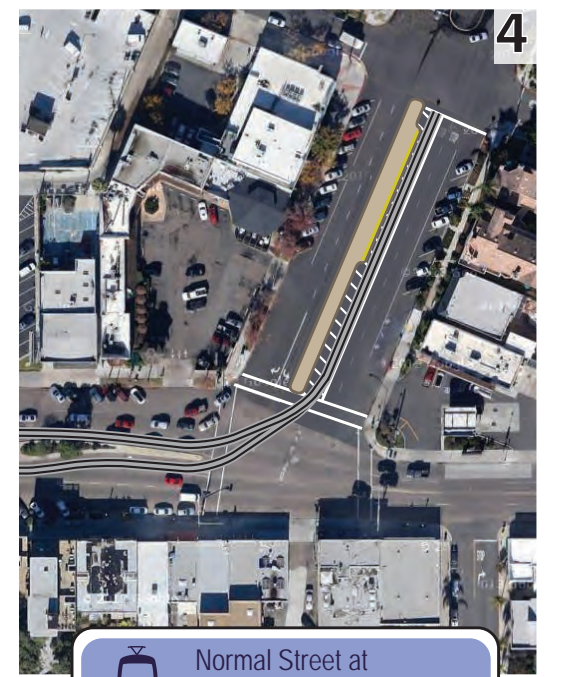
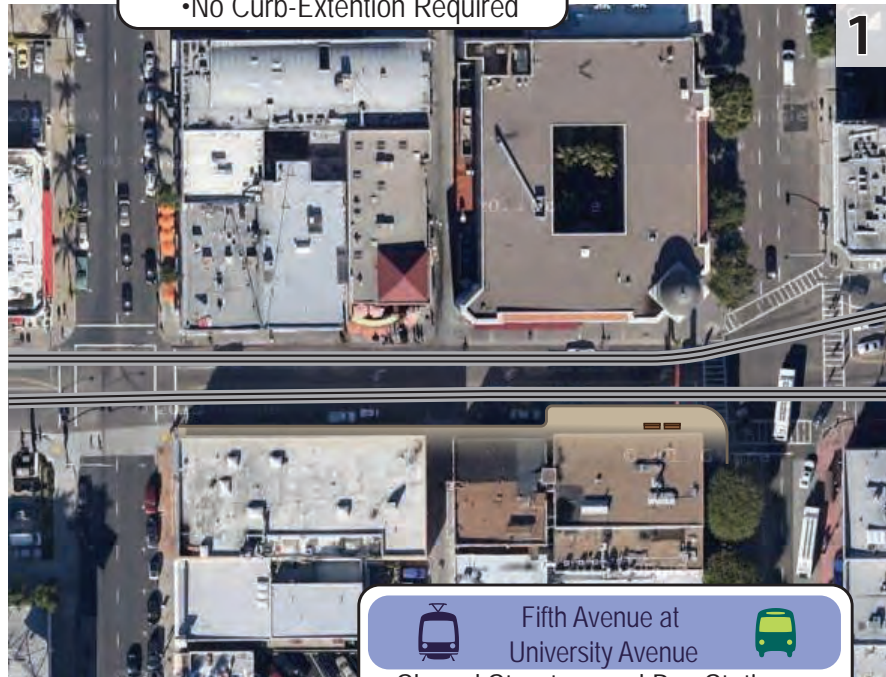




Fourth Avenue at University Avenue
•New Streetcar Station
•No Curb-Extension Required

Seventh Avenue at University Avenue
•Shared Streetcar and Bus Station
•Utilize Two Existing Bus Stop Benches

Vermont Street at University Avenue
•New Median Streetcar Station
•No Changes to Existing Median Layout



Fifth Avenue at University Avenue
•Shared Streetcar and Bus Station
•Utilize Two Existing Bus Stop Benches

Seventh Avenue at University Avenue
•New Streetcar Station
•Lose 3 Parking Spaces

Special control will be required to allow streetcar to change lanes

Normal Street at University Avenue
•New Median Streetcar Station
•Lose 15 Parking Spaces



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6 | PHASE 3: PARK BOULEVARD CONNECTION



Phase 3 of the Uptown Streetcar would be a connection between University Avenue and Zoo Place using Park Boulevard.

While this study assumes this would be an extension of Phases 1 and 2 of the Uptown streetcar, it is important to note that this connection could be developed as an extension of a streetcar line coming from the south on Park Boulevard.



PARK BOULEVARD

Figure 3 presents the following information on Park Boulevard (Phase 3):

- Existing traffic control
- Existing bus stops
- Existing pedestrian crossings
- Existing land uses
- Existing bicycle facilities
- Number of travel lanes
- Proposed land use redevelopment areas
- Proposed streetcar in-street alignment
- Proposed streetcar station locations
- Identified areas of concern (bridges, steep grade, lack of access to storage and maintenance facility)







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Storage and Maintenance Facility

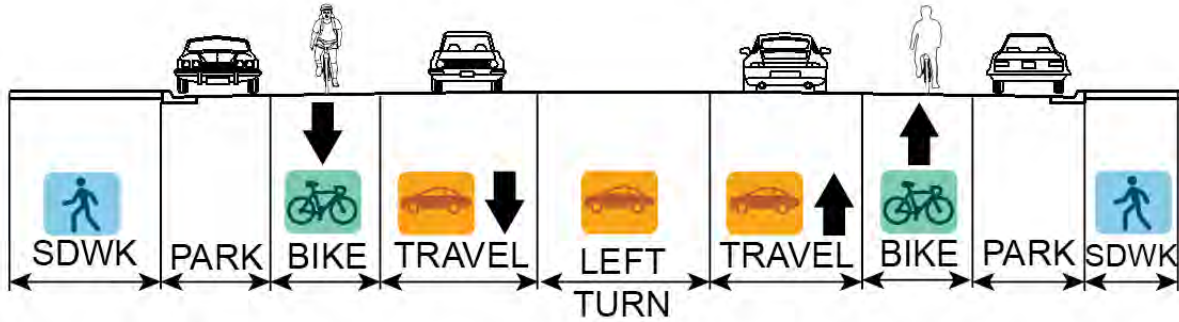
As discussed in Phases 1 and 2, having a storage and maintenance facility along the streetcar route is required to be able to provide service. If Phase 3 is developed concurrently with or before Phase 1 and/or 2, the use of the existing City of San Diego Central Operations Station at the intersection of B Street and 20th Street as a maintenance and storage facility could be considered. Use of this facility would require a connection to downtown. If the City/Park Streetcar line is developed a connection via Park Street could be possible. While the location identified is outside of the Uptown study area, this potential option should be considered as decision-makers continue to explore where appropriate maintenance facilities would be feasible.



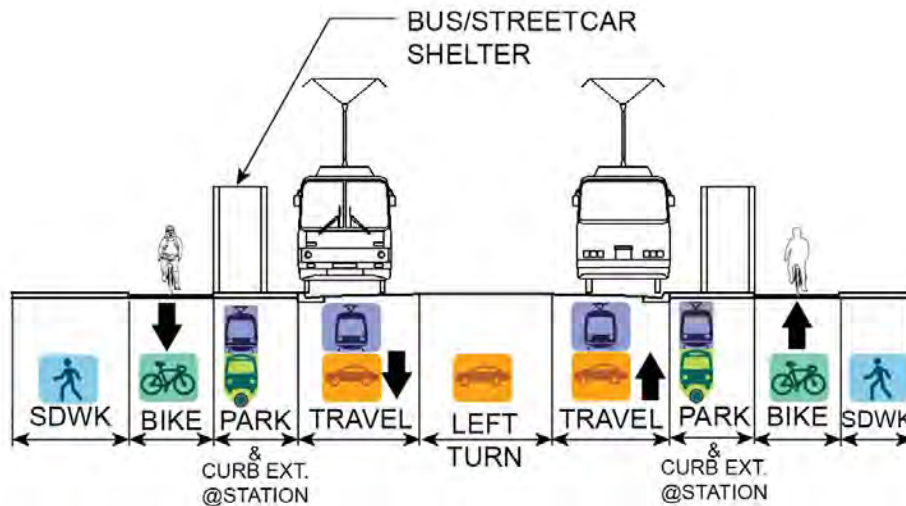
Possible Downtown and Maintenance Facility connection

Roadway Cross-sections

The existing and proposed cross-sections for Park Boulevard are shown below. To be consistent with the preferred cross-section established in the MTS study of a Park Boulevard streetcar line south of Zoo Place, the streetcar would run in the lane closest to the curb. Between University Avenue and Zoo Place this outside travel lane is separated from the sidewalk by parking and, in some cases along this section, a bike lane. Having bike lanes adjacent to the streetcar presents safety concerns and would require special design considerations. For example, at stations the bike lane would need to weave behind the platform area. The MTS study suggested a separated bike facility that removes bicyclists out of the shared space on Park Boulevard to alleviate conflicts with the streetcar.



*Park Boulevard
Existing Cross-section*



*Park Boulevard
Proposed Cross-section with Curbside Streetcar*

Intersection Control

The streetcar would not be required to change travel lanes except at end-of-line treatments. Intersections outside of the end-of-line maneuvers would not require special considerations or improvements unless warranted for traffic priority or other purposes.

End-of-Line Treatments

It is assumed that the northern end of the route connects with the Phase 2 improvements. The potential expansion was discussed in Phase 2.





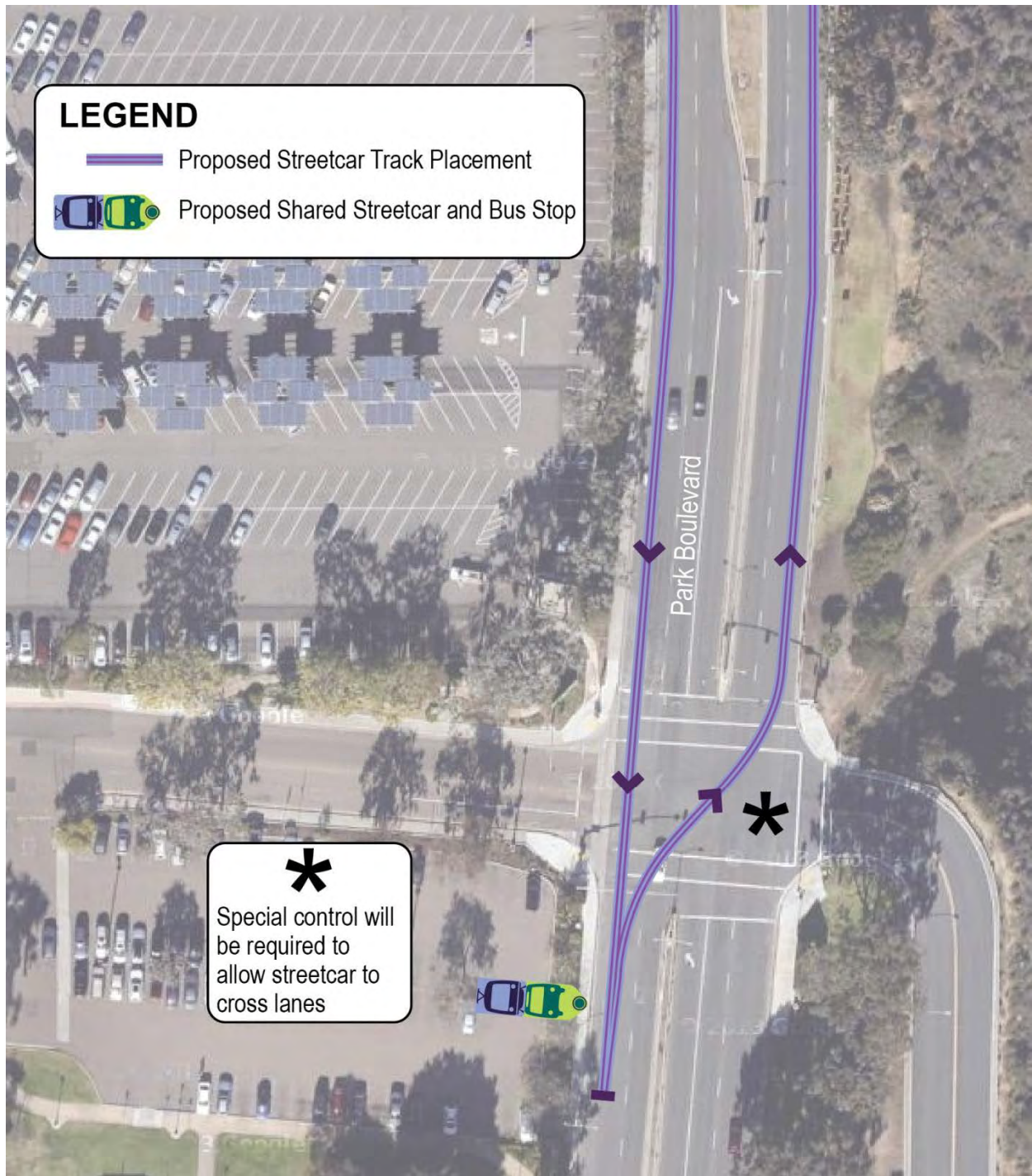
If a streetcar line is in place on Park Boulevard south of Zoo Place prior to implementation of Phase 3, then this extension could connect into the existing track system. If there is not an existing streetcar line, the end-of-line at the southern end of the route could be accomplished by having a far-side station at the intersection with Zoo Place that serves as the change in direction location. The existing signalized intersection would need to be modified to accommodate the streetcar change in direction needs. This option would only be feasible with a double-sided, double-ended vehicle. A single-sided, single-ended vehicle would have to loop through the Zoo parking area to change direction.





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Potential End-of-Line using Zoo Place





ADVANTAGES OF PHASE 3

Project Goals

- Provides connection with the San Diego Zoo and the east side of Balboa Park

Intersection Treatments

- No all-way stop-controlled intersections

Future Connections

- Provides connection to City/Park Streetcar line

DISADVANTAGES OF PHASE 3

Project Goals

- Minimal opportunity for economic development

Bicycle and Pedestrian Interactions

- Bike lanes adjacent to the streetcar presents safety concerns and requires special design considerations

Intersection Treatments

- End-of-line treatment at Zoo Place could require modification to accommodate the streetcar change in direction needs

Vehicle Choice

- Option is only possible with a double-sided, double-ended vehicle

Future Connections

- Must connect to a storage and maintenance facility





CONCLUSIONS & RECOMMENDATIONS

As presented in this chapter, the addition of Phase 3 would not provide many economic development opportunities and would primarily be used to connect with Balboa Park. The Park Boulevard alignment is feasible to implement, but comes with some safety concerns or need for additional right-of-way. While this is an important connection for tourism and may have potential for high ridership, the funding opportunities to develop that line using development or redevelopment are far less great. Most of this stretch of Park Boulevard fronts the park or residential houses, and only a few blocks are zoned for retail. As a result, **it is not recommended that Phase 3 be implemented as part of the initial Uptown streetcar efforts**, but should be considered as an important expansion opportunity once an initial streetcar line is established.





7 | COSTS

This section of the report summarizes the capital and operating cost estimates for the proposed Uptown Streetcar. Planning level costs are developed for elements of the system and applied by units, such as linear feet for track work, or costs for stations. Contingencies of up to 30 percent are included at this stage. The costs for the streetcar system are shown as general planning-level estimates, and are not to be construed as construction costs estimates. Since construction of the streetcar is many years away, these cost estimates will be updated and refined as the project advances and the system design becomes refined. These costs will need to be converted into the year of expenditure values as all costs in this study are in 2014 dollars except where noted. As the anticipated construction date is not known at this level of planning, it is easiest to use current (2014) dollars that can be adjusted to the appropriate year when it is determined.

UNDERSTANDING PLANNING-LEVEL COST ESTIMATES

This study is a planning-level feasibility effort, and is not a detailed engineering analysis, therefore the costs should be regarded as general estimates based on what is currently known about the project. The cost estimates were developed using planning level estimates from similar capital projects, and peer city streetcar costs as support. Cost estimates for projects in their early planning phase are very general and include significant contingencies to address the many unknowns. As such, a thirty percent (30%) contingency is included in this estimate to account for unforeseen issues that could arise, such as impacts to underground utilities, the need to acquire right-of-way, or increased costs for materials in the future. As the City moves forward with planning of the streetcar system the specific engineering details and project costs will be refined in the design stage. Some of the important factors that could impact future project costs include:

- **Timing:** Delays of years or decades can add millions of dollars to planning level estimates. All costs for this study are given in current (2014) dollars and are not





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projected into the year of expenditure (YOE) because it is unknown when the City will implement this project;

- **Utilities:** The location and type of underground utilities along the proposed streetcar corridors could add significant time and costs to the project. An estimated cost for utility relocation and improvements was included in the planning estimate but may not fully reflect the cost of utility modifications;
- **Right-of Way:** Taking land for rail right-of-way (ROW) or for the traction and power substations will add costs. It was assumed that up to one-half an acre of land would be needed for the first phases of the Uptown Streetcar. Additional ROW costs would add to this estimate;
- **Maintenance and Storage:** the Uptown Streetcar will require a facility to store and to service or maintain these streetcar vehicles. Two options are available:
 - MTS Trolley facility: if the City is able to use the existing MTS Trolley facility (by using the downtown trolley lines) they may have to make limited improvements to address the storage and serving of the new streetcar vehicles. However, crossing the I-5 bridges into the downtown may add other costs related to bridge improvements; or
 - City of San Diego Central Operations Station: the city could develop a facility at the existing Operations Station to store and service the proposed Uptown streetcar line, and provide opportunities for connection to downtown and the City/Park streetcar line.
 - New Regional Facility: the City could develop a new regional streetcar facility to store and service the proposed fleet for the Uptown streetcar line, and provide space for expansion as other streetcar lines are added.

This issue should be addressed in the next phase of planning for the streetcar system.





- **Bridge Improvements:** the proposed alignments may cross several bridges over Interstate 5 and State Route 163. These bridges are owned by Caltrans, and may not be sufficient to carry the weight of streetcars. It is not known if Caltrans is upgrading these bridges in the next few years. If the City carries the proposed lines into the downtown by crossing the I-5 bridges at Fourth, Fifth, or Sixth Avenues, there may be a significant capital cost to upgrade or replace these bridges.

Project costs for the proposed streetcar system are divided into two categories:

- **Capital costs** - one-time costs for infrastructure and vehicles required to provide service; and
- **Operating and Maintenance (O&M) costs** - recur each year a service is operating and cover the day-to-day operations of the system.

CAPITAL COSTS

Capital costs include all of the physical elements required to operate any proposed transit system and are identified within categories defined by the Federal Transit Administration. The following provides some project-related information that applies to each category.

Category 10: Guideway and Track Elements

The steel guideway or track that streetcar system operates on is often the most expensive piece of construction, as it sometimes requires major renovations to the existing roadway (for at-grade alignments) or the construction of entirely new structures (for grade-separated alignments). The Uptown Streetcar will be traveling in existing roadways for at least the majority of its route, if not all of it. The only area where it would not be within an existing roadway is at access to the storage and maintenance facility.

Cost estimates for guideway and track were prepared using linear measurements based on alignment length. The preferred alternatives are included in the cost estimates. The assumed track costs of \$500 per linear foot are based on similar peer projects around the nation and assumes an embedded track placed in pavement. It is assumed that a double-





sided, double-ended (modern) vehicle will be used. If a single-sided, single-ended vehicle is used it may also be necessary to build turnaround locations at the end of the line.

At Interstate 5 and State Route 163 crossings, bridge structure improvements will be required that either modify or replace the existing bridges since they are unable to carry the streetcar's weight and address the electrical impacts. The costs for new bridges are not included: this is an additional issue that will have to be addressed in next phase of planning for the streetcar system.

Category 20: Stations, Stops, Terminals, Intermodal

For planning-level purposes, each station was assumed to have a new raised platform, shelter, seating areas, ticketing machines, and informational displays. Cost estimates were developed using standardized, "off the shelf" versions of these elements. If the City chooses specialized equipment or detailed architectural features for the stations, project costs would increase. If the streetcar is able to utilize existing bus stop facilities as expected, project costs would decrease.

Category 30: Support Facilities: Yards, Shops, Administrative Buildings

The streetcar maintenance and storage functions could potentially take place at the existing MTS Trolley facility at 12th and Imperial Avenues and have a one-time cost for providing access to and adding capacity within the facility. However, there are concerns with available capacity and access to the facility. Further, Interstate 5 bridge crossing improvements would most likely be required if the MTS facility was used.

If the MTS facility is not used and a new storage and service facility is constructed, there would be an upfront cost for that new facility. A cost estimate is included for a new facility, but will vary due to the lack of information about its size, space program, and potential location or functions that cannot be obtained at this stage of the development.

Defining a storage and maintenance facility is a critical issue that must be addressed in the next phase of planning for the streetcar system.





Category 40: Sitework & Special Conditions

A complex functional streetcar system requires site work and special condition costs that cannot be defined at a planning level study. Site work is a general description of the civil engineering improvements that are required for the track work and station facilities. It includes replacement of sidewalks, curb and gutter, new roadways, landscaping, drainage and the important issue of utility buffering or relocation. Because of design complexities, special site conditions or other unique circumstances may include other roadway modifications, removal of hazardous materials, demolition and clearing activities, or construction of minor supporting improvements such as short retaining walls or similar civil improvements.

An assumed cost of \$900 per linear foot is assumed for Phase 1 for planning purposes, but could be reduced if the utilities are not impacted by the track design or if the roadway can integrate the tracks with little modifications. This cannot be confirmed until preliminary engineering services are completed, and as such, a refined cost estimate will be need to be prepared after the preliminary engineering task is completed. Phase 2 has the benefit of providing two sets of tracks on the same roadway, so the cost was assumed at \$500 per linear foot for Phase 2.

Category 50: Systems

Two traction power substations (TPSSs) to generate electrical power and an overhead catenary wire system (OCS) to deliver that power to the operating vehicles are included in the cost estimate. In addition, costs associated with traffic signal modifications or installations required for operations and communications systems that allow vehicle operators to interact with each other while on the route are included.

Category 60: Right-of-Way, Land, Existing Improvements

This category covers all land acquisition and acquisition-related costs required to obtain the property needed for the streetcar system. The Uptown Streetcar's alignment is situated almost entirely within public streets or public property. It is assumed that up to one-half an





acre of land will be acquired either for ROW (at constrained turns or stations) or for the placement of the traction power substations.

Category 70: Vehicles

The MTS study provided information on cost estimates for each of the vehicles being considered:

- (Modern) Siemens SD8: \$3,600,000
- (Modern) United Streetcar 100: \$3,500,000
- (Modern) Inekon Trio-12: \$3,100,000
- (Modern) ameriTRAM 300: Unknown
- (Historic) President’s Conference Committee (PCC): \$900,000*
- (Historic) San Diego Class 1 (SD1): \$850,000*
- (Replica) Gomaco Birney: \$900,000

*includes restoration costs

As noted in the MTS study, modern vehicles bring several cost-saving advantages to the system such as bi-directional capabilities and low-floor designs that may help counter the higher acquisition cost. Historic vehicle restoration costs may vary greatly depending on the condition of each vehicle.

Based on these numbers and conservative estimates from other peer city experiences, costs for a modern or replica vehicle would cost approximately \$4 million. To serve the Uptown corridor four (4) vehicles would be needed in Phase 1 plus two (2) as extraboard (or backup) vehicles, for a total of six cars. Phase 2 could require up to two additional vehicles.

Category 80: Professional Services

These costs cover a wide range of planning, design, environmental and construction administration services that will be required over the life of the project. Planning costs will occur early on and account for a very small portion of this fee. Design services will be needed during the preliminary engineering and during the final design phases of the effort. Environmental services are needed during the environmental document phase. Other





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services could include legal support, auditing, public outreach and coordination and construction administration support during the building of the project. It is assumed to be 35% of the construction cost; the subtotal of categories 10 to 70.

In addition, a professional services fee of five percent (5%) is included to cover the cost of preparing the purchase documents and assisting the City with the inspection and testing once they are fabricated.

Category 90: Unallocated Contingency

This cost is a planning-level contingency to cover the many unknown technical issues that will be refined and better understood in subsequent engineering phases. At the planning stage of a large project 30 percent is a standard used by many agencies. As the project advances and more details are made know the contingency is reduced as costs become refined. Thus, contingency is assumed to be 30% of the overall construction and design cost.

Category 100: Finance Charges

This category depends on the funding mechanism. No estimates are able to be provided at this time.





PHASE 1 CAPITAL COST ESTIMATE

The capital cost for the proposed Phase 1 of the Uptown streetcar system was estimated by evaluating three elements of the streetcar system:

- the track and supporting infrastructure (per mile), shown in Table 1A;
- the stations (each), shown in Table 1B; and
- the vehicles (each), shown in Table 1C.

For Phase 1 of the project (3.6 miles of track), the total combined capital costs are estimated to be about **\$130 million**, as shown in Table 1D.

The total capital cost for Phase 1 of the proposed streetcar system includes the following assumptions:

- Track between Elm Street and Washington Street (3.56 miles round trip using Fourth Avenue and Fifth Avenue Couplet);
- 11 stations;
- Stations are assumed to be off-the-shelf type shelters placed at the curb on a 70 foot concrete platform as a “bulb-out” at each location;
- Six (6) vehicles to cover the 4 needed for full service and two as reserve;
- 35 percent professional services fees for planning, design, environmental and construction administration services; and
- 30 percent contingency on top of these costs to allow for unforeseen costs.

The estimate does not include any costs for modifications or replacement of the bridges over Interstate 5, or costs associated to acquire, design or build a new vehicle maintenance and storage yard. There will be a significant cost associated with either connecting to the existing maintenance and storage facility, connecting to the City of San Diego Central Operations Station, or building a new one that is not accounted for until the bigger picture of how the streetcar will be part of the large system is determined. Based on previous studies, this cost could be **\$40 – 50 million** regardless of the way forward (either two bridge modifications or a new facility).





Table 1A –Phase 1 Track Costs Estimate Worksheet, Per Mile

Category	Description	Items	Unit Cost	per	Quantity	Subtotal
10	Guideway & Track	Embedded track at-grade	\$ 500	LF	5280	\$ 2,640,000
20	Stations	See Table 1B				
30	Support Facilities	Not included at this time; more information needed				\$ N/A
40	Site work	Utilities, site civil, landscape	\$ 900	LF	5280	\$ 4,752,000
50	Systems	Overhead Catenary System	\$ 375	LF	5280	\$ 1,980,000
50	TPSS	Traction Power substations	\$ 2,000,000	each	2	\$ 4,000,000
60	Rights of Way	Miscellaneous Easements	\$ 50	SF	21780	\$ 1,089,000
		CONSTRUCTION COST PER MILE				\$ 14,461,000
70	Vehicles	See Table 1C				
80	Professional Services	Design, construction management	% of Construction		35%	\$ 5,061,000
		BASE COST PER MILE				\$ 19,522,000
90	Contingency	30% of Subtotal				\$ 5,857,000
		PLANNING LEVEL COST PER MILE				\$ 25,379,000

Table 1B – Phase 1 Station Costs Estimate Worksheet

Table 2: PLANNING LEVEL STATION COST ESTIMATES

Category	Description	Items	Unit Cost	per	Quantity	Subtotal
20	Stations	Off-the-shelf shelter design	\$ 100,000.00	each	11	\$ 1,100,000
20	Site work	66' low floor platforms, concrete	\$ 250,000.00	each	11	\$ 2,750,000
		STATION CONSTRUCTION COST				\$ 3,850,000
80	Professional Services	Design, construction management	35% of Constr.		35%	\$ 1,347,500
		BASE COST of STATIONS				\$ 5,200,000
90	Contingency	30% of Subtotal				\$ 1,560,000
		PLANNING LEVEL COST of STATIONS				\$ 6,760,000





Table 1C – Phase 1 Streetcar Costs Estimate Worksheet

Table 3: PLANNING LEVEL STREETCAR VEHICLE COST ESTIMATES

Category	Description	Items	Unit Cost	per	Quantity	Subtotal
70	Modern Streetcars	TYP: Siemens, CAF or equiv.	\$ 4,000,000.00	each	6	\$ 24,000,000
70	Historic	PCC rehab or historic replica	\$ 1,000,000.00	each	0	\$ -
		FLEET COST			6	\$ 24,000,000
80	Professional Services	Oversight	5% of Vehicle			\$ 1,200,000
		BASE COST of FLEET				\$ 25,200,000
90	Contingency	30% of Subtotal				\$ 7,560,000
		PLANNING LEVEL COST of FLEET				\$ 32,760,000

Table 1D – Phase 1 Planning-Level Capital Costs Estimate

Item	Unit Cost	per	Units	Subtotal
TRACK COSTS PER MILE	\$ 25,379,000	Mile	3.56	\$ 90,350,000
STATIONS	\$ 614,545	Each	11	\$ 6,760,000
VEHICLES	\$ 5,460,000	Each	6	\$ 32,760,000
TOTAL (Phase 1)				\$ 129,870,000





PHASE 2 CAPITAL COST ESTIMATE

The capital cost for the proposed Phase 2 of the Uptown streetcar system was estimated by adding to the three elements of the streetcar system:

- the track and supporting infrastructure (per mile), shown in Table 2A;
- the stations (each), shown in Table 2B; and
- the vehicles (each), shown in Table 2C.

For Phase 2 of the project (0.74 miles of track), the total combined capital costs are estimated to be about **\$40 million**, as shown in Table 2D.

The total capital cost for Phase 2 of the proposed streetcar system includes the following assumptions:

- Tracks on both sides of the street between Fourth Avenue and Normal Street (0.74 miles);
- 6 stations;
- Stations are assumed to be off-the-shelf type shelters placed either at the curb on a 70 foot concrete platform as a “bulb-out” or placed in the median with associated improvements;
- Two (2) additional vehicles to cover the new service area;
- 35 percent professional services fees for planning, design, environmental and construction administration services; and
- 30 percent contingency on top of these costs to allow for unforeseen costs.

The estimate does not include any costs for modifications or replacement of the bridges over State Route 163, or costs associated to acquire, design or build a new vehicle maintenance and storage yard. Based on previous studies, this cost of the bridge crossing could be **\$15 – 20 million**. It is assumed that minor additional cost would be required for the storage and maintenance facility with addition of Phase 2.





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Table 2A – Phase 2 Track Costs Estimate Worksheet, Per Mile

Category	Description	Items	Unit Cost	per	Quantity	Subtotal
10	Guideway & Track	Embedded track at-grade	\$ 500	LF	10560	\$ 5,280,000
20	Stations	See Table 2				
30	Support Facilities	Not included at this time; more information needed				\$ N/A
40	Site work	Utilities, site civil, landscape	\$ 500	LF	10560	\$ 5,280,000
50	Systems	Overhead Catenary System	\$ 375	LF	10560	\$ 3,960,000
50	TPSS	Traction Power substations	\$ 2,000,000	each	2	\$ 4,000,000
60	Rights of Way	Miscellaneous Easements	\$ 50	SF	21780	\$ 1,089,000
		CONSTRUCTION COST PER MILE				\$ 19,610,000
70	Vehicles	See Table 3				
80	Professional Services	Design, construction management	% of Construction		35%	\$ 6,860,000
		BASE COST PER MILE				\$ 26,470,000
90	Contingency	30% of Subtotal				\$ 7,941,000
		PLANNING LEVEL COST PER MILE				\$ 34,411,000

Table 2B – Phase 2 Station Costs Estimate Worksheet

Table 2: PLANNING LEVEL STATION COST ESTIMATES

Category	Description	Items	Unit Cost	per	Quantity	Subtotal
20	Stations	Off-the-shelf shelter design	\$ 100,000.00	each	6	\$ 600,000
20	Site work	66' low floor platforms, concrete	\$ 250,000.00	each	6	\$ 1,500,000
		STATION CONSTRUCTION COST				\$ 2,100,000
80	Professional Services	Design, construction management	35% of Constr.		35%	\$ 735,000
		BASE COST of STATIONS				\$ 2,835,000
90	Contingency	30% of Subtotal				\$ 850,500
		PLANNING LEVEL COST of STATIONS				\$ 3,685,500

Table 2C – Phase 2 Streetcar Costs Estimate Worksheet

Table 3: PLANNING LEVEL STREETCAR VEHICLE COST ESTIMATES

Category	Description	Items	Unit Cost	per	Quantity	Subtotal
70	Modern Streetcars	TYP: Siemens, CAF or equiv.	\$ 4,000,000.00	each	2	\$ 8,000,000
70	Historic	PCC rehab or historic replica	\$ 1,000,000.00	each	0	\$ -
		FLEET COST				\$ 8,000,000
80	Professional Services	Oversight	5% of Vehicle			\$ 400,000
		BASE COST of FLEET				\$ 8,400,000
90	Contingency	30% of Subtotal				\$ 2,520,000
		PLANNING LEVEL COST of FLEET				\$ 10,920,000





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Table 2D – Phase 2 Planning-Level Capital Costs Estimate

Item	Unit Cost	per	Units	Subtotal
TRACK COSTS PER MILE	\$ 34,411,000	Mile	0.74	\$ 25,465,000
STATIONS	\$ 614,250	Each	6	\$ 3,685,500
VEHICLES	\$ 5,460,000	Each	2	\$ 10,920,000
TOTAL (Phase 2)				\$ 40,070,500





OPERATING AND MAINTENANCE COSTS

Operating and Maintenance (O&M) costs are based on the annual revenue hours of service provided and cover costs associated with vehicle operators, vehicle maintenance staff, and administrative support. These are the recurring expenses to pay drivers, mechanics, supervisors, and management; maintain vehicles and facilities; clean stations; buy fuel and electricity; and provide security. These costs begin once a transit service begins operating and recur every year, becoming a significant investment over the life of the system.

To estimate operating costs a number of important issues have to be addressed:

- Who will own and operate the system? MTS, the City or a private entity?
- Is this a new mode within the system?
- Can the service be accommodated with existing manpower or will it require new operators?
- Are there additional passenger facilities (stations) to maintain?
- Will the stations be shared across services (bus, trolley, new BRT and the streetcar)?
- Are new structures, right-of-way, or facilities required to accommodate the service?

The MTS City/Park Streetcar study prepared a detailed operations plan, which the Uptown Streetcar could utilize. The findings indicated that \$148.74 per revenue hour is a reasonable O&M cost for the streetcar, as stated in that study:

“In FY2012, MTS budgeted \$148.74 per revenue hour (fully allocated) for Trolley light-rail service. MTS informally polled three other cities that operate streetcar service, all of which are in a similar range: Kenosha, WI (\$120/revenue hour); Portland, OR (\$140/revenue hour); and Seattle, WA (\$150-\$160/revenue hour)...There is significant room for variability if the starting date is delayed, as variables such as electricity costs and labor contracts would be unknown at this time...”





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For the purposes of this planning-level estimate, it is assumed that the streetcar lines will operate with 10-minute headways during peak (each stop is served six times an hour) and 15 minute off-peak time periods (four times an hour), with the following schedule:

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Begin Service	8:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	6:00 AM	8:00 AM
End Service	10:00 PM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	2:00 AM (next day)	2:00 AM (next day)
Peak 1 Duration	0 hours	3 hours	3 hours	3 hours	3 hours	3 hours	0 hours
Peak 1 Headways	N/A	10-min	10-min	10-min	10-min	10-min	N/A
Peak 2 Duration	0 hours	3 hours	3 hours	3 hours	3 hours	3 hours	0 hours
Peak 2 Headways	N/A	10-min	10-min	10-min	10-min	10-min	N/A
Off-peak Duration	14 hours	12 hours	12 hours	12 hours	12 hours	14 hours	18 hours
Off-peak Headways	15-min	15-min	15-min	15-min	15-min	15-min	15-min

The purpose of the streetcar is not to provide commuter trips and serves a different ridership demand. As such, there would still be expected to be two peaks during the day, but they would not be the same hours as the automobile commute peak. Therefore, the “peak” referred to in the schedule above would relate to the peak streetcar ridership, and not the peak of the roadway volume.

Phase 1 is 3.6 miles roundtrip from Elm Street to Washington Street, and Phase 2 adds an 1.5 additional miles roundtrip traveling on University between Fourth Avenue and Normal Street, for a total of 5.1 miles roundtrip for both phases combined. Operating and maintenance cost estimates are based on the annual revenue hours of service and the annual revenue miles of service for both Phase 1 and Phase 2 service. This span of service results in revenue miles presented in **Table 3A**.





Table 3A – Revenue Miles

Revenue Miles	Phase 1	Phases 1 & 2
Weekly	2,002	2,836
Annual	104,083	147,451

Assuming an average speed of 7 mph for the streetcar over the route, the proposed service will result in 556 trips per week or 28,900 trips annually. This translates to revenue hours per week and per year as shown in **Table 3B**.

Table 3B – Revenue Hours

Revenue Hours	Phase 1	Phases 1 & 2
Weekly	417	556
Annual	21,684	28,912

The resulting O&M costs for both phases of the project are presented in **Table 3C**. Using the MTS data on the cost per revenue hour (\$148.74) inflated to 2014 dollars, the annual operating cost is estimated as **\$3.4 million for Phase 1** and **\$4.5 million after the addition of Phase 2**.

Table 3C – Phases 1 and 2 Operating and Maintenance Costs Estimate

Operating Costs	Phase 1	Phases 1 & 2
Weekly	\$ 66,000	\$ 88,000
Annual	\$ 3,420,000	\$ 4,560,000



8 | THE WAY FORWARD

Implementing a large and complex transportation project such as the streetcar could take several years. This chapter lays out a road map of how to implement the streetcar system, and describes ways to deliver this exciting new project:

- ***Streetcar Planning and Phasing*** identifies the project planning and phasing and briefly discusses how to fund the streetcar. The Uptown streetcar is one line in a proposed system of streetcars: the City should take a comprehensive look at the total system and coordinate its development in phases;
- ***Streetcar Funding*** describes the project development approach for federally funded projects, and the approach for delivering locally funded, non-federal projects. Using Federal transit grants requires additional planning and compliance adding significant time to the project schedule;
- ***Project Delivery Methods*** illustrates project delivery methods, including alternative approaches for completing project design and construction activities; and
- ***Next Steps*** lays out a potential timeline for implementing the Uptown Streetcar and concludes with a series of next steps for the City to implement the streetcar.





STREETCAR PLANNING AND PHASING

Streetcar System Coordination

There are several separate streetcar lines being studied by different stakeholders in the region, including the Uptown Streetcar. A primary goal for the City would be to consolidate these efforts in order to coordinate streetcar planning as a cohesive transportation system.

- **Action:** Initiate a study of the entire streetcar system (as opposed to looking at individual lines).
- **Timing:** Complete in 2015
- **Deliverable:** A comprehensive study of the future streetcar network throughout the City of San Diego that will address key questions such as:
 - What is the purpose and need for a citywide streetcar system? Is it to stimulate economic development, enhance neighborhood livability, or to serve transit riders?
 - Is the streetcar system a regional entity or will it serve only the City of San Diego?
 - Who will own and operate the future streetcar system (City of San Diego? MTS? Other entity?)
 - How will the construction of the streetcar system be funded?
 - How will operating costs be funded?
 - Should the streetcar system be compatible with and interact with other transit modes (bus and trolley) including the use of stations, tracks and maintenance facilities?, and
 - What are the benefits of a streetcar investment and how could those benefits be monetized to support the project?





Many of these questions were answered in this study specific to the Uptown streetcar line, but to expand those efforts to coordinate a larger scale system may provide benefits in the availability of funding and streetcar facilities.

Phasing the Larger Streetcar System

As these important questions are being addressed, the City can program the streetcar system in phases. This allows it to be built in cohesive, manageable sections that offer independent utility. The City can then evaluate community acceptance, build ridership and support, and spread out project costs over a longer period of time.

- **Action:** Determine the phasing of the entire streetcar system
- **Timing:** Complete in 2015
- **Deliverable:** A system plan with specific phased projects. This would include capital costs of the proposed phases. A streetcar phasing strategy would be based on the following criteria:
 - Ridership – Early phases focus on the most productive ridership segments of the system;
 - Interconnection of Streetcar Lines – The phasing strategy establishes an initial system of lines that expand outward in subsequent phases. This allows for greater flexibility for operations, vehicle fleet management, and maintenance and storage facility utilization; and
 - Coordination with Other Infrastructure Projects – To the extent possible, the streetcar phasing has been designed to coordinate the construction of streetcar facilities with planned roadway, bridge, and bikeway projects located along the line.

Phasing of the streetcar system specific to Uptown was laid out in this study as having three potential phases, two of which should move forward into next steps. Looking at the





larger streetcar system phasing would identify how these phases integrate with the overall system.

STREETCAR FUNDING

Advancing large capital projects like the Uptown Streetcar through the project development process requires a commitment of capital funds for construction and annual monies for operations of the system. Many communities around the country have creatively leveraged funding for streetcars from federal, state, local and private sources. Two primary approaches include:

- **Federal:** Obtaining federal funds through the Federal Transit Administration (FTA) and using a combination of local, regional and state monies as a local match; or
- **Non-federal:** Paying for the streetcar using only local, regional and state monies.

There are pros and cons to each approach.

FTA grants can cover up to 50% of the project cost, but cities must compete for the funds and they require a substantial local match. Further, the Federal process can take decades to plan and implement.

Relying on local and regional funds can result in faster implementation, but it requires a commitment of local revenue and prioritizing the streetcar over other important transportation improvements. In contrast to light-rail projects, streetcar operational and maintenance funding is often subsidized using additional local sources other than just transit or regional transportation funds. For example, business improvement districts, parking meter revenues, and special district fees are secured (sometimes up to 20 years in advance) in conjunction with fares in order to maintain a level of service on the streetcar that encourages ridership. Securing funds for both capital and ongoing operational and maintenance costs from a variety of sources could allow for the construction of a streetcar





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in a shorter timeframe than typical light rail projects. For instance, securing funding for ongoing streetcar operational costs alleviates the potential conflict of re-directing already limited transit dollars from currently operating transit service to streetcar service.

The many recent successful community streetcar projects have used a variety of funding mechanisms, and have not relied on traditional federal, state, and local funding sources. Instead, they have:

- Used local funding sources such as redevelopment funds, improvement district funds, parking fees, and special assessment districts for adjacent land owners;
- Used local-option sales tax measures to cover the cost of the streetcars;
- Secured significant investment by private property owners adjacent to the streetcar line;
- Obtained sponsorships and volunteer labor; and
- Used, but did not exclusively rely on, local transit funds.

SANDAG and the 2050 RTP

For projects to be considered for federal funding, they must be included in SANDAG's 2050 RTP. A system of streetcars is planned in the 2050 RTP that will serve the Downtown, Bankers Hill, Hillcrest, North Park, South Park, and Golden Hill neighborhoods. However, the funding for these projects assumes only 10-percent of regional capital funding for streetcars. This leaves 90 percent of the capital cost to be funded by alternative sources, including and public-private partnerships, state and local funds, and local redevelopment efforts.





“One of the new options for mobility planned in this RTP is to use streetcars to improve connectivity within certain neighborhoods. Cities across the country have implemented or are proposing streetcar projects, often as a redevelopment tool to improve the livability within redevelopment areas. As a result, much of the funding for these streetcar projects comes from local agencies and public/private partnerships. Based on this experience in other cities, about 90 percent of the cost is assumed to be borne by these types of funding sources. The estimated revenue anticipated to be available from these other sources for three streetcar projects detailed in the Plan is about \$600 million.” (2050 RTP)

Funding Analysis

In order to identify the other 90 percent of funds the City must fully explore all other funding options. The City should conduct an analysis of project funding by evaluating the likelihood of winning FTA support, and researching the local real estate market to estimate the potential economic impacts and potential revenue generation of the streetcar system.

- **Action:** Conduct an analysis of project funding (Federal vs. non-federal funding)
- **Timing:** Complete once the system-wide study is completed (2015)
- **Deliverable:** The deliverable for this task would be a detailed analysis of funding opportunities including all potential federal, state, regional and local public grants or revenue sources, and a detailed evaluation of private revenue opportunities. The pros and cons of the two funding methods are briefly discussed below, and should serve as an outline for this task.

FEDERAL FUNDING THROUGH MAP-21

If an individual streetcar project is to remain eligible for federal funding participation then there is a specific federal project development process that candidate projects must follow. The Moving Ahead for Progress in the 21st Century (MAP-21) law, which authorizes





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funding for federal transit programs, was signed into law on July 6, 2012. The new law reforms and streamlines the previous New Starts program, including these changes:

- Establishing a two-year time limit for completing project development.
- Eliminating duplicative alternatives analysis requirements.
- Expanding the use of warrants for making project justification determinations for new fixed guideway capital or core capacity improvement projects where funding provided under section 5309 does not exceed \$100 million or 50 percent of total project costs.
- Expediting technical capacity review for projects designed by applicants that have recently completed a new fixed guideway capital project or core capacity improvement project that has achieved or surpassed expected budget, cost, and ridership projections and where applicants have demonstrated they continue to have the staff expertise and other resources necessary to implement a new project; and
- Reducing the number factors the FTA must consider when approving or advancing a project.

The new law authorizes \$10.6 billion in FY 2013 and \$10.7 billion in FY 2014 for the federal transit program. Future funding levels have not been specified, but Congress has passed annual extensions in previous years. MAP-21 provides just under \$2 billion annually for fixed guideway capital grants (which includes streetcars).

As a result of these changes new streetcar projects have progressed in a number of communities. Almost 20 communities have working streetcar systems today, with another dozen in design or construction. Over 40 cities have studied streetcar systems and more are coming forward each year.





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Source: Streetcar Coalition Summit, March 2014

Streetcar projects have benefited from hundreds of millions in federal transportation grants. The Transportation Investment Generating Economic Recovery (TIGER) program was initiated in 2009 and was used to launch streetcar programs in Dallas, Tucson, Portland and New Orleans, among others. The TIGER grant program was reissued in 2013 and could be a source of funding for the Uptown system. The 2010 Urban Circulator grant was another federal program that helped initiate streetcars in Charlotte, St. Louis and Cincinnati. It is unclear if these programs will be advanced by Congress beyond 2014.

The City should conduct an analysis of funding alternatives – with a focus on the FTA MAP-21 program – to determine if federal grants are suitable for the streetcar system. Even if federal grants are pursued, there is still a requirement for a substantial local match; so local, state and regional funds must be included in the funding analysis.





LOCAL AND REGIONAL FUNDING

State Funding

The state provides a considerable amount of funding for transit operations through the Transportation Development Act (TDA). The TDA provides two major financing sources for public transportation: the Local Transportation Fund and the State Transit Assistance Fund. Funds available through TDA fluctuate year-to-year due to sales tax proceeds. Other alternative California funding sources include:

- Transportation Tax Fund
- State Transportation Fund
- Historic Property Maintenance Fund
- Mass Transportation Fund
- Traffic Congestion Relief Fund
- Other state funds and grants

Local Funding

Local options to pay for the streetcar system include traditional transit sources such as farebox revenue (the fare paid by current transit riders), advertising revenue (inside and outside the vehicles and at stations), as well as options such as local improvement districts or business improvement districts. Recently, most fully funded or constructed streetcar systems utilized local funding sources that are not typically used for transit projects to meet their local match requirements. Examples of these non-typical funding sources include:

- Local utility companies;
- Assessment districts (existing, or created specifically to fund a streetcar);
- Redevelopment funds;
- Local department of transportation funds (Caltrans);
- Local general funds;
- Sale of development or naming rights;
- Sale of property;





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- Parking fees (metered & city-owned garages);
- Sales tax measure (in addition to the SANDAG TransNet) for short-term projects such as streetcars; and
- Advertising.

FUNDING SUMMARY

This report seeks to briefly identify potential sources of funding for both the capital and operating costs of the Uptown Streetcar, and is not an exhaustive analysis of all options. The City should quickly undertake an assessment of funding alternatives. The Federal process is a viable option, but it is highly competitive and many communities are already in the “queue” for FTA grants. State and local alternatives are available, and recent examples of successful streetcar projects show a heavy reliance on these creative and local options.





PROJECT DELIVERY METHODS

Another key decision that will need to be made to advance the streetcar system is to select a project delivery method for each of the projects as they move from the system planning phase into corridor planning and project design. The project delivery method chosen does not change the steps that must occur in the project development process as described in the previous section, but it does determine who has responsibility for various steps in the process. The three most common project delivery methods are described briefly below:

- **Design-Bid-Build** is the traditional project delivery method in which project design and construction services are contracted separately.
- **Design-Build**, also known as a turn-key method, is a project delivery method in which the project sponsor uses a single architectural/engineering entity for both design and construction services. Under this approach, the agency owner does not need to be responsible for coordination between the design professional and the contractor.
- **Design-Build-Operate-Maintain** (DBOM) is similar to Design-Build, but the contract includes operations and maintenance of the system once it is constructed.

Other methods have been used to deliver large transportation projects and are more complex variations on the primary delivery methods listed above.

In summary, as the City advances the project into detailed planning and phasing, it should address the delivery method for the project and be prepared to develop the supporting expertise and staffing to deliver a large and complex transportation program.





NEXT STEPS

Implementing the Uptown Streetcar project over the next five to ten years requires the following tasks:

- **Planning & Phasing:** This next step will advance the conceptual planning work that has been completed in this report and would lead into and support the conceptual engineering and environmental document preparation. This could be focused on just the segments addressed in this study and completing the missing pieces of information, such as storage and maintenance facility locations and connection to downtown. Ideally, it requires a comprehensive overview of the streetcar system for the City of San Diego and the supporting facilities. As part of that system-wide study, each streetcar line should be planned to ensure that it is fully integrated into the existing urban fabric and supports the multi-modal objectives of the corridor, and that they are coordinated with the other streetcar corridors as proposed in the 2050 RTP.
 - **Action:** Complete a study of the entire streetcar system vision for the City of San Diego. Determine the alignments with the highest potential of integration and location of supporting facilities (storage, maintenance, power).
 - **Timing:** Complete this in 2015

- **Funding Analysis:** SANDAG indicates it would support up to ten percent of the streetcar project cost, therefore the City must fully explore all other funding options to secure the remaining 90 percent. The City should conduct an analysis of project funding by evaluating the likelihood of winning FTA support, and researching the local real estate market to estimate the potential economic impacts and potential revenue generation of the streetcar system. The strategy and analysis will involve industry experts in the areas of public-private partnerships and joint development, real estate investment, economic and market feasibility, and assessment and fee-based funding strategies. It will also need to discuss that the ten percent from SANDAG would require board approval and how to approach obtaining those funds.





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- **Action:** Prepare a funding feasibility analysis to determine the feasibility of obtaining adequate funding for the corridors with the highest potential of integration. Evaluate federal v. non-federal funding opportunities, and specific route funding opportunities using land use policies as a metric for redevelopment and new development opportunities.
 - **Action:** Prepare a financing strategy that converts the findings of the funding feasibility study to specific actions that need to be taken to secure funding.
 - **Timing:** Complete this in 2015 once the planning and phasing study is completed
- **Conceptual Engineering:** The City should begin conceptual engineering for the streetcar system once the planning and funding analysis are completed and a way forward has been determined. This task will support the environmental document preparation and include an updated capital cost estimate for the project. The City can decide on the delivery method (design-bid-build or others). Traffic studies should be completed to evaluate the impacts to the operations in the corridor. Conceptual design for the streetcar will define in more detail the routing, stations, site designs, and related infrastructure, including potential access to the existing MTS maintenance facility as it relates to serving the streetcar operations.
- **Action:** Complete conceptual engineering of the streetcar system.
 - **Timing:** Complete this in 2016-2017 once the planning and funding tasks are completed.
- **Environmental Document Preparation:** The environmental document preparation step could include both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) document preparation and clearances. NEPA would only be required if federal funds were included in the project. Environmental analysis to support the environmental document and preparation will include all technical studies, including modeled ridership forecasts.





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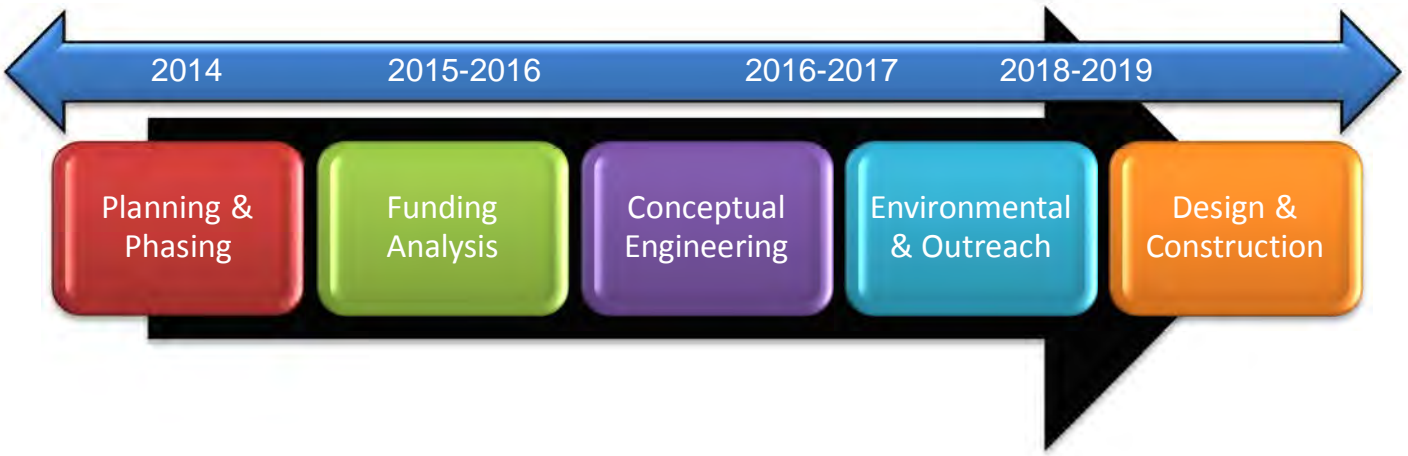
- **Public Outreach:** As part of and during the environmental document preparation, a comprehensive public outreach program will be undertaken to obtain stakeholder and community input and concurrence during development of the modern streetcar. The input will be used to guide the project definition, address potential project impacts, and assess the feasibility of local funding strategies.
 - **Action:** Complete the environmental documents and public outreach for the streetcar system.
 - **Timing:** Complete this in 2018-2019 once the conceptual engineering is completed.

- **Design and Construction:** Once the environmental analyses are completed the next steps would include completing the final design of the project and advancing it into bid and construction. The delivery methods selected by the City will drive the timing, but it will require a minimum of two or more years to complete the task. This includes delivery of the selected streetcar vehicles and testing the system.
 - **Action:** Complete the design for the streetcar system. Obtain bids for construction. Award the construction contract and monitor the completion of the project.
 - **Timing:** Begin design in 2020 once the environmental documents are completed. Construction would occur approximately one to two years after design is completed.





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Timeline of Next Steps to Implementing the Uptown Streetcar System





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APPENDIX A

Public Outreach Materials



Public Outreach Attendance

December Workshop

Richard Ledford
Derek Emery
Christian Chaffee
Roy Dahl
Jesse Gonzalez
Jim Hecht
Walter Chambers
Janet O Dea
Doug Scott
Nancy Moors
Ann Garwood
Ben Baltic
Char-Lou Benedict
Michael Brennan

March Workshop

Sharon & Clayton Haven
David Chadwick-Brown
Sally Seyler
Chris Cole & Suzie Cole
Paul Cortex
Dan Gallagher
George Franck
Marty Levine
Lindsay MacMaster
Garry Bonner
Marilee Kapsa
Fancis Pickford
Mario Amaya
Veronica Sapien
Kathleen Pons
D. Weiss
Marcus Bush
Jeffrey MacMaster
Richard Gorin
Loretta McNeely
Kevin Swanson
Peter Hill
Char-Lou Benedict
Danny Piper
Trish Lundberg
Jim Chapman
John C Scott
Jeanne Burke
Cheyl Salt
Dominik Holters

Final Outreach (May)

Jim Marich
Scott Sandel
Marilee Kapsa
Sharon Gehl
George Franck
Walter Chambers
Richard Gorin
Tom & Linda Henry
John Stender
Elizabeth Hannon
Ted Wilson
Terry & Antoinette Goodbody
Dave Schumacher
Sharon Singleton
Mike Singleton
Derek Emery
Jim Hecht
Tom Custer
Ian Epley
Bruce Dammann
Roy Dahl
Tuere Faaola
Sean Goodin
Ben Baltic
Doug Scott
Jonathan Tibbits & Anne Varis
Marilia Maschion
Kristin Harms
CJ Ametrano
Janet Oden
Chris Cole
Christine Spalding

MEETING MINUTES

**Uptown Streetcar Feasibility Study
Preliminary Findings Public Meeting
St. Paul's Cathedral, Guild Room
May 21, 2014
6:00 PM**

Attendees

See attached Sign-in Sheet

The focus of this meeting was to discuss the findings of the draft report with the public.

Comments Noted

- Consider extending the streetcar north of Washington Street on Fifth Avenue to better serve the medical area.
 - Response: Additional extensions require additional costs and this would serve a very specific purpose. If the surrounding medical area provides funding, this may be an option; however, the road layout is windy through this section and could be difficult for a streetcar to maneuver.
- The project should provide a connection into downtown
 - Several people mentioned that without that connection, this may be a no-go for a project.
 - Response: The text in the report was modified to better represent this view. The scope of the study did not get into coordination with adjacent communities, but that would be a major next step in figuring out the feasibility and alignment of a connection to downtown.
- Add a station near Fir Street to better serve medical area at that intersection.
 - Response: In general, stations were placed based on spacing of about 4 blocks and those with the highest attraction in the surrounding area. If a connection to downtown is established, a station near Fir or Elm Street may be a logical and appealing option. If the streetcar were to turnaround at the southern end, it would use Fir Street or Grape Street and a station would be placed there.
- The streetcar being the RTP was discussed for funding and a larger plan.
 - Response: Text in the report was added to identify where the RTP placed streetcar routes. Further, the next steps were revised to indicate the RTP as a good starting point for the city-wide streetcar planning and phasing study that is recommended.
- Phase 2 terminates at Normal Street just north of University Avenue; could you extend the route to El Cajon Boulevard and connect to the BRT route?
 - It was also mentioned that Normal Street is a historic route that would help with gaining certain funding.
 - Response: The discussion on potential future expansion up Normal Street was modified to be a possible more immediate need. The recommended alignment and associated costs were not changed as that would be an additional 0.5 miles of track to fund. However this could be reevaluated

in the citywide vision to make sure transit connections are made, The current alignment would leave a ¼-mile walk between the BRT station at Park Blvd and University Avenue to the streetcar station on Normal Street.

- An advantage was added to Phase 2 to indicate the historic section on Normal Street.
- As part of Phase 2, can we use Washington Street to loop back from Normal Street instead of heading back on University Avenue?
 - Response: This was considered but there is not much to serve on Washington Street in that area and would be primarily a commute-focused alignment. The cost of the tracks and additional bridge crossing without surrounding development opportunity was determined to not be as good of option as University Avenue.
- Park Boulevard is an important connection and should be part of the plan.
 - Response: While Phase 3 is not recommended as part of the initial streetcar phases, it is agreed that Park Boulevard provides great opportunity and potential to connect with tourist attractions. The text was updated to suggest that this should be an important expansion once there are supporting alignments in place.
- The City has a history of starting big projects and then they are delayed, scrapped, etc.
 - Response: While no change was made in the report, we discussed at the meeting that there is a need for a “champion” to keep this streetcar project moving for the City, and it may not be City staff that does that. An example of the Portland Streetcar, Inc., was used, where a non-profit organization was established to get the streetcar program implemented.
- Was the streetcar placed opposite of the bicycle facilities on Fourth and Fifth Avenues deliberately?
 - Response: No change made to the report, but it was discussed at the meeting that the streetcar alignment is placed strategically so that both the Uptown Regional Bike Corridor project and the Uptown Streetcar project can both be implemented on the same street and do not conflict.

Comments made by San Diego Historic Streetcars via e-mail on May 22:

- 1) The estimated cost of a 3.6 mile loop in Uptown (Phase 1) was reported as \$180 million, which works out to \$50 million per mile. According to the estimate we had prepared for our proposed Little Italy alignment, the numbers worked out to about \$35 million for a 1.7 mile loop. Another consultant we spoke with suggested it could be done for significantly less than that, if designed correctly. Furthermore, in Reconnecting America's book *Street Smart: Streetcars and Cities in the Twenty-First Century*, Shelley Poticha and Gloria Ohland [point out](#) that streetcars are "less expensive to build -- about a third the per-mile cost of light rail, or \$12 to \$15 million per mile compared to \$30 million to \$50 million". I want to be sure that we are not conflating streetcars with light rail in this instance, as that \$50 million number seems to be high-end of that technology's price range. Obviously Kimley-Horn stated that there's a significant difference between streetcars and light rail last night-- I just want to be sure the price point reflects that as well.

➤ Response: The \$180 million cost included a \$50 million assumption for bridge improvements and/or storage and maintenance facility

construction or upgrades, design and engineering fees, and contingency. The study provides line items on the assumptions made to come up with these values. If less expensive options are available, this can be confirmed in future stages (such as during preliminary engineering).

- 2) It was implied that modern streetcars, in comparison to historic or vintage cars, provide for an "easier design" and can more efficiently load/move passengers. San Francisco's F-Market & Wharves Streetcar Line and Tampa's TECO Line serve as two counterpoints to that assertion. In San Francisco, the F-Market & Wharves Streetcar Line, populated by numerous types of vintage and historic cars, is remarkably efficient and capable of carrying large numbers of people. Estimated ridership for that alignment is 25,000 people per day and there are no significant delays in loading. In Tampa, the TECO Line operates with Gomaco 'Birney' replica vehicles and uses an elevated "mini-high platform" design to provide for easy loading of patrons with ADA accessibility needs. This removes the need for an ADA lift and achieves a similar benefit of flat floor vehicles.

➤Response: Each scenario is unique and there may be options for other vehicles. The recommendation for modern vehicles was based on discussions with MTS and evaluating the existing bus stations that would share a stop with the streetcar.

- 3) It was also implied that modern cars are less expensive than historic cars, but according to just about any resource restoring a historic car costs significantly less than purchasing a new modern car. According to Gomaco, the restoration of the three original Class 1 streetcars would cost \$750,000 per car, and replicas would be about \$950,000. The City/Park Streetcar Feasibility Study completed last year identifies that any of the modern vehicle options will cost more than 3 times that (from \$2.9 million to \$3.6 million). As far as the Operations & Maintenance concerns-- many cities operate a historic or replica car without problems or additional costs. Operations and maintenance for our proposed Little Italy line (1.7 mile loop) are estimated at \$2.4 million a year.


➤Response: It is noted in the study that modern vehicles are more expensive and uses the information provided in the City/Park Study.

- 4) I do think that tourism, neighborhood character, and historic preservation should be considered alongside these practical engineering and cost concerns when determining a recommendation for vehicle choice, especially considering that streetcars are largely valued for their transit-oriented development benefits. We are arguing that our historic cars are as practical as modern cars, but they also have a special benefit of being historically significant on a national level. The Class 1 streetcars are San Diego Historic Landmarks (#339) and if they return to any of their original routes (any proposed Phase of the Uptown Streetcar Study would accomplish that) they will qualify for National Historic Designation. Furthermore, the Class 1s can be especially potent tools for development because they preserve and enhance neighborhood character and will provide a significant boon for tourism, much like the San Francisco Cable Cars or the New Orleans Streetcar system. These streetcars can be a branding tool for the city, whereas modern vehicles cannot provide that benefit.

➤Response: While modern vehicles are recommended in the study, the ultimate decision on the vehicle will be made by the owner/operator of the system. It is noted in the study that historic streetcar could be a great option for special event uses if it is not the every day vehicle selected.

Uptown Streetcar Feasibility Study



 Kimley-Horn
and Associates, Inc.

Workshop#1



Study Introduction





- An initial study to evaluate the feasibility, cost and potential impacts associated with implementing a streetcar operating between downtown San Diego and the Uptown Community
- Service would be a segment of an urban streetcar network



Study Introduction

Study Area



-  Primary Focus Area
-  Secondary Focus Area
-  Existing Trolley Network
-  City/Park Proposed Streetcar Line



Today

- Study Introduction
- History of Streetcars in San Diego
- Introduction to Streetcars
- Streetcars in America
- Project Purpose/ Need
 - Goals and Objectives
- Q&A
- Take Home



Saturday

- Overview
- Purpose/ Need
- Station Locations
- Alignment
 - Route
 - Track
- Vehicle Type

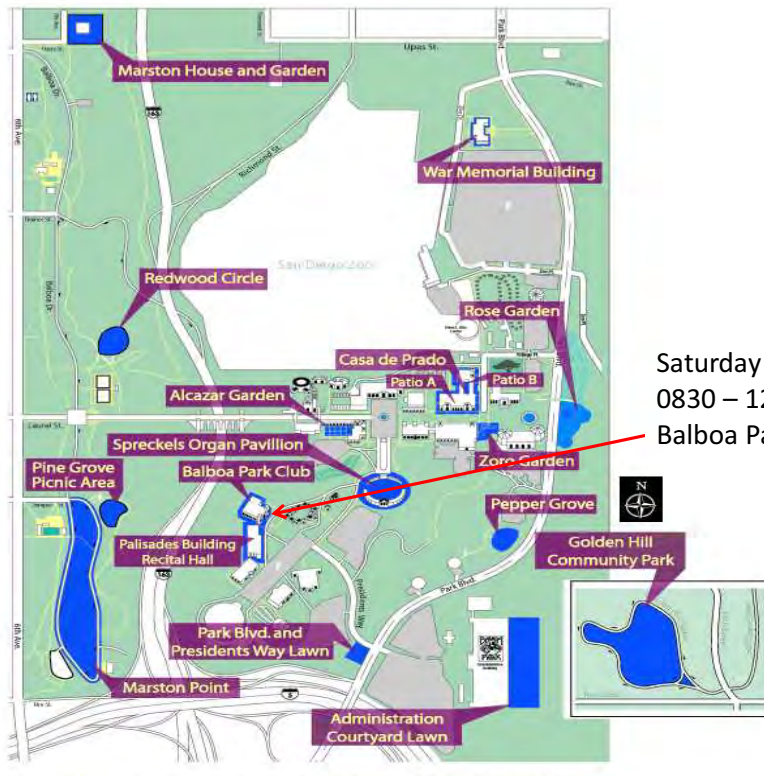
Workshop#2

Open House

8:30 – 12:00

Balboa Park Club

Santa Fe Room



Saturday Open House

0830 – 1200

Balboa Park Club – Santa Fe Room



Why Consider a Streetcar in Uptown?

How would you use a streetcar?

(check your top 2 most important uses)

- Work Commute
- Connect to Trolley line
- Access to Uptown retail/ entertainment
- Access to Downtown retail/ entertainment
- Access to Balboa Park
- Access to North Park retail/ entertainment
- Other _____
- Other _____

What time of day would you use a streetcar?

(check all that would apply)

- Weekday morning commute peak
- Weekday mid-day
- Weekday evening commute peak
- Weekday night
- Friday/ Saturday night
- Saturday daytime
- Sunday daytime
- Early morning (prior to commute peak)
- Other _____

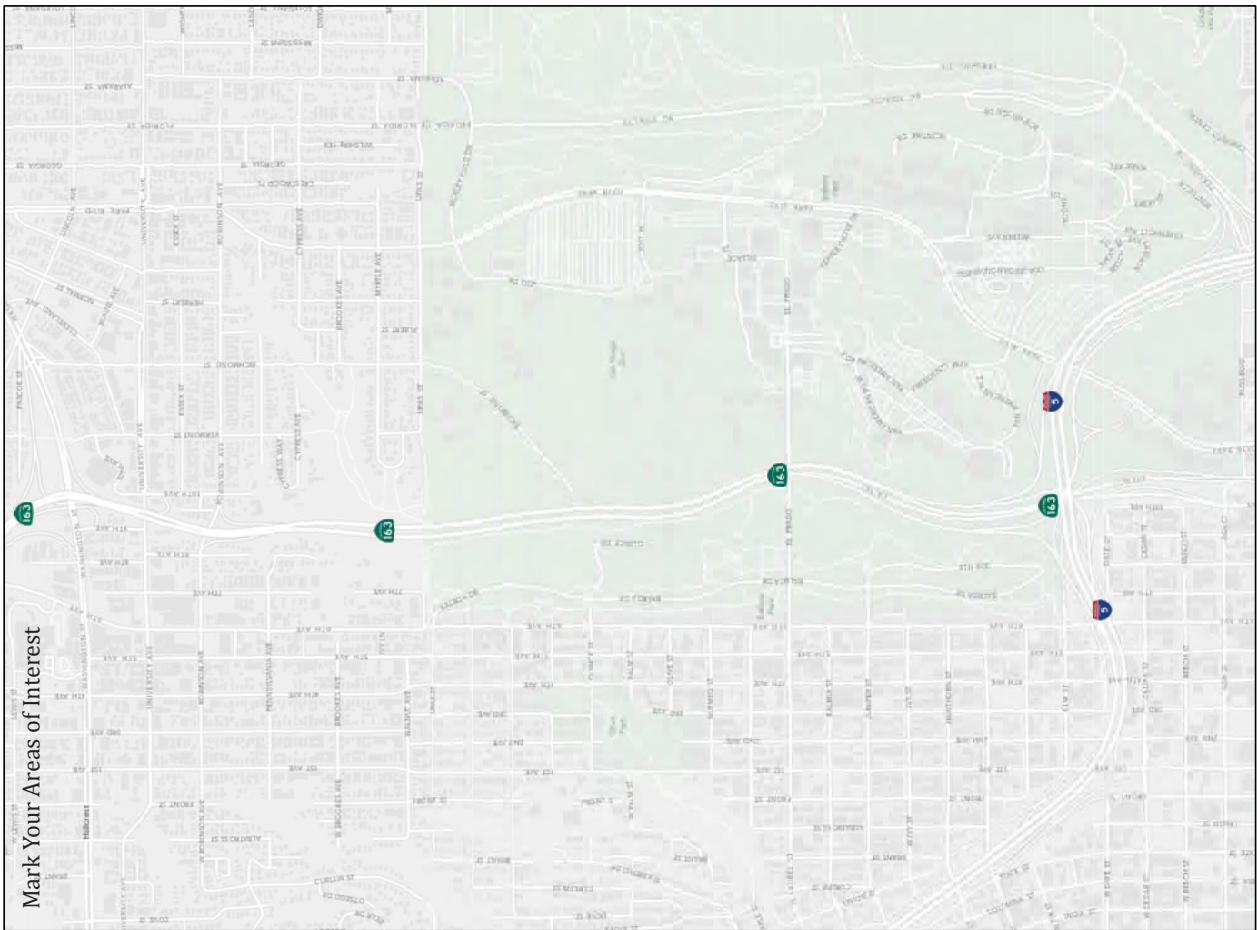
How do you want a streetcar to effect the community?

(check your top 3 most important effects)

- Increase internal connections through Uptown
- Increase connections with downtown
- Increase connections with North Park
- Spur economic development
- Increase tourism in Uptown
- Reduce vehicles on the street
- Reduce parking demand
- Save you money by not having to drive
- Provide an alternative transportation mode
- Replace existing modes of transportation
- Other _____
- Other _____
- Other _____

Are you concerned with any of the following if a streetcar system is installed?

- Noise
- Bicycle conflicts
- Pedestrian conflicts
- Automobile conflicts
- Interaction with buses
- Aesthetics of power wires
- Aesthetics of streetcar vehicles (outside)
- Aesthetics/ cleanliness of streetcar vehicles (inside)
- Loss of parking
- Safety of commute
- ADA access
- Other _____
- Other _____

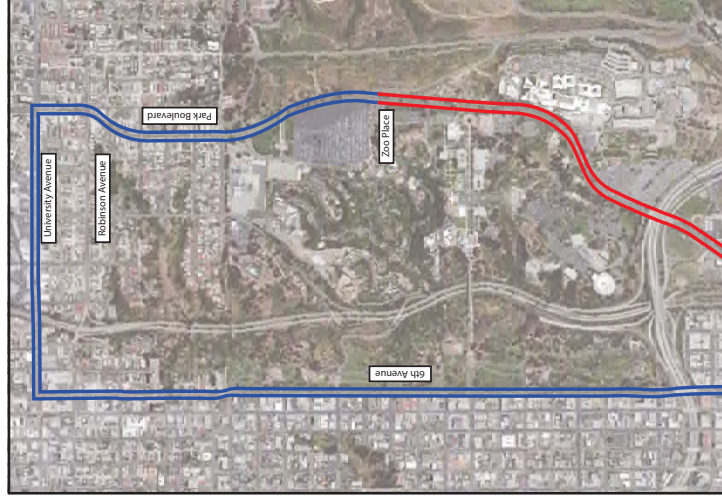




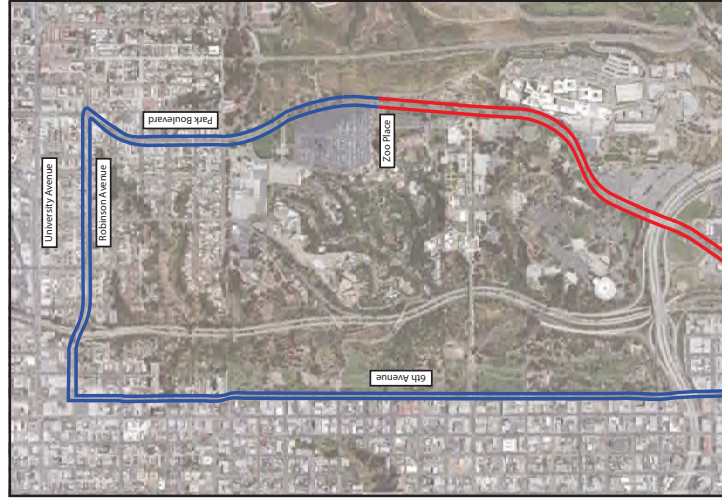
Alternative 1
6th Avenue
Park Boulevard



Alternative 2
6th Avenue
University Avenue



Alternative 3
6th Avenue
University Avenue
Park Boulevard



Alternative 4
6th Avenue
Robinson Avenue
Park Boulevard

Legend



Uptown Streetcar Alternative Alignment



Proposed City/Park Streetcar Alignment



NOT TO SCALE

UPTOWN STREETCAR FEASIBILITY





Alternative 1
5th and 6th Avenue
Park Boulevard



Alternative 2
5th and 6th Avenue
University Avenue



Alternative 3
5th and 6th Avenue
University Avenue
Park Boulevard



Alternative 4
5th and 6th Avenue
Robinson Avenue
Park Boulevard

Legend



Uptown Streetcar Alternative Alignment



Proposed City/Park Streetcar Alignment



NOT TO SCALE





Alternative 1
4th and 5th Avenue
Park Boulevard



Alternative 2
4th and 5th Avenue
University Avenue



Alternative 3
4th and 5th Avenue
University Avenue
Park Boulevard



Alternative 4
4th and 5th Avenue
Robinson Avenue
Park Boulevard

Legend



Uptown Streetcar Alternative Alignment



Proposed City/Park Streetcar Alignment



NOT TO SCALE

UPTOWN STREETCAR FEASIBILITY



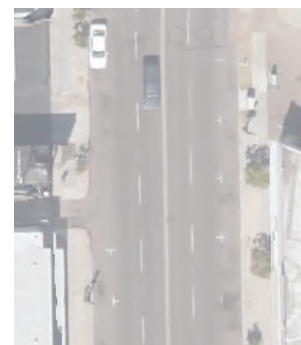
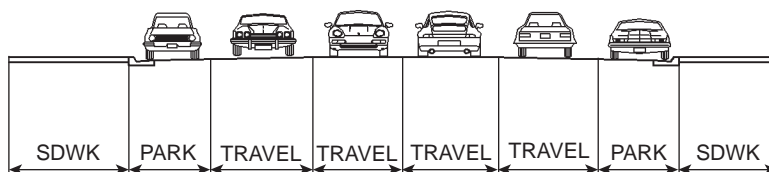
Kimley-Horn
and Associates, Inc.



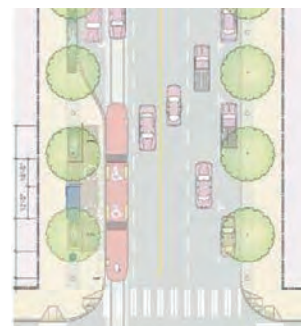
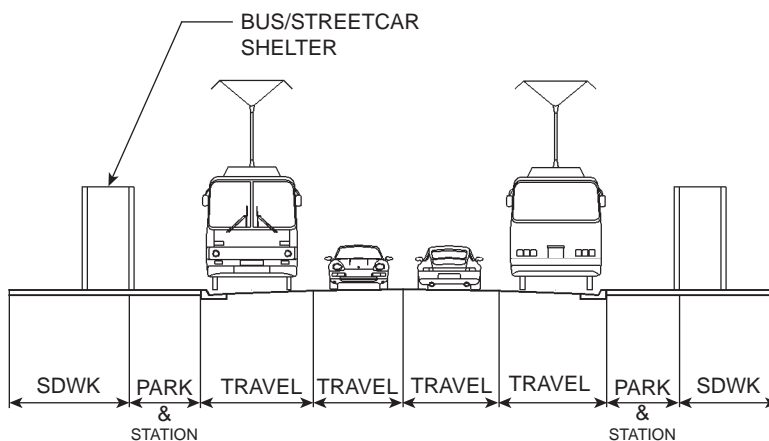
University Avenue



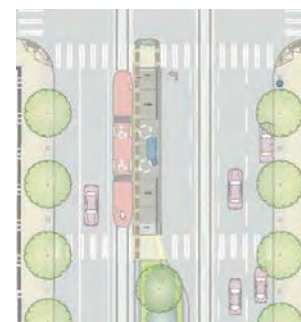
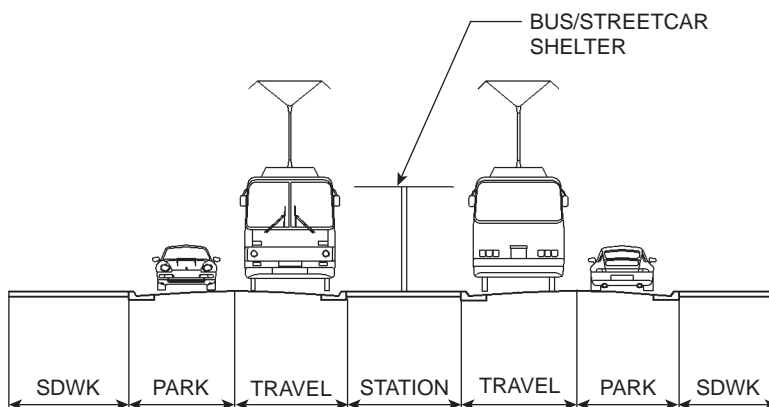
Existing Cross Section



Curb Extension Option



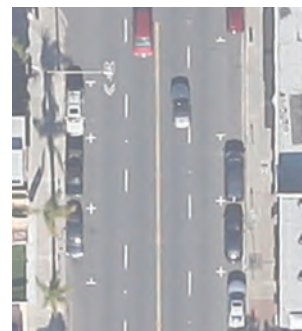
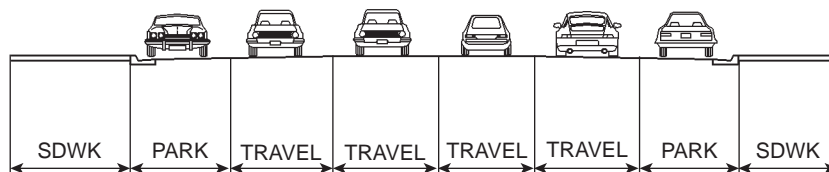
Center Median Option



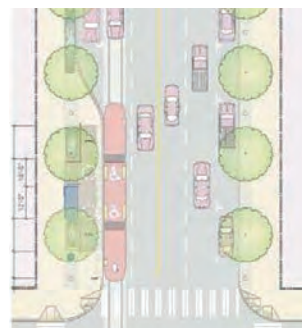
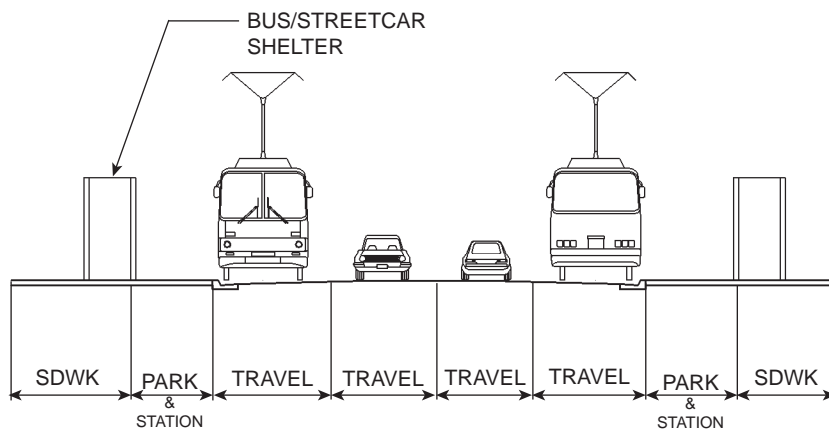
6th Avenue 2 Way Route



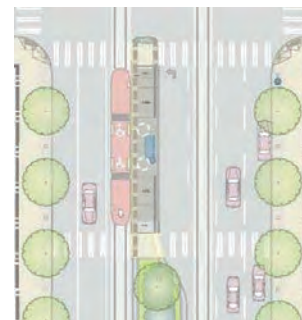
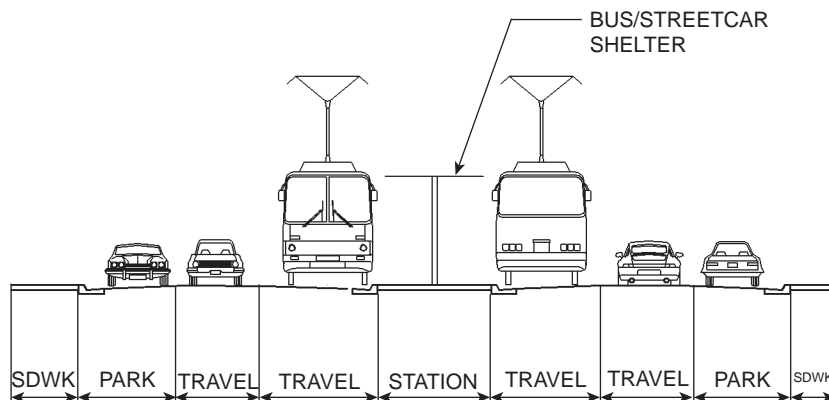
Existing Cross Section



Curb Extension Option



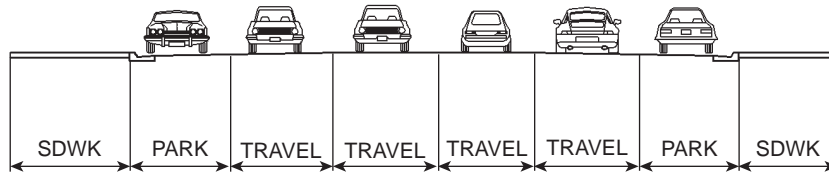
Center Median Option



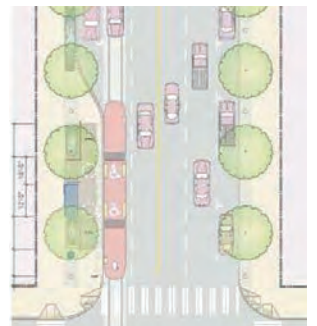
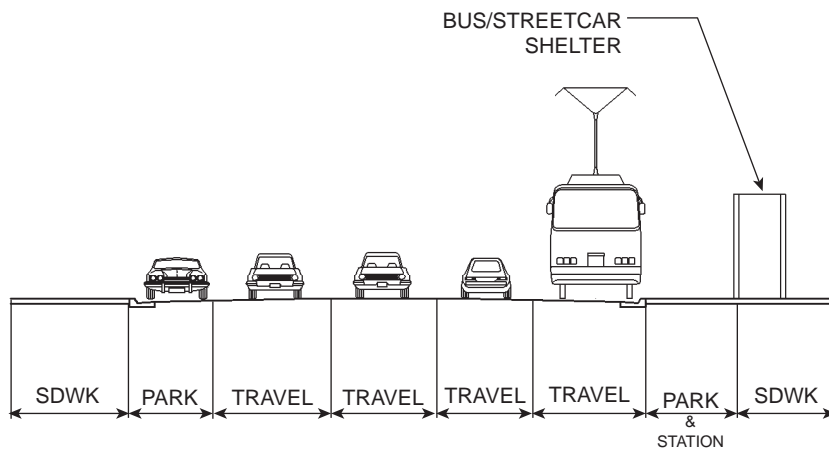
6th Avenue 1 Way Route



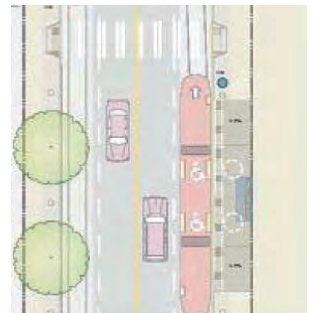
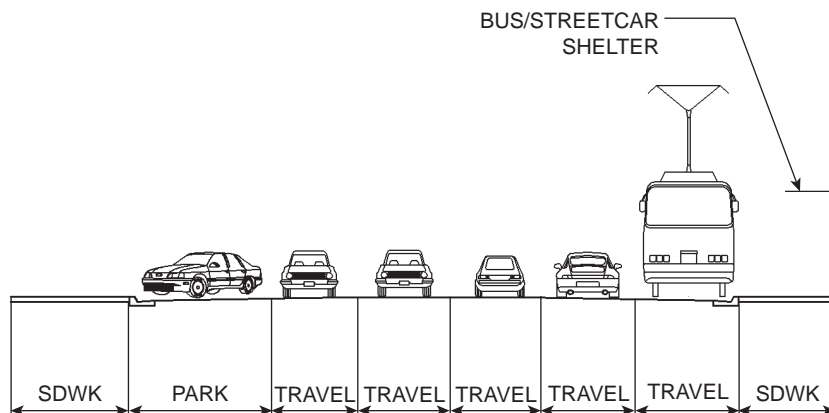
Existing Cross Section



Curb Extension Option



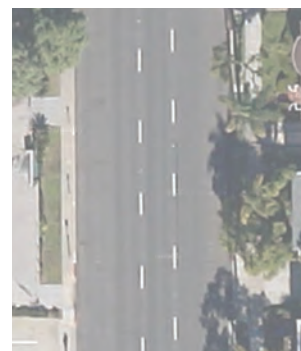
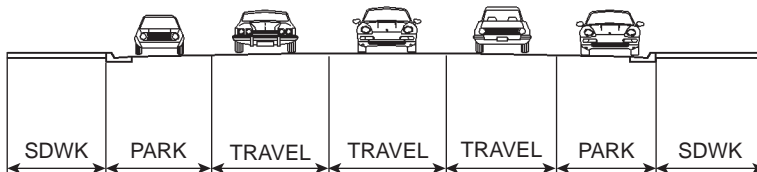
Curbside with Angled Option



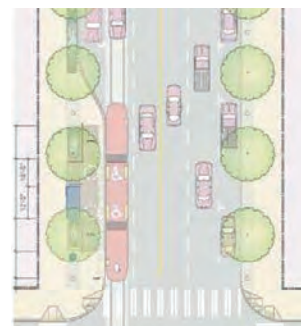
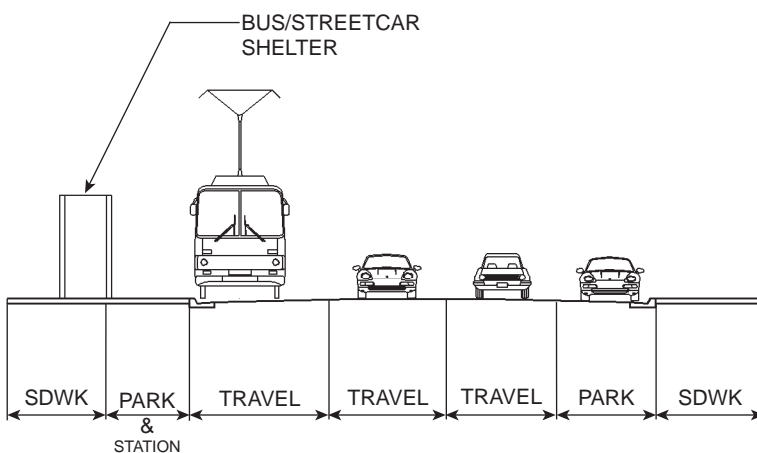
4th & 5th Avenue



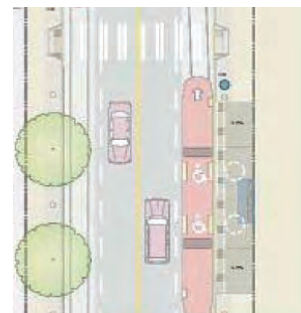
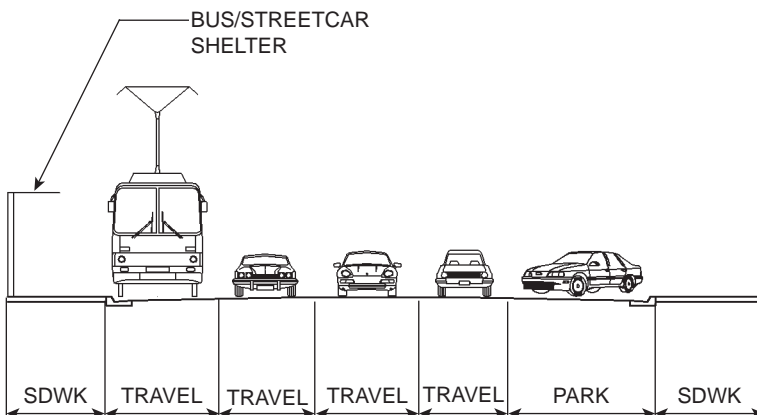
Existing Cross Section



Curb Extension Option



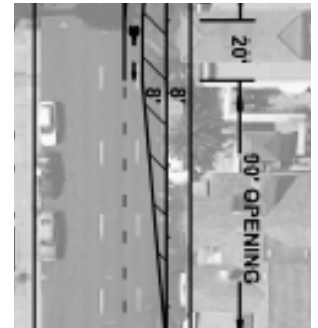
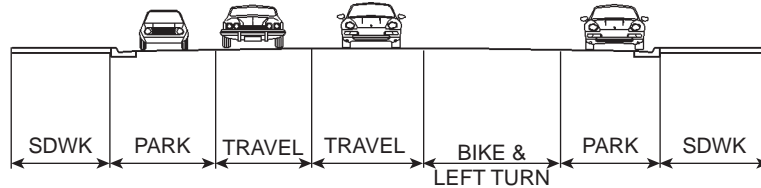
Curbside with Angled Option



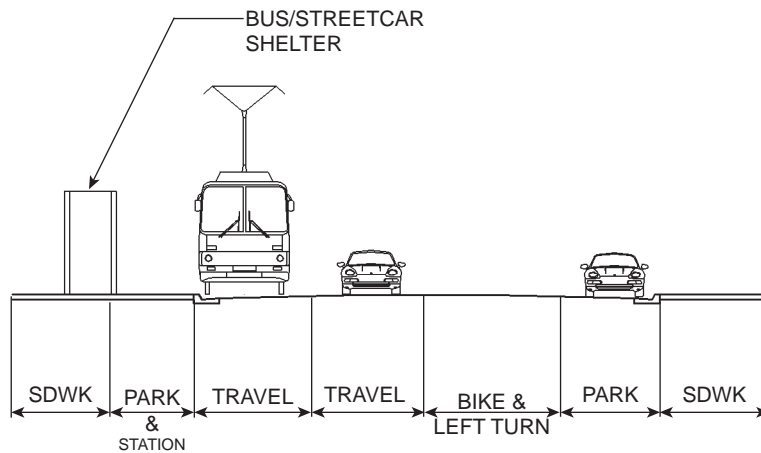
4th & 5th Avenue with Bike Improvements



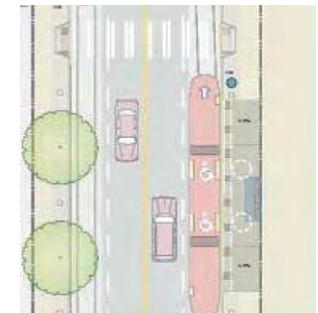
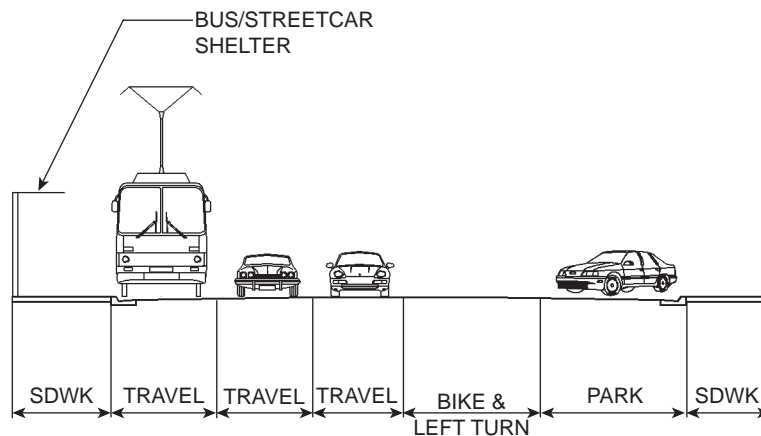
Planned Cross Section



Curb Extension Option



Curbside with Angled Option





What Type of Streetcar?

Modern

1. PORTLAND, OR
UNITED STREETCAR 100



3. PROTOTYPE ONLY
AMERITRAM 300



2. PORTLAND, OR & SEATTLE, WA
INEKON TRIO-12



4. SAN DIEGO, CA & ATLANTA, GA
SIEMENS SD8 & S70



Historic

5. SAN DIEGO, CA & SAN FRANCISCO, CA
HISTORIC PCC

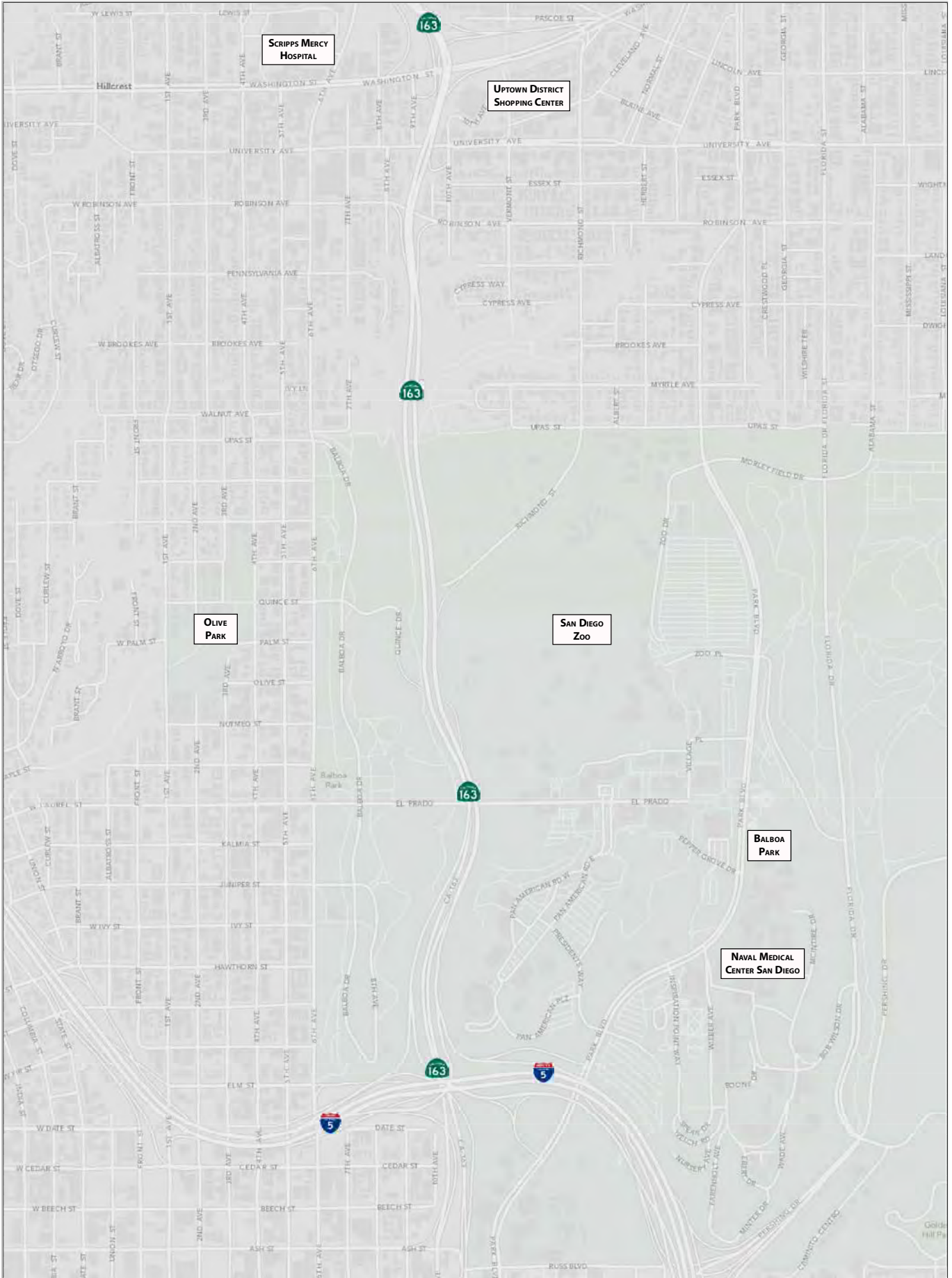


6. FORMERLY SAN DIEGO, CA
HISTORIC SD1





Where Should the Streetcar Stop?





APPENDIX B

MTS Route Maps and Timetables





CASH FARES / Tarifas en efectivo

Exact fare, please / Favor de pagar la cantidad exacta	
Day Pass (Regional) / Pase diario (Regional)	\$5.00
One-Way Fare / Tarifa de una dirección	\$2.25
Senior (60+)/Disabled/Medicare Mayores de 60 años/Discapacitados/Medicare	\$1.10*
Children 5 & under / Niños de 5 años o menores	FREE / GRATIS*
MONTHLY PASSES / Pases mensual	
Adult / Adulto	\$72.00
Senior (60+)/Disabled/Medicare Mayores de 60 años/Discapacitados/Medicare	\$18.00*
Youths (18 and under) Jóvenes (18 años o menores)	\$36.00*

DIRECTORY / Directorio

Regional Transit Information Información de transporte público regional	511 or/ó (619) 233-3004
TTY/TDD (teletype for hearing impaired) Teletipo para sordos	(619) 234-5005 or/ó (888) 722-4889
InfoExpress (24-hour info via Touch-Tone phone) Información las 24 horas (via teléfono de teclas)	(619) 685-4900
Customer Service / Suggestions Servicio al cliente / Sugerencias	(619) 557-4555
SafeWatch	(619) 557-4500
The Transit Store / Lost & Found The Transit Store / Objetos extraviados	(619) 234-1060
Articles found on the bus are turned in at The Transit Store Artículos encontrados en los autobuses son entregados a The Transit Store	1st & Broadway Downtown San Diego M-F 9am-5pm
For MTS online trip planning Planificación de viajes por Internet	www.sdmts.com

1

**Hillcrest –
Grossmont Transit Ctr. (1) or 70th St. Trolley (1A)**
via El Cajon Blvd.



- DESTINATIONS**
- Downtown La Mesa
 - Grossmont Center
 - Hillcrest DMV
 - Sharp Grossmont Hospital
 - Uptown Shopping Center

TROLLEY CONNECTIONS
70th St.
La Mesa Blvd.
Grossmont

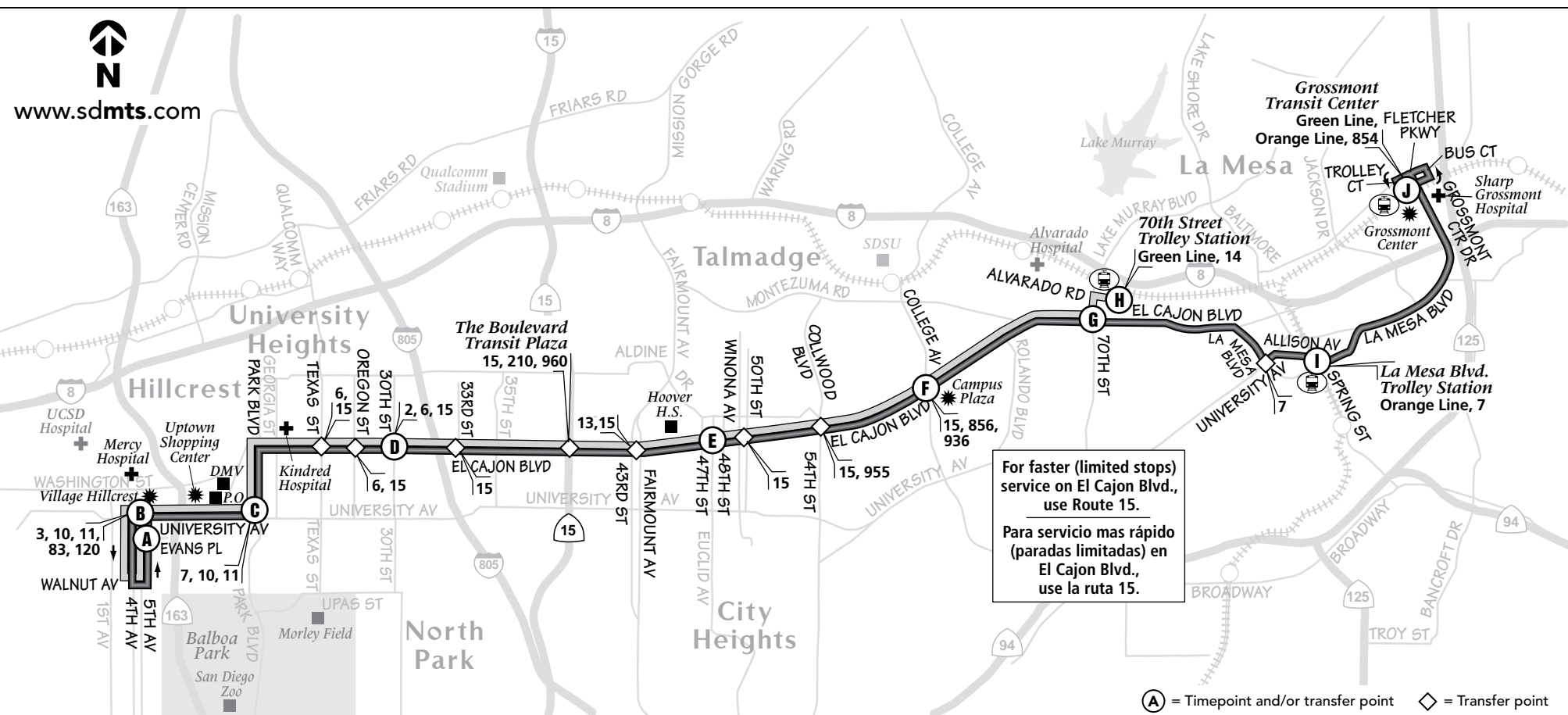


DAY PASS (REGIONAL) / Pase diario (Regional)
Valid for unlimited travel for one person on Trolley, most MTS buses, NCTD Breeze and SPRINTER. Valid for a discount on COASTER fares; not valid on Premium Express, Rural, or special service buses, or ADA paratransit.
Válidos para viajes ilimitados de una sola persona para: el Trolley, la mayoría de los autobuses de MTS, y los servicios del NCTD de BREEZE y SPRINTER. Válidos para acceder a descuentos en el COASTER, pero no para las rutas Premium Express ni rurales, los servicios especiales ni los servicios para discapacitados de ADA.

* I.D. required for discount fare or pass.
* Se requiere identificación para tarifas o pases de descuento.

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Para obtener más información sobre el uso de los servicios de MTS, recoga un 'Rider's Guide' en un autobús o en 'The Transit Store,' o visita a www.sdmts.com.

Thank you for riding MTS! ¡Gracias por viajar con MTS!



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Los horarios y información que se indican en este itinerario están sujetos a cambios. MTS no asume responsabilidad por errores en los itinerarios, ni por ningún perjuicio que se origine por los autobuses demorados.

Route 1 Sunday* / domingo*

Hillcrest → City Heights → La Mesa

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
5th Ave. & Evans Pl.	5th Ave. & University Ave.	Park Bl. & University Ave.	El Cajon Bl. & 30th St.	El Cajon Bl. & 48th St.	El Cajon Bl. & College Ave.	El Cajon Bl. & 70th St.	70th St. Trolley Station	La Mesa Bl. Trolley Station	Grossmont Transit Ctr. ARRIVE
6:30a	6:31a	6:37a	6:44a	6:55a	7:03a	7:09a	—	7:17a	A
7:27	7:28	7:34	7:42	7:54	8:02	8:09	—	8:17	A
8:24	8:25	8:32	8:40	8:53	9:02	9:09	—	9:17	A
9:23	9:24	9:31	9:40	9:53	10:02	10:10	—	10:18	A
10:23	10:24	10:32	10:42	10:56	11:06	11:14	—	11:22	A
11:23	11:24	11:32	11:42	11:56	12:06p	12:14p	—	12:22p	A
11:55	11:56	12:04p	12:14p	12:28p	12:38	12:46	—	12:54	A
12:25p	12:26p	12:34	12:44	12:58	1:08	1:16	—	1:24	A
12:55	12:56	1:04	1:14	1:28	1:38	1:46	—	1:54	A
1:25	1:26	1:34	1:44	1:58	2:08	2:16	—	2:24	A
1:55	1:56	2:04	2:14	2:28	2:38	2:46	—	2:54	A
2:25	2:26	2:34	2:44	2:58	3:08	3:16	—	3:24	A
2:55	2:56	3:04	3:14	3:28	3:38	3:46	—	3:54	A
3:25	3:26	3:34	3:44	3:58	4:08	4:16	—	4:24	A
3:55	3:56	4:04	4:14	4:28	4:38	4:46	—	4:54	A
4:28	4:29	4:36	4:45	4:58	5:07	5:15	—	5:22	A
4:58	4:59	5:06	5:15	5:28	5:37	5:45	—	5:52	A
5:28	5:29	5:36	5:44	5:56	6:04	6:11	—	6:18	A
6:25	6:26	6:33	6:41	6:53	7:01	7:08	—	7:15	A
7:25	7:26	7:33	7:41	7:52	7:59	8:06	—	8:13	A

La Mesa → City Heights → Hillcrest

(J)	(I)	(H)	(G)	(F)	(E)	(D)	(C)	(B)	(A)
Grossmont Transit Ctr. DEPART	La Mesa Bl. Trolley Station	70th St. Trolley Station	El Cajon Bl. & 70th St.	El Cajon Bl. & College Ave.	El Cajon Bl. & 47th St.	El Cajon Bl. & 30th St.	Park Bl. & University Ave.	4th Ave. & University Ave.	5th Ave. & Evans Pl. ARRIVE
—	5:33a	—	5:39a	5:44a	5:51a	6:01a	6:07a	6:12a	6:15a
—	6:40	—	6:47	6:53	7:01	7:12	7:18	7:24	7:27
—	7:40	—	7:47	7:54	8:02	8:14	8:21	8:27	8:31
—	8:40	—	8:48	8:55	9:03	9:16	9:24	9:31	9:35
—	9:40	—	9:48	9:56	10:04	10:18	10:26	10:34	10:38
—	10:40	—	10:48	10:57	11:06	11:20	11:28	11:36	11:40
—	11:40	—	11:49	11:57	12:06p	12:20p	12:28p	12:36	12:40
—	12:40	—	12:49	12:57	1:06	1:20	1:28	1:36	1:40
—	1:40	—	1:49	1:57	2:06	2:20	2:28	2:36	2:40
—	2:40	—	2:49	2:57	3:06	3:20	3:28	3:36	3:40
—	3:40	—	3:49	3:57	4:06	4:20	4:28	4:36	4:40
—	4:40	—	4:49	4:57	5:06	5:20	5:28	5:36	—
—	5:40	—	5:48	5:55	6:03	6:16	6:24	6:32	—
—	6:40	—	6:47	6:53	7:00	7:11	7:20	7:27	—

A = Ends 1 minute later at Allison Ave. and Palm Ave. / Viaje termina 1 minuto después a Allison Ave. y Palm Ave.
B = Begins 4 minutes earlier at Allison Ave. and Palm Ave. / Viaje comienza 4 minutos antes a Allison Ave. y Palm Ave.
*A Saturday or Sunday schedule will be operated on most holidays and observed holidays, including New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas. For holiday service details, visit www.sdmts.com or call 511.
*Se operará con horario de sábado o domingo durante la mayoría de los días festivos y los días de asueto a guardar. Los días festivos incluyen Año Nuevo, Presidents' Day, Memorial Day, Día de la Independencia (E.E.U.U.), Labor Day, Día de Acción de Gracias y Navidad.
Para detalles sobre el servicio en días festivos, visite www.sdmts.com o llame al 511.



The Transit Store

Your full-service store for

- Tickets and Passes
- Souvenirs
- Maps and Timetables
- Compass Cards
- Brochures
- Transit IDs and more!

102 Broadway (at First Avenue)
Downtown San Diego
Monday - Friday, 9:00 a.m. to 5:00 p.m.





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Children 5 & under / Niños de 5 años o menores	FREE / GRATIS*
MONTHLY PASSES / Pases mensual	
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Senior (60+)/Disabled/Medicare / Mayores de 60 años/Discapacitados/Medicare	\$18.00*
Youths (18 and under) / Jóvenes (18 años o menores)	\$36.00*

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Customer Service / Suggestions / Servicio al cliente / Sugerencias	(619) 557-4555
SafeWatch	(619) 557-4500
Lost & Found / Objetos extraviados	(619) 427-6438 or/ó (800) 409-3310
The Transit Store	(619) 234-1060 1st & Broadway, Downtown San Diego M-F 9am-5pm

3

Euclid Trolley – UCSD Med. Ctr. / Hillcrest
via Ocean View Blvd. / Downtown

DESTINATIONS

- Balboa Park
- Educational Cultural Complex
- Gaslamp Quarter
- Market Creek Plaza
- Ocean View Blvd.



5th Ave.
Park & Market
25th & Commercial
Euclid

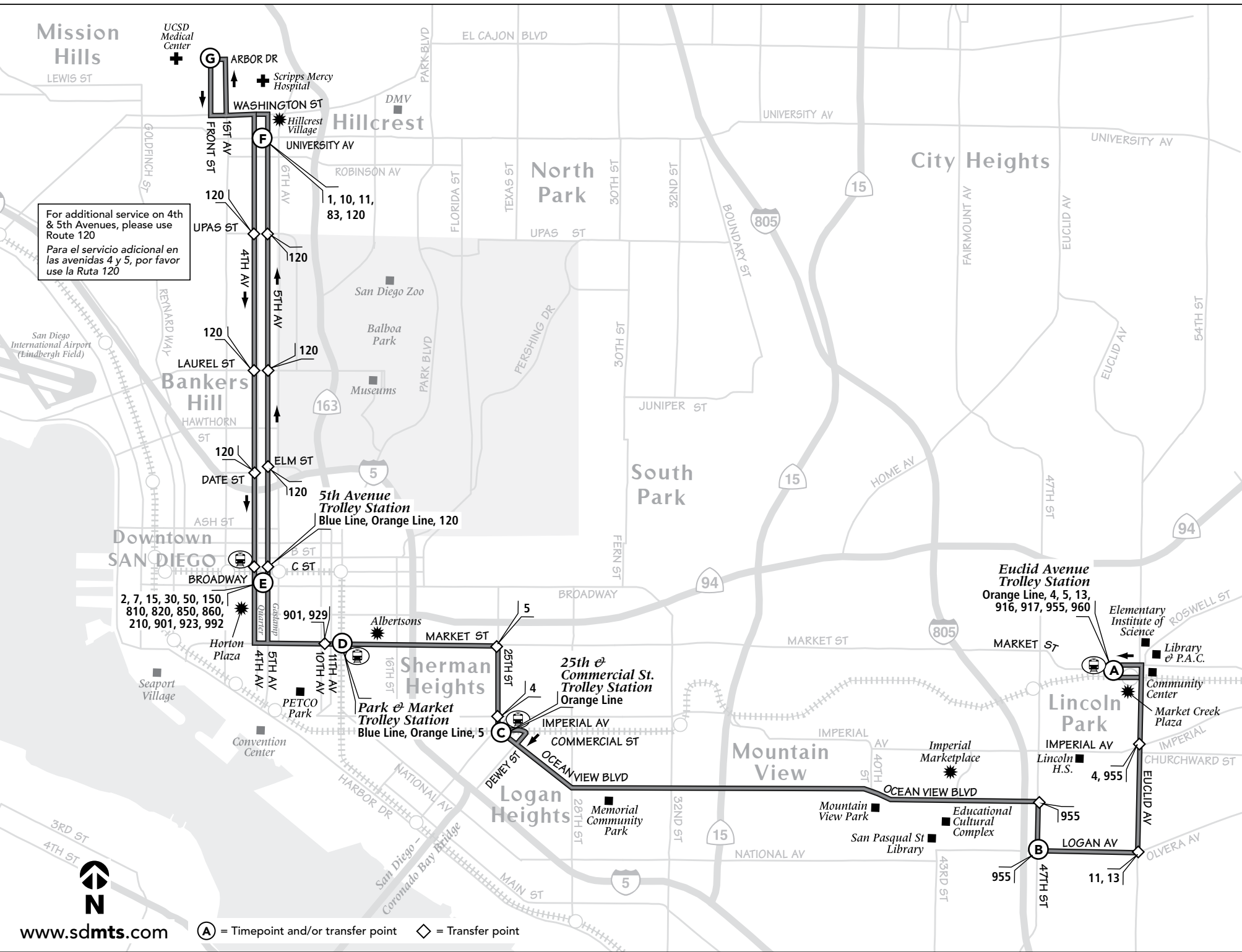


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Alternative formats are available upon request. Please call: / Formato alternativo disponible al preguntar. Favor de llamar: (619) 231-1466

Route 3							Sunday* / domingo*						
Lincoln Park → Downtown → Hillcrest							Hillcrest → Downtown → Lincoln Park						
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(G)	(F)	(E)	(D)	(C)	(B)	(A)
Euclid Ave. Trolley Station	47th St. & Logan Ave.	25th & Commercial Trolley Station	Park & Market Trolley Station	5th Ave. & Broadway	5th Ave. & University Ave.	UCSD Medical Center	UCSD Medical Center	4th Ave. & University Ave.	4th Ave. & Broadway	Park & Market Trolley Station	25th & Commercial Trolley Station	Logan Ave. & 47th St.	Euclid Ave. Trolley Station
DEPART	DEPART	DEPART	DEPART	DEPART	DEPART	ARRIVE	DEPART	DEPART	DEPART	DEPART	DEPART	DEPART	ARRIVE
5:35a	5:41a	5:54a	6:01a	6:07a	6:19a	6:23a	5:57a	6:01a	6:13a	6:19a	6:26a	6:38a	6:45a
6:55	7:01	7:14	7:21	7:27	7:39	7:43	7:20	7:24	7:37	7:43	7:50	8:03	8:11
7:55	8:01	8:15	8:23	8:29	8:42	8:47	8:20	8:24	8:37	8:43	8:50	9:03	9:11
8:55	9:02	9:16	9:26	9:32	9:46	9:51	9:17	9:22	9:37	9:44	9:52	10:06	10:14
9:55	10:02	10:16	10:26	10:32	10:46	10:51	10:17	10:22	10:37	10:44	10:52	11:06	11:14
10:55	11:02	11:16	11:26	11:33	11:48	11:53	11:15	11:21	11:37	11:44	11:52	12:08p	12:16p
12:55p	1:02	1:16	1:26	1:33	1:48	1:53	12:15p	12:21p	12:37p	12:44p	12:52p	1:08	1:16
1:55	2:03	2:18	2:28	2:36	2:51	2:56	1:15	1:21	1:37	1:44	1:52	2:08	2:16
2:55	3:03	3:18	3:28	3:36	3:51	3:56	2:16	2:22	2:38	2:45	2:54	3:10	3:19
3:55	4:03	4:18	4:28	4:36	4:51	4:56	3:16	3:22	3:38	3:45	3:54	4:10	4:19
4:55	5:03	5:17	5:26	5:33	5:47	5:52	4:16	4:22	4:38	4:45	4:54	5:10	5:19
5:55	6:02	6:15	6:24	6:31	6:44	6:49	5:16	5:22	5:37	5:44	5:52	6:07	6:15
6:55	7:02	7:15	7:24	7:31	7:44	7:49	6:19	6:24	6:38	6:44	6:53	7:07	7:14
							7:23	7:27	7:39	7:45	7:53	8:06	8:13

*A Saturday or Sunday schedule will be operated on most holidays and observed holidays, including New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas. For holiday service details, visit www.sdmts.com or call 511.
*Se operará con horario de sábado o domingo durante la mayoría de los días festivos y los días de asueto a guardar. Los días festivos incluyen Año Nuevo, Presidents' Day, Memorial Day, Día de la Independencia (E.E.U.U.), Labor Day, Día de Acción de Gracias y Navidad. Para detalles sobre el servicio en días festivos, visite www.sdmts.com o llame al 511.

Route 3

Monday through Friday / *lunes a viernes*

Lincoln Park ➡ Downtown ➡ Hillcrest

(A) Euclid Ave. Trolley Station DEPART	(B) 47th St. & Logan Ave.	(C) 25th & Commercial Trolley Station	(D) Park & Market Trolley Station	(E) 5th Ave. & Broadway	(F) 5th Ave. & University Ave.	(G) UCSD Medical Center ARRIVE
4:55a	5:01a	5:14a	5:21a	5:27a	5:38a	5:43a
5:25	5:31	5:44	5:51	5:57	6:08	6:13
5:44	5:50	6:03	6:10	6:16	6:27	6:32
5:58	6:05	6:20	6:28	6:34	6:46	6:51
6:13	6:20	6:35	6:43	6:49	7:01	7:06
6:28	6:35	6:50	6:58	7:04	7:16	7:21
6:42	6:49	7:05	7:14	7:20	7:33	7:38
6:57	7:04	7:21	7:30	7:36	7:49	7:55
7:13	7:20	7:37	7:46	7:52	8:05	8:11
7:28	7:35	7:52	8:01	8:07	8:21	8:27
7:43	7:51	8:07	8:17	8:23	8:37	8:43
7:58	8:06	8:22	8:32	8:38	8:53	8:59
8:13	8:21	8:37	8:47	8:53	9:08	9:14
8:28	8:36	8:52	9:02	9:08	9:23	9:29
8:43	8:51	9:07	9:17	9:23	9:39	9:45
8:58	9:06	9:22	9:32	9:38	9:54	10:01
9:13	9:21	9:37	9:47	9:53	10:09	10:16
9:28	9:36	9:52	10:02	10:08	10:24	10:31
9:43	9:51	10:07	10:17	10:23	10:39	10:46
9:58	10:06	10:22	10:32	10:38	10:54	11:01
10:13	10:21	10:37	10:47	10:53	11:09	11:16
10:28	10:36	10:52	11:02	11:08	11:24	11:31
10:43	10:51	11:07	11:17	11:24	11:40	11:47
10:58	11:06	11:22	11:32	11:40	11:56	12:03p
11:13	11:21	11:37	11:47	11:55	12:11p	12:18
11:28	11:36	11:52	12:02p	12:10p	12:26	12:33
11:43	11:51	12:07p	12:17	12:25	12:41	12:48
11:58	12:06p	12:22	12:32	12:40	12:56	1:03
12:13p	12:21	12:37	12:47	12:55	1:11	1:18
12:28	12:36	12:52	1:02	1:10	1:26	1:33
12:43	12:51	1:07	1:17	1:25	1:41	1:48
12:58	1:06	1:22	1:32	1:40	1:56	2:03
1:13	1:21	1:37	1:47	1:55	2:11	2:18
1:28	1:36	1:52	2:02	2:10	2:26	2:33
1:42	1:50	2:07	2:17	2:25	2:41	2:48
1:56	2:04	2:21	2:31	2:39	2:55	3:02
2:10	2:18	2:35	2:45	2:53	3:09	3:16
2:25	2:33	2:50	3:00	3:08	3:24	3:30
2:40	2:48	3:05	3:15	3:23	3:39	3:45
2:55	3:03	3:20	3:30	3:38	3:54	4:00
3:10	3:18	3:35	3:45	3:53	4:09	4:15
3:25	3:33	3:50	4:00	4:08	4:24	4:30
3:40	3:48	4:05	4:15	4:23	4:39	4:45
3:55	4:03	4:20	4:30	4:38	4:54	5:00
4:10	4:18	4:35	4:45	4:53	5:09	5:15
4:25	4:33	4:50	5:00	5:08	5:24	5:30
4:40	4:48	5:05	5:15	5:23	5:39	5:45
4:55	5:03	5:20	5:30	5:38	5:54	6:00
5:11	5:19	5:35	5:45	5:52	6:07	6:13
5:27	5:35	5:50	6:00	6:07	6:21	6:26
5:43	5:51	6:05	6:14	6:21	6:35	6:40
5:58	6:06	6:20	6:28	6:35	6:49	6:54
6:13	6:21	6:35	6:43	6:50	7:04	7:09
6:28	6:36	6:50	6:58	7:05	7:19	7:24
6:43	6:51	7:05	7:13	7:20	7:34	7:39
6:58	7:06	7:20	7:28	7:35	7:49	7:54
7:13	7:21	7:38	7:46	7:53	8:07	8:12
7:28	7:36	7:53	8:01	8:08	8:22	8:27
7:43	7:51	8:08	8:16	8:23	8:37	8:42
7:58	8:06	8:23	8:31	8:38	8:52	8:57
8:13	8:21	8:38	8:46	8:53	9:07	9:12
8:28	8:36	8:53	9:01	9:08	9:22	9:27
8:43	8:51	9:08	9:16	9:23	9:37	9:42
8:58	9:06	9:23	9:31	9:38	9:52	9:57
9:13	9:21	9:38	9:46	9:53	10:07	10:12
9:28	9:36	9:53	10:01	10:08	10:22	10:27
9:43	9:51	10:08	10:16	10:23	10:37	10:42
9:58	10:06	10:23	10:31	10:38	11:07	11:12
10:13	10:21	10:42	10:50	10:56	12:07a	12:12a

Hillcrest ➡ Downtown ➡ Lincoln Park

(G) UCSD Medical Center DEPART	(F) 4th Ave. & University Ave.	(E) 4th Ave. & Broadway	(D) Park & Market Trolley Station	(C) 25th & Commercial Trolley Station	(B) Logan Ave. & 47th St.	(A) Euclid Ave. Trolley Station ARRIVE
4:56a	5:00a	5:11a	5:16a	5:22a	5:35a	5:42a
5:26	5:30	5:41	5:46	5:52	6:05	6:12
5:50	5:54	6:05	6:10	6:16	6:29	6:36
6:05	6:09	6:21	6:27	6:33	6:47	6:55
6:20	6:24	6:36	6:42	6:48	7:02	7:10
6:34	6:38	6:51	6:58	7:04	7:18	7:26
6:48	6:53	7:06	7:13	7:19	7:33	7:42
7:03	7:08	7:21	7:28	7:34	7:48	7:57
7:18	7:23	7:36	7:43	7:49	8:03	8:12
7:33	7:38	7:51	7:58	8:04	8:18	8:27
7:48	7:53	8:06	8:13	8:19	8:33	8:42
8:03	8:08	8:21	8:28	8:34	8:48	8:57
8:17	8:22	8:36	8:43	8:49	9:03	9:12
8:31	8:37	8:51	8:58	9:05	9:19	9:28
8:45	8:51	9:06	9:13	9:20	9:35	9:44
9:00	9:06	9:21	9:28	9:35	9:50	9:59
9:15	9:21	9:36	9:43	9:50	10:05	10:14
9:30	9:36	9:51	9:58	10:05	10:20	10:29
9:45	9:51	10:06	10:13	10:20	10:35	10:44
10:00	10:06	10:21	10:28	10:35	10:50	10:59
10:15	10:21	10:36	10:43	10:50	11:05	11:14
10:30	10:36	10:51	10:58	11:05	11:20	11:29
10:45	10:51	11:06	11:13	11:20	11:35	11:44
10:59	11:06	11:21	11:28	11:35	11:50	11:59
11:13	11:20	11:36	11:43	11:51	12:06p	12:15p
11:28	11:35	11:51	11:58	12:06p	12:21	12:30
11:43	11:50	12:06p	12:13p	12:21	12:36	12:45
11:58	12:05p	12:21	12:28	12:36	12:51	1:00
12:13p	12:20	12:36	12:43	12:51	1:06	1:15
12:28	12:35	12:51	12:58	1:06	1:21	1:30
12:43	12:50	1:06	1:13	1:21	1:36	1:45
12:58	1:05	1:21	1:28	1:36	1:51	2:00
1:13	1:20	1:36	1:43	1:51	2:06	2:15
1:28	1:35	1:51	1:58	2:07	2:24	2:34
1:43	1:50	2:06	2:13	2:22	2:39	2:49
1:58	2:05	2:21	2:28	2:37	2:54	3:04
2:13	2:20	2:36	2:43	2:52	3:09	3:19
2:28	2:35	2:51	2:58	3:07	3:24	3:34
2:43	2:50	3:06	3:13	3:22	3:39	3:49
2:58	3:05	3:21	3:28	3:37	3:54	4:04
3:13	3:20	3:36	3:43	3:52	4:09	4:19
3:28	3:35	3:51	3:58	4:07	4:24	4:34
3:43	3:50	4:06	4:13	4:22	4:39	4:49
3:58	4:05	4:21	4:28	4:37	4:54	5:04
4:13	4:20	4:36	4:43	4:52	5:09	5:19
4:28	4:35	4:51	4:58	5:07	5:24	5:34
4:43	4:50	5:06	5:13	5:22	5:39	5:49
4:58	5:05	5:21	5:28	5:37	5:54	6:04
5:13	5:20	5:36	5:43	5:51	6:08	6:17
5:28	5:34	5:49	5:56	6:04	6:21	6:30
5:42	5:48	6:03	6:10	6:18	6:34	6:43
5:57	6:03	6:18	6:25	6:33	6:49	6:57
6:13	6:19	6:33	6:40	6:48	7:04	7:11
6:29	6:35	6:48	6:55	7:02	7:18	7:25
6:45	6:50	7:03	7:10	7:17	7:32	7:39
7:15	7:20	7:33	7:40	7:47	8:01	8:08
7:46	7:51	8:03	8:10	8:17	8:31	8:38
8:20	8:25	8:37	8:43	8:49	9:03	9:10
8:51	8:56	9:08	9:14	9:20	9:34	9:41
9:21	9:26	9:38	9:44	9:50	10:04	10:11
9:53	9:57	10:08	10:14	10:20	10:33	10:40
10:23	10:27	10:38	10:44	10:50	11:03	11:10
11:23	11:27	11:38	11:44	11:50	12:03a	12:10a

Route 3

Saturday* / *sábado**

Lincoln Park ➡ Downtown ➡ Hillcrest

(A) Euclid Ave. Trolley Station DEPART	(B) 47th St. & Logan Ave.	(C) 25th & Commercial Trolley Station	(D) Park & Market Trolley Station
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CASH FARES / Tarifas en efectivo

Exact fare, please / Favor de pagar la cantidad exacta	
Day Pass (Regional) / Pase diario (Regional)	\$5.00
One-Way Fare / Tarifa de una dirección	\$2.25
Senior (60+)/Disabled/Medicare / Mayores de 60 años/Discapacitados/Medicare	\$1.10*
Children 5 & under / Niños de 5 años o menores	FREE / GRATIS*
MONTHLY PASSES / Pases mensual	
Adult / Adulto	\$72.00
Senior (60+)/Disabled/Medicare / Mayores de 60 años/Discapacitados/Medicare	\$18.00*
Youths (18 and under) / Jóvenes (18 años o menores)	\$36.00*

DIRECTORY / Directorio

Regional Transit Information / Información de transporte público regional	511 or/ó (619) 233-3004
TTY/TDD (teletype for hearing impaired) / Teletipo para sordos	(619) 234-5005 or/ó (888) 722-4889
InfoExpress (24-hour info via Touch-Tone phone) / Información las 24 horas (via teléfono de teclas)	(619) 685-4900
Customer Service / Suggestions / Servicio al cliente / Sugerencias	(619) 557-4555
SafeWatch	(619) 557-4500
The Transit Store / Lost & Found / The Transit Store / Objetos extraviados	(619) 234-1060
Articles found on the bus are turned in at The Transit Store / Artículos encontrados en los autobuses son entregados a The Transit Store	1st & Broadway Downtown San Diego M-F 9am-5pm
For MTS online trip planning / Planificación de viajes por Internet	www.sdmts.com

10

Old Town – University & College Limited Stops
via University Ave.

- DESTINATIONS**
- City Heights Retail Village
 - City Heights Transit Plaza
 - Hillcrest DMV
 - Scripps Mercy Hospital
 - Uptown Shopping Center
 - Village Hillcrest



Old Town
Washington St.

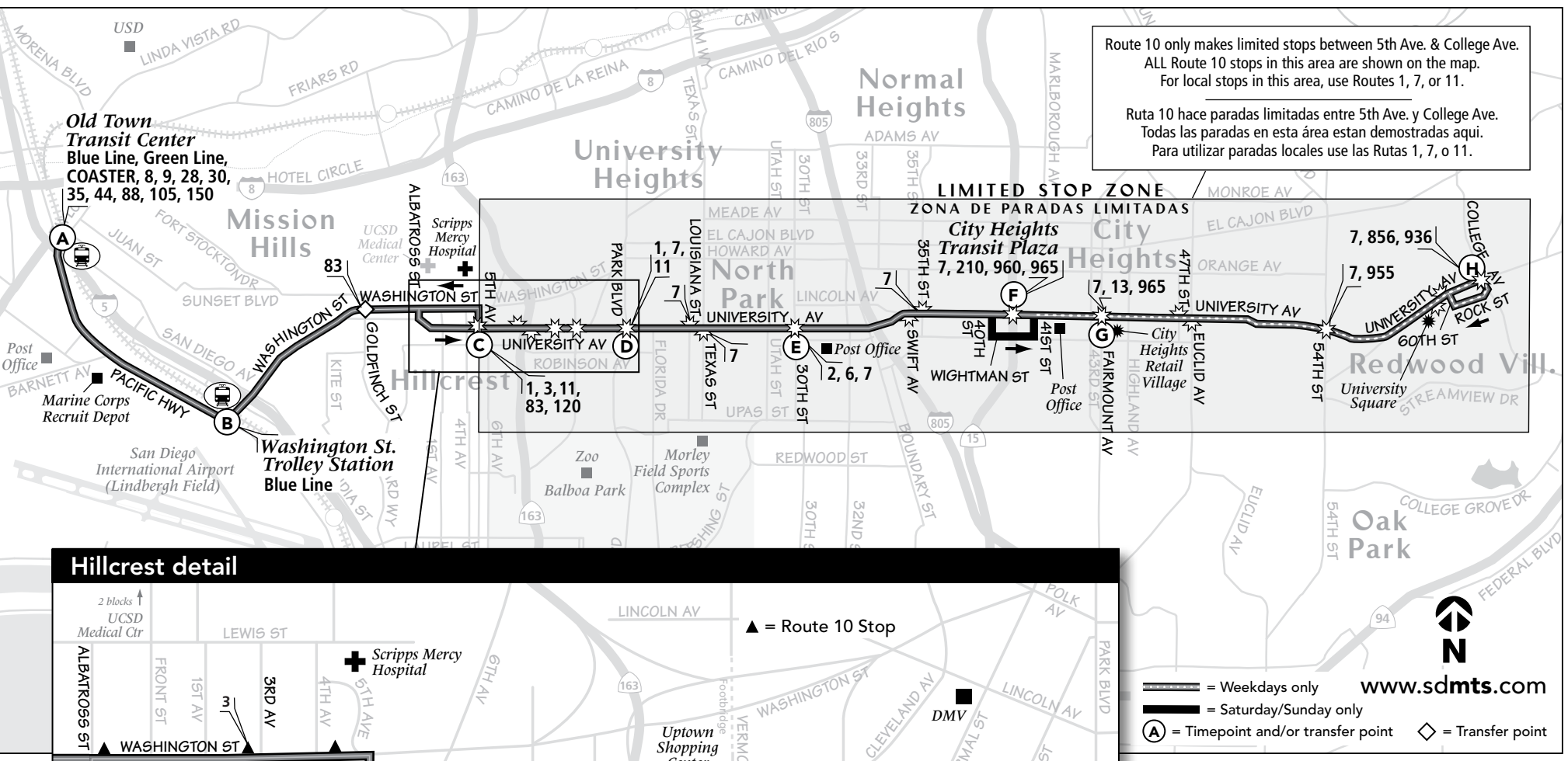


DAY PASS (REGIONAL) / Pase diario (Regional)
Valid for unlimited travel for one person on Trolley, most MTS buses, NCTD Breeze and SPRINTER. Valid for a discount on COASTER fares; not valid on Premium Express, Rural, or special service buses, or ADA paratransit.
Válidos para viajes ilimitados de una sola persona para: el Trolley, la mayoría de los autobuses de MTS, y los servicios del NCTD de BREEZE y SPRINTER. Válidos para acceder a descuentos en el COASTER, pero no para las rutas Premium Express ni rurales, los servicios especiales ni los servicios para discapacitados de ADA.

For more information on riding MTS services, pick up a Rider's Guide on a bus or at the Transit Store, or visit www.sdmts.com. Para obtener más información sobre el uso de los servicios de MTS, recoga un 'Rider's Guide' en un autobús o en 'The Transit Store,' o visita a www.sdmts.com.

Thank you for riding MTS! ¡Gracias por viajar con MTS!

* I.D. required for discount fare or pass. * Se requiere identificación para tarifas o pases de descuento.



Alternative formats are available upon request. Please call: / Formato alternativo disponible al preguntar. Favor de llamar: (619) 231-1466

Route 10								Sunday* / domingo*							
Old Town → Hillcrest → North Park → City Heights				City Heights → North Park → Hillcrest → Old Town											
Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Ⓖ	Ⓗ	Ⓗ	Ⓖ	Ⓔ	Ⓓ	Ⓒ	Ⓑ	Ⓐ	
Old Town Transit Ctr. DEPART	Washington St. & Pacific Hwy.	University Ave. & 5th Ave.	University Ave. & Park Blvd.	University Ave. & 30th St.	City Heights Transit Plaza @ 15-Fwy.	University Ave. & Fairmount Ave.	University Ave. & College Ave. ARRIVE	University Ave. & College Ave. DEPART	University Ave. & Fairmount Ave.	City Heights Transit Plaza @ 15-Fwy.	University Ave. & 30th St.	University Ave. & Park Blvd.	Washington St. & Pacific Hwy.	Old Town Transit Ctr. ARRIVE	
6:33a	6:37a	6:44a	6:49a	6:53a	7:00a	—	—	—	—	5:57a	6:02a	6:05a	6:09a	6:22a	
7:33	7:37	7:45	7:51	7:55	8:03	—	—	—	—	7:02	7:07	7:10	7:14	7:27	
8:32	8:36	8:44	8:50	8:54	9:02	—	—	—	—	7:51	7:57	8:01	8:06	8:20	
9:02	9:06	9:14	9:20	9:24	9:32	—	—	—	—	8:21	8:27	8:31	8:36	8:50	
9:32	9:36	9:44	9:50	9:54	10:02	—	—	—	—	8:51	8:57	9:01	9:06	9:20	
10:02	10:06	10:14	10:20	10:24	10:32	—	—	—	—	9:18	9:25	9:31	9:36	9:50	
10:32	10:37	10:45	10:52	10:57	11:06	—	—	—	—	9:48	9:55	10:01	10:06	10:20	
11:02	11:07	11:15	11:22	11:27	11:36	—	—	—	—	10:18	10:25	10:31	10:36	10:50	
11:32	11:37	11:45	11:52	11:57	12:06p	—	—	—	—	10:46	10:54	11:00	11:06	11:20	
12:02p	12:07p	12:15p	12:22p	12:27p	12:36	—	—	—	—	11:16	11:24	11:30	11:36	11:50	
12:32	12:37	12:46	12:53	12:59	1:08	—	—	—	—	11:46	11:54	12:00p	12:06p	12:20p	
1:02	1:07	1:16	1:23	1:29	1:38	—	—	—	—	12:16p	12:24p	12:30	12:36	12:50	
1:32	1:37	1:46	1:53	1:59	2:08	—	—	—	—	12:46	12:54	1:00	1:06	1:20	
2:02	2:07	2:16	2:23	2:29	2:38	—	—	—	—	1:16	1:24	1:30	1:36	1:50	
2:32	2:37	2:46	2:53	2:59	3:08	—	—	—	—	1:46	1:54	2:00	2:06	2:20	
3:02	3:07	3:16	3:23	3:29	3:38	—	—	—	—	2:16	2:24	2:30	2:36	2:50	
3:32	3:37	3:46	3:53	3:59	4:08	—	—	—	—	2:46	2:54	3:00	3:06	3:20	
4:02	4:07	4:16	4:23	4:29	4:38	—	—	—	—	3:16	3:24	3:30	3:36	3:50	
4:32	4:37	4:46	4:53	4:59	5:08	—	—	—	—	3:46	3:54	4:00	4:06	4:20	
5:02	5:07	5:16	5:23	5:29	5:38	—	—	—	—	4:16	4:24	4:30	4:36	4:50	
5:32	5:37	5:46	5:53	5:59	6:08	—	—	—	—	4:46	4:54	5:00	5:06	5:20	
6:02	6:07	6:15	6:22	6:27	6:35	—	—	—	—	5:16	5:24	5:30	5:36	5:50	
6:45	6:50	6:58	7:05	7:10	7:18	—	—	—	—	5:52	5:59	6:03	6:09	6:23	
7:45	7:50	7:58	8:05	8:10	8:18	—	—	—	—	6:22	6:29	6:33	6:39	6:53	
8:45	8:49	8:57	9:03	9:08	9:15	—	—	—	—	7:03	7:10	7:14	7:20	7:34	
9:45	9:49	9:57	10:03	10:08	10:15	—	—	—	—	8:03	8:10	8:14	8:20	8:34	

*A Saturday or Sunday schedule will be operated on most holidays and observed holidays, including New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas. For holiday service details, visit www.sdmts.com or call 511. *Se operará con horario de sábado o domingo durante la mayoría de los días festivos y los días de asueto a guardar. Los días festivos incluyen Año Nuevo, Presidents' Day, Memorial Day, Día de la Independencia (E.E.U.U.), Labor Day, Día de Acción de Gracias y Navidad. Para detalles sobre el servicio en días festivos, visite www.sdmts.com o llame al 511.

Route 10

Monday through Friday / lunes a viernes

Old Town ➔ Hillcrest ➔ North Park ➔ City Heights

Table with 8 columns (A-H) showing bus arrival and departure times for the Old Town to City Heights route. Includes a limited stop zone at the bottom.

City Heights ➔ North Park ➔ Hillcrest ➔ Old Town

Table with 8 columns (H-A) showing bus arrival and departure times for the City Heights to Old Town route. Includes a limited stop zone at the bottom.

Route 10

Saturday* / sábado*

Old Town ➔ Hillcrest ➔ North Park ➔ City Heights

Table with 8 columns (A-H) showing bus arrival and departure times for the Old Town to City Heights route on Saturdays. Includes a limited stop zone at the bottom.

City Heights ➔ North Park ➔ Hillcrest ➔ Old Town

Table with 8 columns (H-A) showing bus arrival and departure times for the City Heights to Old Town route on Saturdays. Includes a limited stop zone at the bottom.

*A Saturday or Sunday schedule will be operated on most holidays and observed holidays, including New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas. For holiday service details, visit www.sdmts.com or call 511. *Se operará con horario de sábado o domingo durante la mayoría de los días festivos y los días de asueto a guardar. Los días festivos incluyen Año Nuevo, Presidents' Day, Memorial Day, Día de la Independencia (E.E.U.U.), Labor Day, Día de Acción de Gracias y Navidad. Para detalles sobre el servicio en días festivos, visite www.sdmts.com o llame al 511.

CASH FARES / Tarifas en efectivo

Exact fare, please / Favor de pagar la cantidad exacta

Day Pass (Regional) / Pase diario (Regional)	\$5.00
One-Way Fare / Tarifa de una dirección	\$2.25
Senior (60+)/Disabled/Medicare Mayores de 60 años/Discapacitados/Medicare	\$1.10*
Children 5 & under / Niños de 5 años o menores	FREE / GRATIS*

MONTHLY PASSES / Pases mensual

Adult / Adulto	\$68.00
Senior (60+)/Disabled/Medicare Mayores de 60 años/Discapacitados/Medicare	\$17.00*
Youths (18 and under) Jóvenes (18 años o menores)	\$34.00*

DAY PASS (REGIONAL) / Pase diario (Regional)

Valid for unlimited travel for one person on Trolley, most MTS buses, NCTD Breeze and SPRINTER. Valid for a discount on COASTER fares; not valid on Premium Express, Rural, or special service buses, or ADA paratransit.

Válidos para viajes ilimitados de una sola persona para: el Trolley, la mayoría de los autobuses de MTS, y los servicios del NCTD de BREEZE y SPRINTER. Válidos para acceder a descuentos en el COASTER, pero no para las rutas Premium Express ni rurales, los servicios especiales ni los servicios para discapacitados de ADA.

* I.D. required for discount fare or pass.
* Se requiere identificación para tarifas o pases de descuento.

DIRECTORY / Directorio

Regional Transit Information Información de transporte público regional	511 or/ó (619) 233-3004
TTY/TDD (teletype for hearing impaired) Teletipo para sordos	(619) 234-5005 or/ó (888) 722-4889
InfoExpress (24-hour info via Touch-Tone phone) Información las 24 horas (via teléfono de teclas)	(619) 685-4900
Customer Service / Suggestions Servicio al cliente / Sugerencias	(619) 557-4555
SafeWatch	(619) 557-4500
Lost & Found Objetos extraviados	(877) 841-3278

The Transit Store

1st & Broadway
Downtown San Diego
M-F 9am-5pm

For MTS online trip planning
Planificación de viajes por Internet

www.sdmts.com

For more information on riding MTS services, pick up a Rider's Guide on a bus or at the Transit Store, or visit www.sdmts.com. Para obtener más información sobre el uso de los servicios de MTS, recoga un 'Rider's Guide' en un autobús o en 'The Transit Store,' o visita a www.sdmts.com.

Thank you for riding MTS! ¡Gracias por viajar con MTS!

83

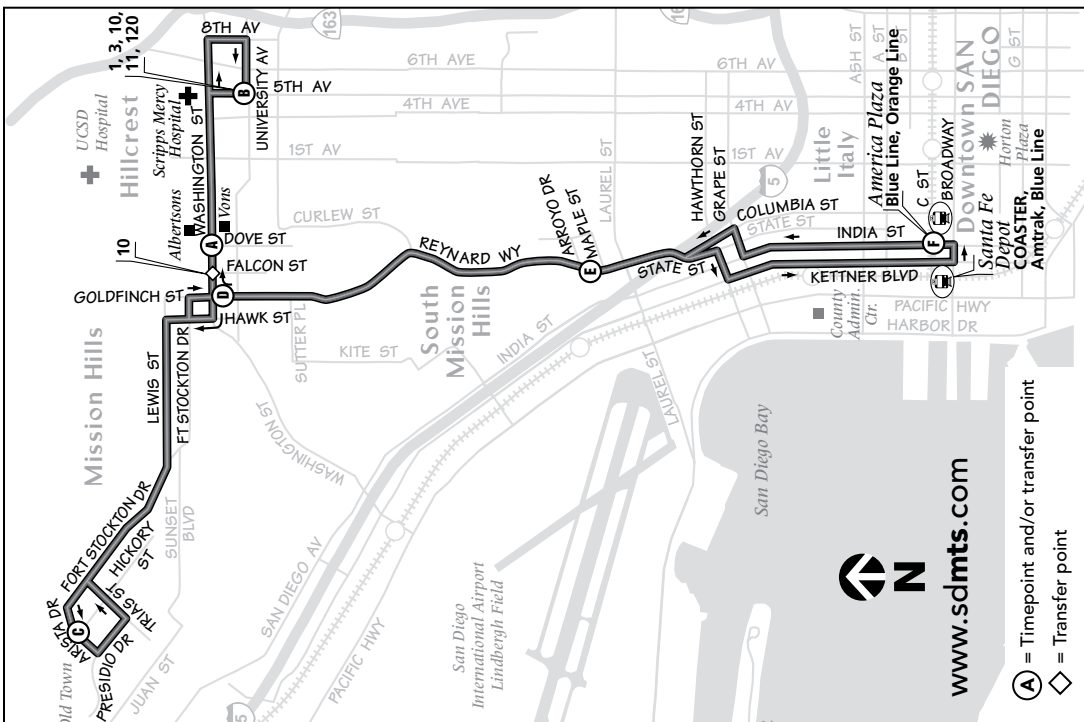
Mission Hills/Hillcrest – Downtown
via Reynard Way

DESTINATIONS

- Ft. Stockton Dr.
- Little Italy
- Reynard Way
- Scripps Mercy Hospital



America Plaza



MTS
Riders Refresh with
Coca-Cola

Alternative formats are available upon request. Please call: / *Formato alternativo disponible al preguntar. Favor de llamar: (619) 231-1466*

Route 83

Monday through Friday / *lunes a viernes*

Washington St. ➔ Hillcrest ➔ Mission Hills ➔ Downtown ➔ Washington St.

(A) Washington St. & Dove St. (Vons) DEPART	(B) University Ave. & 5th Ave.	(A) Washington St. & Dove St. (Albertsons)	(C) Arista Dr. & Hickory St.	(D) Goldfinch St. & Washington St.	(E) State St. & Arroyo Dr. (Southbound)	(F) America Plaza Trolley Station	(E) State St. & Maple St. (Northbound)	(A) Washington St. & Dove St. (Vons) ARRIVE
—	6:04a	6:09a	6:16a	6:22a	6:27a	6:36a	6:44a	6:53a
7:00a	7:04	7:09	7:16	7:22	7:27	7:36	7:44	7:53
8:00	8:04	8:09	8:16	8:22	8:27	8:36	8:44	8:53
9:00	9:04	9:09	9:16	9:22	9:27	9:36	9:44	9:53
10:00	10:04	10:09	10:16	10:22	10:27	10:36	10:44	10:53
11:00	11:04	11:09	11:16	11:22	11:27	11:36	11:44	11:53
12:00p	12:04p	12:09p	12:16p	12:22p	12:27p	12:36p	12:44p	12:53p
1:00	1:04	1:09	1:16	1:22	1:27	1:36	1:44	1:53
2:00	2:04	2:09	2:16	2:22	2:27	2:36	2:44	2:53
3:00	3:04	3:09	3:16	3:22	3:27	3:36	3:44	3:53
4:00	4:04	4:09	4:16	4:22	4:27	4:36	4:44	4:53
5:00	5:04	5:09	5:16	5:22	5:27	5:36	5:44	5:53
6:00	6:04	6:09	6:16	6:22	6:27	6:36	6:44	6:53

This route does not operate on weekends or on the observation of the following holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, & Christmas
 Esta ruta no ofrece servicio durante el fin de semana ó durante los siguientes días festivos: Año Nuevo, Presidents' Day, Memorial Day, Día de la Independencia (E.E.U.U.), Labor Day, Día de Acción de Gracias, y Navidad
PM times are in bold / Los horarios de la tarde (PM) están en negrita



The Transit Store

Your full-service store for

- Tickets and Passes
- Souvenirs
- Brochures
- Maps and Timetables
- Transit IDs and more!

102 Broadway (at First Avenue)
 Downtown San Diego
 Monday - Friday, 9:00 a.m. to 5:00 p.m.





CASH FARES / Tarifas en efectivo

Exact fare, please / Favor de pagar la cantidad exacta	
Day Pass (Regional) / Pase diario (Regional)	\$5.00
One-Way Fare / Tarifa de una dirección	\$2.25
Senior (60+)/Disabled/Medicare / Mayores de 60 años/Discapacitados/Medicare	\$1.10*
Children 5 & under / Niños de 5 años o menores	FREE / GRATIS*
MONTHLY PASSES / Pases mensual	
Adult / Adulto	\$72.00
Senior (60+)/Disabled/Medicare / Mayores de 60 años/Discapacitados/Medicare	\$18.00*
Youths (18 and under) / Jóvenes (18 años o menores)	\$36.00*

DAY PASS (REGIONAL) / Pase diario (Regional)

Valid for unlimited travel for one person on Trolley, most MTS buses, NCTD Breeze and SPRINTER. Valid for a discount on COASTER fares; not valid on Premium Express, Rural, or special service buses, or ADA paratransit.

Válidos para viajes ilimitados de una sola persona para: el Trolley, la mayoría de los autobuses de MTS, y los servicios del NCTD de BREEZE y SPRINTER. Válidos para acceder a descuentos en el COASTER, pero no para las rutas Premium Express ni rurales, los servicios especiales ni los servicios para discapacitados de ADA.

* I.D. required for discount fare or pass. / * Se requiere identificación para tarifas o pases de descuento.

DIRECTORY / Directorio

Regional Transit Information / Información de transporte público regional	511 or/ó (619) 233-3004
TTY/TDD (teletype for hearing impaired) / Teletipo para sordos	(619) 234-5005 or/ó (888) 722-4889
InfoExpress (24-hour info via Touch-Tone phone) / Información las 24 horas (via teléfono de teclas)	(619) 685-4900
Customer Service / Suggestions / Servicio al cliente / Sugerencias	(619) 557-4555
SafeWatch	(619) 557-4500
The Transit Store / Lost & Found / The Transit Store / Objetos extraviados	(619) 234-1060

Articles found on the bus are turned in at The Transit Store
 Artículos encontrados en los autobuses son entregados a The Transit Store

1st & Broadway
 Downtown San Diego
 M-F 9am-5pm

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Thank you for riding MTS! / ¡Gracias por viajar con MTS!

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Downtown – Kearny Mesa Transit Center
 via Hillcrest / Fashion Valley / Linda Vista

DESTINATIONS

- Fashion Valley Mall
- Horton Plaza
- Juvenile Hall
- Kearny Mesa Courthouse
- Mercy Hospital
- Sharp & Children's Hospitals



Route 120 Sunday* / domingo*

Downtown → Hillcrest → Fashion Valley → Kearny Mesa

	(A) 4th Ave. & G St. DEPART	(B) 5th Ave. & Broadway	(C) 5th Ave. & University Ave.	(D) Fashion Valley Transit Center ARRIVE DEPART	(E) Comstock St. & Linda Vista Rd.	(F) Sharp Hospital (Health Center & Frost)	(G) Kearny Mesa Transit Center ARRIVE
		6:09a	6:21a	6:30a	6:38a	6:45a	6:53a
		7:08	7:21	7:30	7:38	7:45	7:54
		8:08	8:22	8:32	8:39	8:47	8:56
		9:08	9:23	9:33	9:39	9:47	9:56
		9:38	9:53	10:03	—	—	—
		10:08	10:23	10:33	10:39	10:47	10:56
		10:38	10:53	11:03	—	—	—
		11:08	11:23	11:33	11:39	11:47	11:56
		11:38	11:53	12:03p	—	—	—
		12:08p	12:23p	12:33	12:39p	12:47p	12:56p
		12:38	12:53	1:03	—	—	—
		1:08	1:23	1:33	1:39	1:47	1:56
		1:38	1:53	2:03	—	—	—
		2:08	2:23	2:33	2:39	2:47	2:56
		2:38	2:53	3:03	—	—	—
		3:08	3:23	3:33	3:39	3:47	3:56
		3:38	3:53	4:03	—	—	—
		4:08	4:23	4:33	4:39	4:47	4:56
		4:38	4:53	5:03	—	—	—
		5:08	5:23	5:33	5:39	5:47	5:56
		5:38	5:53	6:03	—	—	—
		6:08	6:22	6:32	6:39	6:47	6:56
		7:08	7:22	7:32	7:39	7:47	7:56
		8:08	8:21	8:30	8:38	8:46	8:54
		9:09	9:21	9:30	9:38	9:45	9:52

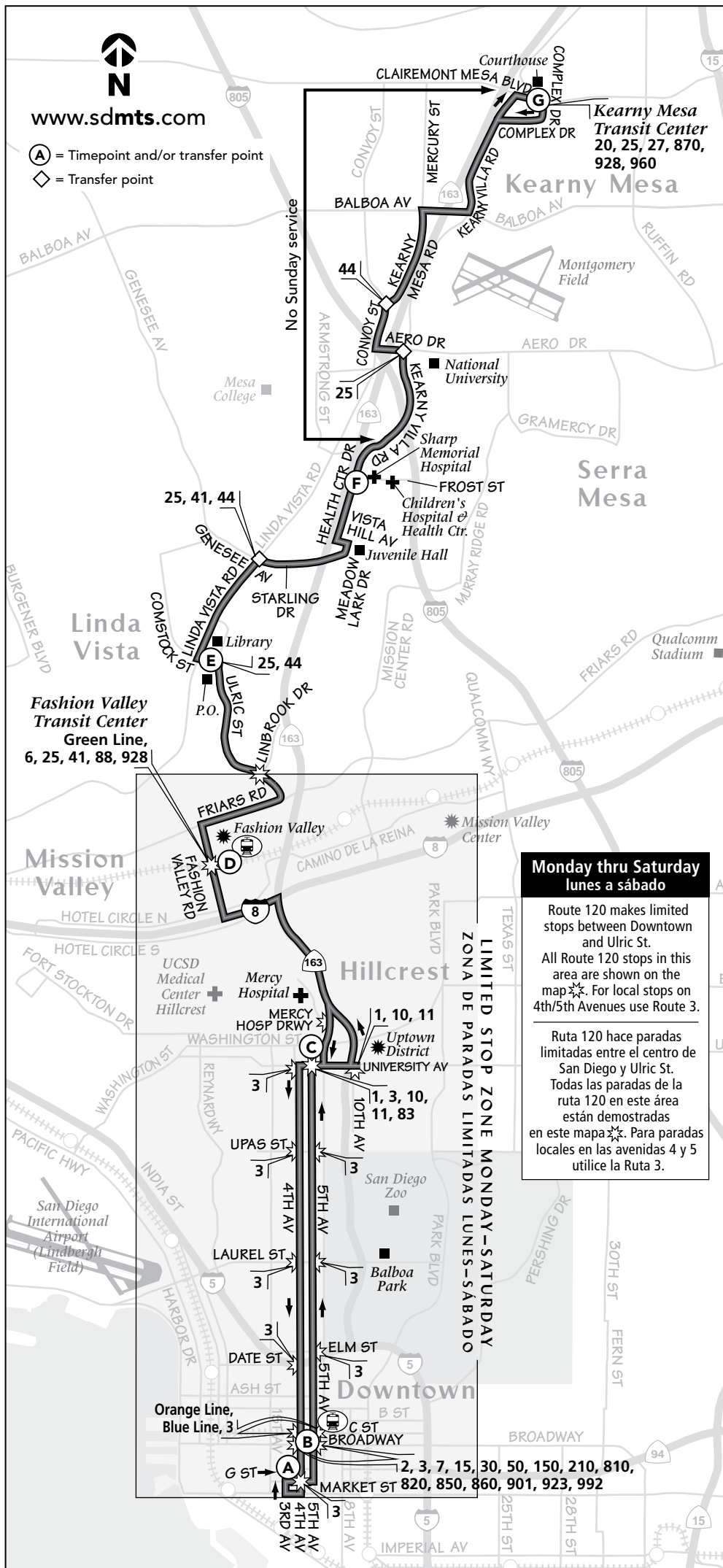
LIMITED STOP ZONE / ZONA DE PARADAS LIMITADAS

Route 120 Sunday* / domingo*

Kearny Mesa → Fashion Valley → Hillcrest → Downtown

	(G) Kearny Mesa Transit Center DEPART	(F) Sharp Hospital (Health Center & Frost)	(E) Comstock St. & Linda Vista Rd.	(D) Fashion Valley Transit Center ARRIVE DEPART	(C) University Ave. & 5th Ave.	(B) 4th Ave. & Broadway	(A) 4th Ave. & G St. ARRIVE
		6:14a	6:22a	6:29a	6:37a	6:43a	6:56a
		7:14	7:22	7:29	7:37	7:43	7:56
		8:14	8:22	8:29	8:37	8:43	8:56
		9:12	9:21	9:29	9:37	9:44	9:58
		—	—	—	10:07	10:15	10:30
		—	—	—	10:45	10:53	11:00
		—	—	—	11:15	11:23	11:31
		—	—	—	11:45	12:01p	—
		—	—	—	12:15p	12:31	—
		12:10p	12:20p	12:29p	12:37	12:45	1:01
		—	—	—	1:07	1:15	1:31
		—	—	—	1:45	2:01	—
		—	—	—	2:15	2:31	—
		—	—	—	2:45	3:01	—
		—	—	—	3:15	3:31	—
		—	—	—	4:07	4:15	4:31
		—	—	—	4:45	4:53	5:01
		—	—	—	5:15	5:30	—
		—	—	—	6:14	6:28	—
		—	—	—	6:44	6:58	—
		6:12	6:21	6:29	6:37	6:44	6:58
		7:12	7:21	7:29	7:37	7:44	7:58
		8:14	8:22	8:29	8:37	8:43	8:56
		9:14	9:22	9:29	9:37	9:43	9:55

LIMITED STOP ZONE / ZONA DE PARADAS LIMITADAS



Monday thru Saturday / lunes a sábado

Route 120 makes limited stops between Downtown and Ulric St. All Route 120 stops in this area are shown on the map. For local stops on 4th/5th Avenues use Route 3.
 Ruta 120 hace paradas limitadas entre el centro de San Diego y Ulric St. Todas las paradas de la ruta 120 en este área están demostradas en este mapa. Para paradas locales en las avenidas 4 y 5 utilice la Ruta 3.

*A Saturday or Sunday schedule will be operated on most holidays and observed holidays, including New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas. For holiday service details, visit www.sdmts.com or call 511.
 *Se operará con horario de sábado o domingo durante la mayoría de los días festivos y los días de asueto a guardar. Los días festivos incluyen Año Nuevo, Presidents' Day, Memorial Day, Día de la Independencia (E.E.U.U.), Labor Day, Día de Acción de Gracias y Navidad. Para detalles sobre el servicio en días festivos, visite www.sdmts.com o llame al 511.

The schedules and other information shown in this timetable are subject to change. MTS does not assume responsibility for errors in timetables nor for any inconvenience caused by delayed buses.
 Los horarios y información que se indican en este itinerario están sujetos a cambios. MTS no asume responsabilidad por errores en los itinerarios, ni por ningún perjuicio que se origine por los autobuses demorados.

Route 120

Monday through Friday / *lunes a viernes*

Downtown ⇒ Hillcrest ⇒ Fashion Valley ⇒ Kearny Mesa

(A)	(B)	(C)	(D)		(E)	(F)	(G)
4th Ave. & G St. DEPART	5th Ave. & Broadway	5th Ave. & University Ave.	Fashion Valley Transit Center ARRIVE	Fashion Valley Transit Center DEPART	Comstock St. & Linda Vista Rd.	Sharp Hospital (Health Center & Frost)	Kearny Mesa Transit Center ARRIVE
4:58a	5:00a	5:10a	5:18a	5:24a	5:30a	5:39a	5:52a
5:28	5:30	5:40	5:48	5:54	6:00	6:09	6:22
5:57	5:59	6:09	6:18	6:21	6:28	6:37	6:52
6:19	6:21	6:31	6:40	—	—	—	—
6:34	6:36	6:46	6:55	6:58	7:05	7:14	7:29
6:49	6:51	7:01	7:10	—	—	—	—
7:03	7:05	7:16	7:25	7:28	7:35	7:46	8:01
7:18	7:20	7:31	7:40	—	—	—	—
7:31	7:34	7:45	7:55	7:58	8:05	8:17	8:32
7:46	7:49	8:00	8:10	—	—	—	—
8:01	8:04	8:15	8:25	8:28	8:35	8:47	9:02
8:16	8:19	8:30	8:40	—	—	—	—
8:31	8:34	8:45	8:55	8:58	9:05	9:17	9:32
8:46	8:49	9:00	9:10	—	—	—	—
9:01	9:04	9:15	9:25	9:28	9:35	9:47	10:02
9:16	9:19	9:30	9:40	—	—	—	—
9:31	9:34	9:45	9:55	9:58	10:05	10:17	10:32
9:46	9:49	10:00	10:10	—	—	—	—
10:01	10:04	10:15	10:25	10:28	10:35	10:47	11:02
10:16	10:19	10:30	10:40	—	—	—	—
10:31	10:34	10:45	10:55	10:58	11:05	11:17	11:32
10:46	10:49	11:00	11:10	—	—	—	—
11:00	11:03	11:15	11:25	11:28	11:36	11:48	12:03
11:15	11:18	11:30	11:40	—	—	—	—
11:30	11:33	11:45	11:55	11:58	12:06p	12:18p	12:33p
11:45	11:48	12:00p	12:10p	—	—	—	—
12:00p	12:03p	12:15	12:25	12:28p	12:36	12:48	1:03
12:15	12:18	12:30	12:40	—	—	—	—
12:30	12:33	12:45	12:55	12:58	1:06	1:18	1:33
12:45	12:48	1:00	1:10	—	—	—	—
1:00	1:03	1:15	1:25	1:28	1:36	1:48	2:03
1:15	1:18	1:30	1:40	—	—	—	—
1:29	1:32	1:44	1:55	1:58	2:07	2:19	2:36
1:44	1:47	1:59	2:10	—	—	—	—
1:59	2:02	2:14	2:25	2:28	2:37	2:49	3:06
2:14	2:17	2:29	2:40	—	—	—	—
2:29	2:32	2:44	2:55	2:58	3:07	3:19	3:36
2:44	2:47	2:59	3:10	—	—	—	—
2:59	3:02	3:14	3:25	3:28	3:37	3:49	4:06
3:14	3:17	3:29	3:40	—	—	—	—
3:29	3:32	3:44	3:55	3:58	4:07	4:19	4:36
3:44	3:47	3:59	4:10	—	—	—	—
3:59	4:02	4:14	4:25	4:28	4:37	4:49	5:06
4:14	4:17	4:29	4:40	—	—	—	—
4:29	4:32	4:44	4:55	4:58	5:07	5:19	5:36
4:44	4:47	4:59	5:10	—	—	—	—
4:59	5:02	5:14	5:25	5:28	5:37	5:49	6:06
5:14	5:17	5:29	5:40	—	—	—	—
5:29	5:32	5:44	5:55	5:58	6:07	6:19	6:36
5:45	5:48	6:00	6:10	—	—	—	—
6:00	6:03	6:15	6:25	6:28	6:36	6:48	7:03
6:31	6:34	6:45	6:55	6:58	7:06	7:17	7:31
7:01	7:04	7:15	7:25	7:28	7:35	7:45	7:58
7:32	7:35	7:45	7:55	7:58	8:04	8:13	8:25
8:02	8:05	8:15	8:25	8:28	8:34	8:43	8:55
8:32	8:35	8:45	8:55	8:58	9:04	9:13	9:25
9:02	9:05	9:15	9:25	9:28	9:34	9:43	9:55
9:34	9:36	9:46	9:55	9:58	10:04	10:12	10:23
10:04	10:06	10:16	10:25	10:28	10:34	10:42	10:53
10:38	10:40	10:50	10:59	—	—	—	—
11:08	11:10	11:20	11:29	—	—	—	—

LIMITED STOP ZONE / ZONA DE PARADAS LIMITADAS

Kearny Mesa ⇒ Fashion Valley ⇒ Hillcrest ⇒ Downtown

(G)	(F)	(E)	(D)		(C)	(B)	(A)
Kearny Mesa Transit Center DEPART	Sharp Hospital (Health Center & Frost)	Comstock St. & Linda Vista Rd.	Fashion Valley Transit Center ARRIVE	Fashion Valley Transit Center DEPART	University Ave. & 5th Ave.	4th Ave. & Broadway	4th Ave. & G St. ARRIVE
5:33a	5:43a	5:53a	6:00a	6:05a	6:11a	6:22a	6:24a
6:03	6:13	6:23	6:30	6:35	6:41	6:52	6:54
—	—	—	—	6:46	6:52	7:03	7:05
6:29	6:39	6:49	6:56	7:01	7:07	7:18	7:20
—	—	—	—	7:16	7:22	7:34	7:36
6:58	7:10	7:21	7:29	7:32	7:38	7:50	7:52
—	—	—	—	7:46	7:53	8:06	8:08
7:23	7:38	7:50	7:58	8:01	8:08	8:21	8:23
—	—	—	—	8:16	8:23	8:36	8:38
7:53	8:08	8:20	8:28	8:31	8:38	8:51	8:53
—	—	—	—	8:46	8:53	9:06	9:08
8:23	8:38	8:50	8:58	9:01	9:08	9:21	9:23
—	—	—	—	9:16	9:23	9:36	9:38
8:53	9:08	9:20	9:28	9:31	9:38	9:51	9:53
—	—	—	—	9:46	9:53	10:06	10:08
9:23	9:38	9:50	9:58	10:01	10:08	10:21	10:23
—	—	—	—	10:16	10:23	10:36	10:38
9:55	10:09	10:20	10:28	10:31	10:38	10:51	10:53
—	—	—	—	10:46	10:53	11:06	11:08
10:25	10:39	10:50	10:58	11:01	11:08	11:21	11:23
—	—	—	—	11:16	11:23	11:36	11:38
10:55	11:09	11:20	11:28	11:31	11:38	11:51	11:53
—	—	—	—	11:46	11:53	12:06p	12:08p
11:25	11:39	11:50	11:58	12:01p	12:08p	12:21	12:23
—	—	—	—	12:16	12:23	12:36	12:38
11:55	12:09p	12:20p	12:28p	12:31	12:38	12:51	12:53
—	—	—	—	12:46	12:53	1:06	1:08
12:21p	12:36	12:48	12:58	1:01	1:08	1:21	1:23
—	—	—	—	1:16	1:23	1:36	1:38
12:51	1:06	1:18	1:28	1:31	1:38	1:51	1:53
—	—	—	—	1:46	1:53	2:06	2:08
1:21	1:36	1:48	1:58	2:01	2:08	2:21	2:23
—	—	—	—	2:16	2:23	2:36	2:38
1:51	2:06	2:18	2:28	2:31	2:38	2:51	2:53
—	—	—	—	2:46	2:53	3:06	3:08
2:20	2:35	2:47	2:57	3:00	3:07	3:20	3:22
—	—	—	—	3:15	3:22	3:35	3:37
2:48	3:04	3:17	3:27	3:30	3:37	3:50	3:52
—	—	—	—	3:45	3:53	4:06	4:08
3:16	3:32	3:46	3:57	4:00	4:08	4:21	4:23
—	—	—	—	4:15	4:23	4:36	4:38
3:46	4:02	4:16	4:27	4:30	4:38	4:51	4:53
—	—	—	—	4:45	4:53	5:06	5:08
4:16	4:32	4:46	4:57	5:00	5:08	5:21	5:23
—	—	—	—	5:15	5:23	5:36	5:38
4:46	5:02	5:16	5:27	5:30	5:38	5:51	5:53
—	—	—	—	5:45	5:53	6:05	6:07
5:16	5:32	5:46	5:57	6:00	6:08	6:20	6:22
—	—	—	—	6:15	6:23	6:35	6:37
5:50	6:05	6:17	6:27	6:30	6:37	6:49	6:51
6:20	6:35	6:47	6:57	7:00	7:07	7:19	7:21
6:55	7:08	7:18	7:27	7:30	7:37	7:49	7:51
7:25	7:38	7:48	7:57	8:00	8:07	8:19	8:21
7:55	8:08	8:18	8:27	8:30	8:37	8:49	8:51
8:32	8:45	8:54	9:01	9:06	9:13	9:25	9:27
9:04	9:16	9:24	9:31	9:38	9:44	9:55	9:57
9:34	9:46	9:54	10:01	10:08	10:14	10:25	10:27
10:04	10:16	10:24	10:31	10:38	10:44	10:55	10:57
10:34	10:46	10:54	11:01	11:08	11:14	11:25	11:27
—	—	—	—	11:40	11:46	11:57	11:59

LIMITED STOP ZONE / ZONA DE PARADAS LIMITADAS

Route 120

Saturday* / *sábado**

Downtown ⇒ Hillcrest ⇒ Fashion Valley ⇒ Kearny Mesa

(A)	(B)	(C)	(D)		(E)	(F)	(G)
4th Ave. & G St. DEPART	5th Ave. & Broadway	5th Ave. & University Ave.	Fashion Valley Transit Center ARRIVE	Fashion Valley Transit Center DEPART	Comstock St. & Linda Vista Rd.	Sharp Hospital (Health Center & Frost)	Kearny Mesa Transit Center ARRIVE
5:39a	5:41a	5:52a	6:00a	6:04a	6:11a	6:19a	6:29a
6:09	6:11	6:22	6:30	6:34	6:41	6:49	6:59
6:39	6:41	6:52	7:00	7:04	7:11	7:19	7:29
7:09	7:11	7:22	7:30	7:34	7:41	7:49	7:59
7:39	7:41	7:52	8:00	8:04	8:11	8:19	8:29
8:09	8:11	8:22	8:30	8:38	8:45	8:	