Southern California Association of Governments
City of Riverside

RIVERSIDE STREETCAR FEASIBILITY STUDY - INITIAL ASSESSMENT REPORT (PART 1)

REVISED DRAFT

JANUARY 7, 2015

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1.0 INTRODUCTION

1.1 Overview

This study represents the initial steps of the planning process for a streetcar system in the City of Riverside. The Southern California Association of Governments (SCAG) and the City of Riverside are studying the feasibility of implementing a streetcar system that would connect the community with several of the city's key destinations. These key destinations include a number of neighborhoods, schools, religious institutions, local businesses, commercial areas, and employment centers. The streetcar system would enhance and contribute to the existing transit and mobility choices available to those who live, work, and play in the City of Riverside.

This report represents Part 1 of a two part process to evaluate potential alignment alternatives for the project and work towards the identification of a proposed preferred alignment that could be advanced for further study. Six potential alignments were developed through discussions with the local community, the project Steering Committee, and city staff through a community charrette and Steering Committee meetings. This technical memorandum examines the opportunities and constraints associated with each alignment using a subset of the evaluation criteria also developed through discussions with the local community, Steering Committee, and city staff. The Part 1 evaluation effort focuses on analyzing six initial alternatives using the criteria available at this early stage, and laying the foundation for a more detail evaluation once ridership and cost information is available.

The contents of this report are divided into five sections. The sections include:

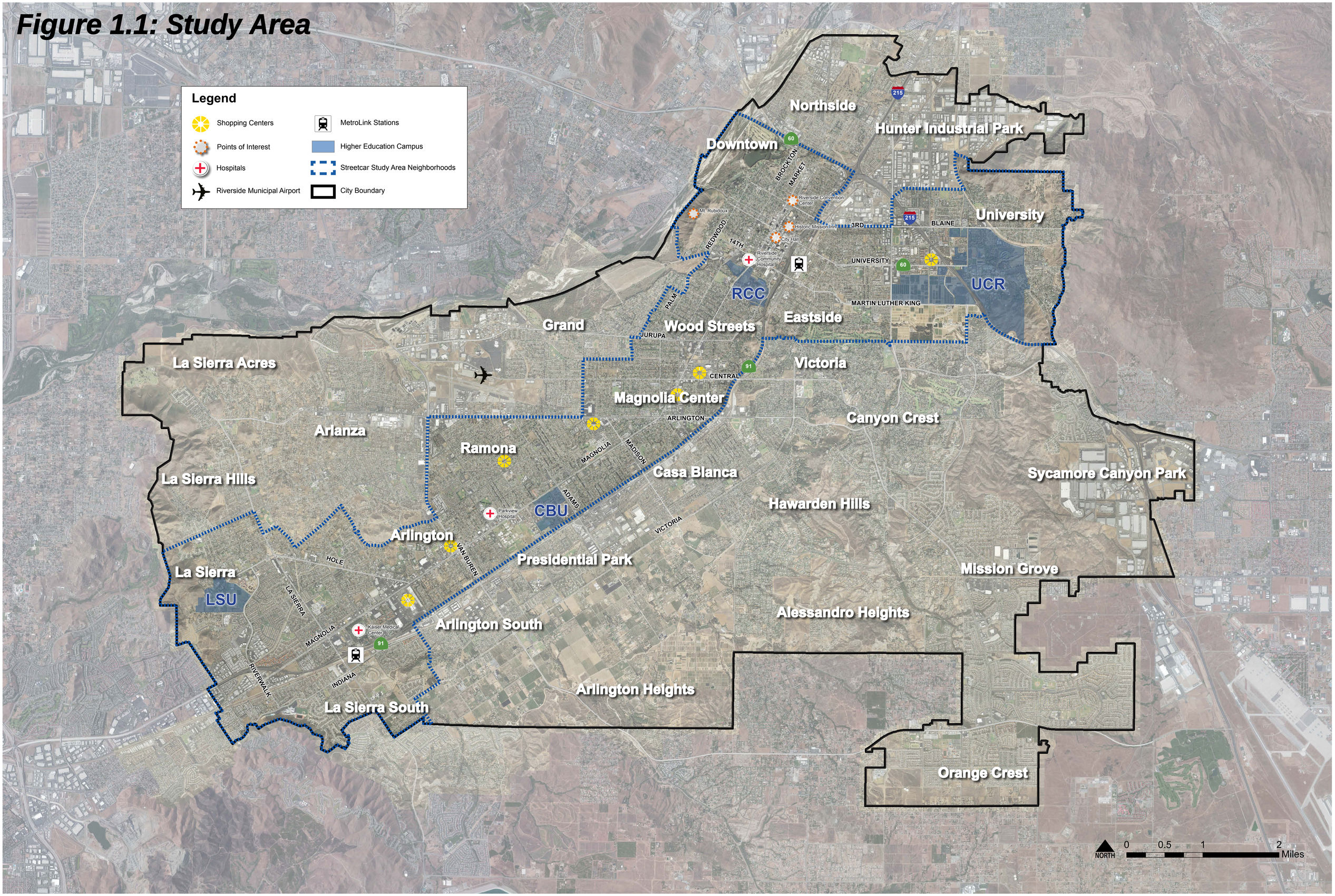
- Introduction
- Community and Stakeholder Participation
- Development of Alignment Alternatives
- Initial Assessment of Alternatives
- Summary and Conclusions

1.2 Study Area

The study area is an "L-shaped" corridor that is approximately twelve miles in length. Four distinct subareas within the corridor have been identified as the primary destination areas considered for the streetcar service. These four primary subareas include: the University/Eastside neighborhoods, the Downtown Area, the Wood Streets/Magnolia/Ramona neighborhoods, and the Arlington/La Sierra neighborhoods. The major corridors servicing the subareas and the primary corridors in consideration for service include: University Avenue, Market Street, and Magnolia Avenue.

Figure 1.1 illustrates the initial study area boundary. The study area boundaries correspond to the City's designated neighborhood boundaries, and illustrate a larger area than would be served or would benefit from a streetcar route.

Figure 1.1: Study Area



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Aerial Map

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Subareas

University/Eastside

The University/Eastside subarea includes the University of California, Riverside (UCR) and University Village as major points of interest. The major arterial servicing the subarea and the arterial that connects downtown Riverside to the campus is University Avenue. University Avenue is one of the corridors considered for service as it contains numerous commercial developments that could benefit from the streetcar. Some of the potential challenges, however, include the freeway underpass and rail under crossings along this corridor. In addition to University Avenue, potential alternatives include utilizing Blaine Street/3rd Street, which contains a number of employment centers and multi-family housing, and 14th Street/Martin Luther King Boulevard.

Downtown

The Downtown subarea encompasses the Downtown Riverside Metrolink Station, Civic Center buildings, Riverside Convention Center, the Mission Inn Hotel & Spa, Riverside Community Hospital, and various local shopping and dining destinations. University Avenue and Market Street are the primary corridors that service the Downtown subarea and are the main corridors in consideration for service. Market Street serves as the primary two-way corridor for traffic on the west side of downtown and Market Street transitions into Magnolia Avenue. Alternative alignments to Market Street include utilizing Orange Street, Lemon Street, and Lime Street.

Wood Streets/Magnolia/Ramona

The Wood Streets/Magnolia/Ramona subarea encompasses various commercial centers, educational institutions, and healthcare facilities such as Riverside City College (RCC), Riverside Plaza, California Baptist University (CBU), and Parkview Hospital. Magnolia Avenue is the primary corridor servicing the subarea. Magnolia Avenue provides easy access to hospitals and medical offices, RCC, and CBU. In addition to Magnolia Avenue, alternative alignments include utilizing Lime Street to connect to RCC and Arlington Avenue/Van Buren Boulevard to connect to the Riverside Municipal Airport and the Arlington/La Sierra subarea.

Arlington/La Sierra

The Arlington/La Sierra subarea encompasses the Kaiser Medical Center, the La Sierra Metrolink Station, and La Sierra University (LSU). Magnolia Avenue and La Sierra Avenue are the primary corridors that service the area. La Sierra Avenue provides access to LSU, the La Sierra Metrolink Station, and low density retail. La Sierra Avenue crosses over the California SR-91 freeway.

1.3 Report Objectives

The objective of this report is to summarize the results of an initial assessment of six potential alignment alternatives and to summarize the outreach efforts involved in the development of alignment alternatives. The overall alignment evaluation process is a systematic evaluation of the opportunities and constraints associated with each alignment using a set of evaluation criteria developed using input from the Steering Committee, city staff, and members of the community. The results of the Part 1 evaluation will help to establish the foundation for the more detailed Part 2 evaluation, which will include ridership modeling and cost estimate work.

2.0 COMMUNITY AND STAKEHOLDER PARTICIPATION

To guide the feasibility study, the City of Riverside assembled a Steering Committee comprised of twenty-eight (28) members, who were either appointed by various community groups or neighborhoods, or staff from universities, colleges, or public infrastructure agencies. The Steering Committee will meet throughout the study process to review and comment on work materials. The Committee conducted two meetings in advance of this initial screening process. These meetings and related community workshops were held to ensure that community perspectives and interests were reflected in the design of the alignment alternatives. The results of these events are summarized below.

2.1 Community Charrette

A community charrette was held on September 24, 2014 to develop initial concepts. In addition to city staff and Steering Committee members, approximately 40 community members attended the workshop and provided input on the study. A series of exercises were conducted to solicit input on stakeholder priorities, alignment options, and other details. Participants were organized into 5 groups for a brainstorming session, which included topics such as:

- Alignment options (east/north leg)
- Alignment options (south leg)
- Defining evaluation criteria
- Land use change
- System technologies

The following section describes the results of the brainstorming session with community members.

Alignment Design

Participants identified several key points of interest for streetcar service. These key destinations include: University of California Riverside (UCR), the Downtown Metrolink station, the Downtown area, Riverside Community Hospital, Riverside Community College (RCC), Riverside Plaza, California Baptist University (CBU), Parkview Community Hospital, Kaiser Permanente, the La Sierra Metrolink station and La Sierra University (LSU). Concerns with using University Avenue and Magnolia Avenue for a streetcar system were identified, particularly in relationship to peak hour congestion, and associated impacts on residents and local businesses were expressed by community members at the charrette. As an alternative, community members requested that the alignment design incorporate other major arterials besides University Avenue and Magnolia Avenue.

Evaluation Criteria

Participants also discussed the key criteria that should be analyzed when evaluating the alignment alternatives. Participants were given a list of evaluation criteria and were asked to prioritize the top five (5) criteria they would use to evaluate the feasibility of a streetcar service in Riverside. The top five most important evaluation criteria identified by participants were:

- Costs
- Connectivity to Activity and Employment Centers
- Population and Employment
- Traffic Impacts
- Land Use Compatibility

Land Use Change

During the charrette, participants also discussed land use changes within the study area, expressing both desired and unwanted uses. Some of the desirable points community members conveyed included:

- Incorporating live-work development projects around the Metrolink Stations
- Intensifying residential uses around the downtown, Central, and Magnolia areas
- Creating mixed uses around the La Sierra Station, CBU and Parkview Community Hospital
- Focusing on changing some of the economically depressed parts of the Arlington area

Along with these desired uses, community members also expressed concerns about changes in land use. These concerns included:

- An abundance of planned higher density housing/apartments on Magnolia Street, which community members felt should be more spread out
- Preservation of the historic area of the Magnolia corridor by excluding it from streetcar service
- The viability of mixed use development
- Ensuring the streetcar services the senior population

System Technologies

Lastly, regarding system technologies, the main concern focused on safety, aesthetics, infrastructure, and costs. There was a preference in ground propulsion with no overhead catenary wires, or additional ground tracks to reduce the aesthetic impacts a streetcar could impose.[1] There was also overall support for an electric or hybrid modern streetcar, which would promote clean energy and technology; however, a historic trolley could fit in with the downtown service. Finally, participants expressed interests in researching how other streetcar cities are doing with maintenance and economic development.

[1] The discussion to date on the preference to avoid utilizing overhead catenary wires has not addressed the costs of alternatives, which could represent a substantial cost increase.

2.2 Steering Committee Meeting

After obtaining community feedback on alignment priorities from the charrette, a Steering Committee meeting was held on October 16, 2014 to finalize the six alignment alternatives for the streetcar service. Six (6) draft alignment alternatives were presented to the members of the Steering Committee to solicit their feedback. Comments and suggestions for each of the alignments were gathered and used to refine and finalize the alignments.

During the review of the six alignments, there was also discussion on some of the various opportunities and constraints in implementing a proposed streetcar system. Committee members discussed the following opportunities:

- Economic Development Potential - Committee members expressed the potential for redeveloping some of the underutilized industrial buildings along the 3rd Street corridor into mixed-use properties.

- Existing Transit - The streetcar presents an opportunity to complement and enhance the existing transit service in the area. There are currently two Metrolink stations in the study area, with a third station in construction nearby, all of which could contribute to ridership.

- Infrastructure Improvements - A streetcar connection to Metrolink would present an opportunity to improve existing conditions for pedestrians. Currently, there is limited connectivity and walking paths between University Avenue and the downtown Metrolink station.

Committee members also voiced the following concerns regarding the streetcar system:

- Construction and operational costs

- Displace the existing local transit services with a streetcar system.

- Would a streetcar on University Avenue impact the operations of the new Downtown fire station, or emergency vehicles along the corridor.

These comments and concerns were taken into consideration as the six alignment alternatives were refined and finalized.

In addition to finalizing the six alignment alternatives, members of the Steering Committee were asked to provide feedback on the set of evaluation criteria that should be used for the feasibility study. Members of the Steering Committee were given a list of fourteen evaluation criteria, and were asked to rank each criterion on a scale of 1 to 14 (from most important to least important). The list of evaluation criteria can be found in Exhibit A of the appendix of this report.

3.0 DEVELOPMENT OF ALIGNMENT ALTERNATIVES

In addition to incorporating the ideas and priorities of community members and the Steering Committee, the six alignment alternatives also incorporated the physical opportunities and constraints within the study area. This section of the report documents the observed opportunities and constraints for a streetcar system, and provides a brief description of each alignment alternative.

3.1 Opportunities and Constraints

Opportunities and constraints were identified in order to define the limitations of the six alignments and streetcar service. They were also identified in order to determine locations where the routing of the system would be infeasible, or where routing conditions might be preferable. The considerations that have been identified to guide the development of the alignment alternatives are outlined below.

3.1.1 Alignment Length

The study corridor is approximately twelve (12) miles long, extending from UC Riverside in the northeast to La Sierra University in the southwest. Alignment lengths within this study corridor vary, depending on the proposed routing and potential for loops or other alignment changes to expand the potential access shed of the service.

3.1.2 Over-Crossings, Under-Crossings, and Tunnels

The study area includes the Burlington Northern Santa Fe (BNSF) railroad corridor, as well as the SR-91 and I-215 freeways. Though not infeasible, crossing freeways and railroad corridors can increase the capital cost of the streetcar. In this regard, the freeways and railroad corridors impose a major, but unavoidable, constraint upon the streetcar system. Due to the geography of the area and the destinations considered for service, there are no possible alternative alignments that would avoid crossing the freeways or railroad corridors and still be capable of serving desired destinations.

3.1.3 Traffic Volumes

A major consideration for the streetcar system is its impact on circulation and traffic. Circulation and traffic impacts are associated with the reduction in capacity or vehicle flow along a particular alignment. To minimize operational impacts, the streetcar alignment should attempt to limit the number of street crossings of arterial roadways that operate at a deficient level of service, as well as avoid other traffic operational constraints that may be caused by peak period traffic congestion or particular traffic conditions generated by adjacent land uses. Analysis of the existing conditions within the study area included review of roadway segments currently operating at a Level of Service (LOS) of D or worse, as well as other potential traffic issues identified by the City of Riverside Traffic Engineering Department.

3.1.4 Connections

Providing connections to major employment and commercial centers can expand mobility choices and reduce the dependence on automobiles in the area. It can also help improve overall ridership potential and local economic growth. The majority of Riverside's employment centers are located within the study area, including governmental offices, higher education, and medical facilities. There are also fifteen (15) major shopping destinations within the City of Riverside, most of which are located within the study area. Tapping into these employment and commercial centers can help to increase ridership potential, as those who work and shop in Riverside are given another mobility option.

The benefits of a streetcar system are not limited solely to transportation. In many areas, streetcar systems have proven effective in not only providing mobility solutions but can improve local economic growth. Providing connections to major commercial centers can increase the number of potential customers, local sales, and optimize parcel value and future commercial activity. Focus will be placed on ensuring alignment alternatives provide connections to the major key destinations of the city.

3.2 Alignment Alternatives

Six alignment alternatives were developed for potential streetcar service as illustrated in Figure 3.1. The alignment alternatives have incorporated stakeholder priorities, physical opportunities and constraints, and community interests as identified in the community charrette and Steering Committee meetings. The following section summarizes the six alignment alternatives.

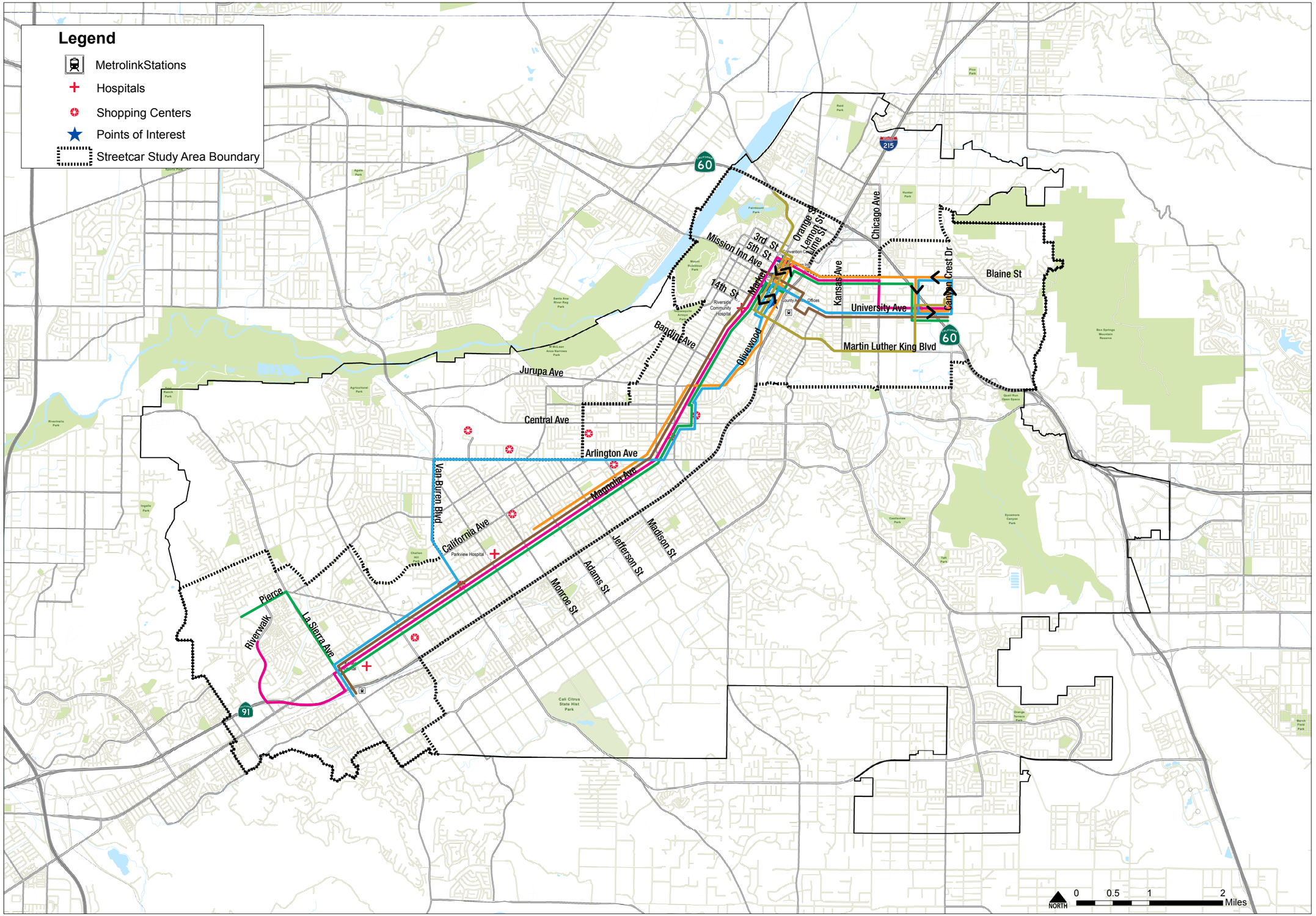

Figure 3.1: Alignment Alternative

- Alignment 1
- Alignment 2
- Alignment 3
- Alignment 4
- Alignment 5
- Alignment 6

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Alignment Map

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3.2.1 Alignment Alternative 1

Alternative 1, as illustrated in Figure 3.1, is approximately 14.7 miles in alignment length and runs primarily along Market Street and Magnolia Avenue. It connects UCR, Downtown Riverside, the Wood Streets/Magnolia/Ramona area, and LSU. It is one of two alternatives that terminates at LSU. Starting at UCR, the alignment travels westbound along University Avenue, turns north on Chicago Avenue, and then turns west on 3rd Avenue to connect to Downtown Riverside. From Downtown Riverside, the alignment travels southbound on Market Street and transitions onto Magnolia Avenue to connect to the Wood Streets/Magnolia/Ramona area. The alignment continues on Magnolia Avenue, turns south on La Sierra Avenue to connect to the La Sierra Metrolink Station, and continues onto Indiana Avenue and Pierce Street/Riverwalk Parkway to make its final connection at LSU.

3.2.2 Alignment Alternative 2

Alternative 2, as illustrated in Figure 3.1, is approximately 10.4 miles in alignment length and runs primarily along 3rd Street and Magnolia Avenue. It is the only alternative at CBU. The alignment also introduces an alternate route to service the downtown area by operating on a couplet via Orange and Lemon Street. Starting at UCR, the alignment travels westbound on Blaine Street/3rd Avenue toward Downtown Riverside. The alignment utilizes the one-way Orange Street to service the Downtown area, and continues southbound on Lime Street/Olivewood Avenue. The alignment turns west on Jurupa Avenue, and turns south on Magnolia Avenue to service the Wood Streets/Magnolia/Ramona area with a terminus at CBU. The alignment utilizes the same route to return to UCR with the exception of traveling northbound through the Downtown area on the one-way Lemon Street, and completes a counterclockwise one-way loop via Chicago Avenue to University Avenue, and Canyon Crest Drive to UCR.

3.2.3 Alignment Alternative 3

Alternative 3, as illustrated in Figure 3.1, is approximately 13.6 miles in alignment length and is the second of two alternatives that terminate at LSU. It is similar to Alternative 1, but introduces an alternate route via Lime Street to service the Downtown area, and provides a closer connection to the Riverside Plaza shopping center. Starting at UCR, the alignment travels westbound along University Avenue, turns north on Iowa Avenue, and then turns west on 3rd Avenue to connect to Downtown Riverside. From Downtown Riverside, the alignment travels southbound on Lime Street and transitions onto Magnolia Avenue, via 14th Street. The alignment travels an alternative route by turning east on Merrill Avenue and south on De Anza Avenue to connect to the Riverside Plaza shopping center, before returning onto Magnolia Avenue via Central Avenue. The alignment continues south on Magnolia Avenue, and turns on La Sierra Avenue and Pierce Street, to make its final connection to LSU.

3.2.4 Alignment Alternative 4

Alternative 4, as illustrated in Figure 3.1, is approximately 15.6 miles in alignment length and is one of two alternatives that terminates at the La Sierra Metrolink Station. The alignment also introduces an alternate route to service the Wood Streets/Magnolia/Ramona area via Arlington Avenue. It is the only alignment to utilize the Arlington corridor. Starting at UCR, the alignment travels west on Blaine Street/3rd Avenue, turns south on Iowa Avenue, and turns west on University Avenue to connect to Downtown Riverside. Similar to Alternative 2, the alignment operates an Orange and Lemon Street couplet to service the Downtown, and continues southbound on Lime Street/Olivewood Avenue to connect to the Wood Streets/Magnolia/Ramona area. The alignment follows the same route as Alternative 3, using Merrill, De Anza and Central Avenues to connect to the Riverside Plaza shopping center, before continuing southbound on Magnolia Avenue until Arlington Avenue. To service the Wood Streets/Magnolia/Ramona area, the alignment travels west on Arlington Avenue and south on

Van Buren Boulevard, before returning to Magnolia Avenue to make its final connection at the La Sierra Metrolink Station, via La Sierra Avenue. The alignment returns to UCR along the same route, except that it continues east on University Avenue, and north on Canyon Crest Drive, until it reaches the start at Blaine Street.

3.2.5 Alignment Alternative 5

Alternative 5, as illustrated in Figure 3.1, is approximately 11.6 miles in alignment length and runs primarily on University Avenue, Mission Inn Avenue, and Magnolia Avenue. It is the second of two alternatives that terminates at the La Sierra Metrolink Station, and the only alternative that provides a direct connection to both the Downtown Metrolink Station and the La Sierra Metrolink Station. Starting at UCR, the alignment travels westbound on University, turns south on Park Avenue, and turns west on 10th Street to connect to the Downtown Riverside Metrolink Station. It resumes its connection to Downtown Riverside by traveling north on Commerce Street and west on Mission Inn Avenue. The alignment services the downtown area via Market Street, and travels southbound onto Magnolia Avenue. The alignment continues southbound on Magnolia Avenue until it turns south on La Sierra Avenue to terminate at the La Sierra Metrolink Station.

3.2.6 Alignment Alternative 6

Alternative 6, as illustrated in Figure 3.1, is approximately 6.4 miles in alignment length and is the shortest of all the alternatives. The alignment provides connection to the University/Eastside neighborhood and Downtown area with a terminus at Fairmount Park. It is the only alternative that does not provide a connection to the Wood Streets/Magnolia/Ramona and La Sierra areas. Starting at UCR, the alignment travels south on Canyon Crest Drive, turns west on University Avenue, turns south on Iowa Avenue, and west on Martin Luther King Boulevard. To service the downtown area, the alignment operates on the Orange and Lemon Street loops similar to Alternative 2, and continues north on Market Street until it reaches its terminus at Fairmount Park. This alignment alternative was created in response to a comment received at the October 15, 2014 Steering Committee meeting, which correlated with feedback during a community charrette conducted on October 8, 2014 with the Eastside Neighborhood's Resident Leadership Academy.

4.0 INITIAL ASSESSMENT OF ALTERNATIVES

Using a set of evaluation criteria, a high level initial assessment (Part 1) was performed on the six alignment alternatives. The process involves a systematic evaluation of the opportunities and constraints for each criterion and alignment alternative. It focuses on the physical conditions along the alignments, connections to key activity centers and destinations, as well as how the alignments would satisfy and achieve the goals and objectives established by the City of Riverside. Available demographic, traffic, and forecasted growth data, as well as field inspections of existing conditions are analyzed during this process.

Part 1 of the assessment process utilizes a subset of the evaluation criteria to conduct a preliminary assessment of the pros and cons of the six alignment alternatives. This initial evaluation does have some limitations in that it does not include evaluation of the alignments considering cost and ridership information. Because of this limitation, the initial evaluation was utilized as a partial input to the identification of the four short-listed alternatives, helping to frame the discussion with city staff to identify the four short-listed alternatives that would advance into the more detailed alternatives evaluation process. The results of this initial assessment are summarized in the following sections of this report.

4.1 Evaluation Criteria Development

A set of evaluation criteria was developed by incorporating the opinions of community members and the Steering Committee. During both the community charrette and Steering Committee meeting, participants were asked to rank a set of evaluation criteria from 1 to 14, or from most important to least important. An average score for each criterion was then calculated using the ranking results obtained from the community charrette and Steering Committee. Based on this average score, each criterion was then assigned a ranking of high, medium, or low importance. The ranking results of each criterion are summarized in Table 4.1 below.

Table 4.1: Evaluation Criteria Ranking

Category	Criteria	Rank		
		High	Medium	Low
Community Considerations	Population and Employment	X		
	Noise Impacts			X
	Visual Impacts			X
	Land Use Compatibility		X	
Operations	Transit Travel Time		X	
	Ridership Potential	X		
	Costs	X		
	Physical Constraints			X
	Transit Stop Amenities			X
Transportation Considerations	Circulation Impacts	X		
	Connectivity to Activity Centers	X		
	Connectivity to Existing Transit	X		
Economic Considerations	Economic Development Potential		X	
	Job Creation		X	

Only the evaluation criteria for the "Community Considerations" and "Transportation Considerations" categories were used in the Part 1 initial evaluation process. This in large part was due to the lack of readily available data for the remaining categories. An evaluation of the remaining categories will be performed in the next phase of analysis (Part 2) using the four (4) short-listed alternatives identified in this report.

To guide the evaluation process, a framework was developed that focused on a detailed approach for measuring each evaluation criterion. The framework provided procedures for assessing each criterion, which is summarized in Table 4.2.

Table 4.2: Evaluation Criteria Ranking

Category	Evaluation Criteria	Approach
Community Considerations	Population and Employment	Measure of population and employment within a 1/2 mile buffer of the proposed alignment alternatives
	Land Use Compatibility	Quantitative assessment of proximity to single-family residential, multi-family residential, and commercial uses along each alignment alternative
	Noise Impacts	Quantitative assessment of proximity to noise sensitive receptors along each alignment alternative
	Visual Impacts	Quantitative assessment of proximity to historical, local, and natural landmarks along each alignment alternative
Transportation Considerations	Connectivity to Activity Centers	Quantitative assessment of proximity to activity centers along each alignment alternative
	Connectivity to Existing Transit	Quantitative assessment of the number of bus routes that intersect or cross alignments, and the number of Metrolink Stations serviced by each alignment
	Circulation and Traffic Impacts	Quantitative assessment of the number of intersections with Level Of Service D or worse along each alignment alternative

The framework also detailed a scoring system for each evaluation criterion. Each criterion was scored using a +1/0/-1 system to determine the added value to each alignment alternative. Additionally, a weighting factor was applied to each criterion based on its level of importance and level in priority. In other words, a high priority criterion could return a potential score ranging from +3 to -3 for each alignment alternative. A medium priority criterion could return a potential score ranging from +2 to -2; and a low priority criterion returned a potential score ranging from +1 to -1. The benefit of this approach is that it allows high priority criteria to be more influential on the final overall score for each alignment alternative. Table 4.3 summarizes the evaluation criteria and the weight factor used during the initial screening process.

Table 4.3: Evaluation Criteria Potential Scores

Category	Evaluation Criteria	Rank	Weight or Potential Score Range
Community Considerations	Population and Employment	High	+3 to -3
	Noise Impacts	Low	+1 to -1
	Visual Impacts	Low	+1 to -1
	Land Use Compatibility	Med	+2 to -2
Transportation Considerations	Circulation Impacts	High	+3 to -3
	Connectivity to Activity Centers	High	+3 to -3
	Connectivity to Existing Transit	High	+3 to -3

4.2 Part 1 Evaluation Results

Part 1 of the evaluation process analyzed each alignment alternative based on community and transportation considerations. It followed the assessment approaches and the scoring system defined in the evaluation framework. The scoring system is preliminary, and may be revised in Part 2 as more data is compiled and analyzed throughout the course of the study. The results of this evaluation are described in the subsequent sections.

4.2.1 Population and Employment

High population and employment along an alignment would be beneficial towards streetcar ridership and was classified as a high priority. A ½ mile buffer along each alignment was used to capture existing U.S. Census population and employment data. Because the alignments vary in length, total population and employment numbers were then divided by the alignment miles for each alignment alternative and a comparison between total population/employment per alignment mile was performed. Alignments with high total population/employment per mile numbers were given a score of +3, and alignments with low population/employment per mile numbers were given a score of -3. Table 4.4 summarizes the results of this assessment.

Table 4.4: Comparison of Population and Employment

Population and Employment	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Population	78,516	44,028	79,529	64,316	73,401	20,109
Total Employment	66,532	34,741	60,119	49,567	61,999	14,982
Total	**145,048**	**78,769**	**139,648**	**113,883**	**135,400**	**35,091**
Total Per Mile	**9,867**	**7,574**	**10,268**	**7,300**	**11,672**	**5,483**
Score	**1**	**-1**	**2**	**-1**	**3**	**-3**

Alternative 5 encompasses the highest number of total existing population and employment per alignment mile within a ½ mile radius, and therefore received a score of +3. In contrast, Alternative 6 contains the lowest number of total existing population and employment per alignment mile within a ½ mile radius, and therefore received a score of -3.

4.2.2 Land Use Compatibility

Streetcar and connector services typically operate in more urban environments. While the condition is not uncommon, it is typical to try to minimize conditions where the streetcar is operating along streets with single-family residential development. This is not only to minimize potential impacts to sensitive uses, but to maximize potential ridership for streetcar service, as lower density development may not generate as much ridership as denser land uses.

In contrast, fronting streetcar services along streets with more multi-family residential and commercial properties tends to maximize the potential for ridership. These land uses are recognized as a beneficial component to alignment design. This evaluation is a high-level land use analysis, focusing the number of parcels of a particular land use type. The objective is to help inform the discussions of existing land use adjacent to the alignment alternatives and help to define which alternatives may have more sensitive uses, and which may have uses the present opportunities for increases in ridership or economic development.

The land use compatibility criterion was classified as medium priority and each alignment had the potential to earn a score ranging from +2 to -2. Because more single-family residential development along an alignment was a negative attribute, alignments with higher development for this type of land use were given a score of -2 and alignments with lower single-family development were given a score of +2. Additionally, because more multi-family residential and commercial development along an alignment represented a positive attribute, alignments with higher numbers for this type of land use were given a score of +2, and alignments with lower numbers were given a score of -2.

As stated above, this approach is a high-level review and consideration of land use impacts and potential benefits for the alignment alternatives. Ideally, this assessment would also consider more detailed factors related to the land uses, including the number of units present in multi-family developments and the amount of development (in terms of square feet) for commercial developments. However, obtaining this detailed level of information for all of the parcels along the various alignment alternatives was determined to not be feasible given the difficulties in obtaining consistently reliable and accurate information.

For comparison, Figures 4.1 to 4.6 illustrate the type of land use within a ¼ mile radius of each proposed alignment.

Scores for each type of land use were then added to obtain a total land use score. The alignments with a higher total land use score were given a final score of +2, while alignments with a lower total land use score were given a final score of -2. Table 4.5 summarizes the results of the evaluation for land use compatibility.

Figure 4.1: Alignment 1 Land Use

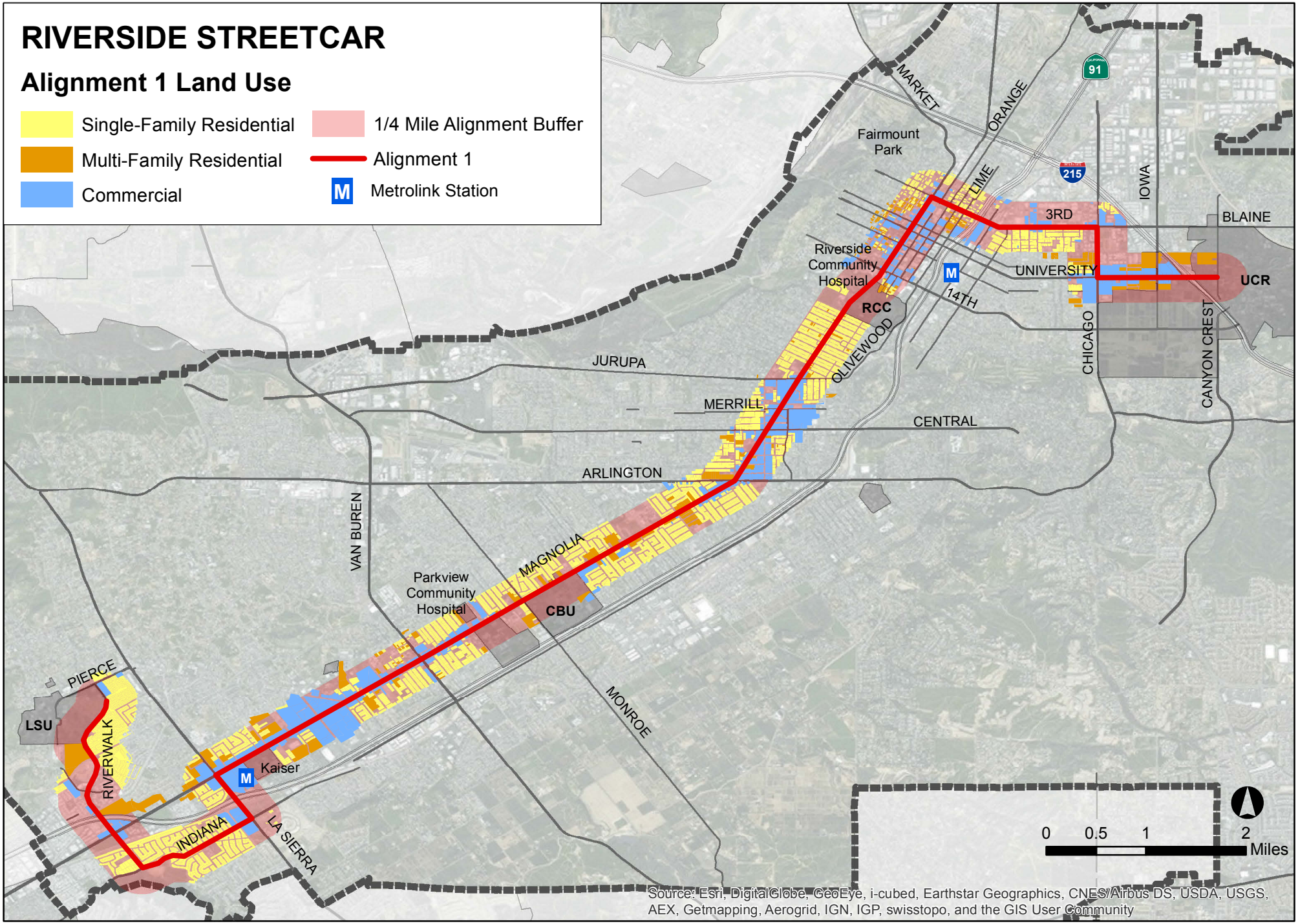

Figure 4.2: Alignment 2 Land Use

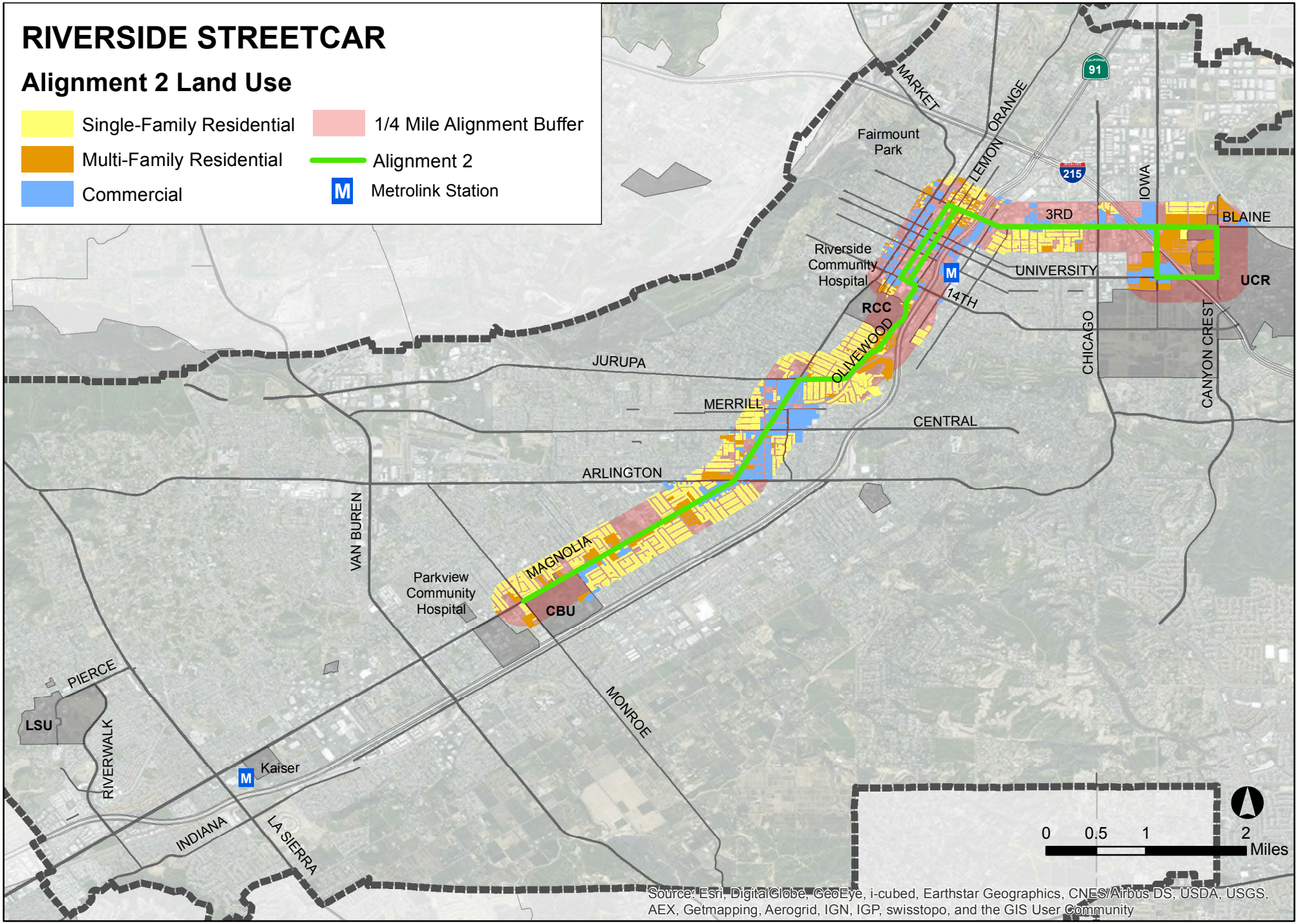

Figure 4.3: Alignment 3 Land Use

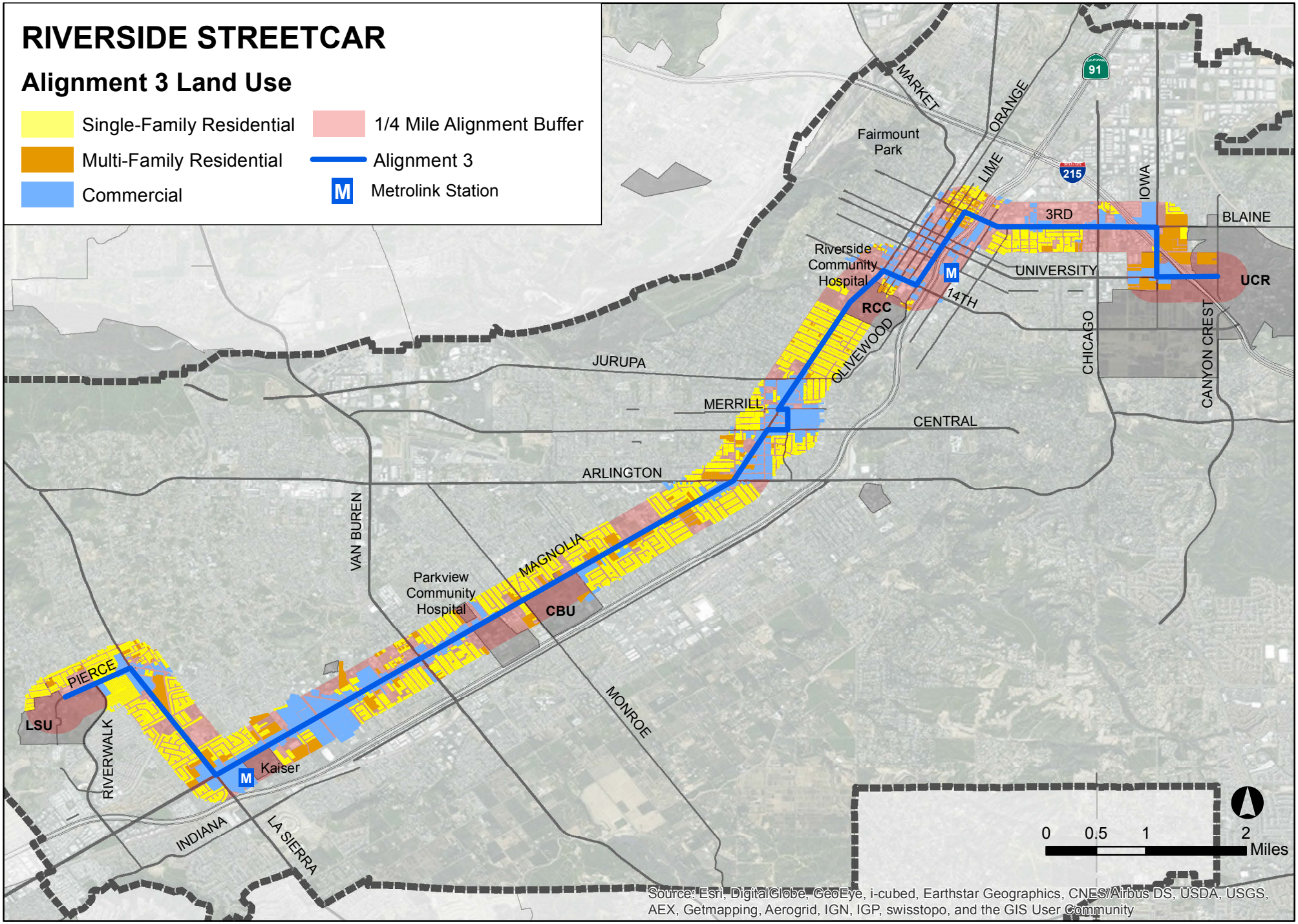

Figure 4.4: Alignment 4 Land Use

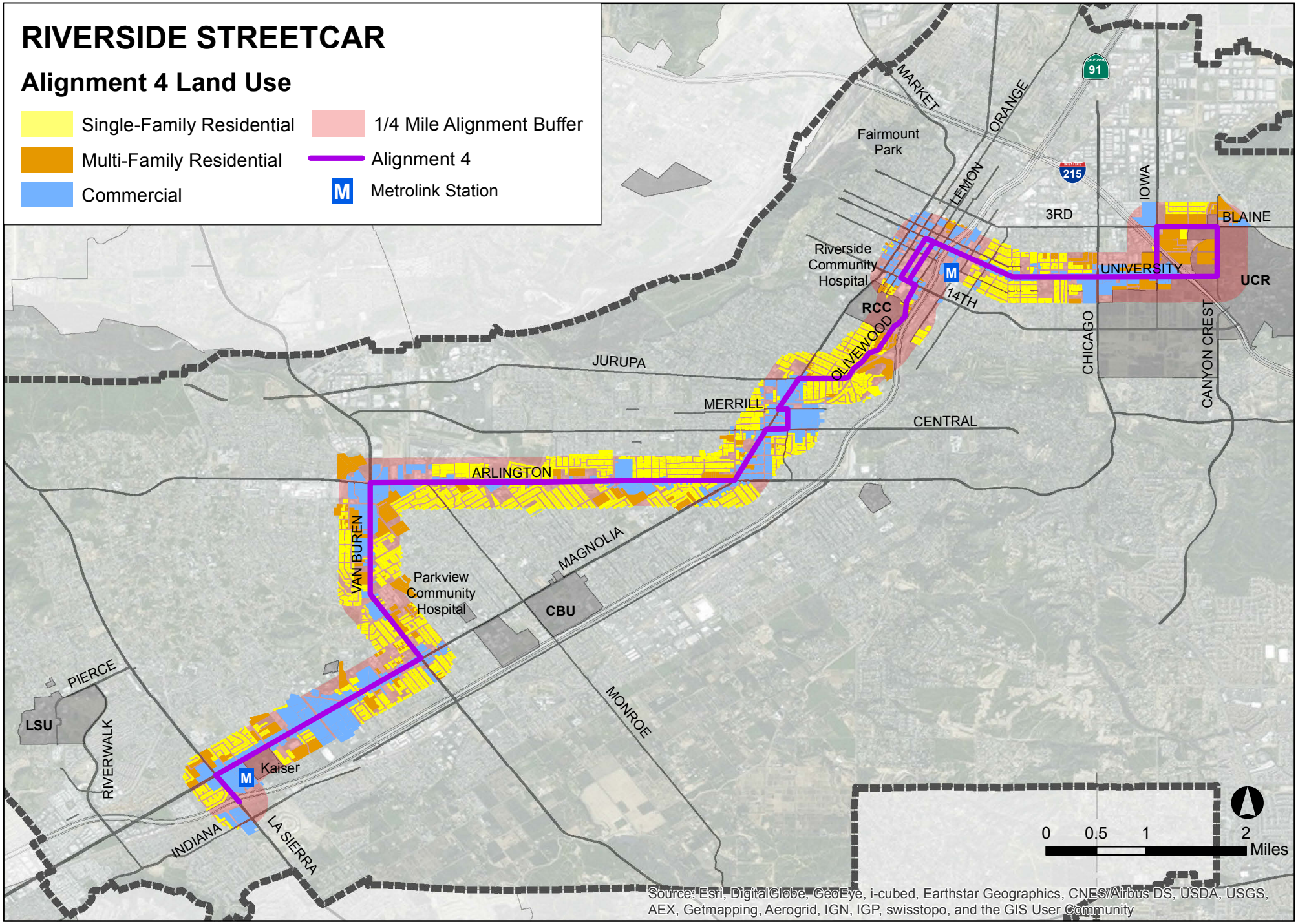

Figure 4.5: Alignment 5 Land Use

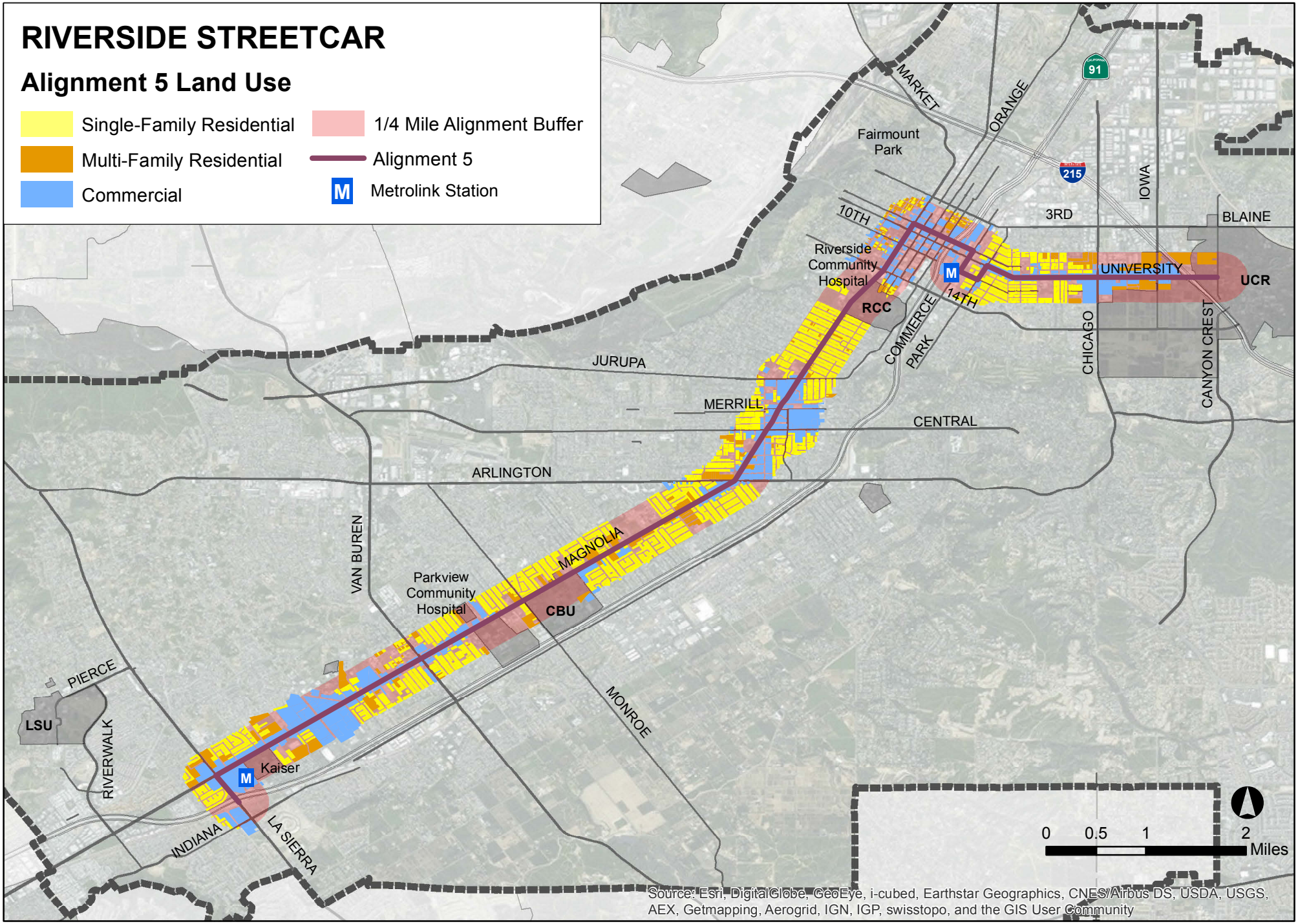

Figure 4.6: Alignment 6 Land Use

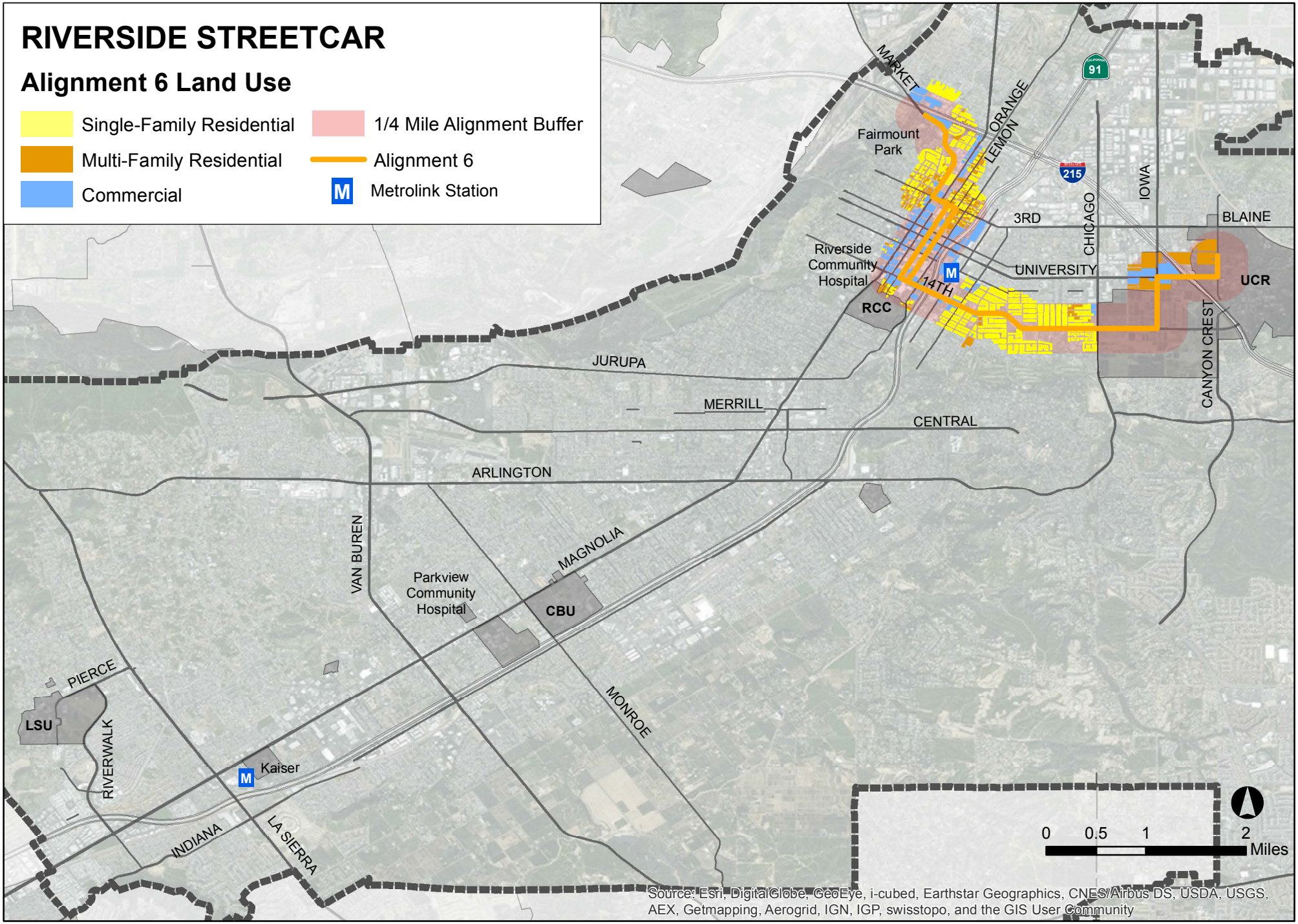

Table 4.5: Comparison of Land Use Compatibility

Single Family Residences Along the Alignment	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Fronting Alignment	191	132	183	118	142	88
Adjacent to Alignment	111	33	71	24	22	40
Total Properties	302	165	254	142	164	128
Score	**-2**	**1**	**-1**	**2**	**1**	**2**

Multi-Family Residences Along the Alignment	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Properties	434	462	435	451	403	303
Score	**2**	**2**	**2**	**2**	**1**	**-2**

Commercial Properties Along the Alignment	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Properties	1,246	760	1,122	1,301	1,223	379
Score	**2**	**0**	**2**	**2**	**2**	**-2**

COMBINED LAND-USE	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
TOTAL POINTS	**2**	**3**	**3**	**6**	**4**	**-2**
TOTAL SCORE	**0**	**0**	**0**	**2**	**1**	**-2**

The highest number of single-family residences fronting and adjacent to the alignment occurred in Alternative 1, which received a score of -2. Alternative 1 incorporates the longest segment of Magnolia Avenue in its alignment design, which contributes to its high number of single-family residences since the corridor contains the highest amount of single-family residential properties. The fewest number of single-family residences fronting and adjacent to the alignment was present in Alternatives 4 and 6, with each alternative receiving a score of +2.

High numbers of multi-family residential properties were present in all the alternatives except Alternative 6. Alternatives 1, 3, 4, and 5 had the highest amount of commercial properties along the alignment and received a score of +2, while Alternative 6 had the least amount and received a score of -2. A large amount of multi-family residential properties are located near UCR. Alternatives 2 and 4 capture more of these properties by utilizing the Iowa Avenue, University Avenue, Canyon Crest, and Blaine Street loop.

In total, Alternative 4 received the highest score in land use compatibility. It represented the alignment alternative that had the fewest number of single-family residential properties and the highest number of multi-family residential and commercial properties along the alignment. In contrast, Alternative 6 received the lowest score in land use compatibility. Although the alternative had the least amount of single-family residential properties along the alignment, it also had the least amount of multi-family residential and commercial properties.

4.2.3 Noise Impacts

Noise impacts are measured by proximity to noise sensitive receptors along the streetcar alignment. These receptors include hospitals, schools, churches, libraries, auditoriums, public meeting rooms, motels, hotels, residences, recreational facilities, and quiet lands that serve a public need. Additionally, California also considers playgrounds, athletic facilities, rest homes, rehabilitation centers, long-term care, and mental care facilities as noise sensitive receptors. A quantitative assessment of the number of noise sensitive receptors along each alignment alternative was performed. Noise impacts were classified as medium priority, therefore alignment alternatives have a potential score ranging from +2 to -2. Alignment alternatives with fewer noise sensitive receptors received a score of +2, while alignment alternatives with greater noise sensitive receptors received a score of -2. Table 4.6 summarizes the number of noise sensitive receptors along each of the six different alignments and the subsequent score for each alignment alternative.

Table 4.6: Comparison of Noise Impacts

Noise Sensitive Receptors	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Hospitals	4	1	4	1	4	0
Schools	14	5	16	6	11	2
Churches	6	5	7	6	9	6
Libraries	2	3	3	2	3	2
Auditoriums	1	3	2	1	2	3
Public Meeting Rooms (Civic Service Buildings)	3	6	3	5	3	6
Hotels/Motels	10	2	8	12	10	2
Residences	Yes	Yes	Yes	Yes	Yes	Yes
Recreational Facilities	3	0	3	0	3	1
Quiet Public Lands	0	0	0	0	0	0
Playgrounds	0	0	0	0	0	1
Athletic Facilities	0	1	0	1	0	0
Rest Homes (etc.)	4	4	4	1	4	1
Total	**47**	**30**	**50**	**35**	**49**	**24**
Score	**-1**	**1**	**-2**	**1**	**-2**	**2**

The fewest number of noise sensitive receptors was present in Alternative 6, with the alternative receiving a score of +2. The highest number of noise sensitive receptors was present in Alternatives 3 and 5, which each alternative receiving a score of -2.

4.2.4 Visual Impacts

Visual impacts along each alignment could occur as a result of the infrastructure necessary to implement the streetcar. These potentially include the overhead power distribution system, stations/stops, signage, and signals that may be required along each alignment. Visual impacts were measured by a quantitative assessment of each streetcar alignment's proximity to single-family residential properties and historical properties (either from the National Register of Historic Places or Local Landmarks identified by the City of Riverside) that front the alignment. Visual impacts were classified as low priority and alternatives had the potential of receiving a score between +1 to -1. Table 4.7 summarizes the evaluation of potential visual impacts resulting for each alternative.

Table 4.7: Comparison of Visual Impacts

Sensitive Properties	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Single Family Residential	191	132	183	118	142	88
National Register of Historic Places	3	4	3	2	6	2
Local Landmarks	10	13	7	15	15	11
Natural (Arboretum)	2	2	2	2	2	1
Total Properties	**206**	**151**	**195**	**137**	**165**	**102**
Score	**-1**	**0**	**-1**	**0**	**0**	**1**

The fewest number of properties sensitive to visual impacts was present in Alternative 6, which received a score of +1. The highest number of properties sensitive to visual impacts was present in Alternatives 1 and 3, with each alternative receiving a score of -1.

4.2.5 Connectivity to Activity and Employment Centers

Connectivity to major activity and employment centers can positively impact streetcar ridership and was classified as high priority. A quantitative assessment on the proximity to existing activity and employment centers for each alignment was performed. The major activity and employment centers were identified in the Existing Conditions Report. Alignments had the potential to receive a score between +3 to -3. Alignments with a higher number of adjacent activity and employment centers received a score of +3, while alignments with a lower number received a score of -3. Table 4.8 summarizes the results of this assessment.

Table 4.8: Comparison of Connectivity to Activity and Employment Centers

Activity/ Employment Center Evaluation	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Adjacent Activity Centers	5	3	5	7	5	2
Adjacent Employment Centers	11	7	10	9	10	5
Total	**16**	**10**	**15**	**16**	**15**	**7**
Score	**3**	**0**	**3**	**3**	**3**	**-3**

Each of the alternatives received high scores for their connectivity to activity and employment centers, with the exception of Alternatives 2 and 6. Alternative 1 provided more connections to employment centers by utilizing Magnolia Avenue, while Alternative 4 provided more connections to activity centers by utilizing Arlington Avenue.

4.2.6 Connectivity to Transit

One of the main goals of the streetcar system is to enhance and contribute to the existing transit system in the area. Providing connectivity to existing transit expands the mobility choices available to the community. Connectivity was measured by a quantitative assessment of the number of bus routes that intersect the alignments and the number of Metrolink Stations serviced by each alignment. Connectivity to transit was classified as high priority, and therefore alignments had the potential to receive a score ranging from +3 to -3. Table 4.9 summarizes the results of this assessment.

Table 4.9: Comparison of Connectivity to Transit

Bus Route Evaluation	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Number of Bus Routes	11	14	12	16	12	12
Number of Metrolink Stations	1	0	0	1.5*	2	0.5*
Total	**12**	**14**	**12**	**17.5**	**14**	**12.5**
Score	**-2**	**0**	**-2**	**3**	**0**	**-2**

NOTE: Alignment Alternatives 4 & 6 were awarded 0.5 points for providing service within a ¼ mile of a Metrolink Station.

Alternative 4 provided the highest number of connections to existing transit services and received a score of +3. Alternative 6 provided the fewest number of connections and received a score of -3. Alternative 5 was also significant as it provided the second highest number of connections and is the only alternative to provide direct connections to both Metrolink Stations in the study area.

4.2.7 Circulation and Traffic Impacts

Circulation and traffic impacts are associated with the reduction in capacity or vehicle flow along a particular corridor. Impacts were measured by a quantitative assessment of the number of deficient

segments along each alignment. Deficient segments were defined as segments operating at Level of Service (LOS) D or worse.

In addition to analyzing deficient segment crossings, an assessment of current traffic conditions was obtained from the City's Traffic Engineering Division as a part of the evaluation for circulation and traffic impacts. The following sections are excerpts from the technical memorandum analyzing current traffic conditions prepared by the City's Traffic Engineering Division on December 9, 2014. The memorandum is not a comprehensive list of traffic issues within the city, but identifies several typical points or areas of traffic congestion that occur along the proposed alignments. The complete technical memorandum can be found in Appendix B of this report. Highlighted locations or roadway segments are summarized below.

Market Street (between 10th Street and Mission Inn Avenue)

- *Heavy congestion during AM and PM peak hours*
- *Adjacent to existing RTA hub and impacted by heavy transit demand*
- *Density of signals and dedicated pedestrian crossings present further challenge from a traffic perspective*
- *Impacts Alternatives 1 & 5*

Third Street (between Vine Street and Commerce Street)

- *Frequent and lengthy disruptions to vehicular service due to freight railroad traffic*
- *Railroad crossing is served by both freight and commuter rail and experiences heavier demand than many crossings*
- *Impacts Alternatives 1, 2, & 3*

Fourteenth Street (between Magnolia Avenue and SR-91)

- *Emergency vehicle pre-emptions originating from Riverside Community Hospital may impact alignment alternatives with lengthy trips along this segment*
- *Westbound trips will intermittently be required to wait as ambulances pre-empt the eastbound direction*
- *Impacts Alternative 3*

La Sierra Avenue (between Channing Street and Collett Avenue)

- *Alignment alternatives may be impacted during school drop-off and dismissal times at the La Sierra High School frontage*
- *High volumes of both motorist and pedestrian traffic*
- *Impacts Alternative 3*

La Sierra Avenue at SR-91

- *Unclear how streetcar will implement a terminus (U-Turn) at La Sierra Avenue & SR-91*
- *Restricted U-Turn at La Sierra Avenue and Indiana Avenue; unclear how streetcar would implement a terminus*
- *Impacts Alternatives 4 & 5*

Magnolia Avenue (approaching Central Avenue)

- *Delays during most peak hours at the approach to the five leg intersection with Magnolia/Central/Brockton*
- *Heavy demand along Magnolia Avenue exceeds available capacity despite optimizing signal cycle lengths*
- *Alternatives diverted towards Riverside Plaza will incur challenges in completing tight turns and weaving maneuver to enter left turn pocket on Central Avenue*
- *Impacts Alternatives 1, 2, 3, 4, & 5*

Central Business District Special Events and Festival of Lights

- *Orange Street/Lemon Street loops is desirable from a traffic perspective, but will encounter significant delay during the holiday season and Festival of Lights*[2]

Circulation and Traffic Impacts were classified as high priority and alternatives had the potential to receive a score between +3 to -3. Table 4.10 summarizes the results of this assessment.

[2] "Riverside Streetcar Feasibility Study – Initial Screening of Alternatives" Technical Memorandum, prepared by the City of Riverside Department of Traffic Engineering. 2014, December 09.

Table 4.10: Comparison of Circulation and Traffic Impacts

Traffic Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Deficient Segments	1	0	0	2	1	0
Market Street	1	0	0	0	1	0
3rd Street	1	1	1	0	0	0
14th Street	0	0	1	0	0	0
La Sierra (Channing – Collett)	0	0	1	0	0	0
La Sierra/SR-91	0	0	0	1	1	0
Magnolia & Central	1	1	1	1	1	0
TOTAL	**4**	**2**	**4**	**4**	**4**	**0**
Score	**-3**	**0**	**-3**	**-3**	**-3**	**3**

Alternatives 2 and 6 received the best scores in circulation and traffic impacts, when taking into consideration the comments from the City's Traffic Engineer. Alternative 6 received a score of +3, while Alternative 2 received a score of 0. Additionally, Alternative 4 crosses two deficient segments operating at LOS D or worse along University Avenue and Van Buren Boulevard. It is the only alternative to cross both deficient segments identified in the study.

4.3 Key Observations

Based on the results summarized above, the following key observations can be made:

Population and Employment

Population and employment has the potential to significantly influence ridership levels in a streetcar system and has been classified as high priority. Based on a ½ mile buffer and U.S. Census data, Alternative 5 scored the highest in this category followed by Alternative 3. The remaining short-list alternatives received a score of -1.

Land Use Compatibility

To minimize potential impacts to sensitive uses and maximize potential ridership, alignment alternatives would typically avoid passing through single-family residential developments, and target areas with high multi-family residential and commercial properties. Land use compatibility was classified as medium priority. Based on a quantitative assessment of single-family residential properties that front and are adjacent to each alignment, and multi-family residential and commercial properties that are within ¼ mile radius of each alignment, Alternative 4 scored the highest in this category.

Magnolia Avenue contains a high amount of single-family residential development, which Alternative 4 minimizes by utilizing an alternate route along the Arlington Avenue and Van Buren Boulevard corridors. In utilizing these corridors, Alternative 4 also taps into more multi-family residential and commercial properties. Alternative 5 scored the second highest amongst the short-listed alternatives in this category, followed by Alternatives 2 and 3.

Noise Impacts

Noise impacts were measured by each streetcar alignment's proximity to noise sensitive receptors. Although classified as low priority, noise impacts can impact the quality of life within the community, and was taken into consideration when assessing the alignment alternatives. Of the short-listed routes, Alternatives 2 and 4 scored the highest in this category, while Alternatives 3 and 5 scored the lowest.

Visual Impacts

Visual impacts were classified as low priority when assessing alignment alternatives. Visual impacts were measured by a quantitative assessment of each alignment's proximity to single-family residential properties and historical properties (either from the National Register of Historic Places or Local Landmarks identified by the City of Riverside) that front the alignment. Of the short-listed alternatives, Alternative 3 scored the lowest in this category, while the remaining alternatives received a neutral score of 0.

Connectivity to Activity/Employment Centers

Connectivity to major activity and employment centers can increase potential ridership and was ranked high in priority. A quantitative assessment on the proximity to activity and employment centers for each alignment was performed. All of the short-listed alternatives received high scores for their connectivity to activity and employment centers, with the exception of Alternative 2. Alternative 4 provided the greatest number of connections to adjacent activity and employment centers.

Connectivity to Existing Transit

One of the main goals of the streetcar system is to enhance and contribute to the existing transit system in the area. It was classified as high in priority and was measured by a quantitative assessment of the number of bus routes that intersect the alignments, and the number of Metrolink Stations serviced by each alignment. Of the short-listed alternatives, Alternative 4 provided the highest number of connections to existing transit services. Alternative 5 was also significant as it provided the second highest number of connections and is the only alternative to provide direct connections to both Metrolink Stations in the study area.

Circulation and Traffic Impacts

Circulation and traffic impacts were classified as high in priority and were measured by a quantitative assessment of the number of deficient segment crossings along each alignment. Deficient segments were defined as segments operating at LOS D or worse. In addition to analyzing deficient segments, feedback from the City's Traffic Engineer was also incorporated as a part of the evaluation. Of the alignment alternatives, Alternative 2 and 6 received the highest scores. Additionally, Alternative 4 was the only alignment alternative to cross both deficient segments in the area.

4.4 Summary of Initial Assessment Results

Table 4.11 provides the detailed summary of the scores for each evaluation criterion for each alignment alternative. This initial assessment will be revisited as part of the preparation of the Part 2 report, when additional information on ridership and cost estimates are available.

Table 4.11: Initial Screening Evaluation Summary

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Population and Employment	1	-1	2	-1	3	-3
Land Use Compatibility	0	0	0	2	1	-2
Noise Impacts	-1	1	-2	1	-2	2
Visual Impacts	-1	0	-1	0	0	1
Connectivity to Activity/ Employment Centers	3	0	3	3	3	-3
Connectivity to Existing Transit	-2	0	-2	3	0	-2
Circulation/Traffic Impacts	-3	0	-3	-3	-3	0
TOTAL SCORE	**-3**	**0**	**-3**	**5**	**2**	**-7**
RANK	**4**	**3**	**4**	**1**	**2**	**6**

Alternative 4 received the highest total score in the initial assessment, with high scores in land use compatibility, connectivity to activity/employment centers, and connectivity to existing transit. It received the lowest score in its assessment of circulation and traffic impacts as it crossed two major arterials operating at LOS D or worse.

Alternative 5 received the second highest total score, with high scores in population and employment, as well as connectivity to activity/employment centers. It received low scores in its assessment of noise impacts, as well as circulation and traffic impacts.

Alternative 2 received a neutral rating overall, and had neutral scores of 0 for a majority of its assessment. Notable value added scores include scores of +1 in land use compatibility and noise impacts.

Alternatives 1 and 3 both received a varying range of scores in their assessment, but end up with the same overall score.

Alternative 6 had the lowest overall score of any of the six potential alignments due to low scores in the population and employment criterion, as well as connectivity to activity and employment centers categories. The Martin Luther King Boulevard segment of the alignment is comprised of mainly agricultural land and single family residential. Because of this, the alignment received scores of -3 in both categories.

5.0 SUMMARY AND CONCLUSIONS

The City of Riverside is interested in studying the feasibility of implementing a streetcar system that would connect the community with several of the City's key destinations. The streetcar system should provide mobility options and enhance the existing transit services. This report has presented the results of the initial assessment of the alignment alternatives developed for the streetcar project. The following sections summarize key observations, recommendations, and conclusions that can be drawn from the assessment process.

5.1 Segment by Segment Assessment/Conclusions

To organize the initial review and assessment of the alignment alternatives, the study corridor was assigned to different sub-segments so that differences between the various alignments could be examined in a more focused fashion. The five segments are:

- UC Riverside to SR-91
- SR-91 to 14th Street/RCC
- 14th Street to Magnolia/Central
- Magnolia/Central to Magnolia/Van Buren
- Magnolia/Van Buren to LSU/La Sierra Metrolink

Discussion of the alignment options by segment is provided below.

UC Riverside to SR-91

This section of the study corridor would link UC Riverside to the Downtown Metrolink Station and/or Downtown Riverside via 3rd Street/Blaine Avenue or University Avenue. Within the alignment alternatives, three alternatives would propose to primarily use 3rd Street/Blaine Street, while two would use University Avenue, and one uses 14th Street/Martin Luther King Boulevard. As part of the initial assessment summarized in the previous section and in reviewing current physical conditions along the corridor, the following alignment segments were recommended to be excluded or minimized from the assessment for the following reasons:

- 14th Street/Martin Luther King Boulevard – limited economic development opportunities given current land use patterns and presence of UC Riverside agricultural lands, and difficult connections to University/Canyon Crest intersection given freeway crossing configuration
- Iowa Street – would introduce additional freeway crossing when compared to alignments on Canyon Crest or Chicago

In all cases, the alignments would originate on the east end at or near the intersection of University Avenue and Canyon Crest Drive to provide a connection to UC Riverside.

With the removal of an alignment on 14th Street/Martin Luther King Jr Boulevard, it is recommended that the following four alternatives be considered using 3rd Street/Blaine Street and/or University Avenue:

- 3rd Street/Blaine Avenue using Canyon Crest Drive to connect to UC Riverside (as in Alignment 2, but without the proposed loop)
- 3rd Street/Blaine Avenue using Chicago Avenue and University Avenue to connect to UC Riverside (as in Alignment 1)
- University Avenue with a direct link to the Downtown Metrolink Station using Park Avenue, 10th Street, and 9th Street (as in Alignment 5, but removing the portion on Mission Inn Avenue)
- University Avenue with no direct link to the Downtown Metrolink Station (as in Alignment 4, but include a one-way loop to minimize construction on Iowa)

These alignment segments allow for evaluation of both the University Avenue and 3rd Street/Blaine Street corridors, using different routes to travel to 3rd Street/Blaine Street, and testing the benefits and constraints of directly serving the Downtown Metrolink Station. The at-grade rail crossing on Mission Inn Avenue would be avoided.

SR-91 to RCC

This segment primarily traverses Downtown and would extend between 3rd Street and 14th Street. Alignments along Market Street, Orange Street/Lemon Street, and Lime Street were considered in the initial assessment. Given the limited potential for ridership and economic development between Lime Street and SR-91 (due to the narrow amount of available developable land), a Lime Street alignment is not recommended for consideration as a shortlisted alignment. Additionally, given the limited ridership and economic development potential of an alignment on Market Street north of 3rd Street, connecting to Fairmount Park, this portion of the alignments has also been recommended for removal from further consideration.

The proposed approach for this segment is to evaluate an alignment on Market Street (between 3rd Street and 14th Street) and a one-way couplet alignment using Orange Street and Lemon Street for both the 3rd Street and University Avenue alignment concepts.

14th Street to Magnolia/Central

The Magnolia Avenue and Olivewood Avenue corridors are the primary routes to consider in this segment. For the detailed evaluation, it is recommended that the alignments using Market Street would continue down Magnolia Avenue, and the one-way couplet alignments would utilize Olivewood Avenue.

It is also recommended that some of the alignments include the "jog" off of Magnolia Avenue to directly connect to Riverside Plaza between Jurupa Avenue and Central Avenue. The other alignments would stay on Magnolia Avenue to provide a comparison of the ridership and cost differences.

Magnolia/Central to Magnolia/Van Buren

There are two basic alignment options recommended for this segment. One option would be for the alignments to remain on Magnolia Avenue. The second option would be to diverge from the Magnolia corridor at Arlington Avenue, and follow an alignment on Arlington Avenue, connecting back to Magnolia via Van Buren. The Arlington/Van Buren route is proposed for a single alignment in order to provide a point of comparison regarding ridership and cost to the Magnolia alignment.

Magnolia/Van Buren to LSU/La Sierra Metrolink

The final segment is recommended with two potential terminus points for the alignment alternatives, either La Sierra University or the La Sierra Metrolink Station. From the original alignment alternatives that served this part of the study area, there are three potential options for the southern terminus point.

- Serve the La Sierra Metrolink Station only
- Serve La Sierra University only
- Serve both destinations

Given these three options, the following alignments are recommended for the shortlisted routes (Part 2 of this evaluation):

- Magnolia Avenue to La Sierra Avenue to Pierce Street to LSU (as in Alignment 3)
- Magnolia Avenue to La Sierra Metrolink (as in Alignments 4 and 5)
- Magnolia Avenue to La Sierra Metrolink, returning to the Magnolia corridor to connect to LSU via Riverwalk Parkway (this is a realignment of Alignment 1 to avoid an at-grade railroad crossing on Pierce Street)

Consideration of an alignment along Indiana Avenue is dropped from the assessment, as this alignment would introduce an additional freeway crossing and an at-grade rail corridor crossing. The termination of an alignment at CBU is also no longer carried forward since this alignment option does not fulfill the complete objectives of the city to serve as many potential major destinations within the study corridor.

5.2 Recommendations

The observations and the segment-by-segment alignment recommendations detailed in Section 5.1 result in the identification of four alignment alternatives that will proceed into the detailed evaluation process (i.e. Part 2). These four recommended alignment alternatives are depicted in Figures 5.1 through 5.4 on the following pages.

5.3 Next Steps

The next steps in this evaluation process include completion of Part 2 in the evaluation of alignment alternatives, which involves the development of conceptual cost estimates, ridership forecasts, and economic analysis along the proposed four alignments, as shown in Figures 5.1 through 5.4. This analysis (Part 1 and Part 2) will be followed by the preparation of a final feasibility report that identifies a preferred alignment option. This final report will not only consider the technical feasibility of the streetcar service as evaluated in this report, but also the economic and financial feasibility of the service.

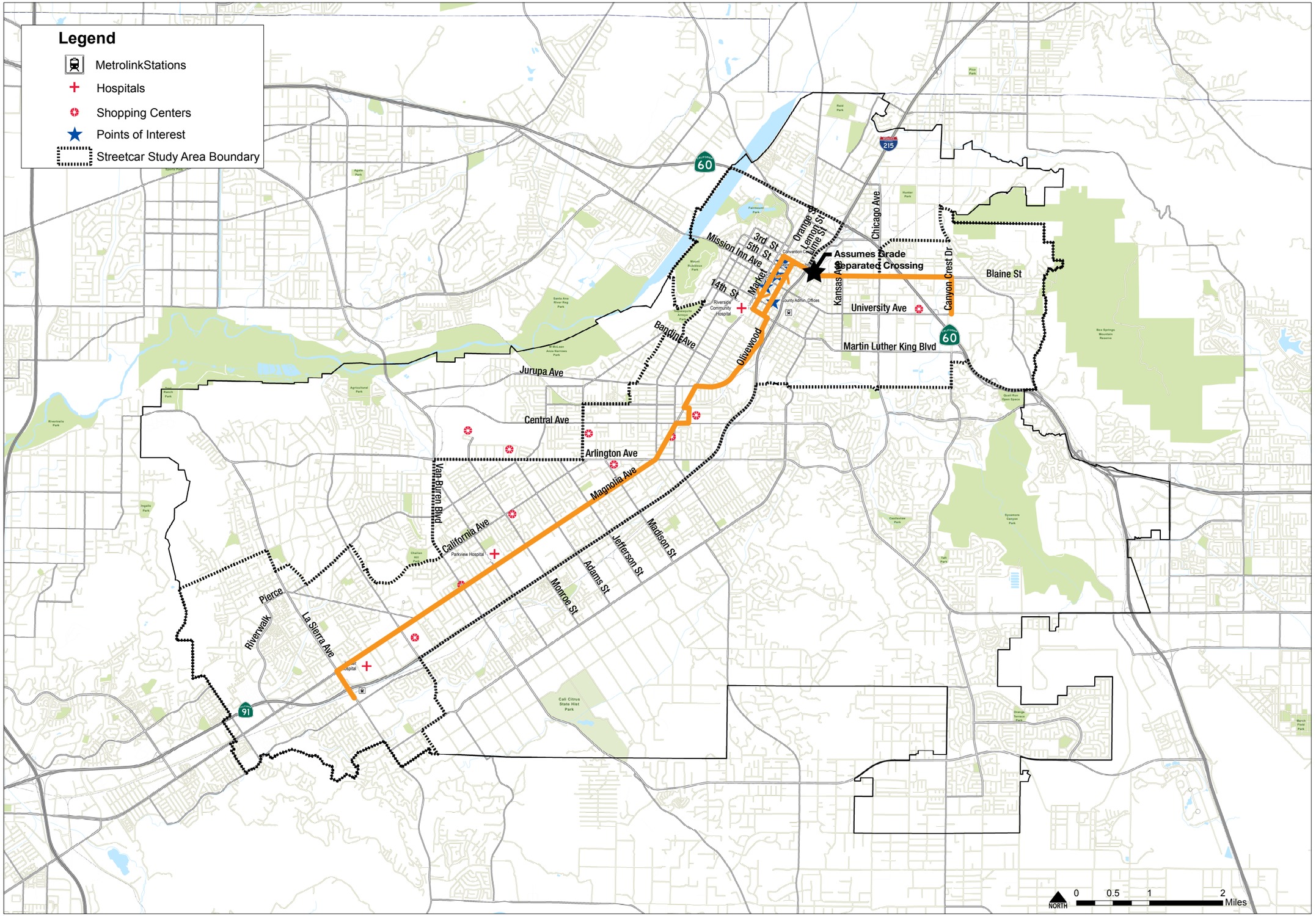

Figure 5.1: Alignment 2a

Alignment 2

Riverside
RECONNECTS
STREETCAR STUDY

Alignment Map

bae
IBI
PLACEWORKS

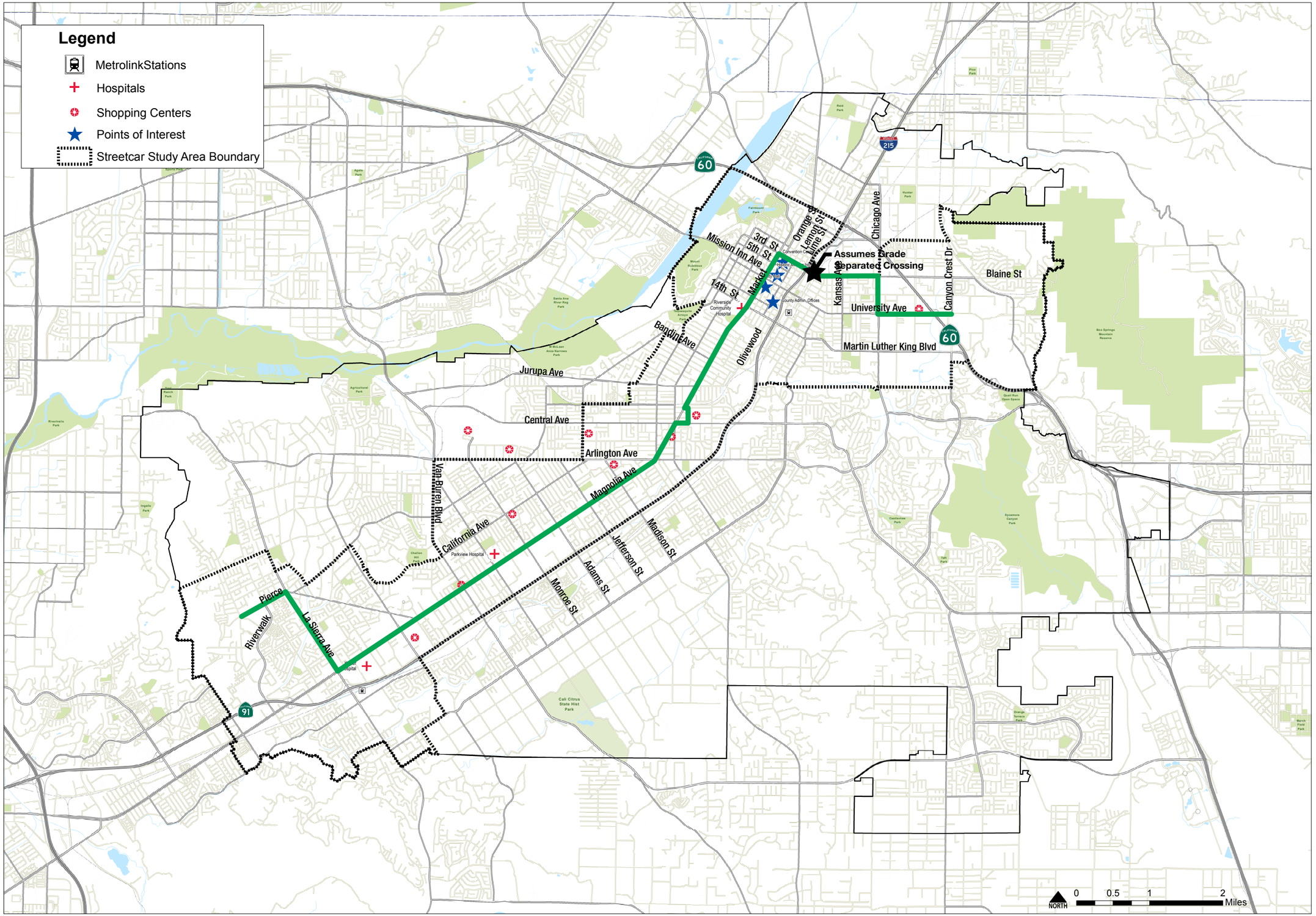

Figure 5.2: Alignment 3a

Alignment 3

Riverside
RECONNECTS
STREETCAR STUDY

Alignment Map

bae
IBI
PLACEWORKS

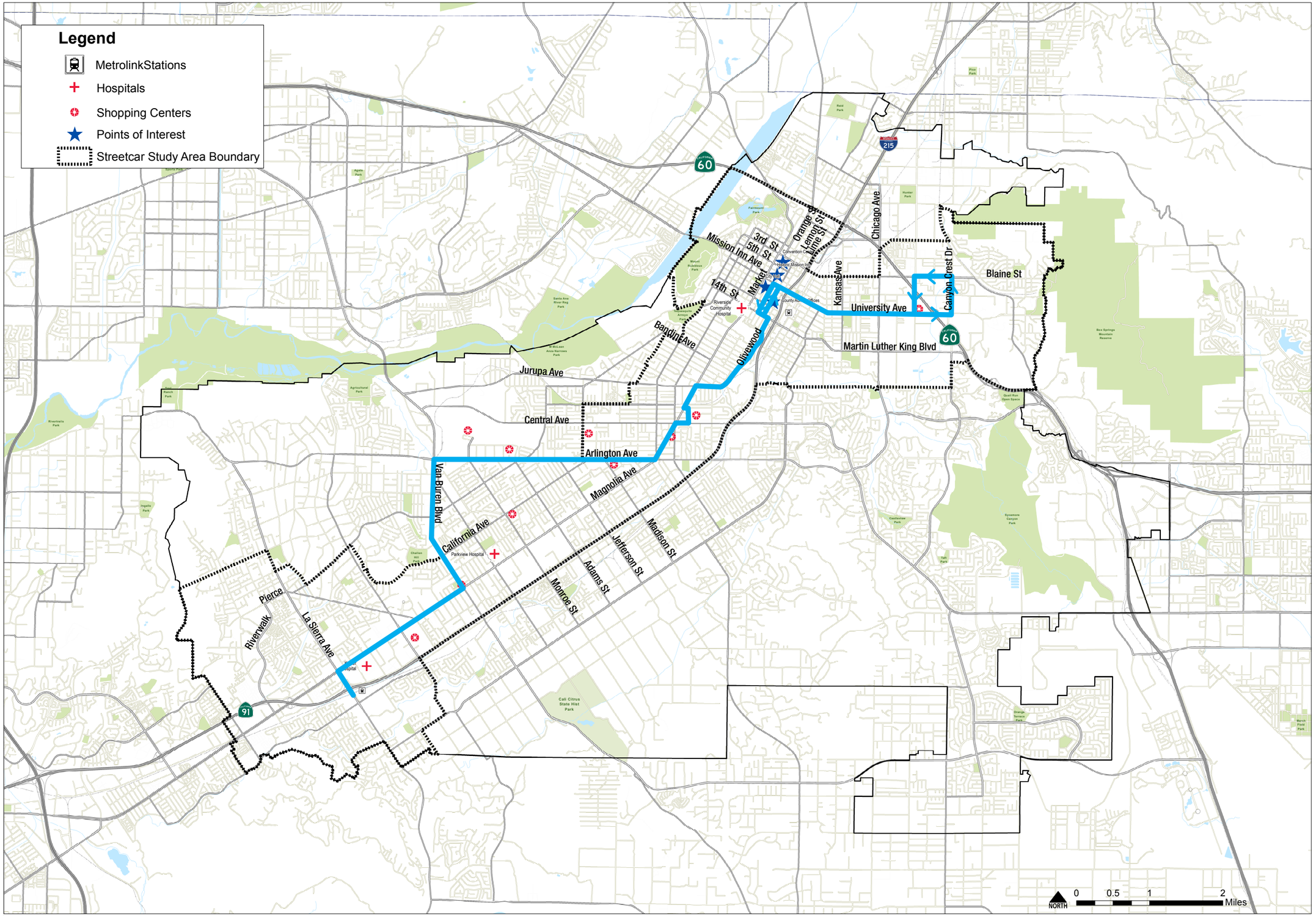

Figure 5.3: Alignment 4a

Alignment 4

Riverside
RECONNECTS
STREETCAR STUDY

Alignment Map

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PLACEWORKS

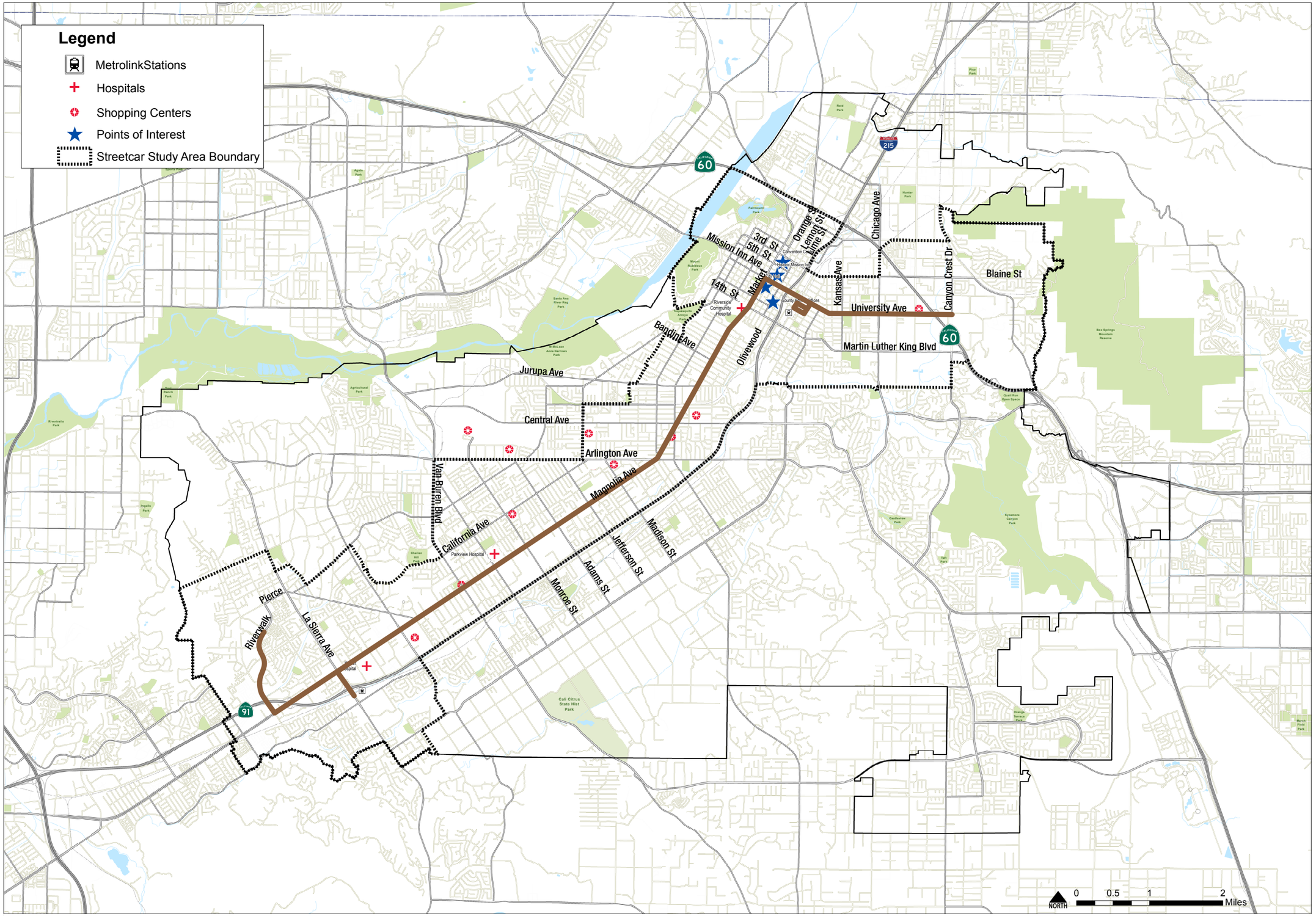

Figure 5.4: Alignment 5a

Alignment 5

Riverside RECONNECTS STREETCAR STUDY

Alignment Map

bae Bay Area Economics

IBI

PLACEWORKS

6.0 APPENDIX

6.1 Appendix A

Exhibit A: Evaluation Criteria Worksheet

Criteria	Approach	Rank
Land Use Compatibility	Assessment based on sensitivity of surrounding and adjacent land uses	
Noise Impacts	Qualitative review based on the potential for noise	
Visual Impacts	Qualitative review based on the potential for impacts to visual character	
Population and Employment	Assessment of population and employment within proximity to alignment	
Transit Travel Time	Degree of interaction with traffic Typical travel speed Station and traffic signal stop delays	
Ridership Potential	Assessment based on activity centers and residential developments served	
Costs	Comparison of the total estimated capital and operating costs	
Physical Constraints	Assessment of physical obstacles (traffic signals, street capacity, topography, and slopes)	
Circulation Impacts	Review of operations at critical intersections Number of streets crossed Classification of streets	
Connectivity to Activity Centers	Assessment of the number of activity centers served	
Connectivity to Existing/ Planned Transit	Assessment of ability to enhance regional connectivity	
Economic Development Areas	Count of the number of economic development or improvement areas served by each alternative	
Development Potential	Identify number of non-SFR parcels that are below current development limits	
Job Creation	Potential for job creation associated with additional development	

Instructions: Please rank the criteria above from most important to least important using numbers between 1 and 14, with the number 14 representing the most important criterion for you, 13 representing your second most important criterion, and so on until you reach the number 1, which would be the least important criterion.

6.2 Appendix B

MEMORANDUM

Engineering

DATE: December 9, 2014

TO: Jay Eastman
FROM: Nathan Mustafa
CC: Gilbert Hernandez/David Murray
RE: Riverside Streetcar Feasibility Study – Initial Screening of Alternatives

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We have reviewed the technical memorandum on the initial screening of streetcar alignment alternatives and have the following comments:

General Approach:

1. It is unclear why certain elements of each alignment are included or omitted. For instance: Alignment 1 passes through a large area of 'buffer' along Chicago Avenue and two difficult segments of traffic along Magnolia Avenue, but has a favorable alignment for travel towards La Sierra University. While the final set of alternatives will of course have their respective advantages and disadvantages, the scoring could be applied more effectively if used to compare segment alternatives – which could in turn be assembled to create the most desirable alternatives as a whole.

Traffic Performance:

2. Market Street between 10th Street and Mission Inn: experiences heavy congestion during the AM and PM Peak hours. This segment of Market Street is located adjacent to the existing RTA hub, and is impacted by heavy transit demand. The density of the signals and dedicated pedestrian crossings within this small segment of downtown present further challenge from a traffic perspective. (Impacts: Alternatives 1 & 5)

3. 3rd Street at the Railroad crossing between Vine Street and Commerce Street: experiences frequent and lengthy disruptions to vehicular service. This line is served by both freight and commuter rail, and as such experiences heavier demand than many crossings. (Impacts: Alternatives 1, 2 & 3)

4. 14th Street between Magnolia & SR 91: alternatives including lengthy trips along this segment will be impacted by frequent emergency vehicle preemptions originating from Riverside Community Hopsital. Westbound trips will

intermittently be required to wait as ambulances preempt the eastbound direction. (Impacts: Alternative 3)

5. La Sierra Avenue between Channing Street and Collett Avenue: impacted during school dropoff and dismissal along the La Sierra High School frontage. Trips making use of this segment would experience delay negotiating high volumes of both motorist and pedestrian traffic. (Impacts: Alternative 3)

6. La Sierra Avenue at SR 91: Alternatives 4 and 5 end at the interchange of SR 91 and La Sierra Avenue. It is not clear how the street car will complete a U-turn at this intersection. If the trip were extended to the nearby intersection of La Sierra Avenue & Indiana, the street car would encounter another restricted U-Turn. (Impacts: Alternatives 4 & 5)

7. Magnolia Avenue approaching Central Avenue: This segment of Magnolia Avenue experiences delays during most peak hours at the approach to the five leg intersection with Magnolia / Central / Brockton. While signal cycle lengths have been optimized to best serve all directions of travel, the heavy demand along Magnolia Avenue often exceeds available capacity. Alternatives diverting the street car towards the Riverside Plaza will avoid delay along SB Magnolia Avenue, but will incur other challenges related to completing several tight turns, and the weaving maneuver to enter a left turn pocket on Central Avenue. Traffic engineering recommends that a final decision is not made on this segment pending a detailed review. With respect to Comment 1, this should be considered a segment alternative and considered for all relevant alignments (Impacts: Alternatives 1, 2, 3, 4 & 5)

8. Central Business District special events and Festival of Lights: Alternatives that do not make use of 3rd Street will be heavily impacted by planned closures during the Festival of Lights and other special events. While the Orange Street / Lemon Street loop is desirable from a traffic perspective throughout the year, it will encounter significant delay during the holiday season each year, and be impacted by street closures during the Festival of Lights.

Recommendations:

9. This is not a comprehensive list of traffic issues encountered along proposed routes. The Traffic Engineering Division recommends that alternatives should be assessed on a segment basis before assembling complete alignments.

10. Traffic Engineering recommends that Alignments 2 & 6 are eliminated as they do not provide a wide reach of service to residents.