2.0 ALTERNATIVES

This chapter presents a detailed description of the two alternatives carried forward from the Phase I Downtown/Riverfront Streetcar Study for environmental analysis. Other alternatives considered and rejected are discussed at the end of this chapter.

2.1 No-Project Alternative

The No-Project Alternative is a base scenario used for comparison purposes with the proposed project. In the No-Project Alternative scenario, existing transit services and roadway configurations would remain in their present state with no changes other than improvements that have been programmed and funded through 2012.

2.1.1 Existing Transit Services in Study Area

2.1.1.1 Sacramento Regional Transit District

RT is the multimodal operator serving the Sacramento metropolitan area. Its 97 bus lines and two light-rail routes travel through a service area that is bounded by the City of Citrus Heights and unincorporated Rio Linda to the north; the City of Folsom to the east; unincorporated Meadowview to the south; and the City of Sacramento to the west.

Twenty-six of RT's bus lines and both of its light-rail routes serve the proposed project's study area. These include local Lines 2, 6, 11, 15, 29, 30, 31, 33, 34, 36, 38, 50E, 51, 62, 63, 64, 86, 88, and 89; express Lines 3, 7, and 109; the Capitol Shuttle Lines 140, 141, and 142; and RT's Downtown Trolley (Line 143) (see Figure 2-1). RT's Blue light-rail line travels from its northern terminus point in North Sacramento, through downtown Sacramento, and south to its southern terminus point in Meadowview. The Gold light-rail line's eastern terminus is in Folsom and its western terminus is in downtown Sacramento at the Amtrak station. These routes carry passengers from different parts of the Sacramento metropolitan area, including neighborhoods such as Arden and Meadowview and cities such as Rancho Cordova and Carmichael, to and from downtown Sacramento. They also transport patrons to key regional destinations such as California State University, Sacramento; the UC Davis Medical Center; Cal Expo; and others.

Line 140 is RT's only regular service that goes to West Sacramento. This weekday shuttle route makes a loop through downtown Sacramento, crosses Tower Bridge, and travels on 3rd Street in West Sacramento to the Ziggurat Building before heading south on 3rd Street to Raley Field and returning to downtown Sacramento (RT, 2008a). In addition, RT operates a shuttle that links Raley Field with downtown Sacramento at 5-minute headways during Sacramento River Cats games. The shuttle route travels from Raley Field via Tower Bridge, 3rd Street, N Street, 8th Street, and L Street.

2.1.1.2 Yolo County Transportation District

YCTD operates Yolobus, which serves Yolo County and its neighboring areas, including the cities of Davis, West Sacramento, Winters, Woodland, and downtown Sacramento. Fifteen of YCTD's bus lines serve the proposed project's study area. These include local Lines 35, 40, and 41; intercity Lines 42A and 42B; and commuter Lines 39, 43, 43R, 44, 45, 230, 231, 232, 240, and 241. YCTD also runs the River Cats Shuttle, which is a special-event service from the Southport area to Raley Field in West Sacramento (YCTD, 2006). Except for the River Cats

shuttle, all of these lines are inter-city routes, carrying passengers from cities outside of Sacramento across Tower Bridge to the downtown Sacramento area.

2.1.1.3 Amtrak

The Sacramento Valley Amtrak Station serves Amtrak's Capitol Corridor route, which offers daily round-trip service between Sacramento, Oakland, and San Jose, with one train per weekday in each direction and a bus bridge service continuing to Auburn. Amtrak operates 16 Capitol trains in each direction on weekdays, and 11 trains in each direction on weekends. Other passenger rail services at this station include the daily Coast Starlight between Los Angeles and Seattle, the California Zephyr between Emeryville and Chicago, and the San Joaquin between Sacramento and Bakersfield. The Amtrak station is located on I Street between 5th and 6th Streets near downtown Sacramento.

2.1.2 Planned Transit Service Changes in Study Area

2.1.2.1 Sacramento Regional Transit District

In mid-2007, RT began an 18-month comprehensive planning process, which included an update of its Transit Master Plan, Short-Range Transit Plan (SRTP), and Americans with Disabilities Act (ADA)/Paratransit Plan. This undertaking would likely result in changes in transit service, including those routes described above. At the time of this writing, the following changes that would affect the study area were anticipated (Lonergan, 2007).

- Line 50E's headway would be reduced to 30 minutes;
- Sunday and holiday service would be eliminated for Lines 61 and 62;
- Line 62's headway would be reduced to 30 minutes on Saturday;
- There would be significant route realignment on Line 63, including a new terminus point at the 16th Street light-rail station;
- Line 64 would be discontinued; and
- Line 140 would operate during commute hours only.

2.1.2.2 Yolo County Transportation District

YCTD includes a base and growth scenario in its SRTP for 2007-2013. The base scenario presents a service plan that assumes a modest increase in resources to serve the growing City of West Sacramento, which has the largest estimated gap in service hours per capita in YCTD's service area. The SRTP also presents a growth scenario, which includes an expanded service plan in the study area that has an increased transit mode split of 3.8 percent, pending additional funding (YCTD, 2006).

2.1.2.3 Other Transit Improvements in Study Area

There are also planned improvements to the West Sacramento Transit Center on West Capitol Avenue next to the Civic Center. The planned improvements consist of on-street improvements, such as new shelters and bus bulbs. Additionally, construction of an 8-foot reinforced concrete bus pad apron is planned to accommodate two bus shelters at the bus plaza at the southwest corner of West Capitol and Merkley Avenues. One bus shelter would be located directly across from the proposed streetcar station on West Capitol Avenue and the other would be located on the Merkley Avenue side of the intersection (DKS Associates, 2007). These improvements are envisioned to integrate the transit center into the existing civic center complex that would include a new satellite

LEGEND

Sacramento Regional Transit

- 36 Bus
- Light Rail
- 143 Downtown Shuttles

Yolo Transit

- 241 Bus

WEST SACRAMENTO

SACRAMENTO

West Sacramento Transit Center

AMTRAK

State Capitol

SACRAMENTO RIVER

REED AVE
RIVERSIDE PKWY
STILLWATER RD
IKEA CT
LISBON AVE
ANNA ST
LIGHTHOUSE DR
SACRAMENTO AVE
HARBOR BLVD
JEFFERSON BLVD
W. CAPITOL AVE
MERKLEY AVE
TOWER BRIDGE GATEWAY
WESTACRE RD
S. RIVER ROAD
15TH ST
PARK BLVD
INDUSTRIAL BLVD
PARKWAY BLVD
SEAPORT BLVD
STONE BLVD
RICHARDS BLVD
North 7TH ST
North B ST
A ST
B ST
C ST
D ST
E ST
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S ST
T ST
U ST
V ST
W ST
X ST
6TH ST
5TH ST
4TH ST
3RD ST
2ND ST
FRONT ST
CAPITOL MALL
CAPITOL AVE
BROADWAY
19TH ST
20TH ST
21ST ST
22ND ST
23RD ST
24TH ST
7TH ST
8TH ST
9TH ST
10TH ST
11TH ST
12TH ST
13TH ST
14TH ST
15TH ST
16TH ST
17TH ST
18TH ST

N

0 0.25 0.5
Scale in Miles

EXISTING TRANSIT SERVICE IN THE STUDY AREA

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Downtown/Riverfront Streetcar
West Sacramento, California

URS

FIGURE 2-1

Map Document: (U:\GIS\WestSac_streetcar\Projects\routes_11x17.mxd) 10/26/2007 -- 4:10:59 PM MTorchia

9/2/08 vsa/hk ..\T:\West Sacramento Streetcar\June 2008\F2-1_ West Sac Alignment_exist rtes.ai

campus of the Los Rios Community College District, a community center, library, and commercial space. The transit center improvements would be managed and paid for by YCTD and the City of West Sacramento and are anticipated to be completed in late 2009 (Ereiqat, 2007).

The Auburn-Oakland Regional Rail Service is a proposed new regional rail commuter system that would operate in the urban corridor between Auburn and Oakland. The commuter service would be operated by the Capitol Corridor Joint Powers Authority and enhance existing Capitol Corridor intercity rail service by providing additional peak capacity. Together, Capitol Corridor and Regional Rail services would offer 30-minute headways during the peak period in both directions (Auburn-Oakland Regional Rail Service Final Report, 2005).

2.1.3 Existing Roadways in Study Area

As shown in Figure 2-1, the study area encompasses the downtown areas of West Sacramento and Sacramento. The study area includes local and regional roadway networks that range from two-lane collector streets to major regional highways. There is also a limited network of bicycle and pedestrian infrastructure in the study area, which is described in more detail in Chapter 3.

Tower Bridge Gateway originates at US-50 in West Sacramento and heads east through West Sacramento's downtown to Tower Bridge as a four-lane and six-lane roadway. Once across the bridge, it becomes Capitol Mall, a four-lane and six-lane roadway and wide median that dead-ends at 9th Street near the State Capitol. Until 2000, Tower Bridge Gateway was the former State Route (SR) 275. The portion of the SR 275 in the City of Sacramento was relinquished to the City in 1999, and the freeway portion was subsequently relinquished to the City of West Sacramento in 2000. The California Department of Transportation (Caltrans) still owns the bridge structure (Moore, 2007).

As it relates to the study area, Interstate 5 (I-5) is an eight-lane freeway traveling along the western edge of the City of Sacramento, parallel to the Sacramento River. This north-south highway has two exits taking motorists to West Sacramento and downtown Sacramento.

The streets in the study area that includes downtown Sacramento are mainly mixed-use, consisting primarily of high-intensity commercial, retail, and residential areas with substantial pedestrian activity. The J Street–15th Street–L Street loop would comprise the easternmost section of the proposed alignment.

2.1.4 Planned Roadway Improvements in Study Area

2.1.4.1 City of Sacramento

There are several roadway improvements in the Sacramento portion of the study area that are planned and funded. These include significant signaling work, roadway widening, and pedestrian enhancements at the intersection of 4th and I Streets, a key entry and exit point into the downtown area via I-5. It is anticipated that the proposed project would be completed in early 2012 (Moore, 2007). The City of Sacramento permanently closed the ramp between eastbound Capitol Mall and N Street on July 9, 2007, in anticipation of the sale of 2.6 acres of property abutting the ramp. The ramp eventually will be removed when the property is developed. The ramp, built and owned by Caltrans until the city took ownership of a portion of Capitol Mall in January 2006, was used by motorists as a direct link to N Street from eastbound Capitol Mall. Similar plans have been discussed for the ramp between westbound L Street and

Capitol Mall, and the adjacent property, but no timetable has been adopted for that closure (Grandy, 2008).

In the winter of 2007, the City of Sacramento was in the design phase of a Streetscape Plan for portions of its downtown. The proposed project would be implemented on K Street between 7th and 12th Streets and would include changing the surfaces of these streets and adding trees, landscaping, and lights. Construction for the proposed project is expected to be completed in 2011 (Moore, 2007). The City Council temporarily authorized cyclists to use the K Street mall during a recent freeway construction project on I-5 that is nearly complete. While there has been some discussion about making the authorization permanent, no formal Council action has been taken (Grandy, 2008).

3rd Street, between I and J Streets, will become bi-directional for motorized vehicles. This street conversion is expected to be finalized by summer 2008 (Moore, 2007).

2.1.4.2 City of West Sacramento

The City of West Sacramento is undertaking several roadway projects in the study area that are anticipated to be completed by or before 2012.

The City of West Sacramento's Tower Bridge Gateway Modification Project has two major phases. The first phase, the completed West Phase, which modifies Tower Bridge Gateway from a freeway to a city street, includes the removal of the Riske Lane Overcrossing; creation of a new Garden Street; installation of signalized intersections at the Garden Street/West Capitol Avenue and Garden Street/Tower Bridge Gateway intersections; and creating landscaped and pedestrian areas on both sides of Garden Street. The second, or East Phase of the proposed project, which is yet to be completed, will include the construction of two new at-grade intersections at 5th Street and 3rd Street. This phase of the proposed project is contingent upon the relocation of the former Union Pacific Railroad (UPRR) (now City-owned) spur track (City of West Sacramento, 2007a).

The City of West Sacramento's West Capitol Avenue Streetscape Project involves the construction of streetscape improvements, including wider sidewalks, lane reconfiguration, utility relocation, and new lighting and planting. Construction is expected to begin in summer 2008 and the work is projected to be completed in 2010 (City of West Sacramento, 2007a).

2.1.4.3 Tower Bridge

The Tower Bridge Pedestrian and Bikeway Improvements Project, which was completed in early 2008, widened the sidewalks on the Tower Bridge to accommodate non-motorized access and use. Pedestrian walkways on each side of the bridge were widened to 10 feet to meet Caltrans' standard for shared pedestrian and bicycle use. New concrete, handrails, and curbs for both the north and south sidewalks were also installed (U.S. DOT and Caltrans, 2004).

2.2 Streetcar Project Alternative

The Streetcar Project Alternative was developed based on findings from the project's Phase 1 Feasibility Study (Phase 1 Summary Report, May 2007) and refinements to the alternative's alignment, track configuration, and station locations during Phase 2. The project refinements resulted from consultation with the participating agencies through their representatives on the Technical Advisory Committee. In addition, coordination was conducted with the Cities of West Sacramento

and Sacramento engineering and planning staff to integrate the streetcar alignment and station locations with development plans and infrastructure improvements carried out by the respective jurisdictions. At several locations, traffic analyses and engineering studies were performed for this purpose. These studies involved the location of the alignment along Capitol Mall, the track configuration at Tower Bridge Gateway and 3rd Street, the terminal at the West Sacramento Civic Center, and the Convention Center loop at the eastern end of the project. Additional coordination with Caltrans regarding the streetcar track and lane configuration over Tower Bridge was also undertaken.

The description of the Streetcar Project Alternative provided below represents a culmination of these collaborative efforts. It defines the initial phase of cross-river streetcar service that can be extended to other neighborhoods and destinations in both cities as capital and operating funds become available. Additional information regarding the selection of the Streetcar Project Alternative as the appropriate mode to be carried forward for environmental analysis is provided in Section 2.5.

2.2.1 Alignment

2.2.1.1 Track Type and Location Descriptions by Segment

The following sections describe the proposed streetcar line by track segment, starting from the western terminal and moving east to the eastern terminal loop. A summary of the track segment descriptions is included in Table 2-1.

West Sacramento Civic Center Terminal

The alignment's western terminus would be located in the reserved center median of West Capitol Avenue, a four-lane roadway (two eastbound and two westbound), near West Sacramento's Civic Center (Figure 2-2). The terminus would be a single (stub) terminal track configured to accommodate vehicle reversing. The tail track would be long enough to accommodate two streetcars and could be used to store an out-of-service car and still provide adequate room for turnbacks for regular service. From this terminus, the streetcar would travel about 200 feet on a single-tail track and transition onto a double track as it approaches the proposed West Sacramento Civic Center Station, in front of the Civic Center. The alignment would cross a left-turn lane in the median directly to the west of Civic Center Station. This station would have a center platform in the median directly facing the Civic Center to the north and the Transit Center to the south. To facilitate pedestrian access, a staggered crosswalk would be constructed across West Capitol Avenue east of the station's platform (Figure 2-3).

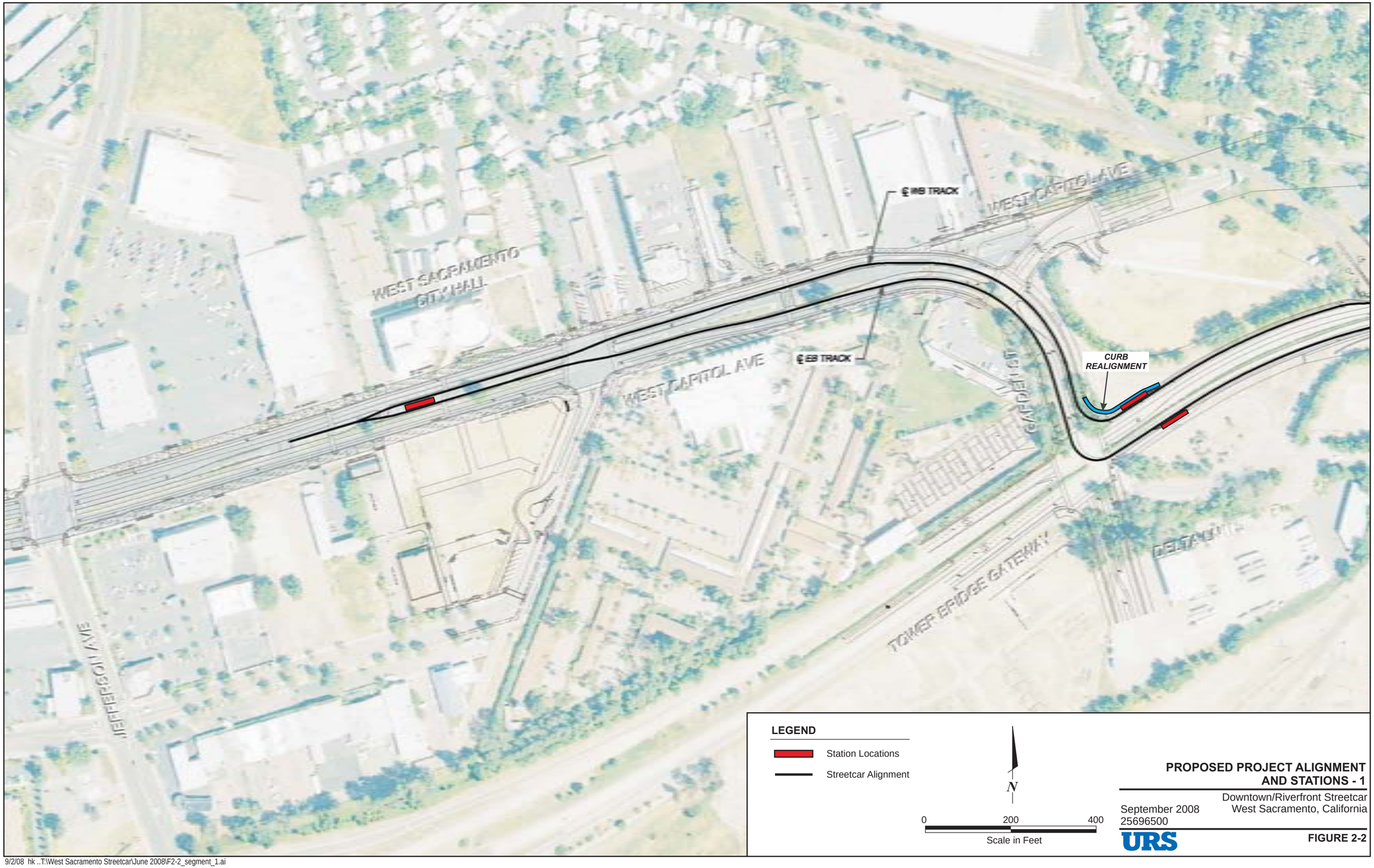
Via West Capitol Avenue – West Sacramento Civic Center Station to Garden Street

From the West Sacramento Civic Center Station to Merkley Avenue, the two-track alignment would operate exclusively in a reserved center median along West Capitol Avenue. The eastbound track would use a semi-dedicated left-turn lane as it approaches the intersection at Merkley Avenue. A new signalized intersection would be constructed at this location in 2008 as a part of the West Capitol Avenue Streetscape Project.

From Merkley Avenue, the double-track alignment would operate in mixed traffic, using the center lanes of West Capitol Avenue. At the T-intersection that allows for the continuation of West Capitol Avenue and marks the beginning of Garden Street (formerly Riske Lane), general traffic continuing on West Capitol Avenue (i.e., eastbound vehicles) would cross the alignment to enter the dedicated left-turn lane for West Capitol Avenue.

Table 2-1. Proposed Track Configuration

Segment	Track	Proposed Configuration
West Sacramento Civic Center Terminal	Single	Stub track in reserved center median.
West Sacramento Civic Center Station	Double	Double track in reserved center median.
Via West Capitol Avenue – West Sacramento Civic Center Station to Garden	Double	Exclusive operation in reserved center median from West Sacramento Civic Center Station to Merkley Avenue. Left-lane operation in mixed traffic on two-way street along West Capitol Avenue from Merkley Avenue to Garden Street.
Garden Street to Tower Bridge Gateway	Double	Left-lane operation in mixed traffic on two-way street.
Via Tower Bridge Gateway – Garden Street to Raley Field Station	Double	Right-lane operation in mixed traffic on each side of two-way street, with exception of Tower Bridge Gateway between 5th and 3rd Streets, which eastbound alignment would operate partially on the former UPRR right-of-way, now owned by the City of West Sacramento.
Via Tower Bridge Gateway – Raley Field Station to Tower Bridge	Single	Left-lane operation in mixed traffic on two-way street.
3rd Street Southbound Extension (proposed)	Single	Right-lane operation in mixed traffic on west side of two-way street.
Tower Bridge	Single	Operation in center of the bridge, overlapping two travel lanes.
Old Sacramento Station	Double	Exclusive operation in reserved center median.
Capitol Mall	Double	Double track with semi-exclusive operation in the reserved center median.
7th and 8th Streets	Double (split pair)	Left-side, mixed traffic operation on one-way couplet, shared with RT.
K Street – 7th Street to 12th Street	Double	Exclusive operation in center of transit mall, shared with RT.
K Street – 12th Street to 13th Street	Single	Exclusive operation in center of pedestrian mall.
13th Street, J Street, L Street	Single	Right-side operation on two-way street (13th Street)/one-way streets (J Street and L Street) in mixed traffic operation.
15th Street	Single	Left-side operation on one-way street in mixed traffic operation.



PROPOSED PROJECT ALIGNMENT AND STATIONS - 1

Downtown/Riverfront Streetcar
West Sacramento, California

September 2008
25696500

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FIGURE 2-2

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WEST SACRAMENTO CITY HALL

WEST SACRAMENTO CIVIC CENTER STATION

BUS SHELTER

COMMUNITY COLLEGE

COMMUNITY CENTER

BUS SHELTER

COUNTY LIBRARY

LEGEND

- Streetcar Alignment
- Bus Loading Areas
- Pedestrian Access
- Passenger Drop-Off Area

WEST SACRAMENTO CIVIC CENTER TRANSIT CENTER AND STREETCAR STATION

September 2008
25696500

Downtown/Riverfront Streetcar
West Sacramento, California

URS

FIGURE 2-3

9/2/08 hk ..T:\West Sacramento Streetcar\June 2008\F2-3_west sac civic center.ai

Garden Street to Tower Bridge Gateway

Along Garden Street, a realigned four-lane roadway (two northbound and two southbound), the streetcar would operate in the center lanes in mixed traffic (Figure 2-2). At the signalized intersection at Garden Street and Tower Bridge Gateway, the alignment would then curve into Tower Bridge Gateway, a two-way surface arterial that was formerly the limited access SR 275. Vehicles turning east onto Tower Bridge Gateway from Garden Street would cross the eastbound alignment into a left-turn pocket. The westbound streetcar would cross two northbound lanes of traffic on Garden Street as it turns into the center lane of Garden Street. Signal phasing would allow safe movement of the streetcar across traffic lanes at this intersection. To accommodate this curvature onto Garden Street, the existing curb return at the northeast corner would be set back from the intersection.

Via Tower Bridge Gateway – Garden Street to Raley Field Station

East of the signalized intersection at Garden Street and Tower Bridge Gateway, the double-track alignment would operate in the curb lanes in mixed-flow traffic along Tower Bridge Gateway. The streetcar would stop at the Garden/Tower Bridge Gateway station, which would have side platforms along the curb of Tower Bridge Gateway and next to a Yolobus bus stop pullout (Hecht, 2008a).

The alignment would continue in the curb lanes of Tower Bridge Gateway, under the UPRR overcrossing between 5th and Garden Streets (Figure 2-4). Under the current configuration, the 15-foot vertical clearance of the overcrossing is lower than the 18-foot vertical clearance required by the California Public Utilities Commission (CPUC) for a streetcar to operate under the overpass. To accommodate the streetcar operation along this portion of Tower Bridge Gateway, the City could seek a CPUC waiver of the clearance standard, which the CPUC has previously granted to RT for similar locations with overpass clearance constraints (Hecht, 2007, 2008b). Alternatively, the overpass would have to meet the height required by the CPUC to support the overhead traction power wire. This would be accomplished by lowering the roadway elevation on Tower Bridge Gateway.

At the planned at-grade signalized intersection on 5th Street, to be reconstructed by the City in advance of the proposed project, the intersection redesign would provide right-turn lanes that would require vehicles to cross the streetcar alignment to access the turn lanes. East of the Tower Bridge Gateway/5th Street intersection, the eastbound track would immediately cross the sidewalk and operate in an exclusive side-running alignment between 5th and 3rd Streets (Figure 2-4). At about 300 feet east of the Garden Street/Tower Bridge Gateway intersection, the eastbound alignment, if permitted, would continue in an exclusive alignment following the former UPRR right-of-way, now owned by the City of West Sacramento, which runs parallel to Tower Bridge Gateway for a portion of this street (Hecht, 2008c). The westbound track would remain in mixed flow traffic in the curb lane on the north side of Tower Bridge Gateway, allowing right-turning vehicles to cross the track just before reaching the Tower Bridge Gateway/5th Street intersection. Just west of 3rd Street, side platforms located on both sides of the Tower Bridge Gateway would provide riders with a station stop at Raley Field. The planned Class II on-street bicycle lanes on both sides of Tower Bridge Gateway would run parallel to the alignment. The proposed project would route these existing bicycle lanes behind the side platforms to provide continuous bicycle lane access from Tower Bridge Gateway to the Tower Bridge approach (Hecht, 2008a).

Via Tower Bridge Gateway – Raley Field Station to Tower Bridge

After stopping at the Raley Field station, the eastbound streetcar would cross the sidewalk to enter the intersection at 3rd Street. The Tower Bridge Gateway Modification Project – East Phase would redesign the 3rd Street intersection in advance of the proposed project (Figure 2-4). Construction of this signalized intersection would require a special phase using a track circuit, loop detector, or train-to-wayside communication to permit the eastbound streetcar to transition from the far right curb to the center of the street directly to the east of the intersection. To allow this movement, it is assumed that all westbound automobile traffic would be held back until the eastbound streetcar passed through the intersection. Eastbound automobile traffic would proceed at the same time as the eastbound streetcar movement.

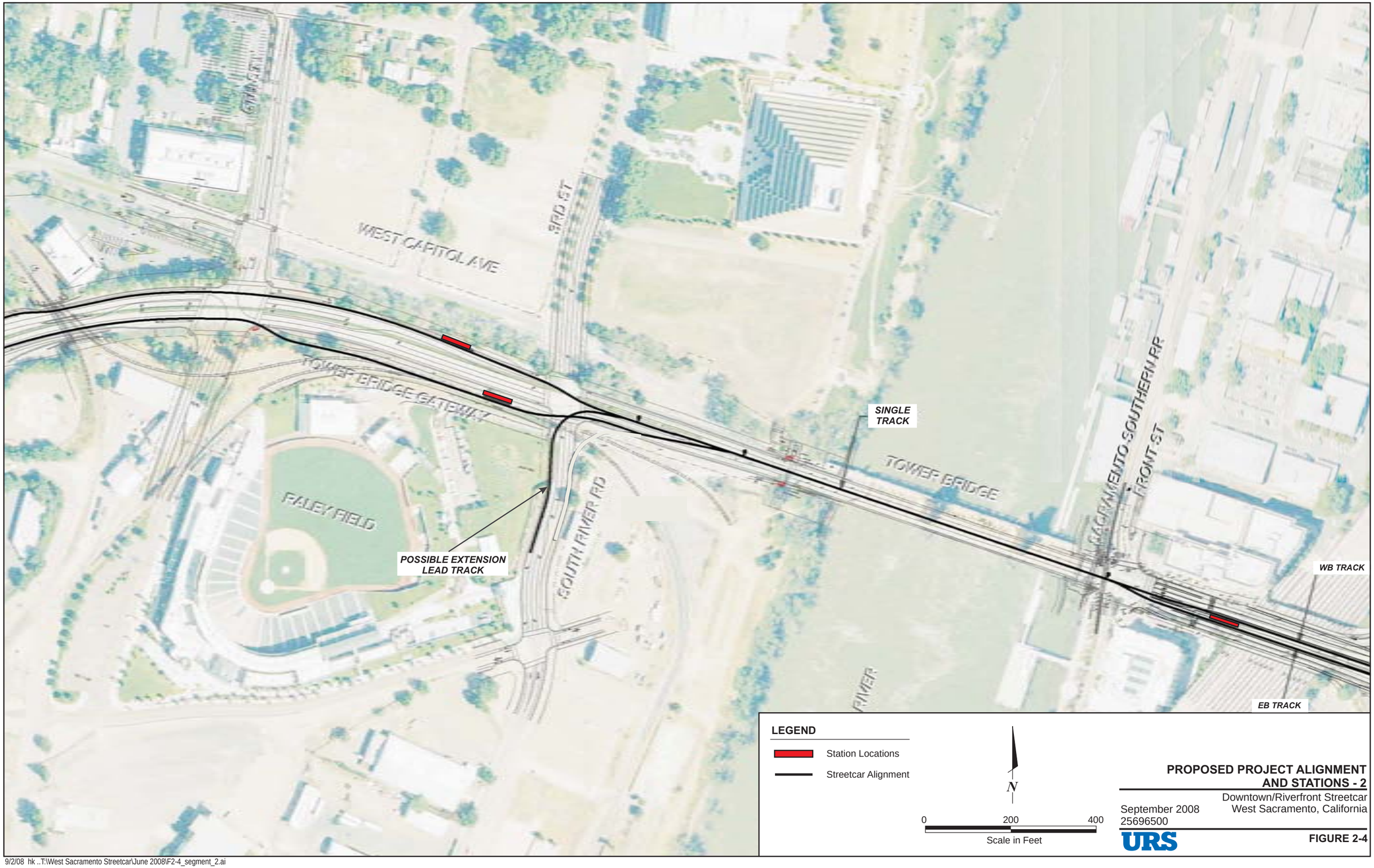
In the opposite direction, westbound streetcars would transition from the center-running alignment west of the Tower Bridge across the 3rd Street/Tower Bridge Gateway intersection. Similar to the eastbound streetcar movement, the westbound streetcar would travel through the 3rd Street intersection on a special signal phase. Automobile traffic in front of the streetcar would be cleared out to allow the streetcar to move to the front of the queue and initiate the special phase. The special signal phase would allow the westbound streetcar to transition from the center lane to the curb lane and access the station platform west of 3rd Street across from Raley Field.

As indicated in Figure 2-5, the lead track for use by light rail or a potential future streetcar extension would turn south on the west side of 3rd Street and be sufficiently long to accommodate two RT light rail vehicles parked along the curb. The turnout could be used to temporarily store light rail vehicles or streetcars for use on days with special events at Raley Field. A return lead track along the east side of 3rd Street could be constructed in a later phase (Hecht, 2008b).

Tower Bridge

Across Tower Bridge, the streetcar would operate on a single track straddling the center-line stripe on the bridge, overlapping the two center traffic lanes (one eastbound and one westbound lane) of the four lanes operating over the bridge (Figure 2-4). When the streetcar crosses the bridge, opposing general traffic would be held back at the nearest approaching intersection to prevent collisions between opposing traffic and the streetcar. The single track would be used to minimize impacts on this historic structure. The single track would restore the original rail alignment on the bridge without requiring modification to the bridge's structural integrity or design, or the functioning of the lift mechanism (HDR, 2006).

East of Tower Bridge in Sacramento, the streetcar would encounter an at-grade crossing with the active railroad track owned by the Sacramento Southern Railroad. The track crossing, located east of Tower Bridge and west of Front Street, would require full interlocking, per CPUC regulations (i.e., General Order 33-B), to prevent collisions. The interlocking at this location would be part of a system of multi-functional interlockings located between the west end of the Tower Bridge and the Old Sacramento station. The interlocking is needed to control a complex set of operational circumstances in a very compact area, including the single-track streetcar occupancy signaling for the Tower Bridge, the diamond crossing of the Sacramento Southern Railroad, and the Tower Bridge lift operation (and related traffic signals for Tower Bridge traffic (URS, 2007).



LEGEND

- Station Locations
- Streetcar Alignment

N

0 200 400

Scale in Feet

PROPOSED PROJECT ALIGNMENT AND STATIONS - 2

Downtown/Riverfront Streetcar
West Sacramento, California

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FIGURE 2-4

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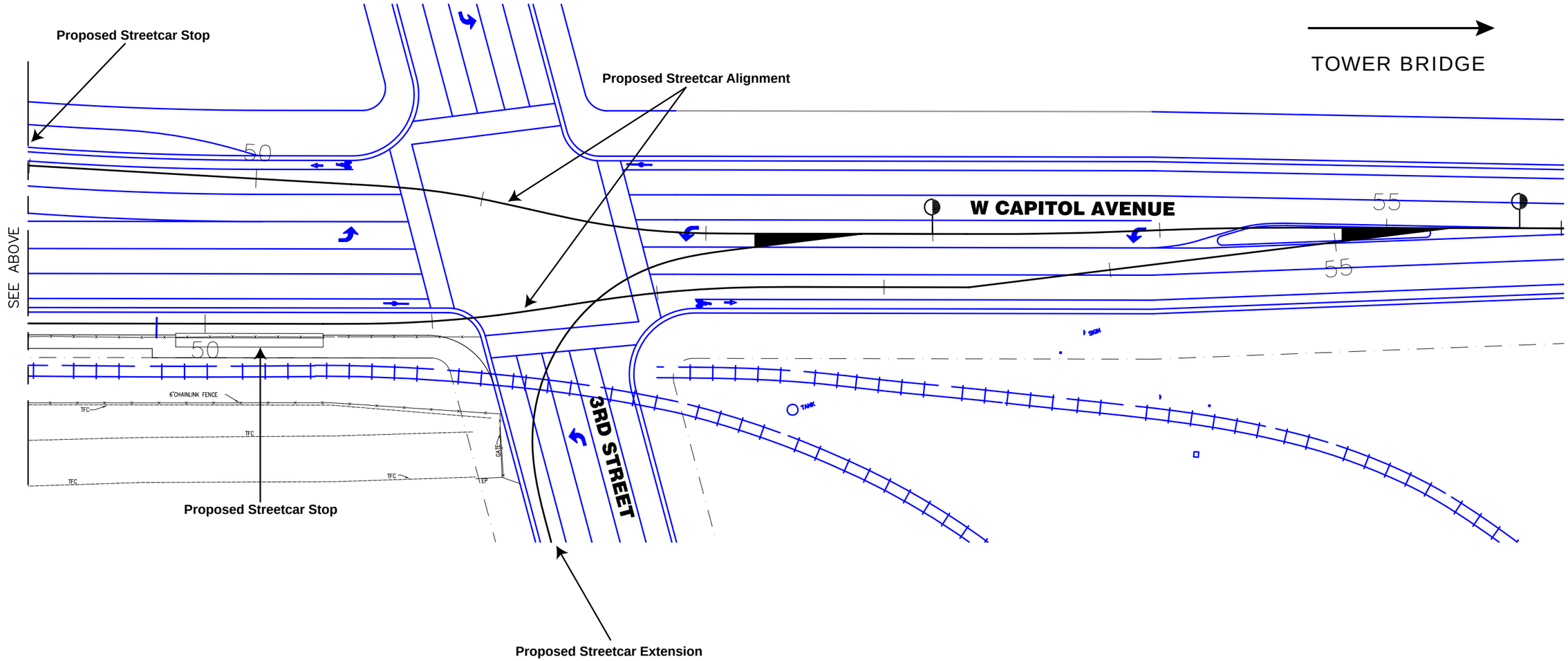


3RD STREET/TOWER BRIDGE GATEWAY INTERSECTION DESIGN

September 2008
25696500

Downtown/Riverfront Streetcar
West Sacramento, California

URS

FIGURE 2-5

9/2/08 hk ..\T:\West Sacramento Streetcar\June 2008\F2-5_3rd_Tower intersection.ai

Old Sacramento Station

East of Front Street, the alignment would be double-track operating exclusively in the reserved center median, which would contain the center platform for the Old Sacramento station just west of the I-5 bridge. A signalized crosswalk would facilitate pedestrian access to the Old Sacramento station center platform. This crosswalk would be constructed across Capitol Mall directly, immediately to the east of the station's platform.

Capitol Mall

The proposed configuration of the track alignment on Capitol Mall from the I-5 overpass to 8th Street would accommodate double trackage with semi-exclusive operation in the reserved center median. At the I-5 overcrossing, the two tracks would be set on top of the bridge deck rather than embedded into it, avoiding costly modifications to the I-5 bridge (Sacramento Streetcar Technical Advisory Committee, 2007).

Approaching 3rd Street from both directions, streetcars would move through the intersection with through traffic on Capitol Mall. The streetcar would travel on the same phase as the eastbound and westbound through movements for autos, because the streetcar is in the median. The project would add an exclusive eastbound right-turn pocket to alleviate eastbound traffic queues backing onto the Tower Bridge from the Capitol Mall/3rd Street intersection during the a.m. peak hour. The backup is due to the recent closure of a ramp that provided a direct link for eastbound traffic exiting the Tower Bridge to get to N Street. This heavy movement now must make an eastbound right turn at the Capitol Mall/3rd Street intersection. Without the right-turn pocket, eastbound streetcars will have to wait in the center of Tower Bridge for this queue to dissipate before approaching the Old Sacramento station.

At Capitol Mall and 6th Street an exclusive, approximately 100-foot eastbound left-turn pocket would be added. The left-turn pocket would provide a refuge for left-turn vehicles, allowing the streetcar to proceed through the intersection at the same time as eastbound and westbound through vehicles on Capitol Mall and improving intersection operations. The streetcar would stop at the 4th Street and 7th Street stations, using platforms located in the center median of Capitol Mall (Figure 2-6).

At 7th Street, the westbound streetcar would turn from the RT light rail track operating southbound on 7th Street to the median of Capitol Mall. A turnback track would also be constructed on 7th Street, allowing westbound streetcars and light rail vehicles to reverse direction and join the eastbound track in the Capitol Mall median. At the intersection of Capitol Mall and 8th Street, the eastbound streetcar would curve northbound onto 8th Street to join the existing RT alignment.

With the streetcar operating along a reserved center median under semi-exclusive operation, minimal conflicts with bicycles crossing the streetcar's rail flangeways would occur. Potential conflicts with vehicles making left turns across the streetcar alignment would be avoided by signal phasing.

7th and 8th Streets

On 7th and 8th Streets, the streetcar would use the existing RT light rail alignment, which operates on the left side of the one-way couplet, westbound on 7th Street, and eastbound on 8th Street until K Street.

K Street

Along K Street between 7th, /8th, and 12th Streets, the streetcar would operate using RT's semi-exclusive double track configuration in the center of the existing transit mall and light rail station stops. At 12th and K Streets, the proposed project would construct a new junction containing automatic switch control to allow streetcar and light rail operation to merge and diverge. Because vehicles moving through this juncture would be operating at low speed, full interlocking would not be needed. From 12th Street to 13th Street, the streetcar would be confined to a single track in a semi-exclusive right-of-way (Figure 2-7). Bicyclists, with the exception of bicycle taxis, would not conflict with streetcar operation in this segment because they are prohibited from riding on the K Street Mall.

Eastern Terminal Loop (13th Street, J Street, 15th Street, L Street)

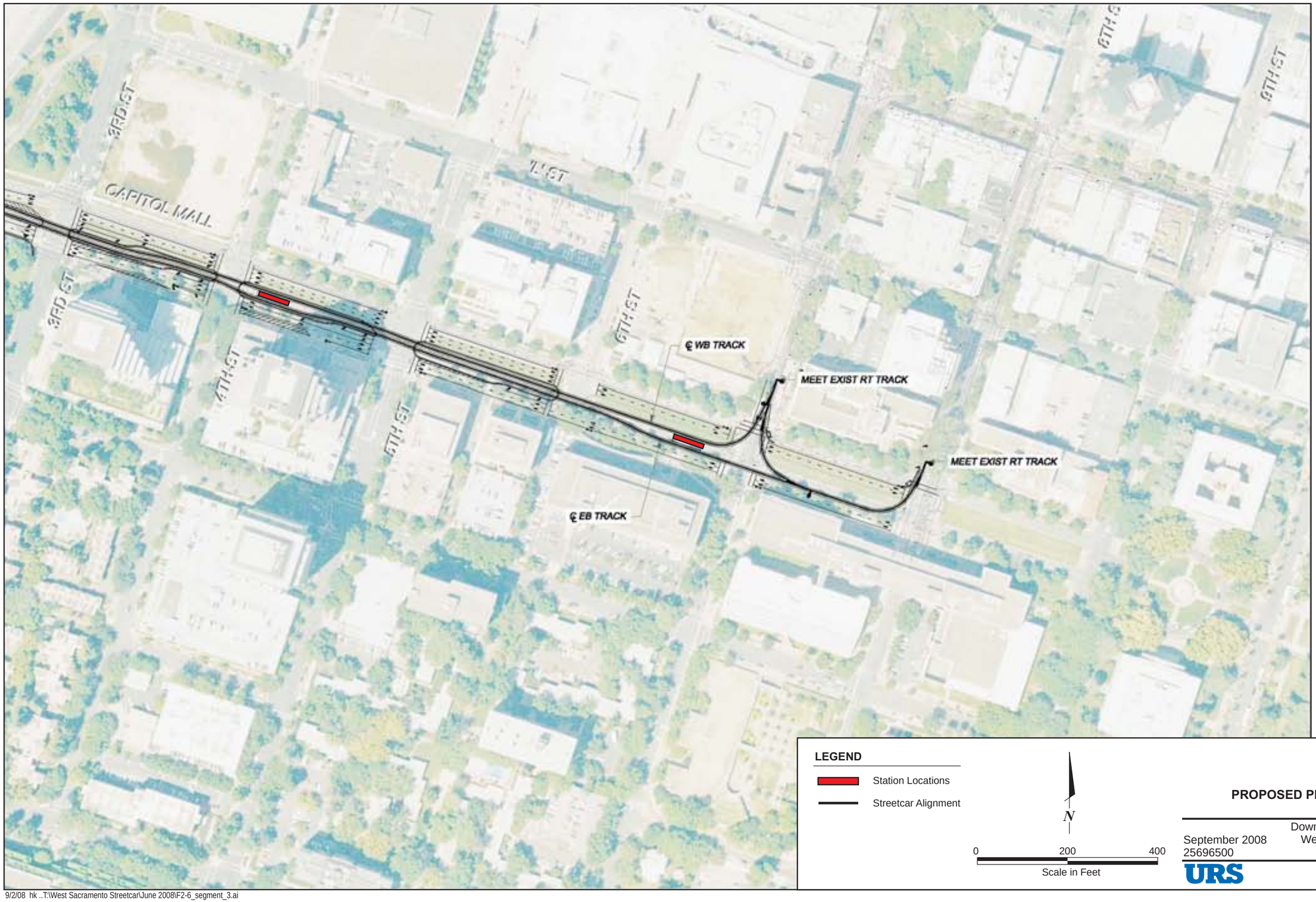
At the intersection of K Street and 13th Street, the streetcar would travel along the proposed Eastern Terminal Loop on a single-track alignment and would loop clockwise, beginning at the intersection of K and 13th Streets (Figure 2-6). At this intersection, the streetcar would travel north along two-lane 13th Street in mixed-flow operation on a single track. A station platform would be located on the right side of the street, midway between K and J Streets. The existing Class II bicycle lane running along 13th Street of this segment would be routed behind the 13th Street station platform. The streetcar would then curve east, crossing the path of the existing bicycle lane, into the right traffic lane on one-way J Street. To accommodate this curvature onto J Street, the existing curb return at the southeast corner would be set back from the intersection. On J Street, the alignment would pass a chartered bus layover area at the Sacramento Convention Center on the right and then make a wide turn through the intersection of J and 15th Streets into the parking lane on the east side of one-way 15th Street. A side platform stop would be located just south of this intersection, providing the eastern terminus for streetcar operation.

Past the station stop, the alignment would transition into the easternmost traffic lane on 15th Street. A signal preemption and exclusive streetcar signal phase would allow the streetcar to make a right turn from the left lane of 15th Street across traffic lanes into the right lane of one-way L Street. Along L Street, the alignment would operate in mixed traffic and then curve north back onto 13th Street to complete the loop.

2.2.1.2 Approximate Station Spacing

The spacing standard for the proposed streetcar is 1,200 to 1,400 feet between stations, or approximately ¼ mile between stations, which is a typical spacing for light-rail circulator systems. Local bus systems typically have closer spacing (between 800 to 1,000 feet), and modern line-haul light-rail systems usually have longer spacing of up to 1 mile. Spacing of ¼ mile allows reasonable walking access to stations along the line.

This spacing is similar to the existing RT light rail transit (LRT) station spacing along the K Street Mall, but closer together than the typical RT station spacing on the line segments outside of downtown Sacramento. The proposed project design is intended to offer accessibility to the system similar to the type of accessibility found on a transit mall. Distances between stations could change as station design is refined, especially in relation to street alignment changes in West Sacramento (URS, 2007). Curb heights at streetcar stops need to be at least 8 inches above top of rail to accommodate ADA requirements for low floor modern streetcars. Similarly, curb heights for platforms shared with light rail cannot exceed 8 inches without conflicting with the light rail vehicles.



LEGEND

- Station Locations
- Streetcar Alignment

N

0 200 400

Scale in Feet

PROPOSED PROJECT ALIGNMENT AND STATIONS - 3

Downtown/Riverfront Streetcar
West Sacramento, California

September 2008
25696500

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FIGURE 2-6

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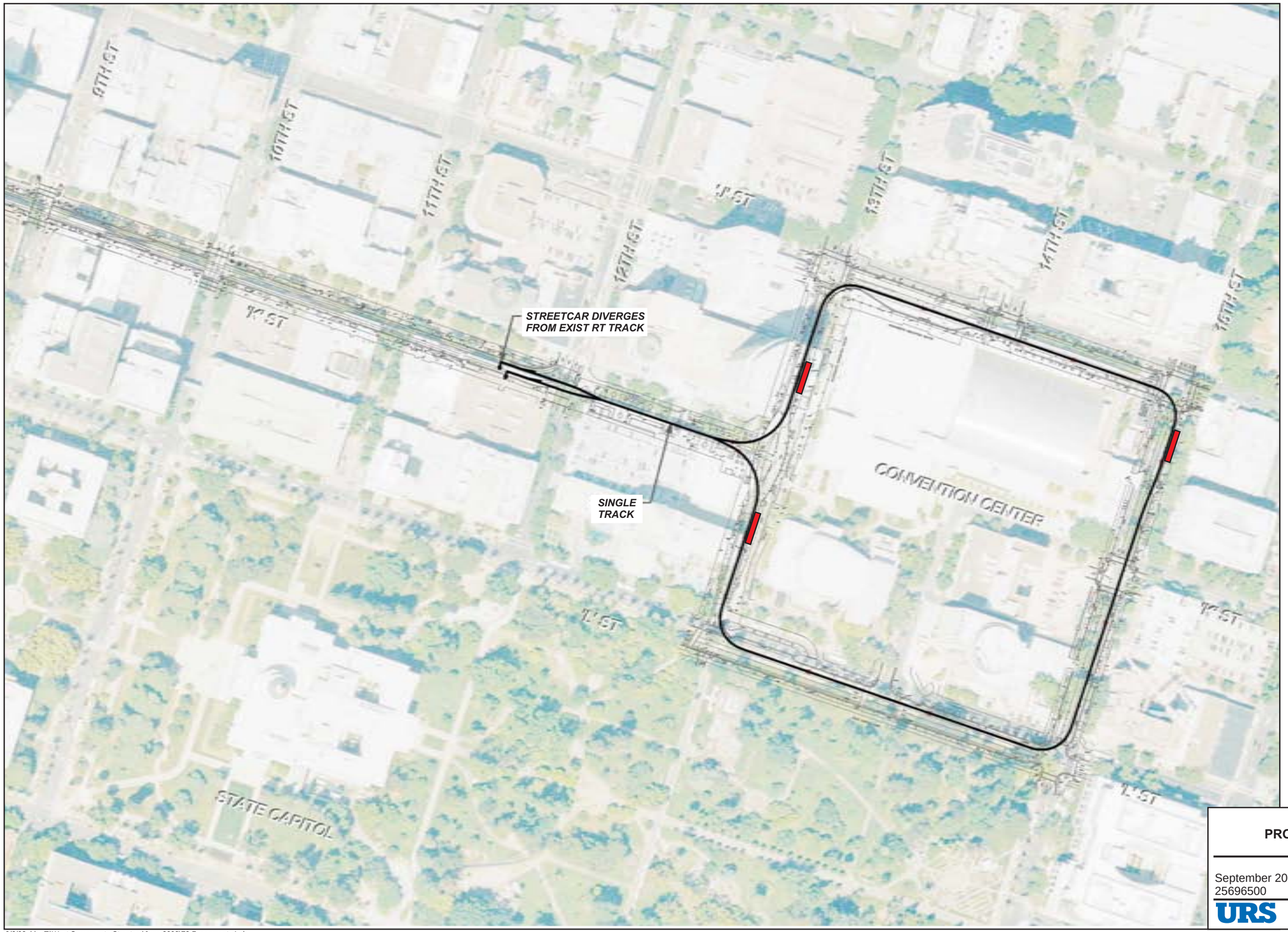

LEGEND

- Station Locations
- Streetcar Alignment

N

0 200 400

Scale in Feet

PROPOSED PROJECT ALIGNMENT AND STATIONS - 4

Downtown/Riverfront Streetcar
West Sacramento, California

September 2008
25696500

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FIGURE 2-7

9/2/08 hk ..T:\West Sacramento Streetcar\June 2008\F2-7_segment_4.ai

2.2.1.3 Turnback Facility at West Sacramento Civic Center Terminal

Based on discussions with the Technical Advisory Committee on December 21, 2007, adjustments were made to the tail track for the proposed project's western terminus point to accommodate two modern length streetcars. The single tail track is long enough to park two modern streetcars. Of the two parking spaces, one is for short-term out-of-service cars, and the other is for turn-backs (Hecht, 2008b).

2.2.2 Station Location and Design Elements

2.2.2.1 Description of Locations

Proposed station locations are shown in Table 2-2. In places where the streetcar shares track with RT LRT services, the streetcars would stop at RT's existing LRT stations. New stations would be built at the locations where track would be used exclusively by the streetcar. These locations are marked as "New" in Table 2-2 (URS, 2007).

Table 2-2. Proposed Station Locations

Item	Location	New or Existing	Single or Double Track	Side or Center Platforms
Westbound				
Station	15th Street and J Street	New	Single	Side
Station	13th Street and K Street	New	Single	Side
Station	K Street and 11th Street (Cathedral Square)	Existing	Double	Side
Station	K Street and 8th Street (St. Rose of Lima)	Existing	Double	Side
Station	Capitol and 7th Street	New	Double	Center
Station	Capitol and 4th Street	New	Double	Center
Station	Old Sacramento Station	New	Double	Center
Station	Raley Field Station	New	Double	Side
Station	Tower Bridge Gateway/Garden Street	New	Double	Side
Station	West Sacramento Civic Center	New	Double	Center
Eastbound				
Station	West Sacramento Civic Center	New	Double	Center
Station	Tower Bridge Gateway/Garden Street	New	Double	Side
Station	Raley Field Station	New	Double	Side
Station	Old Sacramento Station	New	Double	Center
Station	Capitol and 4th Street	New	Double	Center
Station	Capitol and 7th Street	New	Double	Center
Station	K Street and 8th Street (St. Rose of Lima)	Existing	Double	Side
Station	K Street and 11th Street (Cathedral Square)	Existing	Double	Side
Station	13th Street and K Street	New	Single	Side
Station	15th Street and J Street	New	Single	Side

2.2.2.2 Station Integration

Integration with Buses

As discussed above, RT and YCTD operate bus transit services in the streetcar corridor. Based on streetcar ridership forecasting performed in September 2007, system ridership would increase by 36 percent to 45 percent, depending on various factors over time (HDR, 2007b).

Yolo County Transportation District

To complement streetcar service and to make transit operation more efficient in the study area, YCTD may truncate eastbound service for Lines 40/41 and 240 at the West Sacramento Civic Center station during the midday to encourage streetcar ridership. Once high-density development occurs in West Sacramento and pending the availability of new revenue sources, YCTD may increase bus frequency and implement 15- or 30-minute headways to accommodate the 12 noon – 2:00 p.m. peak period.

Sacramento Regional Transit District

With the streetcar in operation, RT may consider a general reduction in downtown bus shuttle service. The proposed project's assumptions about transit service within the Sacramento portion of the study area include:

- Line 140 (peak only) would be discontinued with streetcar service;
- Line 141 would not be discontinued;
- Line 143 would operate on Saturdays only; and
- Radial bus service (Lines 36, 50E, 61, 62, and 63) in downtown Sacramento would not be discontinued.

RT is currently considering the possibility of extending LRT service to Raley Field on event days using streetcar track on Capitol Mall and the Tower Bridge and, terminating at 3rd Street south of Tower Bridge Gateway (Sacramento Streetcar Technical Advisory Committee, 2007).

Integration with New Loading Zones

New Streetcar Stations

According to the Phase I Feasibility Study, low-cost "Portland-style" stops would be designed with a berthing area 60 to 65 feet in length and a boarding area 40 to 45 feet in length. Station elements may include such amenities as a shelter, schedule and patron information rack, bench, lean rail, trash receptacle, sign with stop name, and an ADA pedestrian warning strip running the length of the boarding area. The use of real-time information technology may be installed in shelters to provide patrons with information on the arrival time of the next streetcar (Hecht, 2008b).

Shared Stations with RT

In places where the streetcar shares trackage with RT LRT services, the streetcars would stop at RT's existing LRT stations at specified boarding locations within the RT station areas. RT stations are sized for four-car LRT trains, which are approximately 300 feet long, whereas a streetcar is approximately 50 to 75 feet long (URS, 2007). A portion of the platform may need to be rebuilt to accommodate the streetcars.

Disabled Boarding

It is assumed that station integration with disabled boarding would be handled in one of two ways. Both methods would rely on car-borne solutions. RT LRT relies on wayside ramps or lifts to allow disabled riders access to its cars. For the streetcar, disabled boarding would be through car-borne bridge ramps similar to Portland's streetcars. The preferred platform configuration for the low-floor Modern streetcar would allow a wheelchair to board using a push-button activated ramp, 4 feet, 6 inches from the centerline of tracks and 8 inches above the top of rail (Sacramento Streetcar Technical Advisory Committee, 2007).

New Pedestrian Circulation

To facilitate pedestrian circulation, new crosswalks would be constructed at proposed stations with platforms located in the center median. The new crosswalks would be laid out in a staggered configuration and located at the West Sacramento Civic Center and Old Sacramento stations.

Connection to Transit Center

The proposed project would provide a direct connection to the Transit Center, located at the south side of West Capitol Avenue across from the Civic Center in West Sacramento. The transit center (currently in design) and the streetcar platform would be linked through the provision of pedestrian walkways, signage, and lighting (Figure 2-3). As discussed in Section 2.1.2.3, the Transit Center serves Yolobus, which provides regional, intercity, and local fixed-route services throughout Yolo County and a number of neighboring cities.

2.2.2.3 Station Design

Figure 2-8 presents a simulation of a typical station design for the proposed project. The station would have a canopy mounted on structural supports, and include amenities such as those described in New Streetcar Stations, above. Under the canopy, the platform would contain seating, transit information with alignment map, and may include an electronic information sign.

2.2.3 Traction Power Systems

2.2.3.1 Power Delivery System and Substation Locations

The traction power facilities (support poles, catenary and substations) would be located within the public right of way (HDR, 2007a). Support poles would be placed, whenever possible, to avoid sidewalks or portions of the public right-of-way that cover underground passageways, which constitute remnants of the original Sacramento downtown infrastructure. There is adequate traction power on the Sacramento side of the river from the existing light rail system. In West Sacramento, two substations would be installed within public right-of-way at the northwest corner of Tower Bridge Gateway and Garden Street (Hecht, 2008c). Substations would convert electrical current to the proper voltage for the streetcar and occupy approximately 375 square feet of space (HDR, 2007a).

2.2.4 Operating Plan

2.2.4.1 Days of Operation/Span of Service

The proposed streetcar service would operate seven days per week. The span of service for the service would be 6:00 a.m. to 12:00 midnight, seven days per week, as shown in Table 2-3.

Table 2-3. Span of Service

Day	Span
Monday-Friday	6:00 a.m. – Midnight
Saturday	6:00 a.m. – Midnight
Sunday	6:00 a.m. – Midnight

2.2.4.2 Headways and Potential Ridership

The streetcar's headways would be 10 minutes for service between 12:00 noon and 2:00 p.m. and 15 minutes for the remaining hours of service (i.e., 6:00 a.m. to 12:00 noon and 2:00 p.m. to 12:00 midnight). Establishing the headway at 10 minutes during peak hours and 15 minutes during non-peak hours would allow clock headways to be established, resulting in 6 trips per hour each direction during the midday peak and 4 trips per hour each direction during the rest of the service period, with departures possible at the same times each hour. Streetcar schedules would then be effectively coordinated with connecting rail or bus services operating at multiples of this headway, such as 15 minutes, 30 minutes or hourly.

The ridership estimates from the Phase I feasibility study were refined as part of this effort, based on the selected preferred alignment. The analysis reveals that the streetcar system would have daily non-event day patronage of 7,700 and 10,800 by the years 2010 and 2030, respectively, under the most likely operating scenario (10 minutes peak and 15 minutes off-peak headway, $0.50 fare, and complementary bus service). A non-event day is defined as a typical peak season weekday without any scheduled major events at Raley Field or any other venue within the study area. Currently, RT and YCTD operate bus transit services in the streetcar corridor. The analysis indicates that restructuring of RT and YCTD service routes in the streetcar corridor to complement the streetcar service would increase system ridership by 36 to 45 percent. In addition, the streetcar system has potential to attract 11,700 non-event day riders by the year 2030 under a fare-free policy. In addition, the analysis suggests that by the year 2030 the streetcar system will attract 2,950 daily choice riders.

Most public transit operations schedule service most frequently during the a.m. and p.m. peak hours, usually defined as 7:00 – 9:00 a.m. and 4:00 – 6:00 p.m. For the proposed project, the most frequent service is scheduled during the period of 12:00 noon – 2:00 p.m. This is based on an assessment of the potential ridership in the study area, and a review of the trip patterns currently being made in the area and projected for the year 2032. The ridership forecasting work completed during the Feasibility Study showed that a high percentage of the trips in the study area are either "Work-Other" or "Other-Other" trips, indicating that these are not home-based commuting trips but are more likely to be lunchtime trips or other midday errand trips. Traditional "Home-Based Work," "Home-Based Shopping," or "Home-Based Other" trips are a very small percentage of the trips in the study area.

STREETCAR AND STATION CONCEPT

Downtown/Riverfront Streetcar
West Sacramento, California

September 2008
25696500

URS

FIGURE 2-8

9/2/08 hk ..T:\West Sacramento Streetcar\June 2008\F2-8_design concept.cdr

This information was refined in the second phase of the proposed project, and the Ridership Forecasting Technical Memorandum (September 24, 2007) reports that in 2005, 96.5 percent of all trips in the study area are "Work-Other" or "Other-Other," with only 3.5 percent of trips occurring as commuting pattern (i.e., "Home-Based Work," "Home-Based Shopping," or "Home-Based Other" trips) (HDR, 2007b). It was projected that these percentages would shift somewhat in 2032. However, the "Work-Other" or "Other-Other" trips would still comprise 85 percent of all trips in 2023, with "Home-Based Work," "Home-Based Shopping," or "Home-Based Other" trips comprising 14 percent of all trips. Given these trip patterns and the available travel pattern data, and assuming that the "Work-Other" or "Other-Other" trips are largely midday trips, scheduling higher frequencies during the midday would be a reasonable scheduling strategy until more refined data can be developed on ridership demand by time of day.

2.2.4.3 Integration with Sacramento Regional Transit

Streetcar integration with RT would occur on the Sacramento portion of the study area, along the segment from 7th and 8th Streets and along the K Street Transit Mall where the streetcar would operate on existing RT track. The shared platforms on K Street will be modified for use with low-floor Modern streetcars and will be designed to be compatible with the existing trains. If RT procures new low floor vehicles, these platforms would be compatible with those vehicles also.

2.2.4.4 Advanced Train Control System

The proposed streetcar would not use an Advanced Train Control System, which monitors streetcar movement through a Central Control Facility using satellite or on-street monitoring systems.

2.2.4.5 Dispatch of Streetcars from RT Maintenance Facility

Streetcar storage and maintenance would occur at RT's existing storage and maintenance facility at Academy Way in the city of Sacramento (see Figure 2-9). Coordination of joint dispatch and operation of streetcar and light rail service would be finalized prior to project construction.

2.2.5 Vehicle and Vehicle Storage Facilities

2.2.5.1 Vehicle Type

The vehicle envisioned for the proposed streetcar line is the Modern streetcar, double-ended and double-sided, with operating controls at both ends. The Modern streetcar boards passengers from either side of the car. It is depicted in Figure 2-8 and discussed further below.

The Modern streetcar is a double-ended, 3-unit articulated vehicle. An example of this type of vehicle is the Skoda-Inekon T-10 car, which is used in Portland and Tacoma. These vehicles are 66 feet long and 8 feet wide, with a seating capacity of 41 and a total capacity of 140 (including standees). The top speed of the Skoda vehicles in operation is approximately 30 miles per hour (mph), though they are capable of speeds up to 43 mph if the top speed is not controlled by governing. These cars are partially low floor, and have four doors per side of the car for double-sided boarding and double-ended operation. Disabled boarding is accomplished in the center low-floor section through use of a bridge ramp that extends out to the curb or platform, and provides level boarding into the low-floor center section.

Depending upon interpretation, the Streetcar Project Alternative may not meet some of the stricter interpretations of the CPUC General Order 143-B, Safety Rules and Regulations Governing Light Rail Transit. For any vehicle alternatives advanced further into the process of project definition and analysis, compliance with CPUC General Order 143-B will be addressed in the vehicle specifications and will be discussed between the project management staff and CPUC staff.

2.2.5.2 Streetcar Storage and Maintenance and Fleet Size

Streetcar storage and maintenance would occur at RT's existing Academy Way light rail storage and maintenance facility (see Figure 2-9). Streetcars would share RT's existing light rail track to access the RT facility. Any alteration to the maintenance facility to accommodate the proposed streetcar fleet would be minor and would not affect existing maintenance or storage operations. An additional storage track would be constructed for the streetcars (HDR, 2007a). The operating plan prepared in Phase II shows that the likely fleet size for the initial system is eight cars (i.e., six vehicles during peak demand and two spares) (URS, 2007).

The West Sacramento Civic Center Terminal would have a single (stub) track for vehicle reversing; however, the terminal would not have provisions for storage, except for one car that could be stored beyond the portion of track used for reversing.

2.2.6 Capital Cost and Operating Maintenance Cost Estimates

2.2.6.1 Capital Cost

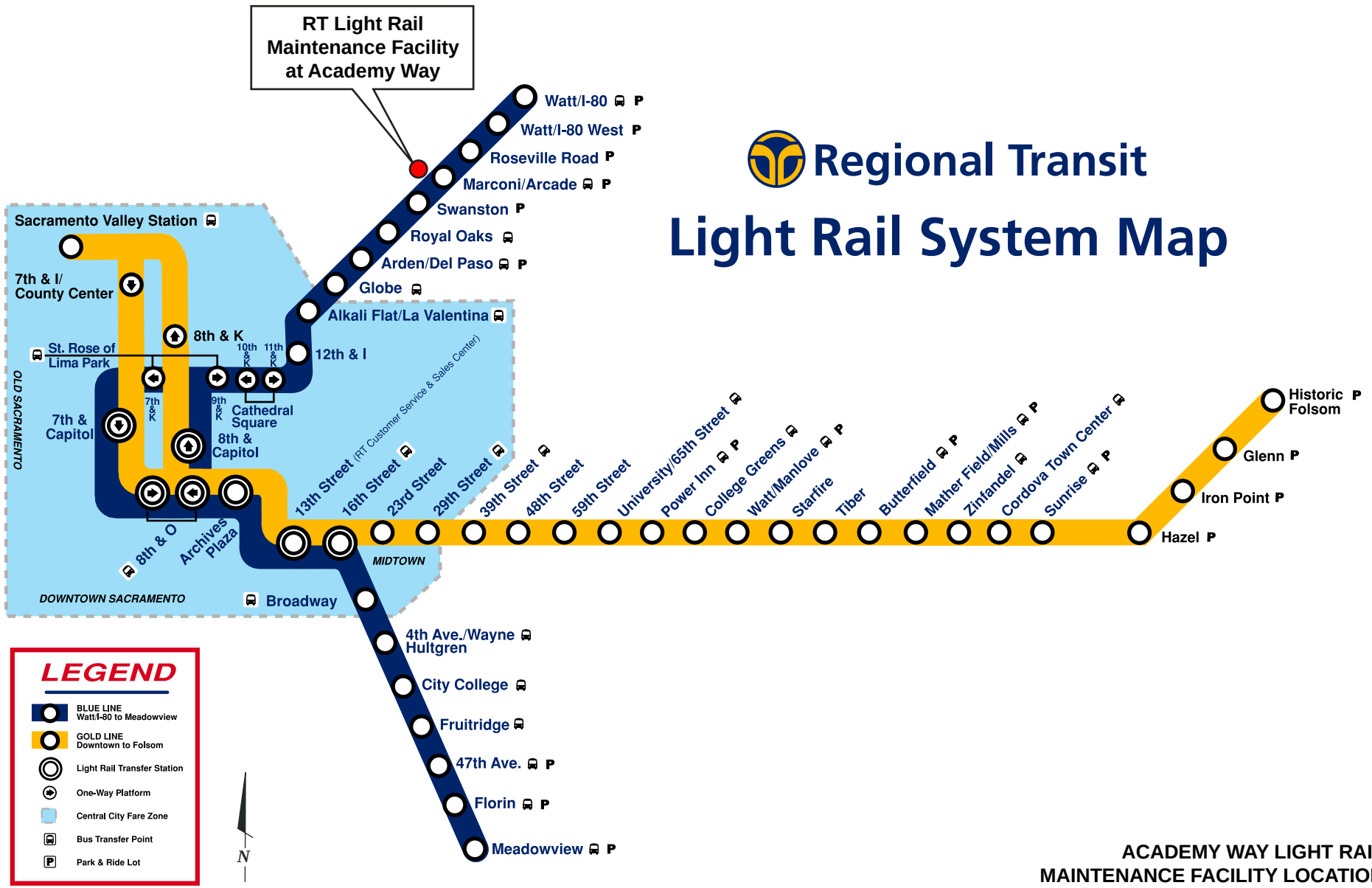
The most current capital cost estimate available is in the *Downtown/Riverfront Streetcar Study Phase I Report* (HDR, 2007). This estimate is provided in Table 2-4 and in the summary below. An updated capital cost estimate is pending Preliminary Engineering, which will add more definition to the trackwork, vehicle, passenger information system, overhead contact system, traction power, signaling, revenue collection, maintenance facility, stray current, and traffic signal modifications (Hecht, 2008c).

The capital costs include the track and systems work, civil and roadway engineering, stop shelters and amenities, vehicles, and soft costs associated with the design and construction of the preferred project. The Streetcar Project Alternative's estimated capital cost is $69,319,151.

2.2.6.2 Operating and Maintenance Cost Estimates

Annual Operating Costs

The operating cost estimate, which has been updated from the Phase 1 Summary Report (HDR, 2007a), is approximately $3.9 million per year (see Table 2-5). Due to uncertainties at this stage of the proposed project about governance and the organizational structure of the future operation, it would be prudent to assume an additional 10 percent contingency. The operating costs presented in this analysis should be considered a very preliminary estimate, subject to refinement as the proposed project is more fully defined and analyzed in detail, in both its operational and organizational aspects. It is likely that the streetcar's institutional arrangements will, in large part, determine the final operating costs, as the decision on the operating entity's governance and organizational structure will lead to the options for the labor cost structure. This analysis assumes a generalized list of positions and costs based on comparison with similar operations, which will need to be adjusted as the governance and management structure is defined.



Regional Transit
Light Rail System Map

ACADEMY WAY LIGHT RAIL MAINTENANCE FACILITY LOCATION

September 2008
25696500

Downtown/Riverfront Streetcar
West Sacramento, California

URS

FIGURE 2-9

Source: Sacramento Regional Transit District, 2008.

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Table 2-4. Conceptual Cost Estimate

Item	Cost Category	Unit Price	Units	Quantity	Total Price
1.1	Trackwork – Track Slab (single)	$425	tf	10,250	$4,356,250
1.2	Trackwork – Grass Track (single)	$468	tf	2,800	$1,310,400
1.3	Trackwork – Tee Rail on Tower Bridge (single)	$450	tf	660	$297,000
1.5	Trackwork – Tee Rail on Tie and Ballast (single)	$270	tf	5,100	$1,377,000
Total Length of Single Track				**18,810**	
2.0	Trackwork – Turn/Track Crossing Installation	$150,000	ea	10	$1,500,000
3.0	Catenary Poles and Overhead Wire	$200	tf	18,810	$3,762,000
4.0	Traffic Signals – New (or Full Replacement)	$200,000	ea	8	$1,600,000
5.0	Traffic Signals – Modified	$120,000	ea	9	$1,080,000
6.0	Civil/Roadway – General Pavement Overlay	$15	f	10,250	$153,750
7.0	Civil/Roadway – High End Treatments and Landscaping	$200	f	3,850	$770,000
8.1	Utilities – High Allowance	$600	f	450	$270,000
8.2	Utilities – Medium Allowance	$300	f	5,500	$1,650,000
8.3	Utilities – Low Allowance	$150	f	4,300	$645,000
9.0	Drainage Allowance	$100	f	12,475	$1,247,500
10.1	Stop Platforms – Low (side)	$20,000	ea	5	$100,000
10.2	Stop Platforms – Low (center)	$30,000	ea	-	$0
10.3	Stop Platforms – Medium (side)	$45,000	ea	-	$0
10.4	Stop Platforms – Medium (center)	$70,000	ea	2	$140,000
10.5	Stop Platforms – High (side)	$100,000	ea	5	$500,000
10.6	Stop Platforms – High (center)	$150,000	ea	3	$450,000
11.0	Temporary Trestle over Triangle Rail Yard (1,250 feet long)	$0	sf	-	$0
12.0	Tower Bridge Improvements (Single Track)	$900,000	ea	1	$900,000
13.0	I-5 Overcrossing (Double Track)	$900,000	ea	1	$900,000
14.0	Substations	$500,000	ea	4	$2,000,000
15.0	Train Signaling Systems	$550,000	ea	5	$2,750,000
16.0	**Baseline Segment Cost**				**$27,758,900**
MOS Alternative					
17.0	**Construction Subtotal**				**$27,758,900**
18.0	Construction Soft Cost (Mobilization, Traffic Control, Quality Control)	18%		4,996,602	$4,996,602
19.0	**Sub-Total Construction Cost**				**$32,755,502**
20.0	Construction Contingency Cost	15%		4,913,325	$4,913,325
21.0	**Total Anticipated Construction Cost**				**$37,668,827**
22.0	Engineering and Administration Cost	15%		5,650,324	5,650,324
23.0	Vehicles (Including Testing and Spare Parts)	$3,000,000		8	$24,000,000
24.0	Right-of-Way				$0
25.0	Maintenance Facility Allowance				$2,000,000
26.0	**Total Project Cost (2007 Dollars)**				**$69,319,151**

Source: HDR, Downtown/Riverfront Streetcar Study, Phase I Study (May 2007).

Table 2-5. Annual Operating Costs Using Baseline Cost Methodology

Cost Item	Estimated Annual Earnings (including fringe)	FTE	Estimated Annual Cost	%	Notes
Vehicle Operations					
Manager, Streetcar Operations	$130,000	1	$130,000		Need for position dependent on organizational structure.
Transit Supervisor	$115,000	4	$460,000		
Transit Operators	$70,000	20	$1,400,000		May be possible to combine operators and fare inspectors.
Fare Inspector	$70,000	3	$210,000		May be possible to combine operators and fare inspectors.
Subtotal			$2,200,000	55	
Vehicle Maintenance					
Supervisor, Streetcar Maintenance	$110,000	1	$110,000		
Mechanics	$80,000	3	$240,000		
Car Cleaner	$75,000	3	$225,000		
Subtotal			$575,000	14	
Non-Vehicle Maintenance					
Supervisor, Maintenance – ROW	$110,000	1	$110,000		Need for position dependent on organizational structure.
Overhead Line Worker	$100,000	2	$200,000		
Rail Maintenance Worker	$75,000	2	$150,000		
Subtotal			**$460,000**	**12**	
Administration and Direct Costs					
Administrative Assistants and Clerks	$75,000	2	$150,000		
Security Contract			$150,000		
Propulsion Power			$150,000		
Materials and Supplies			$100,000		
Parts			$200,000		
Subtotal			**$750,000**	**19**	
TOTAL			**$3,985,000**	**100**	

Notes: Annual Operating Cost Estimate is derived from URS, 2007. Operating cost calculations are in 2007 dollars.

Operating costs are a direct function of the system's headway, span of service, and cycle time. To reduce operating costs, headways can be lengthened, span of service can be reduced, or cycle time could be reduced. Cycle time reductions would require speeding up the service through transit priority measures, such as installing signal priority or operating in private right-of-way instead of mixed traffic. Reducing the cycle time would allow more efficient use of fewer resources (i.e., making the same number of trips with fewer operators and vehicles, because the vehicles are making the cycle faster).

Methodologies Considered

Several methodologies were considered to estimate the streetcar's annual operating costs. The method used in Phase I of the proposed project (Feasibility Study), was to derive a fully allocated hourly cost Figure for the operation using the experience of similar operations, and multiply that Figure by the number of vehicle hours anticipated to be operated. This approach yields order-of-magnitude costs, and is appropriate for a feasibility study. This method was reviewed with RT staff and was not considered to be detailed enough for an EIR.

In this phase of the project, more detail is desired on the functions and structure of the operation. Therefore, a more detailed cost estimate was developed based on a rough evaluation of positions needed and other direct costs, referred to here as the baseline cost estimate. As the proposed project is refined in future work, more detailed estimates can be prepared following preparation of a detailed operating timetable, and a more detailed labor analysis of the maintenance and operating functions. In addition, once the governance and management of the system is defined, it will be possible to more clearly define the size of the managerial structure needed for the streetcar operation, and the labor cost structure.

At the time the operating cost estimate was prepared, the managerial and governance arrangements were not decided upon. Therefore, a staffing plan was prepared and reviewed with RT for appropriateness of staffing levels, usage rates, and direct costs. This baseline estimate represents a hybrid approach, combining elements of how the operation would be expected to be staffed if it were an RT operation, and elements of a new independent operating entity. Once the final operating arrangement is selected, this estimate will be revised.

2.3 Construction Activities

The proposed project would incorporate the streetcar into the existing built environment while minimizing reconstruction. Utility relocations that cannot be avoided would be completed first.

The contractor would saw-cut for a trackway trench approximately 8 feet wide in locations where the streetcar tracks are being installed within the roadway. The contractor would remove asphalt and base material to a depth of approximately 12 inches. Depending on soil conditions, it may be necessary to remove an additional 6 inches of material and replace it with aggregate base.

The contractor would position streetcar rails at specified horizontal alignment and vertical profile using gauge ties located approximately every 10 feet. The contractor would then install steel

@@@reinforcement, pour concrete in one lift, and finish the concrete with a slip-form paving machine. The contractor would then grind the pavement adjacent to track slab to allow a 2-inch minimum pavement overlay. After the asphalt overlay is complete, the contractor would re-stripe the roadway. At that point, the street could be reopened to traffic.

The length of street closed at any one time for track installation and the decision to construct streetcar tracks in one direction at a time or both simultaneously would require the development of construction phasing and traffic handling plans and review of these plans by stakeholders. Given the differing street and development patterns along the streetcar route, it is likely that different staging and traffic handling approaches would be needed. Based on experience, a segment length of three city blocks appears to provide a good balance between expediting the work and minimizing construction impacts. Three city blocks also provides enough work to make the construction operation efficient without reaching beyond what the contractor can accomplish within normal work shifts. Three blocks of streetcar track can be installed in approximately 3 weeks (Hecht, 2007).

The details for streetcar track in the median have not yet been determined. Unpaved medians could use standard rail on ties and ballast. Rail fasteners would be used for the streetcar track in the median of Capitol Mall on the I-5 overcrossing. These rail fasteners could be directly attached to the bridge deck, or placed on grout pads or a plinth. Short-term lane closures could be required during certain construction operations related to median track construction.

Depending on locations, short-duration lane closures may be required to install pole foundations, poles, and overhead wire; reconstruct curb and gutter; modify traffic signals; and perform certain phases of platform construction and other miscellaneous work.

2.4 Permits Required

The proposed project would require the following permits to be obtained prior to implementation.

- The State Water Resources Control Board's (SWRCB's) NPDES General Permit for Stormwater Discharges Associated with Construction Activities;
- Standard Building and Grading Permits from the cities of Sacramento and West Sacramento; and
- Permits from the local regulatory agency for the storage of hazardous materials, and a Waste Generators Identification Number from the state.
- Caltrans encroachment permit for work on Tower Bridge and the I-5 overcrossing.

2.5 Alternatives Considered and Eliminated

Several transit improvement alternatives were considered for the initial Downtown/Riverfront Streetcar Study (Phase I) published in May 2007. The initial list of alternatives was developed based on discussions with the cooperating agencies and community stakeholders who participated in Phase I public involvement activities to gather opinions and comments about the proposed project. In November 2006, the cooperating agencies invited stakeholders to participate in a charrette, which provided the opportunity to define the proposed project, including transit alignments, type of vehicle, service characteristics, and stop locations. Alternative transit modes considered included buses, rubber-

tired cable cars, streetcars, and light rail. Following the completion of the Phase 1 study in May 2007, the cooperating agencies approved the streetcar alignment described for the Streetcar Project Alternative as the most conducive for connecting redeveloping areas and major activity centers in the study area, and for establishing the initial route from which future extensions could emanate.

Table 2-6 summarizes the evaluation of the initial list of alternatives based on the ranking of transit alternatives by evaluation factor. The rankings of high, medium, or low for a range of key factors provide a way to eliminate less feasible alternatives. They also underlie the reasons for the cooperating agencies' selection of the streetcar as the best alternative to meet the proposed project Purpose and Need, advance project goals, and improve transit in the study area within budget constraints.

Table 2-6. Matrix of Project Alternatives

Factor Considered	Project Alternative			
	Bus	Rubber-Tired Cable Car	Streetcar	Light Rail
Supports Project Goals and Objectives	Medium	Medium	High	High
Supports Redevelopment Plans	Low	Low	High	High
Enhances Environmental Quality	Medium	Medium	High	High
Can Operate on Tower Bridge without Affecting the Historic Structure	High	High	High	High
Proven Technology	High	High	High	High
Can Accommodate Demand without Substantial O&M Cost	Medium	Medium	Medium	Medium
Within Capital Cost Budget	High	High	High	Medium
Stakeholder Support	Low	Low	High	Medium
Service Can Be Readily Expanded	High	High	High	High