



3.0 Project Planning

The first cluster of Tasks conducted in this feasibility analysis falls into **Project Planning**. This group of associated Tasks helped determine the preferred Phase 1 alignment. Once the alignment was defined, the project moved through successive steps of project development. **Project Planning** included six separate Tasks; the letters in parentheses following each task title indicate the appendix in which the full technical memo can be found.

1. **Purpose and Need Statement (A)** - While the feasibility study was not involved with the federal New Starts/Small Starts planning and environmental process, the decision was made to develop a Purpose and Need (P&N) Statement. The P&N Statement is a description of the goals and intended benefits of a proposed streetcar line linking the downtowns of West Sacramento, the riverfront, and Sacramento and provides the essential basis for the project.
2. **Route Studies (E)** - The Team identified key destinations within the project area (defined as 16th Street on the east and Jefferson Boulevard on the west, the Sacramento Valley (Amtrak) Station on the north and the Docks Area on the south), and any constraints on routing imposed by physical conditions, traffic, and other considerations. Various routing alternatives were prepared and evaluated. Potential station locations were indicated.
3. **Environmental Screening (I)** - The team identified potentially significant environmental impacts and State and/or federal permitting requirements.
4. **Travel Demand Analysis/Forecasting (C)** – The team assessed the demand for transit services within the study area. Analysis included the inter-relationship between potential new service and the services currently provided by Yolo County Transportation District and Sacramento Regional Transit.
5. **Opportunities and Constraints Analysis (H)** - Physical and institutional constraints which affect the routing, feasibility, and cost of the project were identified and analyzed. The Team formulated recommendations for working within identified constraints, identifying opportunities, and providing recommendations for maximizing opportunities.
6. **Refine Objectives and Evaluation Criteria (D)** - The team developed a statement of project objectives. From these objectives, a set of criteria was developed for use in reviewing and evaluating alignments and alternatives.

3.1 Purpose and Need Statement

The P&N builds on an assessment of existing conditions, regional and local policies and development plans, findings from previous studies, and public input. The overall intent of the project studied was to improve transit service to support existing and proposed development in the core areas of West Sacramento and Sacramento. This includes capturing the economic benefit from improving transit service in these areas.



The P&N serves as a guide for project activities and as a resource for ongoing public involvement during the study. Following completion of the study, the P&N can be used by local implementing agencies and project staff as the foundation for more detailed planning, environmental documentation and engineering design. The sections below summarize the key elements of the project's Purpose and Need Statement

3.1.1 The Planning Context

Major transit capital projects, as a result of increased mobility and infrastructure investment, provide an effective impetus for community and economic development. Successful transit investments are “*place-makers*” at least as much as they are “*people-movers*”. Transit investments can have a powerful effect on the form, character and intensity of development. This has been demonstrated as especially true of streetcar transit investments as recent implementation of streetcar service in other cities has shown.

Therefore, the policy basis for streetcar should be in the “*place-focused*” land use and development plans in effect at the regional, local, and community levels. To reinforce the policy basis for the streetcar project, the General and Strategic Plans for Sacramento and West Sacramento were reviewed.

City of West Sacramento General Plan – The proposed streetcar project linking the Cities of West Sacramento and Sacramento and the riverfront is consistent with and supportive of the stated goals and policies within the General Plan. Some key examples include:

Land Use

Goal: To provide for orderly, well-planned, and balanced growth consistent with the limits imposed by the City's infrastructure and the City's ability to assimilate new growth

Transportation and Circulation

Goal: To create and maintain a roadway network that will ensure the safe and efficient movement of people and goods throughout the city

Urban Structure and Design

Goal: To promote the development of a cohesive and aesthetically-pleasing urban form

Goal: To preserve existing community character and fabric, and promote the development of neighborhoods and districts that emphasizes pedestrian convenience

Goal: To maintain and enhance the quality of the City's landscape and streetscape

Goal: To create a distinctive Central Business District to serve as the City's most important civic and pedestrian-oriented commercial area

Goal: To establish the Triangle Area as a regional, high-density, waterfront-oriented urban core of the City.



City of West Sacramento Strategic Plan – In addition to improvements to downtown, the transit hub, and the riverfront, this Strategic Plan identified a Streetcar Feasibility Study as one of the six high priorities as a means to achieve the City’s goals and objectives.

Washington Specific Plan and Triangle Specific Plan - These two documents provide specific development guidelines for the areas north and south of the Tower Bridge, respectively, along the West Sacramento riverfront. Both emphasize walkable mixed use communities that are well linked by transit. The Washington Specific Plan area includes the existing Ziggurat building, and accommodates an additional two million square feet of office space. 1,300 housing units would be added to the existing housing in the plan area, along with hotels and up to 187,000 square feet of retail. The Raley’s Landing project, within the southeastern corner of the Washington Specific Plan area, is the focus of the most intensive development and is best served by the proposed streetcar route. The Triangle Specific Plan area would accommodate up to 7 million square feet of commercial (office and retail) and 3,000 housing units. The Triangle plan includes specific reference to and design guidelines for rail transit and transit oriented development.

The City of Sacramento General Plan Update – This General Plan emphasizes integrated land use and transit planning and investment. The proposed streetcar project is consistent with and supportive of the stated goals and policies in the General Plan including:

Vision and Guiding Principles - Neighborhoods are emphasized as desirable places with easy access to downtown and jobs. The City is linked to the rest of the region by an extensive, efficient and safe network of roadways, bridges, mass transit, bikeways, pedestrian trails, and sidewalks.

Land Use - Focus higher density developments and mixed-use projects in areas adjacent to transit stations, along transit corridors and commercial corridors, near job centers, and in strategic opportunity areas throughout the city.

Community Design - Stresses the creation vibrant gathering places, promotes the development of complete neighborhoods, protects and replicates the pattern of traditional neighborhoods, locates and designs walkable neighborhoods, promotes developments that foster accessibility and connectivity between areas, and safely and efficiently accommodates a mixture of cars, transit, bicyclists, and pedestrians.

Mobility - Develop a balanced, integrated, multi-modal transportation system that provides transportation choice, and expands and improves existing transit systems to encourage higher ridership, which will lead to better air quality.

Economic Development - Promote strategic development of vacant, underutilized, and infill lands to improve the City’s economic outlook, improve the jobs/housing balance, develop a vibrant 24-hour downtown, and develop the City’s waterfront to provide a world class urban experience.

Environmental Resources - Encourage sustainable levels of energy and resource consumption through efficient land-use, transportation, building design, construction techniques, waste management, and other infrastructure systems.



The 2003 Sacramento Riverfront Master Plan – This Master Plan was a collaborative planning effort between the Cities of West Sacramento and Sacramento that resulted in a coordinated, complementary approach to development along both sides of the river. One of the three guiding principles is “Creating a Web of Connectivity” which emphasizes creating multiple modes and means of access, transportation, and networking to and through the riverfront. The downtown/riverfront streetcar exemplifies this goal.

3.1.2 Statement of Purpose and Need

The **purpose** of the streetcar project is to improve transit service and local circulation in order to serve, support and shape existing and proposed development in the core areas of the cities of West Sacramento and Sacramento. This goal is consistent with, and, in fact, given high priority in, regional and local plans and policies.

The **need** is for a unique transportation mode that meets the mobility needs of a diverse ridership, promotes desired connectivity, attracts private participation, serves as a development and redevelopment catalyst, and fosters place-making. Downtown Sacramento and the Washington/Triangle/Civic Center area of West Sacramento are undergoing concentrated urban development that is significantly intensifying residential, commercial, office, recreational, civic and cultural land uses. This intense development is generating significantly greater demand for mobility within this area than can be accommodated through trips being made by automobile, particularly once people have arrived to the area from outlying suburban communities. It is impractical and undesirable to construct a sufficient number of parking garages and surface streets to facilitate this travel demand. Therefore, a high capacity transit service is needed to link these areas and provide frequent, reliable and cost-effective mobility throughout this urban core area.

3.1.3 The Supporting Goals

A set of Goals and Objectives was also prepared to support the project’s Purpose and Need statement. The Goals and Objectives reflect regional and local development plans, and adhere to the guiding principles established by the cooperating agencies. These Goals and Objectives articulate the result that can be achieved by implementing a successful streetcar investment. For simplicity, only the Goals are referenced as part of the summary.

Goal 1: Improve mobility and connectivity between the downtowns of West Sacramento, and Sacramento, and the shared riverfront.

Goal 2: Provide a sustainable transit investment to support existing and proposed development in the core areas of the Cities of West Sacramento and Sacramento.

Goal 3: Maximize the efficiency and effectiveness of the local and regional transit system.

Goal 4: Provide a transit investment that is affordable in terms of capital and operating expenses, and can be implemented on a fast track.



3.2 Route Studies

Prior to initiation of the study, the PSC had articulated the general parameters for the potential route(s), while allowing flexibility for other route options. The identified route, along Capitol Mall, across the Tower Bridge and on West Capitol Avenue, is one route to be considered, since it directly connects the two downtowns. However, the work conducted under this task evaluated alternative alignments or routes, based on a variety of factors, including current and anticipated development and redevelopment, existing and potential areas with high pedestrian volumes, and a good mix of pedestrian-producing commercial and institutional uses.

The approach was based on the input received during the week-long project Charrette, informed by a group of senior streetcar planners and engineers who examined possible alignments and collected important technical data for each potential route.

Important technical factors considered were as follows:

- Service entries
- Horizontal and vertical clearance issues
- Traffic operations and safety impacts
- Geometric requirements
- On-street parking locations
- Urban design/visual context
- Potential development, redevelopment and joint development locations
- Transit centers
- Light rail transit lines, operations, OCS and connectivity issues
- Sensitive receptors
- Traditional trolley line locations
- Logical termini to accommodate future extensions
- Utility (overhead and underground) conflicts
- Right of way limitations
- One way streets and impacts on turning requirements and signal controls
- Topographic or grade issues.
- Land use adjacencies
- Existing and potential high pedestrian activity areas
- Key destinations and activity centers
- Railroad lines and stations
- Parklands and public spaces
- Possible station/stop locations
- Historic properties and sites
- Possible maintenance/operation/storage facility

Methodology - The process of defining and refining the feasible streetcar alignment (s) included:

- Reviewing the input received during the project Charrette
- Reviewing the technical factors and data collected during field visits in conjunction with inputs received during the Charrette to establish feasible routes
- Preparing graphics illustrating each feasible general route (including station locations)



- Performing route alternative screening to identify the pros and cons of each feasible route
- Further refining the route choices with follow-up meetings with TAC and PSC.

3.2.1 Data Collection and Route Evaluation

Information regarding the local and regional context and history of the issues surrounding the project study area was gathered in order to identify potential streetcar routes.

Data Collection

Types of data collected included available aerial mapping, land use, zoning, public roads right of way, existing transit systems, local road traffic data, local attractions, site conditions, existing physical barriers, surface apparent utilities, existing reports and analysis (such as the Downtown Parking Study). Additionally, this information base included consultation with State, City, County, Yolo County Transportation staff and others. Most of the data obtained was in Geographical Information System and hard copy format.

Project Charrette

A week long Charrette was held during the early weeks of the project. During the Charrette, the project concept was presented to the general public, specific stakeholder groups and public officials. Displays and handouts illustrated the project's P&N, provided education about streetcars in general, and invited a dialogue among the attendees. The first day of the Charrette provided opportunity for the general public to learn more about the project and provide input, while subsequent days included focused meetings with neighborhood leaders, business and tourism experts, local commissioners, existing transit riders and area developers. The display boards, which illustrated

Alignment ideas being discussed at the Charrette



an aerial map of the project study area, provided opportunity for attendees to identify desired destination points for streetcar. Additionally, several meetings and team work sessions were conducted. The meetings and team work sessions were intended to capture ideas, important facts and issues, and overall project direction to objectively reduce the number to a manageable set of alternative routes. During a joint session meeting between PSC and TAC members, potential streetcar routes were referenced and discussed. The pros and cons for different routes were documented. The following key features from the PSC and TAC joint meeting were noted:

- Economic catalyst- future connections for future development
- Outreach to riders not yet present
- Serve both sides of the river
- Riverfront mobility and access



- Serve areas not served by Light Rail Transit

The Charrette process established the conceptual beginning and ending points of a potential initial route (Alignment A). The westerly limit would be at West Sacramento's City Hall, and adjacent to the planned transit center and community college facility; the easterly limit would be at J Street and 19th Street in the City of Sacramento. The Tower Bridge was identified as the most feasible (and likely only) location to cross the river.

Field Evaluation/Focused Meetings

The Charrette process established a set of routes to be carefully examined by the technical team. Through several field evaluations and focused meetings with feedback from PSC and TAC members, the team narrowed down the number of feasible route alternatives. The criteria considered to narrow down the potential routes included:

- Most popular destinations
- Physical barriers (e.g. railroad crossings)
- Available right of way
- Existing utilities
- Existing traffic circulation
- Infrastructure reconstruction cost (e.g., the existing Washington Underpass at West Capitol Avenue has a reduced vertical clearance, thus does not allow enough room for streetcar overhead wires)
- Specific issues and concerns of individual PSC members;

A number of variations in the route were considered in these discussions, and some of those have been incorporated into a resulting refined alignment.

Selecting the Preferred Alignment

A provisional alignment emerged from the Charrette process, and was then developed and further analyzed. It reflected the results of project tours, a review of preliminary route opportunities, public input, PSC and TAC involvement, Design Team guidance, and the principles and selection criteria. Based on that initial alignment, a series of Technical Memoranda explored various aspects of project development. Toward the end of Phase 1, the PSC requested that the Design Team verify that the planned alignment would meet project objectives, serve the civic and cultural heart of West Sacramento, and reach the Midtown area of Sacramento. Between these points, the objectives stated that the streetcar should connect and transform as many area development and redevelopment projects as possible. To do that, the PSC directed the Team to:

- Meet individually with the PSC members to finalize specific issues and concerns
- Hold another TAC work session to incorporate PSC and TAC goals and suggestions into a more refined alignment



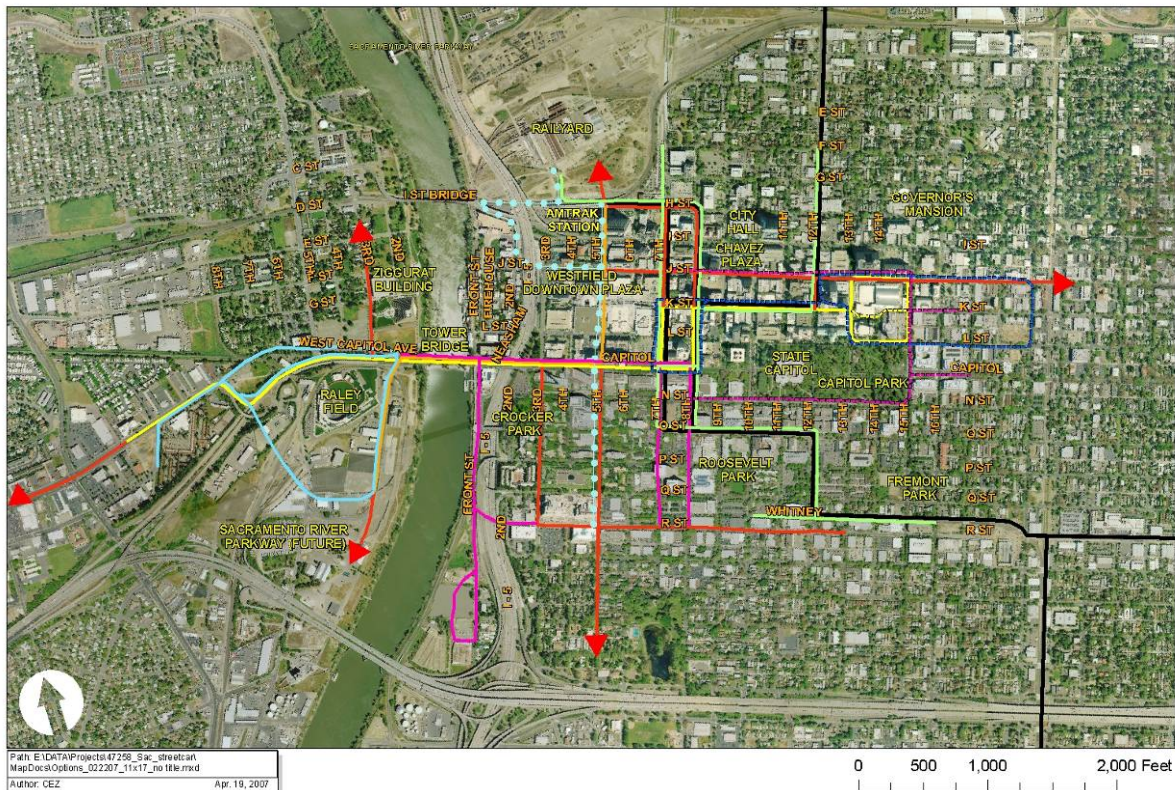
- Define a range of possible future extensions – immediate and near-term – off the refined alignment

Some suggested potential revisions were not adopted for reasons of feasibility. For example, it was suggested that an alignment along J Street (requiring new track) be considered as an alternative to sharing existing track with RT light rail on K Street. This revision would be problematical in terms of added cost (building new track instead of using existing track for a portion of this distance), but a more serious “fatal flaw” is the high traffic volume and congestion on these sections of J Street. High traffic volumes and low levels of automobile service (congestion) make streetcar operations difficult, in that it becomes impossible to maintain a consistent schedule.

There is another issue which bears on this question as well: the City of Sacramento believes that J Street needs to be evaluated in the context of Sacramento RT’s long range light rail operating plans for downtown. Future studies will likely address the location of all light rail lines in downtown Sacramento and such plans would need to be integrated with streetcar operations – and vice-versa.

The result of these PSC and TAC sessions was an approved refined alignment that addressed the goals and concerns articulated by the PSC and TAC.

Figure 3. Charrette Alternatives





The Preferred Alignment

The resulting Preferred Alignment is a refinement of the initial Charrette alignment and is shown in yellow on Figure 3. It works well as an urban circulator or “pedestrian accelerator” - precisely the function that other highly successful streetcar projects serve. The preferred alignment is 2.2 miles long, and 0.5 miles of light rail trackage with RT. The preferred route:

- Follows a direct route from the civic and cultural heart of downtown West Sacramento, and serves most of the potential redevelopment sites along the line
- Extends farther into Midtown Sacramento using the K Street light rail line to 13th Street, thus accessing the area activities and helping vitalize the greater K Street corridor
- Traverses the Sacramento Convention Center, moving up 13th Street to J Street, east to 15th Street, looping back on L Street to 13th Street and K Street for the return trip to West Sacramento.

A list of stops is provided in Section 4.3 of this report. These stops are designed to best access existing and future pedestrian connections to destinations along the line. Individual stop locations will be subject to further refinement in the Preliminary Engineering phase of the process. The Preferred Initial Alignment is designed to be easily expanded as significant future development occurs in the Triangle Specific Plan Area and in the Railyards redevelopment site.

Future Possible Extensions

Understanding the potential for extending the system was an important consideration throughout the feasibility study process, since recent streetcar projects show that when the initial system proves itself, there is an almost immediate call for extensions. Future extensions generally add value to the initial investment, shape more destinations and serve more riders. Figure 4, in addition to the preferred alignment, shows two sets of possible extensions – **immediate**, shown in orange line; and **near-term**, shown in red. These extensions are designed to link and connect true pedestrian-oriented development in the two Downtowns and along the Riverfront.

Immediate Extensions

This first planned extension would travel a “Z” shaped route branching off from the Preferred Initial Alignment. The suggested route would:

- Share track with the initial route from 3rd and Tower Bridge Gateway on the West Sacramento side to 5th and Capitol Mall on the Sacramento side;
- Branch south from the spine (yellow line) on the West Sacramento side to serve and catalyze development in the Triangle Specific Plan area;
- Branch north from the spine on the Sacramento side to extend into and serve the Amtrak Station and the Railyards redevelopment area.

Either of these arms of the “Z” could be built as the immediate extension. Both could also serve as the first leg of further extensions.

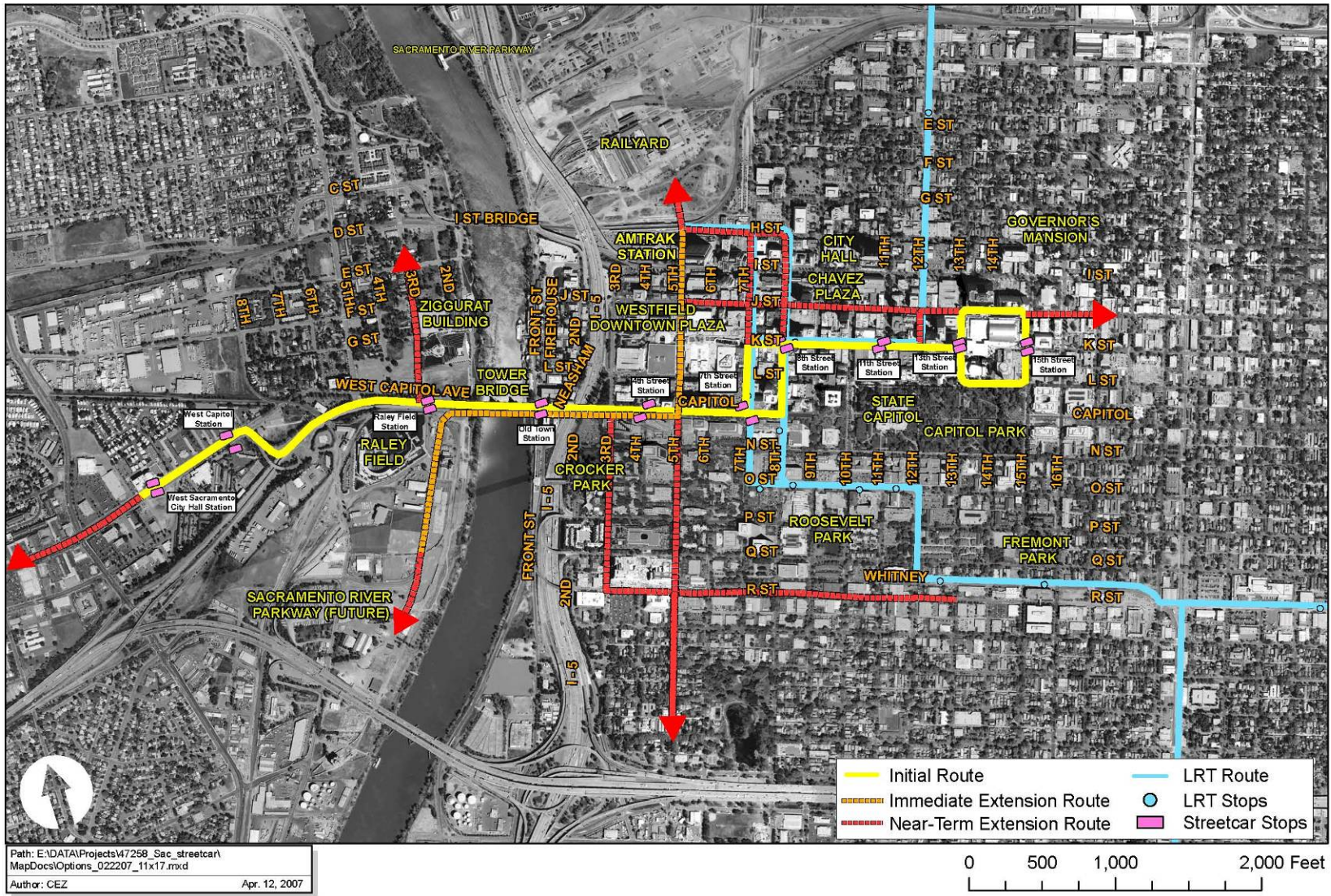


Near-term Extensions

In addition to the immediate possible extensions, there are a wide variety of possible near-term extensions (shown as the red dashed lines on Figure 4). These extension options would serve planned and programmed redevelopment areas on both sides of the River. In West Sacramento, these options would include heading west along West Capitol Avenue; south to Pioneer Bluffs, the Stone Lock District, and Southport; or north to Raley's Landing and the Washington Specific Plan area. For Sacramento, possible extensions could serve redevelopment and infill locations including the Railyards, Richards Boulevard, and Natomas areas to the north; the R Street corridor, Southside Park, and Broadway to the south; and farther east into Midtown.



Figure 4. Preferred Initial Alignment and Possible Extensions





3.3 Travel Demand Analysis/Forecasting

The Travel Demand Analysis/Forecasting Memorandum documented the methodology and the results for ridership projections. During the study, two alternatives based on the provisional alignment developed in the Charrette process (Alignments A and B) were evaluated. As noted in the Executive Summary, a hybrid alternative emerged late in the process. Key findings were recalibrated to reflect the revised alignment selected as the Preferred Initial Alignment. Alignments A and B are illustrated in Figures 3 and 4, respectively.

The analysis of Alignment A revealed that the streetcar system's daily ridership would range between 4,900 and 11,300 by the year 2010. The range depended on system characteristics and whether other transit modes in the streetcar district were competitive or complementary. Currently Sacramento Regional Transit District (SRTD) and Yolo County Transportation District (YCTD) operate bus transit services in the streetcar corridor. The analysis indicated that by restructuring SRTD and YCTD service to complement the streetcar service, system ridership increased by 28% - 75%, depending on various factors over time. Assuming a fare-free policy, the streetcar system has potential to attract 15,700 daily day riders by the year 2030.

Assuming optimal conditions, which includes a fare-free system, with 10 minute headways, and the presence of complementary bus service, by the year 2030 the streetcar system would:

- Attract 3,550 daily choice riders
- Divert 1,480 auto trips, saving 3,700 vehicle miles of travel (VMT)
- Reduce 123 vehicle hours of travel (VHT) each day
- Reduce daily emissions of Carbon Monoxide (CO) by 88.8 kg, Hydrocarbon (HC) by 3.7 kg, and Oxides of Nitrogen (NOx) by 8.1 kg

Alignment B's performance is significantly lower than A, only attracting some 3,200 and 7,800 daily riders in 2010 and 2030, respectively. The difference is explained by the smaller geographic area served by Alignment B, and the lower numbers of jobs and residences within Alignment B's service area.

3.3.1 Analysis Methodology

The approach of the ridership analysis is market based and used travel demand modeling techniques tailored to transit specific issues. The Sacramento Regional Travel Demand Model (SACMET) was used along with a stop-level ridership forecasting model developed by HDR for streetcar systems. The following steps summarize the methodology and results of the analysis:

- Identifying the streetcar market area
- Creating market area traffic analysis zones and estimating zonal land use
- Calculating the number of daily trips generated within the streetcar market areas
- Distributing the market-area trips
- Forecasting trip market-share of the streetcar system



- Analyzing sensitivity of ridership to system characteristics
- Analyzing travel impacts of the streetcar system
- Comparing alternate routes

3.3.2 Analysis Findings

The following summarizes the results of the eight analytical steps. The summary does not attempt to detail the complex methodologies and models, but the focus is on the essential findings.

Identifying the streetcar market area

The first step of the analysis was to identify the potential market area of the streetcar system. The market approach helps determine the source of potential riders along an alignment. A quarter mile buffer (five-minute walk) was created along the alignment, with the assumption that riders would prefer a five minute walk to the nearest stop. A quarter mile corresponds approximately to three blocks in downtown Sacramento. Overlapping market areas were distributed among the stops or stop pairs based on probable preferences of a rider given the onsite conditions. Figure 5, below, shows 14 stop-level sub-areas that collectively present the potential market area of the streetcar system.

Using TAZs to create a market area and estimate land use

The traffic analysis zone (TAZ) is the basis for creating the market area, since each TAZ contains basic socioeconomic data, particularly employment and household information for 2005 and 2032. Due to the finer grained analysis, a new set of traffic analysis zones was created and data sets reallocated the employment and households within them. These new zones and socioeconomic data were important in defining trip markets, determining accessibility, and understanding development density and intensity patterns along the hypothetical alignment.

Calculating daily trips within the market areas

The calculation of total person trips represents all daily person trips coming in or going out of the streetcar market area. The streetcar system likely will attract that portion of these trips that are internal to the streetcar market area. Total daily trips for the years 2005 and 2032 are approximately 1,108,000 and 1,550,800, respectively. Two different methods – SACMET and the Institute of Traffic Engineers (ITE) – were used for comparative purposes and to adjust trip generation to account for any unreasonable under- or over-generation, while accounting for “trip chaining” and “forgotten trips”.



Figure 5. Potential Market Area for Streetcar and Hypothetical Route

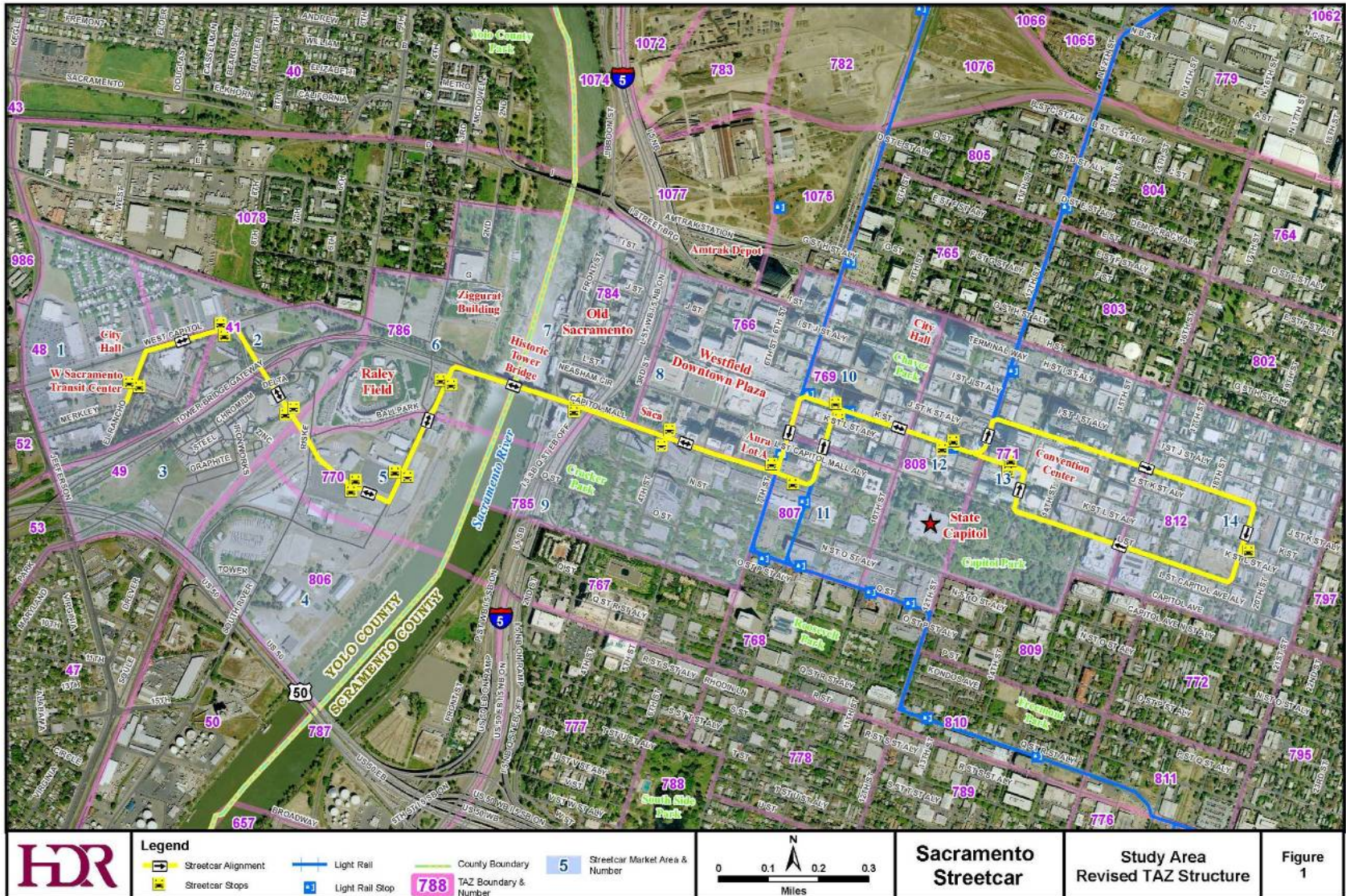
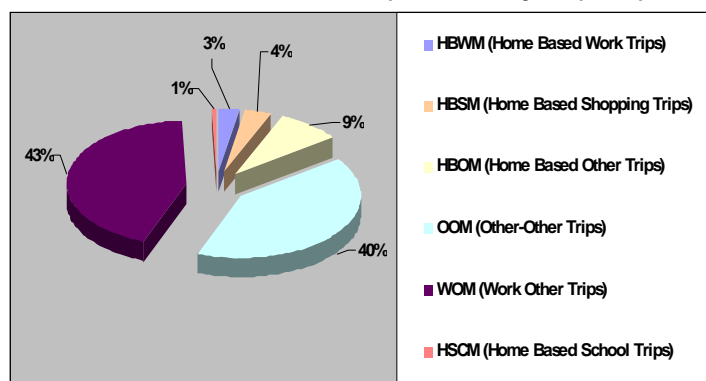




Figure 6. Existing (Year 2005) Streetcar Market Area Trip Markets by Trip Purposes



Trip Purpose	Daily Trips
HBWM (Home Based Work Trips)	5,505
HBSM (Home Based Shopping Trips)	7,084
HBOM (Home Based Other Trips)	16,905
OOM (Other-Other Trips)	80,220
WOM (Work Other Trips)	85,811
HSCM (Home Based School Trips)	1,197
TOTAL	196,721

Distributing the market area trips

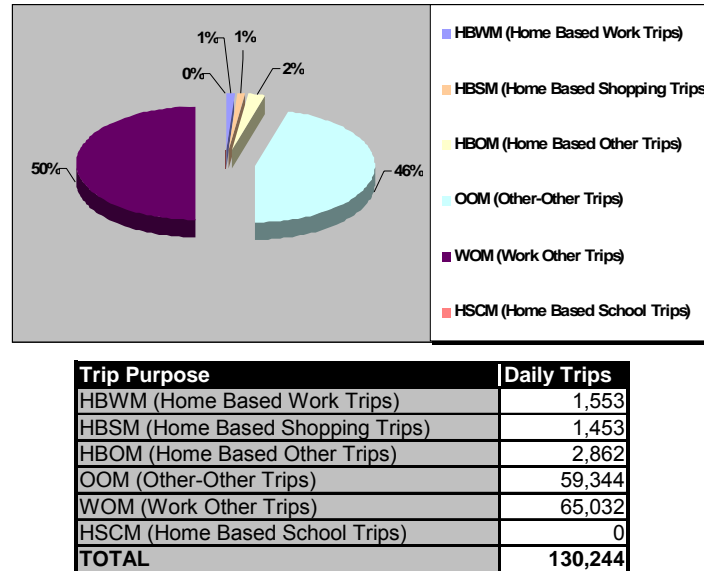
After calculating the market area daily trip generation, the regional model determined the origin and destination of the trips. This was necessary, since an individual’s mode trip choices depend on their origin and destination. SACMET uses a nested destination mode choice model for home based work trip distribution and a gravity model for home based shopping, home based other, other-other, work-other, and home based school trips. Approximately 130,250 and 196,700 daily trips – the primary daily trip “market” - are internally captured for the years 2005 and 2032, respectively. The “work-other” and “other-other” trips collectively constitute approximately 83% - 96% of the total trip market. Figure 6 and Figure 7 show the existing and future market area trips by trip purpose. This information is critical in understanding the travel patterns and target trip markets within the study area.

Examples of such trips include: work to lunch, work to shop/ running errands, work to client site, tourist trips from one attraction to the other, etc. A significant share of total trips within the study area are “work-other” and “other-other” trips, which suggests targeting these trip markets.

Two other potential sources of ridership not captured are trips requiring a transfer to or from the streetcar and other modes, and major events. For example, events at Raley Field, etc, within the streetcar market area will add to the potential trip market of the system and will have positive impact on ridership.



Figure 7. Future (Year 2032) Streetcar Market Area Trip Markets by Trip Purposes



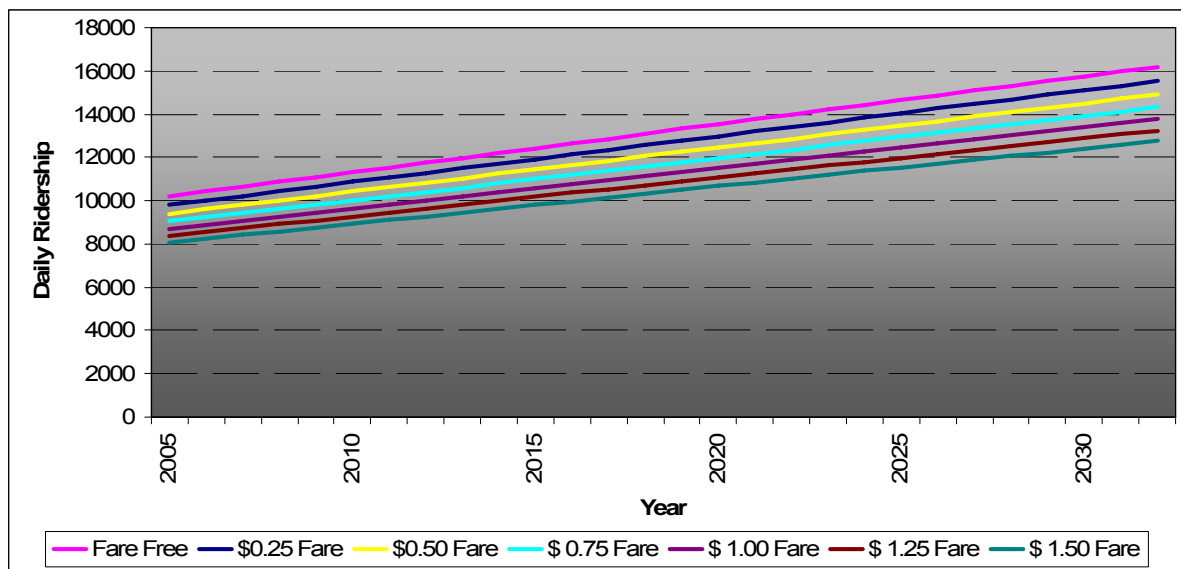
Forecasting trip market share of the streetcar system

The next step addressed the mode choice decisions of an individual. The streetcar system will compete with other modes of transportation in order to capture passenger trips and the trip market share of the streetcar system will depend on the relative utility associated with the mode and the fare structure, along with trip purpose and origin and destination. A market-area nested SACMET logit model for all trip purposes was used to determine the mode share of the streetcar system. The model was calibrated against the SACMET mode choice outputs for the streetcar market area for the year 2005.

Both complementary and competing relationships between the new streetcar service and the existing SRTD and YCTD transit services was considered in the mode choice analysis. Under competing conditions and fare free service, daily streetcar ridership could be between 7,500 and 8,600 by the year 2010 and between 10,900 and 12,400 by the year 2030 depending on service frequency. Restructuring of SRTD and YCTD service routes in the streetcar corridor to complement the streetcar service could increase system ridership by 28% - 75% depending on various factors over time. The streetcar system has potential to attract 15,700 non-event day riders by the year 2030 under a fare-free policy. Figure 8 summarizes forecasted daily ridership of the streetcar system over time for various fare rates assuming a linear growth of ridership over time.



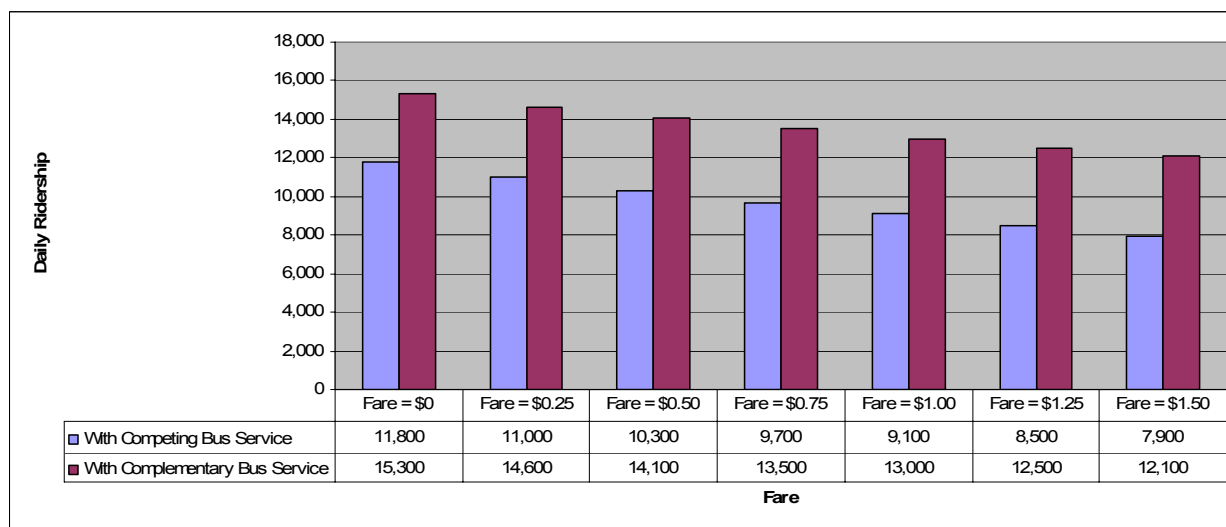
Figure 8. Daily Streetcar Ridership over Time for Various Fare Rates



Analyzing sensitivity of ridership to system characteristics

The analyses indicate that the streetcar system has potential to attract 15,700 non-event day riders by the year 2030 under a fare-free policy. However, ridership will decrease if there is a fare, since a typical market area comprises of substantial number of “choice riders”. Figure 9 illustrates the sensitivity to various fare structures for the year 2030.

Figure 9. 2030 Streetcar Ridership Sensitivity to Fare Structure (Headway = 10 Min)



In addition to fare sensitivity, ridership likely will be influenced, either positively or negatively, by changes in the alignment, actual future development in the streetcar market area as opposed to anticipated future development, accessibility, marketing, service quality, and similar factors. That said, the market area demonstrates strong ridership potential.



Analyzing travel impacts of the streetcar system – The use of the streetcar system has positive environmental benefits. There is a reduction of auto trips, vehicle miles of travel, vehicle hours of travel, and emissions of air quality pollutants. Table 5 shows the market area travel impacts of the streetcar system.

Table 5. Market Area Travel Impacts of the Streetcar System

Criteria	2010	2030
Reduction in Daily Auto Trips	1,100	1,480
Attracted Daily Choice Riders (Person Trips)	2,640	3,552
Reduction in Daily VMT	2,750	3,700
Reduction in Daily VHT	92	123
Reduction in Daily Carbon Monoxide (CO) emission (grams)	66,004	88,804
Reduction in Daily Hydrocarbon (HC) emission (grams)	2,805	3,774
Reduction in Daily Oxides of Nitrogen (NOx) emission (grams)	6,050	8,140
Assumptions: Fare Free System, 7 Min Headway		

3.3.3 Alternate Route Comparison

An alternate route, Alignment B (see Figure 10), was considered in the analysis for comparison purposes. Alignment B would attract 3,200 and 7,800 daily riders in 2010 and 2030, respectively, considering fare-free system, 10-minutes headway, and presence of complementary bus service. Figures 11 and 12 compare daily system ridership for the two alignments for 2010 and 2030, respectively.

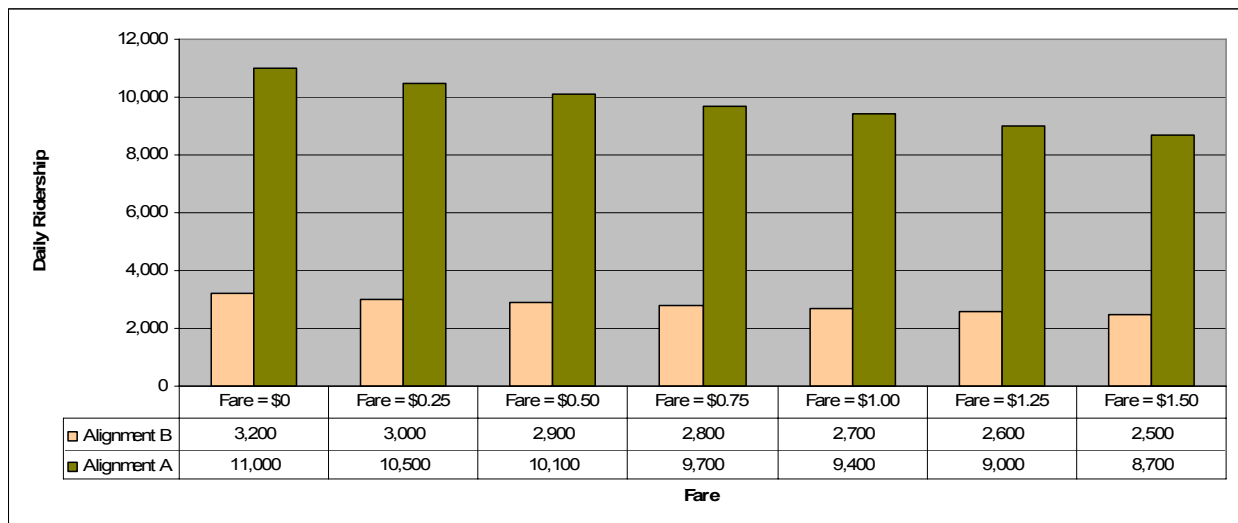
Figure 10. Alternative Streetcar Alignment - Alignment B



Results indicate that system ridership for Alignment B is significantly lower than the ridership for the original provisional alignment.

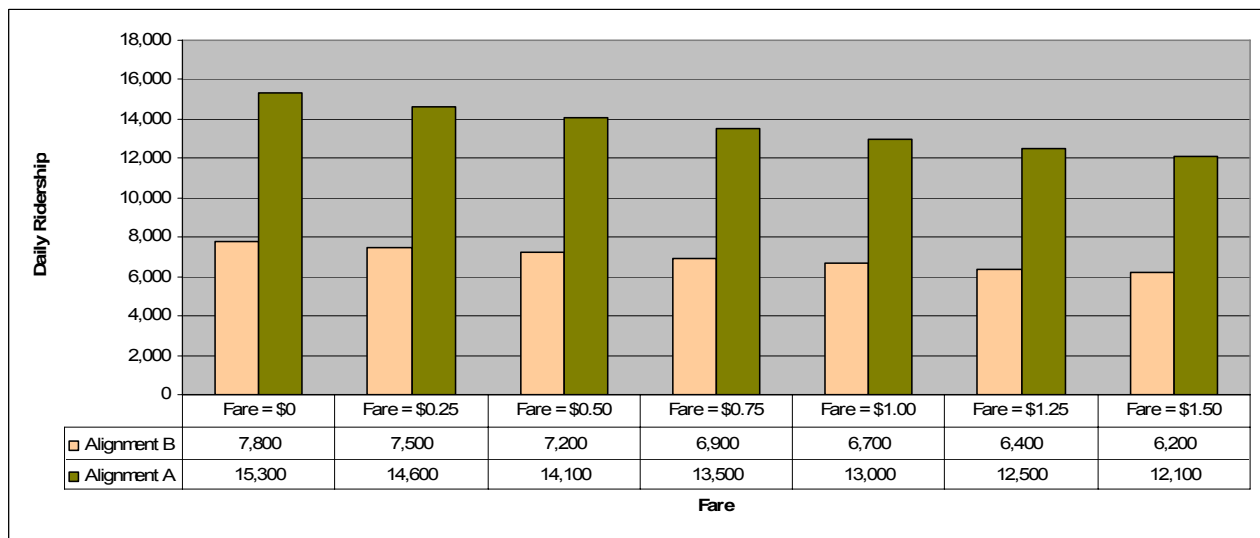


Figure 11. 2010 Ridership Comparison: Alignment A vs. Alignment B



Assumption: Complementary bus service, 10 minutes headway

Figure 12. 2030 Ridership Comparison: Alignment A vs. Alignment B



Assumption: Complementary bus service, 10 minutes headway

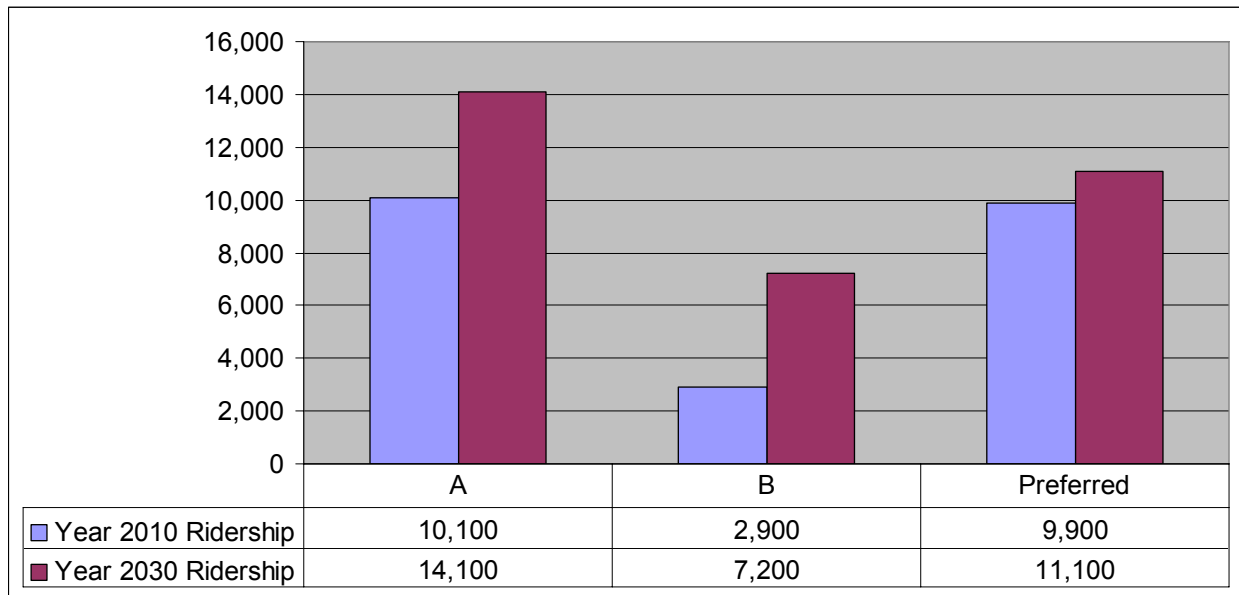
3.3.4 Ridership Estimate for the refined Preferred Initial Alignment

As noted in the Executive Summary and the Introduction to the Report, the team recalibrated ridership estimates for the Preferred Initial Alignment. To revise the estimate, the team used various combinations of Alignments A and B to approximate the Preferred Initial Alignment. For this purpose, the Preferred Initial Alignment consists of the Sacramento side of Alignment A and Alignment B on the West Sacramento side. In addition, the estimate is based on



complementary bus service, ten-minute headways, and a \$0.50 fare. As Figure 13 shows, the estimate is for 11,100 daily riders by 2030, a robust estimate.

Figure 13. Estimated Ridership for the Preferred Initial Alignment



3.4 Opportunities and Constraints

This task identifies and describes significant opportunities that the project may present and constraints the project should avoid, overcome, or reasonably resolve. First, there are opportunities that could enhance the project’s success, lower project costs or contribute to other goals will be described. Such considerations might be available rights-of-way, traditional streetcar track locations, area of prime redevelopment with entitlements in place, areas with high concentrations of pedestrians, and access to alternative funding mechanisms

Secondly, there are constraints that could prevent or negatively impact implementation of the project. Constraints may be geographical or structural issues that can be costly; low overcrossings, surface railroad crossings, and bridges fall into this category. To avoid implementation delays and added project costs, an initial segment should not impose major impacts and avoid obstacles that require expensive solutions.

The opportunities and constraints analysis considers three basic clusters – alignment and operational opportunities and constraints, regulatory constraints, and institutional constraints.

3.4.1 Alignment and Operational Opportunities

There are a myriad of alignment and operational opportunities that accrue to both cities along the for the initial streetcar line. Among the most notable are:

Catalyze and focus redevelopment – One of the documented benefits of streetcars is their ability to stimulate and focus redevelopment. The same opportunities abound in West Sacramento and Sacramento. From west to east, the opportunities include:



- **Downtown West Sacramento** – The area around City Hall, both planned and potential, can support a wide range of added public, civic, and commercial activities that can be served by the streetcar. These activities, including a community college center and senior center, are producers and attractors of streetcar riders. A potential extension further to the west along West Capitol Avenue or Merkley Avenue offers access to significant future redevelopment opportunities.
- **Raley’s Landing and the Triangle** – The initial alignment, following Tower Bridge Gateway and West Capitol Avenue, provides access to these significant and ambitious development and redevelopment locations. The ability to move to and from these destinations via the streetcar will position them uniquely, especially with their attractive riverfront settings.
- **Capitol Mall** – The streetcar reinforces several major mixed use projects along the initial alignment as it moves into downtown. It provides a unique east/west mobility option for current and future residents, employees, and visitors, opening up new patronage potential for West Sacramento and the burgeoning Midtown area of Sacramento.
- **Shopping/Convention Center/K Street** – Sacramento’s premier downtown shopping venue, the Westfield Downtown Plaza, the Convention Center and hotels, and the K Street/Midtown entertainment district are all recipients of focused development. With increased pedestrian activity, existing and new infill retail, service, and food and beverage uses will see more traffic. While these areas are already in place, the attractiveness of these locations becomes more prominent.

3.5 Refine Objectives and Criteria

The purpose of the refinement of the objectives and development of evaluation criteria is to assure that the alternative alignments are properly correlated with and reflective of the project’s P&N and Goals and Objectives. The principal result is a rating or measurement scale for each criterion to be applied after other study elements are prepared. These elements are route studies, service criteria, equipment analysis, ridership and constraints analysis. Once the evaluation criteria were approved by the PSC and TAC, they were applied to overall alignment alternatives and/or individual segments, as were applicable.

3.5.1 Refined Objectives

The refined objectives and evaluation criteria resulted from a review of the Purpose and Need Statement and the initial objectives found there. The refined objectives are:

Mobility and Connectivity

- Enhance connectivity between existing and new downtown housing in both cities and the major employment, commercial, recreational, and cultural activity centers
- Offer a convenient and attractive means of transportation for residents, workers, customers, and visitors



- Improve access and opportunities for all existing and potential transit rider groups
- Enhance access to the riverfront

Sustainable Transit and Development Investments

- Implement a streetcar project that supports the existing and planned built environment
- Capitalize fully on the streetcar's demonstrated powerful placemaking attributes
- Link all possible key destinations in the study area
- Support adopted goals, objectives and plans
- Minimize negative impacts on historic, archaeological, traditional cultural places, parklands, public recreation areas, traffic, and businesses

Efficiency and Effectiveness

- Attract new riders to the local and regional transit system, including an increased ridership in the downtowns by offering fast and frequent service
- Inter-line with the light rail system to help meet the desired headways and to "extend" streetcar service with limited capital investment
- Enhance ridership by connecting the streetcar with all regional transit modes and intercity rail
- Locate streetcar stops close to areas of high existing and potential pedestrian activity
- Accommodate logical and efficient future expansion opportunities

Affordable and Expedited Delivery

- Minimize capital costs with simple stops, in-street running operations, no grade separations, and no park and ride lots
- Minimize net operating and maintenance costs by using existing light rail tracks and maintenance facilities where practical
- Fast track the planning, design, and construction period to total five years or less
- Maximize public-private partnership opportunities, including funding

3.5.2 Evaluation Criteria

The evaluation criteria were used for reviewing and assessing the potential of the candidate alignments. The initial 21 criteria are grouped into five sub-categories that demonstrate complementary relationships – Fundability, Cost Effectiveness, Minimize Construction and Cost Impacts, Maximize Development Opportunities, and Relationships to Local Goals. As a means of evaluation, quantifiable measures are presented as a means of evaluation whenever possible. The final list was reviewed and approved by the TAC. The five categories of criteria include:



Fundability

This criterion evaluates candidate alignments based on their ability to demonstrate funding feasibility, showing potential for private financial participation, and distributing costs among public partners.

Cost Effectiveness

This criterion evaluates candidate alignments based on their ability to demonstrate affordability and constructability, and the potential for future extensions.

Minimize Construction and Cost Impacts

This criterion evaluates candidate alignments based on their ability to minimize:

- Underground Utility Impacts
- Visual Impacts
- Environmental Impacts
- Historic and Cultural Resource Impacts
- Traffic Delays and Safety Concerns
- Minimizes Business Impacts

Maximize Development Opportunities

- This criterion evaluates candidate alignments based on their ability to serve key destinations, access development/redevelopment opportunity location, and enhance pedestrian activity.

Relationships to Local Goals

This criterion evaluates candidate alignments based on their ability to support adopted community goals and objectives, complements existing land use, redevelopment or Specific Plans, reflect neighborhood compatibility, and promote accessibility to the river.

3.6 Environmental Screening

The purpose of the environmental screening was to identify major environmental issues that could result from construction and operation of the proposed streetcar project. The environmental issues identified in this task were detailed in an Environmental Screening Technical Memorandum, developed in accordance with California Environmental Quality Act (CEQA) guidelines. The federal National Environmental Policy Act (NEPA) guidelines are not expected to apply since no federal transit funding is being used or anticipated for project development and construction. However, issues may arise during the project's Phase 2 Scoping process that may trigger NEPA.

Results of the Phase 1 effort combined with those of the Phase 2 Scoping process will determine the level of environmental analysis and appropriate documentation required for CEQA compliance. If the issues raised are limited and can be mitigated to a less than significant level,



then a Mitigated Negative Declaration (MND) may be sufficient for gaining environmental clearance for the project. If this information indicates that that the project would cause potentially significant impacts that may not be easily mitigated, are controversial, or are likely to be unavoidable, an Environmental Impact Report (EIR) would be required. The EIR compares the environmental effects of No Project with those from Project implementation. An EIR embodies a more comprehensive environmental analysis than the MND, and is accompanied by extensive public involvement.

3.6.1 Potential Environmental Issues

The Phase 1 environmental screening analysis was preliminary and is not intended to substitute for complete environmental analysis and documentation. The purpose of the screening was to assess whether preliminary data revealed environmental fatal flaws that would trigger modifying the project description.

The project, although less than three miles in length, traverses many different communities, presenting a variety of conditions that could affect the streetcar. For the purposes of environmental screening, the alignment was divided into nine segments or components, starting with the project's western planned terminus at the West Sacramento Transit Center and ending at its eastern terminus adjacent to the Sacramento Convention Center. Specific alignment details and potential environmental issues and/or the status of environmental analysis (shown in *italic* text) for each of the nine segments or components include:

1. West Sacramento Transit Center to the Triangle Area - The segment between the West Sacramento Transit Center and the Triangle Specific Plan area may be completed as part of the Phase 1 construction or later after the active freight rail line and Union Pacific switching yard are removed from the Triangle area. *At this time, no fatal flaws or unavoidable impacts are anticipated in this segment.*

2. West Capitol Avenue to South River Road – This section of the streetcar alignment would veer south from West Capitol Avenue (following the alignment of a new street created within the Triangle Specific Plan area) through to South River Road.

Assuming land acquisition, infrastructure improvements and soil remediation are completed for the Triangle area prior to project construction, no fatal flaws or unavoidable impacts are anticipated in this segment. However, a traffic analysis, including the study of freight rail operations and potential grade crossing conflicts, may be required to ensure that proper mitigation strategies are applied to expedite streetcar operation without impeding traffic circulation and freight rail operation in the Triangle Specific Plan area.

3. South River Road to Tower Bridge -- The alignment in this segment would use the street right of way along South River Road to the Tower Bridge. There is sufficient width within the right away for streetcar operation without diminishing roadway capacity. No parking currently exists along this road although future plans call for redeveloping this area into a mixed use community.



Assuming land acquisition, infrastructure improvements and soil remediation are completed for the Triangle Specific Plan area prior to Project construction, no fatal flaws or unavoidable impacts are anticipated in this segment. However, a traffic analysis, including the study of freight rail operations and potential grade crossing conflicts, may be required to ensure that proper mitigation strategies are applied to expedite streetcar operation without impeding traffic circulation and freight rail operation in the redevelopment area. Additionally, the Raley's Landing Draft EIR (City of West Sacramento, October 2005) identified unavoidable future traffic impacts at Tower Bridge Gateway/3rd Street, at the streetcar entry onto Tower Bridge. One of the goals of implementing streetcar service in this area is to encourage transit use instead of auto travel to access Raley Field and other destinations in the Triangle and Raley's Landing project area. Use of transit may reduce traffic congestion at the Tower Bridge Gateway/3rd Street intersection. This assumption would need to be verified by studying the cumulative effect of the streetcar project on traffic circulation in this area.

4. Tower Bridge - Tower Bridge, a drawbridge crossing the Sacramento River, is an historic structure built in 1934. Historically, the Sacramento Northern Railroad operated across Tower Bridge. The bridge had a single track and overhead before all rail facilities were removed in 2004. New streetcar track and catenary would restore this historic function to the bridge. However, the restoration of rail service may add new elements to the bridge that could alter its design or appearance. Similarly, the cumulative weight of previous bridge improvements in combination with weight of project elements may adversely affect the bridge's current lift mechanism. Alteration of the bridge's design, appearance, or historic mechanical system could be a significant impact, and would require a determination of effect made in consultation with the State Historic Preservation Office (SHPO).

A more rigorous structural analysis of Tower Bridge and consultation with Caltrans and SHPO must occur to determine the potential effect of the project on the historic bridge and also to determine whether (NEPA) Section 106 and Section 4(f) evaluation is required. Any adverse effect would be mitigated by implementing terms identified in a memorandum of agreement with SHPO. The proposed traffic lane and on-bridge streetcar track configuration would reflect the outcome of traffic analysis, including traffic mitigations (if required) that are approved by Caltrans. The analysis would include a cumulative assessment of future traffic conditions at the eastern approach to Tower Bridge. At this time, it is anticipated that any cultural resource or traffic impacts along this segment could be mitigated.

5. East of Tower Bridge and the I-5 Overcrossing - The alignment continues east on Capitol Mall and crosses an active railroad at grade and the I-5 freeway at an overcrossing. Unlike Tower Bridge, the I-5 overcrossing at Capitol Mall Avenue was never designed to accommodate rail. However, preliminary structural analysis indicated that the additional dead weight of project facilities on the overcrossing would not require bridge modification or strengthening. A more detailed structural analysis, in consultation with Caltrans, would need to be performed to confirm this preliminary finding.

The alignment will cross the Sacramento Southern Rail Line at Front Street. This action will require consultation with SHPO since the Sacramento Southern's Walnut Grove Branch Line



(located on the Sacramento levee) is on the National Register of Historic Places (South Sacramento Corridor AA/DEIS, September 1994).

No fatal flaws or unavoidable impacts are anticipated on the I-5 overcrossing at this time. It is anticipated that construction impacts on the overcrossing would be temporary and could be mitigated. However, the crossing of the Sacramento Southern rail line at Front Street will require consultation with SHPO. A traffic flow analysis would be required at the eastern approach to Tower Bridge.

6. Capitol Mall for the I-5 Overcrossing to the 7th/8th Streets - The streetcar could visually alter Capitol Mall, which was created within the M Street right of way as a formal entrance to the State Capitol Building from the Tower Bridge. As the Tower Bridge was previously used to support rail operations, and the Sacramento Northern had been located here, overhead wire and rail were part of the historic landscape in this area. The visual modifications resulting from project implementation would restore these visual elements and would be designed to conform to the existing RT facilities that cross Capitol Mall on 7th and 8th Streets. Light rail facilities are typically considered part of the urban landscape and not regarded as significant visual impacts.

The project is not expected to produce unavoidable visual and aesthetic impacts to the State Capitol Building or the building viewshed. Streetcar operation may help reduce cumulative traffic impacts in this segment. A more detailed traffic analysis would be needed to verify this assumption.

7. 7th/8th Streets and K Street to the Sacramento Convention Center - The proposed streetcar alignment would share existing RT light rail facilities along 7th, 8th and K Streets through 12th Street. Operational issues, including scheduling, supervision, and operating capacity would need to be examined to determine whether streetcar operation would affect RT's existing light rail service. After 12th Street, the streetcar alignment would divert from the existing light rail line, continuing on K Street into an exclusive pedestrian walkway leading to the Convention Center between 12th and 13th Streets, and then returning to the street grid in order to circumnavigate the Convention Center on 13th, J, 15th, and L Streets on the Preferred Initial Alignment. Pedestrian circulation, safety issues, and visual impact issues associated with alteration of the design and visual context of the proposed walkway would need to be further examined.

Based on preliminary analysis, no fatal flaws or unavoidable impacts are anticipated in this segment.

8. Streetcar Storage and Maintenance - The proposed streetcar would share RT's existing light rail storage and maintenance facilities the RT Academy Way light rail facility. The maintenance facility would not need to be altered to maintain the streetcar fleet. However, an additional storage track may need to be constructed. RT maintenance and dispatching activities should be examined to determine whether concurrent operations would adversely affect RT activities.

No fatal flaws or unavoidable impacts related to vehicle storage and maintenance are anticipated at this time.

9. Traction Power Facilities - Traction power facilities (e.g., support poles and catenary, and substations, which have the largest footprint of the traction power facilities) take up space within



the public right of way. Substations that convert electrical current to the proper voltage for streetcar, use approximately 375 square feet of space and would be placed approximately every one-half mile along the alignment.

If the traction power facilities were located within the public right of way and the substation facilities were designed to be unobtrusive to the urban landscape, these facilities would not produce visual, land use or displacement impacts. As a result, no fatal flaws or unavoidable impacts related to project traction power facilities are anticipated at this time.

3.6.2 Environmental Screening Conclusion

The primary identified preliminary environmental issues focused on potential traffic and transportation impacts along the alignment (particularly on and in the vicinity of Tower Bridge) and potential cultural resource impacts resulting from project construction and operation on Tower Bridge.

At this time, no environmental fatal flaws or unavoidable impacts have been identified that would make the project implementation infeasible or imprudent. It is anticipated that an EIR will be prepared during Phase 2.