REPORT TO COUNCIL
City of Sacramento

915 I Street, Sacramento, CA 95814-2604
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STAFF REPORT
May 22, 2007

Honorable Mayor and
Members of the City Council

Title: Streetcar Feasibility Study

Location/Council District: District 1

Recommendation: Adopt a **Resolution** 1) approving the Streetcar route alignment proposed in the feasibility study; 2) authorizing the City Manager to direct staff to continue to work with City of West Sacramento, Regional Transit and Yolo County Transportation District through the completion of the environmental review and the preliminary design phase of the streetcar project.

Contact: Azadeh Doherty, Principal Planner, 808-3137

Presenters: Azadeh Doherty, Principal Planner; Charlie Hales, HDR

Department: Transportation

Division: Office of the Director

Organization No: 3416

Description/Analysis

Issue: In May 2006, the City of Sacramento entered into an agreement to work in partnership with the City of West Sacramento, Regional Transit (RT) and the Yolo County Transportation District (YCTD) to study the feasibility of a streetcar project to connect Downtown West Sacramento with Downtown Sacramento. Over the past year, guided by a Policy Steering Committee (PSC) and a Technical Advisory Committee (TAC), the initial phase of streetcar planning was conducted. The study team recently completed the feasibility study and will present some details on the results of the study to update the Council.

The planning process was divided into four components which included Project Planning, Concept Development, Operations and System Planning, and Finance and Organization. The initial Streetcar alignment was developed during the October 2006 Design Charrette. It reflected the findings of the project tours, the review of preliminary route opportunities, public input, PSC and TAC involvement, Design Team guidance.

Policy Considerations: The development of a streetcar system in Sacramento is consistent with the strategic goal of expanding economic development throughout the city.

Environmental Considerations: Approval of the Streetcar Feasibility Study does not have a negative impact on the environment and is, therefore, exempt under CEQA Guidelines, Categorical Exemption Section 15061(b)(3) of the California Environmental Quality Act. A comprehensive environmental evaluation under CEQA guidelines will be included in the next phase of the project.

Rationale for Recommendation: Downtown Sacramento and the Triangle/Civic Center area of West Sacramento are undergoing intense residential and commercial development. This growth will generate much greater demand for mobility within this area than can be accommodated through our existing transportation systems. It is impractical and expensive to construct additional parking garages and surface streets to facilitate this travel demand. Therefore, a high capacity transit service is needed to link the two downtown areas to provide frequent, reliable and cost effective travel options throughout this urban core.

Streetcars are a cost effective means of transportation within dense urban cities. This project will create a new form of transportation that utilizes existing rail tracks, surface streets and bridges to the greatest extent possible which will provide optimal mobility between and within downtown Sacramento and the Triangle/Civic Center area of West Sacramento.

Financial Considerations: Approval of this feasibility study will have no direct financial impacts on the City of Sacramento.

Emerging Small Business Development (ESBD): The project consultant, HDR, has met the ESBD requirement of 20% participation for this project.

Respectfully Submitted by: Francesca Lee Halbakken

Francesca L. Halbakken
Operations Manager

Approved by: Jerry Way

Jerry Way
Director of Transportation

Recommendation Approved:

for RAY KERRIDGE
City Manager

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Attachment 1

BACKGROUND

In March 2006, SACOG's Board awarded $500,000 in Community Design grants to RT for the first phase of a streetcar feasibility study. In addition, the YCTD received an allocation for $2.25 million in Yolo County State Transportation Improvement Program (STIP) funds and $250,000 for Sacramento County STIP funds for related environmental and preliminary engineering work associated with this project. Over the past year these four agencies worked on the feasibility study which resulted in selection of a preferred streetcar alignment. This alignment as it is depicted in Exhibit A, connects Downtown West Sacramento to Downtown Sacramento.

The proposed route is 2.2 miles long and shares 0.5 miles of the light rail trackage with RT along 7th, 8th and K streets. The capital cost estimates are approximately $53 million and the operating and maintenance costs are estimated at between $2.5 million to $3.5 million per year. Ridership estimates for this route is 11,000 per day.

The project proponent (City of West Sacramento) is now ready to proceed with the environmental review and preliminary engineering phases of the project. The City of Sacramento has not committed any funds toward the initial feasibility study, the environmental review or the preliminary engineering phase for this project. Currently, no specific source of funding for final design, construction, vehicles and operation/maintenance costs of the proposed project has been identified.

The streetcar project described in this feasibility analysis was identified by the cities of West Sacramento and Sacramento to improve transit service and local circulation in order to serve, support and shape existing and proposed development in the downtown core and the riverfront. This form of public transit is different from light rail and commuter buses because it is designed for urban centers. Streetcars generally increase diverse ridership, serve as a development and redevelopment catalyst and attract private participation.

Attachment 2

RESOLUTION NO.

Adopted by the Sacramento City Council

STREETCAR FEASIBILITY STUDY

BACKGROUND

A. In May of 2006 a Memorandum of Understanding (MOU) was approved which established the working relationships among the City of Sacramento, the City of West Sacramento, Regional Transit and the Yolo County Transit District (the "Parties"). The purpose of the MOU was to promote streetcar service between downtown Sacramento and West Sacramento.

B. The parties agreed to proceed with a feasibility study, environmental review and preliminary engineering phase of the streetcar project.

C. The study team was comprised of staff members from the four aforementioned agencies. Consultants used a $500,000 community design grant that was awarded to Regional Transit to complete a feasibility study for streetcar service between Sacramento and West Sacramento.

D. The Yolo County Transit District will commit $2.5 million in STIP funds for the environmental review and the preliminary engineering phase of the streetcar project.

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE CITY COUNCIL RESOLVES AS FOLLOWS:

Section 1. Approve the Streetcar route alignment proposed in the feasibility study and set forth in Exhibit A.

Section 2. Authorize the City Manager to direct staff to continue to work with City of West Sacramento, Regional Transit and Yolo County Transit District through the completion of the environmental review and the preliminary design phase of the streetcar project.

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Exhibit A: Map-Streetcar Initial and Expansion Routes

Exhibit B: Phase 1 Summary Report Downtown/Riverfront Streetcar Study

Exhibit A

LOCATION MAP
Streetcar Initial & Expansion Routes

Figure 1. Preferred Initial Alignment and Possible Extensions

Executive Summary – May 2007
Downtown/Riverfront Streetcar Study

Page 8

Exhibit B

Phase 1 Summary Report Downtown/Riverfront Streetcar Study, 89 pages

Exhibit B

Phase 1 Summary Report

Downtown/Riverfront Streetcar Study

Prepared by

HDR | ONE COMPANY *Many Solutions*

In cooperation with

Fehr and Peers
Holland & Knight
The Hoyt Company
Leland Consulting Group
LTK Engineering Services
URS Corporation

May 2007

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1.0 Introduction to the Phase 1 Report

The City of West Sacramento, the City of Sacramento, Sacramento Regional Transit District (RT), and the Yolo County Transit District (YoloBus) formed a partnership to study the reintroduction of the streetcar to connect their cities' downtowns and Riverfront areas. Over the past 30 years, both public and private interests looked at many ways to bring the streetcar back to this area - and this unique partnership, aided by funding from SACOG's Community Design Program, performed a thorough feasibility analysis for a Downtown/Riverfront Streetcar. This feasibility study develops information on the project in sufficient detail so that elected officials, public agencies, citizen groups, and other stakeholders can make informed decisions on the most appropriate transit investment, particularly in terms of technology, alignment, financing possibilities, and operating plans.

1.1 The Report Structure

This Report consists of an Executive Summary, followed by technical sections which summarize the technical analysis performed. This report's technical sections recap more lengthy Technical Memoranda that were produced over the course of the Phase 1 effort. These Technical Memoranda have been organized as Appendices A-M, and supplement this report.

This report is organized by the sequential elements of the study – Project Planning, Concept Development, Operations and System Planning, and Finance and Organization. A description of each study process is summarized below

- **The Executive Summary** – An overview of the project development process, including selection of a Preferred Initial Alignment, the fundamentals that drove the project development process, and a summary of the key technical, financial, operational, and organizational requirements needed to move the streetcar project into the next phase.
- **Project Planning** – The principal means of collecting information, assessing existing conditions and factors, and defining the direction for the preferred alignment.
- **Concept Development** – Once the initial alignment was identified, developing the technical aspects of the project
- **Systems Planning** – After the basic alignment was set and conceptual engineering initiated, developing the operations and systems plan to support the streetcar
- **Finance and Organization – Examining** the potential to finance the streetcar, as well as an organization approach that takes into account the intergovernmental nature of this venture

A note about the alignment(s): The alignment for this potential streetcar project went through an evolutionary process during the course of the Phase 1 study effort. During the initial fieldwork and project planning Charrette, a working provisional alignment was devised, and used to further analyze a potential project. Two options, called Alternatives A and B, each serving slightly different areas of both downtowns, were later developed and subjected to further review. To provide some indicator performance measures for a preferred alignment, the team prepared a

preliminary ridership forecast, service plan, and a capital and operating cost estimate based on these hypothetical routes. Revisions to each set of findings, which reflect the ultimate Preferred Initial Alignment, are included at the end of each respective summary section. During the first 60 days of Phase 2, the project's Policy Steering Committee, Technical Advisory Committee and design team will review and confirm the Preferred Initial Alignment and prepare updates for the appropriate Technical Memoranda.

2.0 Executive Summary

Four local agencies worked together to explore the feasibility of a streetcar link across the Sacramento River. This study concludes that the project is feasible and should move forward to the next phase of preliminary engineering and environmental analysis.

The assumptions employed for this analysis included a 2.2 mile route over the Tower Bridge reaching Sacramento's Midtown on the east, and the West Sacramento Civic Center on the west, using existing light rail track along 7th, 8th and K Streets for a portion of the route, and operating on 10 minute headways with a fleet of 8 cars. Ridership estimates for this scenario were surprisingly good, growing to as many as 11,000 per day by 2030. Capital cost estimates for this project are within six percent of the $50 million targeted budget, and operating and maintenance costs were estimated at between $2.5 million and $3.5 million per year.

A variety of funding sources were explored for both capital and operating costs, and while more investigation and planning is required, sufficient funding could be put together to support the project. An assessment district or community facilities district to provide private sector participation is a key component of capital funding.

The conclusion of this feasibility study is that a streetcar system as described is financially and operationally viable and is worth pursuing. The recommendation is that the project proceed into Phase 2, during which preliminary engineering design, environmental analysis, and a financing plan will be developed and further details provided.

2.1 The Streetcar Purpose

The streetcar project described and studied in this feasibility analysis is a different form of transit than light rail or commuter buses. It is an **urban circulator** and a **pedestrian accelerator**, intended to support the "walkable urbanism" of both Downtowns and their shared riverfront. Further, the streetcar reinforces the expansion of a truly urban environment through redevelopment.

Passengers enjoying streetcar transportation

The typical streetcar trip is not strictly to work - although many of the thousands of new Downtown residents will use it for that purpose. Most of the nine trips per day generated by the typical household are not related to the trip from home to work. These are the trips this urban circulator type of transit is designed to capture. These more typical urban circulation trips include:

- Lunch or dinner trips by workers who have commuted downtown by transit or who "park once" and then walk or use the streetcar for other trips

- Downtown workers on both sides of the River crossing to go to retail, restaurant, office, and other inviting destinations
- Trips between business locations for mid-day meetings;
- Visitors circulating between the hotel and convention center core in Downtown and destinations in Old Sacramento, along the waterfront, Midtown and the Crocker Art Museum
- Lunch or dinner trips by downtown residents
- Residents, employees and visitors visiting Raley Field
- Employees and visitors connecting to the larger regional transit network, and - in the next stage of the project - to the Capitol Corridor at the Amtrak station

2.2 Premises for the Plan

To achieve this vision, the four partners agreed the streetcar must meet six fundamental premises:

- Enhance the livability of the two downtowns and the Riverfront
- Offer an attractive mobility option for residents, employees, and visitors
- Support revitalization and economic redevelopment
- Upgrade the transportation infrastructure to increase capacity
- Coordinate improvements with other modes and development initiatives
- Operate within defined budget and schedule limits, using local funds and including private sector participation

2.3 The Planning Criteria

To see that the project is effective, the Planning Criteria set high standards for the streetcar. The Criteria stated that:

- The target planning budget is $50M, and a project delivered within five years
- The initial alignment is to be in the 2-2.5 miles range
- Headways are to be five to seven minutes
- The streetcar should tie to Sacramento RT's light rail system, when possible;
- Stations are to be cost effective
- Vehicles are to be ADA compliant

- There should be no grade separations, if possible, and tracks should be located within the existing rights of way

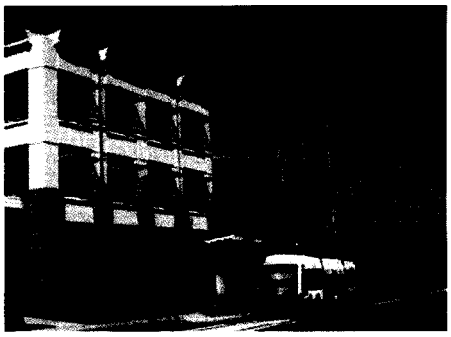
2.4 The Project Development Process

Guided by a Policy Steering Committee (PSC) and a Technical Advisory Committee (TAC), the initial phase of streetcar planning was developed through a rigorous, integrated process. The process was divided into four components encompassing 15 separate tasks. The four components employed were Project Planning, Concept Development, Operations and System Planning, and Finance and Organization.

West Sacramento City Hall - Existing

- **Project Planning** – A six-task cluster that reflects collecting information, assessing existing conditions and factors, and defining the direction for the initial preferred alignment
- **Concept Development** – Once an initial alignment was identified, the second group of tasks began developing the technical aspects of the project including route studies, an examination of potential environmental issues that the project is likely to be required to address, conceptual engineering, ridership, etc.
- **Operations and Systems Planning** – After a basic alignment was devised and conceptual engineering initiated, an operations and systems plan to support the streetcar development was outlined and operating scenarios explored
- **Finance and Organization** – Having the potential to finance the streetcar is central to the determination of feasibility, as is an organization approach that takes into account the intergovernmental nature of this venture. This task group addresses these considerations

West Sacramento City Hall - Concept



2.5 Selecting the Preferred Alignment

A provisional alignment was developed during an October 2006 Design Charrette. 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 the Design Team to make sure that the streetcar route met the project objectives, serving the civic and cultural heart of West

Sacramento, and reaching the highly successful Midtown area of Sacramento. In between, it would need to connect and transform as many development and redevelopment projects as possible. Thus, the PSC directed the team to:

- Meet individually with the Policy Steering Committee members to finalize specific issues and concerns
- Hold another Technical Advisory Committee work session to translate PSC and TAC goals and suggestions into a more refined alignment
- Define a range of possible future extensions – immediate and near-term – from the refined alignment

The Design Team and the TAC considered a number of variations in the route, and some of those variations/improvements in the alignment were incorporated into a resulting refined alignment.

Other revisions were not adopted for reasons of feasibility. For example, J Street in downtown Sacramento was considered, as an alternative to sharing track with Sacramento RT light rail on K Street. This approach was 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 may prove 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.

Convention Center Stop - Concept

The result of those sessions was an approved refined alignment, chosen at the end of the Phase 1 work that addressed the goals and concerns articulated by the PSC and TAC.

2.5.1 The Preferred Alignment

The preferred alignment (shown in yellow on Figure 1) works well as an urban circulator or "pedestrian accelerator" - precisely the function that other highly successful streetcar projects serve. As shown, the preferred alignment is 2.2 miles long, and it shares 0.5 miles of existing light rail trackage with RT. The preferred route:

- Follows a direct route from the civic and cultural heart of Downtown West Sacramento, serving 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 vibrant activities and helping vitalize the greater K Street corridor
- Traverses around the Convention Center 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 detailed narrative of the route can be found in Section 3.2 of this report.

Potential stop locations are also depicted in Figure 1. This set of stop locations provides the best access to existing and future pedestrian connections to destinations along the line. Individual stop locations will be subject to further refinement in the Phase 2 Preliminary Engineering process. The initial alignment is designed to be successful from day one, while serving infill and large redevelopment properties on both sides of the River. It also is configured to easily expand through extensions, as significant future development occurs in the Triangle Redevelopment Area and in the Railyards redevelopment site.

2.5.2 Future Possible Extensions

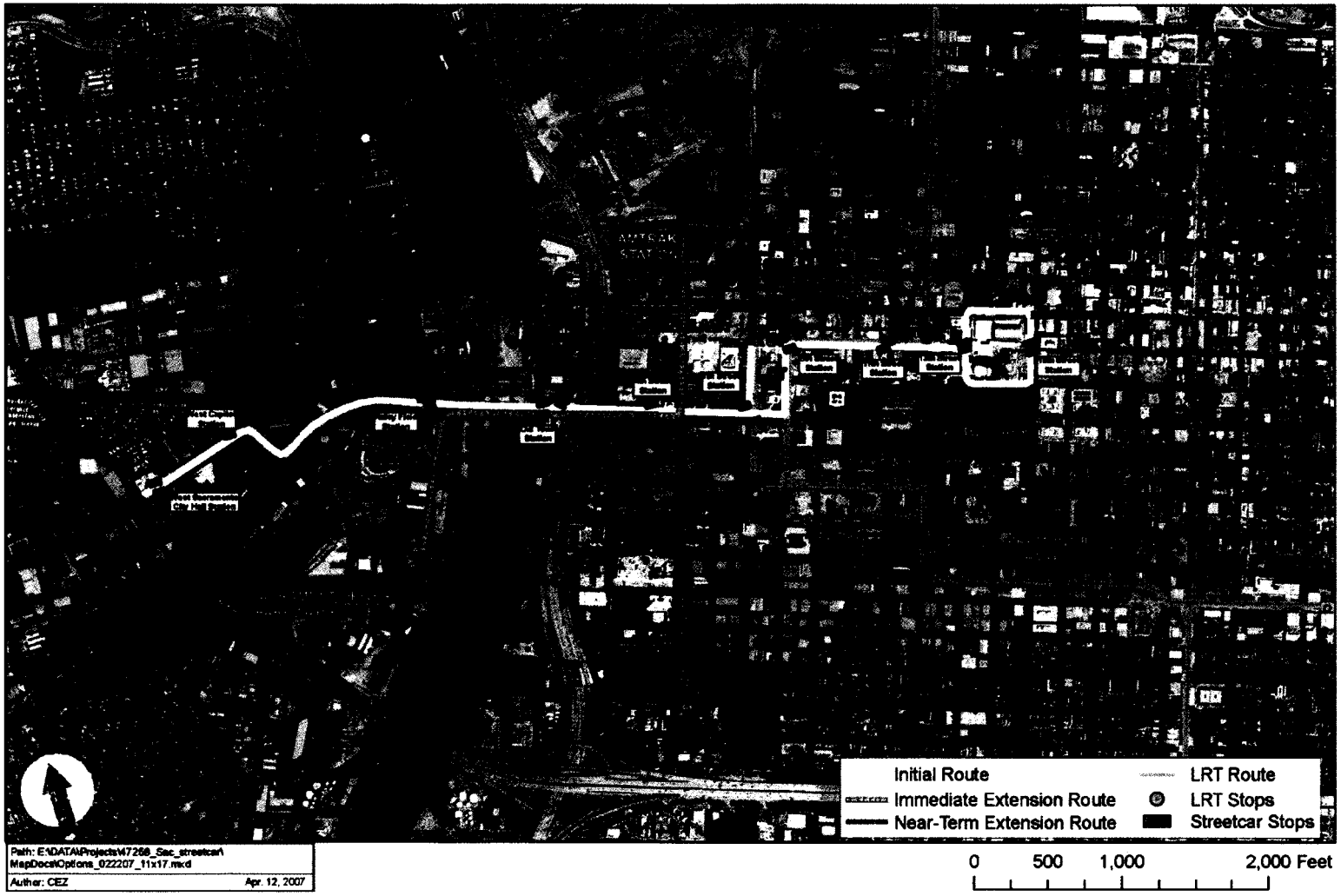
Understanding the potential for extending the system is important, since recent streetcar projects show that when the initial system proves itself, there is an almost immediate call for extensions. Future extensions also will add value to the initial investment, linking more destinations and serving more riders. Figure 1, in addition to the Preferred Initial Alignment, shows a possible extension – called **immediate**, shown as an orange line. This extension - actually a pair of possible extensions, one on each side of the river - is ready when needed to shape and connect true pedestrian-oriented development in the two Downtowns and along the Riverfront.

The immediate extension would share the track over the Tower Bridge, with an extension on the east side of the river north along Fifth Street to the Sacramento Valley (Amtrak) station; and on the west side, extending south to the Triangle redevelopment area along South River Road. This "Z" shaped route could be operated as a second line.

2.5.3 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 1). These extension options would serve planned and programmed redevelopment and neighborhood 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 to the north; the R Street corridor, Broadway to the south; and farther east into Midtown.

Figure 1. Preferred Initial Alignment and Possible Extensions



2.6 Environmental and Engineering Issues

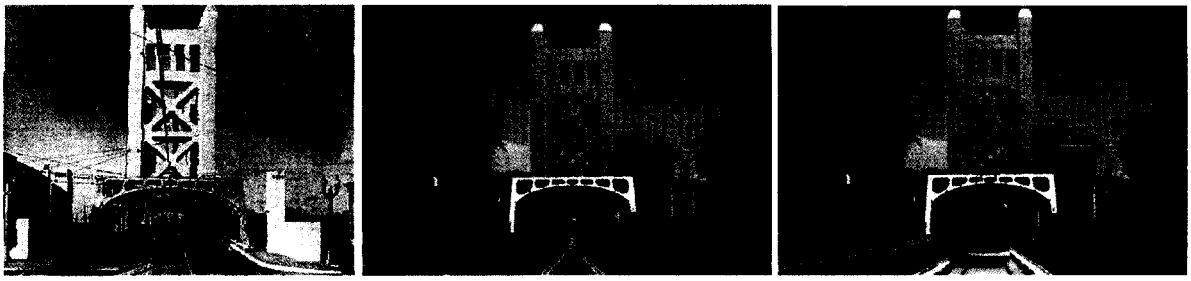
The Phase 1 analysis examined a number of environmental and engineering issues. A partial list of these issues of these appears below; more detailed reviews are found in Appendix B which supplements this report.

Key environmental and engineering issues:

Tower Bridge – The Tower Bridge is an historic structure built in 1934. Originally designed to support rail operation, all rail facilities were removed in 2004. Streetcars would restore this historic function to the bridge, but may add new elements to the bridge that could alter the bridge's design, appearance, or historic mechanical system, as well as the configuration and width of its travel lanes.

Additional structural and traffic analyses, as well as conferring with the State Historic Preservation Office, are included in Phase 2 of the project development process.

Tower Bridge 1943 ***Tower Bridge 2007*** ***Tower Bridge Concept***



The I-5 Overcrossing - Unlike Tower Bridge, the I-5 overcrossing at Capitol Mall originally was not designed to accommodate rail. The streetcar line would need to traverse over this structure.

Preliminary structural analysis and an initial review by Caltrans indicate that the additional dead weight of project facilities on the overcrossing would not require bridge modification or strengthening. Permitting requirements would likely be minimal, involving only an Encroachment Permit from Caltrans.

Streetcar Storage and Maintenance – The intention is for the streetcar to share existing light rail storage and maintenance facilities with RT vehicles at the Academy Way light rail facility.

No fatal flaws or unavoidable impacts related to vehicle storage and maintenance are anticipated at this time. An allowance to augment the RT maintenance facility is included in the Cost Estimate.

2.7 The Vehicles

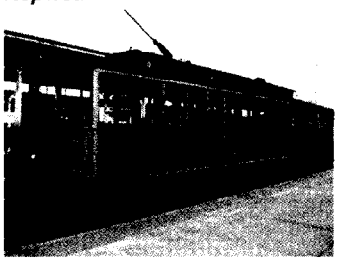
The initial vehicle was assumed to be a replica streetcar, similar to the car that is operating in Tampa, Little Rock, and Charlotte, and a close look-alike to cars that ran in Sacramento from the

1920s through World War II. The vehicle is manufactured by the Gomaco Trolley Company in Iowa. The car is 45-50 feet long, and it holds about 80 passengers, with 40 seated and 40 standing. Given the operational characteristics, an initial fleet of eight vehicles (six in service and two in reserve) would be required.

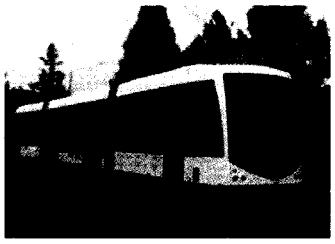
This working assumption on vehicle selection was made based solely on cost considerations, but the PSC and TAC have asked for the modern streetcar (the "Inekon-type" vehicle being used in streetcar projects in Portland, Tacoma, Seattle and Washington, DC) to remain a possibility, depending on the system design and budget findings made during Phase 2 of the study.

The modern streetcar, although more expensive, has greater passenger capacity (about 125 passengers) and other positive operating characteristics. These vehicles are designed with a large low-floor center section, allowing level boarding, a key for both wheelchair access and for passengers with bikes, luggage, or the small folding carts used by urban residents to carry home their groceries. They also have two sets of double doors located in this center section, in addition to a single door at each end. This facilitates much faster loading and unloading of passengers and reduces the "dwell time" at each stop, thus improving average speed along the route.

Replica



Modern



A fleet comprised entirely of modern cars would add approximately $16 million to total project cost.

The choice of vehicles has more than operational implications; it also could influence the applicability and attractiveness of streetcars in possible future extensions.

2.8 Operational Characteristics

This section addresses the total time for a round trip time and frequency of service ("headways"), and the number and type of stops.

Round Trip Times, Frequency of Service, and Hours of Operation

The round trip would take 52 minutes, approximately 26 minutes each way (including layover) and the estimated average operating speed is 10 miles per hour generally and 6.5 miles per hour on RT tracks (due to coordination with light rail trains on the tracks). The average dwell time at a stop would be 15 to 30 seconds, depending on the particular stop. There would be a five minute layover at each end of the route.

Headways (time between streetcars) were assumed to be 10 minutes. The initial Planning Criterion for headways was 5 to 7 minutes, and operation at that frequency is also feasible but had implications for both capital and operating costs. More frequent headways require more vehicles and the system costs more to operate. For reasons of reducing fleet size and managing operating costs, initial headways were set at 10 minutes during peak times and 15 minutes in off-peak times. In general, the streetcar operations were assumed to be from 6:00 AM to 12:00AM.

Streetcar Stops

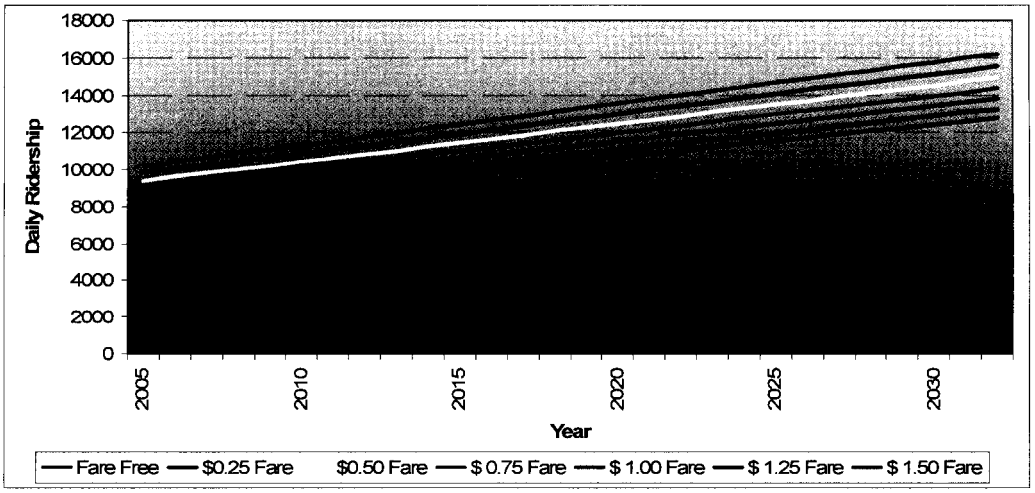
There are 18 stops or stations planned along the route, and they generally are spaced about 1200 to 1400 feet apart, the equivalent of three to four downtown Sacramento blocks. The stops would have simple shelters, and generally they would be located at curb side. In the case of Capitol Mall, they are proposed to be located in the center median between the tracks. The stops would be 65-75 feet long to accommodate one vehicle, and would be configured to be accessible to wheelchair boarding.

Current and proposed view of Tower Bridge towards West Sacramento

2.9 Ridership and Fares

For the year 2010, the estimated patronage on the preferred route is projected at 9,900 riders per day, growing to some 11,100 riders by 2030. The average rider is expected to travel approximately 4-6 blocks, one or two station stops, underscoring the streetcar's role as a "pedestrian accelerator".

Figure 2. Daily Streetcar Ridership over Time for Various Fare Rates



The anticipated fare is $0.50, consistent with the existing Sacramento RT discounted fare, with the ticket being part of the integrated RT and YoloBus fare structure. Convenient ticketing (on-board or off-board) would be designed into the system.

2.10 Capital and Operating and Maintenance Costs

Using basic assumptions about route, vehicle type, headways, and hours of operation, the project team was able to develop preliminary estimates of the cost to build the system (capital costs) and to operate and maintain it.

2.10.1 Capital Cost

The capital costs include construction of the track, electrical power system and signals, stop shelters and passenger amenities, and purchase of the vehicles, as well as the soft costs associated with the final engineering, design and construction of the preferred project. For the preferred route, the estimated capital cost is $53,132,000 or approximately $14,966,000 per track mile. The Planning Criterion was a project cost to not exceed $50,000,000, so the estimate is within 6 percent of the targeted planning budget.

Table 1. Capital Cost Summary

Capital Costs	Cost in Dollars
Track	$ 15,257,000
Power, systems, and signals	11,192,000
Stations	1,190,000
Vehicles (replica), maintenance facility	10,000,000
Final design, construction management, construction soft costs	10,601,000
Contingency (15%)	4,892,000
Total	**$53,132,000**

(2007 dollars)

The project could be redesigned to meet the budget by reducing track length, but this would have consequences for both ridership and the ability to finance the project. The preferred route selection was made with the understanding that the Planning Criterion on cost would be flexed to allow a slightly more expensive, but significantly more viable project.

2.10.2 Operating Costs

Operating costs are those recurring costs associated with the operations and maintenance of the preferred route. Such costs are comprised of vehicle operations (hours and miles generated), vehicle maintenance, non-vehicle maintenance, administration, and a contingency. As currently planned, the estimated annual costs for an eight car fleet, with 10 minute peak-time headways and 15-minute off-peak headways, are $3.55 million.

Table 2. Operating Cost Summary

Estimated Annual Cost – preferred operating scenario	
Vehicle operations (38%)	$1,349,000
Vehicle maintenance (19%)	675,000
Non-vehicle maintenance (12%)	426,000
Management and support (31%)	1,100,000
Total	**$3,550,000**

2.11 Finance and Management

Once the capital and operating costs were estimated, the next step was to develop a funding program. From the beginning, the intent was to fund this streetcar project without federal New Starts transit funds and with active private participation. The primary focus is to identify the potential funding tools likely to be available to support each type of project cost. The following group of criteria was used to select the most appropriate funding tools: ease of implementation; potential revenue generation; timing; projected political support; fairness; predictability; and successful use on streetcar lines elsewhere. Because the project spans two cities and two transit districts, the institutional issues are complex. The objective in this feasibility study and report is to offer a range of possible approaches to be refined and recommended in the next phase of the project.

2.12 Capital Funding Tools

This section identifies a "short list" of potential streetcar funding mechanisms. Each was evaluated for preliminary feasibility and appropriateness for the Downtown/Riverfront Streetcar project. The list of funding tools does not include those that were considered inappropriate (whether for legal, political, technical, or other reasons) for the project. The fund sources are grouped by the potential source – Development Related, City, County/Region, and State and Federal.

The analysis of potential funding revealed there are several suitable and available fund sources to finance final design, construction, and operation of the project. Following the brief description and a possible range of each funding source, Table 3 demonstrates the estimated low-to-high range of funding by potential source.

2.12.1 Development Related

- **Community Facilities District** - A community facilities district (CFD or Mello-Roos CFD) assesses property owners to pay for specific infrastructure that benefits the district.
- **Special Assessment District** - Like a CFD, special assessment districts are geographical areas in which property owners receive a special benefit from new publicly-financed infrastructure, and assessments are made on property in order to build and sometimes operate that infrastructure.

- **Development Impact Fees** - These fees cover the capital cost of the infrastructure needed to serve new development and the people who occupy or use the new development.
- **Real Estate Transfer Fees** – Transfer fees are currently collected by each city upon the sale of real property, however these funds are already dedicated to existing programs. Separate private real estate transfer fees are also allowed and have been used by builders to fund a wide range of improvements. Controlled through deed restrictions, the fees can range from 0.5 percent to 1.75 percent of the sales price.

2.12.2 City Sources

- **West Sacramento ¼ cent Sales Tax** - By renewing (with voter approval) the portion of a citywide sales tax scheduled to expire in 2013, significant revenues would continue to be generated, a portion of which could be bonded and dedicated to the streetcar.
- **Tax Increment Financing** - All of the streetcar alignment is within redevelopment districts in Sacramento and West Sacramento. However, budgets in both districts are overcommitted with projects, and other project funding priorities would need to be delayed in order to add the streetcar to the project list.
- **City General Funds** - General funds are always in tight supply, but such funds have been used to partially pay for a number of streetcar systems, including Portland and Charlotte.

2.12.3 County/Regional Sources

The Sacramento Area Council of Governments (SACOG) is the only source of regional resources. Once planning and engineering is complete, West Sacramento (or whichever agency will be responsible for construction) could pursue a grant from the Community Design program. Regarding County Sources, there is discussion of a future Sacramento County sales tax proposal to fund a variety of transportation improvements.

2.12.4 State/Federal Sources

- **Proposition 1B (Transportation Bond Package)** - California's Transportation Bond Package (Proposition 1B) was approved by voters in November 2006 and later enacted by Senate Bill 1266, allocating $19.9 billion to a wide variety of transportation-related projects around the state, of which $4.0 billion is specifically directed towards public transportation fleet expansion and capital improvement. The majority of the $4.0 billion public transportation fund will be allocated according to formulas.
- **Proposition 1C** - Passed in November 2006, Proposition 1C will provide funding for housing, with specific applications to transit-oriented development (TOD). Pending further legislative definition of applicable projects, this funding source could potentially be used for infrastructure (such as streetcars) that supports TOD and housing.

- **State Grants and Federal Earmarks** - Such earmarks have been used in other transit systems and the streetcar would seemingly be a good candidate. Earmarks or any other federal funding sought for this project are assumed not to include Federal Transit Administration New Starts grants, since other projects in the region will be seeking such funding.

2.12.5 Summary of Potential Capital Funding Sources

Table 3 summarizes the range of potential funding from the sources identified above. A combination of these funding sources will need to be secured to reach a projected capital cost of $53 million. The potential funding from the new Propositions 1B and 1C introduces a significant unknown opportunity. The high range potential from all of these sources totals more than twice the projected capital cost of the streetcar. Therefore, there should be room to adjust the mix of funding tools as more information becomes available about each one and as they are tested more thoroughly with property owners, businesses, and public agencies.

Table 3. Summary of Potential Capital Funding Sources

Funding Type	**Range (millions)**		**Location**	
(Listed from Local to Federal)	**Low**	**High**	**Sac**	**W. Sac.**
Development-Related				
CFD and/or Assessment District	$5.0	$50.0	✓	✓
TIF (Sac)	2.0	10.0	✓	
TIF (West Sac)	2.0	10.0		✓
Development Impact Fees	1.0	5.0	✓	✓
City				
W. Sac ¼-cent Sales Tax Extension	4.0	9.4		✓
W. Sac General Fund	1.0	3.0		✓
Sac General Fund	1.0	3.0	✓	
Parking Revenues	TBD	TBD	✓	
County / Region				
SACOG Community Design Grant	0.5	2.0	✓	✓
Future Sacramento County Transportation Sales tax	TBD	TBD		
State/Federal				
Prop 1B	0.0	10.0	✓	✓
Prop 1C	0.0	20.0	✓	✓
Legislative Earmark	0.0	20.0	✓	✓
TOTAL	***$16.5***	***$142.4***		

2.13 Operations and Maintenance Funding Sources

The package of funding tools for ongoing operations and maintenance will need to be different than that for capital construction, as the former requires a steady, predictable flow of money over the long term, rather than a lump-sum contribution up front. For this reason, bonded money is not as important as sources that will generate cash flow each year.

2.13.1 Farebox Revenues

In most other cities, farebox revenues cover only a portion (between 2 and 40 percent) of operating costs of streetcar systems. This is partially due to the fact that some cities, like Portland, have lowered or eliminated fares in order to improve downtown transit circulation. The magnitude of farebox revenues will depend on many factors, including whether the streetcar integrates with fare structures for Yolobus and RT (this integration is assumed for planning purposes in this study), whether transfers are allowed (and if so, for how long), monthly pass usage, fare evasion rates, and other factors.

2.13.2 Parking

Revenues from city-owned parking meters and garages have played a critical role in the funding of the Portland Streetcar. The potential funding range from this source was not evaluated because parking funds are dedicated to other purposes in the City of Sacramento and because no public parking revenue is currently generated in West Sacramento.

2.13.3 Property Based Improvement District (PBID)

A PBID assesses businesses and property owners to support district marketing, safety, and maintenance and could potentially be used to support operation of the streetcar. A PBID currently exists in downtown Sacramento that surrounds much of the proposed streetcar alignment.

2.13.4 Special Assessment District

An assessment district, as described above, can also fund operating costs. The proposed regional riverfront entity may be one vehicle.

2.13.5 Transit Agency Operating Funds

Many streetcar systems have been subsidized through general operating funds from the regional transit agency. The source of these funds would be each agency's share of regional transit operating funds from state sources and sales taxes (TDA). This could require redirecting funds used to provide current services. Operating funds that currently go toward lines that could be discontinued can be redirected to streetcar operations.

2.13.6 Extension of the West Sacramento ¼-cent Sales Tax

A portion of an extension of the West Sacramento sales tax could be dedicated to operations and maintenance instead of being bonded for capital construction. Since the full amount of existing sales tax revenue is dedicated through 2012 (its scheduled expiration) the timing would be right for using an extension to fund operating costs.

2.13.7 Advertising and Sponsorships

Advertising and sponsorships have been an important component of most other streetcar systems, either through annual advertising renewals or long-term prepaid sponsorships. Advertising can supplement the operations budget.

2.13.8 Endowment Fund

An endowment could be a source of long-term stability for ongoing operating costs for the streetcar. Creating an endowment would require a significant up-front source of money, but would relieve budget uncertainty in future years.

2.13.9 Summary of Operations Funding Sources

Table 4, below, summarizes the potential revenues that could be generated for operations and maintenance. Funding operations and maintenance will undoubtedly be one of the most challenging aspects of the project and will require more detail in Phase 2. With incomplete knowledge about potential revenue sources, the funding package could still cover the $3.5M in annual operating costs if revenues were secured at the high range for each source.

Table 4. Operations and Maintenance Funding Tools

Funding Type	Range (millions)	
	Low	High
Farebox	$0.00	$0.70
Funds from Discontinued Bus Service	0.00	0.16
PBID	0.50	1.00
W. Sac. ¼-cent Sales Tax Extension	0.00	0.80
Advertising / Sponsorships	0.30	2.00
Parking	0	0
Total	**$0.80**	**$4.66**

2.14 Management Alternatives

The means of owning and operating the streetcar in a multi-jurisdictional setting is a critical decision for the communities. The goal of this phase of work is to offer a range of possible approaches to be refined and recommended in then next phase of the project. Three models are offered for further evaluation and discussion; others might yet be devised.

2.14.1 RT Options

Three possibilities for RT operation of the streetcar are described below. Several variations and alternatives may come up in Phase 2 of the study, as well.

- **First** YCTD, or West Sacramento, and Sacramento could contract for the provision of streetcar service with RT. Streetcar service parameters, including financial contributions and sources could be addressed in that agreement. The Policy Steering Committee created for this streetcar study could continue meeting on an as-needed basis.
- A **second** alternative (a variation of above) would be if West Sacramento contracted directly with RT for streetcar service, regardless of the funding source. West Sacramento would be entitled to appoint at least one person to the RT board. As the current legislation allows, votes are weighted based on the level of financial support from participating jurisdictions. This alternative offers the immediate advantage of not financially jeopardizing the continuation of YCTD bus service, which is largely dependent on West Sacramento TDA funds.
- A **third** alternative would be for the City of West Sacramento to activate full membership with RT. West Sacramento, YCTD, and RT would need to resolve operational, managerial, and financial issues associated with this option.

At this early stage, there is no reason to debate whether TDA funds should be shifted from YCTD to RT; rather, the intention of the streetcar project was never to establish one service mode by decimating the other. New funding sources will be needed to address the streetcar funding needs. Bus and streetcar service as complementary to one another. Both YOLOBUS and RT may choose to reconfigure some of their local fixed route services to enhance transfer opportunities to/from streetcar.

2.14.2 The Portland Model

The City of Portland together with private sector supporters of the streetcar concept arranged for the incorporation of a not-for-profit corporation to provide focused leadership for the project. This entity is Portland Streetcar, Incorporated, or "PSI". PSI was established to provide the greatest possible flexibility in addressing implementation of the streetcar system. The PSI Board represents both the city and private partners, while contractual relationships with the City itself and with TriMet provide for the necessary flow of funding, the power of eminent domain, and for operations and maintenance. The Board membership is supportive and stable.

As the primary sponsoring public agency, the City of Portland assigned a Project Manager to oversee the entire sequence of streetcar planning, design, construction, and operating activities. PSI's staff works closely with the City Project Manager, in addition to reporting to the PSI board. In the West Sacramento-Sacramento context, this approach could be used by forming a similar not-for-profit corporation designed to meet the requirements of the local context. Board membership could be on the basis of appointments made by each of the current study partners, and might or might not also include representatives of the private sector.

2.14.3 Joint Exercise of Powers Authority (JPA)

JPAs are commonly used in California and elsewhere where mutually desired projects are dependent upon the coordinated effort of more than one public entity, across jurisdictional boundaries. A good example of a successful JPA in which some of the parties involved in the streetcar feasibility study are also currently engaged is the Capitol Corridor.

2.15 Phase 2 and Next Steps

The streetcar is feasible from technical, political, and financial capacity viewpoints, but many questions remain unanswered and details unresolved. The scope of work for Phase 2 of this effort falls into three broad categories – preliminary engineering and design, environmental analysis, and financing and management. Each of these tasks will be supported by a public outreach program to assure a well informed public is involved in the key decisions about the project and full compliance with public notification and comment requirements of CEQA. The estimated time to complete Phase 2 is 15 months.

Once the environmental documentation is complete, a financial plan is ready to implement and the institutional arrangements are selected, the next phases of the project will focus on final design, creating the institutional arrangements, and initiating the financing. Construction could be accomplished within three years of the completion of Phase 2.

As the project moves into Phase 2, the intent is to move the streetcar closer to reality through a combination of more detailed technical work and the resolution of policy, funding and implementation issues. The PSC and the TAC, working collaboratively with the Design Team, will guide this process and prepare recommendations for the four governing bodies.

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.

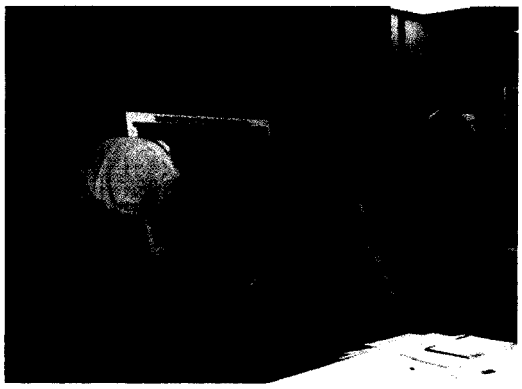
Data Collection

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 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:

Alignment ideas being discussed at the Charrette



- 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 13thth 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:

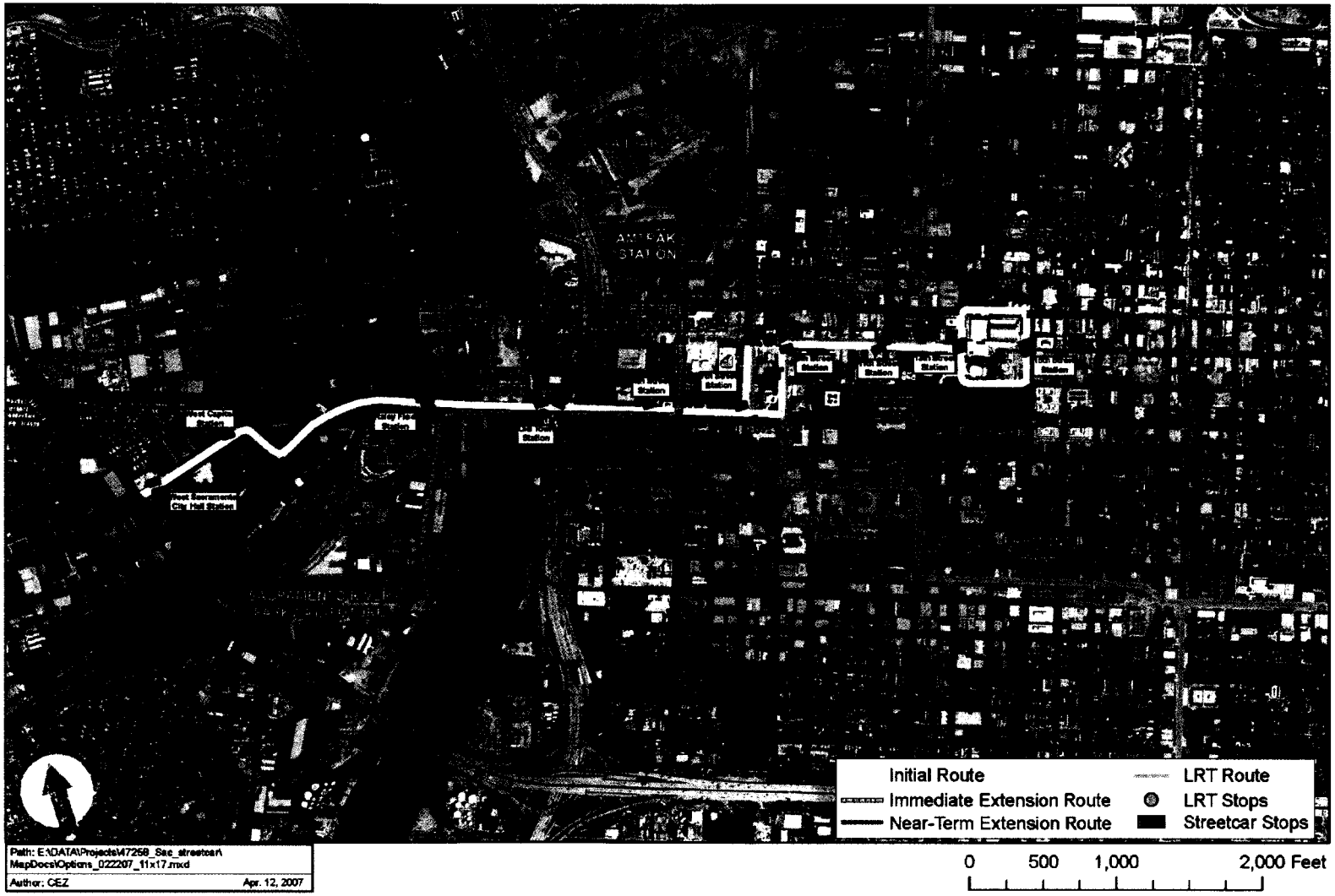
- Share track with the initial route from 3rd and Tower Bridge Gateway on the West Sacramento side to 5th and Capitol Mall on the Sacramento side;
- Branch south from the spine (yellow line) on the West Sacramento side to serve and catalyze development in the Triangle Specific Plan area;
- Branch north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

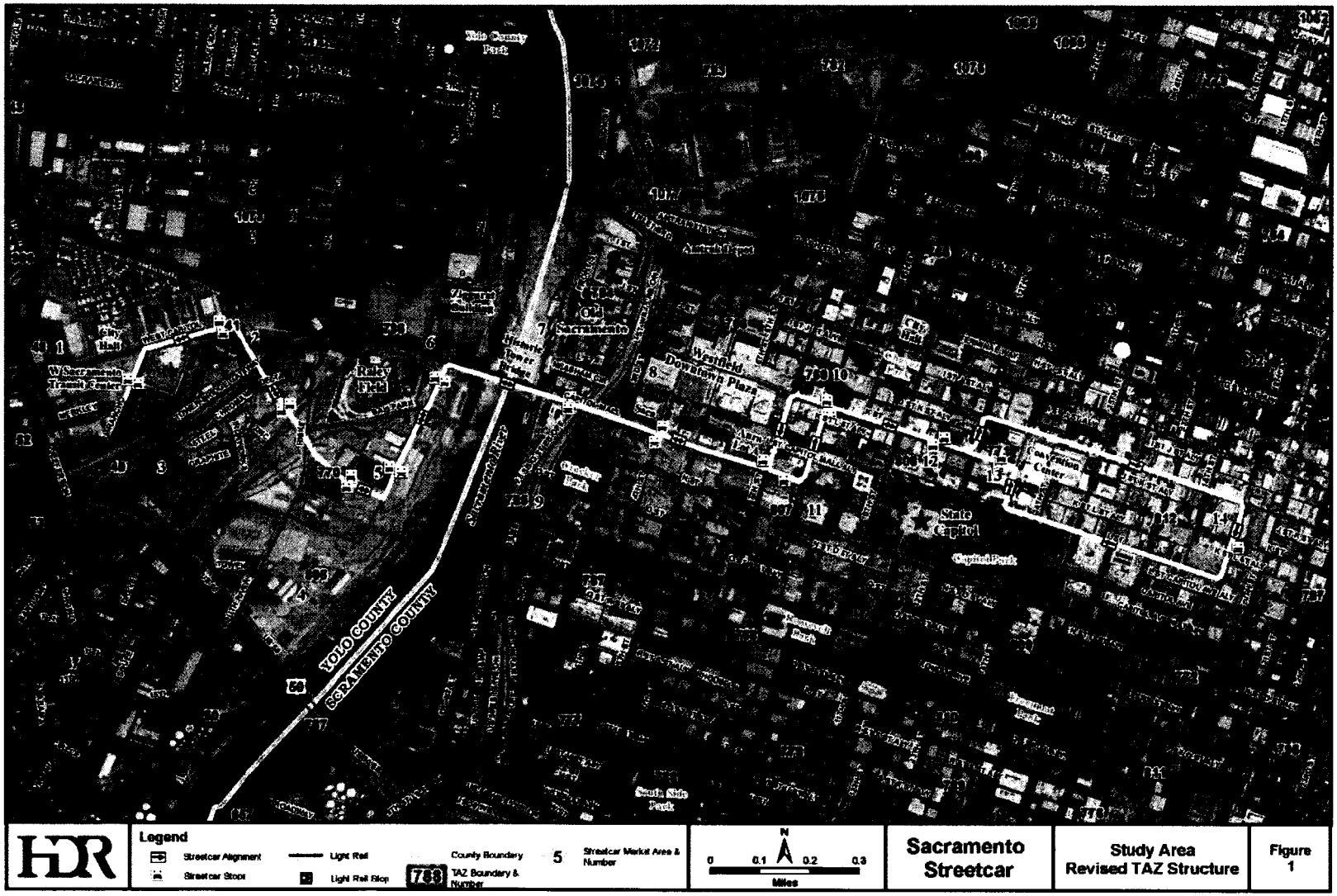
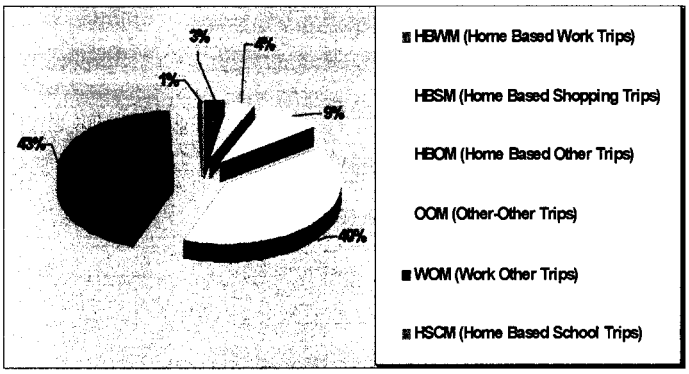


Figure 6. Existing (Year 2005) Streetcar Market Area Trip Markets by Trip Purposes



Trip Purpose	Daily Trips
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

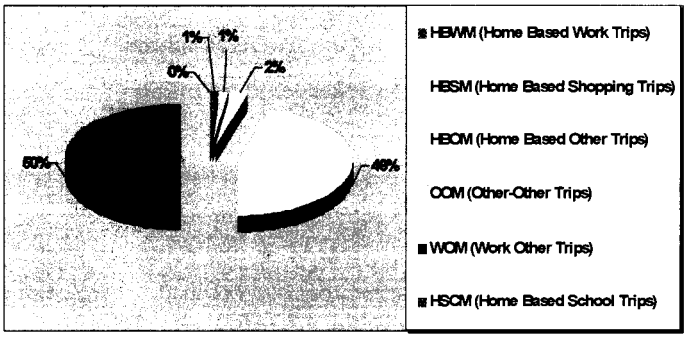
Distributing the market area trips

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



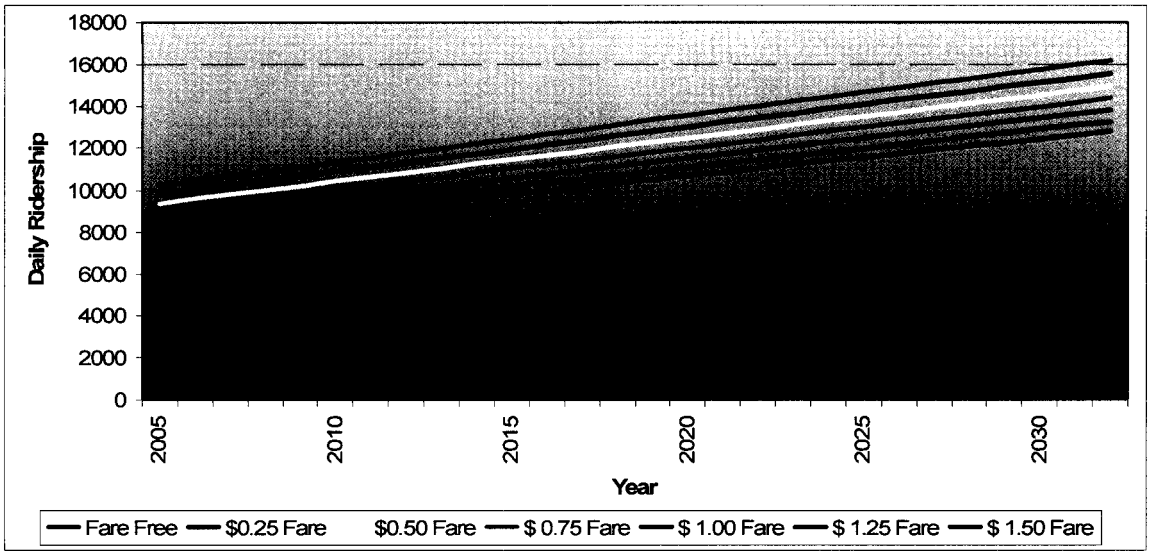
Trip Purpose	Daily Trips
HBWM (Home Based Work Trips)	1,553
HBSM (Home Based Shopping Trips)	1,453
HBOM (Home Based Other Trips)	2,862
OOM (Other-Other Trips)	59,344
WOM (Work Other Trips)	65,032
HSCM (Home Based School Trips)	0
TOTAL	**130,244**

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.

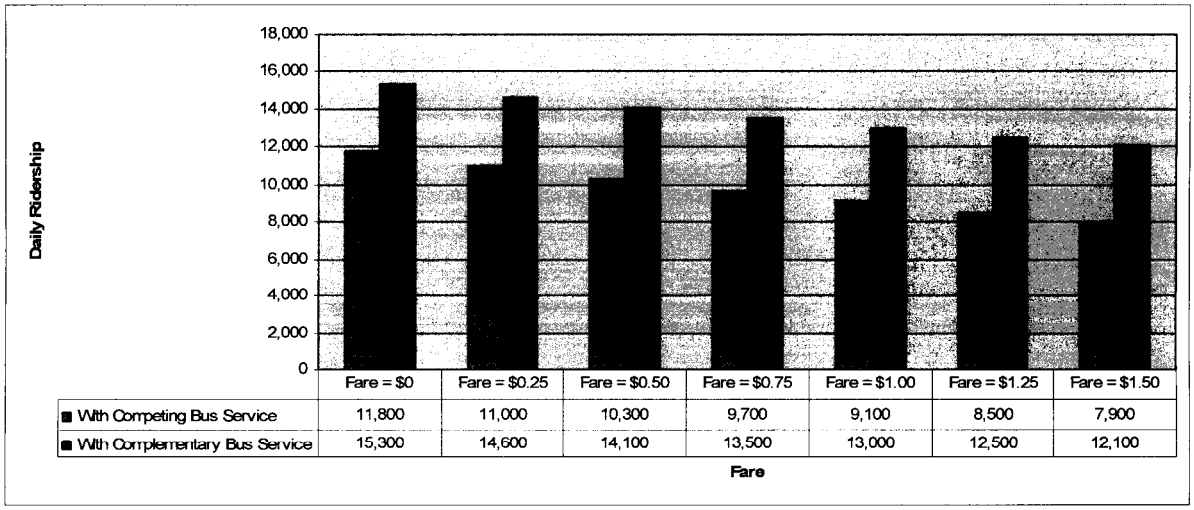
Figure 8. Daily Streetcar Ridership over Time for Various Fare Rates



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.

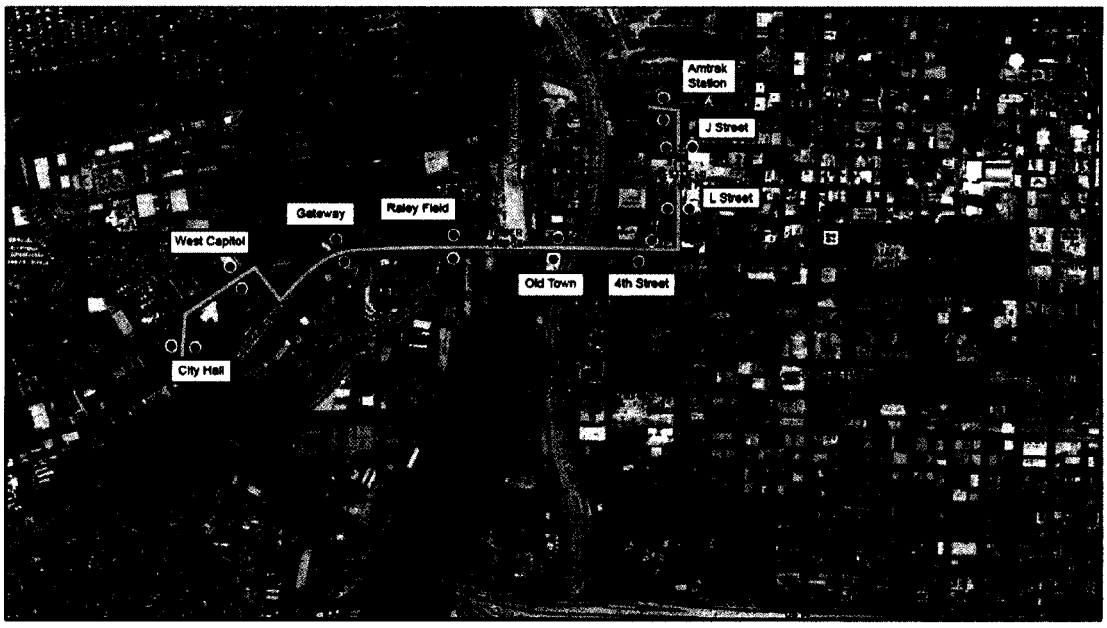
Table 5. Market Area Travel Impacts of the Streetcar System

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

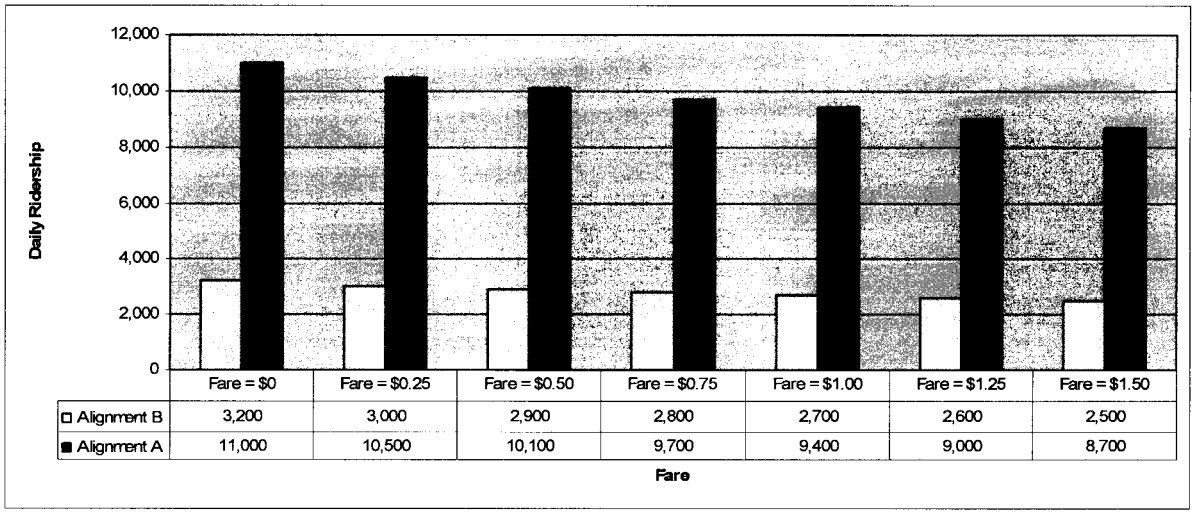
An alternate route, Alignment B (see Figure 10), was considered in the analysis for comparison purposes. Alignment B would attract 3,200 and 7,800 daily riders in 2010 and 2030, respectively, considering fare-free system, 10-minutes headway, and presence of complementary bus service. Figures 11 and 12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

Figure 10. Alternative Streetcar Alignment - Alignment B



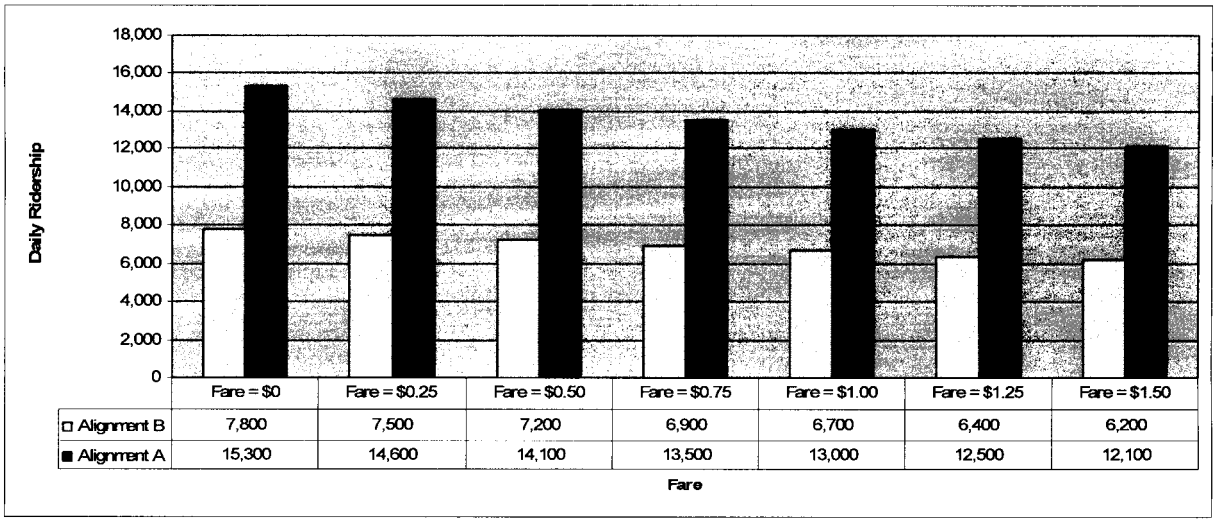
Results indicate that system ridership for Alignment B is significantly lower than the ridership for the original provisional alignment.

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



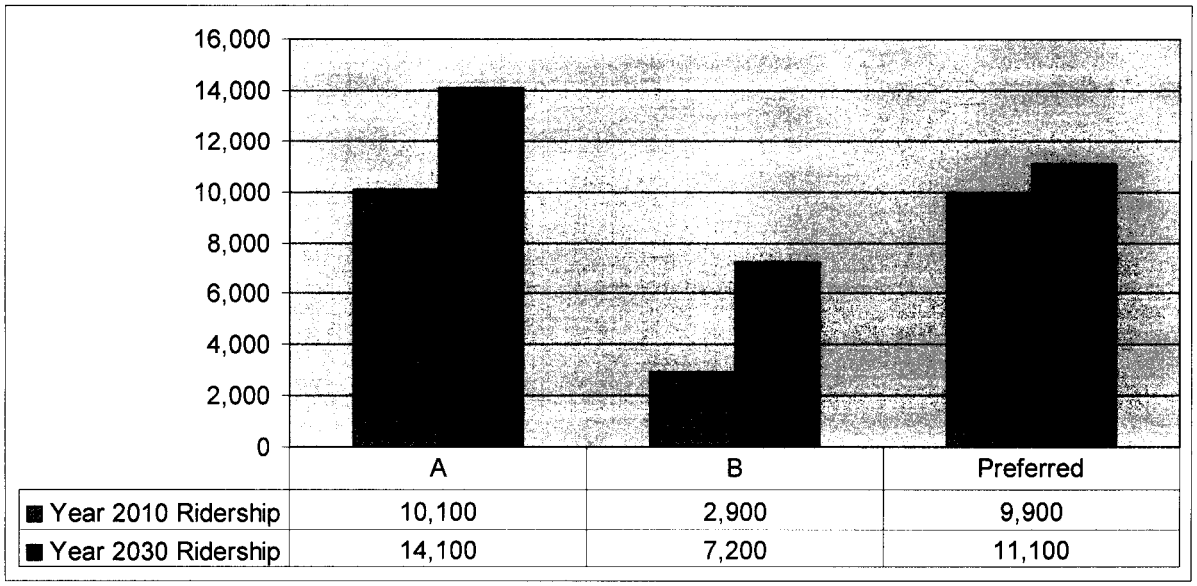
Assumption: Complementary bus service, 10 minutes headway

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



	A	B	Preferred
Year 2010 Ridership	10,100	2,900	9,900
Year 2030 Ridership	14,100	7,200	11,100

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 cites 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 us 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 Wes 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.

4.0 Concept Development

For this project, Concept Development analysis included:

- Bridge Structure Evaluation
- Conceptual Engineering
- Station/Stop Design Criteria
- Cost Estimating

One of the most critical elements that can set the stage for the successful implementation of a streetcar system occurs through **Concept Development**. In general, **Concept Development** focuses on:

- Avoiding underground utilities where possible
- Minimizing potential modifications to traffic operations at critical intersections
- Minimizing impacts to on-street parking
- Configuring termini with consideration for future expansion
- Optimizing streetcar operations

For this project, such issues as the structural integrity of the Tower Bridge and I-5 overpasses can affect project costs. Where the tracks and stations are physically placed can have a direct effect on capital costs, traffic operations, surrounding built environment and the amount of disruption to the community during construction.

4.1 Bridge Structure Evaluation

The Downtown/Riverfront Streetcar Study project area includes two existing bridges - the Tower Bridge over the Sacramento River and the Capitol Mall Separation, which carries Capitol Mall over Interstate 5. The analysis includes a preliminary investigation of both structures' ability to carry streetcar traffic with current motor vehicle, bicycle and pedestrian traffic. Lane configurations, clearances and structural capacities of each bridge were also analyzed. The evaluation also included preliminary recommendations for addressing issues related to bridge structures. Historic issues were explored as part of the environmental screening process.

Figure 14. West Sacramento Approach to Tower Bridge

A Bridge Structure Evaluation Technical Memorandum detailed findings of the analysis. Summaries of specific findings

are described below:

4.1.1 The Tower Bridge

The Tower Bridge (Figure 14, above), owned by Caltrans, is listed on the National Register of Historic Places. It is a seven-span steel truss and plate girder bridge with lightweight concrete deck. The bridge spans 737 feet 7 inches over the Sacramento River. The main river span is a vertical lift span measuring 209 feet 6 inches. The lift span is flanked by truss spans of 192 feet 6 inches and 167 feet 5 inches on the west and east, respectively. The overall bridge width is just over 68 feet with a 52-foot-wide roadway and 4-foot wide sidewalks cantilevered outside of the trusses.

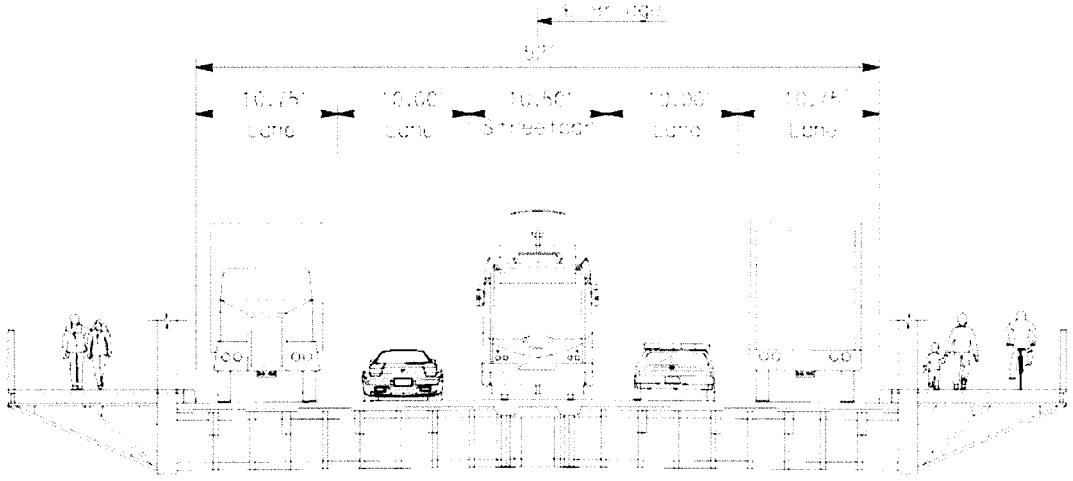
The bridge originally carried a single track electric interurban passenger and freight railway line along the center of the bridge flanked two lanes of traffic on each side. After the interurban passenger trains stopped operating, freight trains continued to use the bridge for a number of years before the tracks were paved over and ultimately removed.

Alternatives Evaluated

Three rail transit alternatives were evaluated to determine the most efficient traffic and streetcar operation scenario and to assess whether structural reinforcements would be needed:

- ***Two Traffic Lanes with One Dedicated Streetcar Track*** - In this alternative, a single streetcar track would run in a centered, dedicated right of way. Here, the number of traffic lanes would be reduced from four to two - one eastbound and one westbound traffic lane. This alternative would include 12-foot-wide traffic lanes, a 14-foot dedicated streetcar guideway, and seven-foot-wide shoulders. Initial discussions with Caltrans indicate that this alternative may be feasible. Both of the cities, however, object to the reduction in capacity given traffic projections for the area. In Phase 2, traffic studies will be conducted to further evaluate the viability of this option.
- ***Two Traffic Lanes and Two Mixed Flow (Traffic and Streetcar) Lanes*** - This lane configuration is comprised of four 11-foot-wide traffic lanes with two 4-foot-wide shoulders. However, two of the four lanes (one in each direction) would serve as mixed-flow of highway and streetcar traffic lanes. For this alternative, the mixed-flow lanes could either be the two interior lanes or the two exterior lanes. This configuration would require structural alteration to the bridge deck or roadway stringers to accommodate double tracking.
- ***Four Traffic Lanes with One Dedicated Streetcar Track*** - In this alternative, shown in Figure 15, a single streetcar track would run along the centerline of the bridge in a dedicated right of way between two eastbound and two westbound traffic lanes. This is the historic rail configuration. Implementing this alternative would require reducing lane widths to below 11 feet and eliminating the existing 4-foot shoulders. This would require a design exception from Caltrans, which Caltrans has indicated would not be approved.

Figure 15. Possible Tower Bridge Configuration



A final lane configuration for the Tower Bridge will be selected in next phase of project implementation.

Original Tower Bridge Design Loads

The original rail line was designed to accommodate rail use of the bridge. Two heavy steel stringers, designed were constructed directly under each rail of the original bridge rail track. Generally speaking, all of the rail vehicles being considered for the proposed streetcar system can be accommodated.

Current Design Loads — Streetcar Loading

Two different electric traction vehicles are being considered for the proposed streetcar system: a replica Birney Trolley (Birney, manufactured by Gomaco Trolley Company), and a modern streetcar such as the Inekon TRIO (modern streetcar).

Streetcar Dead Loads

Dead loads associated with track, train control equipment and an Overhead Catenary System (OCS) must be considered for analysis of project implementation on the Tower Bridge structure. Strengthening of the floor system for double tracking would further add to the dead load.

The bridge's lift span is extremely sensitive to the addition of dead load. The lift span weighs approximately 1,000 tons and the counterweights have a combined weight of over 988 tons. Caltrans' goal is to avoid adding additional lifting weight to the span.

- **Existing and Required Capacity** - The capacity of the main structural components, the lift span trusses, floor beams and stringers to carry the proposed streetcar loads was evaluated by comparing the proposed loads to the original design loads and to the current rated capacity of the bridge. This analysis indicated that the trusses are adequate for all lane configuration alternatives when using either the modern streetcar or the Birney trolley. The floor beams are adequate for any of the proposed streetcar vehicles, including the LRV.

For the third lane configuration, use of either the modern streetcar or the LRV would require strengthening roadway stringers. Consequently, only three first two lane configurations are viable without strengthening of either the deck, four of the roadway stringers, or both.

- **Structural Modifications** - Addition of streetcars to the existing Tower Bridge would require significant strengthening the roadway stringers when using the third lane configuration.

Finally, any re-introduction of electric transit to the bridge will require consideration of electrical stray current. Stray current provisions will need to be added to the bridge to prevent stray current corrosion.

4.1.2 Capitol Mall Separation (Capitol Mall over Interstate Route-5)

The Capitol Mall Separation (Br. No. 24 0236), shown in Figure 16, was constructed in 1966 and is a three-span prestressed concrete box girder structure that carries Capitol Mall over Interstate Route 5 (I-5). This structure actually consists of two independent structures carrying the eastbound and westbound lanes of Capitol Mall and separated by a 1-inch joint centered on the raised median. The structure is approximately 225 feet long with spans, from west to east, respectively, of 48 feet, 87 feet, and 90 feet. The total width of the deck is approximately 108 feet, including barriers, sidewalks, raised median, and a 90-foot roadway.

In contrast to the Tower Bridge, the Capitol Mall Separation was not designed for interurban trains or any other rail vehicles. However, being designed in the 1960s, it was designed for HS 20 loading and overload vehicles.

Figure 16. Capitol Mall Separation, Looking East Near Front Street

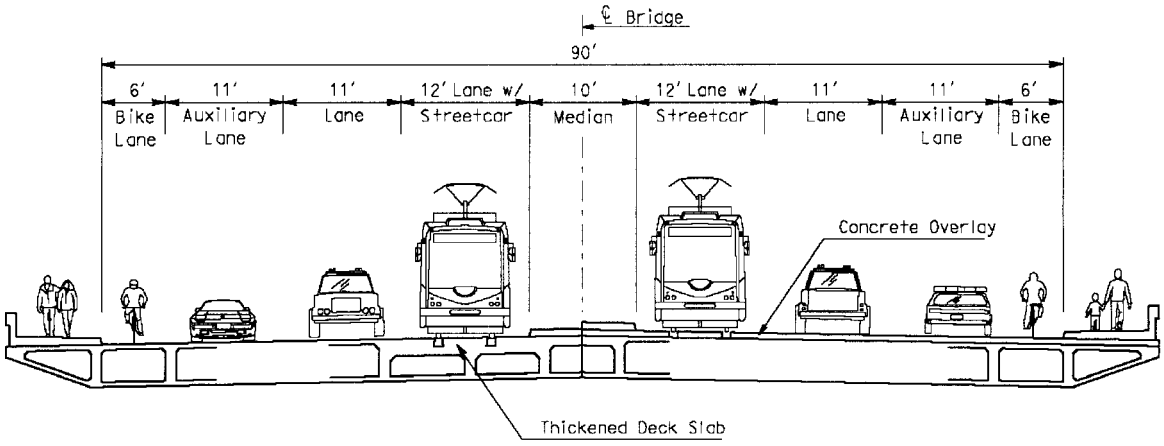
Alternatives Evaluated - Currently, the structure accommodates one eastbound auxiliary lane between 1st Street and an off ramp to 3rd Street, two eastbound through traffic lanes, a 10-foot raised median, two westbound through traffic lanes, one westbound auxiliary lane extending from the on ramp from 3rd Street to a right turn only lane at 1st Street, and four 2-foot shoulders. There is also a westbound left turn lane to 1st Street that starts just before the west end of the separation structure. The separation structure has sufficient width within its 90-foot roadway to accommodate streetcars either in existing traffic lanes or in the median, except at the westbound left turn lane.

According to Caltrans, there is a plan to remove the two ramps to and from 3rd Street. If this is done, then the two outer (auxiliary) lanes on the structure may no longer be needed, especially if the Tower Bridge is reduced to two lanes. For purposes of this discussion, the two auxiliary

lanes will hereafter be referred to as the outer traffic lanes. Following are three potential lane configuration alternatives that were investigated:

- ***Six Traffic Lanes and One Dedicated Streetcar Track*** - This alternative would consist of placing a single dedicated streetcar track in the existing 10 foot median while maintaining the existing six lanes on the bridge. This lane configuration could be accommodated with either flush-mounted rail or rail on the raised median. This configuration is incompatible with the westbound left turn lane unless the turn lane is shortened so it is not on the structure and the track splits between the separation structure and 1st Street.
- ***Four Traffic Lanes and Two Dedicated Streetcar Tracks*** - This alternative would consist of adding double track in dedicated ROW replacing either the two inner or two outer lanes.
- ***Four Traffic Lanes and Two Mixed Flow Lanes*** - This alternative would consist of adding double track to either the two inner or two outer lanes to create two mixed flow lanes as shown in Figure 17. This configuration would not require change to the existing raised median and lane configuration, except that the one eastbound and one westbound lane would be converted into a mixed flow lane where automobiles, trucks, and streetcars would all share the same lane. This alternative would require either flush-mounting the track in the existing bridge deck or overlaying the bridge deck with up to 7 inches of concrete or asphalt to raise the entire deck surface to the track elevation.

Figure 17. Possible Capitol Mall Configuration



Existing and Required Capacity

- **Structural Modifications** - The analyses for all of the proposed lane configurations and all three streetcar vehicles indicate that the overall capacity of the existing structure is adequate for these alternatives. Local thickening and strengthening of the deck slab would be required for flush-mounted embedded rail.

- Consideration will also have to be given for the Capitol Mall Separation, as for the Tower Bridge, for electrical stray current. Stray current provisions will be added to the bridge to mitigate stray current corrosion.

4.1.3 Conclusions

Following is a summary of conclusions reached based on our data collection and analyses of the two structures:

- The addition of streetcars to both the Tower Bridge and the Capitol Mall Separation is feasible using either Birney replica trolleys or modern streetcars such as the Inekon TRIO.
- The Capitol Mall Separation also has adequate capacity for Sacramento Regional Transit LRVs.
- The Tower Bridge appears to have adequate capacity for LRVs on a single, central track, but more detailed analysis would be required to confirm this.
- Both single and double track alternatives are structurally viable for the Capitol Mall Separation.
- Double tracking on the Tower Bridge may be structurally feasible, but would require strengthening or replacement of at least four stringers and a portion of the deck, as well as the addition of support beams for the rails if the existing stringers are to remain and be strengthened.
- Stray current provisions would be required for both structures.
- Tracks on the Capitol Mall Separation could be recessed into a thickened and strengthened deck slab, placed in a full-width overlay, or set on a raised concrete pad.
- Vertical clearances through the trusses on the Tower Bridge are adequate for any lane configuration.

4.1.4 Cost Estimate

Preliminary cost estimates have been prepared for modifications to the two bridges to accommodate streetcars. These do not include track, power distribution and train control systems, mobilization or a contingency.

Tower Bridge

- Single Track Modifications- $720,000
- Double Track Modifications - $4,320,000

Capitol Mall Separation

- Double Track Modifications (thickened slab)- $936,000
- Double Track Modifications (overlay) - $720,000

4.2 Conceptual Engineering

The Conceptual Engineering Technical Memorandum presents the track design requirements for Alignments A and B. The level of design enables an initial analysis and discussion of how the alignment and streetcar interact with existing traffic, parking, adjacent properties, and pedestrian and bicycle traffic. Cost-saving design elements are discussed. A set of 11"x17"Conceptual Engineering drawings accompany the detailed Technical Memorandum in the appendix.

4.2.1 Alternative A – West Sacramento Civic Center to the Sacramento Convention Center

Following is a general description of the general alignment, and details are shown in Table 6. Beginning at the West Sacramento Civic Center/Community College/Transit Center on Merkley Avenue, the alignment proceeds northward onto West Capitol Avenue. It continues on West Capitol Avenue and turns south onto the proposed Garden Street into the planned Triangle street network. The alignment would traverse over the existing Union Pacific rail yard on a temporary trestle, then continue along Riske Lane to South River Road. Here it would turn north to Raley Field and onto the approach to Tower Bridge. The single track proceeds across the bridge toward Capitol Mall.

On the east side, it passes Old Sacramento and crosses over I-5 to 3rd Street, where the tracks enter the grass median on Capitol Mall. The eastbound streetcar operations would then leave Capitol Mall and join the existing Sacramento RT light rail tracks on Eighth Street. The streetcar operations would operate jointly on the existing RT tracks on 7th/8th Streets and along K Street to 12th Street. East of 12th Street, streetcars would enter a short stretch of single track and terminate at 13th Street.

Table 6. Conceptual Alignment Summary Alignment "A"

Street	Segment	Tracks in:	Remarks
Merkley Avenue	Terminus to West Capitol Avenue	West curb lane	Two-way single track at Civic Center Stop/Terminus
West Capitol Avenue	Merkley Avenue to Garden Street	Left (inside) lane	Streetcar runs in traffic adjacent to existing median
Planned Garden Street	W. Capitol Avenue to Tower Bridge Gateway	Travel lane	Future at-grade intersection, no stops
Future Garden Street	Tower Bridge Gateway to Riske Lane	On new trestle	Two-way single track on temporary trestle over switch yard
Riske Lane	Future Garden Street to South River Road	West edge of ROW	Two-way single track, temporary alignment
South River Road	Riske Lane to Tower Bridge Gateway	Travel lane	Two lane, two-way traffic
Tower Bridge Gateway	South River Road to Tower Bridge	Left lane	Transitioning to exclusive single track
Tower Bridge	Tower Bridge Gateway to Capitol Mall	Median	Two way, exclusive, single track
Capitol Mall	Tower Bridge to I-5 Crossing	Median	Exclusive, embedded double track
Capitol Mall	I-5 Overcrossing	Median	Exclusive double track on top of deck
Capitol Mall	I-5 to Third Street	Median	Exclusive, embedded double track
Capitol Mall	Third Street to Eighth Street	Median	Exclusive, landscaped track
7th, 8th, K Streets	Capitol Mall to Twelfth Street	Existing LRT track	Shared with light rail vehicles
12th/K Pedestrian Mall	Eastern terminus	Exclusive ped area	Two-way single track

4.2.2 Alternative B – West Sacramento City Hall to Amtrak Station via Capitol and 5th St.

Following is a general description of the general alignment, and details are shown in Table 7. The eastbound alignment begins at the West Sacramento Civic Center/Community College/Transit Center and turns right onto West Capitol Avenue. It continues down West Capitol Avenue, turning right on planned Garden Street. The trackway would then turn left onto Tower Bridge Gateway through a new at-grade intersection.

Running east, the tracks would be located exclusively in the median or in the left-lane adjacent to the median. The alignment would pass under the existing Union Pacific Railroad overcrossing and then arrive at the Gateway stop adjacent to a new, signalized, at-grade intersection with Fifth Street. The type of trackway used in the Capitol City Freeway median could be one of several types depending on cost constraints and aesthetics, and could include embedded concrete track slab, landscaped or grass track, or tie and ballast. Continuing in the median the alignment would cross a new at-grade intersection at Third Street to serve Raley Field and Raley's landing. The

alignment would enter a single-track segment across the Tower Bridge, and then back to a double-track alignment.

Similar to Alternative A, the exclusive-running tracks would serve Old Sacramento and cross I-5 and Third Street into the Capitol Mall median, where landscaped double track would extend as far as Fifth Street.

The alignment would turn north at Fifth Street in the right lane. Fifth Street's lane configuration and traffic signaling is configured for two-way traffic operation north of Capitol Mall, the length of the streetcar alignment. The tracks would follow the existing roadway under the Westfield ShoppingTown Downtown Plaza and transition to the west curb line of 5th Street north of I Street, adjacent to the Amtrak station. Immediately north of the Amtrak station the single-track alignment would turn left and join with existing LRT tracks to serve a shared terminus stop platform.

Table 7. Conceptual Alignment Summary Alternative "B"

Street	Segment	Tracks in:	Remarks
Merkley Avenue	Terminus to West Capitol Ave.	West curb lane	Two-way single track at Civic Center Stop/Terminus
West Capitol Avenue	Merkley to Garden Street	Left (inside) lane	Shared lane adjacent to existing median
Planned Garden Street	West Capitol Ave. to Tower Bridge Gateway	Travel lane	Future at-grade intersection, no stops
Tower Bridge Gateway	Garden Street to Tower Bridge	Median	Shared, right lane
Tower Bridge	Tower Bridge Gateway to Capitol Mall	Median	Two-way, exclusive, single track
Capitol Mall	Tower Bridge to I-5 Crossing	Median	Exclusive, embedded double track
Capitol Mall	I-5 Overcrossing	Median	Exclusive, above deck, double track
Capitol Mall	I-5 to Third Street	Median	Exclusive, embedded double track
Capitol Mall	Third Street to Fifth Street	Median	Exclusive, landscaped, double track
Fifth Street	Capitol Mall to I Street	Right lane	Two way, double track, adjacent to parking
Fifth Street	I Street to H Street	Left lane	Single, exclusive, embedded, adjacent to curb
H Street Terminus	Adjacent to Amtrak Platform	Right lane	Single, shared with existing LRT

4.3 Station/Stop Design Criteria

For streetcar stop design criteria, the intent is to have the most cost-effective, community accessible stops at the proper locations. The criteria are coordinated with the general alignment developed in the Route Study, Service Planning, Equipment Analysis, and Conceptual

Engineering Tasks. The primary design principles for this Task, in keeping with the overall project goals, are to:

- Keep the design simple and inexpensive
- Use "off-the-shelf" equipment whenever possible
- Design for ease of construction
- Provide safe locations for streetcar patrons
- Offer patrons information on arrival of the next streetcar

4.3.1 Basic Parameters

While the preferred vehicle type can affect the design of the stop, the following basic parameters are applicable:

- Most stations will have two platforms - one for westbound cars and one for eastbound cars
- The streetcar berthing area will be approximately 60-65 feet long, sized for a single car
- The boarding area will be 40-45 feet long
- A shelter, schedule and patron information rack, a sign with the stop name, a bench, a lean rail, a trash receptacle, and an appropriate ADA pedestrian warning strip at the curb edge, along the entire length of the boarding area, would be provided at each station
- "Next vehicle arriving" technology would be included in the shelter to inform riders when the next streetcar will arrive
- A ticketing kiosk, unless there is no fare or there is on-board ticketing, would be provided
- A bicycle rack
- A curb extension (bulb out) to board the car to minimize the loss of on-street parking
- If a replica streetcar is used, an on-board lift or a high block platform will be required for ADA access
- If a modern car is used, curb modifications will be required along K Street and in the median stations

4.3.2 Enhanced Parameters/Amenities

For higher visibility stop locations, in addition to the basic parameters, enhanced amenities may include:

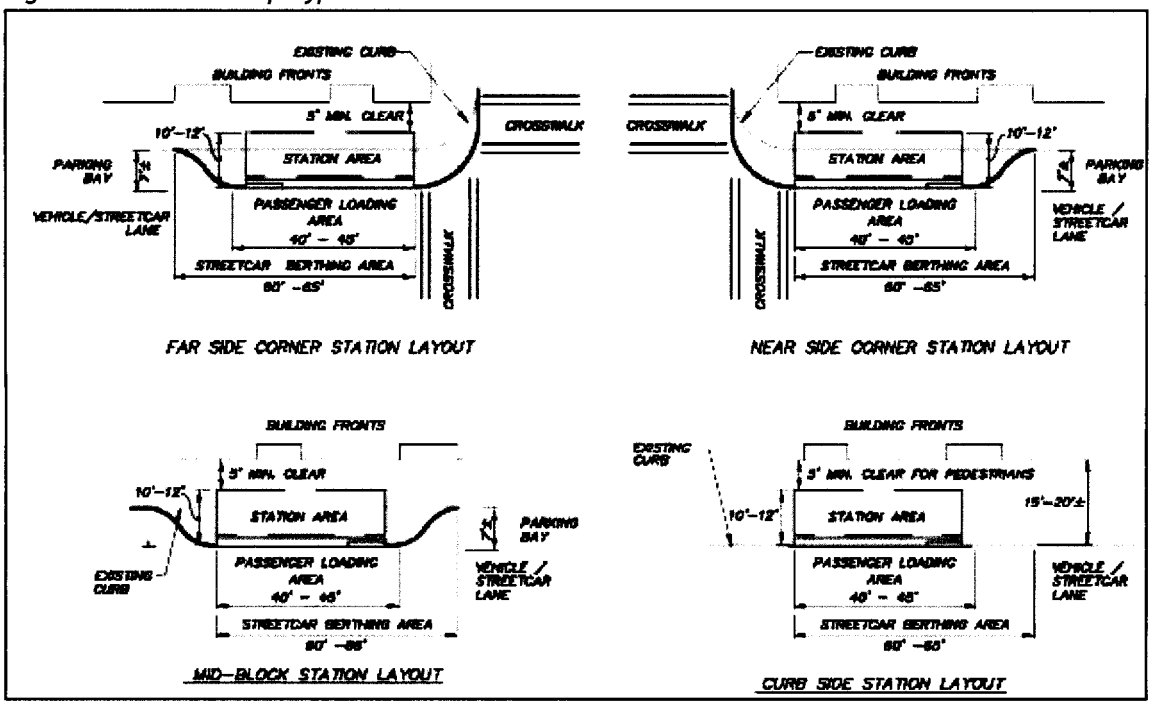
- Enhanced architectural treatment for shelters to reflect the character of the specific location
- Specialty lighting with banners or other decorative features
- Enhanced paving
- Information kiosks

- Public art
- Additional seating beyond the shelter

4.3.3 Streetcar Stop Types

Based on the proposed stop locations and the basic parameters, several stop types may be found – Corner, Mid-block, Curbside and Median/Center Stops. A general description and diagram (Figure 18) of these types follow.

Figure 18. Streetcar Stop Types



- Corner Stop (near or far side) – This stop occurs at the corner to allow direct access from the sidewalk (direct boarding with a low floor vehicle, from an on-board lift or from a raised, ADA-compliant high block platform). The stop is a "bulb-out" or an extended sidewalk. The vehicle stays in the travel lane, minimizing on-street parking loss.
- Mid-block Stop – This type occurs less frequently but may be required due to specific site or block considerations, and it, too, is a "bulb- out" design. The vehicle stays in the travel lane, minimizing on-street parking loss.
- Curbside Stop (Likely Mid-block) – This stop is on a street with no on-street parking, and it allows berthing directly from the existing curb.
- Median/Center Stop – This type occurs if the streetcar is running on the inside lanes. It may take up more available lane width, since it cannot be located in a moving lane. The Median/Center Stop is also applicable for the tracks that run thorough the grassed median in the Capitol Mall. This application requires enhanced pedestrian safety and amenity features. The primary implication of this type is the need for left side doors on all cars in the fleet, and

- Left-side disabled boarding capability.

The following table summarizes planned stations, locations, and platform types for the Preferred Alignment.

Table 8. Streetcar Stations

Station Name	Location	Type	Improvement Level
Civic Center	West side of Merkley Avenue, in planned Transit Center	Curbside	Minor modification to existing Transit Center
West Capitol at Garden	West Capitol at Garden	Median/Center	High
Raley Field	Tower Bridge Gateway and Third Street	Median/Center	High
Old Sacramento	Capitol Mall and Front Street	Median/Center	High
Fourth and Capitol	Capitol Mall and Fourth Street	Median/Center	High
Eighth and Capitol (eastbound)	Eighth Street, north of Capitol	Curbside	Medium
Seventh and Capitol (westbound	Seventh Street, north of Capitol	Existing – curbside	Low
St. Rose of Lima	7th-8th and K Street	Existing – Midblock	Low
Cathedral Square	11th and K Street	Existing – Midblock	Low
Convention Center	13th and K Street	Curbside	Low
Fifteenth and J	15th south of J Street	Curbside	Medium
Fifteenth and L	L Street west of 15th	Curbside?	Medium

4.4 Cost Estimate

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. For the Initial Preferred Alignment, the estimated capital cost is $53,132,000 or approximately $14,966,000 per track mile. The Planning Criterion was a project cost to not exceed $50,000,000; however the decision to include the loop to Midtown was made with the understanding that the Planning Criterion on cost would be "flexed" to allow a slightly more expensive, but significantly more viable project.

Table 9. 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 & 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 & 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	Temp. Trestle over Triangle Rail yard (1250' 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	$780,000
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 (mob. Traffic control, QC)	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, spare parts, etc.)	$1,000,000		8	$8,000,000
24.0	Right-of-way				$0
25.0	Maintenance Facility Allowance				$2,000,000
26.0	**TOTAL PROJECT COST (2007 DOLLARS)**				$53,131,885

5.0 Operations and System Planning

There are many significant aspects of the third grouping, Operations and Systems Planning. The City's stated project goals are:

- The capability to successfully tie into the existing light rail system
- Cost-effective stations and vehicles that are accessible and ADA compliant
- A route with limited crossing controls and no grade separations, and
- Preferred headways of five to seven minutes

Due to these are critical issues, the Team combined three major Tasks into this component of the Feasibility Study report.

5.1 Service Criteria and System Characteristics

The Service Criteria task develops a higher level of knowledge about the alignment, stations, the service design for the system, and the operational characteristics. There are several components of the Service Criteria task.

- The working assumptions are specified for alignments, station configuration, and operating characteristics
- The service design is specified
- A timetable is based on assumed station locations and expected running times
- Information is developed on system capacity and generalized operating and maintenance costs will be developed.

Understanding the streetcar system characteristics is important to developing service design criteria, scheduling, and operating and maintenance costs. System characteristics include:

- Alignment
- Stations
- Track Configuration
- Terminal Configuration\
- Vehicle type and performance
- Running Times
- Operating Speeds
- Operating Impacts

As Phase 1 progressed, service analysis was made for the initial alignment selected at the Charrette (Alignment A). Later, a second alternative (Alignment B) was analyzed. Finally, an Initial Preferred Alignment was chosen and final estimates were made.

5.1.1 Stations and Stops

Station Locations – Stop locations are on the alignment figures [Figures 2, 3, and 4] and in Table 7. Where the streetcar shares trackage with RT, the streetcars stop at the existing RT LRT stations, with specified boarding locations within the RT station areas.

Distances between stations - The standard for station spacing on the Downtown/ Riverfront Streetcar is between 1200 and 1400 feet between stations. One-quarter mile spacing allows reasonable walking access to stations along the line.

Station Design - Station design is simple, with right-side boarding platforms in most locations, sized for single-car trains. Most stations would have two platforms; one for westbound cars and one for eastbound cars. At Old Sacramento Station in the median of Capitol Mall, a shared center-island platform will be utilized for boarding cars going both directions from the same platform.

Disabled Boarding - Disabled boarding will be handled through the use of onboard lifts if replica cars are used or through carborne bridge ramps if new low floor streetcars are used, similar to Portland's streetcars. Both of these carborne solutions preclude the need to construct new wayside ramps or adapt RT's ramps and lifts for cars with different floor heights. Some modification would be required in K Street to accommodate low floor boarding, since existing pavement is at track elevation and the modern cars require a minimum 8" curb height.

5.1.2 Track Configuration

The optimal configuration for an urban streetcar system is to have all double-track within the right-of-way. This method eliminates the need to schedule meets for vehicles proceeding in opposite directions, and allows maximum flexibility in scheduling, operations, and recovery from delays.

The alignment for the Streetcar is assumed to be entirely double-track, except for the following locations (for Alignment A):

- K Street between 12th and 13th Street – Short segment of single track at the stub terminal for reversing
- Tower Bridge from west of Old Sacramento Station to west side of Tower Bridge – Single track assumed due to weight restrictions on the Tower Bridge and limitation of impacts on historic structure (approximately 1000' of single track)
- West Sacramento Transit Center – Short segment of single track at the stub terminal for reversing

Streetcar and light rail operations are very flexible, and can operate with trackage constructed in a variety of settings, from exclusive right-of-way through mixed traffic operation shared with general automobile traffic. Consult the Conceptual Track Engineering Technical Memorandum in the appendix for additional detail.

5.1.3 Terminal Configuration

The initial system incorporates single-track stub terminals for reversing and layover, with separate boarding and alighting platforms on the adjoining double track sections. This configuration allows multiple cars (up to three) to enter and layover at the terminal at the same time.

5.1.4 Running Times

Overall end-to end running time (for Alignment A), exclusive of layover time but inclusive of dwell times at stations, is estimated to be 23.6 minutes, for an estimated distance of 2.74 miles. Total cycle time is estimated to be 57.2 minutes, including layover times at the terminals. Layover times are assumed to be 5 minutes on each end of the line. This is slightly higher than the standard 10% of overall travel time often used to calculate layover times. This is prudent because of the schedule reliability uncertainties at the Tower Bridge.

Table 10. Cycle Time

	Time (min)
WB Travel Time	23.6
West Sacramento Layover	5.0
EB Travel Time	23.6
K Street Layover	5.0
Total Cycle Time	**57.2**

5.1.5 Operating Speeds

Average point-to-point operating speeds are assumed to be 6.5 miles per hour (mph) on the trackage shared with the Sacramento RT LRT service, and 10 mph on trackage not shared with RT. Speed is based on current RT scheduled service on K Street and 7th and 8th Streets. Operation on trackage not shared with LRT was assumed to be slightly faster, due to less interference with other services, more reserved right-of-way, and because operation on the K Street mall is restricted due to the presence of pedestrians.

5.1.6 Operating Impacts

A number of conditions could cause operating impacts or delays along the alignment.

Traffic Signal Delays - The operating speeds assume traffic delays. If signal priority measures are installed, operating speeds could be slightly higher on the segment, allowing the streetcars to make turns. Candidate locations include Tower Bridge Gateway/Third Street/ South River Road near Raley Field, which will be a complex intersection.

Tower Bridge Lift Operation - The project includes a crossing of the Sacramento River on the Tower Bridge, a lift bridge operated by Caltrans. Regular operation of this bridge will affect streetcar operations several times daily, on a somewhat unpredictable cycle. It takes 10-12 minutes to raise and lower the bridge. From May 1 - November 30, the bridge is tended from 6 AM to 10 PM, opening approximately 10-12 times per day. From December 1- April 30, the bridge is tended from 9 AM to 5 PM, and it opens approximately 2-4 times per day.

The running time assumptions and the schedule developed for the service assumes additional recovery time at the line endpoints to allow for random bridge opening cycles, and to allow streetcars to get back on schedule if bridge openings occur.

Single track operation on Tower Bridge - The single-track operation on the Tower Bridge could cause an operating constraint that will restrict scheduling of the services and operations. The single-track segment will be about 1000 feet long and will require approximately 1.1 minutes for a streetcar to traverse. While a streetcar going in one direction is traversing this trackage, an approaching streetcar from the other direction must wait for the first car to clear the single track before proceeding. This will cause some minor delays but should be manageable under normal conditions.

The track segment needs to be signalized to control access from the two ends and to prevent occupancy by two cars at the same time heading in opposite directions. The single-track operation will force compromises in lane widths and roadway configurations on the Tower Bridge. The Bridge Evaluation Technical Memorandum addresses these issues.

Railroad Crossing Delays - Alignment A crosses mainline railroad track in four locations. Two of these locations (Sacramento Southern Railroad and the running track at the Union Pacific's Westgate Yard) are expected to remain permanently, but the two on South River Road are expected to be removed. None of these crossings except the Sacramento Southern experience frequent train activity; however the delay caused by a slow freight train crossing the alignment or switching cars in a lineside industry could be significant.

5.2 Service Design

The service is envisioned as an urban circulator, and as such would provide transportation for a multiple trip purposes - journey-to-work, shopping, entertainment, lunchtime trips, and others. The service needs to accommodate people making trips for all purposes. Service must offer convenient, basic transportation which is easy for the riders to use, is understandable from the point of view of how the service operates, and does not require the rider to plan ahead in order to use the service.

One of the goals for the project is for the streetcar to contribute to the placemaking efforts in redeveloping the riverfront and in developing areas. In order for this to occur, the service design must be legible to the rider, offer a high quality of service, and be convenient for the rider to use.

5.2.1 Days of operation

Streetcar service would operate 7 days per week.

5.2.2 Span of Service

The span of service for the service would be as shown in Table 11 below.

Table 11. Span of Service

Day	Span
Monday-Friday	5am-midnight
Saturday	6am-midnight
Sunday	6am-midnight

5.2.3 Headways

Headways are major factors in operating costs, determine the car requirements, and influence ridership numbers. Headways were analyzed for 7 ½ minutes for all hours of service. This was consistent with the policy direction established by the PSC and TAC to maintain headways between approximately 5 and 7 minutes. Establishing the headway at 7 ½ minutes allows clock headways to be established, resulting in eight trips per hour each direction, with departures possible at the same times each hour. Streetcar schedules may be effectively coordinated with connecting bus services operating at multiples of this headway, such as 15 minutes, 30 minutes or hourly. Also, with a short streetcar headway of every 7 ½ minutes, riders do not need a timetable – they can just walk to the stop and expect a streetcar within an acceptable waiting period. However, more frequent service requires a larger fleet and incurs higher operating costs. Due to budget constraints, a base headway of fifteen minutes and a peak (lunch period) headway of ten minutes have been used for cost estimating and are proposed for further study in Phase 2.

Capacity

Capacity is determined by several factors - vehicle size and configuration, operating characteristics, and the number of riders.

Vehicle Size –The seating and standing layout inside the car affects the number of riders that can be carried on each individual car.

Operating Characteristics - Operation of the line determines the ultimate number of riders that can be carried. Frequency of service (cars per hour) is the prime factor that determines overall line capacity.

Rider Turnover - The number of riders can turn over several times over the course of a transit vehicle's progress over the line, especially on long lines on crowded urban systems. In this situation, a line's capacity can be many times the capacity of the individual car, if riders are boarding and alighting for short trips and the car is filling up several times over. A way to summarize turnover is the capacity on hourly or daily capacity.

- Hourly - The hourly capacity is assumed to be 2240 riders per hour past any one point on the line if the modern streetcars are used, or 1408 riders per hour if Gomaco Birney replicas are used.
- Daily - The daily capacity is assumed to be 42,560 riders per day past any one point on the line if modern streetcars are used, or 26,753 riders per day if Gomaco Birney replicas are used.

5.2.4 Vehicle Demand and Spares

Requirements for vehicles on a system are determined by two factors – operating needs and spare cars. The requirement to operate service in the peak hour (known as peak vehicle demand) is determined by the cycle time and the service frequency at the busiest time of the day, when the maximum number of cars is scheduled to be in service.

Every system needs spare cars so repairs and cleaning can occur on cars that are not in service without affecting service delivery. Most systems use a 20% spare ratio requirement. For systems with a large fleet, this ratio is adequate, and in some cases may be reduced somewhat based on experience. For smaller systems, if the 20% spare ratio results in only one spare car, the decision is often made to have more than one spare. For the purposes of this project, a 20% spare ratio was assumed, with a minimum of two spares. Car requirements need to be evaluated carefully to ensure that the system is sized correctly in relation to the expected demand.

5.2.5 Operating Scenario

Basic operation would be the streetcar in line-of-sight operation, controlled at intersections by traffic signals. Where signal priority is provided, where RT already has signaling, or where the streetcar must make a movement not normally allowed for automobiles, control would be provided by white "T" traffic signal indicators coordinated with the traffic signal system.

One segment of the line would be controlled by an interlocking signal system - the Tower Bridge segment, where signals would control the interface with the lift bridge, the single track section of track, the Sacramento Southern Railroad diamond and several street intersections

Diverging movements at junctions with Sacramento RT LRT trackage would be controlled by switch position indication lights. Signal aspects would be consistent with current RT operating rules.

5.2.6 Revision Estimates for the Initial Preferred Alignment

After the PSC/TAC decision to develop the Initial Preferred Alignment (a hybrid between A and B), the team made estimates of round trip times, headways, hours of operation, and annual operating and maintenance costs.

The round trip takes 55 minutes, approximately 28 minutes each way and the estimated operating speed is 6.5 miles per hour on RT tracks, and 10 miles per hour otherwise. The average dwell time at a stop is 25 to 50 seconds, depending on the particular stop. There is a five minute layover at each end of the route.

Headways (time between streetcars) are estimated at 10 minutes. The Planning Criterion for headways is 5 to 7 minutes and operation at that frequency is also feasible; it is assumed that for reasons of managing operating costs, initial headways will be 10 minutes during peak times and 15 minutes in off-peak times. In general, the streetcar operates from 5:00 AM to 12:00 AM, from Monday through Friday and 6:00 AM to 12:00AM on the weekend.

For the preferred route the estimated capital cost is $53,319,000 or approximately $14,966,000 per track mile. The Planning Criterion was a project cost to not exceed $50,000,000; however

the decision to include the loop to Midtown was made with the understanding that the Planning Criterion on cost would be "flexed" to allow a slightly more expensive, but significantly more viable project.

As currently planned, the annual operating costs for an eight car fleet, with 7.5 minute peak-time headways, would be $3.55 million. If the headways are stretched to 10-minute peak-time service and 15 minutes in off-peak times, the annual operating costs fall to $2.61 million.

5.3 Equipment Analysis

No element of a rail transit system captures the hearts and minds of the public more than the vehicle itself. Both the riding and non-riding public usually interact with the transit vehicle more than with any other part of the transit system - from actually using it as a means of travel, to sometimes competing with it in traffic, or to recognizing it as a symbol of the transit service. In some cases, such as the cable cars in San Francisco, the vehicle can even become a defining symbol for the metropolitan area. Thus, selection of a vehicle – from the basic type of car to its various specific physical and performance characteristics, cost and aesthetics – is obviously a key decision, or series of decisions, to be taken in the course of a streetcar project.

5.3.1 Streetcar Characteristics

A wide range of alternative streetcars exists for consideration at the onset of a project. Electric streetcars have a long history, stretching back to the late nineteenth century when they supplanted vehicles whose motive force was provided by horses, or by cables propelled by steam engines. For the purpose of this report, streetcar vehicles are first divided into four broad, chronological categories: vintage and replica trolleys, Presidents Conference Committee (PCC) cars, and modern streetcars. Within each category, there are a number of variations and possibilities which will be summarized below. For modern streetcars, often it is a question of the extent of departure from service proven or "off the shelf" designs.

Some of the important configuration and operating considerations that factor into selection of a vehicle are:

- Basic size (length and width), clearance requirements, and capacity
- Performance (top speed, acceleration and braking rates, etc.)
- "Sided-ness" and "ended-ness", i.e., single-sided, single-ended vs. double-sided, double-ended
- Single unit operation (tow bar or mechanical coupling only) vs. multiple unit operation (mechanical and electrical coupling)
- Floor height (low floor vs. high floor) and the means of accessibility

These and other considerations are reviewed in the following sections.

Vintage Trolley and Replica Streetcars

Early streetcars typically were made with all-wood bodies or composite wood-and-steel bodies with deck roofs and clerestories. The earliest electric streetcars were small, 25 to 30 feet long with a single four-wheel truck, but the popularity of this new technology soon required that operating companies acquire larger cars in the range of 40 to 50 feet in length (Figure 19). These cars typically had two powered trucks, were not articulated, were high floor, were found in both single-sided, single-ended and double-sided, double-ended versions, and normally operated as single units. There were many variations to these generalities. Rehabilitation of historic vehicles is an expensive undertaking. In Sacramento, one historic PG&E car has been restored and operates on the light rail line on special occasions.

Figure 19. Vintage Trolley - Dallas, Texas

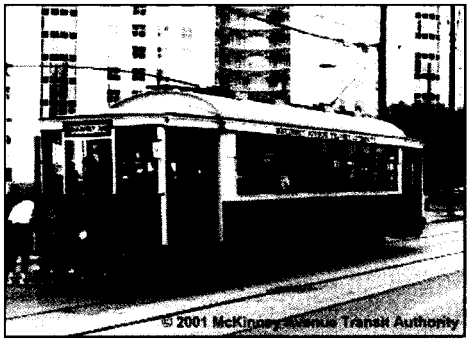
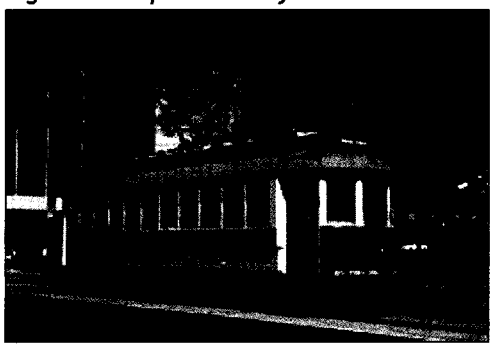


Figure 20. Replica Trolley - Portland



Several cities – Portland, Tampa, Little Rock and Charlotte have opted to replicate rather than rehabilitate a vintage trolley (Figure 20), and New Orleans has a large replica fleet in addition to its refurbished cars. Replicating a vintage trolley could involve, for example, the construction of a steel underframe and inclusion of more modern safety features while retaining an original or vintage looking appearance (Figure 21, below). This approach helps guarantee consistency of design and parts, and essentially results in a new product that has a vintage appearance, plus a long economic life ahead of it.

Of particular interest for this project, because they are so similar in appearance to cars operated in Sacramento from the 1920s until the streetcar system's demise in 1947, is the replica double-truck Birney car manufactured by the Gomaco Trolley Company in Iowa. First built for Tampa, additional units have been delivered to Little Rock, Memphis and Charlotte. These cars are 45 to 50 feet in length, 8.5 feet wide, and equipped with about 40 seats.

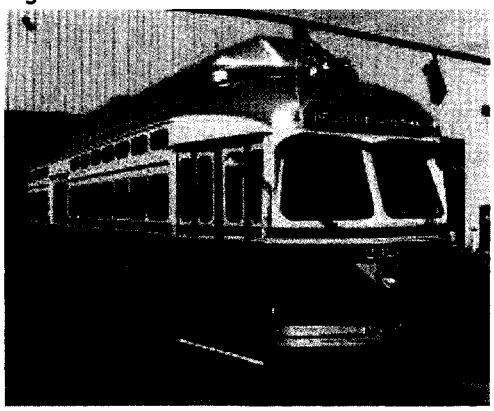
Figure 21. Replica Double Birney - Tampa

PCC Cars

From the mid-1930s through the early 1950s, the Presidents Conference Committee (PCC) car rose to fame throughout North America, and its design was exported to Europe and elsewhere. Again, while

there were many variations, the PCC car was basically an all-steel, non-articulated car, approximately 50 feet in length, with two powered trucks and high floors.

Figure 22. Rebuilt PCC Car



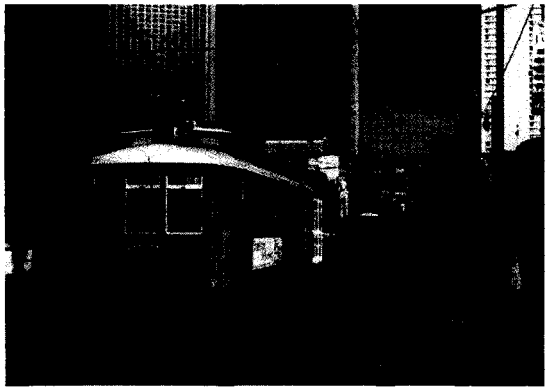
PCCs were built in both single-sided and double- sided configurations, and they were operated as single cars and in multiple unit consists. The rounded, more contoured look and several performance and passenger comfort improvements generally distinguished the PCC car from older vintage trolleys. Some transit agencies in the U. S. cities, e. g. Boston and San Francisco, have retained and rehabilitated some of their PCC cars, and still operate them in limited or special service. Philadelphia has completed a PCC rehabilitation program (Figure 22), which included substantial changes to the original cars. In New Jersey, NJ Transit has purchased modern vehicles to replace its PCC fleet for the Newark Subway. Many of these cars were purchased to be used on the San Francisco F Line. These cars were never used in the Sacramento area so are not consistent with local history.

Modern Streetcars

The term "modern streetcar" is meant to encompass new streetcars currently available in the marketplace and generally based on designs, technologies, and product improvements developed within the last ten or so years. However, there is no precise technical definition for a "streetcar", and, while there is considerable experience in the U. S. with modern light rail vehicles (LRVs), the actual experience with modern streetcars (as generally understood) in this country to date is limited to the Inekon/Skoda vehicle produced for Portland and duplicated with minor exceptions for Tacoma (Figure 23). A similar car is being developed by Inekon for Seattle's South Lake Union Streetcar project and for the Anacostia Streetcar project in Washington, DC. Most of what is considered modern streetcar experience resides in Europe, and streetcar vehicles there are typically defined more by the characteristics of their rights-of-way (ROW) than necessarily by the characteristics of the vehicle itself. Thus, distinctions between modern streetcars and modern light rail vehicles (LRVs), particularly in the European context, can often be more blurred than instructive.

Figure 23. Modern US Streetcar by Inekon/Skoda - Portland

Figure 24 Replica Vintage Trolley - New Orleans



In Portland, a conscious effort was made to distinguish the city streetcar service and the streetcar vehicle from the regional light rail service and the LRV. Compared to the LRV, the streetcar vehicle is shorter (66 feet vs. 92 feet) and narrower (8 feet vs. 8 feet 8 inches), thus making it less intrusive and more in scale with crowded urban streets and residential neighborhoods (Figure 24).

Portland chose to avoid multiple unit operation, so all streetcar service is with single cars, further enhancing the feel of a smaller scale, urban rather than regional system. Performance parameters are accordingly reduced compared to those of the LRVs which operate at higher speed and on considerable grade-separated ROW throughout the metropolitan area.

Table 12, below, provides a summary of U.S. cities that have some form of vintage trolleys, PCC cars, replica cars, or modern streetcars either in service or in the process of being procured. Also noted are modern light rail vehicles (LRVs) in those cities that have such vehicles as well as streetcar in service. Overall counts of the numbers of cities with various classes of streetcars are: restored vintage trolleys – 10, replica trolleys – 7, restored PCC cars – 5, and new modern streetcars – 3 in service with orders placed by 2 more projects.

Table 12. Survey of US Streetcars in Service or Procurement

City	Historic/Vintage Cars		PCC	Modern Cars	
	Restored	Replica		Streetcar	LRV
Boston	X [a]		X		X
Charlotte	X	X		X[b]	X
Dallas	X		X		X
Kenosha			X		
Little Rock		X			
Lowell		X			
Memphis	X	X			
New Orleans	X	X			
Philadelphia			X		X
Portland		X		X	X
Sacramento	X [a]				X
San Francisco	X		X		X
San Jose	X				X
Seattle	X			X	X
Tacoma				X	
Tampa	X [a]	X			
Washington, DC				X	

Notes: [a] restored vehicles

5.3.2 Criteria for Vehicle Selection

There are obviously different approaches to purchasing rail vehicles. The approach recommended in this report is that resources initially be devoted to deciding the basic type and configuration of streetcar vehicle and to not focus on a specific vehicle or vehicle details until more general considerations are resolved, and the parameters of the overall streetcar project more sharply in focus. Once the basic type of streetcar vehicle is decided and a procurement process started, the procurement documents would list in detail all the specific criteria for evaluation and selection. Typically these criteria include the following major categories:

- Qualifications and experience of the manufacturer and sub-suppliers
- Manufacturing plant (location and capacity of facilities, Quality Assurance program, testing capabilities)
- Conformance of proposed vehicle to technical specifications

- Price (in various aspects)

Characteristics and issues related to the several vehicle alternatives are summarized in Table 13.

Table 13. Summary Comparison of Vehicle Alternatives

Item	Modern	PCC	Replica	Vintage
Initial $ Each	$3.0 M	~$1.5 M	≤$1.0 M	~$1.5 M
Cost: 5 or 8 cars	$15 M/$24M	$7.5 M/$12M	$5 M/$8 M	$7.5 M/$12 M
Meet project schedule?	Yes	Doubtful [a]	Yes	Doubtful [a]
Accessibility	Low Floor w/Level Boarding	Lift (Rear Door)	HiBlock or Lift (Front Door)	HiBlock or Lift Major Modification to Car
LRT Compatibility?	[b,c]	[b]	[b,c]	[b]
Double Ended, Double Sided	Yes	No	Yes	Some
Electrification (voltage)	750 vdc	600 vdc [f]	600/750 vdc	600 vdc[f]
Fit Sacramento History	No	No	Possible [d]	Possible [e]

a- Must undergo painstaking and time consuming restoration of PCCs or historic carbodies.
b- May need to adjust streetcar anticlimber to match LRV anticlimbers if thee is shared track.
c-Need upgrade carbody compression to 2g per GO 143B, or obtain waiver (does not affect cars built prior to 1956).
d- Gomaco Birney cars close in appearance to 1920s PG&E American cars used in Sacramento.
e- Car 35 (operational) and FLRT carbodies - all old Sacramento trolleys, but limited in number.
f- Propulsion system usually can be modified to work with 750 vdc TES.

5.3.3 Summary

Either replica vintage trolleys or modern streetcars could work successfully in the context of initiating a streetcar circulator between West Sacramento, Sacramento, and the riverfront. Vintage trolleys or PCCs, while potentially available, will likely to require a restoration and rebuilding effort that will exceed the project timeline. Primary issues to consider are image, cost, availability and accessibility.

- **Cost:** Replica cars are likely to have an initial cost about one-third as much as modern streetcars
- **Regulatory Issues:** Conforming to California Public Utility Commission regulation, or seeking relief from them
- **Availability:** Both replica and modern streetcars can be purchased from existing suppliers, using existing designs
  - **Replica** – Gomaco (double truck Birney)
  - **Modern** – Any of several global suppliers, if willing to build a small order or able to combine with another city's order

- **Accessibility:** Both replica and modern cars can be equipped to meet ADA
  - **Replicas** – Lift in right front door at each end of car (e.g., Gomaco Birney)
  - **Modern** – Level boarding from raised platform at mid-car door; however, raised platforms pose a design issue, especially on any trackage shared with RT Light Rail, which has some downtown station platforms at rail height (street) level.

Whichever approach is chosen, the basic vehicle configuration should be double-sided, double-ended and, for planning purposes, the basic vehicle width should be no wider than RT's existing LRVs since shared track is contemplated. While the capital cost of modern streetcars would be higher compared to replica trolleys, modern streetcars provide improved performance and passenger comfort, quieter operations, higher capacity, a better long-term accessibility solution, and greater ease in expanding the system beyond a short starter line.

6.0 Financing and Organization

How the project will be funded and operated organizationally is fundamental to its success. This cluster of tasks, **Financing and Organization,** includes the Financing Plan, but it is expanded to address operating and governing considerations.

Goals and principles guiding this section included:

- A total initial project of $50 million or less
- A planning and delivery period of five years or less
- A local funding strategy, including significant private participation in funding

Toward these ends, the Team developed the Financing and Organization cluster to focus on the financial and organizational elements necessary to deliver a locally funded project.

6.1 Funding Tools

This section identifies a "short list" of potential streetcar funding mechanisms. Each was evaluated for preliminary feasibility and appropriateness for the Downtown/Riverfront Streetcar project. The list of funding tools does not include those that were considered inappropriate (whether for legal, political, technical, or other reasons) for the project. The fund sources are grouped by the potential source – Development Related, City, County/Region, and State and Federal.

The analysis of potential funding revealed there are several suitable and available fund sources to move the project to the next stage of project development. Following the brief description and a possible range of funding, Table 14 demonstrates the potential low-to-high range by candidate source. The next step in the process is to perfect a package of acceptable funding mechanisms for the streetcar's implementation.

6.1.1 Development Related

Four principal sources fall under this category. The sources are the Community Facilities District (CFD), Special Assessment District, Tax Increment Financing (TIF), and Development Impact Fees. A brief description is presented with an estimate of a potential range of funding for each.

Community Facilities District

A community facilities district (CFD or Mello-Roos CFD) assesses property owners to pay for specific infrastructure that benefits the district. Revenues can be collected up front or paid over a fixed period of time in annual assessments. The formula for assessing property can be very flexible. For a streetcar, it could be variable based on a property's distance from the streetcar, with those closest to the alignment paying more. Other factors in the assessment formula could include the size of the parcel, the number or size of residential units, the amount of commercial space, fronting footage along the streetcar, and other factors.

CFDs must be approved by a 2/3 majority of property owners. However, this only applies when the planned area is essentially vacant or only made up of commercial properties. If there are more than 12 registered voters in the proposed district, then the CFD must go to a public vote of all registered voters in the district. This could present a much higher hurdle to achieving the 2/3 support.

The potential funding range is from $5 million to $50 million. This was calculated by estimating total property value within the area served by the proposed streetcar line, using data provided by SACOG for each of the TAZs, and projected to 2015. Assessment rates of 2% and 3% of total value were applied to low and high estimates of value to derive the potential funding range.

Special Assessment District

Special Assessment Districts are very similar to Mello-Roos CFDs in intent, logistical implementation, and result. Like a CFD, special assessment districts are geographical areas in which property owners receive a special benefit from new publicly-financed infrastructure, and assessments are made on property in order to build and sometimes operate that infrastructure. Special assessment districts are widely used in California.

Assessment Districts are authorized by three pieces of legislation—dating from 1911, 1913, and 1915—that allow for the collection of assessments (1911 and 1913) and for bonds to be issued, paying for the improvements or operations related to assessments (1915). Thus, the districts have a very long history of legal precedence and infrastructure funding in the state. Since 1913, assessment districts can fund public transportation projects, so this will not be an issue in the case of the streetcar.

The potential funding range is from $5 million to $50 million, derived in the same manner described for CFDs. Assessments could be paid upfront, in a lump sum, or spread over time and repaid with annual installments.

Tax Increment Financing

Tax increment financing (TIF) is one of the most powerful urban financing tools available. All of the streetcar alignment is within redevelopment districts in Sacramento and West Sacramento. However, budgets in both districts are overcommitted with projects, and other project funding priorities would need to be delayed in order to add the streetcar to the project list. Nevertheless, doing this should be strongly considered by both cities since the streetcar is exactly the kind of infrastructure project that TIF is designed for: to lay the groundwork for more intensive private investment that will generate higher property taxes in the future.

The potential funding range is estimated from $2 million to $10 million per City (up to $20 million combined).

Development Impact Fees

Development impact fees can be collected on new development that occurs within the project area. The fees cover the capital cost of the infrastructure needed to serve new development and the people who occupy or use the new development. The potential funding range is from $1 million to $5 million.

6.1.2 City Sources

Two principal sources fall under this category, and one source is applicable to both cities. The sources are the extension of the West Sacramento ¼ cent sales tax, and the second is General City Funds. A brief description is presented with an estimate of a potential range of funding for each.

West Sacramento ¼ cent Sales Tax

West Sacramento's Measure K provides for a ½-cent citywide sales tax to fund a variety of projects. This is actually a combination of two separate ¼-cent sales taxes, one of which is set to expire in 2013. By renewing the expiring portion of the sales tax, significant revenues would continue to be generated, a portion of which could be dedicated to the streetcar. Such an extension would require a citywide vote and the revenues would likely need to be dedicated to a range of citywide projects in addition to the streetcar in order to gain widespread support. The renewal would only require a 50 percent voter approval. This vote could take place before the expiration of the tax, allowing for future revenues to be bonded for construction in the next few years.

The potential funding range is $750,000 per year or $9.4 million bonded for capital construction.

City General Funds

General funds are always in tight supply, but such funds have been used to partially pay for a number of streetcar systems, including Portland and Charlotte. Since all parties have agreed that the streetcar should have minimal impacts on existing budgets, a relatively small range of general fund revenues is included here.

The potential funding range is $1 million to $3 million per City.

6.1.3 County/Regional Sources

The Sacramento Area Council of Governments (SACOG) is the only source of regional resources. Once planning and engineering is complete, West Sacramento (or whichever agency will be responsible for construction) could pursue a grant from the Community Design program. Regarding County Sources, there is discussion of a future Sacramento County sales tax proposal to fund a variety of transportation improvements.

6.1.4 State/Federal Sources

- **Proposition 1B (Transportation Bond Package)** - California's Transportation Bond Package (Proposition 1B) was approved by voters in November 2006 and later enacted by Senate Bill 1266, allocating $19.9 billion to a wide variety of transportation-related projects around the state, of which $4.0 billion is specifically directed towards public transportation fleet expansion and capital improvement. The majority of the $4.0 billion public transportation fund will be allocated according to formulas;

- **Proposition 1C** - Passed in November 2006, Proposition 1C will provide funding for housing, with specific applications to transit-oriented development (TOD). Pending further legislative definition of applicable projects, this funding source could potentially be used for infrastructure (such as streetcars) that supports TOD and housing;
- **State Grants and Federal Earmarks** - Such earmarks have been used in other transit systems and the streetcar would seemingly be a good candidate due to its potential to serve as a model for other California cities. Earmarks or any other federal funding sought for this project are assumed no to include Federal Transit Administration grants, since other projects in the region will be seeking such funding.

Table 14. Summary of Potential Capital Funding Sources

Funding Type	Range (millions)		Location	
(Listed from Local to Federal)	Low	High	Sac	W. Sac.
Development-Related				
CFD or AD	$5.0	$50.0	✓	✓
TIF (Sac)	2.0	10.0	✓	
TIF (West Sac)	2.0	10.0		✓
Development Impact Fees	1.0	5.0	✓	✓
City				
W. Sac ¼-cent Sales Tax Extension	0	9.4		✓
W. Sac General Fund	0	3.0		✓
Sac General Fund	0	3.0	✓	
County / Region				
SACOG Community Design Grant	0.5	2.0	✓	✓
SUBTOTAL	*10.5*	*92.4*		
State/Federal				
Prop 1B	0.0	10.0	✓	✓
Prop 1C	0.0	20.0	✓	✓
Legislative Earmark	0.0	20.0	✓	✓
TOTAL	***16.5***	***142.4***		

6.1.5 Summary of Potential Capital Funding Sources

Table 14 summarizes the range of potential funding from the sources identified above. If only the lowest amount were secured from each source, there would clearly be a funding shortfall. Therefore, it will be critical that at least some of these funding sources are secured at the high end of the range indicated here, if not even higher, in order to reach the projected budget of $55 million. The potential funding from the new Propositions 1B and 1C introduces a significant

unknown opportunity. The high range potential from all of these sources totals more than twice the projected capital cost of the streetcar. Therefore, there should be room to adjust the mix of funding tools as more information becomes available about each one and as they are tested more thoroughly with property owners, businesses, and public agencies.

6.1.6 Sample Assessment Calculation

Since one of the project criteria was to incorporate substantial private sector participation in financing, and a special assessment district appears to have good potential for funding some of the streetcar costs, a sample assessment calculation is included here.

In order to generate $25 million in funds and limit the assessment to two percent of value ($2 per $1,000 in value), the special assessment district would need to be spread over a collection of properties valued at $11.7 billion. Total property value within the streetcar service area was projected to be approximately that amount by 2015. To annualize the $25 million assessment, a 20 year bond financed at 6% interest was assumed; annual payments on the bond would be $2.2 million. Spread over the $11.7 billion in properties, that equates to a payment of about 19 cents per $1000 in property value per year. So for a property valued at $1,000,000, the annual assessment payment would be $190. If any exemptions were made for certain property types (e.g., residential, institutions, churches, etc.) the assessment rate would need to be higher for remaining properties to make up for the loss.

Another way to look at this sample assessment would be on a per employee basis. Property value estimates for office and retail properties were based on the projected number of employees. A property value of $1,000,000 was derived from assuming $300 per square foot in value for a small retail building of about 3,300 square feet. Such a building was assumed to host 9 employees. The same $190 annual assessment works out to about $21 per employee, or $1.75 per employee per month.

For a residential property worth $325,000, an assessment equal to 0.2 percent of value would be $650. Annualized, using the same 20 year bond financed at 6%, the payment would be $57 annually or $4.75 per month.

This sample assessment could be reduced by varying the total property value over which it is spread, or by adjusting the percentage of value that's used, or by changing the total amount of funds to be financed. The primary benefit to properties paying the assessment is the locational advantage of being close to the streetcar, and the value added by the streetcar.

6.1.7 Potential Operations and Maintenance Funding Sources

The package of funding tools for ongoing operations and maintenance will need to be different than that for capital construction, as the former requires a steady, predictable flow of money over the long term, rather than a lump-sum contribution up front. For this reason, bonded money is not as important as sources that will generate cash flow each year.

Farebox Revenues

In most other cities, farebox revenues cover only a portion (between 2 and 40 percent) of operating costs of streetcar systems. This is partially due to the fact that some cities, like Portland, have lowered or eliminated fares in order to improve downtown transit circulation. The magnitude of farebox revenues will depend on many factors, including whether the streetcar integrates with fare structures for Yolobus and RT, whether transfers are allowed (and if so, for how long), monthly pass usage, fare evasion rates, and other factors.

Parking

Revenues from city-owned parking meters and garages have played a critical role in the funding of the Portland Streetcar. The potential funding range from this source was not evaluated because parking funds are dedicated to other purposes in the City of Sacramento and because no public parking revenue is currently generated in West Sacramento.

Property Based Improvement District (PBID)

A PBID assesses businesses and property owners to support district marketing, safety, and maintenance and could potentially be used to support operation of the streetcar. A PBID currently exists in downtown Sacramento that surrounds much of the proposed streetcar alignment.

Special Assessment District

An assessment district, as described above, can also fund operating costs. The proposed regional riverfront entity may be one vehicle.

Transit Agency Operating Funds

Many streetcar systems have been subsidized through general operating funds from the regional transit agency. The source of these funds would be each agency's share of regional transit operating funds from state sources and sales taxes (TDA). This could require redirecting funds used to provide current services. Operating funds that currently go toward lines that could be discontinued can be redirected to streetcar operations.

Extension of the West Sacramento ¼-cent Sales Tax

A portion of an extension of the West Sacramento sales tax could be dedicated to operations and maintenance instead of being bonded for capital construction. Since the full amount of existing sales tax revenue is dedicated through 2012 (its scheduled expiration) the timing would be right for using an extension to fund operating costs.

Advertising and Sponsorships

Advertising and sponsorships have been an important component of most other streetcar systems, either through annual advertising renewals or long-term prepaid sponsorships, advertising can supplement the operations budget.

Endowment Fund

An endowment could be a source of long-term stability for ongoing operating costs for the streetcar. Creating an endowment would require a significant up-front source of money, but would relieve budget uncertainty in future years.

6.1.8 Summary of Operations Funding Sources

Table 15, below, summarizes the potential revenues that could be generated for operations and maintenance. Funding operations and maintenance will undoubtedly be one of the most challenging aspects of the project and will require more detail in Phase 2. With incomplete knowledge about potential revenue sources, the funding package could still cover the $3.5M in annual operating costs if revenues were secured at the high range for each source.

Table 15. Operations and Maintenance Funding Tools

Funding Type	Range (millions)	
	Low	High
Farebox	$0.00	$0.70
Funds from Discontinued Bus Service	0.00	0.16
PBID	0.50	1.00
W. Sac. ¼-cent Sales Tax Extension	0.00	0.80
Advertising / Sponsorships	0.30	2.00
Parking	0	TBD
Future Sacramento County Transportation sales tax	0	TBD
Total	**$0.80**	**$4.66**

6.2 Management Scenarios

While the proposed West Sacramento-Sacramento streetcar system is not difficult to understand conceptually, there is a wide range of functions which would have to be exercised in order to design, permit, fund, construct, operate and maintain the system. This section suggests several alternative managerial structures that could undertake the functions required to make the project a reality, and operate it on a continuing basis.

The present feasibility study was undertaken by an ad hoc consortium of the Cities of West Sacramento and Sacramento, and the principal transit agencies – the Yolo County Transportation District and the Sacramento Regional Transit District. As the work moves forward into the implementation stage, a more formal organization, with legal authority to reach decisions and act, likely will be required. In addition to meeting the requirements of public expectation as to political responsiveness and administrative transparency, the organization will need to be able to receive funds from various sources, carry out standard accounting functions, enter into contracts, and arrange for the extension of liability and property insurance over the operations and assets of the streetcar system. The relationship of a permanent implementation and operating structure that recognizes the participation of the various entities, while addressing ongoing performance of operations and maintenance functions for the streetcar system, is a key issue to be addressed by the feasibility study partners.

During the final design, procurement and construction period, the entity will have to be able to oversee the completion of environmental documents, implementation of the physical aspects of the system, and negotiate and enter into any necessary agreements with local and state agencies. In addition, the agency must have an ability to objectively monitor the actual operation and maintenance of the service.

6.2.1 General Requirements

An optimal permanent administrative and management structure for the West Sacramento, Sacramento and riverfront streetcar system is required to discharge the following general requirements within the three phases – Project Development, Construction and Procurement, and On-going Operations and Maintenance.

Project Development Phase

In the Project Development Phase, the existing partnership is the entity that oversees preliminary engineering and environmental analysis. In this capacity, the following actions will occur:

- Finalize the west and east ends of the alignments, service and operations plan, ridership estimate, and overall project cost
- Fund and oversee the successful completion of all preliminary engineering tasks
- Develop and negotiate an agreement for a funding and cost-sharing strategy among the four partners, including a continuing cost-sharing agreement
- Finalize a specific funding package for capital and annual operating expenses
- Conduct public outreach as required
- Develop a financing and cost-reimbursement structure for operations

Construction/Procurement Phase

As the project development moves into implementation, the complexities begin to build, and the pressure for centralized management becomes more evident. During this Phase, the project goes through final design and construction. Requirements for the Phase are to:

- Complete the final design of all civil and systems elements
- Develop and adopt a construction management plan
- Construct, install, test, and accept the track, traction power system, OCS
- Procure the vehicles
- Construct/test/accept modifications to RT maintenance facility as required
- Conduct operations and maintenance training
- Procure, test, and install fare collection equipment
- Complete the safety certification of entire system
- Put property and liability insurance in place

- Develop an O&M contract for the use of RT track and facilities
- Complete and implement the complementary bus/transit service plan (YoloBus and RT)
- Conduct public information campaign

Ongoing Operations and Maintenance Phase

- Implement O&M contract
- Monitor compliance with operations and cost objectives
- Implement marketing and promotion programs
- Modify as necessary
- Continuously monitor ridership and public/stakeholder satisfaction
- Prepare plans for extension

6.2.2 Management Alternatives

The means of owning and operating the streetcar in a multi-jurisdictional setting is a critical decision for the communities. The management orientation is to offer a range of possible approaches to be refined and recommended in then next phase of the project. Three models are offered for further evaluation and discussion.

The RT Option

Three possibilities for RT operation of the streetcar are described below. Several variations and alternatives may come up in Phase 2 of the study, as well.

- **First** YCTD, or West Sacramento, and Sacramento could contract for the provision of streetcar service with RT. Streetcar service parameters, including financial contributions and sources could be addressed in that agreement. The Policy Steering Committee created for this streetcar study could continue meeting on an as-needed basis.
- A **second** alternative (a variation of above) would be if West Sacramento contracted directly with RT for streetcar service, regardless of the funding source. West Sacramento would be entitled to appoint at least one person to the RT board. As the current legislation allows, votes are weighted based on the level of financial support from participating jurisdictions. This alternative offers the immediate advantage of not financially jeopardizing the continuation of YCTD bus service, which is largely dependent on West Sacramento TDA funds.
- A **third** alternative would be for the City of West Sacramento to activate full membership with RT. West Sacramento, YCTD, and RT would need to resolve operational, managerial, and financial issues associated with this option.

At this early stage, there is no reason to debate whether TDA funds should be shifted from YCTD to RT; rather, the intention of the streetcar project was never to establish one service mode by decimating the other. New funding sources will be needed to address the streetcar

funding needs. Bus and streetcar service are complementary to one another. Both YOLOBUS and RT may choose to reconfigure some of their local fixed route services to enhance transfer opportunities to/from streetcars.

The Portland Model

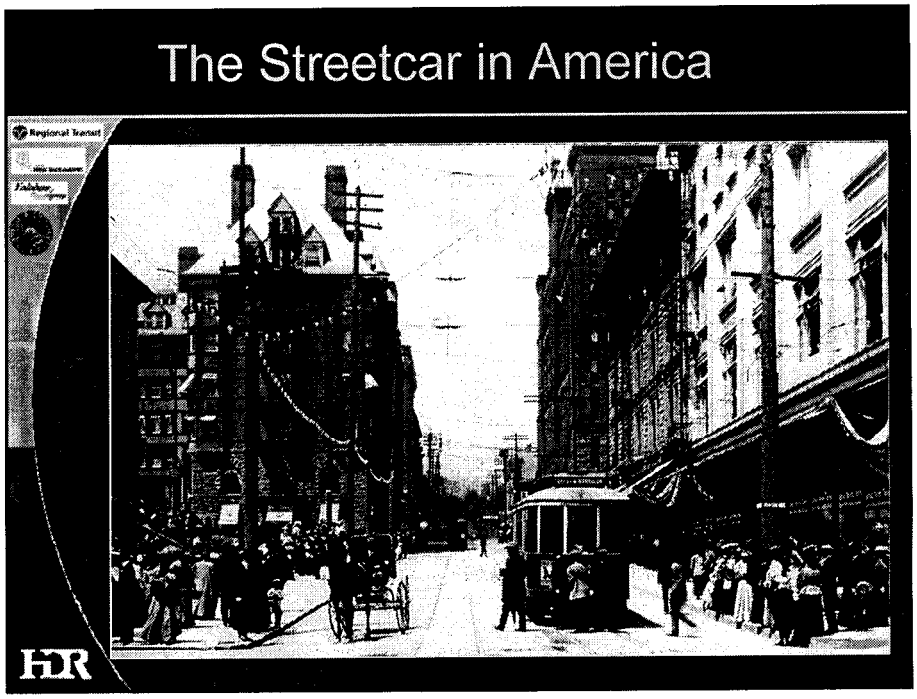
The City of Portland together with private sector supporters of the streetcar concept arranged for the incorporation of a not-for-profit corporation to provide focused leadership for the project. This entity is Portland Streetcar, Incorporated (PSI). PSI was established to provide the greatest possible flexibility in addressing implementation of the streetcar system. The PSI Board represents both the city and private partners, while contractual relationships with the City itself and with TriMet provide for the necessary flow of funding, the power of eminent domain, and for operations and maintenance. The Board membership is supportive and stable.

As the primary sponsoring public agency, the City of Portland assigned a Project Manager to oversee the entire sequence of streetcar planning, design, construction, and operating activities. PSI's staff works closely with the City Project Manager, in addition to reporting to the PSI board. In the West Sacramento-Sacramento context, this approach could be used by forming a similar not-for-profit corporation designed to meet the requirements of the local context. Board membership could be on the basis of appointments made by each of the current study partners, and might or might not also include representatives of the private sector.

Joint Exercise of Powers Authority (JPA)

JPAs are commonly used in California and elsewhere where mutually desired projects are dependent upon the coordinated effort of more than one public entity, across jurisdictional boundaries. The Capitol Corridor is a good example of a successful JPA, and some of the parties involved in the streetcar feasibility study are parties to that JPA.

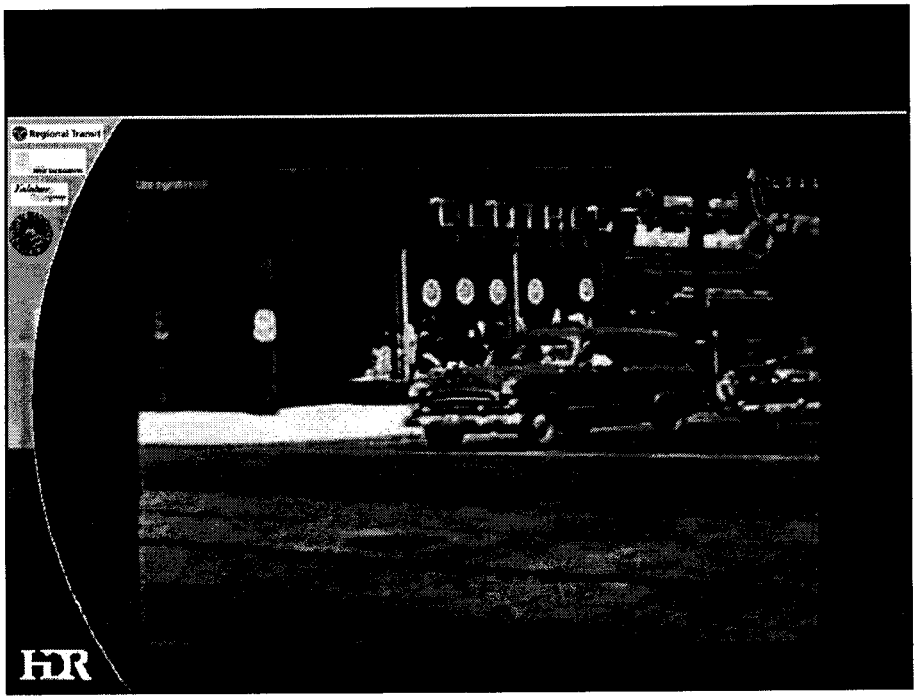
Attachment 3

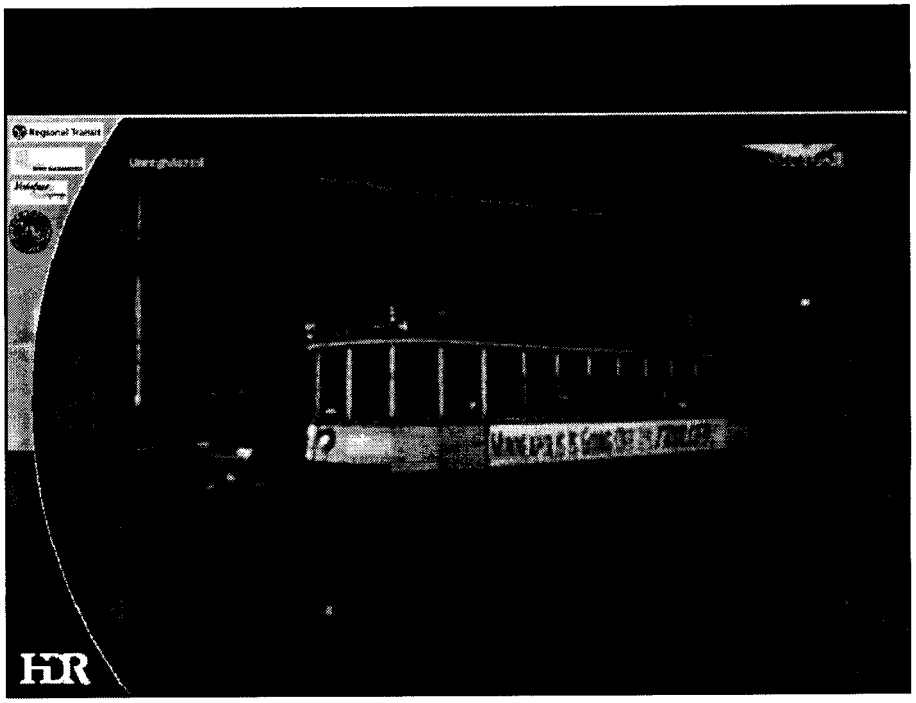


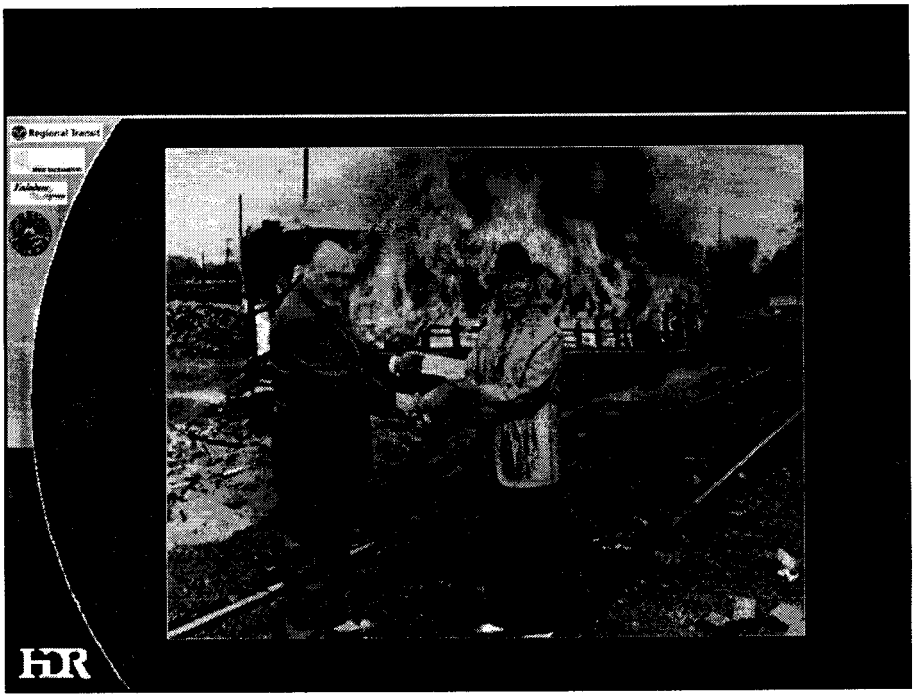
Sacramento History

Sacramento History

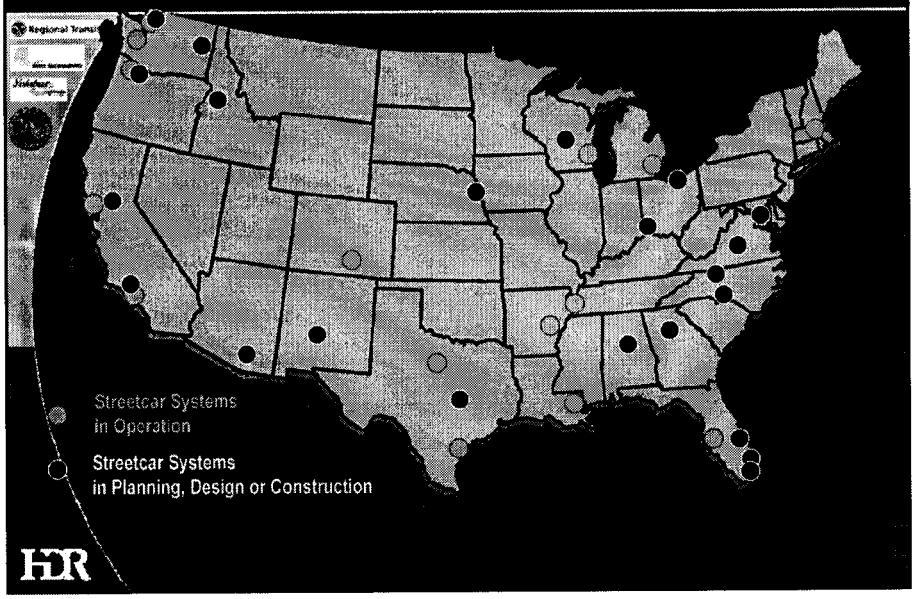
Sacramento History



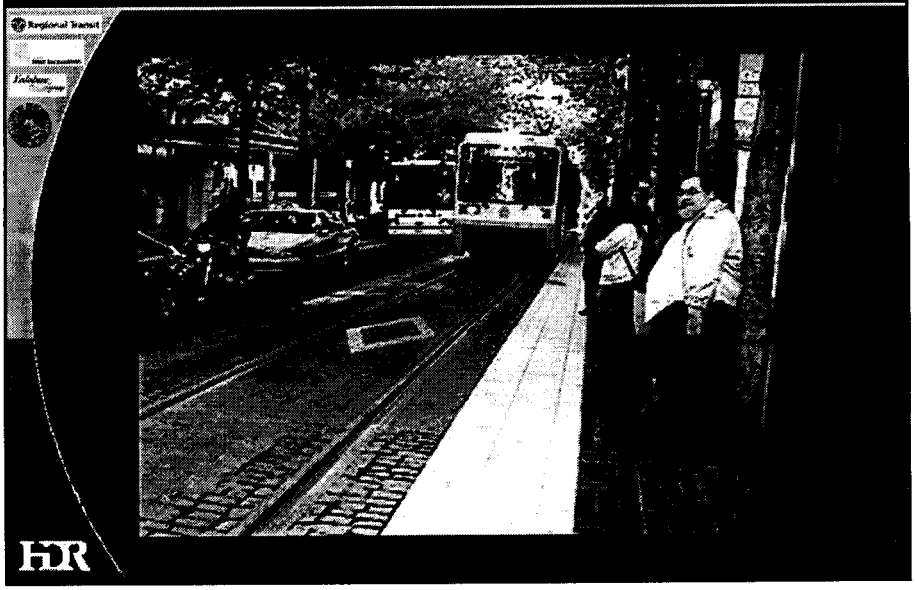

Regional Transit
HDR


Regional Transit
HDR

American Streetcar Renaissance



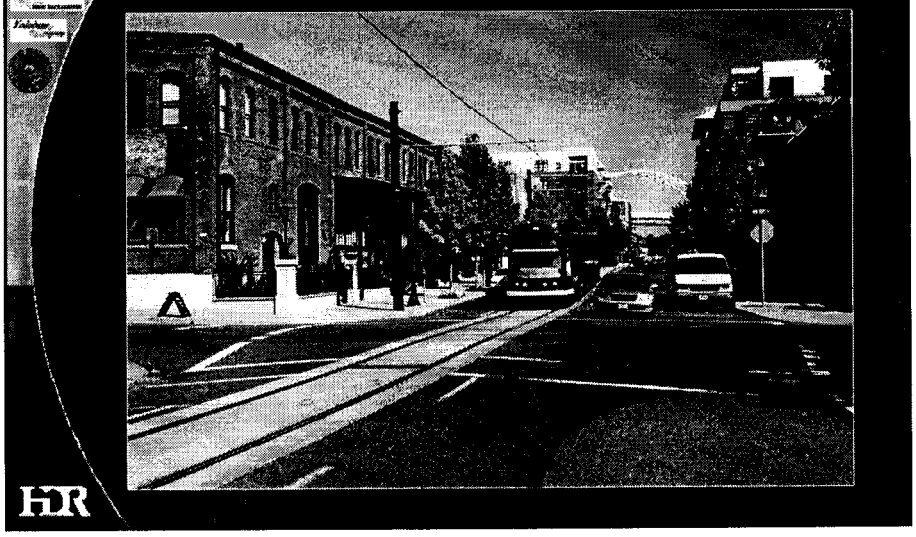
Light Rail…



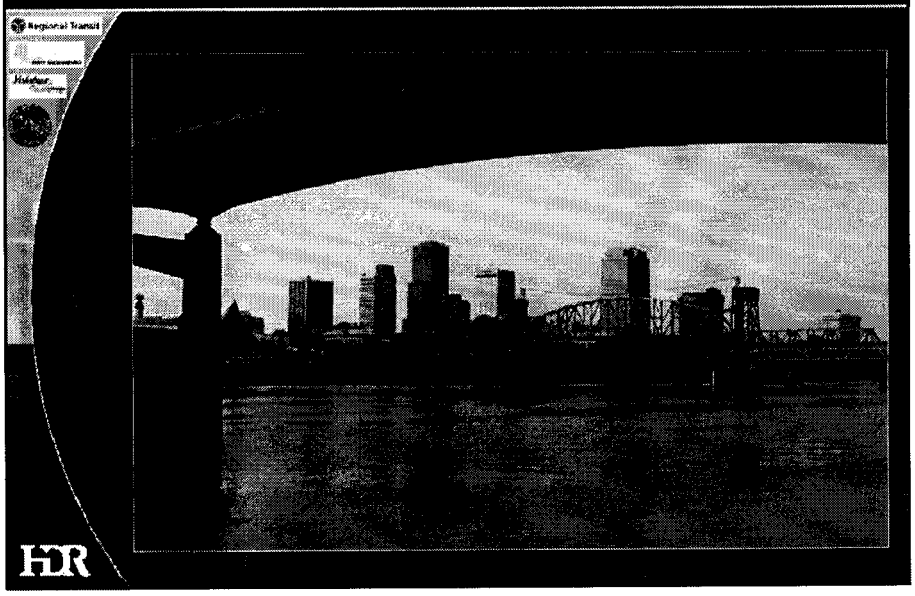
Streetcars…

A Catalyst for Change

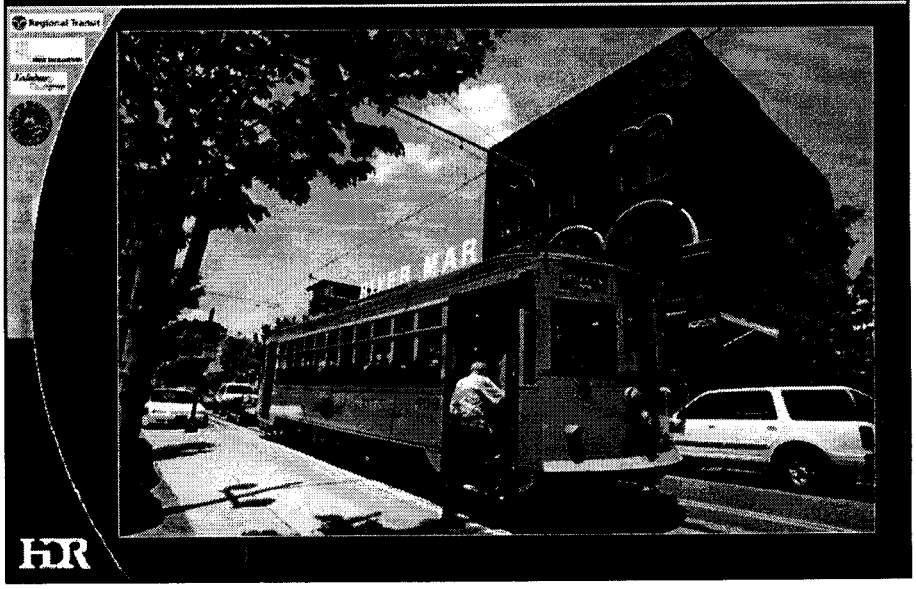
Before… and After



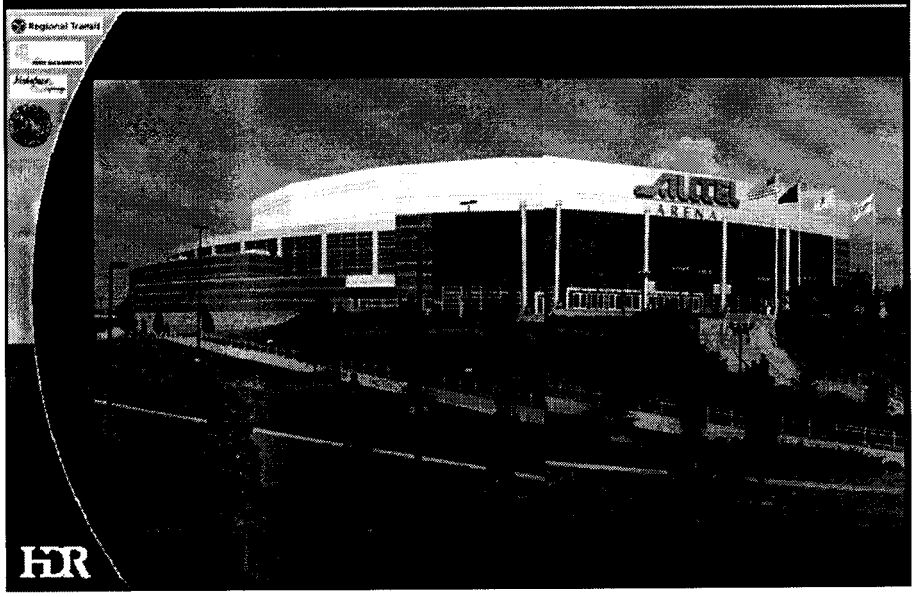
Case study: Little Rock



Case study: Little Rock



Case study: Little Rock



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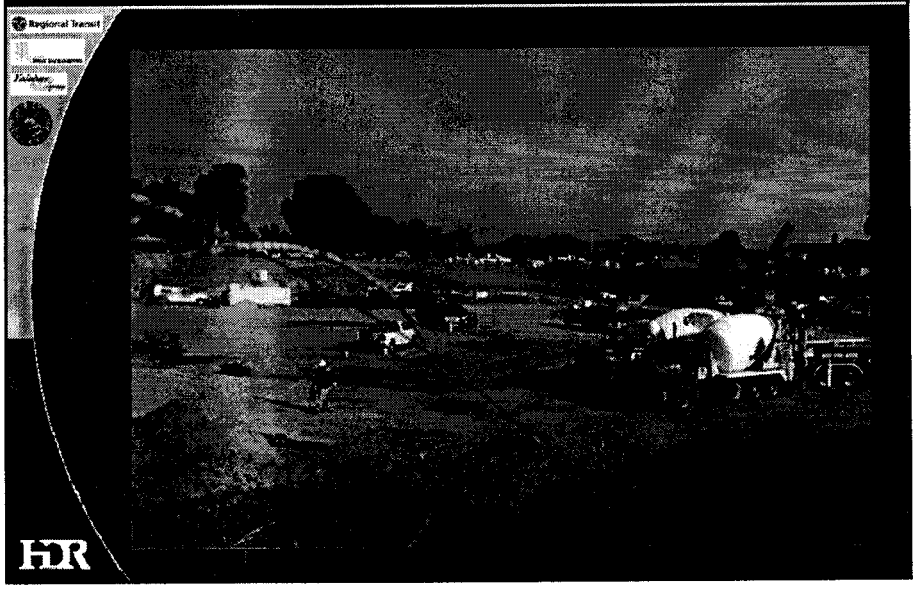

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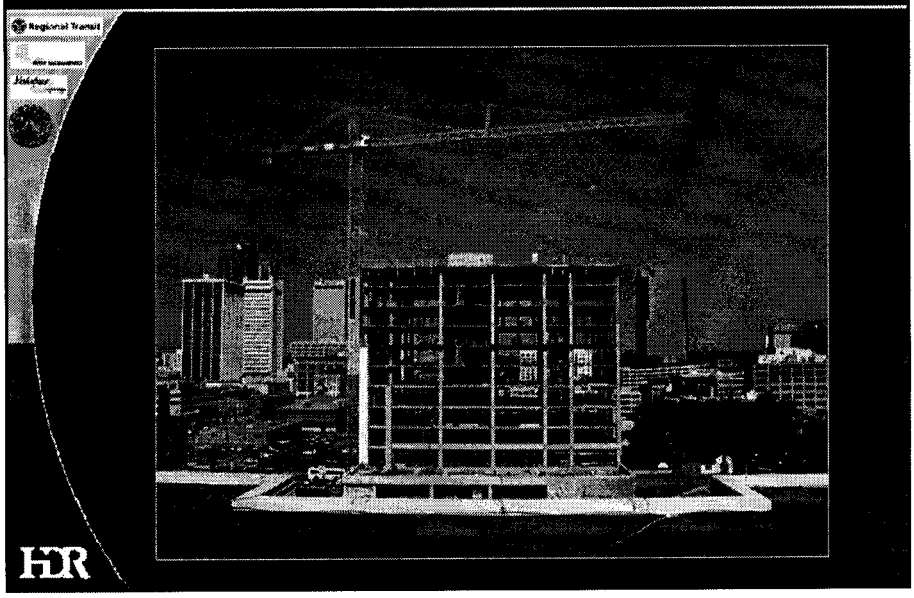
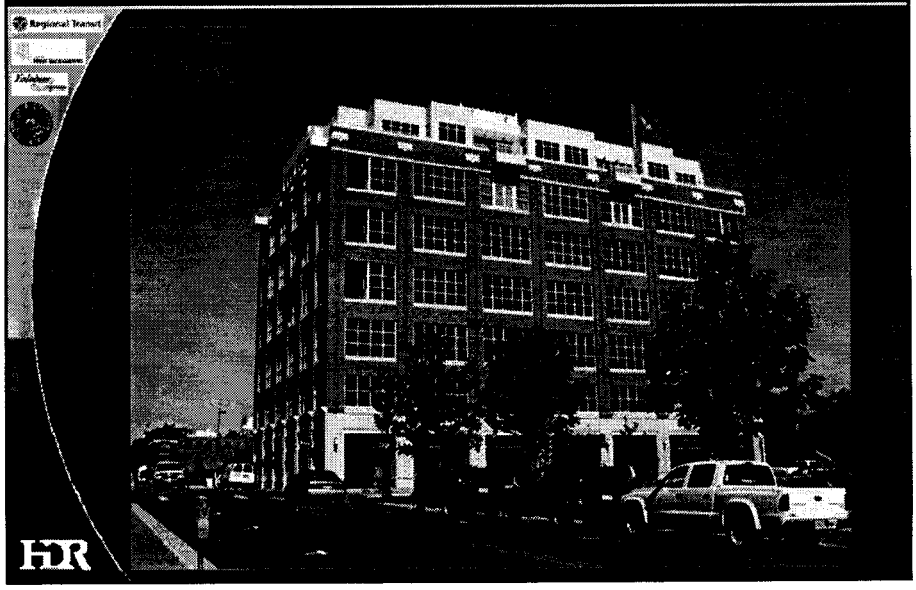


Case study: Little Rock



Project Sponsors

- City of Sacramento
- City of West Sacramento
- Sacramento Regional Transit District
- Yolo County Transit District
- Financial Support from Caltrans and SACOG

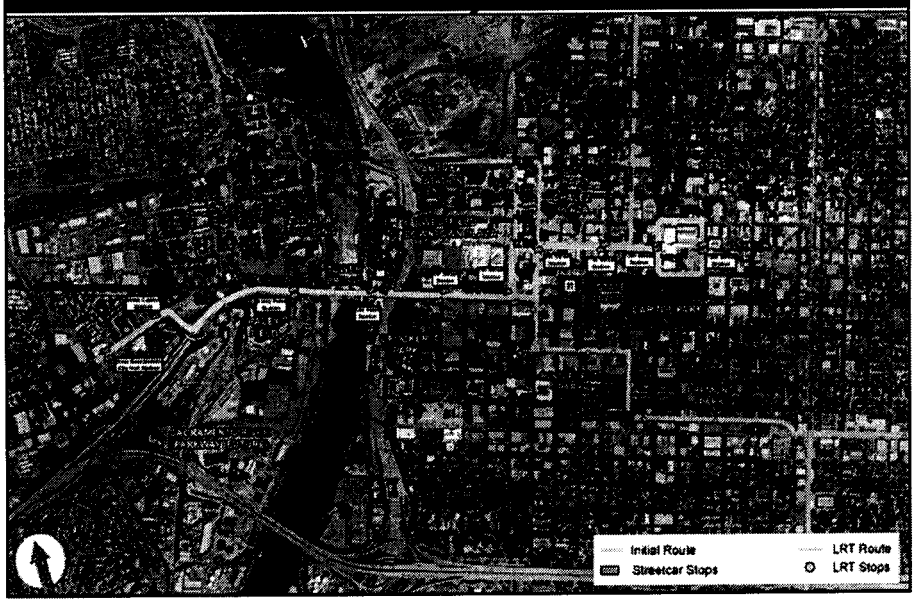
Defining Principles

- $50 Million or Less
- Delivered in five years or less
- An Initial 2 – 2.5 Mile Route
- Frequent service ("headways")
- Capable of Tying into RT
- Cost-effective Stations
- ADA Compliant Vehicles
- No Grade Separations

Study Area

Existing destinations and RT lines

Preferred Initial Alignment



Route Characteristics

2.2 miles long, shares .5 miles of the light rail trackage with RT

Direct route from the heart of Downtown West Sacramento to Midtown/Convention Center

Serves most potential redevelopment sites

Strong ridership

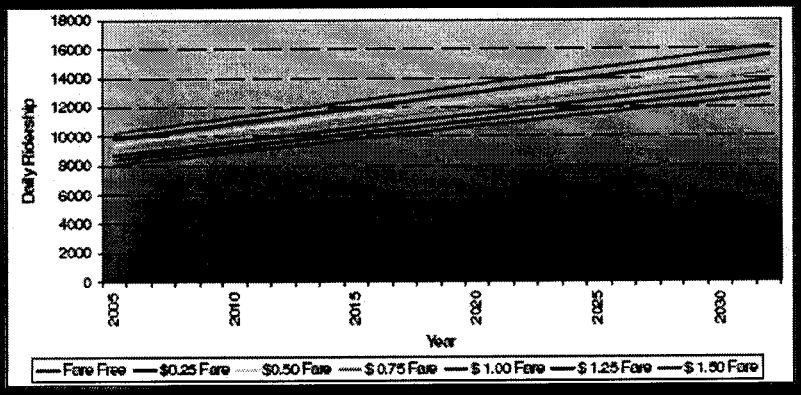
Many options for extensions

HDR

Immediate Extensions

Near-term extension options

Ridership



Estimated Capital Cost

Track	15,257,000
Power, Systems, Signals	11,192,000
Stops,	1,190,000
Vehicles, Maintenance facility	10,000,000
Design, construction soft costs	10,601,000
Contingency (15%)	4,892,000
TOTAL ESTIMATED COST	$53,132,000

Operating Assumptions

- 10 minute service (15 minute off-peak)
- 18 stops
- 22-minute end-to-end travel time
- Fare: $.50
- Operating cost: $3.55 million
- Share maintenance facility with RT

Funding Tools

Development Related

- **Community Facilities District**
- **Special Assessment District Development Impact Fees**
- **Real Estate Transfer Fees**

City Sources

- **West Sacramento ¼ cent Sales Tax**
- **Tax Increment Financing**
- **City General Funds**
- **Parking revenues**

Funding Tools

County/Regional Sources

- SACOG Community Design grant program
- Future Sacramento County sales taxfor transportation improvements

State/Federal Sources

- **Proposition 1B (Transportation Bond Package)**
- **Proposition 1C (**Transit-oriented development)
- **State Grants and non-FTA Federal Earmarks**

Funding Tools

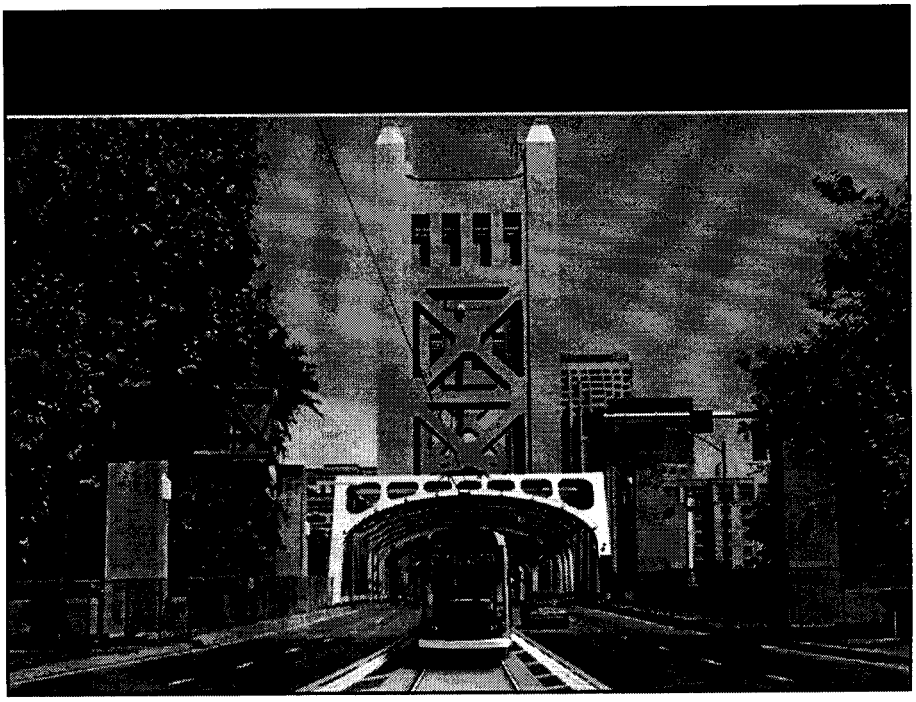
...a VERY wide range of possible yields from these sources...

Capital funding:

- Low: $16 million
- High: $142 million

Operating funding:

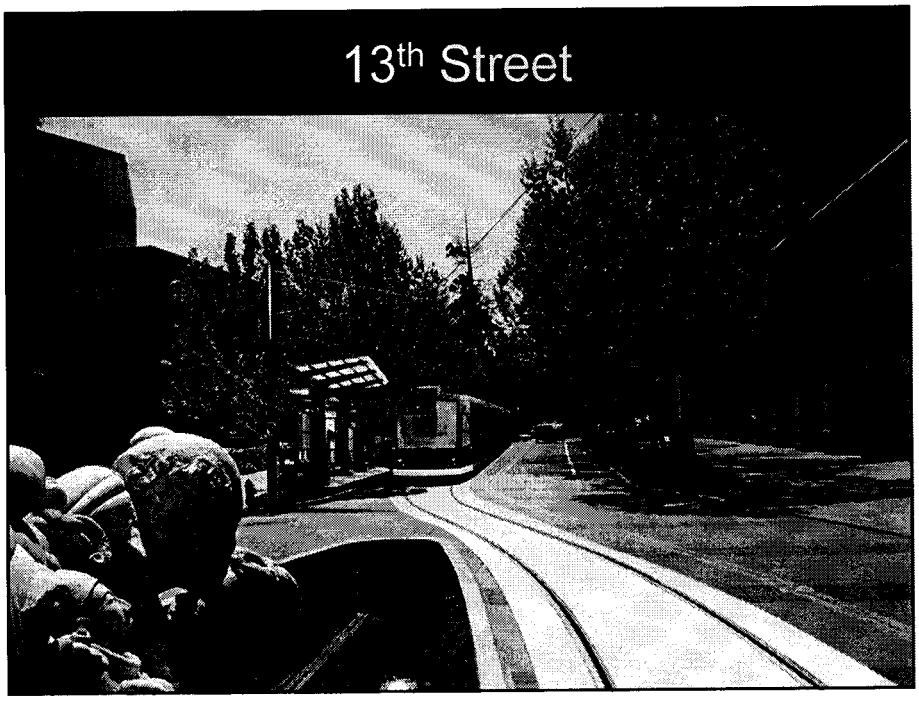
- Low: $.96 million
- High: $4.66 million



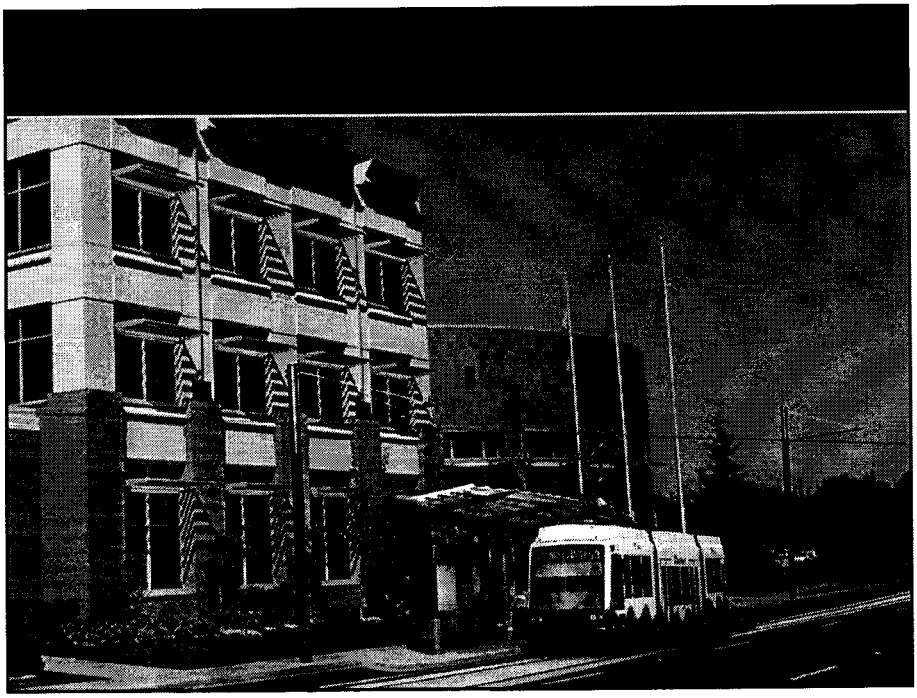
Capitol Mall

Capitol Mall

13th Street



L Street



Phase 2 Scope of work

Technical Tasks:

- Final Alignment and Service Plan
- Surveying and Base Maps
- Structural Exploration for Tower Bridge and the I-5 Overcrossing
- Plans, Specifications, and Estimates (PS&E)
- Civil Engineering
- Systems
- Engineering Drawings
- Cost Estimates

HDR

Phase 2 Scope of work

Environmental Tasks

- The Environmental Impact Report (EIR)

Implementation Program

- A Financial Plan for Capital, Operations and Maintenance Costs
- A Management and Organization Plan
- A Preferred Procurement Method

HDR

Phase 2 Scope of work

...all supported by a more comprehensive **Public Information/Public Involvement** effort, including:

- Collateral Materials – newsletter, etc.
- A Community Advisory Committee (CAC)
- General Community Meetings;
- Continued Developer Coordination Meetings;
- City Council and Transit Board Meetings;
- Visual simulations

HDR

Looking Forward to the Trip!

HDR