

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

ISSUE

Whether or not to approve the recommendations for completion of the Green Line to the Airport recommended improvements to the Green Line Preferred Alternative.

RECOMMENDED ACTION

Adopt Resolution No. 10-11-_____, Approving the Recommendations of the Green Line Transitional Analysis, including:

- Recommended Engineering and Urban Design Improvements to the Green Line;
- Recommended Funding and Implementation Strategy;
- Recommended Next Steps for the Green Line to the Airport, and
- Authorizing Staff to Evaluate Options for Additional Transit Funding to Enable the Green Line and Other TransitAction Plan Improvements to be Implemented.

FISCAL IMPACT

None as a result of this action. Approximately \$1.9 million in STP and Local Measure A funds remain available for the proposed additional work. An additional \$4.5 million in Federal grant funding may be available if staff is successful in working with FTA to convert these funds to this project for future environmental work.

DISCUSSION

There have been multiple studies of the Green Line (formerly called the Downtown Natomas Airport Project or DNA) dating from the 1980's (Attachment A: History of the Green Line). The Locally Preferred Alternative (LPA) was adopted by the RT Board in 2003 at the end of an Alternatives Analysis planning process. The Green Line LPA is also included in the RT TransitAction Plan (2009), and the Sacramento Area Council of Governments (SACOG) Metropolitan Transportation Plan (MTP). A Program Environmental Impact Report (EIR) was prepared for the entire Green Line project in accordance with the California Environmental Quality Act (CEQA) and certified in 2008.

The Transitional Analysis of the LPA began in 2008 with a two-fold goal: 1) to perform Preliminary Engineering and obtain CEQA clearance for Phase One of the project (the Green Line to the River District) and 2) to determine that portion of the Preferred Alternative which would perform best in

Approved:

Presented:

FINAL 11/3/10

General Manager/CEO

AGM Planning and Transit System Development

C:\Temp\BCL Technologies\NitroPDF6\@BCL@4804D733\@BCL@4804D733.doc

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

the very competitive FTA New Starts process. The consultant firm HDR | The Hoyt Company was chosen to conduct the Analysis.

While it was assumed early during the Transitional Analysis that the next construction phase of the project would need to stop at a point short of the Airport to achieve the required New Starts competitiveness factors, the Transitional Analysis has arrived at a project definition consistent with the LPA that can be built entirely to the Airport in its second construction phase and still be a competitive New Start project.

I. Study Process – Alternatives Analysis

The DNA/Green Line Alternatives Analysis was conducted between 2001 and 2003 with the following goals.

- Provide mobility improvements in the DNA/Green Line Corridor;
- Provide environmental benefits in the Corridor;
- Improve system-wide operational efficiencies;
- Provide cost-effective transportation solutions; and
- Provide transportation improvements that are enhanced by transit-supportive land use plans and policies.

A wide range of technology improvements were evaluated including enhanced bus, bus rapid transit, monorail, automated guideway people mover, personal rapid transit and heavy rail transit. All of the technologies except light rail and bus rapid transit were deemed too expensive to be cost effective to compete well in the New Starts process.

Twenty seven different alignments were considered as detailed in Attachment B. The 27 alternatives were eventually narrowed to three alignments because of cost, ridership, neighborhood impacts (sound, visual, construction impacts, and/or property takes) or environmental impacts. Additional alternatives were added based on public input and nine alternatives were carried forward for further review. All alignments included an evaluation of both BRT and LRT.

The final alignments studied included I-5 to I-80/Truxel Road to the Airport; I-5 to the Airport and Truxel Road to the Airport with a new bridge crossing the American River. Attachment C illustrates the Preferred Alternative, a LRT alignment serving the Railyards and River District with a bridge crossing at the American River (east of I-5) and continuing on Truxel Road crossing I-80 and I-99 on bridge structures on to the Airport.

II. Study Process – Transitional Analysis

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

The Transitional Analysis began with a Project Definition workshop to review the recommendations of the Alternatives Analysis and to identify potential avenues for cost savings and other improvements to the Preferred Alternative.

In addition to HDR staff, consultants who had worked on previous phases of the study as well as experts in streetcars and other technology participated along with Sacramento area planners and RT staff. The workshop yielded a number of potential improvements for further consideration, including:

- Reexamine use of the existing Truxel/ I-80 Bridge with elevated structure across Gateway Blvd.;
- Re-evaluate the bridge type for the American River Bridge and I-99 Crossing;
- Evaluate vehicle options including availability, performance characteristics, cost, trainability (ability to couple), scalability, capacity, image, low floor, maximum speed,, Buy America, and proven, system compatibility;
- Create a recognizable unique brand or image using context-friendly design; and
- Consider single tracking where appropriate.

The team also identified the need to:

- Determine the track placement along Truxel Road; and
- Identify some stations for possible deferment because of close proximity.

The Consultant team evaluated all of the potential improvements from the Project Definition workshop and developed several engineering and design recommendations. Through a broad based community outreach program, the initial recommendations were refined to become the descriptions listed in the Recommendations portion of this paper.

III. New Starts Justification - Cost Effectiveness

FTA evaluates projects on six different project justification criteria.

- Cost Effectiveness
- Mobility Improvements
- Environmental Benefits
- Operating Efficiencies
- Transit Supportive Land Use Policies and
- Economic Development

While all of the factors are important to the project’s overall rating, a good Cost Effectiveness Index (CEI) is considered as essential for entry into the FTA New Starts process. The CEI is the only rating factor that is purely quantitative and non-subjective. Without at least a medium-low rating, it is very difficult to obtain New Starts funding.

The CEI is a comparison of the proposed “build” project against a theoretical “baseline” project.

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

The “baseline” is designed to come as close as possible to providing similar transit service to the “build” project without the expenditure of significant capital costs. Capital costs for the “build” and “baseline” are annualized, and the “baseline” cost is subtracted from the “build” cost (incremental annualized capital cost). Similarly, the operations and maintenance (O+M) cost is estimated for both “build” and “baseline”, and the incremental annual O+M cost is calculated. The performance of the two options is compared by looking at the overall system-wide travel time savings between the transit system with the “build” option, and the transit system with the “baseline” option—known as Transit System User Benefit (TSUB). CEI is the incremental annualized capital cost plus the incremental annual O+M cost divided by TSUB, which results in a cost per hour of transit system user benefit.

Each of the following options were evaluated to determine its CEI:

- Airport
- Airport Express
- Club Center
- North Natomas Town Center
- Gateway Park

A. Operations and Maintenance (O+M) Cost Estimates

An operating plan was developed for each option assuming 15-minute service on weekdays, and 30-minute service for evenings, weekends, and holidays, and service from 5:00 a.m. to 10:30 p.m. The Airport Express option included an additional train inserted between the local trains every 30 minutes through the peak periods. Schedules were developed based on vehicle acceleration, station dwell times, speed restrictions along the route, and layovers. Train consists were assumed based on changing passenger demands throughout the day. These calculations resulted in the number of train hours and car miles. Taken together with the route miles and number of stations, and using actual 2010 cost data from Regional Transit, the annual O+M cost was estimated for each alternative including the baseline. Note that for the purpose of this analysis, the O+M costs, capital costs, and ridership changes are calculated for a Green Line from the northern end point to the 13th Street Station south of downtown.

The baseline is an enhanced bus service from the airport following the build alignment through Natomas, terminating at 13th Street. Stop locations are the same as for the build option. The baseline route must deviate from the build route at the American River, using Garden Highway, I-5, and Richards Boulevard to complete the route. Although traffic signal priority is assumed, traffic congestion by 2035 requires 14 buses in service to maintain 15-minute service. Articulated buses are used to accommodate the passenger demand. Note that for build options that stop short of the airport, a bus connection is provided from the end of the build option to the airport.

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis
--

Table 1: O+M Costs

	Baseline	Airport	Airport Express	Club Center	North Natomas	Gateway
Annual O+M Cost	\$8.21M	\$17.78M	\$20.66M	\$17.22M	\$14.15M	\$12.89M
Incremental Annual O+M Cost	NA	\$9.57M	\$12.44M	\$9.01M	\$5.94M	\$4.68M
Buses	14	-	-	5	5	5
LRVs	-	29	33	24	19	14

Note that there is a significant jump in the incremental annual O+M cost between the North Natomas and Club Center options because an additional train would have to be put into service to serve Club Center.

B. Capital Cost Estimates

The capital cost estimates are consistent with the recommendations provided in Section III. Other key assumptions for the estimate are listed here. A permanent maintenance and storage facility is planned within industrially zoned property at Metro Air Park and included in the estimates for the options that reach the airport. For options that don't reach the airport, a temporary light maintenance and storage facility is planned on appropriate land within the corridor. Trailers would be used for supervisor offices and equipment and material storage. The cost estimate includes the acquisition cost for this property. It is assumed that traction power substations would be constructed within masonry block buildings to improve their appearance and allow them to fit within available public right of way. The loop track at the Sacramento Valley Intermodal Transit Center is included in the cost estimate. The vehicle cost assumes that a new generation of 120-foot-long light rail vehicles will be procured rather than 90-foot-long vehicles. So rather than trains being made up of four 90-foot-long cars, they will be three 120-foot-long cars. There is a cost savings by eliminating the number of operator consoles and coupler units.

The capital cost estimates were prepared by an estimator who spent most of his career preparing bids for construction contractors using estimates of labor-hours, materials, and equipment. These numbers were reviewed by the consultant team and input into Federal Transit Administration Standard Cost Category (SCC) worksheets. RT's standard contingencies were applied by cost category depending on the type of work. RT's standard mark-ups for items such as administration, design, construction management were applied. The costs were distributed by year of expenditure. The inflation rate of 3.2% from SACOG's MTP was used. The SCC calculated the annualized capital cost.

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

Table 2: Capital Costs

	Baseline	Airport	Airport Express	Club Center	North Natomas	Gateway
Capital Cost (2010)	\$85.09M	\$756.43M	\$785.10M	\$561.46M	\$495.71M	\$390.54M
Capital Cost (YOE)	NA	\$894.78M	\$928.56M	\$661.20M	\$582.90M	\$457.42M
Cost per Mile (2010)	\$5.83M	\$59.84M	\$62.11M	\$71.16M	\$74.88M	\$85.83M
Annualized Capital Cost	\$8.52M	\$56.92M	\$59.91M	\$42.84M	\$37.81M	\$29.71M
Incremental Annualized Capital	NA	\$48.40M	\$51.39M	\$34.32M	\$29.29M	\$21.19M

Note that the cost per mile of the project is highest for the shortest options because there are fewer miles to spread the cost of the American River Bridge and the Gateway Park Boulevard grade separation. Also note that the Year of Expenditure (YOE) cost per mile for the North Natomas Town Center option of \$88.1M is less than the average cost per mile of \$116.1M of LRT Projects in the FY 2011 FTA Annual Report on New Starts. The comparable projects are the Houston University Corridor (\$131.8M/mi), Portland Milwaukie (\$201.6M/mi), Charlotte Northeast (\$111.3M/mi), St. Paul-Minneapolis Central (\$96.1M/mi), Houston North (\$143.2M/mi), and Houston Southeast (\$126.6M/mi), Salt Lake City Draper (\$55.8M/mi), and Sacramento South Corridor Phase 2 (\$62.8M/mi). The cost per mile of the project is heavily influenced by the complications of the alignment; for example, huge property takes, several bridges, and/or tunnels.

C. Transit System User Benefits (TSUB)

Ridership for the options was estimated using SACOG's Travel Demand Forecasting Model. As reported previously, ridership has improved with the change in the forecast year from 2025 to 2035, which includes additional employment downtown, and being able to account for development that had not been previously approved. In addition, paid parking rates were adjusted downtown, and expanded to cover Railyards and the River District. Off-model estimates for the airport were updated based on current passenger counts. And the background bus network in Natomas was adjusted to eliminate competing routes and provide better connections to the build and baseline alternatives.

Transit System User Benefits (TSUB) (Table 3) were calculated using FTA's Summit software program. The Summit program uses the transportation demand model outputs as inputs and calculates the aggregate system-wide travel time differences between the build and baseline options. An annualization factor of 305 was calculated for the RT system and applied to obtain the annual TSUB hours, used in the CEI calculation.

The ridership model does not calculate ridership for special event uses such as Arco Arena.

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

Based on the calendar of events, number of tickets sold, and typical mode-share for similar facilities with similar transit service, an off-model ridership estimate was performed for Arco Arena. Similarly, an off-model estimate of the contribution of these riders to TSUB was estimated and added.

Table 3: Transit System User Benefits (Hours)

	Airport	Airport Express	Club Center	North Natomas	Gateway
Daily TSUB	7,650	8,640	6,080	6,060	4,860
Annual TSUB	2.33M	2.63M	1.85M	1.85M	1.48M

D. Cost Effectiveness Index (CEI)

Each year, FTA provides New Starts reporting instructions, and the CEI breakpoints for different rating categories are typically adjusted to account for inflation. Currently the breakpoints are \$12.49 for “High”, \$16.49 for “Medium-High” \$24.99 for “Medium” and \$31.49 for “Medium-Low”.

At this point, we have the numbers necessary to calculate CEI as shown in Table 4:

$$\text{Cost Effectiveness Index} = (\text{Incremental Annual O\&M Cost} + \text{Incremental Annualized Capital Cost}) / \text{Transportation System User Benefit}$$

Table 4: Cost Effectiveness Index (CEI) (\$/User Benefit Hour)

	Airport	Airport Express	Club Center	North Natomas	Gateway
CEI	\$24.84	\$24.22	\$23.37	\$19.06	\$17.45
Rating	Medium	Medium	Medium	Medium	Medium

Using the current FTA CEI breakpoints and taking into account the numerous assumptions that were necessary for these calculations, the options to the Airport are just barely in the Medium category. Given how close these are to the breakpoint to Medium-Low, it should be anticipated that with FTA review and comment on the assumptions and as more details become clear on the project as it is developed, that these options could dip to a Medium-Low rating, which is an acceptable rating, but perhaps not as high as Regional Transit would want to have going into discussions with FTA.

The North Natomas and Gateway options, on the other hand, are well past the mid-point of the Medium rating bracket, and given the magnitude of changes that are required to affect a different ranking, it can be expected that these will stay solidly within a Medium ranking each year as the project is annually re-evaluated as required by the New Starts process.

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

IV. Other New Starts Project Justification Evaluation Factors

As previously mentioned, CEI is only one of several Project Justification Ratings that FTA uses. An overall project rating of Medium is required for the Approval to Enter Preliminary Engineering and Final Design. The other evaluation factors are more subjective than CEI and depend on a variety of inputs. Our consultant, HDR, has staff who formerly worked for FTA evaluating projects against these criteria, and they are familiar with the other projects in the New Starts pipeline and the ratings they have received. With that experience, they have predicted the other ratings that the Green Line project would receive and explain why.

A. Mobility Improvements

The Mobility Improvement measure looks at a number of factors, but a primary consideration is how well the project serves transit dependents compared to the region as a whole. It considers the number of transit dependents anticipated to use the project, their user benefits per passenger mile, and the share of user benefits received by transit dependents compared to the share system-wide. Forty two percent of the Green Line and system-wide transit ridership are transit dependents. Thirty nine percent of user benefits in the Green Line corridor come from transit dependents versus 36 percent system-wide. Given that transit dependent use and user benefits are about the same on the Green Line as compared to the system as a whole, the project will receive a Medium Mobility Improvement rating.

B. Environmental Benefits

Projects in non-attainment areas for any transportation-related pollutants receive a High rating. Sacramento is a non-attainment area for air quality, and therefore this project will receive a High rating for Environmental Benefits.

C. Operating Efficiencies

The Operating Efficiency measure is based on the difference between system-wide operating and maintenance cost per passenger mile between the Build and Baseline alternatives. Given the size of the Sacramento region’s transit system, the Green Line project does not make an appreciable difference in the O+M cost per passenger mile and therefore would receive a Medium rating. The South Line Phase 2 Project received the same Medium rating.

D. Land Use

The Land Use rating is prepared by Land Use Assessment Contractors hired by FTA. While they look at numerical measures of population, number of households, employment, and densities in a half-mile radius of the stations, there aren’t specific breakpoints for these numbers into ratings. In addition, there are several other subjective factors that are used. Development character looks at the relationship of the buildings to the street: setbacks, human scale, entrance orientations. It also looks for roads narrow enough to be crossed easily, low to moderate traffic speeds, and

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

continuous development with an absence of vacant land or parking lots. Pedestrian facilities look for a compact grid system of streets with many alternative walking paths to proposed stations. Parking supply looks for a scarcity of parking and high parking costs. While this project directly serves downtown Sacramento with strong employment and many activity centers, and there is decent residential development and some strong commercial land uses, as a whole, it is competing against larger metropolitan areas with higher numbers. In addition, while North Natomas was planned to be transit oriented in conjunction with the Green Line Project, because development to date has not had the benefit of robust transit service, the character of development up to now has been primarily auto-oriented, and will not rate as well as it might be hoped for in relation to these other factors explained above. We expect that the project would receive a Medium-Low Land Use rating.

E. Economic Development

The Economic Development measure is based on the existence and effectiveness of transit supportive plans and policies and evidence of higher density development projects advancing in areas adjacent to planned stations. The SACOG Blueprint, California Senate Bill 375, Sacramento RT Transit Oriented Development (TOD) Guide and TransitAction Plan, City of Sacramento General Plan, and the North Natomas Community Plan and Development Guidelines all provide strong rationale for a good rating. In addition, the plans for multiple projects downtown and in North Natomas, the Railyards, River District, Greenbriar, and Metro Air Park should allow the project to receive a Medium-High rating.

Cost Effectiveness 20%	Mobility Improvements 20%	Environmental Benefits 10%	Operating Efficiencies 10%	Land Use 20%	Economic Development 20%
Medium	Medium	High	Medium	Medium-Low	Medium-High

Overall, the project would receive a Medium or Medium-High Project Justification Rating.

F. Other Considerations

The amount of funding being requested will make a difference in FTA’s ability to advance the project through the New Starts process. Only six of the 19 non-exempt projects in the Fiscal Year 2011 New Starts report have a capital cost of less than \$750M—approximately the cost of the non-express option to the Airport. Projects requiring less funding but with ratings similar to more expensive projects will move forward more quickly—a fact that works in this project’s favor.

Working against the project is the fact that one-quarter of the non-exempt projects in the FY11 New Starts report are in California, and RT’s South Line Phase 2 is one of those projects. FTA tries to spread funding amongst regions. The number of California projects is likely to create challenges for the Green Line Project in the short term.

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

V. New Starts Financial Rating

The Project Justification Rating is 50% of the Overall Project Rating. The other 50% is the Financial Rating. The Financial Rating is based on three components: How much FTA funding is being requested (20%), the Capital Funding Plan (50%), and the O+M Funding Plan (30%).

Federal New Starts funding anticipated to fund 50% of a project’s capital cost is in line with the Federal New Starts guidelines.

A financial analysis of the Green Line to the Airport option was completed. This analysis was done to determine the financial capacity which will be expected to be demonstrated by RT when competing in the New Starts process. The analysis determined that the Green Line to the Airport could be built and operated by RT with the addition of a new revenue source equivalent to a one-half cent sales tax collected within Sacramento County. The early years of the analysis indicated a need for financing to bridge potential deficits. The financing cost can be covered in out years.

The cost of the Green Line to the Airport places a demand on revenue and limits what can be spent on other Transit Action Plan projects during the development and construction of the project.

Table 5 shows the capital funding plan for the Green Line to the Airport. It assumes restoration of service due to recent budget reductions.

Table 5: Green Line Funding Plan to the Airport (excluding the Green Line to the River District)

Revenues	Total
New Starts	\$428,388,500
Airport Contribution	\$ 77,627,000
Developer Fees	\$ 29,000,000
Measure B/State/Other Local	\$321,761,499
TOTAL REVENUES	\$856,776,999
Capital Costs (YOE)	\$856,777,000

An analysis was also performed to evaluate an option which ends the Green Line at North Natomas Town Center as a New Starts project and extends to the Airport shortly after completion of construction. The North Natomas Town Center option is less costly and requires about half of the local revenue needed for the option continuing to the Airport. This results in more funding for the expansion of the rest of the transit system while the Green Line is being built.

Table 6 shows the capital funding plan for the incremental construction of the Green Line to the Airport with a New Starts funded portion to Natomas Town Center..

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

Table 6

Green Line New Starts Funding Plan to Town Center

Revenues	Total
New Starts	\$272,448,000
Developer Fees	\$ 29,000,000
Measure B/State/Other Local	\$243,448,000
TOTAL Revenues	\$544,896,000
Capital Costs (YOE)	\$544,896,000

Green Line Non New Starts Funding Plan to Airport

STP/CMAQ	\$ 20,000,000
Airport Contribution	\$ 77,627,000
Developer Fees	\$ 3,000,000
Measure B/State/Other Local	\$252,395,223
TOTAL Revenues	\$353,022,223
Expenditures (YOE)	
Capital Costs	\$353,022,223

The analysis of the Natomas Town Center option indicates ample revenue to build the Green Line, implement service restoration and implement some TransitAction Plan projects.

VI. Recommended Green Line Funding and Implementation Strategy

The Transitional Analysis concludes that RT can build and operate an extension of the Green Line which reaches the Airport. The project falls within the range for a Medium rating for an FTA New Starts project, has considerable community support, will significantly increase transit system ridership, and can be completed through an aggressive planning and construction schedule.

Staff recommends a funding strategy to deliver a project which extends to the Airport and will stand up to Federal scrutiny. The recommendation is that a portion of the Green Line extending to Natomas Town Center be built with a 50% contribution of New Starts funds; and further, that RT pursue a new, additional funding source that will provide Federal matching funds for the New Starts portion. In addition, staff recommends that RT combine the new funding source with funds from Federal non New Start sources and a contribution from the Airport to extend the line to the Airport. RT will also remain poised to take advantage of future state bond measures or new statewide funding programs as they become available over the next 10 years. In the past, programs such as Proposition 116 and TCRP have provided substantial funding for RT’s major expansion programs. When similar opportunities become available in the future, funding can be added to support either or both phases of the Green Line.

The rationale for this recommendation is based on many factors, including:

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

- The CEI, perhaps the most important of the Project Justification ratings in the New Starts process, for both Natomas Town Center and the Airport options, is projected at Medium. A CEI of Medium is considered adequate for entry into the New Starts process. The Natomas Town Center Medium rating is very strong and will not likely change during the course of the project development, while the Airport rating poses some risk. A number of things can change a CEI rating through the project development process; the Natomas Town Center option is much more likely to hold its CEI rating through Final Design.
- The Federal contribution for a New Starts project is usually apportioned annually. Experience has indicated that it is reasonable to expect an annual Federal apportionment no larger than \$100M for an area the size of Sacramento. The projected annual apportionment for the North Natomas option is \$90M for three years; for the Airport, \$145M for three years. Achieving the funding required beyond the \$100M mark will require RT to provide financing, thereby increasing the cost of the local match for the project.
- The Airport will provide funding for the extension of the Green Line on Airport property. Airport representatives have indicated that bonding capacity will not be available until at least 2017.
- The experience of other transit properties in building airport extensions is that the design and approval process is significantly slowed by FAA involvement due to security concerns. This could negatively affect the schedule of the entire line, if it were all to be built at once.
- The incremental construction of the Green Line to the Airport will allow additional financial capacity to make improvements to the bus route network, while the Green Line is under construction. Moving the entire project at this time will not allow for investment in the transit system beyond the Green Line.

VII. Recommended Engineering and Urban Design Improvements to the Green Line

A. American River Bridge

Significant cost savings were identified for the American River Bridge by changing the assumed bridge type from a cast-in-place segmental bridge to a precast concrete girder or steel girder bridge. These bridge types make use of the construction road necessary to construct the bridge foundations and bridge columns. The disadvantage is that significantly more of the construction activities depend on non-flooded conditions in Discovery Park and rely on the assumption that a sensitive species will not decide to build a nest near the construction site. Alternatively, since the last study was completed, structural engineers have discovered ways to design pre-cast segmental bridges to meet California seismic requirements. For a 20 percent or a \$7.5M increase in bridge cost, the flood or biological risks associated with the superstructure construction could be eliminated, which is still a significant cost savings over cast-in place segmental.

The American River Bridge would be designed and built to ultimately carry northbound and

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

southbound tracks. Initially it would have a single track on one side of the bridge, and the other side would have a sidewalk and a northbound and a southbound bike lane. The single-track bridge will support 15-minute train service. Long term, if a roadway bridge is built nearby, the bike lanes and sidewalk could be provided on the roadway bridge, and the LRT bridge could be double-tracked.

B. South Natomas Track Placement

Design changes in South Natomas did not result in construction cost savings, but were nonetheless valuable because they identified a feasible way to incorporate LRT tracks into the median of Truxel Road without significant roadway widening or impact to traffic, while providing reliable and relatively fast LRT service. The tracks are assumed to be in the center median of Truxel Road with center platform stations and shared left turn lanes.

C. I-80 and Gateway Park Boulevard Crossings

The recommended design refinement takes advantage of the existing Truxel Road bridge over I-80. Feasibility, traffic operations, and LRT operations are significantly improved by this option which accommodates exclusive LRT tracks in the median of the bridge by shifting traffic lanes out and widening the existing bridge. The Preferred Alternative envisioned a separate rail bridge crossing I-80, landing at Gateway Blvd. The cost savings generated from eliminating the original I-80 bridge were put back into the project to elevate the tracks over Gateway Park Boulevard. An elevated platform at this location and an elevated pedestrian bridge across Truxel Road eliminates significant conflicts between trains, pedestrians, and the very high traffic volumes at this intersection.

D. Stations

There were small improvements found in the key FTA Transportation System User Benefits (TSUB) measure by deferring the stations that were generating the lowest ridership: Arena Boulevard, East Town Center, and Commerce Parkway. Travel time savings per station deferred is approximately 35 to 45 seconds. While this isn't enough to save a train set and have a major impact on operating cost, the TSUB is the product of ridership and travel time savings, and deferring these stations improved TSUB by about 3 percent.

E. Parking

Parking supply in South Natomas was kept the same as it was in the Program EIR based on prior community concerns that additional parking supply might attract drivers from outside of South Natomas. It is assumed that parking in South Natomas will be provided in three different ways. First, the City of Sacramento would expand their parking lot at the South Natomas Community Center by 140 spaces and make those available for park-and-ride use. Second, RT would solicit proposals from the owners of the shopping centers near West El Camino and San Juan Road that in exchange for what it would cost to build structured parking, RT would contribute that sum

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

toward the redevelopment of the shopping center and use of the necessary parking spaces. Third, RT will either be able to make use of the 2 acre parcel that they own on the west side of Truxel north of San Juan Road with the approval of a new traffic signal at Mammoth Street, or RT will be able enter into an agreement to lease excess surface parking from one of the shopping centers.

Parking supply in North Natomas was increased by 215 spaces to match the demand for park-and-ride and increase ridership. Parking at Gateway Park Boulevard was assumed to be exactly what is required to be provided by the developers to the west and to the east of the station. The prior assumption that additional structured parking would be provided at Gateway Park has been eliminated. The additional 1,000 parking spaces shown by the ridership model as being needed in North Natomas are split evenly between Arco Arena and North Natomas Town Center. It is assumed that it will be possible to have an agreement for shared use parking during non-event periods with Arco Arena, and it is assumed that it will be possible to have an agreement with the City for RT to construct shared-use parking spaces on City property at North Natomas Town Center.

F. Single Track

The project has been planned to ultimately be double-tracked from end-to-end. The operations plan produced run-time estimates and string line diagrams that identified train “meets” (locations where southbound and northbound trains will pass) so that single-track segments could be identified. Six trains are required to provide 15-minute service from 13th Street to the Airport, resulting in five “meets”. It is possible to provide 15-minute service with single track located: 1) on 7th Street through Railyards, 2) across the American River, 3) from the end of the Gateway Park Viaduct to just past the former East Town Center station site, 4) from the former Commerce Parkway station site past the Greenbriar Station, and 5) from end of runway to just before the Airport Station. Longer segments of single-track could have been proposed, but the shared left turn concept in South Natomas does not work with a single track alignment, and it would have too impacts to retrofit areas of single track within streets or on the Gateway Park Viaduct. With the exception of Railyards and the American River Bridge, the areas identified for single-track are exclusive right-of-ways that can be easily modified.

G. Urban Design/Community Integration

The design elements presented and well received at the community review workshops are included in the cost estimates, including grass or paved track, the replacement of wood privacy fences in South Natomas, and the procurement of new low-floor streamlined European tram-type vehicles.

VII. Recommended Next Steps

There are significant steps ahead to secure funding through the Federal Transit Administration’s (FTA) Section 5309 New Starts program. The next milestone in the FTA process is Preliminary

Agenda Item No.	Board Meeting Date	Open/Closed Session	Information/Action Item	Issue Date
13	11/08/10	Open	Action	11/03/10

Subject: Approve the Recommendations of the Green Line Transitional Analysis

Engineering, entry into which requires the approval of FTA Headquarters following a prescribed review of the various quantitative and qualitative measures used to determine the eligibility of the project to compete favorably for federal funds.

Formally requesting entry into Preliminary Engineering (PE) requires the submittal of documentation addressing specific criteria. One of the more important sections of the required documentation is the financial capacity of the transit agency. According to the most recent financial projections, RT will not have the financial capacity to build and operate the Green Line until after FY 2022. Therefore, the project will be significantly delayed unless a new source of revenue is obtained. RT will need to make a decision as to the pursuit a new revenue source if the project is to be completed earlier than 2027. FTA will likely not approve entry into Preliminary Engineering until we can demonstrate the financial capacity to build and operate the project.

The anticipated start of PE will be FY 2012, after a new revenue source is obtained. The schedule anticipates that the project continues to move forward, and the information developed to date is kept current. Presently, there is approximately \$6M available to move the project ahead. Staff recommends using these funds to finalize the DEIS/R and develop a high level of conceptual engineering on the recommendations described in this paper and proposed for adoption by the Board.

Given that a great deal of engineering work will have been ongoing, PE and Final Design are expected to be completed in two to three years and construction is anticipated to take up to three to four years. Our consultants do not consider this an unreasonable schedule.



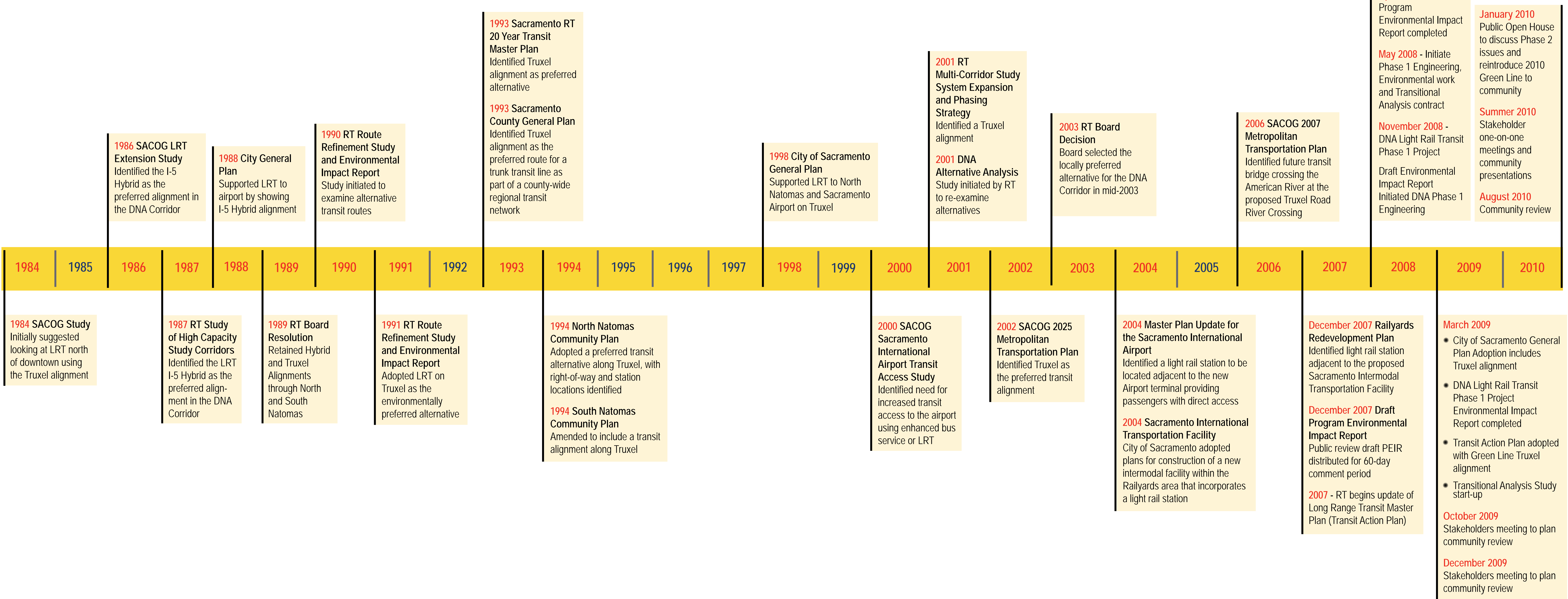
Downtown Natomas Airport

Green Line to the Airport



HISTORY OF GREEN LINE (DNA) CORRIDOR

Since 1984, there has been considerable local and regional interest in Sacramento to build light rail between Downtown and the Airport. As part of the last Measure A survey conducted prior to the referendum of 2004 that extended transit funding for 30 years, the DNA project was rated as one of the most highly ranked transportation improvements in the region.



Connecting Our Community to the World

5.2 Fatal Flaw Analysis / Long List of Alternatives

Early in the DNA Corridor study, a preliminary evaluation of alternatives was conducted to eliminate those that had flaws that would prevent their implementation or would have a limited ability to service the transportation needs in the corridor. A total of seven transit modes and seven alignments or routes were initially analyzed. It was also necessary to consider the implications of six potential American River crossings (bridges). The modes, alignments, and river crossings evaluated in the “fatal flaw” analysis are described below.

Technologies

Seven transit technologies were identified with input provided from previous studies, members of the communities in the corridor, and local agencies:

- Enhanced Bus
- Bus Rapid Transit (BRT)
- Light Rail Transit (LRT)
- Monorail
- Automated Guideway Transit (AGT)/People Mover
- Personal Rapid Transit (PRT)
- Heavy Rail Transit (HRT)

The fatal flaw analysis resulted in the elimination of a number of different technologies, including AGT, PRT, Monorail, and HRT. These transit modes did not satisfy the goals and objectives of the corridor for the following reasons:

1. AGT/PRT and Monorail did not satisfy the corridor mobility goal because of lower vehicle capacity.
2. HRT would require higher construction and operating costs than the other technology options under review.
3. Initial ridership projections did not justify the high capacity HRT technology.
4. All four technologies were considered to be too expensive to be cost-effective in the DNA corridor.
5. All four technologies had the potential of creating an unacceptable level of visual environmental impacts as a result of the extensive use of aerial structures.

Alignment Alternatives

Seven different alignments were identified as potential locations for a fixed-guideway transit alternative. Alternative alignments were identified using information from past planning studies,

guidance from RT staff, and public comments from the Scoping process. These alignments are described below and illustrated in Figure 1.0.2 (in Chapter 1):

- I-5 using a new transit guideway
- I-5 using shoulder lanes (for bus-based alternatives)
- Truxel Road
- An alignment using a portion of I-5 and Truxel Road
- Western Area Power Administration (WAPA) right-of-way
- Northgate Boulevard
- The ex-Western Pacific Railroad tracks

Among the potential alignments that were reviewed, the ex-Western Pacific Railroad (now UPRR) alignment was dropped from consideration due to its close proximity to the existing Northeast LRT line and, therefore, overlap in service area, and because it did not serve the heart of the DNA corridor since the alignment is located on the eastern fringe.

Potential Bridge Crossing Locations

Six options for crossing the American River were identified using information from past planning studies, guidance from RT staff, and public comments from the scoping process:

- A new crossing adjacent to I-5
- A new crossing directly south of and connecting to Truxel Road
- A new crossing connecting to the WAPA right-of-way
- Using the existing State Route (SR) 160 Bridge
- A new crossing connecting to Northgate Boulevard
- A new crossing connecting to the ex-Western Pacific Railroad tracks

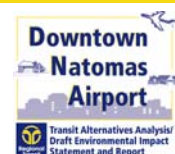
The potential crossing using the existing SR 160 Bridge was dropped from consideration because this crossing would utilize an existing single-track that is currently used by RT’s Northeast LRT route. RT expressed concerns about maintaining schedule reliability and flexibility for future expansion on the Northeast LRT line if the existing bridge was used.

Long List of Alternatives

Following the fatal flaw analysis, an initial long list of alternatives was developed by “mixing and matching” the remaining alignments, technologies, and potential river crossings. As shown in Table 5.2-1, a total 27 alternatives were identified, including: eleven alignments with BRT, seven alignments with LRT, and nine alignments with a combination of LRT and BRT.

**TABLE 5.2-1
INITIAL LONG LIST OF ALTERNATIVES**

	Alternative	Description	Technology	Source
1.	BRT-1	I-5 shoulder/mixed lanes from the Central Business District (CBD), or Downtown Sacramento to I-80; Truxel Road to Airport	BRT	RT
2.	BRT-2	I-5 shoulder/mixed lane from CBD to Garden Highway; Truxel Road to Airport	BRT	RT
3.	BRT-3	I-5 new guideway from CBD to I-80; Truxel Road to Airport	BRT	RT
4.	BRT-4	I-5 new guideway from CBD to Garden Highway; Truxel Road to Airport	BRT	RT
5.	BRT-5	I-5 shoulder/mixed lanes from CBD to Airport	BRT	Team



**TABLE 5.2-1
INITIAL LONG LIST OF ALTERNATIVES (CONTINUED)**

	Alternative	Description	Technology	Source
6.	BRT-6	I-5 new guideway from CBD to Airport	BRT	Team
7.	BRT-7	CBD to Richards Boulevard; Truxel Road Overpass to Truxel Road to Airport	BRT	RT
8.	BRT-8	CBD to Richards Boulevard; Truxel Road/El Camino Avenue to I-5 shoulder/mixed lanes to I-80; Truxel Road to Airport	BRT	Team
9.	BRT-9	CBD to Richards Boulevard; Truxel Road/El Camino Avenue to new I-5 guideway to I-80; Truxel Road to Airport	BRT	Team
10.	BRT-10	CBD to Richards Boulevard; WAPA Bridge to WAPA alignment; Truxel Road to Airport	BRT	RT
11.	BRT-11	CBD to Richards Boulevard; Northgate Boulevard/WAPA Bridge to Northgate Boulevard; Truxel Road to Airport	BRT	RT
12.	LRT/BRT-1	LRT from CBD to Richards Boulevard. BRT on I-5 shoulder/mixed lanes from Richards Boulevard to I-80; Truxel Road to Airport	LRT/BRT	RT
13.	LRT/BRT-2	LRT from CBD to Richards Boulevard. BRT on I-5 shoulder/mixed lanes from Richards Boulevard to Garden Highway; Truxel Road to Airport	LRT/BRT	RT
14.	LRT/BRT-3	LRT from CBD to Richards Boulevard. BRT on new I-5 guideway from Richards Boulevard to I-80; Truxel Road to Airport	LRT/BRT	RT
15.	LRT/BRT-4	LRT from CBD to Richards Boulevard. BRT on new I-5 guideway from Richards Boulevard to Garden Highway; Truxel Road to Airport	LRT/BRT	RT
16.	LRT/BRT-5	LRT from CBD to Richards Boulevard. BRT on Richards Boulevard to Truxel Road Overpass; Truxel Road to Airport	LRT/BRT	RT
17.	LRT/BRT-6	LRT from CBD to Richards Boulevard. BRT on Richards Boulevard to Truxel Road/El Camino Avenue to I-5 shoulder/mixed lanes to I-80; Truxel Road to Airport	LRT/BRT	Team
18.	LRT/BRT-7	LRT from CBD to Richards Boulevard. BRT on Richards Boulevard to Truxel Road/El Camino Avenue to new I-5 guideway to I-80; Truxel Road to Airport	LRT/BRT	Team
19.	LRT/BRT-8	LRT from CBD to Richards Boulevard. BRT on Richards Boulevard to WAPA Bridge to WAPA alignment; Truxel Road to Airport	LRT/BRT	RT
20.	LRT/BRT-9	LRT from CBD to Richards Boulevard. BRT on Richards Boulevard to Northgate Boulevard/ WAPA Bridge to Northgate Boulevard; BRT on Truxel Road to Airport	LRT/BRT	RT
21.	LRT-1	I-5 new guideway from CBD to I-80; Truxel Road to Airport	LRT	RT
22.	LRT-2	I-5 new guideway from CBD to Garden Highway; Truxel Road to Airport	LRT	RT
23.	LRT-3	I-5 new guideway from CBD to Airport	LRT	Team
24.	LRT-4	CBD to Richards Boulevard; Truxel Bridge; Truxel Road to Airport	LRT	RT

**TABLE 5.2-1
INITIAL LONG LIST OF ALTERNATIVES (CONTINUED)**

	Alternative	Description	Technology	Source
25.	LRT-5	CBD to Richards Boulevard; Truxel Road/El Camino Avenue; I-5 to I-80; Truxel Road to Airport	LRT	Team
26.	LRT-6	CBD to Richards Boulevard; WAPA Bridge to WAPA alignment; Truxel Road to Airport	LRT	RT
27.	LRT-7	CBD to Richards Boulevard; Northgate Boulevard/WAPA Bridge to Northgate Boulevard; Truxel Road to Airport	LRT	RT

Source: Parsons Brinckerhoff, 2002.

5.3 Alternatives Considered and Rejected

Level One Screening

The Level One screening process evaluated the initial set of 27 potential build alternatives and resulted in a repackaging of the potential alternatives into five primary alignments. These five alignments are defined in Table 5.3-1. This allowed the subsequent screening analysis to focus on the alignment first, and then on the transit technology. The selection of a technology was made secondary to the selection of an alignment to allow BRT to be compared directly against LRT for each alignment.

**TABLE 5.3-1
ALTERNATIVES CARRIED FORWARD BASED ON THE LEVEL ONE SCREENING**

Original Alternative Number	New Alternative Number	Description
21	1	I-5 new guideway from CBD to I-80; Truxel Road to Airport
22	2	I-5 new guideway from CBD to Airport
26	3	CBD to Richards Boulevard; WAPA Bridge to WAPA alignment; Truxel Road to Airport
16	4	CBD to Richards Boulevard; Truxel Road Bridge; Truxel Road to Airport
27	5	CBD to Richards Boulevard; Northgate Boulevard/WAPA Bridge to Northgate Boulevard; Truxel Road to Airport

Source: Parsons Brinckerhoff, 2002.

Level Two Screening

A Level Two screening was undertaken for the purpose of further reducing the number of alternatives by subjecting the selected alignments and technology carried forward from the Level One screening to a more detailed level of analysis. The Level Two screening included refinement of the study goals and objectives by the TRP and CRP (see Table 5.1-1), developing initial ridership estimates, conducting environmental assessments, performing a financial analysis, devising a preliminary corridor alignment, and developing station site options, as well as considering technology design issues and constraints for each alternative. Detailed data and information derived from this stage provided input for developing a detailed screening data table for evaluating seven key issues that included environmental, demographic, operational, physical, ridership, and cost characteristics as well as implementation issues associated with each alternative. The evaluation process was further refined by applying quantitative factors for comparing attaining each of the goals and objectives for the DNA Corridor.

The Level Two screening focused on analyzing alternatives on the basis of alignments, using the five primary alignments identified at the end of the Level One analysis. These five alignments consist of transit corridors along I-5, Truxel Road, a combination of I-5 and Truxel Road, the Western Area Power Administration (WAPA) right-of-way, and Northgate Boulevard.

As a result of the Level Two screening process, the Northgate and WAPA alignments were dropped from further consideration. The WAPA alignment was eliminated for the following reasons:

1. The use of the right-of-way for LRT or BRT could limit the possibility of expanding power transmission lines for both the WAPA and Sacramento Municipal Utility District.
2. The alignment was not as conducive to transit-oriented development as the other alignments since it goes through single-family residential neighborhoods whose walled backyards abut against the utility rights-of-way.

The Northgate alignment was eliminated due to its longer alignment, and correspondingly longer travel times, higher construction cost, and its location at the eastern fringe of the corridor – thus, not adequately serving the heart of the study area. In addition, the Northgate alignment would potentially divert ridership from RT’s Northeast LRT starter line.

As part of the Level Two screening process, the consultant team recommended the elimination of the I-5 alignment. This recommendation was based on preliminary capital cost and cost-effectiveness estimates. The performance of the I-5 alignment against the study goals was only slightly better than the WAPA and Northgate alignments. After obtaining feedback from the TRP and CRP and conducting a meeting with corridor residents, it was determined that there was significant support for keeping an I-5 alignment as a study option. Therefore, this alignment was carried forward as part of the Level Two screening process.

The remaining three alignments were carried forward for further evaluation--each potentially using either BRT or LRT technology. This created six distinct build alternatives to be carried forward in the AA process. The results of the Level Two screening are summarized in Table 5.3-2.

**TABLE 5.3-2
ALIGNMENTS CARRIED FORWARD BASED ON THE LEVEL TWO SCREENING**

Level Two Alternative Number	Description	Results	Alternative Number in the AA Report
1	I-5/Truxel Road Alignment: New guideway on I-5 from CBD to I-80; Truxel Road to Airport	Carried Forward	5 – LRT 6 – BRT
2	I-5 Alignment: New guideway on I-5 from CBD to Garden Highway; Truxel Road to Airport	Carried Forward	7 – LRT 8 – BRT
3	WAPA Alignment: CBD to Richards Boulevard; WAPA Bridge to WAPA alignment; Truxel Road to Airport	Dropped	-
4	Truxel Road Alignment: LRT from CBD to Richards Boulevard BRT on Richards Boulevard to Truxel Road Overpass; Truxel Road to Airport	Carried Forward	3 – LRT 4 – BRT

**TABLE 5.3-2
ALIGNMENTS CARRIED FORWARD BASED ON THE LEVEL TWO SCREENING (CONTINUED)**

Level Two Alternative Number	Description	Results	Alternative Number in the AA Report
5	Northgate Alignment: CBD to Richards Boulevard; WAPA Bridge to Northgate Boulevard; Truxel Road to Airport	Dropped	-

Source: Parsons Brinckerhoff, 2002.

Design Options Considered and Rejected

Several design options were proposed and dropped from further consideration during the alternatives screening process. Design options are alignment variations at certain locations along each of the alternatives. The design options that were dropped include the following:

- An alignment along 7th Street going over the UPRR/Amtrak Railroad right-of-way in the Railyards area: This option was considered and dropped because it would have created significant visual impacts and potential opposition from community residents. However, the option to cross over the railroad tracks along 6th Street remains open, if the Railyards developer and the City recommend this option.
- A stub-end LRT station at the Sacramento Valley Station (Amtrak): This option was dropped because it would have a negative impact on travel time, requiring train operators to walk to the other end of the train to leave the station.
- Operating BRT service in a combination single-lane exclusive busway/single-lane mixed-flow operation using the existing 7th Street undercrossing: This design option was dropped because it did not provide a significant travel time advantage as compared to operating BRT service in mixed-flow lanes using the 7th Street undercrossing.
- A new BRT or LRT bridge across the American River along the west side of I-5: This bridge option was dropped because it would have limited future physical improvements to the I-5/Richards Boulevard Interchange, crossed over a popular recreation destination (i.e., confluence of the American and Sacramento Rivers), and resulted in the removal of a number of trees in the American River Parkway.
- An exclusive BRT or LRT alignment along the east side of Truxel Road in South Natomas: This alignment option was dropped by the RT Board of Directors because it would have the highest number of property displacements of any remaining alternative along Truxel Road. This alternative evoked strong community opposition and was also the most expensive alignment option along Truxel Road.
- A semi-exclusive LRT double track alignment down the median of Truxel Road in South Natomas: Like the exclusive east side alignment options discussed above, this alignment option was also dropped because it too would have significant property displacement impacts to residential and commercial properties.
- The use of shoulder lanes along I-5 north of I-80 for the I-5 BRT alternative: This alternative was dropped because it does not conform to Caltrans design standards. In addition, the use of shoulder lanes would not provide a significant travel time benefit as compared to mixed flow operations north of I-80.

Additional Refinement of Truxel Alternatives

Based on input received from the public and initial calculations of the financial feasibility of all the alternatives, RT subsequently examined how to reduce the cost and environmental impacts for a BRT or LRT guideway along a Truxel Road alignment. This alignment was selected since the Truxel Road alternatives have the highest potential for providing the most cost-effective transit solution. (See Section 6.1 for more detail.) By comparison, the alternatives proposed for I-5 and the I-5/Truxel alignments are not as cost-effective, since they do not directly serve as many residents and because of the higher construction cost associated with use of aerial structures along the alignments.

From this analysis, four new sub-alternatives were developed for the Truxel alignment that would provide transit service in a more cost-effective manner. These sub-alternatives include the following:

3A: Truxel LRT Starter Line

3B: Truxel LRT Minimum Operable Segment (MOS)

4A: Truxel BRT Starter Line

4B: Truxel BRT MOS

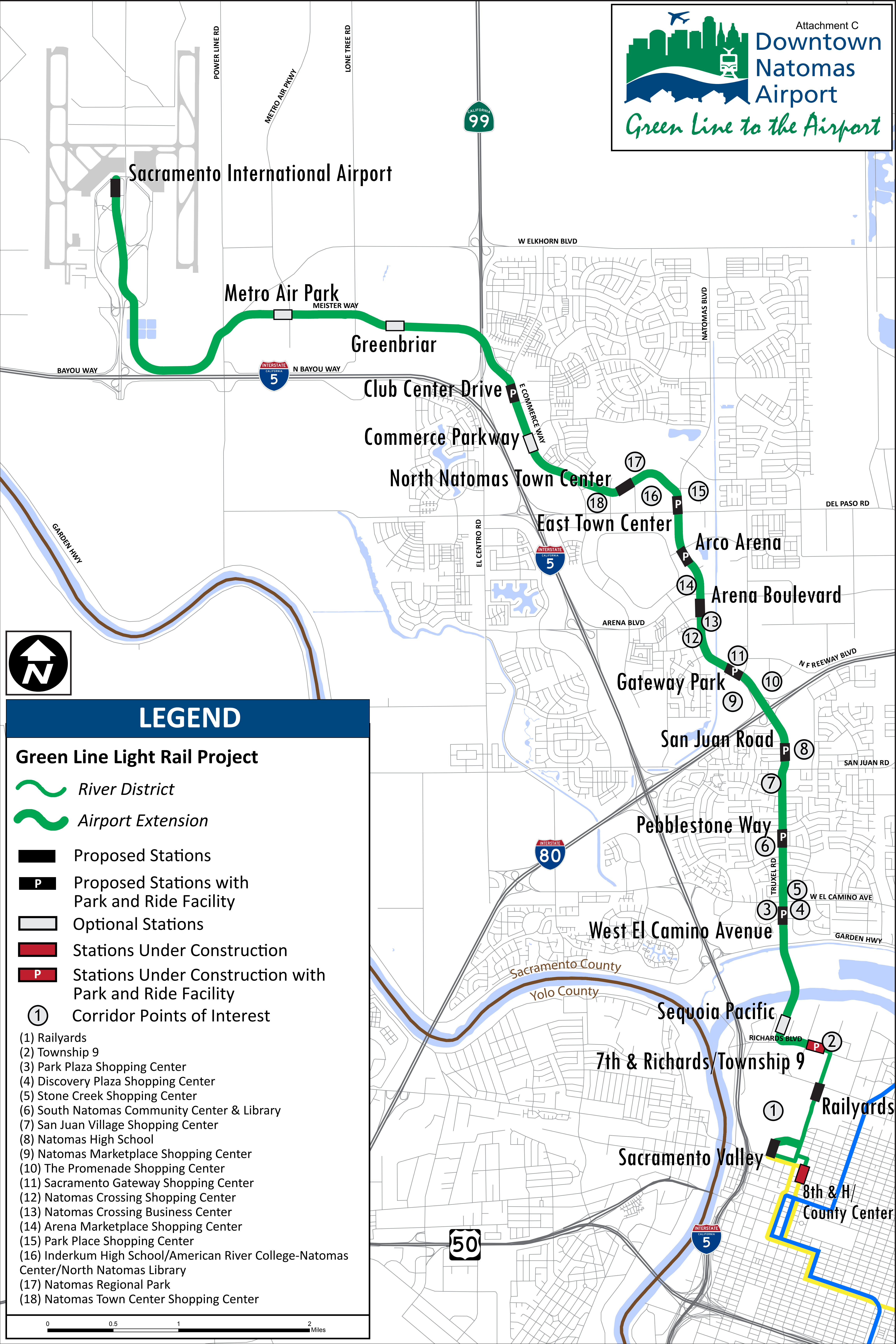
The addition of these four alternatives has resulted in a total of twelve alternatives (ten build alternatives in addition to the No-Build and Baseline Alternative/TSM) to be carried forward in the AA process.

5.4 Alternatives Carried Forward for Further Review

Eight of the 12 alternatives would construct a new transit guideway from Downtown Sacramento, through South and North Natomas, to the Sacramento International Airport; and two minimum operable segments would provide a new transit guideway between Downtown Sacramento and the Natomas Town Center. The remaining two alternatives, the No-Build Alternative and Baseline/TSM Alternative, have been carried forward as legitimate alternatives and for comparison purposes to satisfy environmental requirements under the National Environmental Policy Act (NEPA), the California Environmental Quality Act (CEQA), and federal New Starts funding guidelines. The No-Build/No-Action alternative is required by CEQA and NEPA to serve as a baseline for comparing the environmental impacts of the “study” alternatives. The development of a Baseline/TSM alternative is required by the FTA to serve as a less costly alternative that could potentially solve the transportation problems in the corridor in a less costly manner. The following list provides a summary description of the 12 alternatives identified in this section:









- **Alternative 1: No-Build.** The No-Build Alternative consists of the existing transportation system, as well as all transportation projects that are planned and programmed in the Metropolitan Transportation Plan for 2025 (MTP) adopted by the Sacramento Area Council of Governments (SACOG) in July 2002.
- **Alternative 2: Baseline/Transportation Systems Management (TSM).** The Baseline/TSM Alternative was developed to meet an FTA requirement for an alternative that addresses transportation needs in the corridor without a major new capital investment. Based on the 2025 MTP, the Baseline/TSM Alternative includes a set of lower-cost bus transit improvements in the DNA Corridor.

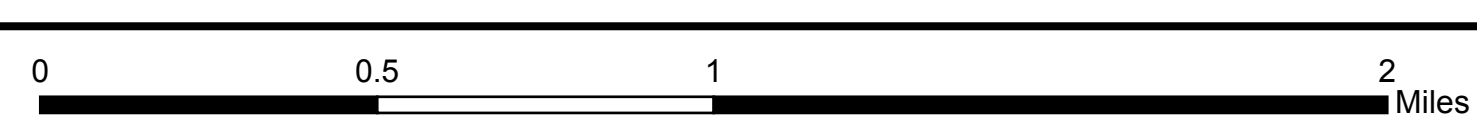
- **Alternative 3: Truxel Light Rail Transit (LRT).** The Truxel LRT Alternative would extend RT LRT service from Downtown Sacramento through Natomas, along Truxel Road, to Sacramento International Airport.
- **Alternative 3A: Truxel LRT Starter Line.** The Truxel LRT Starter Line Alternative would construct an LRT extension similar to Alternative 3, with single-track sections and fewer structures to provide a lower-cost alternative.
- **Alternative 3B: Truxel LRT Minimum Operable Segment (MOS).** The Truxel LRT MOS Alternative would construct a LRT extension similar to Alternative 3A, with single-track sections and fewer structures to provide a lower-cost alternative; however, the alignment would be shorter, extending from Downtown Sacramento to the Natomas Town Center.
- **Alternative 4: Truxel Bus Rapid Transit (BRT).** The Truxel BRT Alternative would construct a new guided-busway for a BRT system from Downtown Sacramento through Natomas, along Truxel Road, to the airport.
- **Alternative 4A: Truxel BRT Starter Line.** The Truxel BRT Starter Line Alternative would construct a BRT extension similar to Alternative 4, with fewer structures and grade separations to provide a lower-cost alternative.
- **Alternative 4B: Truxel BRT Minimum Operable Segment (MOS).** The Truxel BRT MOS Alternative would construct a BRT extension similar to Alternative 4, with fewer structures and grade separations to provide a lower-cost alternative; however, the alignment would be shorter, extending from Downtown Sacramento to the Natomas Town Center.
- **Alternative 5: I-5/Truxel LRT.** The I-5/Truxel LRT Alternative would extend LRT service along a route following I-5 and Truxel Road between Downtown Sacramento, Natomas, and the airport.
- **Alternative 6: I-5/Truxel BRT.** The I-5/Truxel BRT Alternative would construct a new guided-busway for a BRT system using a route following I-5 and Truxel Road between Downtown Sacramento, Natomas, and the airport.
- **Alternative 7: I-5 LRT.** The I-5 LRT Alternative would extend LRT service along a route following I-5 between Downtown Sacramento, Natomas, and the airport.
- **Alternative 8: I-5 BRT.** The I-5 BRT Alternative would construct a new guided-busway for a BRT system using a route following I-5 between Downtown Sacramento, Natomas, and the airport.



LEGEND

Green Line Light Rail Project

-  River District
 -  Airport Extension
 -  Proposed Stations
 -  Proposed Stations with Park and Ride Facility
 -  Optional Stations
 -  Stations Under Construction
 -  Stations Under Construction with Park and Ride Facility
 -  Corridor Points of Interest
- (1) Railyards
 - (2) Township 9
 - (3) Park Plaza Shopping Center
 - (4) Discovery Plaza Shopping Center
 - (5) Stone Creek Shopping Center
 - (6) South Natomas Community Center & Library
 - (7) San Juan Village Shopping Center
 - (8) Natomas High School
 - (9) Natomas Marketplace Shopping Center
 - (10) The Promenade Shopping Center
 - (11) Sacramento Gateway Shopping Center
 - (12) Natomas Crossing Shopping Center
 - (13) Natomas Crossing Business Center
 - (14) Arena Marketplace Shopping Center
 - (15) Park Place Shopping Center
 - (16) Inderkum High School/American River College-Natomas Center/North Natomas Library
 - (17) Natomas Regional Park
 - (18) Natomas Town Center Shopping Center





Green Line Transitional Analysis Findings and Recommendations

Presentation to the RT Board of
Directors

November 8, 2010

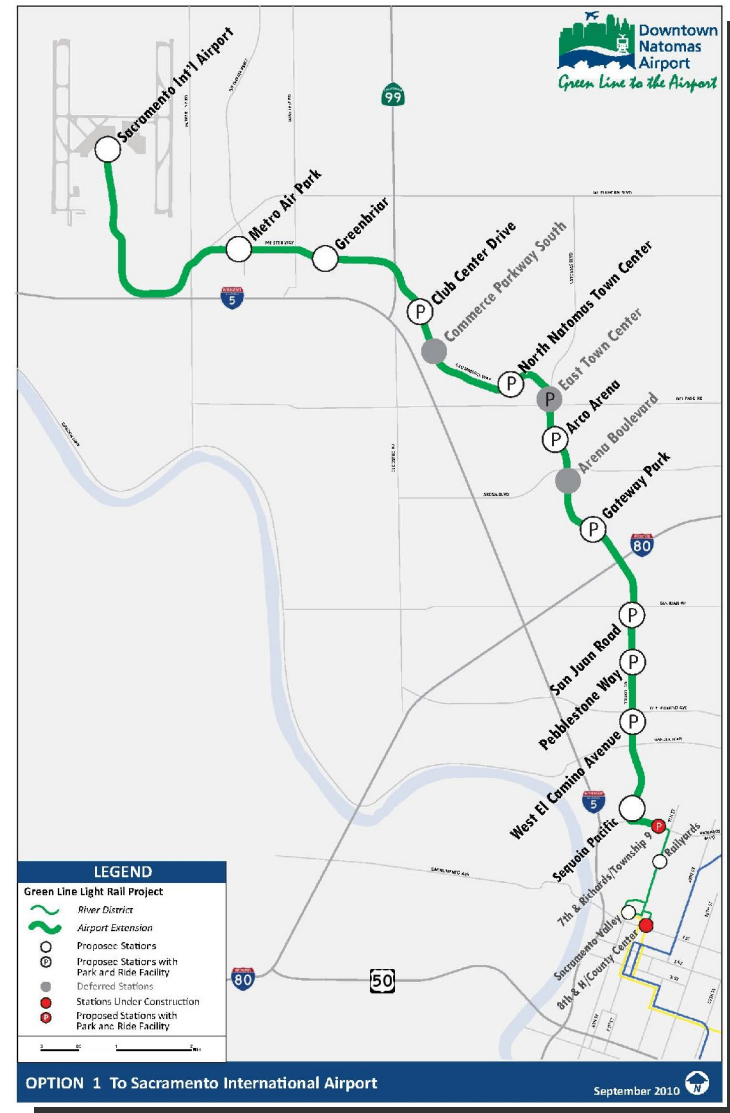
Connecting Our Community to the World

Transitional Analysis Goals

- Conduct preliminary engineering and environmental clearance for the Green Line to the River District
- Determine next project phase that can perform best in the FTA New Starts process

Analysis

- Improvements to the Locally Preferred Alternative adopted in 2003



Green Line Transitional Analysis Scope

- Identify improvements to the LPA project
- Evaluate options for reducing the LPA project cost
- Develop new capital and operating cost estimate
- Develop new ridership projections using SACOG land use projections for 2035
- Identify optimal phasing for the project beyond the River District with strong potential for FTA New Starts funding
- Recommend alternative project delivery strategies

LPA Improvement Opportunities

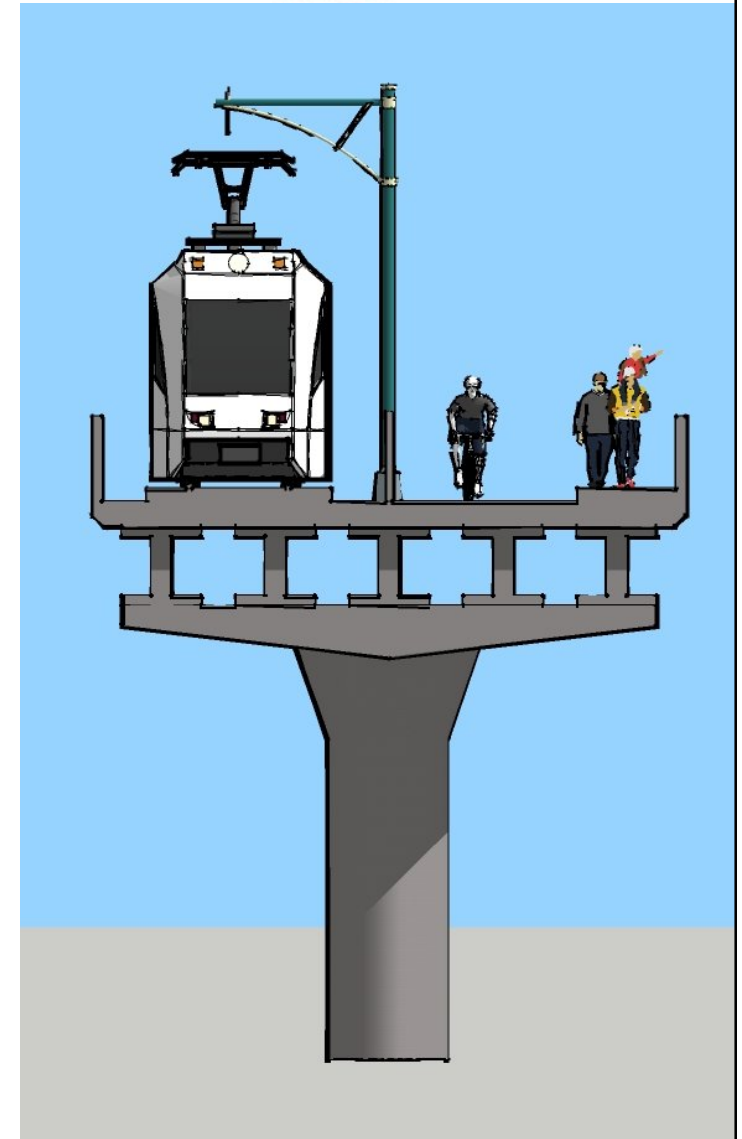
- Re-examine use of existing Truxel/I-80 Bridge with elevated structure at Gateway
- Re-evaluate bridge type for the American River
- Evaluate vehicle options
- Create a unique brand/image using context sensitive design
- Consider single track
- Determine track placement along Truxel Road
- Identify potential station deferment

Recommendations

- Based on technical analysis and engineering considerations
- Agreements developed during the Alternatives Analysis
- Community input
- Stakeholder review and input

Recommendation

- New bridge concept for American River crossing resulting in cost saving
 - Precast concrete girder or steel girder bridge
 - Build bridge for double track, initially install single track, other half of bridge for pedestrians and bicycles



Recommendation

- Double track placement in the median of Truxel Road with center platform stations and shared left turn lanes
 - Minimizes property acquisition to two feet on either side of ROW



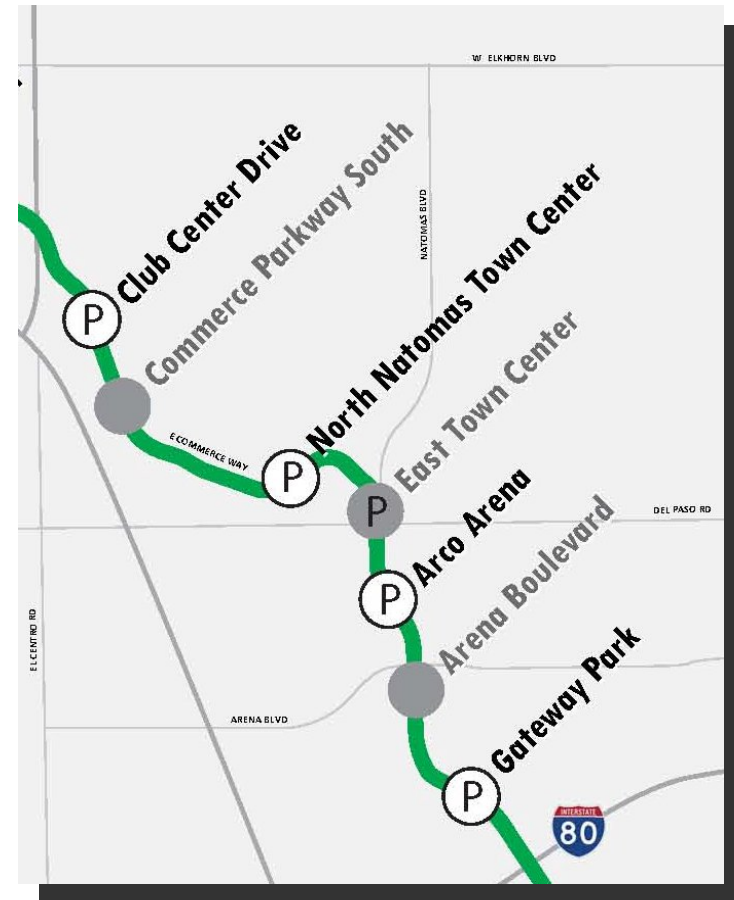
Recommendation

- Use the I-80 overcrossing to accommodate light rail tracks connected to an elevated track and station at Gateway Park
 - Eliminates conflicts between trains, pedestrians and high traffic volumes at intersection



Recommendation

- Defer stations at Arena Blvd., East Town Center and Commerce Parkway
 - Small travel time savings
 - Improves FTA cost effectiveness

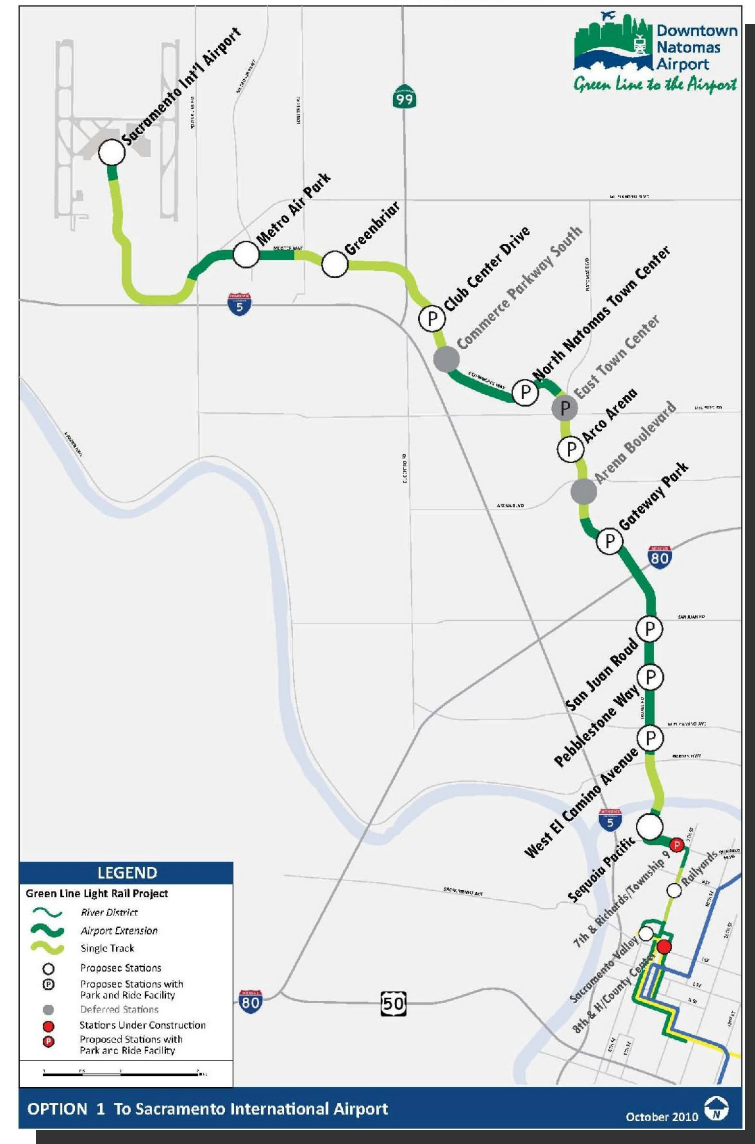


Recommendation

- Increase parking supply in North Natomas by 215 spaces
 - Increased shared parking at Arco Arena
 - Shared parking at Natomas Town Center
 - Improves ridership estimate

Recommendation

- Single track segments where appropriate
 - Cost reduced
 - Operations not impacted



Recommendation

- If New Starts Phase is short of Airport
 - Temporary maintenance facility
 - Location undetermined
 - Temporary trailers for offices, equipment and material storage
- For options continuing to Airport
 - Permanent facility to be located at Metro Air Park



RTD - Denver



Valley METRO - Phoenix



RTD - Denver

Recommendation

- Incorporate design elements well received by community
 - Grass or paved track
 - Replace privacy fences in South Natomas
 - Low floor European tram type vehicles



European Tram Vehicles

THE CITADIS FULL LOW-FLOOR TRAM RANGE

Vehicle Lengths
& Passenger Capacities (4 people/m²)



Length : 20m
140 passengers : 40 seated, 100 standing



Length : 30m
200 passengers : 56 seated, 144 standing



Length : 40m
300 passengers : 70 seated, 230 standing

- Attractive Modular Design
- 100% Low Floor
- Would Meet Speed and Capacity Requirements of Green Line
- Can be Coupled into Multi-Car Consists
- 10-15% savings for three 120-foot cars versus four 90-foot cars (fewer cabs and couplers)



Alstom Citadis

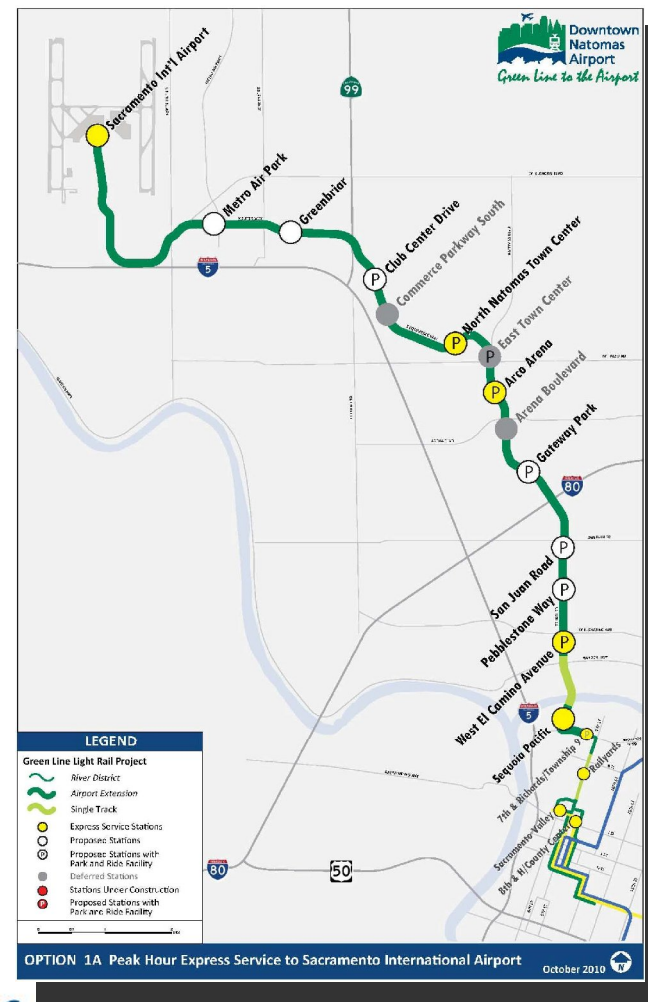
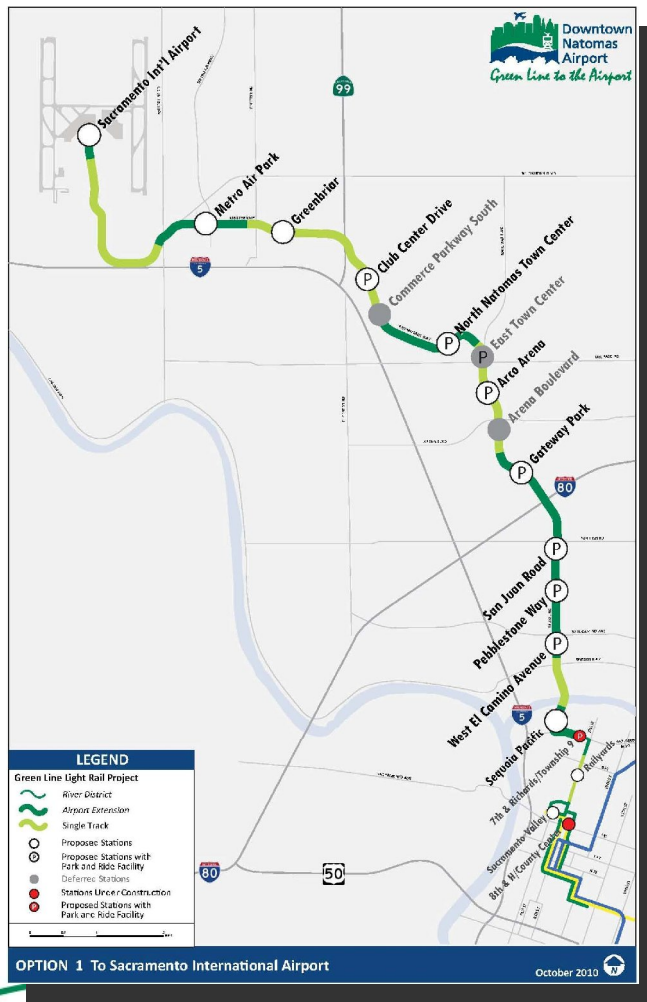
AnsaldoBreda Sirio

Bombardier Flexity

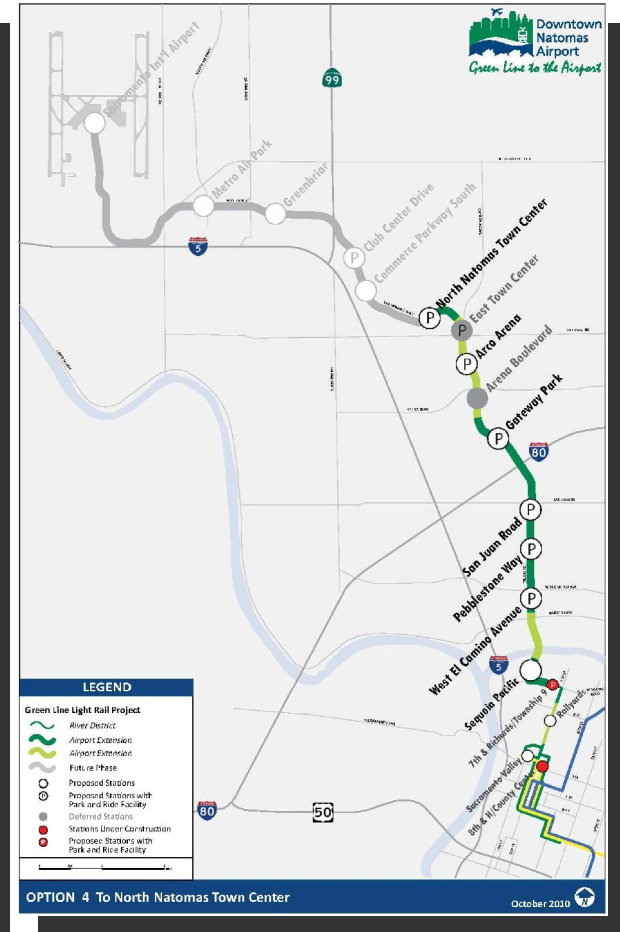
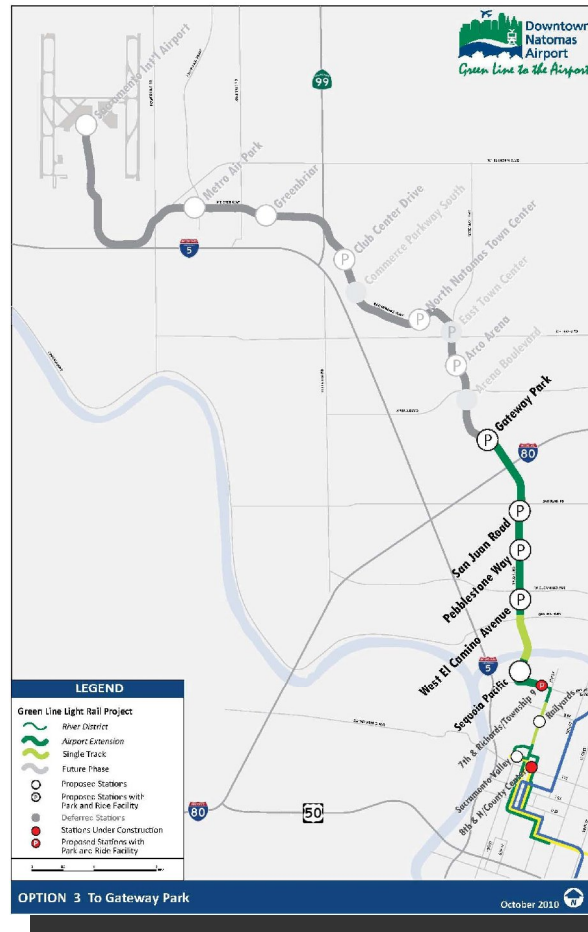
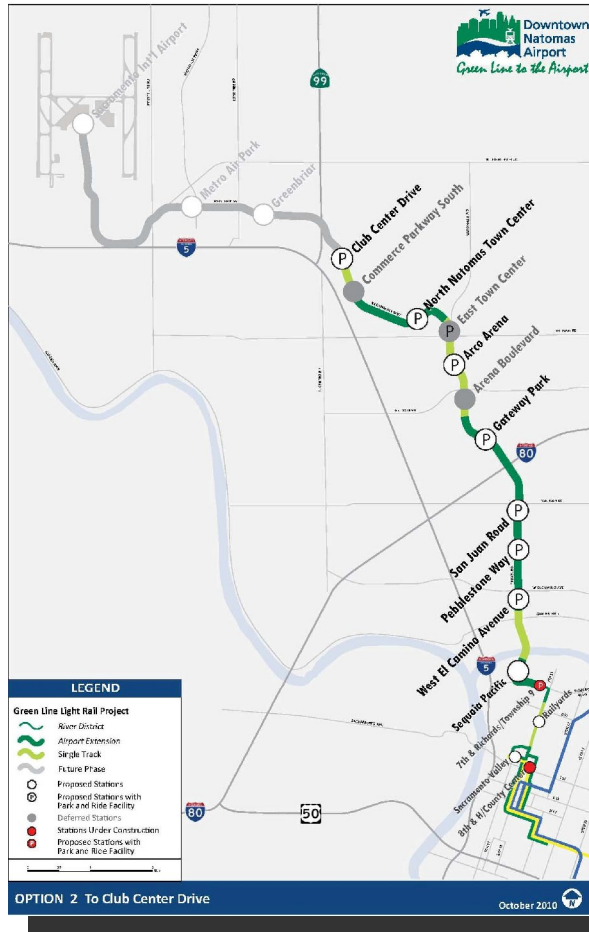
Green Line Cost Effectiveness

- Cost effectiveness Index (CEI) is only FTA rating factor that is purely quantitative and non-subjective
- Requires at least a medium-low rating to obtain New Starts funding
- Important factors impacting CEI calculation
 - Baseline cost, incremental O&M Cost, incremental annualized capital cost, transportation system user benefit calculation
- Four options were evaluated as potential New Starts projects
 - Sacramento International Airport
 - Club Center Drive
 - North Natomas Town Center
 - Gateway Park

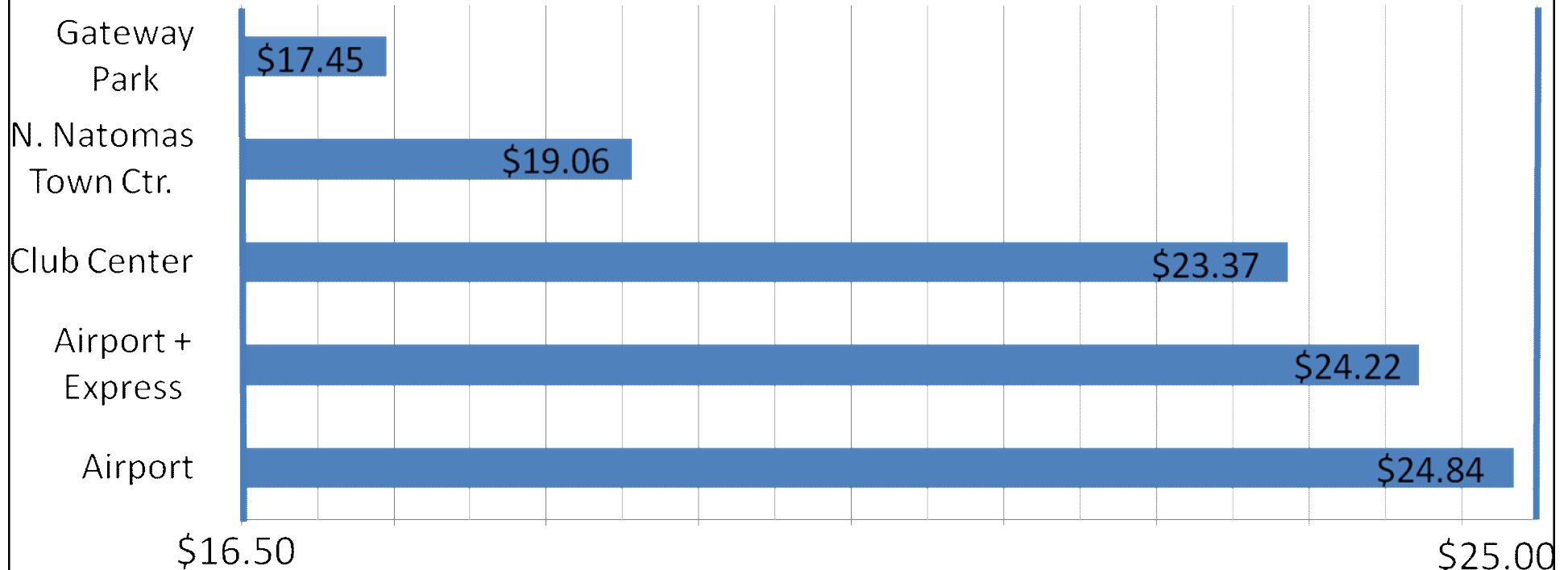
New Starts Options evaluated to determine CEI



Options evaluated to determine CEI



CEI Calculation Result



- All end points attain a Medium rating
- Airport options barely attain Medium rating
- North Natomas Town Center and Gateway Park are well past the mid-point of of the Medium rating bracket



Other New Starts Project Justification Factors

Cost Effectiveness	Mobility Improvements	Environmental Benefits	Operating Efficiencies	Land Use	Economic Development
20%	20%	10%	10%	20%	20%
Medium	Medium	High	Medium	Medium-Low	Medium-High

- Need Overall Project Justification Rating of Medium
- Mobility Improvements—Proportion of Transit Dependents
- Environmental Benefits—Air Quality Non-Attainment Area
- Operating Efficiency—Is there a Change in O+M Cost/Passenger Mile
- Land Use—Subjective—Looking for Urban Development Pattern
- Economic Development—Policies and Potential
- Overall Medium

Connecting Our Community to the World

New Starts Financial Rating Criteria

- 50% of overall rating
- Must be Medium
- Amount of FTA Funding (20%)
- Capital Funding Plan (50%)
- O+M Funding Plan (30%)

Project Financial Assumptions

- Financial Assumptions
 - 50% New Starts Funding
 - New local revenue source equivalent to one half cent sales tax
 - New Starts application scheduled after South Line 2 approved for Final Design and new local revenue source is secured

Project Financial Plan - Airport Option

Revenues	Total
New Starts	\$428,388,500
Airport Contribution	\$ 77,627,000
Developer Fees	\$ 29,000,000
Measure B/State/Other Local	\$321,761,499
TOTAL Revenues	\$856,776,999
Capital Costs (YOE)	\$856,776,999

Project Financial Plan Natomas Town Center Option

Revenues	Total
New Starts	\$272,448,000
Developer Fees	\$ 29,000,000
Measure B/State/Other Local	\$243,448,000
TOTAL Revenues	\$544,896,000
Capital Costs (YOE)	\$544,896,000

Project Financial Plan Natomas Town Center to Airport

Revenues	Total
STP/CMAQ	\$20,000,000
Airport Contribution	\$77,627,000
Developer Fees	\$3,000,000
Measure B/State/Other Local	\$252,395,223
TOTAL Revenues	\$353,022,223
Capital Costs (YOE)	\$353,022,223

Project Financial Rating

- Amount of New Starts Funding at 50% – medium
- Capital Funding Plan – medium
- O & M Funding Plan – medium
- Able to maintain financial capacity of existing system and expand Green Line



Green Line Implementation Strategy

- Objective – develop the strongest strategy to deliver a project extending to the Airport and that meets Federal scrutiny
 - Natomas Town Center is the recommended New Starts project
 - RT should pursue a new additional local funding source to provide Federal matching funds and operating support
 - Airport extension is funded using a combination of Federal, State, new/existing local funding and Airport funding

Recommendation

- Approve Transitional Analysis recommendations on alignment, track placement, station location, and parking.
- Approve Green Line Implementation Strategy
- Approve Next Steps and Schedule



Next Steps

- Meet with SACOG and FTA
- Project EIS/EIR
- Secure Local Funding
- Request FTA Approval to Enter PE for New Starts Project
- Preliminary Engineering
- Final Design for New Starts Project
- Construction

RESOLUTION NO. 10-11-_____

Adopted by the Board of Directors of the Sacramento Regional Transit District on this date:

November 8, 2010

APPROVING THE RECOMMENDATIONS OF THE GREEN LINE TRANSITIONAL ANALYSIS

BE IT HEREBY RESOLVED BY THE BOARD OF DIRECTORS OF THE SACRAMENTO REGIONAL TRANSIT DISTRICT AS FOLLOWS:

THAT, the recommendations of the Green Line Transitional Analysis are approved including:

- Engineering and Urban Design Improvements to the Green Line
- Funding and Implementation Strategy
- Next Steps for the Green Line to the Airport, and
- Authorizing Staff to Evaluate Options for Additional Transit Funding to Enable the Green Line and other TransitAction Plan Improvements to be Implemented.

STEVE MILLER, Chair

A T T E S T:

MICHAEL R. WILEY, Secretary

By: _____
Cindy Brooks, Assistant Secretary