Final Report
Alameda Transit Plan

Prepared for the
City of Alameda

Prepared by
Pacific Transit Management Corporation
Berkeley, California

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I. Summary

An extensive year-long process has led to the findings, conclusions and recommendations contained in the Alameda Transit Plan. The plan was developed by a team of consultants working with City staff and under the policy guidance of the Public Transit Committee.

Findings and Conclusions

The major findings and conclusions of the study are:

- To enhance quality of life and allow for economic growth, Alameda must increase the mobility of City residents through a meaningful and well used public transit system. Primary transit services should be useful and attractive, with service operating not less than every 15 minutes on weekdays.

- Alameda's transit system must be designed to meet the public's agreed upon land use plan. The Long Range Transit Plan recommends a route network that is consistent regardless of transit mode. Depending on the land use densities adopted in the General Plan, higher capacity modes such as light rail should be considered. However, high capacity rail systems can only be effective and justified if supported by higher density land uses along their corridors.

- To optimize development, by 2005 peak hour cross-estuary capacity must be enhanced through transit services and transit priority measures.

- Additional transit capacity would support the City's and the region's air quality and environmental objectives.

- To improve the capacity of the congested tubes and bridges linking Alameda to the East Bay, the City should commit to an objective of a 30 percent transit modal split in the tubes to provide 400 to 500 additional peak hour person trips; and on the estuary bridges, provide 400 additional peak hour person trips on transit.

- The City should investigate additional transit-only cross estuary capacity, including a dedicated transit tube or a bus barge or ferry. A two-vessel bus barge or ferry would have a capacity of about 500 trips per hour, while a transit only tube could have a capacity of about 3,000 trips per hour.

- The City's modal split objective for San Francisco trips should be 65 percent via transit, including 25 percent on ferries, 20 percent on Transbay buses, and 20 percent on BART. The current modal split for all transit modes is about 45 percent.

Specific Service Recommendations

A restructuring of the transit fixed route system and mode changes are proposed. Enhancements to the water transportation system are recommended, provided sufficient resources and demand exist to support the changes.

- The most significant recommendations extend the Santa Clara Avenue trunk line route eastbound via Santa Clara, south on Park Street, east on Otis and then via Island Drive on Bay Farm Island into Oakland International Airport and then south to BayFair BART. This new and extended route would provide service to Bay Farm at all hours, and link Alameda with the large job market in the Hayward and Fremont areas.

- The Buena Vista/Clement corridor would be provided with all-day frequent transit service connecting to the West Oakland BART station and to Fruitvale BART.

- Lines 50 and 63 would operate every 15 minutes on weekdays, and would be converted to battery buses.

- Longer term recommendations include increasing Estuary capacity with a bus barge or ferry operating from Alameda Point to West Oakland BART.

- An expansion of the Alameda to San Francisco ferry is proposed, and would be relocated to the Seaplane Lagoon at Alameda Point to avoid Estuary marine traffic and provide a better connection with the Mission Bay development area.

- In the longer term, a light rail system operating on the Alameda Belt Line right-of-way is feasible, but only justifiable with increases in land use intensity. However, the right-of-way should be retained for possible use in the future.

Cost

Total operating costs in the first phase are expected to increase by almost $6 million annually. However existing and projected sources could fund up to $5 million of this increase, leaving an unfunded service increase of $1 million. Additional increases beyond this point would require more resources.

Benefits

The proposed system is designed to produce between 7,500 to 12,000 weekday additional transit trips. It is also intended to meet Alameda's development desires, including the redevelopment of the former NAS Alameda, now Alameda Point.

1. Introduction

This report analyzes and recommends various changes and improvements to the public transit system that operates in the City of Alameda. The recommendations are based on a detailed set of goals and objectives that was developed in conjunction with the City's Public Transit Committee (PTC), which was established to supervise and guide this study effort.

This report is the result of an intensive year-long study and community effort, and reflects both economic reality and public desire. The actions included in this report can be accomplished – some of the improvements, such as route changes, are accomplished with a minimum of political capital. Other suggestions, such as mode changes, require political will and public acceptance. All, however, can be achieved.

1.1 Study Organization

This report is organized into seven sections:

Introduction
Goals and Objectives
Travel Patterns and Existing Conditions
Routing Systems – Principles and Sample Networks
Recommended System
Financial Analysis
Institutional and Implementation Plan

It also includes a Glossary and Appendix with public comments.

1.2 Study Purpose

The City of Alameda, acting through its Public Works Department and in consultation with the PTC, has undertaken the development of a City-specific transit plan for the City of Alameda that would ultimately be adopted in some form as part of the City's General Plan Transportation Element.

The objectives of this analysis are to:

- Assess how public transit can improve the quality of life and improve mobility for Alameda residents, employees and visitors.
- Investigate the feasibility of developing a balanced and inviting multimodal transit system.
- Assess the feasibility of alternative transit modes and electric transit vehicles.
- Develop a public transit plan that is attractive, multi-destinational, multi-purpose, reliable, economical, and can be implemented.

- Assess and prioritize the physical, facility and financial needs of a public transit system, and identify the opportunities to provide for these needs.

The plan includes route and schedule changes that improve the overall transit system in the short-term, and, in the longer term, provide the basis for a focused public consideration of linking land use and transit services. This opportunity comes at a critically important time for Alameda – the redevelopment of Alameda Point and other development in the city will draw more than 15,000 new residents. Transit works best when integrated with land use; the City has a unique opportunity to create neighborhoods that support and are supported by public transit service.

1.3 Study Area

The area studied was the entire City of Alameda and the main commute and travel routes out of the city. As such, the travel patterns play a large role in the definition of the study area.

1.4 Public Participation

The public has been extensively involved in the development of this plan. In addition to monthly public meetings of the Public Transit Committee where the Committee analyzed and reviewed draft chapters of the plan, the staff and consultants presented concepts at two public meetings, and also surveyed Alameda residents through the *Flash* newsletter. More than 900 responses were received from the *Flash* survey.

1.5 Coordination with Other Studies

The Alameda Transit Plan has been designed to become an integral element of the City's new General Plan. It is also consistent with the Webster Renaissiance and Park Street Visioning efforts and is sensitive to the overall objectives of the NAS Alameda Reuse Plan. The plan is also consistent with the Service Policies that AC Transit has adopted, and the routing implications of those policies.

2. Goals and Objectives

The following goals, objectives and criteria were developed by the consulting team in conjunction with City staff and individual members of the PTC, and were then reviewed by the entire PTC and adopted by the Committee.

While there are very specific goals, an overriding principle is that:

Transportation is a means, and not an end. Transportation does not produce economic benefits to society. Rather it is a service that societies and economies employ to meet other goals. These goals can include access and mobility, economic specialization, and improved quality-of-life. How the transportation system is designed and functions affects society's ability to meet these other goals.

The specific goals of public transit in Alameda are:

19. Enhance mobility for Alameda through the provision of a public transit system that is comprehensive, safe, reliable and fully accessible.

Objectives:

A. Transit routes should be direct and logical, without unnecessary diversions, with route spacing broad enough to allow for 80 percent of Alameda residents to walk to a bus stop no more than 1,200 feet (360 meters) from their residence. Routes should serve high demand destinations, such as jobs, schools, medical facilities, and shopping areas.

B. Transit service frequency should minimize waiting by providing frequent service throughout the day.

C. Transit services should be a seamless system, with easy and convenient connections between buses and to and from regional carriers such as ferries and BART. Alameda residents should be able to access jobs and destinations in Oakland, Berkeley, San Francisco and other transit rich areas without using an automobile.

D. Transit operators should be courteous and well trained in the safe operation of a transit vehicle. Transit equipment should be well maintained to insure safety and reliability.

E. Transit schedules should be realistic, and transit priority measures should be considered when street traffic delays or impedes transit vehicles.

F. Transit services must meet environmental justice requirements, including accessibly to the disabled, and availability to low income residents.

G. Transit services and facilities must be designed to function and operate during a disaster recovery period.

H. Transit operations should use proven and reliable equipment and operating practices and should employ technology advancements as appropriate.

Criteria:

1. *Do transit routes provide two-directional service on main streets without unnecessary deviations?*

2. *Are transit routes spaced to provide service within 1,200 feet of 80 percent of Alameda residents?*

3. *Are transit stops located within 500 feet of major traffic generators such as employment centers, schools, medical facilities, and shopping areas?*

4. *Are transit stops located within 200 feet of transfer points?*

5. *Do transit trunk routes provide at least 15 minute service throughout the day and evening?*

6. *Are there timed transfers at intermodal transit connections such as the ferry terminals?*

7. *Are transfers or passes accepted between various transit operators?*

8. *Is Alameda served by Transbay routes connecting with downtown San Francisco and East Bay trunk routes serving downtown Oakland and Berkeley?*

9. *Do the transit routes on congested corridors operate at speeds that ensure quick and reliable service? Do street operations provide priority for faster transit operations, enabling them to adhere to schedules, not wait in traffic for more than one signal phase, and have a travel time advantage over private vehicles?*

10. *Are wheelchair accessible transit stops located at all important trip generators that serve the disabled?*

11. *Is an emergency operations plan for Alameda prepared for both ferry and bus operations?*

2. Create a transit option that is an attractive alternative to the automobile to alleviate traffic concerns.

Objectives: A. Transit must be competitive with the automobile in travel time, cost/fare reliability and comfort.

B. Transit should be convenient to work and travel destinations.

C. Transit facilities should have amenities that improve the attractiveness and comfort of the transit experience for passengers.

Criteria: 1. *Does transit provide door-to-door travel time comparable with the private automobile?*

2. *Is the cost per ride on transit comparable to automobile travel and parking costs?*

3. *Are transit stops generally about 1,000 feet apart depending on land use and block length to ensure a smooth ride comparable to that of a private automobile?*

4. *Are more than 50 percent of job sites accessible with one transfer to East Bay transit trunk lines, and do 50 percent of job sites have a direct connection to BART?*

5. *Are existing transit facilities including bus shelters well maintained, and are new bus shelters planned?*

6. *At major transit stops are important amenities, such as curb pull-ins, shelters, and benches with backs available?*

3. Develop a transit system that is efficient and effective, meets or exceeds environmental requirements, and can be implemented.

Objectives: A. Transit patronage must meet minimum passengers per revenue vehicle hour measures to justify public support.

B. Transit services must meet basic mobility requirements of Alameda residents.

C. Transit vehicles must meet or exceed minimum air quality or noise standards.

D. Transit operational improvements should be implemented within two years, and transit capital projects should be able to be implemented within 10 years.

Criteria 6. *Do all transit routes subsidized directly by Alameda generate at least 20 passengers per revenue vehicle hour?*

7. *Are 65 percent of Alameda residents' travel destinations*

accessible with one transfer?

8. *Do all transit vehicles in service in Alameda conform to minimum air quality and noise standards?*

9. *Has the City of Alameda or another designated agency completed transit operational improvements by January 2003, and has the City or another designated agency implemented a major transit capital project within a 10 year timeframe?*

4. Develop and implement a transit system that supports regional and City development and land use goals.

Objectives:

A. The overall transit system must be designed to meet the development goals of the Alameda General Plan, including, but not limited to, access to employment sites and access to future residential development areas.

B. The transit system facilities must meet all local and regional requirements associated with impacts on neighborhoods and residents.

C. Improvements should be designed comprehensively, but allow for incremental implementation.

D. Transit improvements and services should be environmentally responsible.

Criteria:

10. *Do transit routes serve new developments with densities equal to or greater than Alameda's average density?*

11. *Do transit routes serve employment sites during the hours that employees need to travel?*

12. *Does transit provide adequate service to meet the automobile traffic reduction goals set for existing and new developments?*

13. *Are transit facilities and operations consistent with local and regional zoning, transportation, and development plans?*

14. *Do transit operations have a significant impact on air and/or noise pollution?*

15. *Have local transit operators been contacted to determine whether transit services complement existing, new, and planned development?*

5. Develop and implement a local funding package that supports comprehensive, safe, reliable, and fully accessible transit services.

Objectives:

A. Regional, state and federal funding sources for Alameda transit services should be actively pursued. These resources should be allocated in an equitable manner.

B. Adequate resources from subventions and set-asides should be directed toward transit service.

C. Local funding sources should be actively pursued and subsidy levels should be allocated in an equitable manner.

D. The City of Alameda should work with local and regional transit operators to promote active partnerships to improve transit efficiency and effectiveness.

Criteria:

1. *Is the per capita transit subsidy in Alameda similar to that of other comparable cities in the region?*

2. *Do developers provide subsidies for transit to mitigate additional automobile traffic associated with new development?*

3. *Are local transit subsidy levels consistent throughout Alameda?*

3. Travel Patterns and Existing Conditions

For a public transit system to be relevant to society, it must serve the market. Where people travel and how they travel are key conditions that must be included in any analysis and redesign of a public transit system.

3.1 Origin and Destination Information

Dowling Associates was retained by the City to determine overall traffic generation information as part of a development fees process. This previous work created a database that the Alameda Transit Plan consultants used to determine origins and destinations within Alameda, and to and from Alameda.

These travel patterns assume year 2020 land uses, and are based on the Alameda County Congestion Management Agency (CMA) travel model, which in turn is based on the 1990 census and various travel input updates that have been performed during the last five years. While the information from the year 2000 census would be valuable, that information will not be available for several years. In any case, the difference between 1990 and year 2000 trips, while potentially statistically significant, is not very large in terms of gross travel numbers. For example, the Alameda to Santa Clara County commute is estimated at about 2.6 percent of work trips – this is based on the current model, which assumes 1990 travel patterns with some changes reflected from additional surveys. Even if this share doubled in 10 years, which would be a huge statistical increase, the total trips in each direction to the South Bay would only approach 2,300. This is insignificant in comparison to the southern Alameda County numbers, which total almost 28,000 trips in each direction. The Dowling projections should be accepted as valid and accurate information, and certainly are appropriate for refining a public transit network.

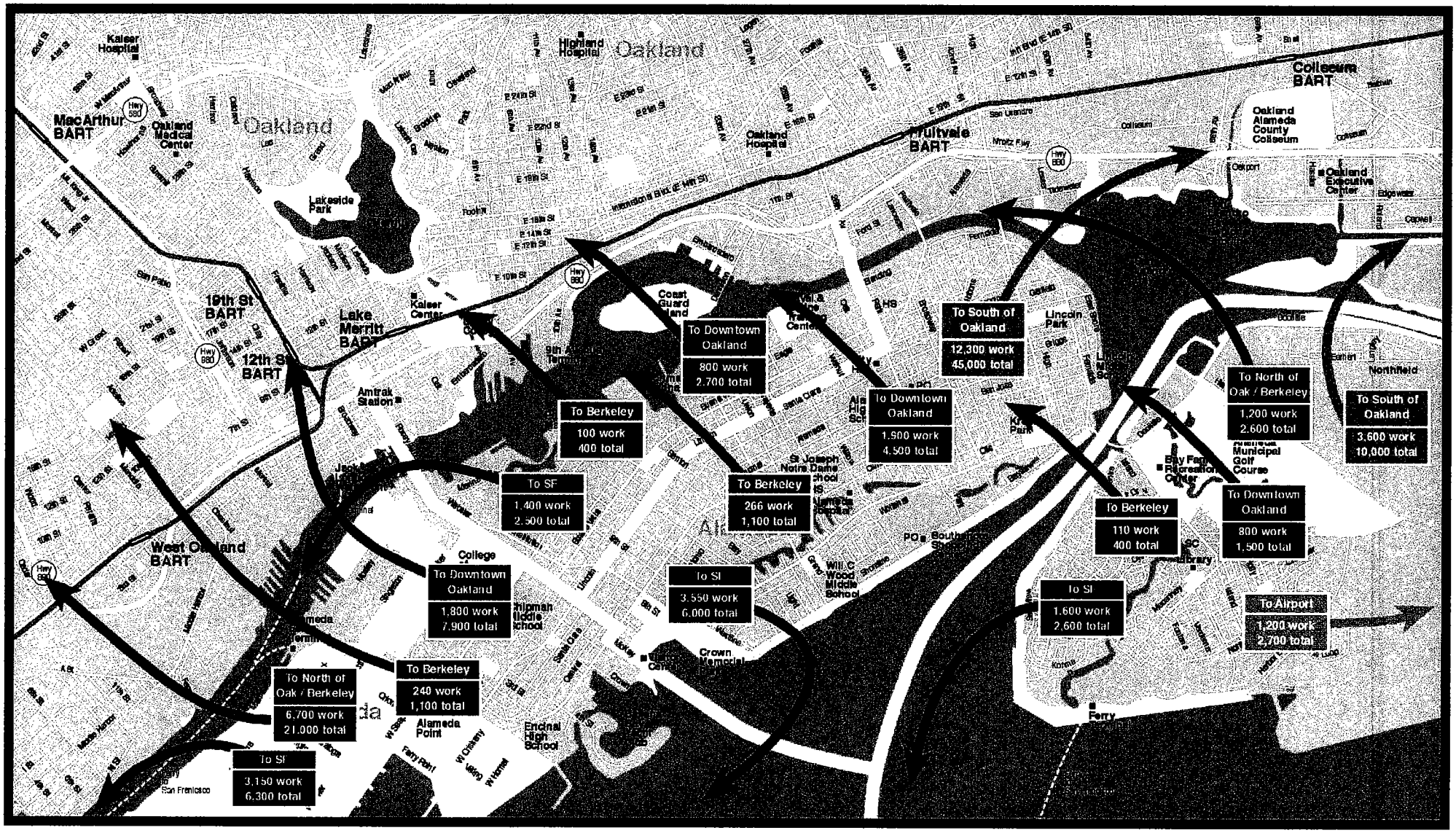
As with most travel findings, many trips in Alameda are local. The model estimates there are more than 104,000 daily trips within the city. In comparison, there are about 109,000 trips that originate (and then return – 54,500 in each direction) in Alameda for destinations outside of the city, and about 37,000 trips that originate outside the city and are destined for Alameda (18,500 in each direction). Table 3-1 lists the main travel corridors to and from Alameda:

TABLE 3-1 TRIPS TO AND FROM ALAMEDA (All are One Way Trips)[1]

Corridor	Trips Starting in and Returning to Alameda	Trips Starting Outside of Alameda and Returning
San Francisco	17,400	4,850
Downtown Oakland	16,600	5,100
North of Oakland CBD	23,600	15,100
Berkeley/UC Berkeley	3,000	260
South of Oakland CBD	55,000	66,600
Santa Clara County	2,300	360
Oakland Airport	3,700	1,200

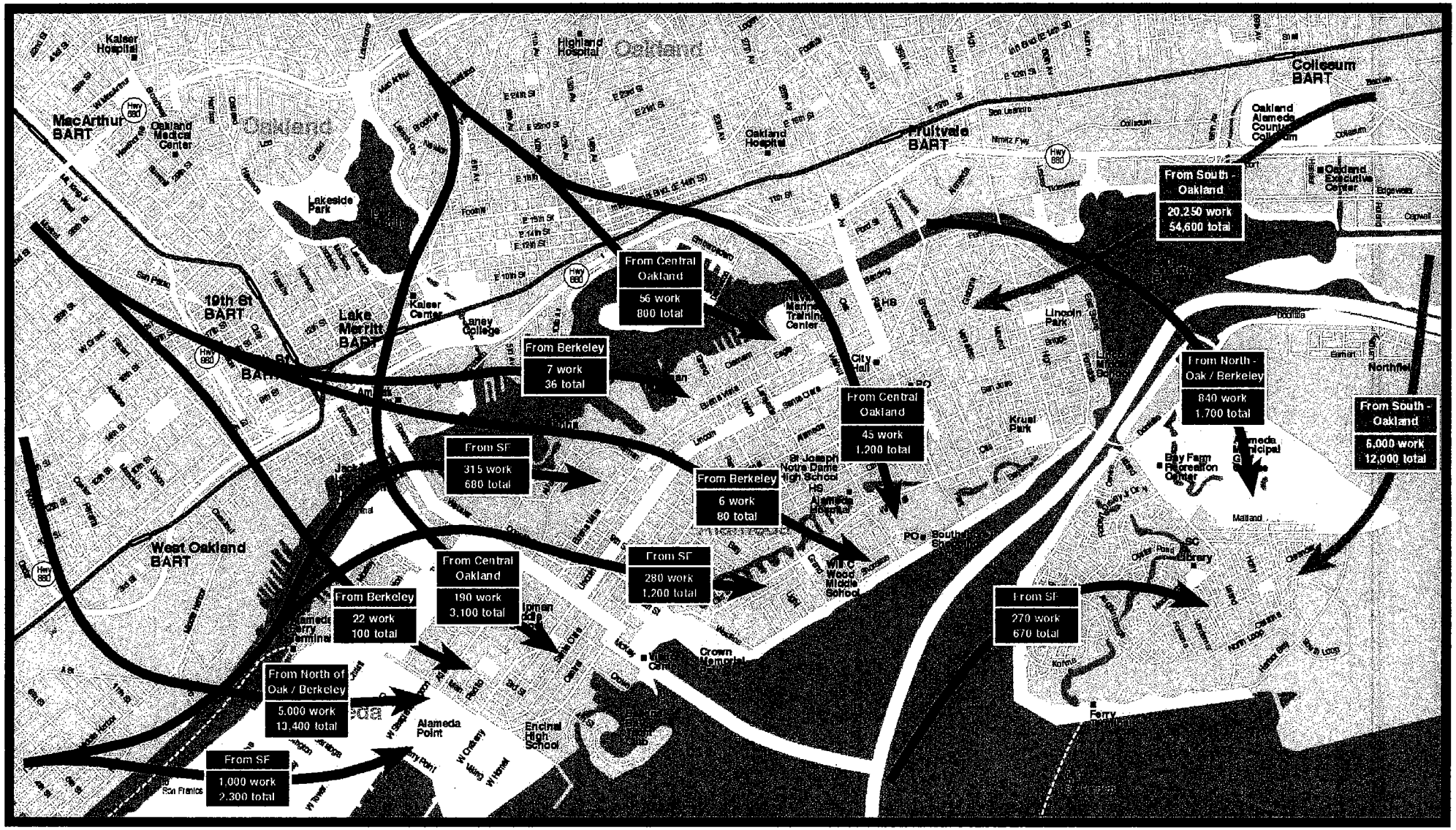
The three following maps (Figures 3-1 through 3-3) provide a visual representation of the data.

[1] Example: Each day, about 8,700 Alameda residents leave for San Francisco and return in the afternoon, for a total of 17,400 one way trips.



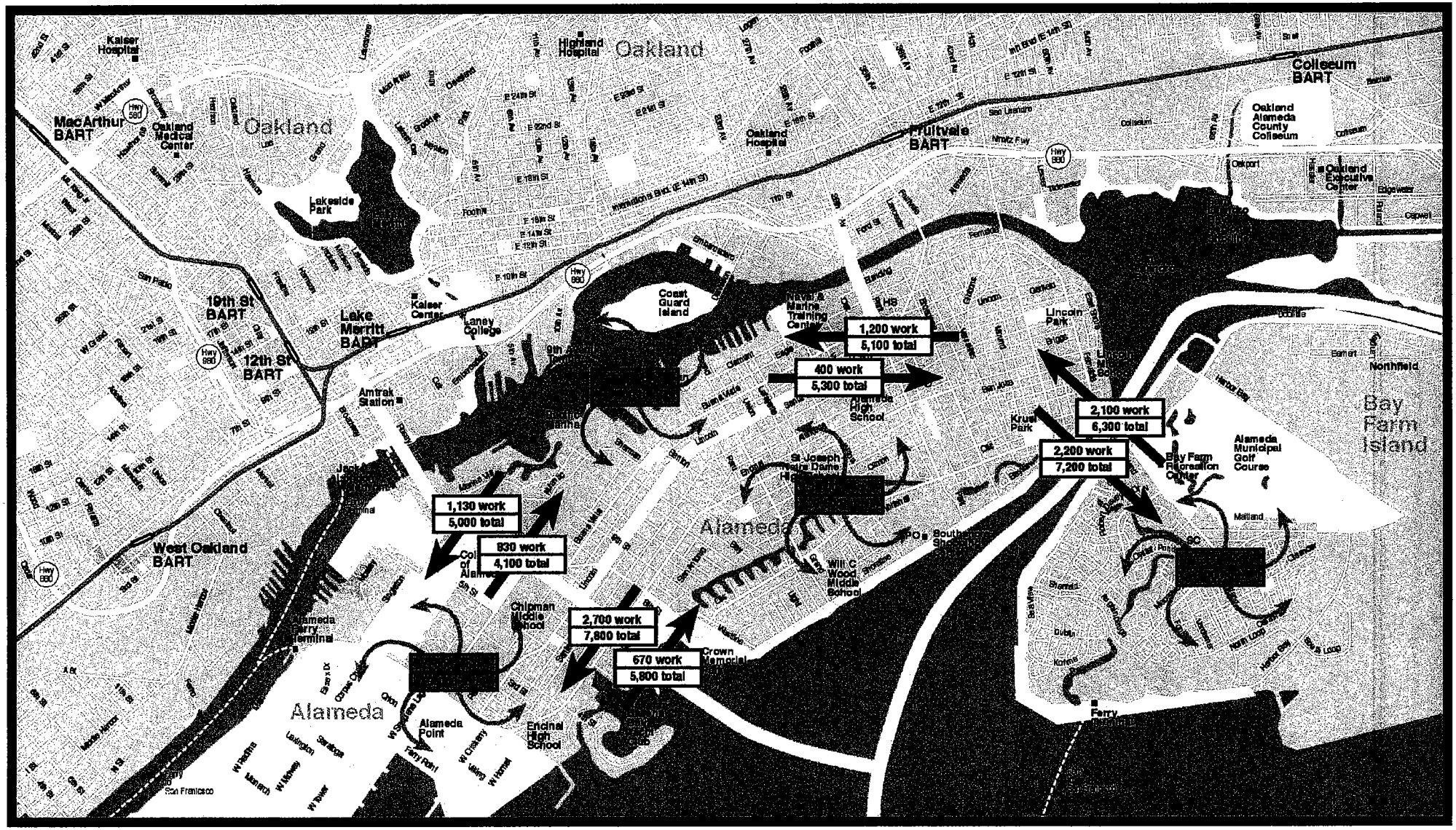
Alameda Origins

trips to outside of Alameda



Alameda Destinations

trips into Alameda



Trips within Alameda

As Figures 3-1, 3-2 and 3-3 illustrate, the greatest number of people going to one concentrated area is San Francisco, followed by downtown Oakland. Oakland Airport volumes exceed those to either Berkeley or Santa Clara County. The large numbers of people traveling to large geographic areas north and south of downtown Oakland indicates that trips are originating in Alameda and are destined for large areas all around – indicating the need for a multi-destinational transit network. The same principle holds for trips coming into Alameda – a many-to-many travel pattern.

In a non-scientific mail-in survey, Alameda residents were asked about their travel patterns. The following Figures (3-4 through 3-6) summarize the results.

FIGURE 3-4 WORK COUNTY

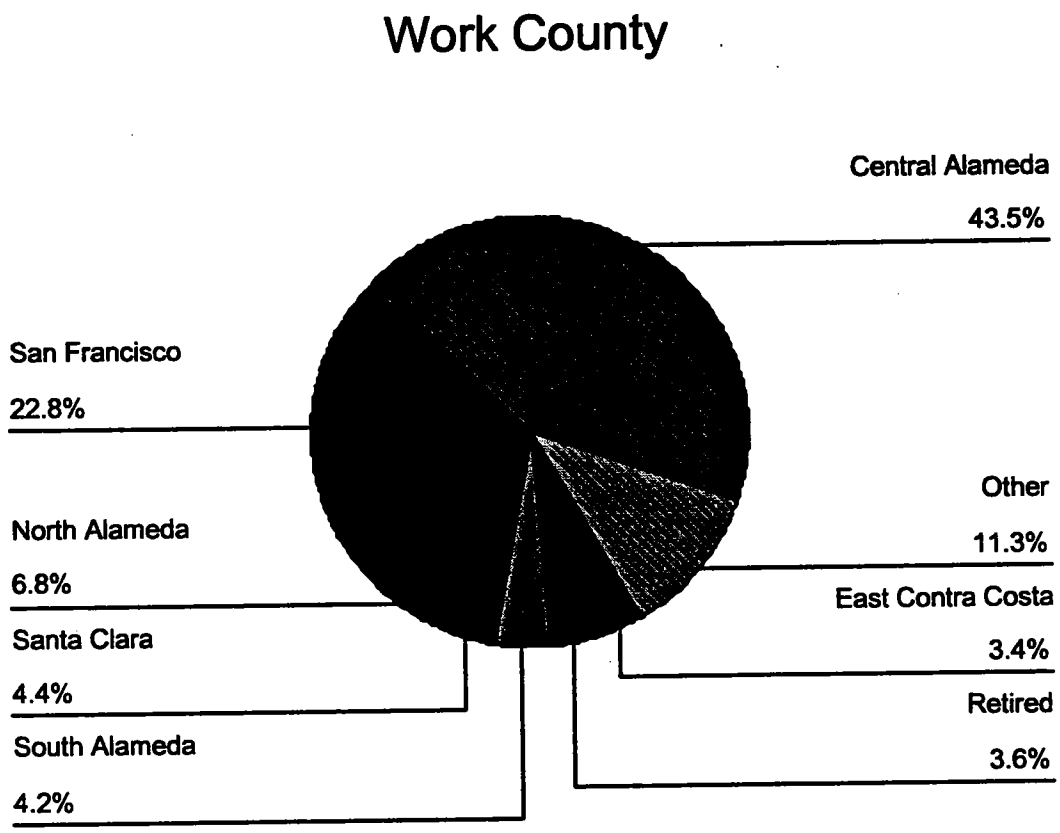


FIGURE 3-5 COMMUTE MODE BY DESTINATION

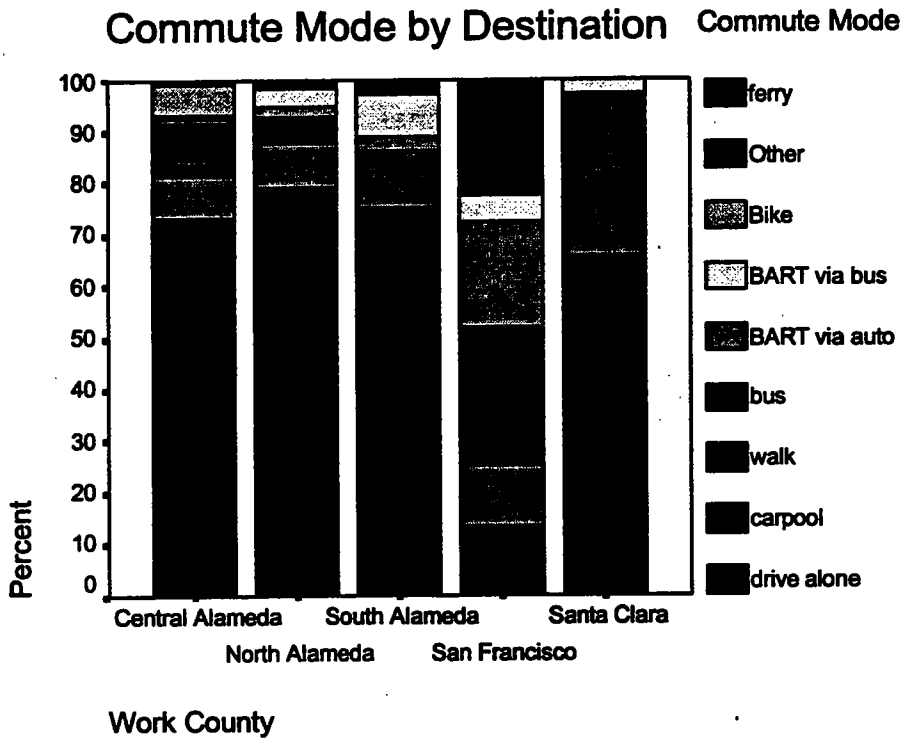
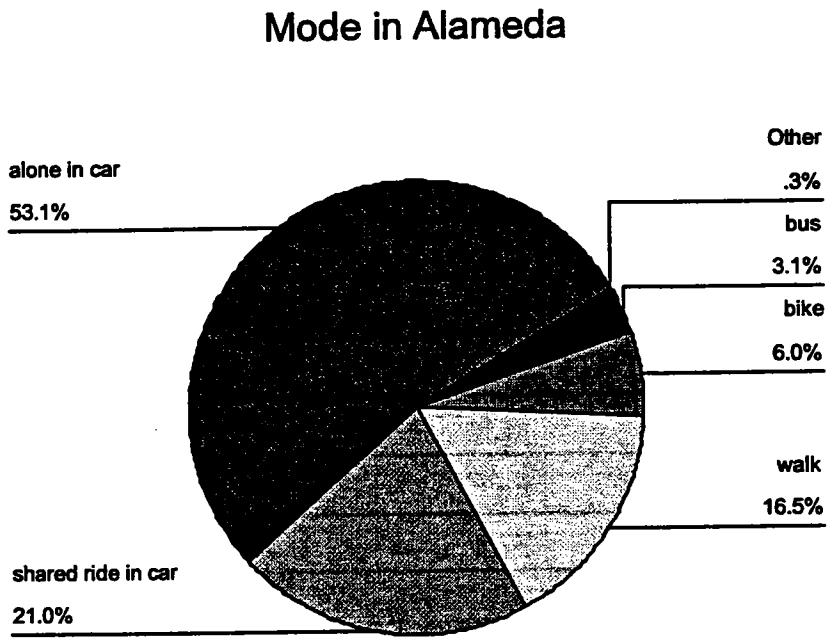


FIGURE 3-6 MODE IN ALAMEDA



3.2 Traffic Counts

Vehicular traffic within Alameda is generally free-flowing (often at Levels of Service A). However, certain links to and from Oakland show some signs of reaching capacity.

The Environmental Impact Report (EIR) for the Catellus Fleet Industrial Supply Center (FISC) development presents the most comprehensive assessment of roadway constraints available. Most of this information was developed less than one year ago, and it represents the most current assessment of current and future conditions.

The FISC EIR notes the following intersections are now at Level of Service D (vehicle/capacity ratio of .90) or worse, and projected year 2020 with the FISC project:

TABLE 3-2 INTERSECTION LEVEL OF SERVICE

	Current Conditions		Year 2020 with FISC	
Intersection	AM	PM	AM	PM
Atlantic/Webster	D	C	F	F
Central/Webster	B	C	D	C
Mariner's Square/Constitution	C	E	F	F

TABLE 3-3 STREET OPERATION LEVEL OF SERVICE

	Current Conditions		Year 2020 with FISC	
Street Operations	AM	PM	AM	PM
Webster/Posey Tubes (NB)	D	A	D	F
Webster/Posey Tubes (SB)	A	E	F	F
Park Street (NB)	F	F	F	F
Park Street (SB)	F	F	F	F
High Street (NB)	F	D	F	F
High Street (SB)	D	E	E	D
Doolittle Drive (NB)	E	F	F	F
Doolittle Drive (SB)	F	F	F	F

The City's traffic studies estimate that cross-estuary peak hour demand will exceed capacity by about 1,000 vehicle trips by 2020. While the City has advocated for additional estuary crossing capacity, it is likely that such capacity is many years away. In the interim, the existing links into Alameda could be managed much as the Bay Bridge toll plaza is managed – with queue jumps and other measures that would decrease transit travel times, make transit more competitive with the automobile, and ultimately increase transit's share of the modal split. It should be noted that in the AM northbound direction in the peak hour, transit carries 19 percent of the people through the Posey Tube with absolutely no transit priority measures.

3.3 Existing Transit Services and Use

This section provides a summary and critique of transit services in Alameda.

Many of the Public Transit Committee's goals and objectives are currently met by existing services, but there is room for improvement. These areas include rerouting bus services to improve reliability and connectivity, increasing bus and ferry frequencies, further investigating mode conversion options, consolidating and improving amenities at bus stops, implementing transit centers at the College of Alameda and South Shore Shopping Center, and actively promoting transit for all Alameda residents, workers, and visitors. Improving transit services now may enable the City to avoid the degree of traffic congestion currently facing many communities in the Bay Area.

Alameda has good bus route coverage, but services should operate more frequently and for longer spans of service. Fifteen bus routes cover the City during weekday commute hours, but only half as many operate during the middle of the day, three run after 7:30 pm, and three operate on weekends. This service pattern leaves some areas of the City, such as Harbor Bay, without any transit service on weekends and at night.

Ferry services have good frequencies in the peak hours, but Alamedans could benefit from more frequent service in the off -peak hours and regular, clock-based schedules. Currently, the Alameda-Oakland Ferry Service provides 15 trips to San Francisco each day. Harbor Bay Maritime operates six commute-hour trips every weekday.

BART serves many travelers to and from Alameda. However, connectivity between BART and Alameda could be improved with more frequent shuttle services. In addition, as most of the peak hour trains are nearly full by the time they reach stations near Alameda, Alamedans could benefit from the implementation of midline starts on the Fremont line.

Review of Existing Service

The following sections present data about the span, frequency, ridership, and fares for the various transit modes serving Alameda.

Span and Frequency of Service

The City of Alameda is served by 14 bus lines and two ferry routes. Three bus routes and one ferry route operate on weekends. The City has extensive peak hour service including ferry and transbay bus service to San Francisco, express buses, and specialized school and business park bus routes. Two special services, #314 and #356, provide rides to the South Shore shopping center on Tuesdays and Fridays. One trunk bus line, #51, provides 24-hour service with frequent headways throughout the day and owl service at night.

Bus service frequencies range from 6 to 60 minutes depending on the route and time of day. Most bus lines operate with 30 minute service frequencies.

The Harbor Bay ferry route operates with regular hourly headways in the morning and afternoon peaks. The Alameda-Oakland Ferry Service provides all day service with irregular headways seven days a week.

TABLE 3-4 ALAMEDA BUS SERVICE SPANS OF SERVICE AND FREQUENCIES

Bus Route	Route Type	Weekday		Weekend	
		Hours of Service	Frequency	Hours of Service	Frequency
10	Local	5:45 am - 7:30 pm	30 - 60 minutes		
12	Local	6:00 - 9:00 am & 2:00 -7:00 pm	15 - 30 minutes		
35X	Express	7:30 - 8:00 am & 4:00 - 6:00 pm	30 - 40 minutes		

Bus Route	Route Type	Weekday		Weekend	
		Hours of Service	Frequency	Hours of Service	Frequency
42	Commute	7:00 - 8:30 am & 4:00 - 6:00 pm	15 minutes		
49	Local	6:00 am - 7:00 pm	15 - 30 minutes		
50	Local	6:00 am - 11:30 pm	30 minutes	6:00 am - 11:30 pm	30 minutes
51	Trunk	24 hours	6 - 60 minutes	24 hours	15 - 60 minutes
63	Island Shuttle	6:00 am - 7:00 pm	30 minutes		
314	Shopper Special	11:00 am & 2:00 pm	one trip in am and pm on Tuesday and Friday only		
325	Ferry Shuttle	6:00 - 8:00 am & 4:40 - 7:50 pm	60 minutes		
356	Shopper Special	10:00 am & 12:30 pm	one trip in am and pm on Tuesday and Friday only		
631	School	7:15 am - 9:00 am & 2:30 pm - 4:40 pm	four morning and five afternoon school trips		
O	Transbay	5:30 am - midnight	10 - 60 minutes	5:45 am - midnight	60 minutes
OX	Transbay	5:45 - 8:00 am & 4:15 - 7:00 pm	10 - 12 minutes		
OX1	Transbay	7:00 - 8:30 am & 5:10 pm	30 minutes		

Bus Route	Route Type	Weekday		Weekend	
		Hours of Service	Frequency	Hours of Service	Frequency
W & WA	Transbay	5:45 - 8:00 am & 4:00 - 7:00 pm	15 minutes		

TABLE 3-5 ALAMEDA FERRY SPANS OF SERVICE AND FREQUENCIES

Ferry Service	Weekday		Weekend	
	Hours of Service	Frequency	Hours of Service	Frequency
Alameda - Oakland	6:10 am - 8:45 pm	30 - 130 minutes	9:25 am - 10:05 pm	75 - 100 minutes
Harbor Bay	6:30 am - 8:55 am & 4:30 pm - 8:00 pm	60 minutes		

TABLE 3-6 BART SPAN OF SERVICE AND FREQUENCY

BART	Weekday		Weekend	
	Hours of Service	Frequency	Hours of Service	Frequency
	4 am - midnight	7 - 20 minutes	6 am - midnight	20 minutes

Ridership by Route

Alameda's bus patronage is comparable to the entire AC Transit service district, and higher than other Bay Area transit agencies. Alamedans average 46 bus boardings each year, nearly the same number as residents of the entire AC Transit service district (48 boardings per capita per year). This level of ridership is higher than that of the SamTrans and Golden Gate Transit.

Slightly more than half of the bus boardings in Alameda are during the morning and afternoon peak hours. This percentage is an indicator of a transit system's efficiency. Providing additional peak hour service is often more expensive than off-peak service as more drivers must be hired and more equipment must be procured. Off-peak service, on the other hand, is usually less expensive to provide as drivers are already

available and vehicles either have extra space or are idle.

The following table presents bus ridership data from AC Transit's most recent Short Range Transit Plan. (The proportions of Alameda boardings are based on data from AC Transit's 1997 - 98 collection effort. Ridership changes due to any service changes since then will not be reflected in this information.)

TABLE 3-7 BUS RIDERSHIP BY ROUTE IN ALAMEDA

Bus Route	Daily Weekday Boardings in Alameda	Daily Weekend Boardings in Alameda	Total Daily Weekday Boardings for Entire Route	Total Daily Weekend Boardings for Entire Route
10	460		536	
12	209		305	
35X	98		210	
42	65		152	
49	553		1441	
50	1660	1848	2656	2956
51	3987	3490	16096	14092
63	916		916	
314	N/A		N/A	
325	123		123	
356	30		30	
631	344[2]		344	
O	650	465	1363	974
OX	325		643	
OX1	35		76	
W	200		407	
WA	45		95	

Ferry ridership fluctuates throughout the year primarily due to the weather and tourism. In general, ferry riders can be grouped into two categories: commuters and

[2] AC Transit staff estimate.

excursion riders. Ridership on the Alameda-Oakland Ferry Service this year has increased 16% over last year.

TABLE 3-8 DAILY FERRY RIDERSHIP

Ferry Route	Daily Boardings in Alameda
Alameda-Oakland	500
Harbor Bay	250

Nearly 1.2 million weekday BART trips each year (or 3,400 trips per day) originate in Alameda. Alamedans regularly use five BART stations including Fruitvale, 12th Street, West Oakland, Lake Merritt, and Coliseum for these trips. (BART estimates about 25% of passengers at the Fruitvale station are Alameda residents.) While precise data is not available, roughly a third of the trips away from the island use the Fruitvale station, a quarter each use the 12th Street and West Oakland stations, and Coliseum and Lake Merritt together total about 10% of BART trips with Alameda origins.

From mapped BART origin data, it appears that Alamedans throughout the City use BART, but different areas use different stations. Most of the trips through the Fruitvale station originate in Bay Farm Island and the eastern end of the main island, and taper off west of Grand. 12th Street trips are primarily from the west end of the island, with fewer trips starting beyond Park Street. Trips through the West Oakland station originate throughout the city. Trips using the Coliseum and Lake Merritt stations originate in a few small pockets throughout the city.

Fares

Fares for transit services in Alameda vary by mode and destination, but are all relatively comparable. Discounts are available for some groups of riders such as seniors and children. Discounts are also available for multi-use passes. The following table provides information about fares for the various services:

TABLE 3-9 TRANSIT SERVICE FARES

	AC Transit within East Bay	AC Transit Transbay	Alameda - Oakland Ferry Service	Harbor Bay Maritime	BART[3]

[3] BART fares are distance-based and vary depending on origin and destination. For this chart, fares are based on a trip from Fruitvale station in Oakland to Montgomery station in San Francisco.

Adult Cash	$1.35	$2.50	$4.75	$4.75	$2.50
Senior[4] Cash	$.65	$1.25	$3.00	$3.00	$.63
Child[5] Cash	$.65	$1.25	$2.00	$2.00	$.63
Disabled Cash	$.65	$1.25	$3.00	$3.00	$.63
Adult Monthly Pass	$49.00	$80.00	$125.00	$125.00	Not available
	AC Transit within East Bay	AC Transit Transbay	Alameda - Oakland Ferry Service	Harbor Bay Maritime	BART
Senior Monthly Pass	$13.00	Not available	Not available	Not available	Not available
Child Monthly Pass	$27.00[6]	Not available	Not available	Not available	Not available
Disabled Monthly Pass	$13.00	Not available	Not available	Not available	Not available

Transfers are available within and among the various transit services. AC Transit imposes a transfer charge for passengers moving from one bus line to another. Transfers cost $.25 and are valid for a maximum of 2.5 hours.

Transfers between AC Transit and the two ferry services in Alameda are free.

Passengers leaving BART can pick up a transfer coupon inside the BART station which they then present to the AC Transit bus driver. With the transfer coupon, the cash fare is reduced by $.20 for adults to $1.15. The cash bus fare for children, seniors, and the disabled is $.55 with the BART transfer coupon, a $.10 discount. The bus driver will return a portion of the coupon to the passenger who can use it in the same manner the following day for their bus trip to a BART station.

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[4] Seniors are defined as 65 years and older.

[5] Children are defined as 5 - 12 years of age.

[6] $27.00 monthly pass available for youth and children 5 - 17 years of age.

The variety of transfer costs, media, and rules makes transferring confusing for the public. A better system would simplify transfers with the goal of making services seamless from the passengers' perspective.

3.4 Compliance with Goals and Objectives

The following table rates Alameda's existing transit network based on the PTC's approved goals and criteria. In some cases, there is not a clear "yes" or "no" answer. As such, discretion was used to determine an appropriate response. In general, questions were answered positively or negatively based on the majority of data. Brief explanation of selected responses are found below the table. The last column of the table shows which criteria have further notes.

TABLE 3-10 CURRENT TRANSIT SYSTEM'S COMPLIANCE WITH CRITERIA

Goals & Criteria	**Does Alameda's existing transit network meet the criteria?**			Notes Below
	Yes	No	?	
Goal 1. Enhance mobility for Alameda through the provision of a public transit system that is comprehensive, safe, reliable and fully accessible.				
1. *Do transit routes provide two-directional service on main streets without unnecessary deviations?*		X		X
2. *Are transit routes spaced to provide service within 1,200 feet of 80 percent of Alameda residents?*	X			X
3. *Are transit stops located within 500 feet of major traffic generators such as employment centers, schools, medical facilities, and shopping areas?*	X			
4. *Are transit stops located within 200 feet of transfer points?*	X			
5. *Do transit trunk routes provide at least 15 minute service throughout the day and evening ?*	X			
6. *Are there timed transfers at intermodal transit connections such as the ferry terminals?*		X		X
7. *Are transfers or passes accepted between various transit operators?*	X			

Goals & Criteria	Does Alameda's existing transit network meet the criteria?			Notes Below
	Yes	No	?	
8. *Is Alameda served by Transbay routes connecting with downtown San Francisco and East Bay trunk routes serving downtown Oakland and Berkeley?*	X			
9. *Do the transit routes on congested corridors operate at speeds that ensure quick and reliable service? Do street operations provide priority for faster transit operations, enabling them to adhere to schedules, not wait in traffic for more than one signal phase, and have a travel time advantage over private vehicles?*	X			X
10. *Are wheelchair accessible transit stops located at all important trip generators that serve the disabled?*		X		X
11. *Is an emergency operations plan for Alameda prepared for both ferry and bus operations?*	X			X
Goal 2. Create a transit option that is an attractive alternative to the automobile to alleviate traffic concerns.				
1. *Does transit provide door-to-door travel time comparable with the private automobile?*		X		X
2. *Is the cost per ride on transit comparable to automobile travel and parking costs?*	X			X
3. *Are transit stops generally about 1,000 feet apart depending on land use and block length to ensure a smooth ride comparable to that of a private automobile?*		X		X
4. *Are more than 50 percent of job sites accessible with one transfer to East Bay transit trunk lines, and do 50 percent of job sites have a direct connection to BART?*	X			
5. *Are existing transit facilities including bus shelters well maintained, and are new bus shelters planned?*	X			
6. *At major transit stops are important amenities, such as curb pull-ins, shelters, and benches with backs available?*		X		X
Goal 3. Develop a transit system that is efficient and effective, meets or exceeds environmental requirements, and can be implemented.				

Goals & Criteria	Does Alameda's existing transit network meet the criteria?			Notes Below
	Yes	No	?	
1. *Do all transit routes subsidized directly by Alameda generate at least 20 passengers per revenue vehicle hour?*	X			X
2. *Are 65 percent of Alameda residents' travel destinations accessible with one transfer?*	X			
3. *Do all transit vehicles in service in Alameda meet or exceed minimum air quality and noise standards?*	X			
4. *Has the City of Alameda, or another designated agency completed transit operational improvements by January 2003, and has the City or another designated agency implemented a major transit capital project within a 10 year time frame?*			N/A	X
Goal 4. Develop and implement a transit system that supports regional and City development and land use goals.				
1. *Do transit routes serve new developments with densities equal to or greater than Alameda's average density?*		X		X
2. *Do transit routes serve employment sites during the hours that employees need to travel?*		X		X
3. *Does transit provide adequate service to meet the automobile traffic reduction goals set for existing and new developments?*		X		X
4. *Are transit facilities and operations consistent with local and regional zoning, transportation, and development plans?*		X		X
5. *Do transit operations have a significant impact on air and/or noise pollution?*	X	X		X
6. *Have local transit operators been contacted to determine whether transit services complement existing, new, and planned development?*	X			X
Goal 5. Develop and implement a local funding package that supports comprehensive, safe, reliable, and fully accessible transit services.				
1. *Is the per capita transit subsidy in Alameda similar to that of other comparable cities in the region?*	X			X

Goals & Criteria	Does Alameda's existing transit network meet the criteria?			Notes Below
	Yes	No	?	
2. *Do developers provide subsidies for transit to mitigate additional automobile traffic associated with new development?*	X			X
3. *Are local transit subsidy levels consistent throughout Alameda?*		X		X

GOAL 1

Criteria 1: As a rule of thumb, two-way operations serve passengers better as they can catch a bus in either direction. Several routes have one-way loops, and others have deviations off main streets. Routes with one-way loops include 12 (Marina Village), 35X (Marina Village), and 42 (Marina Village loop changes direction from morning to afternoon). Route 49 deviates into office parks in Harbor Bay, and 325 has numerous deviations on streets such as Third, Fifth, Park, Broadway, and Versailles. Route 51 primarily runs on major streets, but does operate on San Jose Avenue, a narrow residential street, for several blocks.

Criteria 2: Approximately 95% of Alameda residents live within 1,200 feet of a bus route. Three small areas of the City are more than 1,200 feet from a bus route: the area between Mosley Avenue and Mayport Circle from Cimarron Street to the estuary (in the U.S. Coast Guard housing area); streets east of Fernside Boulevard between Encinal Avenue and East Shore Drive; and the western edge of Bay Farm Island from Creedon Circle to Nottingham Drive and inland to Tralee Lane and Brunswick Road.

Not all areas of Alameda have weekend transit service. Harbor Bay is the largest area of the City without weekend service.

Criteria 6: Only a few of Alameda's transit services have timed transfers. This section provides information about transfers between different modes.

Bus to Bus: There are no timed transfers between different bus lines. This means that individuals who need to transfer from one bus line to another must rely on random transfers. This system works well when buses run on 15 minute headways or better.

Bus to Ferry: There are a few timed transfers between bus routes and the ferries. Route 325 has timed transfers with the Alameda-Oakland Ferry Service. The schedule for route 49 includes layover times to improve connections with the Harbor Bay Ferry. Route 63 connects with the Harbor Bay Ferry in the morning. However, in the afternoon, the scheduling may be too close to provide adequate time for transferring.

AC Transit has grave problems making connections with the Alameda ferry, primarily

due to the regular headways of the bus routes (every 15 or 30 minutes, at the same times each hour) and the irregular headways of the ferry. The solution lies not in rescheduling local transit lines to erratic times, but in developing a regular and precise ferry schedule – one which can be memorized by passengers and mesh with local transit. For example, Route 10 is not scheduled to coincide with the Alameda-Oakland Ferry Service. Route 50 is not regularly scheduled to meet the Alameda-Oakland Ferry's arrivals or departures. At some times, particularly in the evening, the bus is scheduled to depart the terminal 10 minutes after the ferry arrives. At other times of day, the wait can be longer. In the early morning, the bus is scheduled to drop off ferry passengers close to the ferry's departure time.

Bus to BART: There are no timed transfers between buses and BART. However, the high level of service on BART's Fremont line suggests that transferring passengers do not have to wait very long to catch a train. However, connectivity in the other direction, from BART to a bus, may not be as good depending on the bus route's headways.

The following table provides information about BART's intermodal connections.

TABLE 3-11 SELECTED INTERMODAL AMENITIES AT BART STATIONS

BART Station	Bus Routes Serving Alameda	Parking
West Oakland		Free
12th Street	10, 12, 35X, 51	None
Lake Merritt	35X	Validated
Fruitvale	12, 49, 50	Free
Coliseum	49	Free

Criteria 9: The vast majority of streets in Alameda currently operate at Level of Service C or better. The exceptions include the following intersections: Atlantic Avenue/Webster Street - LOS D in AM peak; Mariner's Square Loop/Constitution Way - LOS E in PM peak; Park Street between Santa Clara and Encinal - LOS E.

Criteria 10: The following transit stops near government buildings, schools, and other sites that serve the disabled are not wheelchair accessible:

TABLE 3-12 NON-WHEELCHAIR ACCESSIBLE BUS STOPS

Cross Streets	Direction	Site
Santa Clara/St. Charles	WB	Mastick Senior Center
Santa Clara/Oak	EB	City Hall, Police station
Webster/Tinker	SB	College of Alameda
Atlantic/W. Campus	EB	College of Alameda
Santa Clara/Eighth	WB & EB	School, library
Pacific/Fourth	EB	School
Lincoln/Fifth	EB	School
Marshall/Fourth	WB	School
Robert Davey/Oyster Pond	WB	School
Aughinbaugh/Robert Davey	NB	School

Cross Streets	Direction	Site
Otis/Mound	EB	School
Encinal midblock between Walnut & Oak	WB	School
Encinal/Paru	WB	School
Central/Fifth	WB	School
Third/Santa Clara	SB	School
Central/Taylor	EB	School
Central/Fifth	EB	School
Encinal/Paru	EB	School
Encinal/Walnut	EB	School
Atlantic/Third	WB & EB	School

Criteria 11: Both AC Transit and the Blue and Gold Fleet have worked with MTC to develop emergency operations plans. The plans are on file with MTC.

GOAL 2

Criteria 1: For trips within Alameda, bus travel times are likely to be longer than for private automobiles for several reasons. First, Alameda does not have significant congestion on local streets, which enables fast travel. (This circumstance improves travel times for both autos and transit.) In addition, finding parking in Alameda is not difficult. Finally, most of the bus routes in Alameda have too many bus stops which serve to slow down transit.

Transit travel to East Bay destinations is likely to be longer than auto travel. Congested streets slow both autos and buses, and few areas have transit preferential measures that would significantly improve transit travel times. In addition, transit travel will likely involve transfers to other lines or modes. Unfortunately, timed transfers are limited in the East Bay. Parking is available at many East Bay destinations, which speeds door to door travel times for private automobiles. Transit travel times may be faster than autos to some destinations that are well-served by bus trunk lines and/or BART and have limited parking, such as downtown Berkeley.

In the morning and afternoon peaks, transbay transit provides better door to door travel times than the private automobile as all three transit modes (bus, BART, and ferry) avoid queues for the Bay Bridge.

Criteria 2: Within Alameda, the cost per ride for transit is probably slightly higher than the cost of driving, including parking costs. Because the island is small and transit prices are fixed, the cost per mile may be slightly higher for transit. In addition,

average parking costs in Alameda are low.

The costs of transit and automobile travel for East Bay destinations may also be similar, with transit having a slight cost advantage. The distances between Alameda and East Bay destinations are, in most cases, longer than those on the island which would result in a lower cost per mile for transit. In addition, many East Bay destinations have free or low-cost parking.

Even including transfers to other modes and higher Transbay bus fares, the cost of taking transit to San Francisco is lower than driving. This cost advantage is primarily due to the high cost of parking in San Francisco. For example, parking can cost as much as $30 per day. Areas of San Francisco that have free or low-cost parking tend to be in the southern or western neighborhoods which are farther from Alameda – reaching them incurs higher mileage costs.

Criteria 3: Bus stops in Alameda are spaced an average of less than 700 feet apart. This close spacing can result in uncomfortable rides for passengers who experience numerous stops and starts throughout the route, longer bus trips due to slow average speeds on the bus routes, and higher fuel expenditures due to acceleration after each stop. East-west streets have slightly better stop spacing than north-south streets (720 feet between stops compared to 640 feet).

Criteria 6: While most of the major bus stops in Alameda have benches or shelters, few have adequate space for buses to pull in to the curb. Plans for Park and Webster Streets as well as Santa Clara Avenue should provide adequate red curb at key stops and/or bus bulbs where necessary to ensure that passengers can board buses safely and quickly. In addition, shelters should be provided at well-patronized stops along routes that connect with BART.

Both ferry terminals provide good amenities for passenger safety and comfort.

GOAL 3

Criteria 1: The term "revenue vehicle hours" refers to those hours when a bus is in service to pick up passengers. Route 42 averages 27 passengers per revenue vehicle hour. Route 49 averages 24, and Route 49M averages nearly 32. These routes are directly subsidized by Alameda.

Criteria 4: Not applicable. The transit operational improvements and capital projects in the Long Range Transit Plan await implementation.

GOAL 4

Criteria 1: Due to the high level of existing transit service in Alameda, new development on the small island will have some level of transit service, particularly during peak hours. However, weekend and night services in the City are limited. As such, new developments may not have transit access at those times.

Criteria 2: Marina Village reports that buses are not running during the hours when they are needed, and existing service is not frequent enough.

Criteria 3: Much of the new development in Alameda is slated for the Northern Waterfront area, which does not have adequate transit service. Bus services are not available during the mid-day, evenings, or weekends.

Criteria 4: Transit facilities and operations are consistent with most zoning, transportation and development plans. For example, the streetscape plan for Webster Street is consistent with bus stop consolidation plans currently under consideration. However, some streets such as San Jose Avenue may not be suitable for existing transit service. The most notable exception to the transit system's consistency with development plans involves Alameda Point.

Criteria 5: High transit ridership in Alameda helps reduce air pollution in the city as fewer people use cars. Large diesel buses do contribute to noise pollution, particularly in residential neighborhoods. To improve both air and noise pollution, the City may consider implementing electric transit vehicles where possible.

Criteria 6: AC Transit has been contacted regarding requests for transit services to complement new developments in Alameda. However, those services have yet to be implemented.

GOAL 5

Criteria 1: The per capita cost of AC Transit services in Alameda ($96.24) is approximately 5% more than that of the entire District ($91.60).[7] Alameda residents, on average, take nearly the same number of bus trips per year as District residents.

Criteria 2: Transit subsidies are applied to new development in Alameda, but not older developments.

Criteria 3: Annual transit subsidies vary dramatically in different parts of Alameda. While the average annual subsidy is $96.24 per person, Alameda Point receives almost half that level of subsidization. This is due to a combination of factors: relatively low levels of transit service and high population estimates. Alameda's Northern Waterfront, with its low level of service, ridership, and population, receives close to 90% less subsidy than the City as a whole. Bay Farm Island receives 25% more subsidy per capita than the City average. The remainder of the island receives a per capita subsidy one third higher than the City average despite its impressive ridership totals. This area of the island, bordered by Webster Street, Lincoln Avenue, and the Bay, has nearly six

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[7] Per capita subsidies were calculated as follows: (total AC Transit service hours within the geographic area multiplied by $75 per hour [average AC Transit hourly cost]) - (total number of boardings within the geographic area multiplied by $.65 per boarding [average AC Transit revenue per boarding]) = total subsidy. Total subsidy divided by population in geographic area = per capita subsidy. This analysis includes local and transbay services.

times the bus service hours than Alameda Point, and forty times the service of the Northern Waterfront.

TABLE 3-13 PER CAPITA SUBSIDIES THROUGHOUT ALAMEDA

	Alameda Point	Northern Waterfront	Central Island	Bay Farm Island
Weekly Ridership	9,700	1,400	48,600	6,000
Weekly Fare Revenue	$6,300	$950	$31,600	$3,900
Total Weekly Cost	$22,200	$3,100	$125,400	$26,600
Population	16,200	9,100	38,000	11,400
Annual Per Capita Subsidy	$50.98	$12.31	$128.20	$121.00

3.5 Critique of Existing Transit Service Network

Routes

Alameda's transit routes provide good connectivity to local and regional destinations as well as strong feeder service to BART. Any new routing plan should maintain or enhance these connections.

While Alameda has extensive bus routes, several of them are too circuitous to provide fast access to many destinations. Such routes include the 50 and 63 lines. The City would be better served with more direct, well-spaced routes.

Several bus lines and the Alameda-Oakland Ferry Service have split ends. For example, the 51 and 51A buses follow different routes near the end of their trips. Such routing practices are often confusing to the public as passengers are not certain which bus or ferry will take them to their destination. In addition, bus routes that split into two branches, while eliminating the need for some transfers, are confusing. They can also provide inadequate service on the two "tails." For example, on a line with 15 minute service, each of the two tails has only 30 minute service frequencies as only half of the buses serve each tail. In redesigning Alameda's route structure, bus lines should be simplified to create a more user-friendly and useful network.

Frequency and Span of Service

It is not surprising that bus line 51 has both the highest service frequencies and ridership as frequency is one of the most important factors influencing the usefulness

of transit. The significantly higher ridership on the #51 than on any other bus line suggests that Alamedans would ride other routes more often if they had better service frequencies. Improving headways on the north and south sides of the island could have substantial benefit for Alameda travelers. Ferry ridership could also increase with additional service.

Alameda is served by 14 bus routes during the morning and afternoon peak hours. These routes cover virtually the entire City. In the midday, half as many bus lines traverse the island. After 7:30 pm, service drops to only three bus lines. One line, the 51, provides owl service. Three lines provide weekend service.

A wide span of service is important for a strong transit network. Potential passengers cannot easily take transit if service is unavailable for either their start or return trips. Inadequate off-peak service may disproportionately impact the working poor whose jobs often do not coincide with 9 to 5 shifts. Some traditional peak-hour commuters may be wary of using transit if they are concerned about their ability to return home in the middle of the day if necessary. Strong midday service is also important for non-work trips that could be made on transit rather than in a car or by those who depend on transit for personal mobility such as many seniors and the disabled.

Strong weekend service is an important factor in mitigating traffic congestion. The worst local traffic often arises on Saturdays as most families travel on this day for errands, sporting events, and recreation. As such, Alameda should investigate providing local circulation services on weekends.

Equipment

Alameda is served with the same type of bus equipment as the rest of the AC Transit service district. In the future as AC Transit transitions to low-floor buses, Alameda's flush curb returns may pose challenges. Currently, the low floor technology cannot accommodate disabled access at flush returns at near-side stops (stops at the intersection). At far-side stops, however, low-floor buses can work well, even with flush returns. As such, the City and AC Transit will need to locate stops with this requirement in mind – and may need to mitigate the problem when near-side stops are necessary (such as at stop signs). Some solutions include bus bulbs or more extensive red curb. In all cases, the City should work with AC Transit to ensure that the agency is aware of the extent of the issue and to promote equitable solutions that will serve all Alamedans well.

The Alameda-Oakland Ferry Service is currently procuring a new ferry to enhance the existing service. The new ferry should enable the provider to improve headways by mid-2001.

Alameda has several opportunities to create an electric corridor for transit that would both improve the passengers' transit experience, reduce noise pollution in neighborhoods, and improve air quality. Perhaps most promising is the opportunity to implement battery-powered electric buses on local circulation routes. Such technology has proven to be successful in various communities in the United States, most notably

Santa Barbara, California. With its local electric utility, strong transit ridership, flat geography, and temperate climate, Alameda appears to be a strong candidate for a successful electric bus program.

An electric trolley coach line connected with Oakland could also be successful for Alameda. In this scenario, overhead wires would provide power to buses that would travel through key corridors in Alameda and Oakland. While this option is expensive, it could be financed through development assessments and operational cost savings.

Other mode changes such as light rail would require intensifying land uses and adopting development assessments to both garner enough ridership and finance the program.

Facilities

Alameda needs better transit facilities. Improvements should include more extensive bus shelters and five transit centers.

While the City does have numerous bus shelters, passenger safety and comfort would be greatly enhanced through the City's participation in an "advertising shelter" program. These programs use advertising revenue to pay for the installation and maintenance of bus shelters. Although a standard agreement already exists for cities within AC Transit's service district, the terms could be amended to better serve Alameda. For example, bus shelter design could be developed jointly by the ad shelter program managers and Alameda City planners and consultants working on the Park and Webster street designs.

To facilitate transit connectivity, Alameda should investigate the design and implementation of transit centers at South Shore Shopping Center, the College of Alameda, the West End Ferry Terminal, Bay Farm Island, and Park Street north of Santa Clara Avenue. Ideally, these centers would provide adequate space for timed-transfers between bus lines and passenger amenities. Amenities could include shelters, passenger information, and storage facilities for bicycles and perhaps even automobile park and ride facilities.

Marketing

The most successful marketing strategy for transit is the existence of a logically-routed, well-connected, frequent and reliable network with good passenger amenities. Implementing such improvements can increase ridership virtually on its own. The strong presence of the transit vehicles themselves will provide immediate advertising for the system. In general, user-friendly transit systems have a strong return on marketing investments. For example, regular headways make it easier for the public to remember departure times are easier for the public to remember than schedules that fluctuate throughout the day. (This type of scheduling as it relates to ferries may be more important for excursion riders. Commuters may tend to be more interested in reaching downtown as early as possible rather than on a clock-based schedule.) Also, most passengers are more comfortable with transit lines that do not branch as they know which route the bus they board will use.

Marketing for the Alameda Oakland Ferry Service is conducted by the service provider (The Blue and Gold Fleet), the City of Alameda, and the Port of Oakland. Plans are developed by a coordinator and approved by a task force comprised of a member from the provider, City, and port. The annual marketing budget for the Alameda-Oakland Ferry Service is approximately $140,000. $65,750 of this is paid for by the City of Alameda, while the service provider, Blue and Gold Fleet, contributes the balance. The annual budget for Harbor Bay Maritime is $40,000. It is important to note that the marketing budget includes funds for items such as printing of all materials such as schedules, tickets, and signs; security; and advertising and promotion. Approximately $63,000 of the Alameda-Oakland Ferry Service budget is designated for advertising and promotion. These funds pay for such activities as newspaper ads, outside displays including those on transit vehicles, and telephone directory listings.

In general, marketing for ferry services is divided into two market segments: commuters and excursion riders. Marketing for commuters is based primarily at the work site, particularly for the Alameda-Oakland Ferry Service riders as they are drawn from the entire East Bay. Promotional materials for Harbor Bay Maritime, on the other hand, are sent directly to residents of Bay Farm Island as the ferry service is essentially a local neighborhood service.

4. Routing Systems – Principles and Sample Networks

Designing transit system that functions efficiently and effectively raises critical issues – issues that involve both service design principles and practical, workable and useable transit routings.

4.1 Service Design Principles

Multi-destinational, Multi-purpose, and Multi-modal

Travel is dispersed, both in time and location. For example, employment sites are widely dispersed throughout the metropolitan area, with new suburban business parks under construction in areas that were once open space. Working hours are changing as well, with flex time, job sharing, and late night or early morning service industry jobs. These changing travel patterns are reflected in all types of trips such as shopping, personal business, and recreation, not just work trips.

Serving multiple origins and destinations can be challenging for transit. Relatively few trips can start and end on the same route. As such, easy transfers within a strong multi-modal transit network are an essential component of a useful public transit system.

Different transit modes can effectively serve different types of trips, but the services should all be well-coordinated. Alameda's ferries serve both commuters and recreational trips. BART provides strong regional service for multiple trip types and destinations including commuting to San Francisco and other employment areas, shopping, school, and medical trips. AC Transit buses provide local connectivity both to numerous destinations and to other transit modes. As a ubiquitous transit mode, buses can serve all trip types at most times. Although not a public transit mode in the traditional sense, taxis are an important component of a useful and efficient transit network as they can fill service gaps in the transit network as well as provide faster service for those who are willing to pay for it.

In addition to serving multiple destinations with different, interconnected modes, transit should be available throughout the day and night. Peak hour-only service may work well in some areas, but it is rarely sufficient for all neighborhoods. Potential passengers cannot easily take transit if service is not available for either their start or return trips. Inadequate off-peak service may disproportionately impact the working poor whose jobs often do not coincide with traditional 9 to 5 shifts. Some traditional peak-hour commuters may be wary of using transit if they are concerned about their ability to return home in the middle of the day if necessary. Strong midday service is also important for non-work trips that could be made on transit rather than in a car or by those who depend on transit for personal mobility such as many seniors, the young, and the disabled.

Range of Services

Due to the constant, dispersed need for travel, transit cannot efficiently link every origin and destination directly and at all times. To do so would be an irresponsible use of scarce public resources. The key in designing transit services, then, is to provide access and mobility between the highest number of origins and destinations through a well-coordinated transit network with seamless transfers. In practice, this means providing a range of services tailored to local needs.

Density is one of the primary determinants of the level of transit service in a particular area. The more people who live, work, or shop in a given area, the more likely they are to need and use transit. As noted in a Transportation Research Board report, "As density increases within a zone, total transit ridership will continue to increase, strictly because there are more and more people within the zone with access to transit."[8] In addition, transit service works well in dense areas as a given route can serve numerous origins and destinations in a short distance. Higher ridership from transit routes in dense areas brings higher fare revenue, resulting in a better return on investment. On the other hand, as population and employment densities decrease, fewer people are available to ride transit, providing service becomes more expensive, and farebox receipts drop.

A range of transit service levels are necessary to serve different types of development. For example, feeder bus services with longer headways can link lower density residential developments with trunk bus lines, rail services, and ferry terminals. Bus trunk routes with high service frequencies can provide the level of service necessary for dense corridors. Multiple high capacity modes such as rail and ferries can serve heavily traveled routes such as the Transbay corridor between San Francisco and the East Bay.

Trunk Routes

Trunk services with strong frequencies and good connections with other routes and modes in dense corridors can be the both highly effective and efficient. Frequent service along routes with numerous and/or large traffic generators enable most passengers to reach multiple destinations more quickly and reliably. In addition, wide spans of service on trunks enable large numbers of passengers to travel at various times of day and days of the week.

In essence, building strong trunk routes enables a transit agency to operate a highly useful and used system that maximizes ridership. In the end, this type of resource allocation can produce a strong return on investment and promote the financial stability of the service.

In contrast, allocating resources to ensure that all locations in a geographic area have

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[8] Robert J. Spilar and G. Scott Rutherford, "The Effects of Population Density and Income on Per Capita Transit Ridership in Western American Cities," *ITE 1990 Compendium of Technical Papers*, p. 330.

some access to transit service, however limited, does not usually result in high ridership. Given scarce resources, transit systems that maximize geographic coverage will have less frequent service during fewer hours of the day. As the following sections explain, this type of service design is not useful to most people.

Frequencies and Span of Service

Other things being equal, frequency and connectivity become the most important determinants of system attractiveness. Frequency is important because it is directly reflected in perceived transit travel time; travel time is almost always found to be the characteristic most likely to determine the choice of whether to drive or use transit. An express bus might save ten minutes on a trip, but if one must wait an hour for it, it is unlikely to be able to attract a sizeable ridership.

Lengthening headways (reducing the frequency of service) greatly reduces usefulness of routes and the transit system without saving many service hours. Passengers making discretionary trips can, in theory, schedule their trip to catch an hourly bus – but only those in the most desperate situations will do so. Those with cars will simply drive, and those without will not make the trip. Those passengers who must make the trip will spend a great deal of their time on travel. They may need to take a much earlier bus to arrive at work on time, for example, if the hourly bus schedule does not fit their work schedules. In addition, they will likely have long waits for transfers. And since headways are reduced on all lines, those passengers on the trunks suffer the added indignity of crowded buses often arriving late.

Transferring

Connectivity is important because proportionately few trips in multi-centered urban areas can begin and end on a single route, due to the nature of dispersed travel patterns. A needed trip for a transit dependent person may begin in an area characterized by a high level of transit dependence overall, but it may end at a suburban job site, a medical office or a school in another part of town. A truly useful transit network must provide access and mobility throughout its service area. It is not individual routes, but overall *networks* that are capable of attracting and moving large numbers of people, of meeting mobility needs and realizing the goals all transit systems set for themselves. Only by making it possible to flow easily and quickly through an interconnected network can many trip origins and destinations be linked in a way that makes using transit a reasonable alternative for those who have a choice. And, a system that is good enough to attract those who have a choice will be that much better a system for those who may not have one.

In a transit network rationally designed to meet multiple mobility needs, transfers are an essential component. It is not possible to design a transit system that can link every trip origin to every destination. Instead, the most successful systems design strong grid patterned routes that allow (and require) passengers to conveniently transfer. This allows high frequency service on all routes and creates a straightforward and marketable route system.

High service frequencies (15 minute headways or less) enable passengers to make random transfers between routes and modes. In other words, regardless of the routes' schedules, passengers will not have to wait long for the next bus, train, or ferry. For example, the average wait time for a bus on a route with 10 minute service is five minutes, compared to 30 minutes for a route with hourly service. On a strong grid network with good service frequencies, passengers will have short waits for buses to which they are transferring. The combined average wait time for the original and transfer buses would be ten minutes for a grid network with 10 minute headways. This makes the transit system both a more viable transportation option and easier to use.

When service frequencies are lengthened beyond 15 minutes, timed transfers between heavily utilized routes become a necessary component of an attractive transit network. In these systems, routes are scheduled to arrive and depart transfer nodes simultaneously.

By introducing a transfer charge, a transit system creates an incentive to create counterproductive route patterns. Branching, which creates poor service on all the branches instead of good service on trunks, is a natural result of this financial practice (i.e.," we need a branch so we do not have pay an additional fare") and is a clear case of a financial need making the system less user-friendly. Transfer charges are also discriminatory in a high-frequency grid system, since many of the trips must transfer by design – the transit system has designed a system that requires transfers, but then charges for them.

To remedy this situation, transit agencies should not charge for transfers. In addition, passengers should be able to transfer more easily between different modes and agencies such as AC Transit and BART.

Transit Centers

Transit centers can provide safe, well-planned sites for multiple transfers as well as provide information, visibility, and marketing opportunities for transit. These centers can facilitate both random and timed transfers depending on service levels.

The five most logical locations for transit centers in Alameda are the College of Alameda, the South Shore Shopping Center, Harbor Bay Island, the West End Ferry Terminal, and a site on Park Street between the bridge and Santa Clara Avenue. All are major traffic generators, and all are able to accommodate a modern and well designed transit center. Shelters, passenger information, and bicycle storage facilities, at a minimum, should be included in these centers. In conjunction with a Park Street transit center, BART has considered a satellite parking lot that would require BART passengers to take a bus into the Fruitvale station.

Ferry terminals should include more extensive shelters with facilities for purchasing tickets, waiting for ferries or connecting buses, transit information, bicycle storage, and other amenities as appropriate.

4.2 Alternative Local Transit Systems

To provide an effective multimodal and multidestinational system for Alameda within a reasonable cost is challenging. The primary conflict is between the need to accommodate internal Alameda trips, and the need to connect to regional destinations.

In addition, the East Bay trips from Alameda are scattered everywhere, and many trips lengths are long. While it is desirable to minimize transferring, it is not possible to do so and still serve so many possible destinations. In addition, AC Transit experiences severe traffic congestion on many of its long routes, and route length can limit service recovery options. As an example, the existing 51 bus line, which serves Santa Clara Avenue, is often bunched because it has severe congestion on University Avenue in Berkeley, College Avenue in Oakland, and the approaches to the tubes in Alameda.

So a prime trade-off is route length, which provides passenger convenience and reduces transfers, but reduces operational effectiveness. Another trade-off is between route duplication, which would occur if there was a separate internal shuttle system, and efficiency, which would indicate using the trunk system for both regional and internal transit trips.

It should be noted that at the public workshop in November, various citizens attempted to design internal shuttle systems, but none of the authors of these systems were satisfied with the results.

The routing alternatives will all increase access to the BART system, and should be adequate to meet rising BART demand. BART anticipates having enough trains to meet capacity for the near term. However, the 20 year forecasts suggest that peak hour capacity may be exceeded.

Common Elements

Every route system that is developed in Alameda should encompass the following elements, listed in order of importance:

- Route networks connect different transit modes as seamlessly as possible.
- Santa Clara Avenue continues to be served by a high frequency trunk service, and the southern end is extended to an important regional destination.
- Park Street has at least one route running the entire length of the street, with service frequencies of at least 15 minutes.
- Other routes, both internal and some external, operate and feed Park Street, South Shore Center and the College of Alameda.
- Service frequency is more important than coverage.
- Span of service should be expanded to improve weekend, night, and mid-day

transit availability.

With these common elements, the consulting team designed four different alternatives to provide service to, from, and within Alameda. (Transbay services are discussed in a later section.) These alternatives are not mode-specific, rather they are generic transit lines. (Mode analysis follows in Section 4.4.)

Alternative 1

This alternative meets the four Alameda service design elements by concentrating service at South Shore Center and the College of Alameda. Four transit lines would serve Alameda, and provide connections to downtown Oakland and Fruitvale BART, and northern and southern Alameda County.

Line 3 (new route designation, currently Line 43) would replace Line 51 on Santa Clara Avenue in Alameda. Routing would originate in Albany at San Pablo and Solano and operate via Solano, Shattuck, Telegraph, Broadway, tubes, Webster, Santa Clara to Park and Santa Clara. At Park, the route would operate southbound to Otis to provide a direct connection with the South Shore Center, and then would continue east onto Otis, over the bridge to Island Drive, then via Maitland and the Cross-Airport Roadway to the FedEx sorting facility, into the Airport terminal, and then via 98th Avenue to either San Leandro BART or (preferably) further south to BayFair BART.

This route would maintain the important connections to downtown Oakland and Berkeley without the severe street traffic disruptions associated with the current 51 route, which operates on congested University and College Avenues. As noted earlier in the origins and destinations section, there are a substantial number of Alameda trips going south (more than 12,000 work trips and 45,000 total trips), and there is substantial justification to extending the most active Alameda transit line further south into the county. By operating via Bay Farm Island, those residents will have night transit service, which is justified not only by their needs, but primarily because of the need to serve the late night activities at the air express sorting facilities at Oakland Airport. The best southern terminal location would be the BayFair BART station, which has service to both Fremont and Dublin, and which may become the terminal for bus services across the San Mateo and or Dumbarton Bridges. BayFair could also become the focal point for central Alameda County transit service, providing multiple connections to most transit services.

Line 6, a proposed new line, would connect West Berkeley, Emeryville, and West Oakland with Alameda's northern waterfront on Atlantic, Marina Village and Clement, with service continuing to the Fruitvale BART station. With service provided every 15 minutes all-day long, this route would also function as an effective BART shuttle. This line would link Berkeley's active 4th Street area with Hollis Street, and the West Oakland BART station. These connections would provide excellent service to the fast growing technology areas along the northern waterfront, with direct, all day service to BART and downtown Oakland.

Lines 49 and 50 would be combined into one new route with minor adjustments in east

Alameda, but with a service extension to Alameda Point and to the existing ferry terminal and then via the Tinker Avenue extension to the College of Alameda. This service would operate every 15 minutes, and would provide service along both Webster and Park Streets and function as a BART shuttle.

Line 63 would remain unchanged except for relocating service to Atlantic Avenue in both directions, with a terminal near a proposed ferry terminal at the Seaplane Lagoon at Alameda Point. Service would be provided every 15 minutes.

Taken together, Alternative 1 would provide enhanced service throughout Alameda, would provide all day and night service to Bay Farm Island, and would provide connections with both ferries and with BART.

Alternatives 1A and 1B would slightly alter the route pattern to allow for development of light rail in place of Line 6. Light rail would follow the same route essentially as Line 6 east of Webster.

Alternative 2

This alternative would swap "tails" of several different routes, and would provide a slightly different route pattern. The West Berkeley/Emeryville/West Oakland connection would operate on Encinal and Central, while the Santa Clara Avenue line would operate as in Alternative 1.

Line 3 would operate as in Alternative 1.

Line 6 would operate from West Oakland and the tubes via Webster, Central, Encinal, Willow Otis and Park to Fruitvale BART.

Line 49 would operate basically as currently, but would be routed from High Street to Versailles (to provide service in northeast Alameda) and would then operate to K-Mart and Fruitvale BART.

Line 63 would operate as currently east of Webster, but would be rerouted to operate via Santa Clara, Fifth, Pacific and then into Alameda Point, and then to the College of Alameda via Tinker Avenue extension.

Line 42 (N) would operate from the current ferry terminal via Alameda Point, Atlantic Avenue, Marina Village, and then via Buena Vista, Park, Encinal, High to Fruitvale BART.

This alternative would provide slightly better internal connections, but at the expense of faster external connections.

Alternative 3

This alternative is the same as Alternative 1, however, the "tail" of the Buena Vista/Clement line would be swapped with the tail of the Santa Clara Avenue line.

Line 3 would operate from Albany, Berkeley and Oakland via the tubes, Webster, Santa Clara Avenue, Park to Fruitvale BART.

Line 6 would operate from West Berkeley, Emeryville, and West Oakland via the tube, Atlantic, Buena Vista, Clement, Park (to South Shore Center) Otis Island Drive, Maitland, Cross Airport Roadway, Oakland Airport, 98th Avenue, then to either San Leandro BART or BayFair BART.

Line 49/50 would be as described in Alternative 1.

Line 63 would be as described in Alternative 1.

The only difference in this alternative compared to Alternative 1 is the distribution of trips on Santa Clara to Fruitvale BART instead of via the Airport to San Leandro or Bay Fair BART. Those areas would be served by the line operating through Marina Village.

Alternative 4

This alternative would retain the basic Alternative pattern for Line 3, with service on Santa Clara Avenue to the Airport and then BayFair BART, but other services would be modified substantially.

Line 3 would operate as in Alternative 1.

Line 6 would operate via Marina Village and then via Grand to Shoreline and then into the South Shore Shopping Center.

Line 10 would be modified to operate via the FISC site and then into Alameda Point.

Line 49 would operate from Bay Farm Island to South Shore Center and then via Park to Fruitvale BART.

Line 50 would operate from Alameda Point via Atlantic to Webster and then via Central, Encinal, High to Fernside and then to Fruitvale BART.

Line 61 would operate from the South Shore Center via Alameda Hospital on Willow to Buena Vista and then to Fruitvale BART.

Line 63 would operate as it is currently configured, with an extension into Alameda Point.

Alternative 4 provides improvement in north-south service, but at the expense of service on the east-west streets. It does provide good connections to BART at both Oakland City Center and at Fruitvale.

4.3 San Francisco Services

Alameda has a high number of commuters working in San Francisco (about 5,000

residents, or about seven percent of the total population). Currently about 50 percent of these residents are taking either the bus or ferry into San Francisco, and an unknown number are taking BART into San Francisco. It is reasonable to estimate that at least 65 percent of Alameda residents who work in San Francisco take transit to work. While the results are not scientific, in a recent survey of Alamedan's transit use, 75% of San Francisco commuters reported that they take transit.

TABLE 4-1 WORK TRIPS: ALAMEDA TO SAN FRANCISCO

Mode	Passengers	Percentage
Total	4,150	100%
Bus	1,250	30%
Ferry	750	19%
BART	680	16%
Private Auto and Other	1,470	35%

As noted previously, the proposed routing alternatives should all meet the increasing demand for BART access. While in the near term BART should have enough trains to meet that demand, the 20 year forecasts suggest that demand will exceed capacity, particularly for transbay travel. Because BART Transbay Tube capacity may be exceeded in the long term, alternatives to BART, at least in the peak hour, must be considered.

At the very least, a continuation and expansion of AC Transit's Transbay Express bus service is warranted. MTC, in conjunction with CalTrans and the City and County of San Francisco, is currently investigating a modernization and expansion of the Transbay Transit Terminal in San Francisco to allow for increased levels of bus activity – the current plan could accommodate up to 350 buses per hour (or about 25,000 passengers) in the peak hour. AC Transit operates 110 buses and serves 3,500 passengers in the peak hour at the seismically deficient Transbay Terminal.

In addition, the current Alameda-Oakland Ferry Service provides service to about 1,700 passengers each weekday, with the terminals at both the north side of Alameda (Main Street) and at Jack London Square. There is a new Water Transit Authority that has been established by the Legislature to guide the creation of additional ferry service on the Bay.

More ferry service can only be implemented if there is additional public support for the services. Should additional operating funding become available for ferries and ridership projections indicate sustainable service levels, then Alameda and Oakland service could improve if the services were operated separately. The current arrangement, necessary for cost-sharing and maximizing seat occupancy, unfortunately slows the service down for Oakland commuters and Alameda mid-day users by adding stops. In addition, these additional stops are rotated, so that a consistent schedule is not possible. Service

alternatives are analyzed later in this Plan.

4.4 Mode Analysis

The network route alternatives do not make a presumption on the transit mode that would be most appropriate. Different modes have various strengths and weaknesses – for example, diesel buses are relatively inexpensive to operate, but often have inferior rides and can be noisy. Trolley coaches require overhead wires to operate, light rail infrastructure is expensive, but both modes are more comfortable for passengers and often attract additional patronage as a result.

It should be noted that the City of Alameda has adopted a policy favoring electric vehicles. The City's ownership of Alameda Power and Telecom could be an important factor in implementing and financing a new electric vehicle corridor.

The following is an analysis of various mode options for Alameda:

Fixed Guideway

Aerial Gondolas

A gondola could be a creative alternative for expanding cross-estuary capacity. While gondolas are primarily used in recreational settings, the technology can be adapted for public transportation. A typical gondola system consists of multi-passenger cars attached to a moving cable with stations at either end of the route. Midway stations are feasible. At the stations, the individual cars detach from the cable and move through the station at slow speeds to enable passenger boarding and alighting. The cars can be equipped to carry bicycles. With 8-person capacity cars, a gondola can carry as many as 2,800 passengers per hour.

A preliminary six mile route could connect the east end of Alameda (near Park Street) from a transit center to the downtown Oakland area via Coast Guard Island. Based on the recently completed gondola at Heavenly Ski Resort, the capital cost for an Alameda-Oakland gondola would be between $45 and $50 million.

Heavenly Ski Area Gondola	
Length	2.4 miles
Capital Cost	$18 million
Environmental Mitigation	$3 million
Capital Cost per Mile	$7.5 million
Cap & Env Cost per Mile	$8.75 million

Alameda - Oakland Gondola	
Estimated Length of Alameda Gondola	6 miles
Estimated Capital Cost	$45 million
Estimated Cap and Env Cost	$50 million

Gondola Capacity Estimate
8 passengers/car
5- 6 cars/minute
Hourly capacity = 2,400 - 2,800 passengers

Analysis – While aerial gondolas are sometimes used in urban applications, operating costs are not well defined and therefore risk is associated with the technology absent more extensive analysis. The Roosevelt Island development on the East River adjacent to Manhattan was initially developed with gondola access, but a subway station was later added to improve access. Other issues involve aesthetics and impacts on the urban environment.

CyberTran

Advanced Group Rapid Transit is another form of electrified transit, and the sponsoring company (CyberTran International) has a development site on Alameda Point. The system is computer controlled and uses small vehicles operating autonomously. The company believes its system would have a lower capital and operating cost than other forms of rail transit. Since most of the electrified transit (Belt Line) right-of-way is located in public street, a Cybertran installation would require overhead aerial transit structures pursuant to state law (i.e. safety hazards). Such structure is not consistent with the existing urban design patterns of the City of Alameda. In order to be consistent with the City's patterns, a new urban design streetscape would have to be approved. The mode may be considered as part of master planning in new developing and redeveloping areas.

Trolley Coach

Trolley coaches are electric-powered rubber-tire buses that utilize two overhead wires as their power source. Trolley coaches are a minor part of the national public transit fleet, but trolleys are well known and much loved in San Francisco. Trolleys constitute more than one-third of Muni's fleet and have lower maintenance costs per mile than their diesel counterparts.

There are many benefits to trolley coaches, including:

Noise – Trolley coaches have very limited engine noise. Therefore, they are much quieter than diesel buses.

No Exhaust – Trolley coaches do not produce exhaust on the street, unlike diesel buses. (The electric power supply may adversely impact air quality elsewhere, but Alameda Power and Telecom provides power from 80 percent renewable sources.)

Better Performance on Grades – Trolley coaches can climb 15% grades, compared with 10% for diesel buses. (However, Alameda is flat.)

Equipment Life – The useful life of trolley coach vehicles is twice that of diesel buses.

There are costs to trolley coach infrastructure, including:

Higher Investment Costs – The capital cost for installing posts and wires for electric trolley coaches is approximately $2 million/mile.

Complex Operations and Maintenance – Introducing trolley coaches requires a second set of operations and maintenance practices for the local operator. In addition, facilities for the storage and maintenance of the coaches must be either constructed or converted.

Aesthetics – Neighbors may be unhappy with the overhead wires required for electric trolley coach operations. (It should be noted that trolley coach systems in other communities have improved aesthetics compared to San Francisco's system.)

Less Operational Flexibility – Electric trolley coaches must stay on streets with wires except for short trips to and from the garage. Should street operations on the wired route be disrupted for repaving or unforseen problems, trolley coaches will need to be replaced with diesel buses to maintain service on the detoured route.

A study several years ago in Sacramento indicated that trolley coach service would be warranted on several City bus routes based on the passengers per mile. Note how these routes compare with the AC routes operating in Alameda:

TABLE 4-2 TRANSIT CORRIDOR RIDERSHIP COMPARISON: SACRAMENTO AND ALAMEDA

Sacramento	Pax	Miles	Pax/mile
J Street Corridor	2659	4.6	578
Stockton Blvd.	1725	8.3	208
Freeport Blvd.	1882	7.2	261
Broadway	2318	6.1	380
Folsom Blvd.	1327	5.0	265

AC Transit (within Alameda only)

Alameda	Pax	Miles	Pax/mile
Santa Clara (51)	8000	4.0	2,000
Buena Vista (12)	400	2.5	160
Park/Encinal (50)	5400	5.0	1,080
Otis (63)	1800	12.0	150

Light Rail

The work scope for this study included a provision to analyze light rail service or electrified transit on the Alameda Belt Line tracks and corridor. The operating parameters were to provide service frequencies of at least 15 minutes throughout the

day, with stops at reasonable distances and provide service to the fast redeveloping areas of the northern waterfront along the Estuary.

Light rail generally requires higher levels of density than are present in Alameda, although these densities could be achieved through redevelopment efforts. Various academic efforts[9] have indicated the following minimum thresholds:

Development

- 9 - 15 dwelling units/acre average for corridor of 25 - 100 square miles (based on East Coast studies conducted 25 years ago and Cervero Transit Village work).
- Higher density within 1/4 mile or 5 minute walk of stations important.
- Strong development potential along proposed route necessary to realize development benefits of transit investment and vice versa.
- Infill development near transit and downtown will increase use of transit.
- Per capita transit ridership increases quickly when density increases from 7 to 16 du/acre.
- Ridership elasticity with densification = .592 (1995). This means that for every ten percent increase in densification, transit ridership increases by 5.92%.

Regional Central Business District (CBD) Size

- Regional Central Business District size is an important factor in determining ridership; larger cities have higher transit use, regardless of density. This could be due to concentrated employment centers, availability of transit, or other factors.
- Connecting rail to downtown provides a link to places people want/need to go.
- CBD of 20 - 50 million square feet non-residential space (100 - 250,000 people) is a good anchor for light rail system.
- Connecting with strong traffic generators at both ends in a multi-centric land use pattern may produce strong ridership demand as well.

Distance

- People living closer to downtown tend to take transit more - trip duration difference between car and transit lessened, more transit available, etc.
- Effective route length necessary to generate demand and significant boardings

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[9] Benick at Cervero, *Transit Villages in the 21st Century*, New York: McGraw-Hill, 1997. Cervero, "California's Transit Village Movement," *Journal of Public Transportation*, Fall 1996, Volume 1, Number 1. Davis and Seskin, "Effects of Urban Density on Rail Transit," *LandLines*, May 1996, Volume 8, Number 3. Pushkarev and Zupan, *Public Transportation and Land Use Policy*, Bloomington, Indiana: Indiana University Press, 1977. Pushkarev and Zupan, "Where Transit Works: Urban Densities for Public Transportation," in *Urban Transportation: Perspectives and Prospects*, 1982. Transportation Research Board, "An Evaluation of the Relationships Between Transit and Urban Form," Transit Cooperative Research Program *Research Results Digest*, June 1997, Number 7.

and alightings along route (compare AC Transit's North-South routes vs. East-West routes; if route is too short, may not have a large enough total catchment area; most productive transit routes have many boardings and alightings all along route).

Patronage

- Between 7,000 and 40,000 passenger miles per line mile[10]; this study assumes the threshold is 14,000 passenger miles per line mile. (Passenger miles per line mile measures a light rail line's utilization.)

Policy

- Land use, transportation and finance policies must complement design and operation of light rail system.
- Appropriate zoning in light rail catchment area.
- Appropriate development requirements.
- Parking restrictions at route destinations (such as downtown) should improve transit ridership.
- Availability of some parking at route origins should enhance ridership - park and ride lots, etc.

Alameda could meet these thresholds with some additional and higher density development specifically sited along the proposed LRT route.

Routing and Alignment

As a part of this study, the consultant studied a light rail service operating in the right-of-way of the Alameda Belt Line. The proposed line would operate from the Fruitvale BART station, under the Union Pacific Railroad mainline tracks adjacent to Fruitvale Avenue, across the existing Fruitvale rail bridge to the Clement Street alignment of the Belt Line. At Grand Street the light rail service would use the existing private right-of-way through the Pennzoil site, and then behind the delMonte warehouse and continuing on the private right-of-way to the south of the existing Marina Village area. At Constitution Way and Atlantic the line would continue west on Atlantic on the old railway right-of-way, and then into Alameda Point with a terminal at the proposed Ferry Terminal in the Seaplane Lagoon. As an option, the line could be extended north, drop under the Estuary and re-emerge at the West Oakland BART station.

The study assumes light rail service operates every 15 minutes using electrified rail vehicles. Trackway would be conventional street railway track, with some sections of open ballast, and some sections of track-in-pavement. The trackway would alternate between single and double track. Traction power would be provided by a single overhead contact.

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[10] Boris Pushkarev, *Urban Rail in America: An Exploration of Criteria for Fixed-Guideway Transit*, Bloomington, Indiana: Indiana University Press, 1982.

There would be 10 station stops on the proposed line between Fruitvale BART and the Seaplane Lagoon. Trains would operate at about 15 to 20 miles per hour, with double track sections designed to allow for 15 minute service frequencies.

Costs

Total costs for the system are estimated at about $190 million for the Fruitvale BART to Seaplane Lagoon portion of the proposed system. This includes about $17 million for a grade separation between the LRT system and the Union Pacific Railroad mainline at Fruitvale Avenue, $16 million for various other civil work, about $11 million for trackwork, another $11 million for the traction power system, $10 million for communications and electrical systems, and $8 million for a maintenance facility. A 25 percent contingency is included ($29 million), as well as 30 percent for engineering, construction management, etc. ($44 million). These construction costs would likely also apply to other route options, such as Lincoln Avenue, which is the old Key System route. The cost to continue to West Oakland under the estuary is informally estimated to approach $250 million, although a thorough engineering cost study has not been performed of this segment.

Noise and Operations

There is a perception in the public that light rail vehicles are noisy and intrusive. Well designed and well maintained light rail systems can be good neighbors. Noise is a function of poor wheel and track maintenance, while vibration can be mitigated through innovative track design. It should be noted that electric light rail produces little motor noise (unlike conventional buses) and no emissions.

Patronage Thresholds

Applying the industry patronage criteria indicates that for the five-mile line, 12,000 weekday trips would be required (6,000 each way) for cost-effectiveness. Under the more expensive alternative with an extension under the Estuary to West Oakland BART, a daily patronage of about 24,000 would be required. Approximately 12,000 of those trips would need to be generated at the FISC and Alameda Point developments. The annualized capital cost per rider for the line extending to West Oakland BART would be about $35. More intensive development at Alameda Point, either residential or commercial, could be accommodated with a high capacity transit service such as light rail.

Transit Supportive Land Uses in Alameda

Residential Land Use

The Alameda General Plan only has two residential land use categories, low-density, and medium density. In accord with the provisions of Measure A, new residential development in Alameda is limited to one and two family dwellings. This is reflected in only two residential density categories in the zoning ordinance.

R-1. This is limited to a minimum lot size of 5,000 square feet which translates to a maximum density of 8.7 units per acre.
R-2 All of these categories have a minimum lot size per unit of 2,000 square feet, or
R-3 approximately 22 units per acre.
R-4
R-5

Residential parking requirements in Alameda are 1.5 spaces per studio unit, 1.75 spaces for a one-bedroom or two-bedroom unit, and two spaces for a three-bedroom or larger dwelling unit, per Section 30-7.6 of the Zoning Ordinance.

According to the 1990 Census, approximately 56 percent of the housing stock in Alameda was in one or two-unit buildings, comparable to the ratios in Berkeley and Oakland but distinct from the averages for Alameda County. Table 4.1 summarizes housing tenure and housing type for Alameda and other nearby communities. Of the cities shown, San Leandro has distinctly different characteristics with few housing units in 3-9 unit buildings and a higher proportion of units in one and two unit buildings. The county averages reflect the mix of Northern Alameda County cities and the more suburban ones that resemble San Leandro.

TABLE 4-3 HOUSING TENURE AND UNITS/BUILDING CHARACTERISTICS: 1990

	Alameda	Berkeley	Oakland	San Leandro	Alameda County
Housing units	30,520	45,735	154,737	30,189	504,109
% Owner occupied	46%	44%	42%	58%	53%
% 1-2 units in bldg.	56%	55%	56%	68%	64%
% 3-4 units in bldg.	10%	11%	11%	4%	7%
% 5-9 units in bldg.	9%	11%	8%	4%	6%
% 10+ units in bldg.	21%	22%	24%	21%	20%

Source: US Census

With the Measure A limitations on multiple dwelling buildings, all new development in Alameda is limited to one or two-unit dwellings at a maximum density of 22 units per acre. With the high land costs in the Bay Area, it is not possible to build smaller units at densities of 22 units per acre or less. The result is that all recent or planned development in Alameda consists of units with three or more bedrooms, most of it for-sale as opposed to rental housing. New housing units in Alameda are generally 1,500 square feet or larger.

It remains feasible to build multi-family housing in the Bay Area, but minimum feasible densities for smaller unit sizes (studios, one, or two-bedroom) are closer to 40 units per acre, a density that requires three or four stories over parking.

Commercial Land Use

There are several commercial General Plan categories, including Neighborhood Business, Community Commercial, Office, and Business Park. The corresponding zoning classifications are as follow:

- A-P Administrative-Professional District
- C-1 Neighborhood Business District
- C-2 Central Business District
- C-M Commercial Manufacturing District

Height limits in the A-P and C-1 districts are two-story, while the C-2 and C-M districts allow a 100 foot height, and floor area ratio (FAR) of 5. Parking requirements in these districts are one space per 200 square foot of ground floor space, and one space per 400 square foot for second floor or higher (Section 30-7.6).

In addition to the above zoning districts, The City has a PD (Planned Development Combining District) zone which has been used for larger scale new development. It provides greater flexibility for joint uses, and contains the provision that regulations applicable to the combined district shall apply, although the Planning Board can modify the off-street parking requirement (Section 30-4.13.c.4.e). There are provisions for shared parking between uses, to be approved by the Planning Director, as long as the amount of parking meets the "accumulated peak demand" (Section 30-7.7.a).

Land Use Adjacent to Potential Rail or Electric Vehicle Corridor

The potential Alameda rail corridor enters the City at the Fruitvale Bridge, from which it could connect to the Fruitvale BART Station on the Oakland side. On Alameda, tracks still exist along Clement Avenue and Eagle Avenue. A right-of-way still exists between Eagle and Atlantic through the Marina Village area, and with the exception of the block between Constitution and Webster, the right of way exists along Atlantic Avenue from Webster to Main Street.

Between Fruitvale and Oak Streets, the quarter mile catchment area on either side of the corridor is primarily industrial, with pockets of retail commercial use and scattered low-density residential uses. Between Oak and Grand Street, the use along the Estuary north of the right-of-way is generally low density marine-oriented industrial usage, including marinas, although the area does include a military reserve training center. In parts of the area, there is only 400-500 feet between the potential transit corridor and the Estuary, limiting the potential catchment area. South of the right-of-way in the Oak to Grand segment, the catchment area is mostly zoned R-3 and R-4 residential, but contains mostly smaller single family homes with some smaller multiple unit buildings.

From Grand north to Sherman/Atlantic, the corridor includes Alameda's North Waterfront planning area, an area of 125 acres (north of the alignment) presently undergoing redevelopment activities from industrial and warehousing uses to new residential and office park type uses. A new Kaufman and Broad residential development is planned at a density of approximately seven units per acre (152 units),

and the area includes the new Wind River office park that will contain up to 375,000 square feet of office use at build-out. There are potential sites for approximately 350 additional housing units plus 100 units of live/work. There is also the potential for 200,000 square feet of mixed office/retail/industrial use plus an elementary school at the Encinal Terminal site. To the south of the alignment, the usage remains relatively small single family homes although the zoning is R-4.

West of Sherman Street, the corridor moves further from the Estuary, almost 4,000 feet by the time it reaches Webster Street, a primary retail commercial corridor. Between Sherman and Constitution, the Marina Village mixed use (office, retail, and residential) area is to the north, and the area to the south is mostly R-2 single family residential. Between Webster Street and the entrance to Alameda Point at Main Street, the corridor passes the College of Alameda, and then military housing on the north and relatively high-density R-4 zoned apartment buildings on the south. Further to the north, but more than a quarter mile from the right-of-way is the FISC site under development by Catellus. The plan for this area includes 1.3 million square feet of office space, anticipated to include up to 4,700 employees, and 539 housing units at an average density of about six/seven units per acre.

Transit Supportive Planning Policies

The features of European communities that Americans find most intriguing generally include the pedestrian scale as opposed to the automobile scale form of development most prevalent in this country. However, few American cities have adopted land use policies which encourage the use of transit and automobile alternatives, including more walking and bicycle usage. The result is our level of auto dependency and unwillingness to walk or take transit.

A primary activity utilized by Alameda has been the required Transportation Systems Management Funding (City Ordinance 8-29.25) used to support alternatives to single occupant automobile usage. The fee, now set at approximately $58 per employee or $.19 per square foot annually for firms employing 50 or more, generates a considerable amount of annual funding utilized to create supplemental bus service in Alameda. This has led to additional AC Transit service on Routes 12, 42, and 49 which connect Alameda business centers to Alameda neighborhoods, Oakland and the BART system.

The Harbor Bay Business Park generates approximately $150,000 annually, and the Marina Village development approximately $70,000 annually. The 1.3 million square feet of commercial space anticipated in the Catellus FISC project will generate $247,000 annually at build-out. In addition, the City has required developers improving streets to provide bus turnouts and shelters.

There are a variety of policies which cities can adopt that will serve to facilitate transit usage. Examples include:

- Increasing development densities in station areas or along transit corridors (TODs)

Alameda's *Economic Development Strategic Plan* calls for a range of affordable housing. It will be difficult to accomplish this with the current zoning limitations on densities above 22 units to the acre. In order to minimize traffic impacts of such development, any increases in permitted density should be sites adjacent to the major transit corridors. While generally used for rail stations, Transit-Oriented Development (TOD's) can be considered for major bus or electric vehicle routes. As described previously, standard zoning ordinances often do not differentiate development by access to transit alternatives. Techniques of achieving higher density development in specific transit served zones can include:

- Developing new zoning classifications;
- Creating a transit overlay zone; or
- Instituting design guidelines.

In TOD neighborhoods, the design, configuration, and diversity and intensity of uses encourage a pedestrian-oriented form of development and makes transit use more convenient. Such neighborhoods ideally include retail, office, open space, and community uses. TOD encourages people not only to walk to transit, but to work, shopping, or errands as well. This type of development reduces sprawl and makes more efficient use of our transit and overall urban infrastructure.

- Facilitating pedestrian access to transit stops

This includes two primary strategies. The first is to ensure good pedestrian connections between residential areas and transit stops. This involves subdivision design. Grid system streets and elimination of walled subdivisions with cul-de-sacs are a primary example of this. Few people are willing to walk more than a 1/4 mile to a bus stop or ½ mile to a rail station. Walled neighborhoods increase walking distance and preclude many pedestrian trips. Where walls exist for sound protection, designs can be utilized to allow pedestrian paths without significant adverse effects on sound transmission. Strategy #7 of Alameda's *Economic Development Strategic Plan* also calls for new development to:

> " be laid out in a modified grid pattern, to provide seamless integration with the existing street pattern and to provide public sightlines to the shore. The use of walls around residential developments will not be allowed." (Page 29)

The important strategy for commercial areas is proper site design and minimum building setbacks in order to eliminate large separation between transit streets and large commercial buildings, such as designs that locate parking between the street and the building. At a minimum, there should be direct pedestrian paths between bus stops and retail or office buildings. Ideally, parking spaces would be on the side of buildings with good pedestrian access between a transit stop and building entrance. The presence of waterfront sites complicates this, as buildings should not be located along the street with parking along the waterfront.

- Reducing parking requirements along primary transit corridors

Cities such as Alameda generally have minimum parking standards. In many cases, developers provide more than the minimum as an inducement to tenants. In downtown areas with good transit access or areas with good transit, pedestrian, or bicycle alternatives, some cities differentiate parking requirements based on access to alternatives. Thus, a mixed use community that provided residential choices within walking distance to jobs could result in a lower parking requirement for the work portions. Some cities, Portland is a prime example, have distinctly lower parking requirements in the vicinity of light rail stations. As one example, section 33.266.110 B.4 of the Portland Zoning Ordinance allows the substitution of "transit-supportive plazas for required parking." Up to 10 percent of parking may be reduced under certain conditions, such as an open plaza, a bench and shelter, landscaping, and adjacency to a transit street.

Conclusions

While development agreements on new development have included funding for transit enhancements, a good model for Alameda County, in general Alameda land use policy is not supportive of transit and auto-alternatives. Inability to develop new housing above 22 units per acre limits new units to larger units which tend to generate more auto trips. Separation of land uses (residential, commercial, industrial, etc.) encourages people to drive for most trips, and the availability of plentiful free parking at most destinations in Alameda further encourages the use of automobiles.

At present, the AC Transit 51 line represents the most frequent transit service in the City, and the ability to build small pockets of higher density housing along that right-of-way would encourage more transit trips. Likewise, the relatively low density of redevelopment along the northern waterfront, such as the Kaufman and Broad and Catellus projects, diminishes the potential for establishing a new light rail transit or electric bus spine along Atlantic and Clement Streets. As part of the Catellus and Alameda Point plans, there is an opportunity to create opportunities for a walk-in market for the Main Street ferry terminal, and plans for redevelopment in this area should ensure good pedestrian access to the ferry terminal.

Non-Fixed Guideway Surface Transportation

Battery Bus[11]

Battery electric buses can run successfully if they are used in appropriate settings and are carefully managed. Electric buses are well-suited to local circulation services with multiple stops and minimal grades. Vehicles must be carefully matched to a thoroughly

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Information on battery buses from Santa Barbara Electric Transportation Institute, Electric Transit Vehicle Institute, and the University of California at Berkeley Transportation Department. Sources: **http://www.etvi.org; http://sbeti.com;** Paul Griffith, "Six Years of Battery-Electric Bus Operations at the Santa Barbara Metropolitan Transit District," The 13th International Electric Vehicle Symposium (EVS-13), *Symposium Proceedings*, Volume 1, 1996.

analyzed route to ensure efficient and effective operations. Capital and operating costs are higher for electric vehicles, but capital grants are available to offset this cost. However, electric buses have numerous benefits over diesels: they are quiet, have very low emissions, appeal to the public (some operators have experienced tremendous ridership gains with electric buses), and have a high public relations profile. The Santa Barbara Electric Transportation Institute (SBETI), an organization with extensive electric bus experience, can conduct a comprehensive feasibility analysis to assess routes, recommend vehicles, and project costs. Funds from a variety of sources may be available to cover a large part of the cost of the study.

Capital

Electric buses are available in a wide range of sizes and designs. As electric buses and their batteries have a wide variety of operating characteristics, operators should procure a vehicle that best suits the planned duty cycle. In general, battery electric buses have eight times more on-board mass dedicated to energy storage than diesels. On the other hand, electric power trains are five times more efficient than a diesel engine. Overall, the driving range of an electric bus is one-eighth that of a diesel. Accessories such as heaters and air conditioners are often powered by a separate system to reduce the energy drawn from the battery electric system.

The life cycle of an electric bus varies by vehicle type, duty cycles, and the operating environment (particularly ambient temperatures). In many cases, electric buses are assigned to shorter and slower routes where they accumulate fewer miles than diesels. As a result, electric buses may have a longer life cycle than other vehicles in a fleet. However, as the battery sets do require replacement every three to four years (discussed below), determining the true life cycle of an electric bus is complicated. SBETI provides life cycle comparisons in its feasibility studies.

As with any investment, the operators should be diligent in selecting a reputable manufacturer with extensive experience and success in electric transit vehicles. UC Berkeley had to shut down its electric bus program because their vehicle manufacturer, US Electricbus, went out of business. Replacement parts and warranty coverage were no longer available to maintain UC Berkeley's fleet. As the industry is now about ten years old, most of the remaining manufacturers now have field-proven products.

Operations

Range – Although an electric bus has one-eighth the range of a comparable diesel, electric buses can operate as effectively as diesel buses provided they are used in appropriate settings. Electric buses can operate continuously for 8 hours with a range of 160 km (100 miles). To do so, the buses should be equipped with regenerative braking systems, drivers should be trained in the most efficient use of battery power and energy, and the bus route should have only minimal grades and a slow average speed. Due to their limited on-board energy storage, electric battery buses are not well-suited for high speed or hilly routes. To minimize the energy drain associated with auxiliary systems such as climate control, many battery electric buses employ a second power source for these systems.

Battery Recharging – Several battery recharging options are available to extend each bus's range. Buses can be equipped with regenerative braking systems that add energy to the battery as the bus gradually slows down. In addition to adding 17% to the vehicle's range, regenerative braking systems also extend brake life. Frequent stops along the route can extend the vehicle's range as the batteries can regenerate as the driver applies the brakes and minimal energy is spent while the vehicle is stopped.

Batteries can also be "quick charged" during layovers. Tests in Santa Barbara revealed that charging sealed lead-acid batteries for six minutes every hour during layovers enabled the battery to deliver 2.5 times more kWh than its rated capacity. Santa Barbara expects that "fast charging could enable an electric bus to perform virtually unlimited daily service."

Full battery recharges take from 7 to 8 hours, depending on battery type, charger type, and depth of discharge. In Santa Barbara, each electric bus has its own dedicated charger.

Driver Training – Some driving techniques conserve more battery energy than others. Studies in Santa Barbara have shown a 40% difference in energy management between different drivers. Drivers can be trained in the best techniques for efficient driving and regenerative braking. Operators recommend follow-up training and regular monitoring to ensure that drivers continue to conserve battery power.

TABLE 4-4 BATTERY AND DIESEL BUS OPERATING AND MAINTENANCE COST COMPARISON

	Battery Electric	Diesel
Driver cost	$2.23/km	$2.23/km
Fuel	$.04/km	$.07/km
Vehicle Maintenance	$0.38/km (includes battery maintenance and replacement)	$0.21/km
Total	$2.65/km or $4.26/mi	$2.51/km or $4.04/mi

In Santa Barbara, electric bus operations are approximately 6% more expensive than diesel operations. However, because of the popularity of electric buses, the cost per passenger mile may be lower for electric buses, depending on ridership.

Maintenance

Battery Maintenance – Electric bus batteries require careful maintenance by specially-trained staff. While the maintenance of batteries varies by type, the requirements are

fairly extensive. SBETI notes that currently, most electric bus operations employ lead acid batteries. In part because of their particularly rigorous routine maintenance needs, SBETI suggests that lead acid batteries may not be the best battery option for new electric bus operations. Recent advances in battery technology have produced new battery types that have a longer range and lower maintenance burden.

Battery Replacement – The life expectancy of batteries varies by type, operation, and maintenance and can range from 500 to 2,000 cycles (charges and discharges).

Variations in charging and discharging influence a battery's life expectancy. Conventional wisdom suggests that slower charging is better for batteries than quicker charges. The greater the average depth of discharge (energy discharged divided by total energy capacity), the shorter the battery life expectancy. Operating and charging at high temperatures shortens battery life expectancy as heat promotes cell corrosion. Battery system maintenance greatly impacts battery life, particularly for flooded-cell batteries.

The capital cost for a lead-acid battery set for a small bus starts at $12,000. The cost per kilowatt hour ranges from $.30 to $.50.

Road Calls – Electric buses have more road calls than diesels, almost always because of battery power or energy shortages. However, road calls can be reduced with strategic management - particularly scheduled vehicle replacements during daily operations. Over time, electric vehicle reliability will likely surpass diesels as battery and charger technology advances as electric vehicles have fewer mechanical problems.

Mechanic training – As with any new technology, mechanics will need special training for battery, charger, and vehicle maintenance. In general, because the electric bus has fewer components that are more accessibly, replacing components in an electric bus is less complicated than for a diesel bus.

Maintenance Facilities – Maintenance facilities must be able to accommodate battery maintenance procedures and materials including toxic chemicals that may be discharged from damaged or old batteries.

Management

Technical Expertise – Because the new technology involved with operating electric buses differs dramatically from standard equipment and requires different operating procedures, instituting an electric bus program requires diligent managerial oversight. Successful electric bus programs often have strong technical expertise on staff or with consultants who help manage the battery programs. In some cases, this expertise is available at reduced costs to the agency as part of a demonstration or research and development program. The technical partners help gather and analyze data to maintain and improve operational efficiency and reliability.

Benefits

Ridership – The use of electric buses can directly impact ridership, particularly when combined with strong marketing efforts. The public likes electric buses. Operators have noted that passengers waiting at bus stops will watch a diesel bus go by in order to ride an electric bus. In Santa Barbara, ridership quintupled when electric buses were implemented on a downtown route. The operator had to implement a fare because they could not handle the passenger volumes on the free electric buses.

Noise – Electric battery buses are very quiet as they do not have an internal combustion engine.

Air Pollution – The Chattanooga-based Electric Transit Vehicle Institute (ETVI) reports that electric vehicles reduce air pollution by 98% as compared to existing diesel vehicles, including energy generation. Santa Barbara's Electric Transportation Institute reports that in eight years of electric bus operations, air pollution was reduced by about 28 metric tons.[12] These reductions are due in part to the relative efficiency of electric power plants compared to diesel internal combustion engines, the energy supply mix of the local electric utility, and the relative effectiveness of localized power plant scrubbers over mobile-source tailpipe emissions.

Community Relations – A less quantifiable but nonetheless important benefit if electric vehicle operations involves the operator's relationships with local jurisdictions, government agencies, and the public. Implementing an innovative, popular program such as this can show that the agency is responsive to local and regional environmental concerns, forward-thinking, and even fun. As the ETVI notes, electric bus operations garner the immediate support of most elected officials, transit riders, the general public, and the media.

Fuel Cell Bus

Recently, fuel cell technology has been applied to transit buses. A hydrogen reaction in the fuel cells generates both water and an electrical charge that is used to power the vehicle. One of the primary benefits of fuel cell technology is its lack of harmful air emissions. However, the provision of the hydrogen necessary for the reaction can be problematic. As it is a highly volatile gas, the transportation and storage of pure hydrogen is cumbersome and expensive. To overcome these limitations, hydrogen can be extracted from other fuels using a reformer. However, the chemical reactions required to extract the hydrogen are very inefficient. The reforming process requires more energy than the fuel cell's hydrogen reaction produces. As a result, overall fuel consumption for a reformer and fuel cell is higher than internal combustion.

Despite these technical challenges, several transit agencies - including AC Transit - have plans to test fuel cell buses for regular transit service. If these tests are

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[12] Paul Griffith, "Six Years of Battery-Electric Bus Operation at the Santa Barbara Metropolitan Transit District," The 13th International Electric Vehicle Symposium (EVS-13), *Symposium Proceedings*, Volume 1, 1996.

successful, fuel cell buses could be used for Alameda's bus routes.

Natural Gas Bus

Buses fueled with natural gas produce fewer particulate and NOx (a component of smog) emissions than diesel buses. However, the combustion of natural gas produces more carbon dioxide, a greenhouse gas, than diesel.

While experiences have varied, some operators have found that natural gas buses are slightly less powerful than their diesel counterparts. The primary operational issue has been the requirement for new fueling systems at the bus garages. Sacramento and Palm Springs have converted their entire fleets to natural gas.

Diesel Bus

Most of AC Transit's buses are conventional diesel vehicles. The diesels have a variety of sizes and characteristics including low floors, kneeling buses, and lifts. Over time, the District plans to phase in new vehicles that are both cleaner and more accessible for seniors and the disabled.

Conventional diesel buses are in such widespread use for numerous reasons: mechanical reliability, simplicity, durability, cost, and fuel economy. Diesel buses have relatively low capital and operating costs, are comparatively simple to operate and maintain, and perform well in transit service applications.

Because they are so widely used, diesel buses can be replaced easily in case of failure during a duty cycle. In effect, all of the buses that are not in active service or undergoing maintenance can act as spares.

Despite these operational benefits, diesel buses are not without problems. Noise and emissions are two of the largest challenges associated with this type of vehicle. While noise problems are difficult to significantly mitigate on a diesel vehicle, progress has been made (and continues) in reducing exhaust emissions.

Primarily in response to legislative mandates, industry has vastly reduced diesel bus emissions. The combination of cleaner fuels, modern four-stroke engines with in-cylinder particulate matter controls, and catalytic converters has resulted in diesel-powered transit vehicles that meet California's stringent emissions standards.[13]

AC Transit has embarked on an on-going effort to covert their bus fleet to "clean diesel" which reduced particulate emissions by about 90%.

Shuttles and Taxis

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[13]Arcadis, Gerharty & Miller, Inc., *Report 38: Guidebook for Evaluating, Selecting, and Implementing Fuel Choices for Transit Bus Operations*, Transit Cooperative Research Program, Transportation Research Board, Washington, DC: National Academy Press, 1998, pp. 5-6.

There has been a great deal of interest in designing, operating and promoting "shuttle" systems to move people between Alameda employment locations and various retail areas, such as Park Street and Webster Street.

The four alternative route systems present a range of internal circulation options, and Alternative 4 is especially concerned with making a local system work. However, in any of these systems, shuttles could be overlayed if it was determined that the shuttles provided a specialized and necessary service.

As an example, a shuttle route could be designed to offer a direct connection between Alameda Point, Marina Village and Webster Street. To provide a 15 minute service frequency, about five shuttles would be required (costing about $200,000 each, depending on size). AC Transit currently operates a shuttle service along Broadway in Oakland, and the cost is about $70 per revenue vehicle hour. At this rate, a three shuttle system operating three hours per weekday would cost about $260,000 annually.

Shuttles have been successful in linking line-haul transit with employment sites – a good example are the employee shuttles linking Caltrain stations with scattered offices and factories. On the other hand, midday shuttles have not been as successful in attracting passengers, although the Broadway Shuttle is useful enough so that employers and businesses are willing to underwrite its expenses.

Another option to midday transportation is a larger taxi fleet. Taxis in some cities, such as New York and London, are perceived as fun to ride, either because they represent a big-city adventure or they are unique vehicles. As an example, if the Alameda taxi fleet was converted to an all-electric system using minivan type vehicles, then it may have a unique appeal. Passengers may be more willing to ride the services – or as an alternative, businesses may be interested in subscribing for taxi services in lieu of shuttles, and at a much lower cost, for a specified number of hours daily. It may be conceivable that electric taxi service could operate between Marina Village and Webster Street in the lunch hour at costs of perhaps $40 to $50 per hour.

The expansion of the taxi fleet is a necessary component of any increase in transit service in any event. Transit depends on good taxi service because at night, for example, many people may have traveled to their location on transit but would rather take a taxi back home.

Paratransit

Under the federal Americans with Disabilities Act (ADA), public transit operators are required to provide specialized transportation services, known as paratransit, for qualified disabled individuals within the transit agency's service area. Fares for paratransit rides cannot exceed twice the adult cash transit fare. AC Transit and BART jointly formed East Bay Paratransit to meet their paratransit obligations. That service has provided 24 hour advanced reservation paratransit services to Alameda residents since 1996.

Under the new routing alternatives discussed in this report, paratransit service

obligations will not change significantly. However, with the passage of Measure B, the City of Alameda's Paratransit Program will provide enhancements to social service transportation and expand services to some Alameda residents whose homes are located outside the mandated service area. Funds will be used to cover transportation costs for individuals awaiting approval of their ADA certification applications. In addition, funds have been allocated to subsidize regularly scheduled group trips to and from the Senior Center and other locations in Alameda, and group trips to and from destinations outside the paratransit service area, including a few trips outside the Bay Area. The City has allocated $5000 for a scholarship program to provide matching funds for low-income residents' paratransit expenses. Participants must be certified as eligible for paratransit services and have a limited income. Each person is eligible for $100 per year.

Water Transportation

Ferries

Alameda is well acquainted with water transit service. The modern Alameda-Oakland Ferry has operated since 1989's Loma Prieta earthquake, providing service from Jack London Square and the Main Street Alameda terminal (Estuary side) to San Francisco. The East End ferry (Harbor Bay) began regular service in 1992 after a hovercraft demonstration in 1986. In the absence of fixed links, or in the reality of congested links, ferry service can provide an effective alternative transit system, particularly when the cost of new bridges or tunnels is factored into an alternatives assessment.

Ferries are more expensive to operate than other transit modes – typically costs range from $350 to $400 per operating hour for a 149 passenger vessel to $400 to $500 per hour for a 300 passenger vessel (costs vary with speed and fuel consumption). When this cost is compared against operating a bus, a bus is almost always less expensive on a seat-mile basis – a 50 passenger bus costs about $70 per hour to operate, or about two-thirds the cost of the ferry operation. Often this cost difference can be reduced because the ferry may have a more direct route and hence operate fewer hours relative to the bus. However, the great advantage of the ferry is that it does not need a right-of-way. So the economic argument for the bus is irrelevant if the bus is stuck in traffic.

For ferry systems to work effectively, they should be designed essentially as rail systems. They have the same high capital needs (terminals and vehicles), and they require the same concentrations of passengers to function efficiently. Unlike a rail system which has multiple stations, ferry systems require either larger concentrations or extensive land-side feeder systems to work well. Downtown San Francisco is an ideal transit market, both for rail and ferry, because more than 100,000 jobs are within a 10 minute walk of the Ferry Building.

In designing a ferry system in the Bay Area, the challenge is not in serving San Francisco, but in access to the boats at the more suburban origins. Downtown San Francisco has both high density and extensive transit access, enabling ferry passengers to reach their destinations quicky either by foot or transit. However, most of the other

ferry terminals in the Bay Area do not have either high density or extensive transit service. As such, automobile parking has become a popular suburban access option, but the land costs (350 square feet for every car and, therefore, every passenger) is extraordinary. For example, to serve 2,000 originating passengers in Alameda completely with automobile access would require about 1,800 parking places (assuming 1.1 passengers per car) requiring 15 acres. The public is rightfully concerned about devoting this much waterfront property to automobile parking, especially when other alternative uses – for example, housing - have equally pressing needs, and if well designed, may actually mitigate the need for automobile parking. Transit villages are clear examples of trying to use land more creatively and extensively, and could work around ferry terminals.

The alternative routing scenarios included in this report attempt to provide a comprehensive ferry feeder network that is both fast and efficient. For the ferry service to continue to improve, the following service design principles should be adopted:

- Service should be fast, direct, and reliable;
- Service should be on a regular schedule, with the same departure times each hour;
- Service frequencies should be improved;
- Span of service should be expanded to provide better evening and weekend service; and
- Service should be provided to South-of-Market, the Ferry Building, and Fisherman's Wharf.

In order to be fast, direct, and reliable, the Alameda ferry route should avoid the turning basin, eliminate two stops or reverse running, and avoid small boat harbors. This could mean separating Oakland and Alameda services and/or relocating Alameda's Main Street Terminal to the seaplane lagoon as proposed in the NAS Alameda Community Reuse Plan prepared by the Alameda Reuse and Redevelopment Authority, to a location that is consistent with the Marina Development proposal. The Water Transit Authority could investigate the advantages and disadvantages of the terminus options. This routing would reduce slow running in the Estuary, and it would also allow service to be operated to the fast growing Mission Bay area of San Francisco. Serving Mission Bay would have the dual effect of both connecting Alameda residents to the UCSF/Mission Bay biotech campus, and of encouraging biotech companies to locate on Alameda Point, since there would be excellent service to other biotech facilities at Mission Bay. The Bay Area Council Water Transit Action Plan called for a route connecting Alameda Point, Mission Bay and the Ferry Building. This route could also provide service to Harbor Bay Isle in the mid-day. For the peak periods, the existing Harbor Bay route meets most of the principles outlined above, and would thus continue unchanged.

For main Alameda ferry route, service frequencies should be changed to consistent hourly headways throughout the day, with half hour frequencies in the peak periods. Alameda residents have requested expanded evening services. These should be implemented as demand warrants. The first phase could include Friday and Saturday night runs. Incremental increases in service frequencies should be implemented

periodically, with the ultimate objective of 15 minute all day ferry service. Harbor Bay (East End) ferry patronage has limited growth potential due to its limited capture area. As such peak service frequencies would not be changed, however, it may be desirable to operate additional mid-day ferry services as an extension of other routes.

Service could be provided directly to the Wharf as it is now, or as a cross-dock transfer at the Ferry Building, provided that the transfer is timed.

Water Taxis

Water taxis are another transit option, especially for service across the Estuary to and from Oakland. A water taxi is usually classified as a four to 10 person vessel operating at moderate speeds. Water taxis can operate on routes, with fixed schedules, or as traditional taxis with "on-demand" service.

The most successful water taxi operation is located in Baltimore's Inner Harbor, which contains numerous visitor attractions. Service is provided by several companies, and some operate on a fixed route, fixed schedule. Fares are $5 day passes, good on all vessels all day long. Vessels are operated every 15 minutes in the summer, with less service in the off-season.

The average operating cost for a water taxi appears to be about $75 per hour for a six passenger vessel, or about $12 per seat hour. If a water taxi can turn over that seat several times during the hour, then the cost per passenger is greatly reduced. Should a service be operated across the Estuary, then it is likely that one vessel could make three round trips per hour – and have a carrying capacity of 36 passengers per hour. Assuming a 50 percent load factor, the cost per passenger would be about $4, unsubsidized.

The main constraint on water taxi service is the demand for travel from waterfront destinations in Oakland and Alameda. While Oakland has a dense and active retail waterfront, Alameda does not currently have the same level of activity. Since it is unlikely that people will transfer from buses to use a water taxi service, how and how well Alameda's waterfront develops will likely determine if a water taxi is a feasible option. For example, development at the FISC site and the golf course may provide appropriate water taxi landing sites. Both Oakland's Estuary Plan and Alameda's Waterfront Plan encourage land uses that complement a water taxi system. In addition, funding and use by bicyclists would support water taxis.

Amphibious Buses

Amphibious buses are a unique mode of transportation that could conceivably provide additional cross-estuary capacity. Amphibious buses operate throughout the United States as recreational touring vehicles. However, they have not been used as a public transit mode and their loading characteristics, reliability and maintenance costs would likely preclude their usefulness in Alameda.

World War II vintage amphibious vessels called DUKW's are currently in use in various

cities throughout the world as tourist vehicles. These vessels, while not the only possible design for amphibious craft, have characteristics that would prevent their effective use as a public transit mode. Boarding and alighting is very time consuming as the operator must send down and pull up a ladder at every stop, travel on land is cumbersome, and vessel maintenance is highly specialized and expensive. Perhaps most importantly, the vessels are not ADA accessible.

While new vessels could be specifically designed to mitigate these issues, implementing proven transit preferential measures and improving traffic flow on existing estuary crossings are more viable short-term solutions.

Bus Barge/Ferry

A barge or ferry designed to carry buses only across the estuary could increase cross-estuary capacity at a reasonable cost. While not used extensively in the United States, it is an alternative that could increase estuary capacity incrementally and provide significant time savings to the transit modes.

In addition, as the barge or ferry would provide an alternative crossing to the congested tubes, this type of system could prove faster than automobile travel during the peaks. And, since the incremental cost would likely be substantially lower than any other new crossing, this option may be the most affordable and practical alternative.

System design – The design of this system is quite simple. There would be two simple docks – one on the Alameda side of the estuary, probably just west of the existing ferry terminal, and the other on the Oakland side, probably just east of the Port of Oakland's American Presidents Line terminal. Barges or ferries would operate every 10 to 15 minutes, coinciding with the bus schedules. Two barges or ferries would be required. If this concept works Alameda Point, it could be applied at other locations such as Park Street and Fruitvale Avenue.

Under a bus barge system, each barge would be 28 feet wide and 60 feet long – and would be able to cross the estuary in less than 10 minutes. Tugboats would provide power for the barge, and would be attached to the side of the barge. The terminal design would allow for bow loading (roll-on, roll-off), and a minimum of queuing for buses (no more than two buses at a time). There may be legislative conflicts with a bus barge system, requiring changes to antiquated state legislation before implementation.

With bus ferries, the vessel's deck would be approximately the same size as the bus barge, but would be self-propelled.

Buses accessing from the Alameda side would likely operate through Alameda Point, and then onto the barge. From the Oakland terminal, the buses could operate via Middle Harbor Road, Adeline, west on 5th to West Oakland BART, and then either to Emeryville and Berkeley via Mandela Parkway and Hollis Street, or to downtown Oakland via Mandela and 14th Street.

Capital and Operating Cost – Total capital costs would likely be about $5 million – about $1.5 million for terminal costs, and about $3.0 million for the two barges and tugs, and another $500,000 for design, engineering and contingency. Operating costs would like total about $150 per hour per barge ($60 per hour for labor, $50 per hour for fuel, $25 per hour for maintenance, $15 for miscellaneous expenses). Total annual operating costs would be about $1.7 million (11,400 barge hours – 16 hours daily – at $150 per hour). Some of this expense would be offset by decreases in bus route vehicle hours, but the change is not likely to be substantial.

5. Recommended System

5.1 Findings and Conclusions

- To enhance quality of life and allow for economic growth, Alameda must increase the mobility of City residents through a meaningful and well used public transit system. Primary transit services should be useful and attractive, with service operating not less than every 15 minutes on weekdays.

- Alameda's transit system must be designed to meet the public's agreed upon land use plan. The Long Range Transit Plan recommends a route network that is consistent regardless of transit mode. Depending on the land use densities adopted in the General Plan, higher capacity modes such as light rail, should be considered. However, high capacity rail systems can only be effective and justified if supported by higher density land uses along their corridors.

- To optimize development, by 2005 peak hour cross-estuary capacity must be enhanced through transit services and transit priority measures.

- Additional transit capacity would support the City's and the region's air quality and environmental objectives.

- To improve the capacity of the congested tubes and bridges linking Alameda to the East Bay, the City should commit to an objective of a 30 percent transit modal split in the tubes to provide 400 to 500 additional peak hour person trips; and on the estuary bridges, provide 400 additional peak hour person trips on transit.

- The City should investigate additional transit-only cross estuary capacity, including a dedicated transit tube or a bus barge or ferry. A two-vessel bus barge or ferry would have a capacity of about 500 trips per hour, while a transit only tube could have a capacity of about 3,000 trips per hour.

- The City's modal split objective for San Francisco trips should be 65 percent via transit, including 25 percent on ferries, 20 percent on Transbay buses, and 20 percent on BART. The current modal split for all transit modes is about 45 percent.

5.2 Benefits of Improved Transit Service in Alameda

Improving transit services in Alameda will result in higher transit ridership on the island. Improving transit's speed, reliability, connectivity, safety, and comfort will attract more "choice" riders – those individuals who have the option of taking a private car instead of transit. In addition, those who do not have a choice such as the poor, young, elderly, and disabled, will be better served as well. By attracting more choice riders, transit improvements can mitigate automobile congestion and reap additional benefits such as cleaner air and a higher quality of life.

Most communities implement transit improvements *after* traffic congestion has become nearly unbearable. Unfortunately, transit usually cannot undo the traffic problems that the earlier lack of planning has intensified. In many cases, transit itself suffers from the congestion: buses cannot run quickly as they, too, are stuck in traffic jams and often fall behind schedule. Travelers, then, do not choose to ride the buses as they are late, crowded, and a slower option than driving. In such a situation, transit does little to improve congestion on the streets.

Alameda has an excellent opportunity to take proactive measures now to avoid gridlock in the future. Alameda may not face the extensive traffic congestion that most other cities in the Bay Area experience today if transit is successful in attracting new riders. Attracting new riders from their cars will help keep Alameda's streets running smoothly which will benefit all of Alameda's residents, workers, employers, and visitors.

In addition to preventing traffic congestion, laying out a strong transit network now will help the City attract appropriate development in its neighborhoods. Too often, transportation systems are developed on an ad hoc basis without long-term goals in mind. The result can be a jumble of streets and neighborhoods where cars are the only effective travel option. As the streets' capacity is filled, development slows and moves to a more suitable location.

The preferred situation would be to design the transportation system *before* land use changes are made. At Alameda Point, for example, the existence of an effective transit network can help attract businesses whose employees need or prefer options to car travel.

Well-planned transit improvements can attract new riders and keep existing ones, help prevent traffic congestion, improve air quality, and attract appropriate development. As such, Alameda has excellent opportunities to improve the island's quality of life and maintain its small-town character for the future by planning and implementing transit improvements today.

5.3 Local-East Bay Route System

The four alternative route designs were reviewed by the public at a meeting in late January, 2001. As a result of the presentations and discussions of the alternatives, the public at the meeting chose Alternative 1 as the most promising option. In addition, there were specific recommendations to modify and improve the alternative. With these modifications, the Alameda Transit Plan's Recommended Route System (RRS) is as follows:

Five transit lines would provide connections to downtown Oakland and Fruitvale BART, and northern and southern Alameda County. Transbay and express services would be unaffected except to the extent that street routings are consistent. In total, twelve routes would serve all of the areas currently served by the existing 14 lines. There would be no diminution in service as the plan anticipates the merging of some lines to produce more effective service.

TABLE 5-1 PROPOSED SERVICE MODIFICATIONS

New Transit Line	Existing Transit Service
3-Shattuck/Santa Clara	51-College/Broadway
6-6th Street	12-Buena Vista; 42-Marina Village
49-Harbor Bay	49-Harbor Bay
50-Park Street	50-Park Street; 10-Downtown Oakland
63-Alameda InterIsland	63-Alameda InterIsland

The other six lines represent express, Transbay and school services which are basically unchanged.

Line 3 (new route designation, currently Line 43) would replace Line 51 on Santa Clara Avenue in Alameda. Routing would originate in Albany at San Pablo and Solano and operate via Solano, Shattuck, Telegraph, Broadway, tubes, Webster, Santa Clara to Park and Santa Clara. At Park, the route would operate southbound to Otis to provide a direct connection with the South Shore Center, and then would continue east onto Otis, over the bridge to Island Drive, then via Maitland and the Cross-Airport Roadway to the FedEx sorting facility, into the Airport terminal, and then via 98th Avenue to BayFair BART.

Line 6, a new line, would connect West Berkeley, Emeryville, and West Oakland with Alameda's northern waterfront on Atlantic, Marina Village and Clement, with service continuing to the Fruitvale BART station. With service provided every 15 minutes all day long, this route would also function as an effective BART shuttle. This line would link Berkeley's active 4th Street area with Hollis Street, and the West Oakland BART station.

Line 49 would continue as a separate line linking Bay Farm to Fruitvale and Coliseum BART and K-Mart with only minor changes.

Line 50 would have minor adjustments in east Alameda, and would be combined with existing Line 10. From Alameda Point and the existing ferry terminal, the route would operate via the Tinker Avenue extension to the College of Alameda. From the College, the line would continue into the Webster/Posey tubes to connect to the 12th Street BART Station. This service would operate every 15 minutes, and would provide service along both Webster and Park Streets and function as a BART shuttle. (The line would continue to serve the CalWorks program in Alameda Point in all funding scenarios.)

Line 63 would remain unchanged except for relocating service to Atlantic Avenue in both directions, with a terminal at the existing ferry terminal, which would be relocated to the proposed Alameda Point Ferry Terminal at the appropriate time.

As the changes are made the City, working with AC staff, will assess operations and marketability and make adjustments as necessary.

Cross Estuary Bus Ferry - An alternative to the local bus routing system outlined above

would include a bus barge across the estuary between the western end of the island and Oakland East of the West Oakland BART station, as pictured in the map of Alternative 1A. Under this alternative, routes 6 and 50 would cross the estuary via a bus-only barge. This plan would increase cross-estuary capacity with less expense than new structural crossings. This analysis assumes that the operating costs for the bus ferry would be offset by reductions in bus service hours resulting from re-routings and faster speeds.

Cross Estuary Water Taxi – To provide better connections with Oakland, and to provide alternatives to traditional transit and automobile based transportation, a formal water taxi service could be established as development increases along Alameda's northern waterfront.

A preliminary routing alternative would include stops at Park Street, Oakland's Embarcadero, Grand, Coast Guard Island, Marina Village, Jack London Square, Catellus FISC site, and Alameda Point. Providing 15 minute service would require seven vessels.

TABLE 5-2 PROPOSED SERVICE FREQUENCIES

Proposed Service Frequencies - Initial Phase

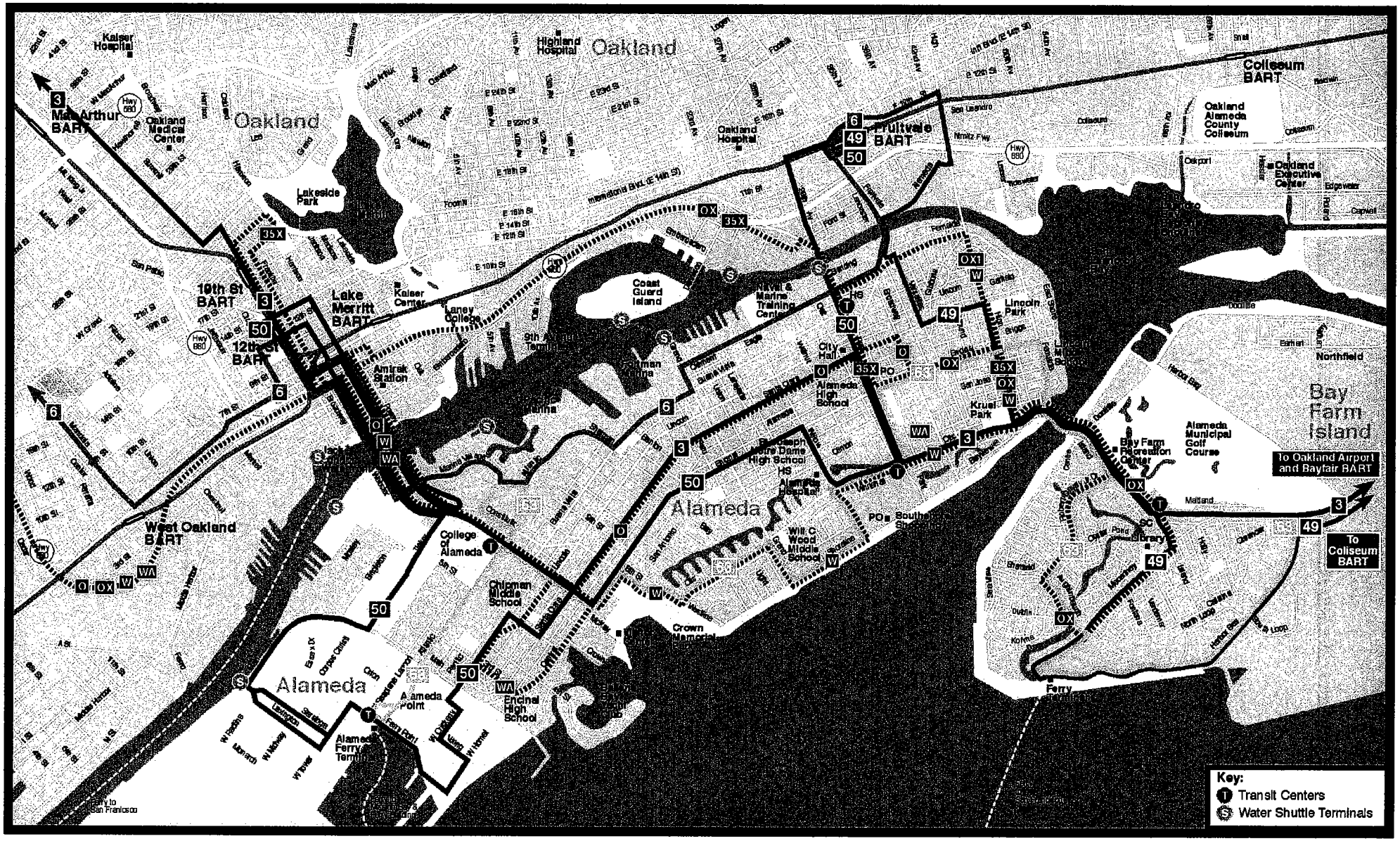
Line	Service Freq. (In min.) Peak	Midday	Night	Weekend Service
3-Shattuck/Santa Clara	7.5	15	20	Yes
6-6th Street	15	15	15	No
49-Harbor Bay	20	30	–	No
50-Park Street	15	15	30	Yes
63-Alameda InterIsland	15	15	–	No

Proposed Service Frequencies - Second Phase

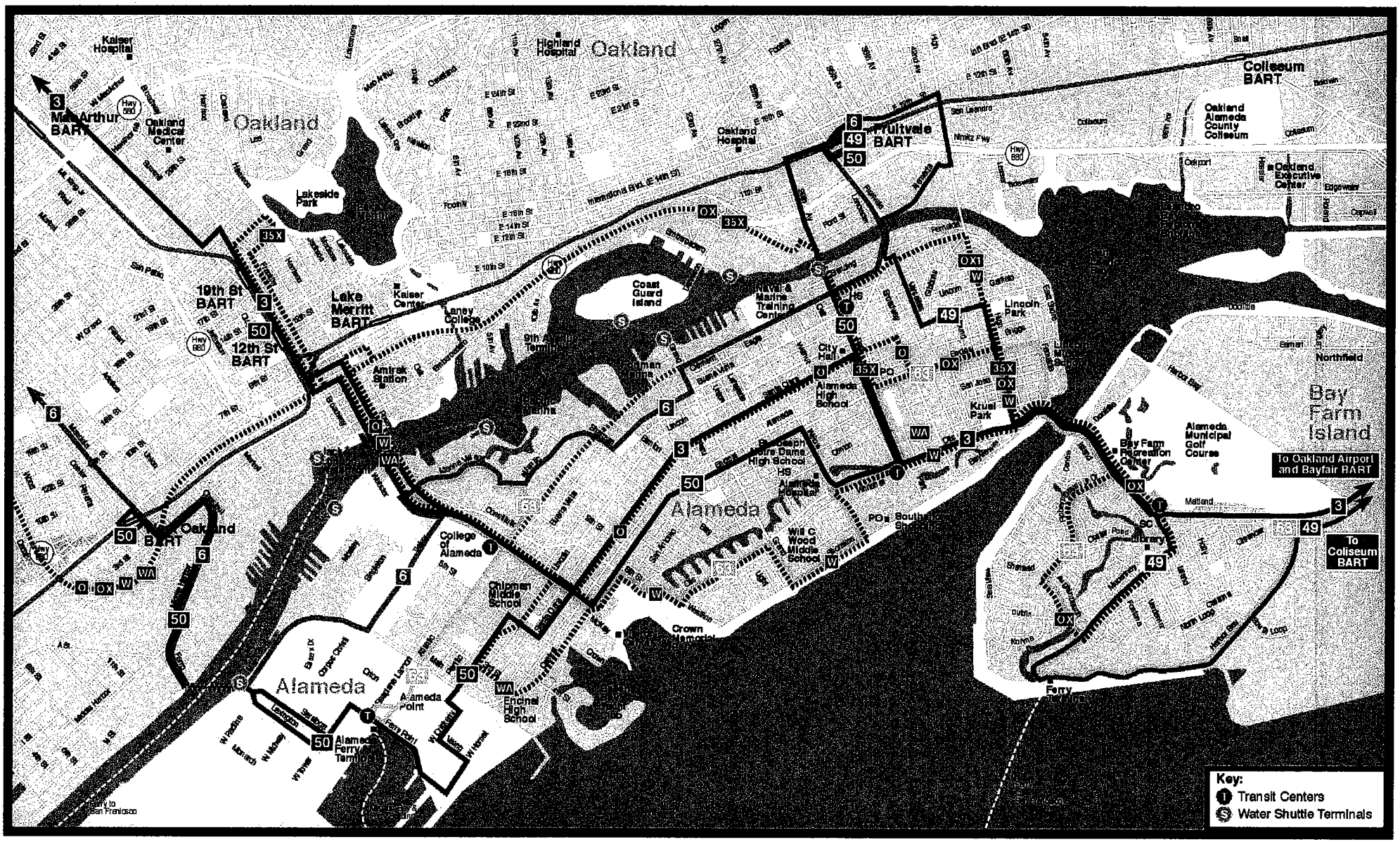
Line	Service Freq. (In min.) Peak	Midday	Night	Weekend Service
3-Shattuck/Santa Clara	5	10	15	Yes
6-6th Street	10	10	15	Yes
49-Harbor Bay	20	30	–	No
50-Park Street	15	15	30	Yes
63-Alameda InterIsland	15	15	–	Yes

Proposed Service Frequencies - Third Phase

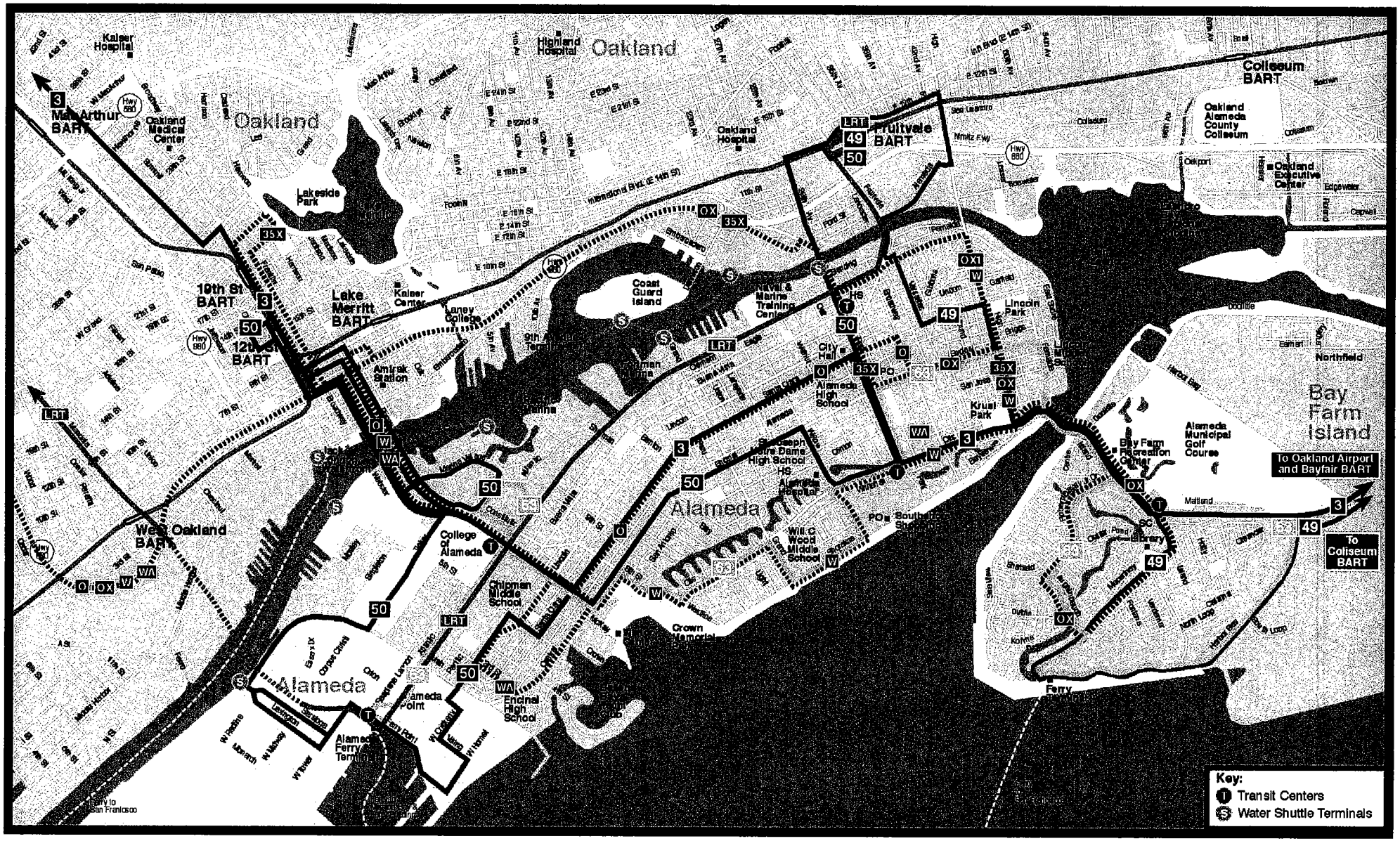
Line	Service Freq. (In min.) Peak	Midday	Night	Weekend Service
3-Shattuck/Santa Clara	5	10	15	Yes
6-6th Street	15	15	15	Yes
49-Harbor Bay	20	30	–	No
50-Park Street	15	15	15	Yes
63-Alameda InterIsland	15	15	–	Yes
Estuary Water Taxi	15	15	–	Yes



Proposed Alameda Bus Routes Alternative 1



Proposed Alameda Bus Routes Alternative 1A - Bus Ferry



Proposed Alameda Bus Routes Alternative 1 - Light Rail

5.4 Costs and Benefits

Currently, AC Transit expends about $4.7 million net costs, assuming a 25 percent farebox recovery) within Alameda, and from Alameda to a BART station, on the following routes:

TABLE 5-3 CURRENT AC TRANSIT SERVICE COSTS

Line	Weekly Hours	Annual Cost @ $75 Hour
10	85	$ 331,000
12	30	$ 117,000
42	5	$ 20,000
49	275	$1,070,000
50	364	$1,420,000
51	640	$2,500,000
63	215	$ 840,000
Total	1,614	$6,298,000

TABLE 5-4 ESTIMATED COSTS FOR REVISED ALAMEDA TRANSIT SERVICES

First Phase

Line	Weekly Hours	Annual Cost @ $75 Hour
3-Shattuck/Santa Clara	1315	$5,130,000
6-6th Street	350	1,360,000
49-Harbor Bay	275	1,070,000
50-Park Street	630	2,460,000
63-Alameda InterIsland	450	1,750,000
Total	3,020	11,770,000

Total net (assuming 25 percent farebox recovery): $ 8.8 million

Second Phase

Line	Weekly Hours	Annual Cost @ $75 Hour
3-Shattuck/Santa Clara	1550	$6,050,000
6-6th Street	420	1,600,000
49-Harbor Bay	275	1,070,000
50-Park Street	630	2,460,000
63-Alameda InterIsland	540	2,100,000
Bus Barge/Ferry		1,500,000
Total	3,020	14,780,000

Total net (assuming 25 percent farebox recovery): $ 11.5 million

Third Phase

Line	Weekly Hours	Annual Cost @ $75 Hour
3-Shattuck/Santa Clara	1550	$6,050,000
6-6th Street	490	1,900,000
49-Harbor Bay	275	1,080,000
50-Park Street	735	2,870,000
63-Alameda InterIsland	540	2,100,000
Bus Barge/Ferry		1,500,000
Water Taxi	686	2,675,000[14]
Total	3,020	15,500,000

Total net (assuming 25 percent farebox recovery): $ 12.0 million

TABLE 5-5 SUBSIDY REQUIREMENTS

Route Network	Subsidy	Increase from Current
Current System	$ 4.7 million	N/A
Phase 1	8.8 million	$4.1 million
Phase 2	11.5 million	6.8 million
Phase 3	12.0 million	7.3 million

Benefits – It is likely that as service increases, additional patronage can be expected

[14] This analysis assumes that private sector contributions will pay for the cost of the new water taxi system. As such, the annual cost is not included in the Total Annual Cost below.

on the transit system. The key routes are the 3-Shattuck/Santa Clara, and the 6-6th Street/Clement lines. Both services can be expected to gain additional patronage, although actual estimates for the range of increases is beyond the scope of this effort. The Plan extends frequent trunkline service to Bay Farm Isle at all times. As a tradeoff service levels on Santa Clara Avenue are slightly reduced. Prior to actual implementation service levels should be analyzed and balances to patronage on all line segments.

A further benefit is simply better transit and mobility through the City of Alameda. Bus frequencies are improved, waits are shorter, routings are more logical and center on individual streets, business centers are well served, and transfers occur at clearly marked, safe and busy transit centers. Transit is also positioned to provide significant capacity in the Webster/Posey corridor, serving both residents and businesses throughout the City.

There are two methods to directly quantify benefits – one is obviously patronage, and the other is land use alternatives. Patronage should increase as both destinations and service frequency are increased. As an example, AC Transit trunk routes typically carry between 40 and 50 passengers per revenue vehicle hour. This plan calls for increasing service by about 250 weekday vehicle hours, which should produce additional patronage of between 7,500 to 12,000 transit trips daily. The other benefit is that transit can increase capacity in congested corridors, allow decreases in parking requirements, and generally allow for more intensive and efficient development while still providing excellent mobility. Better transit service can lead to more jobs or more residents in Alameda while still allowing the community to develop into a walkable, attractive and quality environment.

5.5 Transbay Transit Services

Transbay transit services include both bus, rail and waterborne services.

BART is the provider of Transbay rail services. A significant technical and policy issue that must be confronted is the limitations on BART capacity in the Transbay Tube. Currently, BART can operate about 24 trains per hour (with a capacity of about 25,000 passengers assuming about 1,040 passengers per train and 10 car trains). BART plans to provide capacity for 30 trains per hour as a result of a new signaling system. This would increase capacity to about 31,000 passengers per hour, but projections for the Transbay Terminal project estimate that peak hour demand for Transbay transit services will greatly exceed BART's capacity. BART is studying various alternatives to increase capacity, including faster station dwell times and bypasses, some of which could include service to Alameda, but at a substantial financial and construction impact cost. In addition to tube constraints, BART also faces problems with station access, including access to the Fruitvale BART station, which serves Alameda. Alternatives have included more automobile parking and better connecting transit services.

This plan does not endorse a BART bypass to serve Alameda. Better and more cost-effective alternatives include additional bus and ferry services from the island, and better connections to both the 12th Street and Fruitvale BART station. BART should

consider transit access to Alameda as an extension of the original system.

Transbay Buses – AC Transit is the sole provider of transbay bus service between Alameda and San Francisco. AC currently also coordinates transbay bus service across the Dumbarton Bridge, and is considering establishing service across the San Mateo Bridge. San Francisco service is well established, and has been aggressively studied and modified by AC Transit staff, with community input, for the last several years. Only minor changes are proposed, and these changes would simply ensure that Transbay bus services follow the same streets as the local services and that existing services have sufficient capacity to meet demand.

A more exciting development is the emerging Transbay Express Bus services proposed for both the San Mateo Bridge and the Dumbarton Bridge. Service could begin at the Bay Fair BART station and make limited stops until the service reaches Peninsula and South Bay destinations. The location of the Transbay Express Bus Service origin at the Bay Fair BART station is especially important because this terminal would be directly connected to Alameda via the new Line 3 route. The concept is to allow a simple and convenient transfer to a Transbay bus that crosses the San Mateo or Dumbarton bridges.

Ferry – As noted previously, there is substantial merit in retaining the existing shared Oakland/Alameda Ferry assuming a continuation of the current level of regional funding for ferries (about $500,000 annually for the Oakland/Alameda service). However, there is growing interest in providing additional public support for ferry service, and should a funding increase occur, then the Oakland and Alameda services could be split into separate routes.

The new Alameda service could be based in the seaplane lagoon at Alameda Point. Ultimately, service should depart every 15 minutes daily with vessels operating a route from Alameda to Mission Bay/UCSF then to the Ferry Building. When a Berkeley route is established, service could be through-routed, allowing for efficiencies which Alameda now enjoys by sharing services with Oakland.

Sailing time from Alameda Point to Mission Bay/UCSF would be about 10 minutes, and sailing time from Alameda Point to the Ferry Building, even with a stop at Mission Bay, would be about 20 minutes. Four vessels would be required for 15 minute service, and additional vessels (probably express to the Ferry Building) would provide more service in the peak period. This would provide adequate capacity to meet the 25% modal split objective.

Facilities should be designed at Seaplane Lagoon and Mission Bay presuming funding is identified and available. Such plans should be compatible with the development of the West End and will warrant further consideration as plans for Alameda Point are developed.

No change is proposed in the operation of the Harbor Bay Ferry.

Operating and subsidy costs would be as follows:

TABLE 5-6 SUBSIDY REQUIREMENTS – TRANSBAY AND FERRY

Ferry Network	Annual Ops Cost	Annual Subsidy	Increase from Current
Current			
West End(Alameda/Oak)	$2.5	$ 0.7 million	N/A
East End (Harbor Bay)	1.1	0.7 million	N/A
Proposed Phase A			
West End(Alameda/Oak)	$4.9	$ 1.5 million	$0.8 million
East End (Harbor Bay)	1.1	0.7 million	0.0 million
Proposed Phase B			
West End (Alameda Point)	$7.1	2.4 million	$1.7 million
East End (Harbor Bay)	1.1	0.7 million	0.0 million

(Existing West End [Alameda/Oakland] subsidy includes about $100,000 each from City of Alameda and Port of Oakland; new Alameda system assumes 65 percent farebox recovery and no contribution from City of Alameda; East End [Harbor Bay] subsidy includes $300,000 subsidy from City of Alameda and Harbor Bay and no change in future service levels.)

5.6 Transit Improvements and Mode Changes

Mode Changes – Alameda residents and City staff have requested analysis of mode changes, specifically from diesel bus to alternative forms of propulsion. These alternatives could include trolley coach, electric battery bus, and electrified light rail. It should be noted that AC Transit is investigating the feasibility of fuel cell buses, which convert hydrogen and oxygen into water, providing an electrical charge in the process. The advantage of this system is that an on-board mini-electrical power plant provides electrical power to traction motors in a quiet and no-emissions vehicle. The disadvantage is that the technology is still largely untested, and large scale supplies of hydrogen are not currently available. Fuel storage is also an important issue. These recommendations will deal with mode changes using existing and proven technology on a line-by-line analysis.

Line 3 – Recommendation: Retain diesel bus. While this service could be a candidate for electrified trolley coach operation, its proposed extension to the BayFair BART station, which entails substantial freeway operations, effectively rules out overhead wires, at least for the immediate future. As the service matures, the matter should be studied again, because trolley coaches would be more efficient and environmentally superior to diesel operation.

Line 6 – Recommendation: Initially operate as diesel bus. Retain right of way and estuary bridge for either future rail use or busway use. Investigate opportunities for light rail use dependent upon land use intensification. Pursue grade separation of UP line and Fruitvale Avenue in Oakland.

Line 49 – Recommendation: Retain vans. This is a limited use service that includes operation in Oakland and in Alameda. During the immediate future, van operation is recommended.

Line 50 – Recommendation: Convert to battery buses. Line 50 will connect the 12th Street BART station with Fruitvale BART via Encinal and Central in Alameda. This is an ideal candidate for conversion, since the route is flat (with the exception of the tubes) and a charging station can be incorporated into the Fruitvale BART station bus facilities. Approximately 10 full-size battery buses (including spares) would be required for Line 50.

Line 63 – Recommendation: Convert to battery buses. Line 63 is essentially retained as an intra-island shuttle service, and conversion to battery buses is consistent with the flat routes in Alameda. About 10 smaller (30 passenger) battery buses (including spares) would be required for Line 63 service.

Street and Traffic Improvements – Traffic on the island is generally good – flows are consistent, and there is little congestion. However, in the future, depending on development on Alameda Point and the Northern Waterfront, there may be increases in demand for street space, especially in the Estuary crossings (as noted previously).

This plan makes the following recommendations on street and traffic improvements: Tubes: 1. Construct Broadway/Jackson project to provide better northbound traffic flow from the tubes to Oakland and onto I-880. 2. Meter automobile traffic into the northbound tubes during peak periods, but give transit "queue jumps" so that transit vehicles have a time advantage over private automobiles. This is how the Bay Bridge operates, and transit has a 50 percent mode share in that corridor. In the peak hour transit has a 25 percent market share of all the people using the tube without any transit priority measures.

Bridges: Investigate options for transit "queue jumps" at the Park Street and High Street Bridges.

Bus Barge/Ferry – Continue to investigate feasibility of a bus barge as a method to increase estuary capacity at a reasonable cost, and schedule for implementation in phase 2. The main constraints are 1. The suitability of an Oakland landing site, and 2. Financing of both the capital and operating costs. However, the life cycle cost of a bus barge is much lower than a new estuary crossing. An estuary crossing would likely cost at least $250 million. The annual cost, including the cost of money, for such a structure, would be about $23 million. This would provide a capacity of about 4,000 vehicles in the peak hour. The annual cost for the bus barge would be about $2.1 million, which would provide a capacity of about 400 people per hour, or about 10 percent of the new crossing.

Recommended Route System Alternative 1A illustrates bus route changes resulting from implementation of a bus barge. Line 50 would access Oakland via the bus barge, and its routing on Tinker Avenue would be served by Line 6, which would continue to the West Oakland BART station and then into Emeryville and West Berkeley. There are substantial advantages to this routing scheme, most prominently an improvement in service along the northern waterfront and better service to Marina Village.

Route System Alternative 1- Light Rail illustrates bus route changes resulting from the implementation of light rail on the Alameda Belt Line rail line. This right of way should be preserved to facilitate the implementation of an electric transit vehicle corridor, including the possibility of light rail. Although current densities are insufficient to support light rail, other transit modes could use the Belt Line right of way. This right of way is both in-street and through private property. In the private sections, at least 30 feet of right of way should be reserved.

Doolittle Drive: When the Cross-Airport Roadway opens, traffic patterns around Bay Farm Island will change dramatically. The new Line 3 must be given priority in the signal phase at Doolittle and Island Drive to ensure reliable operation.

Webster Street: Figures 5-4 and 5-5 illustrate the suggested changes to Webster Street that have been discussed as part of the Webster Renaissance Streetscape plan. The plan rationalizes bus stops, and may provide "bus bulbs" so that transit passengers have additional waiting areas and the buses do not pull into and out of traffic.

FIGURE 5-4 WEBSTER STREET BUS STOP PLAN WITH TRANSIT CENTER

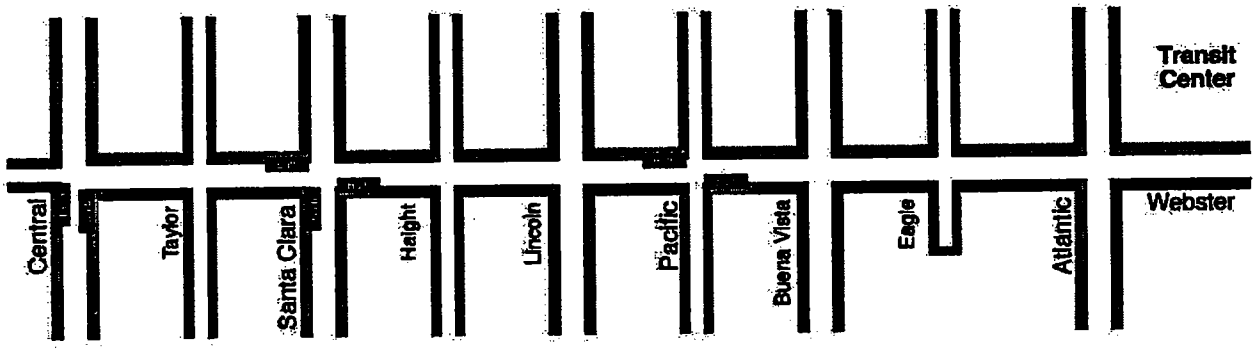
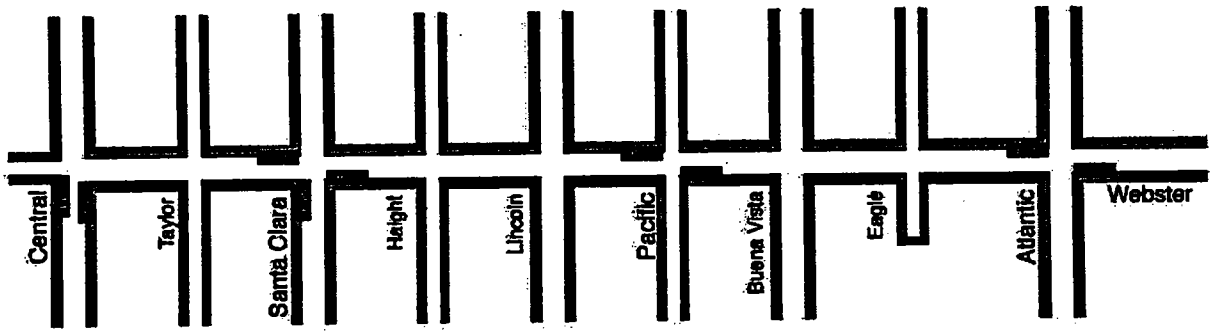
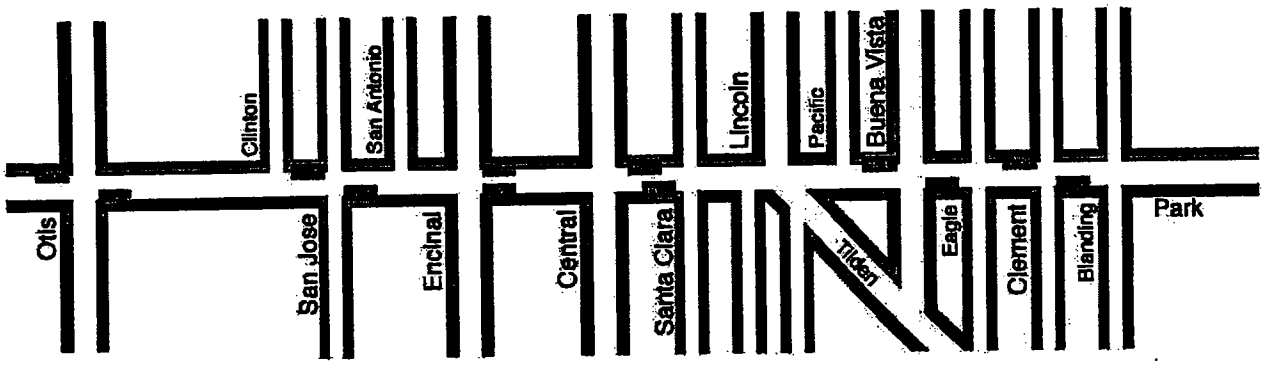


FIGURE 5-5 WEBSTER STREET BUS STOP PLAN WITHOUT TRANSIT CENTER



Park Street: Figure 5-6 illustrates the suggested changes to Park Street that have been discussed by the Public Transit Committee. Again, bus bulbs are a key element of the plan, and stops are located at consistent intervals. All stops are fully marked, and passengers are able to board the bus without walking around automobiles. In addition, the use of bulbs allows for an increase in automobile parking. This plan provides a net increase of four parking spaces.

FIGURE 5-6 PARK STREET BUS STOP PLAN

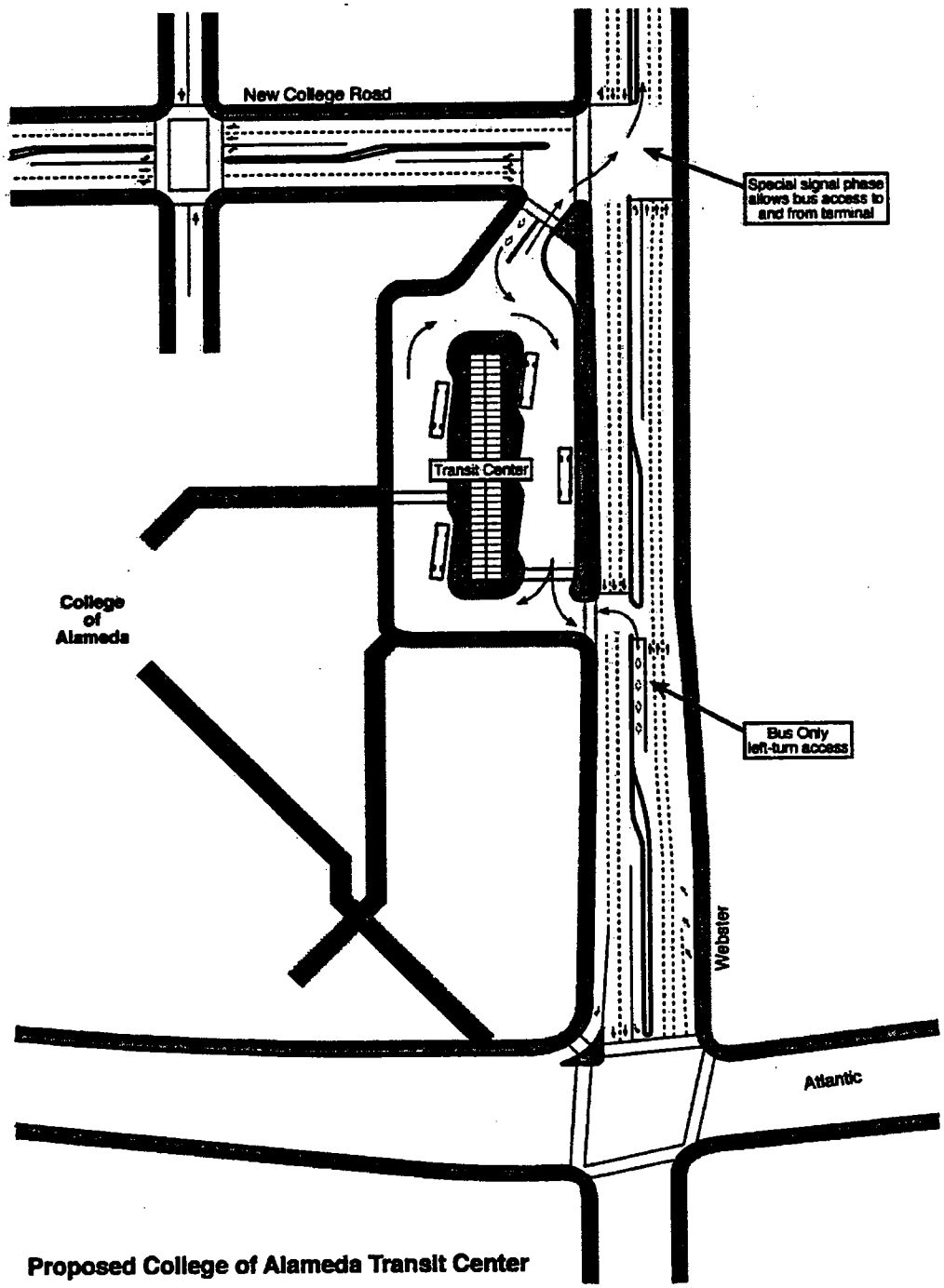


Both the Park Street and Webster Street suggested bus relocations require further community input, coordination with the respective business associations and traffic analysis prior to approval and implementation. The Webster Street plan also may require further modification subject to the location of the proposed College of Alameda transit center.

Transit Centers – Transit centers should be considered at various locations throughout the island, including the College of Alameda, Park Street, Bay Farm Island, Alameda Point and South Shore Center. At these transit centers, multiple transit lines could converge and allow for the efficient transfer of passengers. In addition, limited automobile parking could be provided at the College. Potential amenities include shelters, transit information, news racks, bicycle lockers (possibly with manned bicycle stations), clocks, phones, and solid waste/recycling facilities. Figure 5-7 illustrates the proposed alternative for the College of Alameda transit center. Currently there exists an informal transit center, which is utilized as a major transferring hub on the Island, within the South Shore Center. However, the owners of the South Shore Center are considering a large remodeling of its facility. Redevelopment plans have yet to be finalized and more specific plans will evolve over the next 3-10 years. This is an opportune time to consider incorporating a transit center into the South Shore Center either on-site or immediately adjacent to. South Shore Center should be designed to facilitate a transit center with easy access, if the transit center is not constructed on-site (the Public Transit Committee has indicated a desire for an on-site transit center). A transit center would enhance the South Shore Center's accessibility and provide for efficient transferring on the south side of the island. Design of a South Shore transit center that both satisfies transit needs as well as compliments the features of the South

Shore Center, while not interfering with the multiple uses of the Center, should be a guiding principle. The City should thus work toward a collaborative partnership with the Center management and the community in striving toward a high quality project.

FIGURE 5-7 COLLEGE OF ALAMEDA TRANSIT CENTER



Proposed College of Alameda Transit Center

Two additional satellite centers are also proposed. The Harbor Bay center would be a facility for bicycle and auto drop-off interface near the intersection of Island Drive and McCartney Road, while another satellite facility should be constructed on Park Street near Eagle or Clement. Again, the facility would provide for bicycle and auto drop-off.

Stops and Amenities – The Public Transit Committee has adopted a set of goals and objectives which outline the basic requirements for bus stop location. The objective is to provide a bus stop about every 1,000 feet (depending on land use and block length), and at the heavier stops, red curb should be used to allow the bus to pull into the curb. At these same heavily-utilized stops, transit shelters should be provided. At all stops, adequate public information should be displayed, including route number, map and schedule. In addition, as proven advanced information technology systems become available, such systems should be incorporated into the transit network.

These recommendations generally provide for two-tiers of transit amenities:

Tier 1– Heavy Stops (all stops on Santa Clara between Webster and Park, all stops on Park, all stops on Webster; major stops on Encinal and Central; some stops on Clement and Line 63; and all four transit centers): Boarding from the sidewalk, with red curb or with bus bulbs; and some transit shelters with lighting, transit and public information, trash facilities, phones, and clocks.

Tier 2 – Light Stops: Boarding from the street, transit and public information. In general, tier 2 stops are pole stops without red curb. It is important to note that AC Transit vehicles currently are able to deploy wheelchair lifts down to the street level to board passengers. As such, disabled passengers should be able to access the transit vehicles from tier 2 stops.

6. Financial Analysis

6.1 Introduction

The funding plan recognizes that in the American public transit funding system, capital costs are funded separately, often with separate funding sources, from operating costs. Because of this distinction, there are two funding analysis – capital and operating.

6.2 Capital Plan

The funding plan assumes three distinct elements: vehicles/vessels, guideways, and fixed facilities.

Vehicles/Vessels – The plan proposes an increase in both diesel buses and electric vehicles as well as new ferries and water taxis required to serve Alameda. Note the following table:

TABLE 6-1 VEHICLE/VESSEL REQUIREMENTS

Route	Mode	Current Req	Proposed Req
Line 3/51	Diesel	7	13
Line 6/12	Diesel	1	6
Line 49	Diesel	8	8
Line 10/50	Diesel	6	0
	Battery	0	10
Line 63	Diesel	4	0
	Battery	0	10
Ferry	Ferry	3	5
Bus Barge/Ferry	Marine	0	2
Total		28	53

The capital plan assumes that the current 28 vehicles and vessels continue to be funded as part of the existing system through MTC's vehicle replacement program. The net increase in 21 buses (both battery and diesel) represents an investment of about $5.5 million, while the two additional ferries cost about $10.0 million, and the bus barge/ferry costs about $5.0 million.

Rail: This plan proposes deferring the light rail system until land use densities can support such an intensive transit service. However, in any case the right-of-way should be preserved for either a future service, or some busway type operation. The cost of the Belt Line right-of-way is currently being determined and may be below market, owing to the City's interest in the Belt Line. The value of the additional right-of-way proposed on Atlantic was assessed at close to $600,000 in 1998.

Streets: Various elements include queue jumps, bus bulbs, and signal changes to allow for transit priority. The cost of each of these items averages about $100,000, and the

total number of projects is about 40 (20 bus bulbs through the City but primarily on Webster and Park; four queue jumps, six traffic signal changes, 10 miscellaneous items), costing $4.0 million.

Facilities – Facilities includes the transit center options at possible locations such as the College of Alameda, Alameda Point, at or near South Shore Center, and on Harbor Bay and Park Street. Ferry terminal improvements will be studied by the Bay Area Water Transit Authority which will develop cost estimates and financing plans for docks and landside facilities. Note the following table:

TABLE 6-2 TRANSIT FACILITIES

Location	Land Cost	Improvements
College of Alameda	$0.0 million	$500,000
South Shore Center	$0.2 million	$500,000
Bay Farm Island	$0.2 million	$100,000
Park Street	$0.2 million	$100,000
Alameda Point	$0.0 million	$500,000
Total Program	$600-750,000	$1.7 - $2.0 million

6.3 Operating Costs

As noted previously, the first phase of the plan improvement would cost an additional $4.1 million for surface operations, and an additional $1.7 million for increased ferry services. Operating costs for surface transportation do not vary significantly for different modes.

6.4 Funding Sources

The following lists funding sources available now or contemplated:

Operating Costs – There are several funding sources for transit operating costs. Generally, AC Transit service is funded through several sources including the state's Transportation Development Act funds, part of the BART sales tax, some property taxes, state budgetary assistance through the State Transit Assistance Fund, fares, and various regional sources including Measure B in Alameda County. With the exception of Measure B, these sources have rates that are essentially fixed and AC Transit has projected their revenue for the next five and 10 years based on the revenue sources that currently exist. AC has also estimated the District's expenses. Based on these conditions, AC estimates that revenues will barely keep pace with expected increases in costs, leaving little opportunity for additional service. Therefore, new sources of revenue must be sought to increase local transit service. (See Table 6-3.)

Among these potential sources are:

Farebox - All costs are net of farebox receipts, which are estimated at 25% recovery.

Measure B – As noted previously, the recently-approved renewal of Measure B provides a net increase of $2 million each year for AC Transit service in northern Alameda County, and a $2 million increase each year in central Alameda County. Some of this increase can be expected to benefit Alameda. In addition, there is an annual allocation of about $500,000 for the Alameda ferry service. As this funding source will not be sufficient to cover all of the recommended service improvements, other sources of funding will need to be developed.

Bridge Tolls – The current $1 surcharge ($2 total) on the Bay Bridge is committed to seismic retrofit for the next eight years. Most observers expect the surcharge to continue after this period, and be committed to other projects. The surcharge generates about $115 million annually. Among the uses of the surcharge revenues could be:

Ferry funding – There is a substantial constituency for increased ferry service, along with providing funding for these services. This funding would potentially include operating and capital programs. It is likely that this funding would not only provide the increase necessary for the 15 minute service recommended in this plan, but would also "buy-out" the City's Measure B $500,000 ferry subsidies, freeing those funds for other purposes. The rationale in using toll bridge revenues to subsidize ferry service is that ferry service directly increases the capacity of the bridge corridors.

Transbay Bus Funding – If ferry service increases the capacity of the bridge corridors, then the operation of AC Transit's Transbay Bus service accomplishes the same objective. Transbay bus service should also be eligible for operating funding. Since AC currently spends about $5 million net of fares on Transbay Bus services, using $5 million in bridge tolls for Transbay Bus service would have the effect of increasing AC's local service budget by a like amount. Alameda's share of this increase in local service could be $300,000 to $500,000 annually.

Regional Pass Program – AC Transit has investigated making its monthly pass valid on BART in the AC Transit service area, essentially the same program as the Muni Fast Pass being valid on BART in San Francisco. Preliminary estimates indicated that there would be a substantial increase in bus passengers, and a corresponding increase in pass sales, assuming that BART's revenue was held constant. If a funding source could be identified for guaranteeing BART's current East Bay revenue (i.e., bridge tolls), then it is likely that AC would net an additional $8 million annually in pass revenues, which would be available to increase service. Alameda's share of this additional funding could range from $500,000 to $750,000 annually.

Local Funding Options – In all these service scenarios, it is unlikely that the level of service in Alameda can be increased substantially without increases in local (City) contributions. There are already several funding sources available for meeting some of this demand including the current $58 per year per employee fee charged to new commercial development. This fee generates about $70,000 annually from Marina Village, $150,000 annually from the Harbor Bay Business Park, and should generate about $250,000 annually from the Catellus FISC development. In addition, development of Alameda Point could involve up to 10,500 employees, which would

generate about $600,000 annually for transit service.

Additional options include a City-wide assessment district or parcel tax, or a parcel tax within the AC Transit service area. Under the city tax scenario, a $35 annual tax on each of the City's 30,000 residential units would generate about $1.0 million annually. A district-wide AC Transit parcel tax at $110 per parcel would generate about $40 million, with perhaps a third of the tax returned to cities for improvements in local and neighborhood transit services.

A further option could be an Eco-Pass arrangement with either major employees or through the City. An Eco-Pass is similar to health insurance where everyone pays a small price for access to a service with the realization that only a minority actually utilize the service at any given time. As a result, the passes are priced at a steep discount: sometimes 20-25% of retail price (e.g. UC Berkeley Student Class Pass). By selling large numbers of passes at a reduced price, the transit system can generate more revenue spread out from more potential passengers.

TABLE 6-3 ANALYSIS OF TRANSIT OPERATING FUNDING OPTIONS

AC Transit Service Area Only – Year 2005

Existing Sources		Potential Sources	
State Transit Assistance	$ 4 mil	Bridge Tolls	$10 mil
Transportation Development Act	$56 mil	Developer Fees	$ 1 mil
AB 1107 (BART Tax)	$33 mil	Parcel Tax	$40 mil
Measure B	$25 mil		
AC Transit Property Tax	$44 mil		
Fares	$49 mil		
Misc (contracts, grants, ads, etc.)	$33 mil		
Total	$244 mil		$51 mil
Operating Cost	$243 mil		

By 2005, AC Transit projects that existing funding sources will barely cover operating costs for a system with about as much breadth as today. Therefore, increases in service must be funded with new revenues.

Capital Costs – Capital funding for midscale transit projects, such as proposed in this plan, is available from numerous sources. These sources include state subventions for transportation (which primarily fund street repairs and renovations), CMA allocated resources, MTC allocated resources (including federal funds), funding from the Bay Area Air Quality District, and City general funds (which are obviously limited). In addition, special state legislation has sometimes funded various transit projects, or provided additional funds to reduce the "project queue." For the last several federal transportation reauthorizations, Congress has added an entire list of local benefit projects. In any case, while the queue for projects can be lengthy, good projects can usually be funded at some point in the future.

6.5 Analysis and Funding Recommendations

Analysis – The First Phase funding increases are noted in the following table:

TABLE 6-4 COST OF NEW SERVICES - FIRST PHASE

Line	Current Annual Cost @ $75 Hour	Proposed Annual Cost @ $75 Hour	Net (Incl. Fares)	Possible Source
3-Shattuck/Santa Clara(51)	$2,500,000	$5,130,000	$2,000,000	AC and Other
6-6th Street (12/42)	137,000	1,360,000	900,000	AC and Other
49-Harbor Bay	1,070,000	1,070,000	0	N/A
50-Park Street	1,751,000	2,460,000	530,000	Parcel Tax/Other
63-Alameda InterIsland	840,000	1,750,000	700,000	Parcel Tax/Other
Ferry Improvements	3,300,000	7,900,000	1,700,000	Bridge Tolls
Water Taxi	0	2,675,000	0	Private
Total	$9,598,000	$22,345,000	$5,830,000	

The total net cost of the additional recommended Phase 1 (including the addition of the water taxi) is $5.8 million annually.

This plan assumes that following off-sets from this net increase:

TABLE 6-5 FUNDING OFF-SETS

Service	Off-Set	Amount
Lines 3 and 6	AC Measure B, Airport Eco-Pass, Bridge toll offset, etc.	$2.0 million
Ferry Improvements	Bridge Tolls	$1.7 million
Water Taxi	Private Funding	Not included in total
Total Off-Sets		$3.7 million
Net remaining deficit		$2.1 million

Possible Funding Sources for Net Unfunded Service – Of the $2.1 million remaining deficit (unfunded service), there are three additional city controlled sources that could be used to reduce this amount. These sources are:

City Measure B allocation	$100,000
Ferry funds replaced by bridge tolls	$500,000
Developer Fees	$500,000
Total	$1.1 million

The City received a share of Measure B funds for its own discretionary use. This plan assumes that of the $1 million the City of Alameda will receive annually from the new Measure B, a small portion would be used to assist in transit funding.

Measure B also allocated about $500,000 annually for the Alameda-Oakland Ferry service. Assuming that these funding responsibilities are assigned to bridge tolls, then these funds would be "freed" for other uses, in this case specifically related to additional unfunded ferry-bus feeder services that are included in the service designs of Lines 50 and 63.

Finally, the City expects that at least another $500,000 annually would be generated through new developer fees.

This then totals another $1.1 million in additional possible funding sources.

With this additional operating funding, there continues to be a new net deficit of about $1.0 million. There is no easily identified source for these funds. There are few other choices to provide this increased level of service other than some AC Transit district-wide tax or a citywide fee or tax, such as a $35 annual tax on all residential units.

The following table presents a 5-year funding critical path for both operating and capital expenses:

TABLE 6-6 5-YEAR FUNDING PLAN

Date	Service	Funding Source	Amount	Type
June 2002	Ferry Vessels	Bridge Tolls	$10.0 million	Capital
June 2002	Ferry Improvements	Bridge Tolls	TBD	Capital
June 2003	Ferry Improvements	Bridge Tolls	$1.7 million	Operating
June 2003	Lines 3 & 6	AC Transit/Other	$2.9 million	Operating
Dec. 2004	Bus Phase 1	Local/Other	$1.2 million	Operating
March 2005	Transit Centers	Local/Other	$2.5 million	Capital
June 2005	Bus Barge	Local/Other	$5.0 million	Capital

7. Institutional and Implementation Plan

7.1 Institutional Analysis

Introduction

The systems by which transit currently operates within the City, both for buses and ferries, are complex and multi-tiered. Currently AC Transit provides the major bus line services to Alameda. The City contracts with AC for some BART Shuttle services, and contracts with private operators for the Oakland-Alameda and East End Ferry Services. At times, the City's priorities have not been fully reflected in AC Transit's service allocations due to regional considerations. In other cases, the lack of intermodal coordination has resulted in less than optimal service.

These concerns have raised questions of how to achieve the most effective and efficient systems. Ideally, ferries and buses would function as a single multimodal entity, reflecting patrons' needs. However, there are many factors which make achieving this goal difficult.

Current Bus Practices

AC Transit is the provider of public bus services in Alameda, as it is in most of the East Bay. AC Transit is similar to a utility, serving various municipalities. AC Transit often needs to balance resources and investments among these competing entities. As such, AC Transit's priorities may differ from those of selected cities.

AC Transit has an elected Board of Directors, accountable to their wards. AC Transit has limited amounts of dedicated funding, resulting in the District soliciting outside funding sources, some of which include city funds, to promote and increase transit services. The funding scheme creates a system of defused authority and accountability. From the transit operator perspective, the cities ask for service that is often perceived as cost-inefficient. From the City's perspective, AC Transit's service decisions may not fully reflect the City's preferred alternatives. Many essential transit services, such as currently servicing Alameda Point, may not be the most cost efficient. When the cities ask for a reallocation of AC Transit resources, cost efficiency considerations often guide AC management and Board decisions.

In the past several years, many cities throughout the country have requested that transit agencies move towards smaller transit operations – generally buses seating 20 passengers operating on routes that may deviate. Such services can provide a more community friendly system, oriented towards the specific needs and desires of the community. Many of the more successful routes include a high level of community "ownership," including funding and promotion. However, cost per passenger for these services is oftentimes higher than other services the transit agency operates, such as main line frequent trunk service.

Within the current institutional arrangement for bus services, the City of Alameda acts as both a constituent city of AC Transit and also funds some services. The City funds

additional AC Transit service to areas that generate development fees, such as Harbor Bay Business Park and Marina Village. The City has often requested additional AC Transit service and restructuring of existing services.

Current Ferry Practices

The Alameda/Oakland and East End Ferry are both currently City managed and privately operated services. The East End Service is administered by the City and contracted out to Harbor Bay Maritime. Similarly, the Alameda/Oakland Service is administered by the City, in conjunction with the Port of Oakland, and contracted out to Blue and Gold Fleet. The City manages this service and provides operational oversight and marketing. The City also conducts surveys of the ferry riders, determines schedules, provides for maintenance of the terminals, and obtains and administers funding for both operating and capital costs and a variety of other associated services. Because of the City's role and close ties to the ferry service, positive relations have been established between the service and its patrons. However, unlike Vallejo, AC Transit's ferry feeders are of limited duration. As such, AC Transit ferry feeder bus service is not as effective as the BART Shuttle or transbay services.

Other Options

The key objective of any institutional structure is to provide a high quality of customer service within a reasonable cost. A high quality of customer service includes not only clean buses and ferries operated reliably, but also a high frequency of service in cases supported by demand. The current structure has met some, but not all, of these requirements. Within the current bus and ferry structure, fare transfers are seamless, but timed transfers are limited.

A number of fundamental factors and variables exist in trying to establish a fluid system that would answer to the specific needs and desires of the City's travelers. There are *at least* five institutional models (highlighted below) for the City to consider as it moves forward with transit service improvements. The first model is the status quo, where the City continues to fund some AC services directly, advocates for additional services, and manages and supervises the ferry contracts. The second model considers the City becoming a full-time transit operating entity, contracting out for operation of its own bus and ferry services. The third model is a hybrid where the City funds and directs the route selection of intra-Alameda service, which is operated by AC Transit, while AC Transit operates the regional and transbay bus services and the newly formed Water Transit Authority operates the ferry services. The fourth model is another hybrid where again the City funds and directs the route selection of intra-Alameda service, which is operated by AC Transit, and AC Transit is responsible for all regional bus and ferry services. A fifth model would identify an intermodal service administrator and operator, which would be responsible for all services in Alameda. There are a number of pros and cons associated with each of these models, as explained in detail below.

Status Quo – AC Transit would continue to provide trunk line services to Alameda, while the City would continue to contract for some BART shuttle services with AC and private operators for the ferries. The system currently functions successfully, but has a

number of drawbacks that can be improved upon. Through its administration of the ferry service contract, the City has a more direct link with the ferry's service design and customer service than it does with bus services. The City has also proven that it is quite versatile in dealing with private contracts and living up to service performance standards. However, within the current model there exist a number of convoluted responsibilities. AC staff acknowledges that its services to "customer" cities can improve, but a critical mass for the management structure for such a program is currently lacking. Though the ferry services, as they currently exist, have been improving with time, they are still lacking in coordination with links to others modes (e.g. buses). This illustrates some of the drawbacks associated with not having all modes operating as one single system.

City Operated Model – Under this model, the City would take primary responsibility for the operation of all transit services in Alameda (the City cannot directly operate these services because of the City's charter). These actions are currently occurring in Los Angeles, where the San Gabriel Valley split from the Los Angeles MTA to become Foothill Transit, and the San Fernando Valley is considering the same action. Similarly, the City of Vallejo has primary responsibility for their bus and ferry systems, and place great importance on intermodal connectivity. However, these service areas are much larger than the City of Alameda, although there are municipal operators in Los Angeles County, such as Santa Clarita, Santa Monica, Torrance and Long Beach, who operate good services within their jurisdictions.

This model would create a much simpler structure (the City) than currently exists and all modes would function as a single entity. There would be greater flexibility with these services and direct accountability, requiring a high level of regard to be paid towards the service's patrons. There are also several potential concerns with this model. Inter-regional service, currently provided by AC Transit, may be lost. Service would likely be truncated – which would mean more transfers for passengers and fewer through routings (a good example would be the 51 line only operating to downtown Oakland, requiring a transfer to travel further up Broadway or into Berkeley). An alternative would be to provide express service to centers, likely at a higher cost. Financing is an additional consideration. AC Transit is the designated recipient of TDA funding, which is allocated by MTC. AC Transit may not willingly give up this funding to Alameda. Regardless of who operates transit service in Alameda, city residents would continue paying property taxes for service that would not be provided. Finally, the City would need to set up a new structure to support the operation and administration of such a system.

Hybrid Model Analysis - Either of the two aforementioned "hybrid" models can also be called the "Customer" driven model because it makes the City a customer of AC Transit services. Under these models, which can probably only be considered if the City finds additional transit funding that it generates or is generated for the City, Alameda would purchase services on the routes that are primarily Alameda based. The City would request routings and service frequencies and AC would sell this service to the City. The City of Alameda would become the primary arbitrator of service within Alameda. However, scheduling and coordination would continue to reside with the AC Transit staff. AC Transit would continue to design and operate the regional and trunk route

systems, such as the service along Santa Clara Avenue.

In the third option, the City would look to the Water Transit Authority to fund and operate ferry services. However, while the Authority's enabling legislation implies direct management of regional ferry services, the Authority is prohibited from such power until the Legislature, by statute, adopts the overall Bay Area Ferry plan. The Legislature will not consider the plan until early 2003. The earliest that it could be effective is January 2004. The Water Transit Authority would have no proven track record running such services, which could mean taking a step backwards in comparison to the City's current ferry services. Once the WTA has proven themselves in such a capacity then this model would become a more viable option.

In the fourth option, AC Transit could also become the contract manager for the ferry service. This would be in line with an assignment of roles that reserves essentially local operations to the City and regional issues and services to AC Transit. AC has legislative authorization to immediately become the manager and operator of ferry services. Once again, AC has no experience with administering and operating ferry services. Furthermore, each of the hybrid models would diminish the City's role in the transit system, in turn, creating a larger gap between the service administrators and the citizens.

Single Multimodal Entity - A fifth option creates a comprehensive multimodal system functioning as a single entity. This entity would assume all responsibilities for each mode and the associated interconnectivity. They would either contract out the services to a private operator or conduct the operations themselves. Some of the tasks that would be required for the operation and administration of such a system include: identifying and obtaining funding, marketing, achieving performance standards, establishing essential services, and all other tasks currently associated with running the bus and ferry systems. Furthermore, a formalized and powerful institutional arrangement would have to be established between the City and this entity. A proven and effective relationship must also exist between this entity and the community. This would consolidate all functioning transit services and remove any convoluted responsibilities that may currently exist. As it currently exists, accounting for the current status of BAWTA and MTC, AC Transit would be the leading candidate to assume this role. However, in order to do so, AC Transit would have to establish an internal structure to function in such a capacity, as well as greatly improve upon its performance and service standards.

Under any of these scenarios, the functions of a qualified contract manager and support staff cannot be underestimated. A full-time transit contract manager would bid out services to qualified bidders then supervises and audit the performance of the bidders. The contract manager would negotiate the usually elaborate bidding process, along with the approval cycles. Issues of prevailing wage and fair bidding are usually extremely contentious. After contract approval, the contract manager and support staff (contract management group) would have three primary functions. One aspect would be quality control – the contract manager would need to ensure that service was being delivered as required in the contract. This requires stop quality checks, audits of management and maintenance practices, audits of driver records and training regimes. An

associated requirement is the provision of contractual payments, and the withholding of funds due to contractual lapses. The second major function would be the funding of the transit service. The third contract management responsibility would be to file the required state and federal reports, including reports on patronage and federal state-mandated performance audits.

7.2 Recommendation

Ideally, the administration and operation of transit services for the City would function as one comprehensive multimodal system. This would provide service efficiently and effectively and be publicly beneficial.

In the short term, the City's strategy will be to remain with the status quo. The way in which the system currently functions is the most feasible and practical model without implementing any larger institutional changes. In the meantime, the City should make a conscious effort to monitor the future actions taken by the WTA and MTC, while establishing a stronger and more open relationship with AC Transit.

In the longer term, the City would like to see the evolution of the fifth model, in which all transit functions as a single multimodal entity. However, there are a number of conditions that must be satisfied in order for this model to take shape. As it exists today, AC Transit would be the most logical selection for administering and operating such an entity. However, due to all the factors associated with the future of BAWTA and MTC, it will be at least three to five years before the operator can be solidified. Some of the factors and conditions that must be considered include:

- Establishing a formalized and strengthened institutional arrangement between the City and the selected operator/administrator (e.g. AC Transit, BAWTA, MTC, etc.).
- Work with the operator/administrator to consider the acquisition of in-house expertise in relation to private contract(s).
- Work with the administrator/operator in order to: agree upon essential services; establish and monitor performance standards; identify funding mechanisms; create a process by which to establish fares; and provide the City with the right to (dis)approve selected service operators.

Once these conditions are met, this model will begin to take shape and consolidate all transit services provided to the City. In either scenario, AC Transit should establish and staff a Transbay & Contract Services Department, and must show a core competency in marketing and supervising its service, and in managing outside contract operations.

7.3 Implementation Timelines and Priorities

Timeline – With the passage of Measure B, the first major hurdle has been met. AC Transit now has additional resources, and can look forward rather than focusing on cutting service. The first priority should be for the City, along with all other associated

parties, to develop the appropriate institutional and management relationships.

The next steps would be provision of additional transit services. These provisions are based on funding increases, of which Measure B is a small part. The City's first priority has been establishing all day, seven days a week service to Bay Farm Island. The extension of Line 3 to Harbor Bay and the Airport meets this objective and is therefore the first priority for service changes. The extension could be implemented incrementally, first with service to the airport and eventually, service to BayFair BART. Furthermore, the City recognizes the community's interest in providing expanded shuttle service to satisfy special needs that have been identified, including Alameda Point, BART Stations, Ferry Terminals, and other locations. The City will be working with various partners to investigate potential services that could be implemented in the future.

Additional implementation would occur as funding is identified and available. This plan anticipates the following schedule:

TABLE 7-1 IMPLEMENTATION TIME LINE

Service Change	Action Required	Date
Line 3 to OAK	Measure B/AC Route Restructuring	June 2003
Line 6 to Fruitvale	Measure B/AC Route Restructuring	June 2003
Ferry Changes	Toll Bridge Revenues	June 2003
Transit Centers	Capital Funding	Nov 2003
Full First Phase	AC or City Parcel Tax (15 minute service)	Dec 2004

Glossary

ADA, ADA Accessible:	Americans with Disabilities Act; federal legislation enacted in 1990 that grants civil rights protection to persons with disabilities in employment, public accommodations, access to State and local government facilities, communication and public transportation. The ADA mandates increased accessible and nondiscriminatory service, such as wheelchair lifts on buses, improvements in information dissemination to people with hearing and visual disabilities, rail stations that can be used be people with disabilities, and lift-equipped paratransit services. The Federal Transit Administration (FTA) has the responsibility for ensuring that all transit operators in the United States comply with the law.
Bus Bulb:	A bus stop which extends the sidewalk into the street to enable buses to remain in traffic lanes to serve passengers. Bus bulbs tend to improve passenger safety and mitigate sidewalk congestion at heavily used bus stops.
CMA:	Congestion Management Authority/Agency, established by state legislation to disburse state transportation monies in accordance with performance measurements.
Destination:	The point at which a trip terminates.
Duty Cycle:	The duration of time when a transit vehicle is in operation, including revenue service, layovers, and deadheading.
Electric Corridor:	A geographical band that follows a general directional flow or connects major sources of trips to be served with electric transit vehicles such as light rail, trolley coach, or battery buses.
Far-Side Stop:	A transit stop located beyond an intersection. It requires that a transit vehicle cross the intersection before stopping to serve passengers.
Farebox Recovery Ratio:	The ratio of fare revenue to operating expenses.
Farebox Receipts:	The passenger payments for rides, including cash, tickets, pass receipts and transfer charges.
Feeder Service:	Local transportation service that provides passengers with connections with a major transportation service such as a BART station or ferry terminal.
Flush Returns:	Sections of sidewalk that meet the street at the same

elevation as the street (without a curb), usually at an intersection.

Headway: The time interval between the passing of successive transit vehicles on the same line or route in the same direction, usually expressed in minutes.

Level of Service (LOS): A measure of the quality and quantity of transportation service provided. For roadways, a quantifiable measure of congestion as determined by the volume to capacity ratio and expressed by a series of letter grades from A (low volume to capacity ratio) through E (high volume to capacity ratio) and F (gridlock; volume exceeds capacity).

Line Miles: The sum of the actual physical length (measured in only one direction) of all streets, highways, or rights-of-way traversed by a transportation system, regardless of the number of routes or vehicles that pass over any of the sections.

Modal Split: The proportion of total person trips that uses each of various specified modes of transportation. Also, a term that describes how many people use alterative forms of transportation. It is frequently used to describe the percentage of people who use private automobiles, as opposed to the percentage who use public transportation.

Mode: A particular means of travel such as bus, walking, or rail.

Multimodal: Concerning or involving more than one transportation mode.

Near-Side Stop: A transit stop located on the approach side of an intersection. The transit vehicles stop to serve passengers before crossing the intersection.

Origin: The point at which a trip begins.

Paratransit: Forms of transportation services that are more flexible and personalized than conventional fixed-route, fixed schedule service but not including such exclusory services as charter bus trips. The vehicles are usually low- or medium-capacity highway vehicles. Normally such services are available on demand. Commonly refers to comparable transportation services required by the Americans with Disabilities Act (ADA) for individuals with disabilities who are unable to use the fixed route transportation system.

Passenger Miles: The total number of miles traveled by transit passengers

(e.g., one bus traveling 3 miles while carrying 5 passengers results in 15 passenger miles).

Pax: Abbreviation for "passengers."

Peak: The period (often one hour) during which the maximum amount of travel occurs. It may be specified as the morning or afternoon or evening peak.

PTC: City of Alameda Public Transit Committee.

Queue: A line of waiting vehicles, for example, traffic at a signal.

Queue Jump: A short section of exclusive or preferential lane that enables specified vehicles (often buses or carpools) to bypass an automobile queue or a congested section of traffic. A queue jump is often used at signal-controlled freeway on-ramps in congested urban areas to allow high-occupancy vehicles preference.

Revenue Service: Any service scheduled for passengers trips.

Revenue Vehicle Hour: Time period when transit vehicles are actively serving paying passengers. Does not include time spent on layovers (time between arrivals and departures, used for the recovery of delays and preparation for the return trip) or deadheading (time spent moving a vehicle from the end of the line to the garage or between garages).

Road Call: A mechanical failure of a bus in revenue service that necessitates removing the bus from service until repairs are made.

Set-Asides: Dedicated funding sources.

Signal Preemption: An automatic or manual device for altering the normal signal phasing or the sequence of a traffic signal to provide preferential treatment for specific types of vehicles, such as buses or trains.

Span of Service: The time between the first scheduled departure and the last scheduled arrival for a transit route.

Subventions: Revenues to local jurisdictions derived from state authorized taxes, as allowed by the legislature.

Tail: On transit lines that have two or more distinct geographical paths at either end, those distinct paths that flow toward the

terminal.

Timed Transfer:	The scheduling of intersecting transit routes so that they are due to arrive at a transfer point simultaneously, eliminating waiting time for transferring passengers.
Transit:	Transportation system, usually publicly but sometimes privately owned and operated, designed to move large numbers of people in various types of vehicles, along fixed and non-fixed routes in cities, suburbs, and larger metropolitan areas.
Transit Center:	At a location where multiple transit lines meet, a facility that enables easy transfers between lines and access to transit service. For lower frequency routes, transfers may be timed. All transit centers are accessible to pedestrians. Transit centers often have amenities including shelters, transit information, clocks, and bicycle parking facilities. Some may also include automobile parking. These should be designed to emphasize pedestrian as well as transit needs. Safety, accessibility, circulation, information, and aesthetics concerns should all be addressed.
Transit Preferential:	Giving special privileges to a specific mode of transportation. Bus lanes and signal preemption are examples.
Transit Priority:	See Transit Preferential.
Trolley Coach:	An electrically propelled bus that obtains power via two trolley poles from a dual (positive and negative) overhead wire system along routes. It may be able to travel a limited distance on battery power or an auxiliary internal combustion engine. The power-collecting apparatus is designed to allow the bus to maneuver in mixed traffic over several lanes.
Trunk Routes:	Major (heavily patronized) transit routes that operate on principal or major surface streets with high service frequencies.
Turnkey:	Supplied, installed, or purchased in a condition ready for immediate use, occupation, or operation.

Appendix: Community Comments

Transit in Alameda Mail-In Survey

Responses: Data was collected on 913 travelers (some of the returned surveys included information about more than one traveler). Despite the high response rate, the survey is not scientific.

Commute

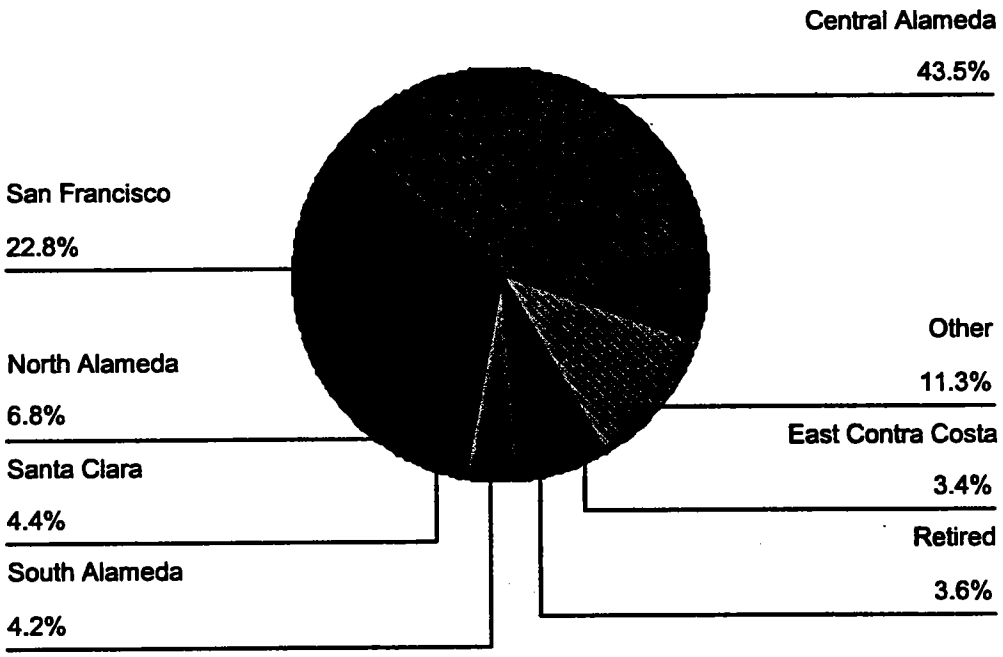
Central Alameda: Work at Home, Alameda, Castro Valley, Oakland, San Leandro

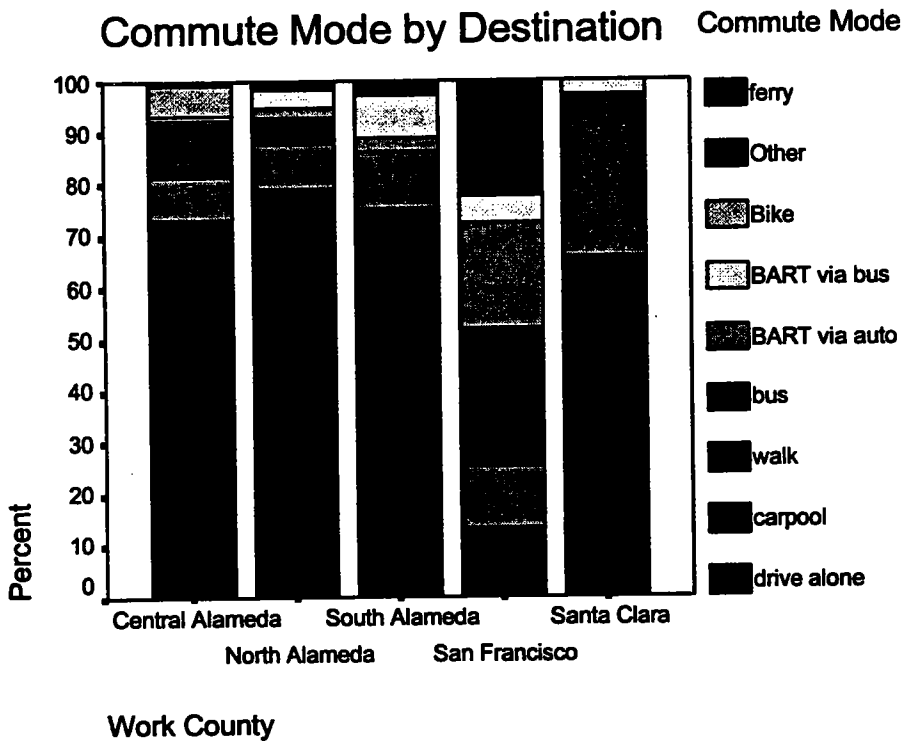
North Alameda: Albany, Berkeley, Emeryville

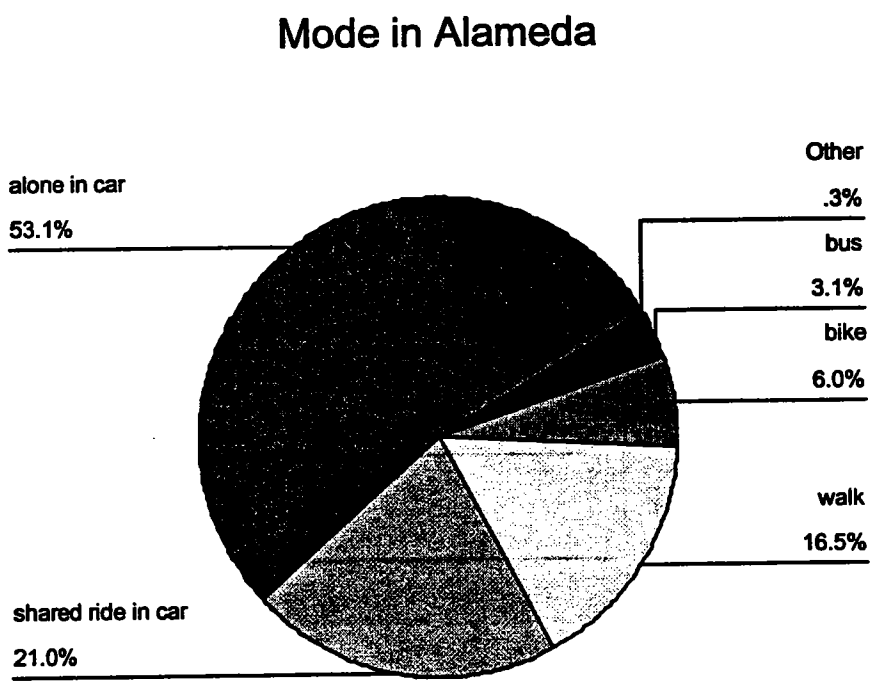
South Alameda: Fremont, Hayward, Newark, San Lorenzo, Union City

Other (in order from smallest to largest): Sacramento, Napa, Solano, Marin, West Contra Costa, San Mateo, East Alameda, Multiple Locations

Work County




Commute Mode by Destination
Commute Mode
ferry
Other
Bike
BART via bus
BART via auto
bus
walk
carpool
drive alone
Percent
100
90
80
70
60
50
40
30
20
10
0
Central Alameda
North Alameda
South Alameda
San Francisco
Santa Clara
Work County


Mode in Alameda
alone in car
53.1%
Other
.3%
bus
3.1%
bike
6.0%
walk
16.5%
shared ride in car
21.0%

Opinions:

Electric Transit Corridor: Yes: 60% No: 19% Undecided: 22%

Mode Choice: 1. Electric Bus 2. Shuttle 3. Light Rail (1/3 comments about light rail were negative)

Other Opinions:

- Flexibility and Convenience:Flexibility and convenience were cited most often as reasons why Alameda residents do not ride transit or as areas for improvement. Some of the issues noted include multiple destinations (trip linking), carrying packages, and dropping off children at school.

- Trip Duration: Following flexibility and convenience, the long trip duration associated with transit was cited as a reason for not using transit or an area for improvement. Many respondents noted that taking transit for work would require a significantly longer trip than taking their cars. Transit trip durations are usually a function of headways (resulting in waiting), transit speed that can be slowed by multiple stops and street traffic, travel distances to reach a transit stop, and transfers.

- BART Access: Many Alameda residents commented that they wanted improved access to BART. In order of popularity, the following access improvements were noted: shuttle buses, increased parking capacity, light rail to BART, BART extension to Alameda, improved bike facilities, and pedestrian access.

- Other: Other issues raised by Alameda residents include: transit frequency, span of service, routing improvements, comfort, cost, and reliability.

Comments from November 9 Public Workshop
Special Session of Public Transit Committee
Summary

Attendance: Approximately 15 Alameda residents attended the meeting. Representatives from the Public Transit Committee, the City of Alameda, Pacific Transit Management, AC Transit, and Lamar (bus shelters) were also in attendance.

Format: Tony Bruzzone, the Consultant to the City of Alameda, gave a brief overview of transit planning to the entire group. Three smaller groups were formed to answer the four questions listed below. A summary of the responses follows each question.

15. What do you like about existing transit services in Alameda?

- Multiple modes
- Ferry service
- Two ferry terminals
- Access to BART
- Bike accessibility
- Walkable city
- Off-island service to Oakland, SF, BART
- Owl service
- Vocal transit advocates
- City receptive to transit needs
- Inexpensive
- Strong transit infrastructure

2. How would you improve existing transit service in Alameda?

- Improve Transit Information:
  - 24-hour information about routes, schedules, and connections
  - regular schedules
  - better marketing
  - bus arrival information
  - more consistent stop calling esp. at night
  - missed-run handling
  - better signage for bike rules
  - better Tube Closure signage
- Improve Multi-Modalism:
  - better BART connections
  - better connection to BFI
  - better bus connections with ferry
  - bus to Oakland Airport
  - ferry terminals at Hornet and Southshore
  - water taxi
- Longer Hours of Service:
  - late night access to BART
  - to Marina Village
  - to Bay Farm Island
  - for 35X
- More Frequent Service:
  - higher peak frequency
  - more frequent ferries
  - route 50 more often
  - better Tube Closure service
- Faster Service:
  - bus stop every 1000 feet
  - red zones
  - bus lanes on Park, Webster, and Lincoln
  - Park and Webster transit only peak
  - transit only estuary crossing
  - 51L - limited to Berkeley
  - bow-ramp on ferry
- Passenger Comfort and Amenities:
  - large bus shelters

- bus bulbs
- BART too crowded
- sidewalk transit access at Southshore

- Equipment:
  - quieter buses
  - smaller buses
  - electric buses

- Miscellaneous:
  - safer drivers
  - business subsidies for transit

3. What would it take for you to ride transit on Monday morning?

- faster service
- higher frequency
- more direct routes
- late service
- service closer to home
- free fare zones
- comfortable seats
- quieter buses
- cleaner buses
- traffic information
- limited parking at destination

4. What would be your vision of transit in 2010 in the City of Alameda?

- Mode Changes:
  - light rail
  - zero emissions
  - quiet buses
  - smaller vehicles
  - on-demand transit
  - self service taxis
  - water taxis
  - Cybertrans
  - high speed train to South Bay and LA
  - virtual BART stops

- Better Connectivity:
  - universal fare card
  - easy connections to other systems
  - unified system between AC and BART
  - bikes on all public transit at all times

- More Transit Service:
  - 5 minute headways on island shuttle bus
  - increased ferry service
  - convenience like private auto

- Information:
  - complete info at all stops
  - hotline for immediate traffic information
  - alert that passengers are waiting at stop
  - better education

- Transportation - Land Use Connection:
  - transit a factor in land use planning
  - payment for tranist in lieu of parking requirements
  - Transit oriented development
  - agressive TDM

- Facilities:
  - transit centers at College of Alameda and South Shore
  - more ferry terminals

- Less Private Auto Use:
  - transit only streets
  - transit only estuary crossing
  - telecommuting
  - 75% auto traffic reduction

- Miscellaneous:
  - better security
  - proof-of-payment

Alameda Transit Plan Public Meeting
January 20, 2001

Approximately 25 to 30 Alameda residents attended the public meeting. Tony Bruzzone, the consultant for the Transit Plan project, described transportation data and services, outlined the four local bus transit routing alternatives, and solicited comments on all forms of transit for Alameda, including BART and ferries. Members of the public were invited to comment on and the four local transit routing alternatives as well as provide comments on any transit-related issues in Alameda.

Ranking of Alternatives
Participants noted their preferences by placing colored dots below the alternatives to indicate their first, second, third, and fourth choices. By assigning numerical values to each of the colors, the group's votes were tallied accordingly:

Alternative 1	54	First
Alternative 3	47	Second
Alternative 4	46	Third
Alternative 2	44	Fourth

Votes were also assessed by determining which color received the most votes within each alternative. For example, under alternative 1, blue (indicating first choice) received the most votes. By this method, the ranking of alternatives is as follows:

Alternative 1	First
Alternative 3	Second
Alternative 2	Third
Alternative 4	Fourth

Comments

Alternative 1
- Move bus from Santa Clara to Lincoln
- Service on Buena Vista is preferred to Clement
- Route 63 should terminate in Marina Village
- Route 63 should serve Encinal High School
- Route 6 should travel closer to 12th Street BART
- Not enough service near Central and 4th
- Service should be extended to the Hornet
- Not enough reliable service to the ferry terminal
- Good routing for east end of island

Alternative 2
- Route 63 should serve the ferry terminal
- Marina Village should have direct access to BART

Alternative 3

- Park Street should have 15 minute service

Alternative 4

- Park Street needs better service to BART
- Route 61 should go to 12th Street BART
- Would route 61 have enough patronage to justify 15 minute service?
- Good routing for west end of island
- Fernside should have better access to Harbor Bay
- Good for internal access

Local Bus Service

- Bay Farm Island should have more frequent service on route 49 and better holiday service
- Bus service to the Hornet should go until 10 pm on weekends and holidays
- Marina Village should have a direct connection to 12th Street BART
- Marina Village should have service to BART and ferry
- Increase number of buses running through tube
- Improve internal connections
- Improve reliability
- Create transfer points with good amenities
- Local trips should be permitted on transbay services
- Transbay O should serve 12th Street BART
- Ferry terminal should have better service
- Changing bus numbers is a bad idea
- What is the impact on mobility of alternatives
- Consider and mitigate noise from new 24 hour services
- Emissions from buses should be reduced
- Next Bus system would be helpful
- What are the travel time estimates for the different alternatives?
- Has the increase in service frequency been authorized?
- How will the improvements in spans of service be implemented?

BART Access

- Staffed bike facility at BART
- Improve bus stop amenities at BART stations
- Route 50 service to BART should have the same level of service and schedule all week
- BART and AC Transit maps and schedules should be available at all transit nodes
- Investigate the tube capacity impacts of changing bus service to BART
- BART should be more bike friendly
- BART should be extended to Alameda
- Proposed BART satellite parking lot on Park Street would be a poor use of land, would not improve air quality, or benefit commerce. A shared lot (such as with the theater) might be mutually beneficial. Shuttle service from lot to BART would have to be fast.
- Electric vehicle car sharing at BART
- Reinstate BART shuttles

Ferry Services

- Higher frequency bus service to ferry terminal would improve reliability of transfer
- Outdoor bike facility on ferries is bad for bikes
- Bikes should have easier access to ferries (separate loading)
- Ferry pollution per passenger mile should be improved

Other Modes

- Improve bike capacity on buses
- Secure bike parking structures at important transit nodes and destinations
- Improve connections to Amtrak
- Dial-a-ride to Alameda Point in off-peak
- Water taxis to improve cross-estuary capacity
- Investigate personal water craft launching and docking facilities to improve cross-estuary capacity
- Investigate gondola to Jack London Square
- Do population trends justify an electric corridor?
- Feasibility of light rail on Beltline
- Is an elevated guideway included in the easement on Clement?

Other Issues

- What are the current assessment fees for developers and businesses?
- Where will additional funds for new service come from?
- Can and should Alameda contract out for operating its own services?
- Promote transit oriented development, particularly at the old rail yard
- Environmental assessment of preferred alternative
- Breakdown of costs for preferred alternative
- Transit information should be included on all public meeting notices

Public Meeting
Alameda Draft Long Range Transit Plan
April 18, 2001

A public meeting was held at Alameda City Hall on April 18, 2001 to discuss the Draft Long Range Transit Plan (Draft Plan) for the City. Approximately 15 people attended the meeting.

The Consultant, Anthony Bruzzone of Pacific Transit Management, provided a brief description of the elements of the Draft Long Range Transit Plan as well as an outline of the planning process to date. A map of the proposed transit routing alternative was posted for public view.

The following comments were provided by the meeting participants:

Water Transit Services

- The Draft Plan's proposed relocation site for the ferry terminal to the Seaplane Lagoon at Alameda Point should support the Marina Development proposal.
- What is the feasibility of combining Alameda's West End and East End ferry services if the West End service is moved to the Seaplane Lagoon?
- The costs of ferry operations included in the Draft Plan should be updated. A representative of Blue and Gold Fleet, the operator of the Alameda Oakland Ferry Service, said that the Fleet would be able to provide those cost figures to the Consultant.
- If the Draft Plan's proposal for using smaller 149-passenger ferries for service in Alameda is followed, what would happen to the larger vessels that are currently in operation or due to be delivered soon? The Consultant said that the implementation of smaller vessels should only occur if other locations were identified where the larger vessels could be used.
- The Draft Plan should include a discussion of landside facilities at ferry terminals, including landside ticketing options.
- The location of the water taxi terminals in the Draft Long Range Transit Plan should coincide with the locations described in the Oakland Estuary Plan. This would entail moving one terminal as proposed in the Draft Plan from the western side of the Catellus FISC site to the proposed Central Plaza closer to the center of the FISC site.

Land-Based Transit Services

- The Draft Plan should include a more extensive discussion of an inter-island shuttle system and its potential benefits.

- A discussion of the concept *passenger mile per line mile* should be included in the text of the Draft Plan to explain and clarify the term and its relevance to the mode analysis.

- The discussion of Tier 1 and Tier 2 bus stops in the Draft Plan should provide a more detailed explanation of the Tier 2 bus stop standards, and should recommend making all bus stops in Alameda accessible to persons with disabilities. The Consultant noted that Alameda's Public Transit Committee previously approved a policy to make the more important but not all transit stops accessible.

- As the Alameda County Draft Bikeway Plan includes a bicycle and pedestrian drawbridge at the location of the proposed bus barge/ferry in the Draft Plan, would it be feasible to include light rail on the drawbridge?

Financial Plan

- The Draft Plan should address service allocation decisions in times of financial constraint, including fall back plans and the consequences of having less funding.

- The Draft Plan's suggestion for a parcel tax to raise funds for transit may not be politically viable. As development at Alameda Point may be a more viable revenue source, the Draft Plan should include a discussion of the feasibility and benefits of seeking this type of revenue.

Implementation Plan

- The section of the Draft Plan discussing institutional options should include a discussion of the Bay Area Water Transit Authority as a third option for the management of Alameda's ferry services.

- The Institutional Plan of the Draft Plan should address local control and service quality issues more extensively.

Glossary

- The Glossary in the Draft Plan should include a definition of the terms *transit*, *transit center*, and *turnkey*.