HISTORY OF DEVELOPMENT OF THE LACTC COUNTY-WIDE RAIL SYSTEM

APRIL 19, 1988

LACTC

REFERENCE ONLY

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ITEM #6

Los Angeles County
Transportation
Commission
403 West Eighth Street
Suite 500
Los Angeles
California 90014-3096
(213) 626-0370

LACTC

April 19, 1988

MEMO TO: TRANSIT COMMITTEE - 4/25 MEETING

FROM: ACTING EXECUTIVE DIRECTOR

SUBJECT: **HISTORY OF DEVELOPMENT OF THE LACTC COUNTY-WIDE RAIL SYSTEM**

ISSUE

At its March 23 meeting, the Commission requested that staff review the development of the County-wide Rail Development Plan to explain the criteria used to select high-priority rail corridors, routes and alignments. This memo is a response to that request.

The memo begins with the passage of the Proposition A Ordinance and its mandate for development of a County-wide rail system. It then traces the steps of the Commission's Rail Transit Implementation Strategy (RTIS). These included selecting high-priority rail corridors, representative routes and modes within each corridor, and a systemwide operating plan. The memo concludes with a brief discussion of Route Refinement studies that have further defined alignments within high-priority corridors and the status of projects that have proceeded to the Environmental Impact Report phase of development.

BACKGROUND

Proposition A Ordinance

After the Supreme Court validated the Proposition A law, the Commission had to determine where to build rail transit and when. To direct the Commission in its task, Proposition A provided policy guidelines. These guidelines are contained in Section 5 of the ordinance, "THE USE OF REVENUES RECEIVED FROM IMPOSITION OF THE TRANSACTION AND USE TAX", and are as follows: "The system will be constructed as expeditiously as possible. Emphasis shall be placed on the use of funds for construction of the System. Use of existing rights-of-way will be emphasized. The System will be constructed and operated in substantial conformity with the map attached hereto as Exhibit 'A'" (illustrated on the next page).

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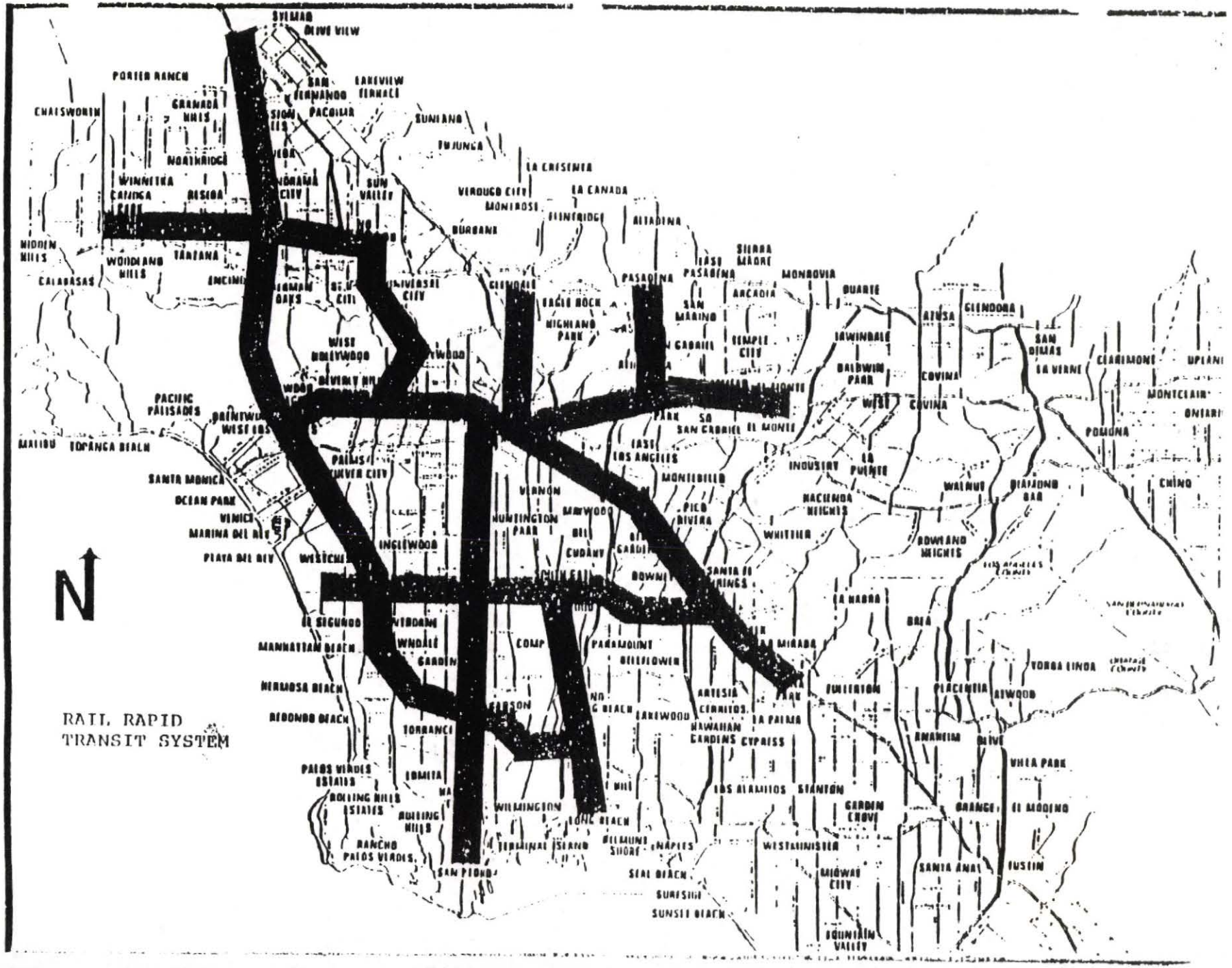
EXHIBIT A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CALABASAS
ENCINO
GLENDALE
EAGLE ROCK
HIGHLAND PARK
PASADENA
EAST PASADENA
SIERRA MADRE
MONROVIA
ARCADIA
DUARTE
SAN MARINO
TEMPLE CITY
IRWINDALE
AZUSA
GLENDORA
SAN DIMAS
LA VERNE
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BALDWIN PARK
WEST COVINA
MONTCLAIR
ONTARIO
POMONA
CHINO
PACIFIC PALISADES
MALIBU
TOPANGA BEACH
SANTA MONICA
OCEAN PARK
VENICE
MARINA DEL REY
PLAYA DEL REY
WESTCHESTER
INGLEWOOD
CULVER CITY
VERNON
HUNTINGTON PARK
MAYWOOD
BELL
CUDAHY
SOUTH GATE
EAST LOS ANGELES
MONTEBELLO
PICO RIVERA
SAN GABRIEL
EL MONTE
INDUSTRY
LA PUENTE
HACIENDA HEIGHTS
WHITTIER
WALNUT
DIAMOND BAR
ROWLAND HEIGHTS
EL SEGUNDO
MANHATTAN BEACH
HERMOSA BEACH
REDONDO BEACH
TORRANCE
GARDENA
COMPTON
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BELLFLOWER
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YORBA LINDA
FULLERTON
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ANAHEIM
BUENA PARK
ORANGE
EL MODENO
GARDEN GROVE
LOS ALAMITOS
STANTON
WESTMINSTER
SEAL BEACH
SURFSIDE
SUNSET BEACH
PALOS VERDES ESTATES
ROLLING HILLS ESTATES
ROLLING HILLS
RANCHO PALOS VERDES
LOMITA
WILMINGTON
LONG BEACH
TERMINAL ISLAND
BELMONT SHORE
NAPLES
SAN PEDRO
MIDWAY CITY
SANTA ANA
TUSTIN
FOUNTAIN VALLEY

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While Proposition A was proceeding through litigation in the California Courts, the Commission had begun a study to consider construction of a rail project with existing State funds set-aside for rail transit in Los Angeles County. Also, the SCRTD had begun the Environmental Impact Report process for the Metro Rail Starter Line. The Commission elected to proceed with a light rail transit project between the cities of Long Beach and Los Angeles using the existing Southern Pacific Transportation Company's right-of-way. The SCRTD began its quest for federal funds for Metro Rail. When the Supreme Court validated the Proposition A ballot, these two projects were the first Proposition A rail lines committed for construction by the Commission.

Rail Transit Implementation Strategy

Since rail construction could not begin simultaneously in the 13 corridors identified by the Proposition A Map, the Commission initiated a Rail Transit Implementation Strategy (RTIS) to develop a plan to guide the phased implementation of the county-wide system. The RTIS had 3 stages. The first step was to designate high-priority corridors (beyond San Fernando Valley-to-Los Angeles and Long Beach-to-Los Angeles) which warranted rail transit service in the near term. Stage 2 evaluated a number of possible routes and modes within these corridors. Stage 3 combined these routes, in addition to the Metro Rail Starter Line, the Long Beach-Los Angeles Line, Harbor and El Monte Busways, and the Century Freeway transitway, into an interim system of busways and rail lines. The first step of Stage 3 was to evaluate how the interim system would operate, what design requirements were needed at rail-busway and rail-rail transfer points, and how the individual lines would be affected by the ridership on the entire system. The next step was to evaluate the system implications of a busway/HOV or rail facility in the median of the Century Freeway.

The Stage 1,2 and 3 reports accompany this memo. They provide the details of how the county-wide system was developed. At each step the Commission deliberated and adopted a position. Each adopted position provided the policy platform for the decisions at the next level of detail. Together they constituted a series of nested decision levels logically leading to project definition.

The next sections of the memo will review the RTIS community involvement program and will focus on the criteria used and procedure followed to select high priority corridors and representative routes within the corridor.

Community Involvement in the RTIS Process

The LACTC community involvement program for the Rail Transit Implementation Strategy used a hierarchy of organizations to represent different levels of community interests for different phases of the Strategy. In Stage 1, determining high-priority corridors, LACTC worked with community groups, agencies and elected officials to discuss the county-wide development of the rail system. In Stage 2, groups were identified that had interest in the general location of the rail line within a corridor to help select a representative route within corridors. The position of these local jurisdictions, chambers of commerce, elected representatives, and other community leaders was important to the Commission as it selected the "representative" routes chosen in the Stage 2 process.

Stage 1, Selecting the High-Priority Corridors

Staff first reviewed the numerous previous studies that had been produced for rail transit projects in Los Angeles to gather the data. These studies included engineering, cost and ridership information for routes within the corridors. This information was supplemented by current data from the Los Angeles City and Los Angeles County Departments of Planning to assess the number of growth centers a line would traverse within a corridor; the Los Angeles County Assessor's file to develop a land use distribution score; and SCAG's 1982 Regional Line Haul Study to obtain year 2000 volume-to-capacity ratios. Other factors such as forecasted ridership, potential construction cost, and percentage of the line that might use existing rights-of-way were also included in the evaluation.

The principal criteria used to select high priority corridors were developed from SCAG's Regional Transportation Plan (RTP). The RTP is the document required by Federal law that guides transportation planning in metropolitan areas. Three criteria were used. These included:

1. Support Development of Centers
2. Relieve Capacity Deficiencies
3. Promote Balanced Subregions

These criteria are general policies that apply to a broad array of transportation improvements. To orient these criteria toward rail transit, staff used the following quantitative indicators for each criteria, respectively:

1. Number of growth centers a rail line would traverse in a given corridor on a "per mile" basis.

2. Volume/Capacity ratios in each corridor which measure traffic congestion and the ability of the transportation system to accommodate travel.

3. Land use distribution pattern and transit dependency which encourages travel within a subregion.

The greater the number of growth centers potentially traversed by rail transit in a corridor the more likely the service would support the adopted Los Angeles City and County General Plans. The focus on growth centers and the land use distribution criteria was to emphasize the support of land use policies with the rail transit project. This general planning criterion was supplemented with the transportation goal of relieving traffic congestion, as indicated by the volume/capacity ratios. Those corridors that had higher ratios had more traffic congestion and would benefit to a greater degree from additional transit facilities than those corridors that had lower ratios.

Table 2 of the Stage 1 report, shown on the following page, illustrates the results of the analysis. On the basis of the table, discussions with other transportation agencies and local jurisdictions, the Commission selected the following 6 high-priority corridors (beyond San Fernando Valley-to-Los Angeles and Long Beach-to-Los Angeles):

1. San Fernando Valley (E/W)
2. West Los Angeles (N/S) (actually along the Coast, north-south)
3. Wilshire West
4. Santa Ana
5. Pasadena
6. Century

Stage 2, Selecting Representative Routes and Modes

The next step in the RTIS was to evaluate possible generalized routes within a corridor. The initial phase of this work included

TABLE 2: CORRIDOR RATINGS BY SYSTEM CRITERIA

SYSTEM CRITERIA	CENTURY	EL MONTE	EXPOSITION	GLENDALE	HARBOR	PASADENA	ROUTE 2	SAN FERNANDO (E/W)	SAN FERNANDO (N/S)	SANTA ANA	SOUTH BAY/HARBOR/TB	WEST L.A. (N/S)	WILSHIRE WEST
Support development in centers . number of growth centers per mile			X				X					X	X
Relieve capacity deficiencies . year 2000 volume/capacity ratios	X									X		X	X
Promote balanced subregions . degree of land use mix				X		X		X				X	X
Meet existing needs first . percent transit dependency . crosstown orientation . patronage	X					X				X			X
Maximize transit ridership . volume/capacity ratio . cost per mile . patronage					X	X				X			X
Use existing facilities . percent of line along existing facility	X	X	X		X			X					
Be cost effective.													
Be environmentally sound													
Be financially feasible													
Be acceptable to public													

a review of the rail alignments studied previously by other transportation agencies and in consultation with representatives of both local jurisdictions and transportation-oriented community groups.

The general process the Commission followed in the Stage 2 route analysis was to start with the high-priority corridors as broadly defined by the Proposition A map. Staff, with input from the community groups and elected officials, then used the policy guidelines as defined by Proposition A to select candidate routes for each of the high-priority corridors. The task was to discover potential routes based on the policy of expeditious construction and use of existing rights-of-way that would substantially conform to the Proposition A map. In some cases, such as the San Fernando Valley (E/W) corridor, to satisfy this policy and to evaluate reasonable candidate alignments, the routes covered a broad geographical area within the San Fernando Valley subregion.

The Commission selected an engineering consultant to evaluate 26 candidate routes for engineering feasibility and cost. The Commission also contracted with SCAG to provide patronage analyses for assessing the ridership demand for each of the candidate routes in the year 2000. The Commission contracted with the Los Angeles City and County Departments of Planning to describe the land uses along each of the routes. As a proxy measure for environmental impacts, it was felt that the more residential land uses along a route, the more environmental impacts could be expected. Specific impacts were not evaluated because the precise alignments of the alternative routes were not known. Maps were prepared by the planning departments that illustrated land uses along each route. The city and county then estimated the percentage of residential, industrial and commercial uses that the routes passed through.

The Commission's consultant prepared conceptual alignment drawings and cost estimates for representative routes within each corridor. These included both grade-separated and at-grade modes of rail transit. Each representative route was studied based primarily on the SCAG ridership forecast and engineering considerations derived from the previous studies and conceptual engineering. The corridors that required high-capacity transit were designated (for simplicity) as "heavy rail" and those with lesser capacity requirements "light rail".

These two designations were consistent with the committed Metro Rail and Long Beach-Los Angeles projects and were important in developing an integrated operations plan, described in Stage 3,

below. It was not intended that these mode descriptions would be final, nor have they been. As work advances in each corridor we have continued to evaluate the mode based on the specifics of the alignments being studied.

The final step in the Stage 2 work was to select "representative" routes in the high-priority corridors. The concept was to determine, to the extent possible, the general routing and mode of rail transit service in a corridor. For example, the Commission identified the "Burbank Branch" route in the San Fernando Valley (E/W) Corridor. This route generally used a railroad right-of-way. However, variations of this route were later studied in a route refinement process that included sections of the line not within that railroad right-of-way. In simple terms starting with a broad corridor, we were trying to decide on a more narrow corridor for alignment studies to come. (For example, should we generally be at the southern, middle or northern portion of the corridor.)

Representative routes for each high-priority corridor were selected using cost-effectiveness, land use and community support criteria. Cost-effectiveness measures the economic return, i.e.,how many riders would we attract for each million dollars invested. The types of land use adjacent to a route is a proxy measure for potential environmental impacts, and the ability of a line to support the land use objectives of the region. Community support was based on input from local jurisdictions, chambers of commerce, political representatives and other community leaders generally representing the subregions that the corridors are located in.

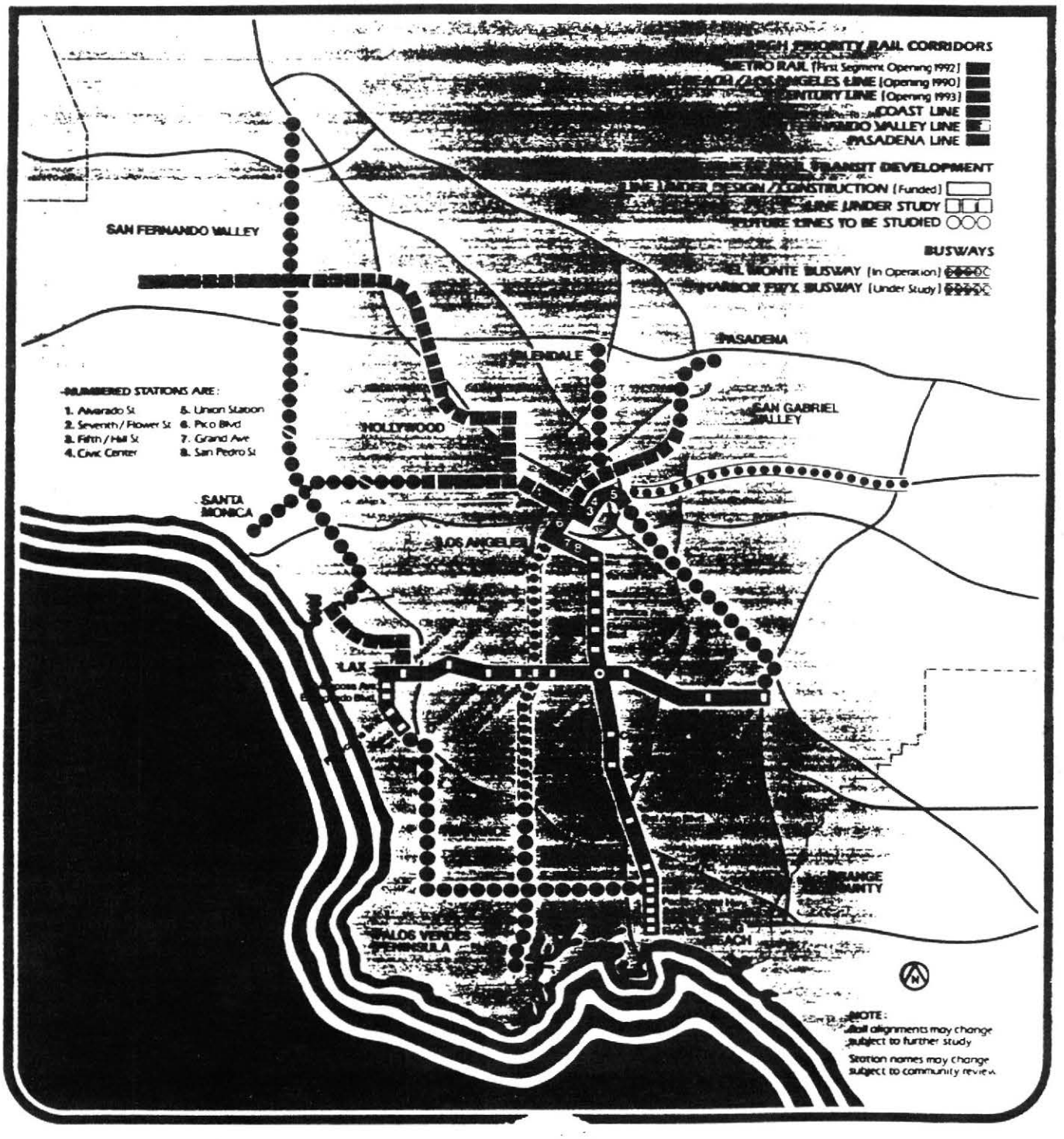
The representative routes adopted in Stage 2 resulted in an interim rail system, as shown by Map 1 on the next page. The next step in the RTIS process was to determine how the representative routes would operate as a system. In addition, Stage 3 analyzed the effects on the system of adopting a Busway/HOV or Rail Transitway facility within the Century Freeway median. The analysis resulted in the Commission adopting the Century Freeway Rail Transit Project.

Stage 3A, System-wide Operations

A systemwide operating plan was developed for the full interim rail system including an assumed (long-range) Century Freeway rail line. The approach taken was to assume a certain preliminary operating plan, to estimate line patronage levels based on this plan, and then to modify the plan based on the initial patronage

Transit Development in Los Angeles County

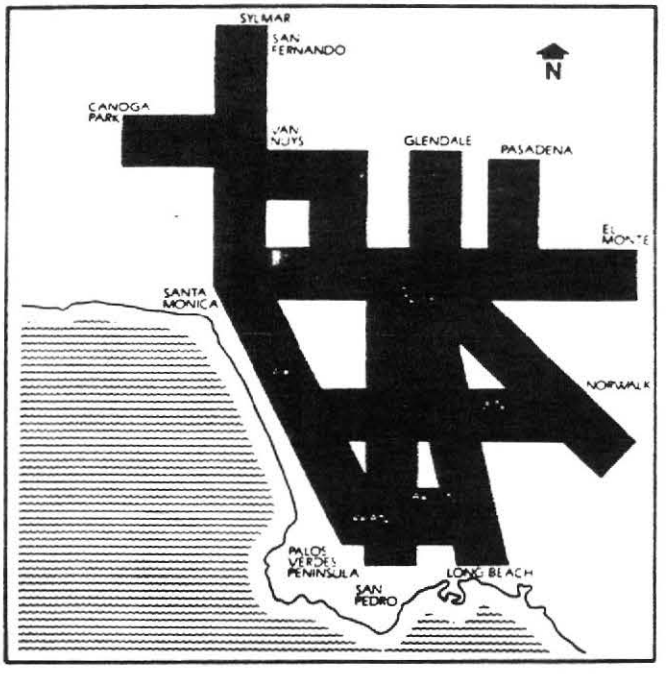
LOS ANGELES COUNTY TRANSPORTATION COMMISSION



LACTC

TRANSIT DEVELOPMENT IN LOS ANGELES COUNTY

- Proposition A is Los Angeles County's half-percent sales tax for public transit, passed by county voters in 1980.
- 35 percent of these tax revenues (about $110 million per year) are dedicated to the construction and operation of a rail transit system serving the entire county. Rail lines will be built in the transportation corridors outlined on the map below.
- The SCRTD's Metro Rail starter-line had been identified in previous studies as the most effective way to serve the densely populated regional core of the county; it will be built using federal, state, and local funds and private benefit assessments, as well as Proposition A funds.



- The LACTC selected a route from downtown Long Beach to downtown Los Angeles as the next line of the system; it will be constructed using only Proposition A funds.
- The LACTC also is building a rail line with Proposition A funds in the middle of the new Century Freeway. The line turns southward near LAX to serve the El Segundo employment area; in the future, plans call for extensions north and south along the coast.
- Projects are being developed in other corridors as well. The LACTC is studying possible routes for an east-west rail line in the San Fernando Valley and for a line from downtown L.A. to Pasadena. In the San Gabriel Valley, when passenger-demand warrants, the El Monte Busway can be converted to rail. Caltrans is designing an exclusive busway along the Harbor Freeway, which will serve the needs of that corridor and also may be converted to rail at some time in the future.
- The color map on the reverse side shows corridors where projects are under construction and other corridors that have been designated as 'high priority.' The LACTC will study corridors not yet designated as high priority when conditions in those areas justify building more rail lines.

For more information, please write or call the LACTC's rail hotline, (213) 620-RAIL, or write to the LACTC at:

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
403 W. Eighth Street, Suite 500
Los Angeles, CA 90014

results. A final operating plan was then assumed and the ridership estimates recalculated. The result was a conceptual operating plan that showed routings for the Metro Rail and Light Rail Lines; transfer stations between Metro Rail, Light Rail and Busways; train turn-around locations; mid-day train storage requirements; and maintenance yard requirements and locations.

This operating plan is revised as new information is developed about the developing system progresses. For example, a more detailed analysis of the operating requirements for the San Fernando Valley (E/W) line was done in conjunction with the route refinement work in that corridor. It was determined that a non-revenue service subway connection between the Valley Line and Metro Rail at N. Hollywood for infrequent heavy maintenance would be more costly than adding more capability to the light maintenance and storage yard initially assumed for the Valley.

Stage 3B, The Century Freeway Transitway

The Consent Degree issued in September 1981 by the court authorizing construction of the Century Freeway required that it include a transitway in its median. It was to be constructed as a bus/HOV facility, designed for convertibility to rail, or if funds were committed for the extra cost, the transitway could be constructed initially as rail. Ultimately, Proposition A requires the transitway to be rail. Caltrans asked LACTC for design direction no later than mid-1984. This section describes the method used to determine whether a rail line or bus facility should operate in the transitway initially. This decision had to await this point in the planning process because until we knew to what the Century line connected, it was not possible to evaluate the options meaningfully.

The first step in the analysis was to develop an agreed operating plan, specifically for the Century/Harbor busway subsystem. Patronage projections were then calculated and operating costs derived based on required vehicle miles of operation. This was done for both the busway and rail alternatives. Capital costs were estimated based on the design elements for each of the alternatives. The cost of later converting a busway/HOV facility to rail was also estimated and the specific construction impacts described.

The results of the analysis were as follows: a) the difference in bus vs. rail patronage was not significant when compared to the accuracy of the patronage forecasting process itself; b) the total

net cost increment to initially build rail on the Century transitway was then estimated to be $133 million; and c) the rail alternative, as compared to the busway, might save up to $9 million dollars a year in operating costs.

These findings were reviewed with the Commission, regional agencies, and affected local jurisdictions. Twenty-two cities officially requested that the rail line be built initially with parallel carpool lanes; no city opposed the rail line or favored the busway.

The Commission committed funds to build the line on June 13, 1984. It subsequently approved extending the project an additional 3 miles to the El Segundo employment area in late 1986.

Route Refinement and Environmental Impact Report Studies

At the conclusion of the RTIS the Commission had an adopted interim rail transit plan to guide the development of the high-priority rail system in Los Angeles County. The plan included commitments to three projects: Metro Rail, Long Beach-Los Angeles, and the Century Transitway (subsequently re-named as the Norwalk-El Segundo Project). Representative routes and modes were selected in 5 corridors: "light rail" in the Pasadena, San Fernando Valley (E/W) and Coastal (formerly called West Los Angeles (N/S)) Corridors. Extensions of Metro Rail were envisioned in the Santa Ana and Wilshire West Corridors.

The next step in further developing the adopted plan was to better define the representative routes in the "light rail" corridors. The heavy rail corridors were designated as extensions of Metro Rail. Further analysis of these extensions are dependent on the availability of Federal funds for construction after the San Fernando Valley-to-Los Angeles section is committed fully.

The goal of route refinement was to flesh out environmental and engineering issues for proposed alignments within a corridor and prepare for the environmental clearance process. Before proceeding with an environmental impact report to clear a project, it is prudent to do more detailed engineering work, environmental assessment and broaden the community outreach effort to better evaluate the costs and environmental issues associated with the alternative routes in each of the high-priority corridors. In this way the Commission would be better informed about the engineering, cost and community issues of any proposed rail project, and during the formal EIR process much more attention could be

paid to alternative mitigation measures. Under the California Environmental Quality Act, only the project and a "no-build" alternative have to be carried; that is different than the federal clearance process where multiple alternatives must be carried. The route refinement study step is useful to make sure the project has support and to avoid surprises during the formal EIR process.

The first project to proceed to the route refinement stage was the North Segment of the Coastal Corridor. The City of Los Angeles was preparing a Coastal Corridor Transportation Specific Plan and requested that the LACTC extend its proposed route refinement work from the Airport to the Marina Del Rey area, the initial northern terminus of the Coastal Corridor. Subsequently route refinement studies were completed in the San Fernando Valley and the Pasadena Corridors.

Environmental Impact Reports and Financial Considerations

Before funds can be committed to an additional rail transit project, the Commission has to clear it with an environment impact report. However, the decision to do an EIR is dependent, to a large degree, on the confidence the Commission has in its ability to fund an additional project.

Recently staff provided the Commission with an assessment of the funding availability for an additional light rail project in either the San Fernando Valley (E/W), Pasadena or Coastal Corridors. The analysis at that time indicated that approximately $485 million will be available in the 1989-1995 period, assuming that the committed projects are built within budget and the LACTC share of the Metro Rail MOS-2 segment is moderate. Given this information, the Commission is proceeding with environmental impact reports for projects within each of the corridors indicated above. The EIR's for these projects are expected to be completed by the end of this year at which time a funding commitment can be made to a cleared project. In addition, the Commission will be asked to commit funds for MOS-2 this summer or fall.

CONCLUSION

The Commission has progressed to a stage in the development of the county-wide rail system that will allow it to complete or have under construction 75 miles of rail transit before the year 2000; this is our primary rail transit objective. The foundation of this progress is the adopted rail development plan that emerged from the Rail Transit Implementation Strategy work in 1983 and

1984. Building on this foundation has been route refinement work in 3 "light rail" corridors and the success of the SCRTD in obtaining a federal commitment for continued Metro Rail MOS-2 funding. Environmental impact reports have begun in the San Fernando Valley, Pasadena and Coastal Corridors. The Commission should be in a position to fund an additional light rail project at the beginning of next year. We have made substantial progress in expeditiously constructing the county-wide system and have the momentum to provide rail service to a significant portion of the county by the year 2000.

By way of comparison, Houston started planning its rail system in 1980 and Dallas in 1983; it is clear how much further Los Angeles has advanced in the intervening years. To a great extent this has been the result of our staged process which has defined a high-priority plan and built upon incremental policy decisions. Details within the plan may change as studies advance, but having adopted the overall vision is the essential difference in our ability to move forward.

Prepared By: BENJAMIN DARCHE
Rail Development Engineer

for Paul C. Taylor (BD)

PAUL C. TAYLOR
Acting Executive Director

PCT:BD:cm

Item #7

Los Angeles County
Transportation
Commission
354 South Spring Street
Suite 500
Los Angeles
California 90013
(213) 626-0370

July 18, 1984

MEMO TO: RAPID TRANSIT COMMITTEE - 7/23 MEETING

FROM: DEPUTY EXECUTIVE DIRECTOR

SUBJECT: RAIL TRANSIT IMPLEMENTATION STRATEGY: FY '85 PROGRAM

ISSUE

Over the past 18 months, the Commission has taken important steps in establishing an implementation strategy for the Proposition A rail transit system. It has determined priority corridors, adopted representative rail routes within those corridors, and evaluated its financial ability to construct this interim rail network. Its decisions to proceed with the initial Century Freeway rail project line and to perform its preliminary engineering have further advanced implementation. Knowledge gained in this process has also been critical in helping the Metro Rail and Long Beach rail projects understand how they might best accommodate future rail lines.

In the months ahead issues related to Metro Rail funding and revenue bonding authorization may be clarified. This will allow us to discuss more fully possible line section priorities and tentative design and construction schedules.

In certain instances, however, we need to begin further work to refine future rail alignments. These are primarily locations where rail lines come together. These are: a) how the San Fernando Valley light rail line should approach and integrate with the North Hollywood Metro Rail Station, b) how the Long Beach line and the Pasadena line should connect with each other through downtown Los Angeles, and c) how the Century and Coast light rail should be tied together in the El Segundo area. Additional areas of needed work include the refinement of the Coast light rail line in the Playa Vista development area and the establishment of procedures to protect future rail transit rights-of-way.

BACKGROUND

The work program to resolve the issues related to the continuing implementation strategy are presented below in the order they need resolution:

1. The North Coast Line Alignment Study - ~~$50,000~~ $0,000 Revised

In the areas between Los Angeles International Airport and Marina del Rey, a number of County and City of Los Angeles agencies are doing studies to help define development plans. Because of the uncertainties on future access, a one-year moratorium was placed on development in part of this area so that this work can be done. A plan is to be drafted by the end of this year at which time the moratorium may be lifted. Critical decisions are being made -- on land use, road improvements, and funding -- which will directly affect the cost and effectiveness of the light rail line in our Coastal corridor. I believe it is critical that we support this work by detailing by the end of the year the plan, profile, and station needs of the light rail line through this area,with special emphasis on the Playa Vista development area.

2. The North Hollywood Station Approach Study - $150,000

Over the last six months the Commission and RTD staffs have worked closely to modify the design of the Seventh & Flower Station to incorporate light rail. The result will be a very attractive and convenient means of transferring between the Metro Rail and Long Beach rail lines. The same must be done at the North Hollywood Station. So far, the design of the North Hollywood Station is proceeding without a clear understanding of how the light rail line is to approach and be physically integrated with that station. Because the number of light rail patrons who will be transferring to Metro Rail is very large (over 7,000 during the morning peak hour) it is imperative that this transfer be as convenient as possible. Moreover, because this station may well need to be built soon, it is important to study and agree on what the interrelationship will be. Final design of the North Hollywood Station needs to be delayed until all of us--RTD, LACTC, the community--have agreed on the light rail approach and integration. Because of the community participation involved, it is likely that this work will take 6 months, and be directly usable in any follow-up environmental clearance process necessary.

3. The El Segundo Environmental Impact Assessment - $200,000

This work was committed by the Commission as part of its Century light rail decision. Caltrans will need to know how the western end of the Century line, including the Aviation Station, will be configured in order to complete its freeway design. This information, however, depends on how the Century and Coast Line come together and how the El Segundo Extension is designed. This work will result in a completed Environmental Impact Report.

4. Downtown Connection to the Pasadena Line - $250,000

For a number of reasons it is important to agree on an alignment and implementation plan for the downtown extension of the Long Beach line through downtown Los Angeles. Because the result depends so much on the consequent feasibility and cost of the Lincoln Heights alignment, the work will necessarily include that area. It will be done in conjunction with a number of agencies working on downtown developments; the communities downtown, in Lincoln Heights, and in Chinatown; and the development community itself. The result will be helpful to each of these interests.

5. Rail Transit Right-of-Way Protection - $40,000

The Commission should also develop a policy and then procedures for protecting land clearly needed for future rail lines and station areas. Administering this will require continuous coordination with planning and permitting agencies throughout the County.

RECOMMENDATIONS

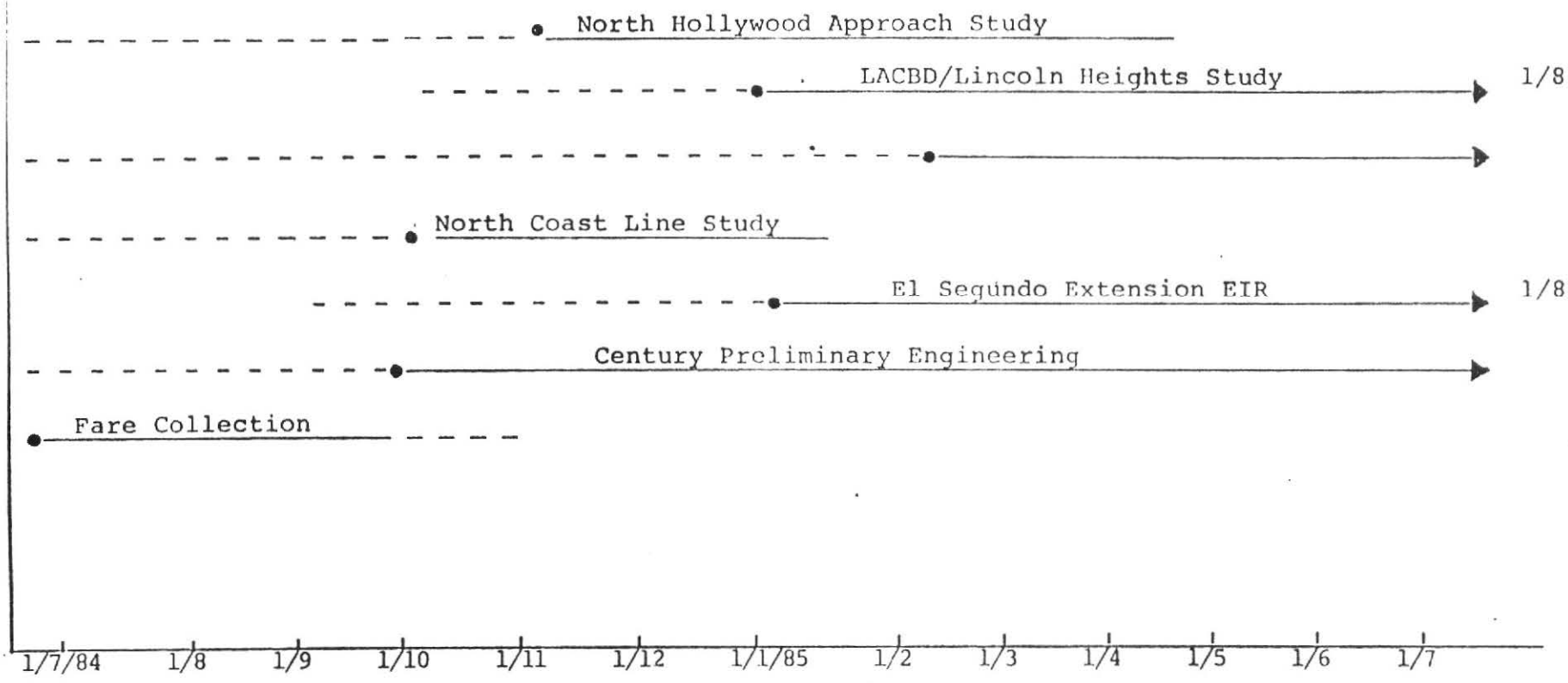
The staff recommends to the Commission that it concur with the need to do this work over the next year and one-half and budget the $700,000 expected to be needed to perform this work. Our intent would be to perform much of this work with consultants at the direction of our present rail development staff; however, combining this workload with engineering of the Century Freeway rail transit project may warrant adding two staff positions in rail development, details on which will be brought before the Committee in the near future. The expected schedule for this activity is attached.

Because of its critical time path, the staff also requests that it be authorized to issue an RFP for the North Coast Line Alignment Study, the specific contract for which will be brought to the Committee at a later date. The expected schedule for undertaking the other studies is shown in the attached chart.

Report Prepared by: RICHARD M. STANGER
Project Director,
Rail Development

PAUL C. TAYLOR
Deputy Executive Director

RMS:gb



RAIL TRANSIT IMPLEMENTATION STRATEGY: WORK PROGRAM FOR FY'85

LACTC

Los Angeles County
Transportation
Commission
354 South Spring Street
Suite 500
Los Angeles
California 90013
(213) 626-0370

Capsule Descriptions of Members of The Rail Development Team

October 19, 1984

PAUL TAYLOR, DEPUTY EXECUTIVE DIRECTOR FOR TRANSIT DEVELOPMENT

Mr. Taylor has been with LACTC for three years, with responsibility for programming and fiscal analysis for one year and the transit development activities for two years. Previously, he was Director of Bus Planning for Southern California Rapid Transit District and Principal Planner for Rapid Transit at RTD. Mr. Taylor has a Master's degree in civil engineering.

DANIEL S. CAUFIELD, PROGRAM DIRECTOR

Mr. Caufield began at LACTC as Project Manager in September, 1982. Prior to coming to Los Angeles, he had six years' experience in rail transit operations and construction with the Massachusetts Bay Transportation Authority, including three years' responsibility for operations and project development for Boston's light rail system. Mr. Caufield has a Bachelor's degree in civil engineering from M.I.T.

RICHARD M. STANGER, PROJECT DIRECTOR, RAIL DEVELOPMENT

Mr. Stanger has guided LACTC's development of a rail transit implementation strategy over the last two years. Prior to employment at LACTC, he was a design manager for the Metropolitan Atlanta Rapid Transit Authority, from project planning through design into operations. Mr. Stanger is a graduate civil engineer with Master's degrees in city planning and transportation engineering. He is a registered Professional Engineer, and is Chairman of the Rail Transit Committee of the Transportation Research Board.

EDMUND R. RICHARDSON, RAIL TRANSIT DESIGN

Mr. Richardson has been the Chief Engineer on the Long Beach-Los Angeles project for the last two years. He worked the previous three years as Chief Civil Engineer supervising civil design of the light rail transit project in Pittsburgh, Pennsylvania. Mr. Richardson has a total of twenty-five years in design and construction of public works projects. He is a registered Professional Engineer and holds a Bachelor's degree.

NORMAN J. JESTER, MANAGER, RAIL TRANSIT SYSTEMS

For the last fourteen years, Mr. Jester has been involved in the day-to-day operations of a rail system, and as a consultant in system engineering design of several rail transit systems. For seven years he gained operating experience with PATCO (Lindenwold Line) which operates a highly successful rail line from Philadelphia to suburban New Jersey. Working for NFTA he was involved in the planning and design of Buffalo's Light Rail System. As a consultant for seven years he was involved in planning, design, construction, test and start-up of Miami's rapid transit system, and operations planning for SCRTD's Metro Rail.

SHARON ROBINSON SIVAD-EL, MANAGER OF EXTERNAL AFFAIRS

Ms. Sivad-El has been the Environmental Affairs Officer for the Long Beach-Los Angeles project for two years. The previous five years she worked as a consultant in community/economic development and transportation in Los Angeles and Boston. Ms. Sivad-El holds a Bachelor's degree in sociology and a Master's in city planning from M.I.T.

MARIO R. GUZMAN, RAIL TRANSIT SYSTEMS ENGINEER

Mr. Guzman has fouteen years' experience in engineering, design, construction and start-up of large industrial projects, ranging from 300 to 1700 million dollars, with the Bechtel group of companies. For two years, he worked on the BART project in San Francisco. He is a graduate electrical engineer from UTFSM, and is a Registered Professional Engineer and speaks English and Spanish fluently.

LINDA FORD McCAFFREY, PROJECT CONTRACTS OFFICER

Ms. McCaffrey has been responsible for contract administration for the Long Beach-Los Angeles project for the past two years. She has four years' previous experience in project management and was staff to the Environmental Quality Board of the City of Los Angeles. She holds Bachelor's and Master's degrees from UCLA and is presently working toward special certification in contracts administration at UCLA.

WALTER S. STEPHENSON, MANAGER OF PROGRAM CONTROL AND CONTRACTS

Mr. Stephenson has thirty-four years' experience in engineering and management of major construction projects. For the most recent nine years, he was Manager of Project Controls and Contracts for the Ralph M. Parsons Company, responsible for estimating, planning/scheduling, cost control, progress reporting, management information systems and contract administration of major engineering procurement and construction management projects valued over $500 million.

LIONEL W. VINCENT, MANAGER OF CONSTRUCTION

With over twenty years' experience in construction related to transportation, Mr. Vincent recently worked six years with the Massachusetts Bay Transportation Authority in Boston. At MBTA, he was responsible for testing, inspection and evaluation of construction materials, components and systems for a major system-wide expansion and modernization program. Mr. Vincent served six years on the faculty of Harvard University as Assistant Professor in Construction. He is a graduate civil engineer and a Registered Quality Engineer in California.

BENJAMIN DARCHE, RAIL DEVELOPMENT OFFICER

For the last two years, Mr. Darche has been responsible for planning and financial analysis of LACTC's rail transit implementation strategy. Prior to joining the Commission he worked in social and economic development programs in Los Angeles and abroad. Mr. Darche has a doctorate in urban and regional development.

BETTY BRYANT, DIRECTOR, GOVERNMENT AND PUBLIC AFFAIRS

Ms. Bryant has held her position with LACTC since May, 1983. She has practiced law 8 years in the private sector; served as Assistant Secretary and General Counsel for the State Business, Transportation and Housing Agency; was Director of the state Department of Economic & Business Development where she was co-coordinator of the Century Freeway Task Force for the state; then was appointed Senior Vice President of a bank, serving as Director of Business & Government Administration. She holds a Juris Doctor degree.

STEPHEN LANTZ, COMMUNITY RELATIONS OFFICER

Mr. Lantz has served on LACTC staff for the past year; for the previous 5 years he served on the Commission's Citizens' Advisory Committee, which he chaired in 1983. Before joining LACTC staff, Mr. Lantz was editor and General Manager of the Century City News and the first General Manager of the Century City Chamber of Commerce. He holds a Bachelors degree in journalism/public relations.

ROBIN MCCARTHY, COMMUNITY RELATIONS REPRESENTATIVE

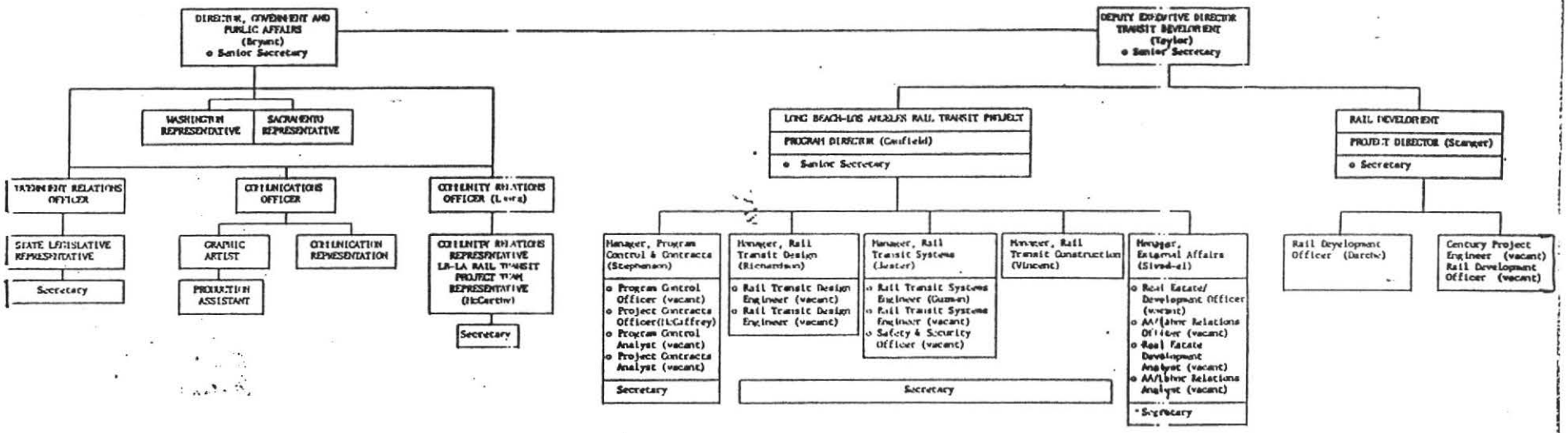
Ms. McCarthy has coordinated community relations for the Long Beach-Los Angeles project for the past year. Prior to joining LACTC staff, she worked six years in public relations with the State of California, three of which were with Caltrans. Additionally, Ms. Carthy has four years' experience managing political campaigns. She holds a Bachelor's degree in political science and history.

BARBARA NORRIS, VICENTA BECERRAL, GERI BRODIE, LINDA BUTLER - SECRETARIES

LACTC is fortunate to have the most experienced, hardest working, and most productive group of secretaries imaginable. They came to the Commission from long experiences in other less-difficult environments.

PCT:gb
Disk#4
10/17/84

STAFF ORGANIZATION FOR RAIL DEVELOPMENT
OCTOBER, 1984



Item #7

Los Angeles County
Transportation
Commission
354 South Spring Street
Suite 500
Los Angeles
California 90013
(213) 626-0370

July 18, 1984

MEMO TO: RAPID TRANSIT COMMITTEE - 7/23 MEETING

FROM: DEPUTY EXECUTIVE DIRECTOR

SUBJECT: RAIL TRANSIT IMPLEMENTATION STRATEGY: FY '85 PROGRAM

ISSUE

Over the past 18 months, the Commission has taken important steps in establishing an implementation strategy for the Proposition A rail transit system. It has determined priority corridors, adopted representative rail routes within those corridors, and evaluated its financial ability to construct this interim rail network. Its decisions to proceed with the initial Century Freeway rail project line and to perform its preliminary engineering have further advanced implementation. Knowledge gained in this process has also been critical in helping the Metro Rail and Long Beach rail projects understand how they might best accommodate future rail lines.

In the months ahead issues related to Metro Rail funding and revenue bonding authorization may be clarified. This will allow us to discuss more fully possible line section priorities and tentative design and construction schedules.

In certain instances, however, we need to begin further work to refine future rail alignments. These are primarily locations where rail lines come together. These are: a) how the San Fernando Valley light rail line should approach and integrate with the North Hollywood Metro Rail Station, b) how the Long Beach line and the Pasadena line should connect with each other through downtown Los Angeles, and c) how the Century and Coast light rail should be tied together in the El Segundo area. Additional areas of needed work include the refinement of the Coast light rail line in the Playa Vista development area and the establishment of procedures to protect future rail transit rights-of-way.

BACKGROUND

The work program to resolve the issues related to the continuing implementation strategy are presented below in the order they need resolution:

1. The North Coast Line Alignment Study - $50,000

In the areas between Los Angeles International Airport and Marina del Rey, a number of County and City of Los Angeles agencies are doing studies to help define development plans. Because of the uncertainties on future access, a one-year moratorium was placed on development in part of this area so that this work can be done. A plan is to be drafted by the end of this year at which time the moratorium may be lifted. Critical decisions are being made -- on land use, road improvements, and funding -- which will directly affect the cost and effectiveness of the light rail line in our Coastal corridor. I believe it is critical that we support this work by detailing by the end of the year the plan, profile, and station needs of the light rail line through this area, with special emphasis on the Playa Vista development area.

2. The North Hollywood Station Approach Study - $150,000

Over the last six months the Commission and RTD staffs have worked closely to modify the design of the Seventh & Flower Station to incorporate light rail. The result will be a very attractive and convenient means of transferring between the Metro Rail and Long Beach rail lines. The same must be done at the North Hollywood Station. So far, the design of the North Hollywood Station is proceeding without a clear understanding of how the light rail line is to approach and be physically integrated with that station. Because the number of light rail patrons who will be transferring to Metro Rail is very large (over 7,000 during the morning peak hour) it is imperative that this transfer be as convenient as possible. Moreover, because this station may well need to be built soon, it is important to study and agree on what the interrelationship will be. Final design of the North Hollywood Station needs to be delayed until all of us--RTD, LACTC, the community--have agreed on the light rail approach and integration. Because of the community participation involved, it is likely that this work will take 6 months, and be directly usable in any follow-up environmental clearance process necessary.

3. The El Segundo Environmental Impact Assessment - $200,000

This work was committed by the Commission as part of its Century light rail decision. Caltrans will need to know how the western end of the Century line, including the Aviation Station, will be configured in order to complete its freeway design. This information, however, depends on how the Century and Coast Line come together and how the El Segundo Extension is designed. This work will result in a completed Environmental Impact Report.

4. Downtown Connection to the Pasadena Line - $250,000

For a number of reasons it is important to agree on an alignment and implementation plan for the downtown extension of the Long Beach line through downtown Los Angeles. Because the result depends so much on the consequent feasibility and cost of the Lincoln Heights alignment, the work will necessarily include that area. It will be done in conjunction with a number of agencies working on downtown developments; the communities downtown, in Lincoln Heights, and in Chinatown; and the development community itself. The result will be helpful to each of these interests.

5. Rail Transit Right-of-Way Protection - $40,000

The Commission should also develop a policy and then procedures for protecting land clearly needed for future rail lines and station areas. Administering this will require continuous coordination with planning and permitting agencies throughout the County.

RECOMMENDATIONS

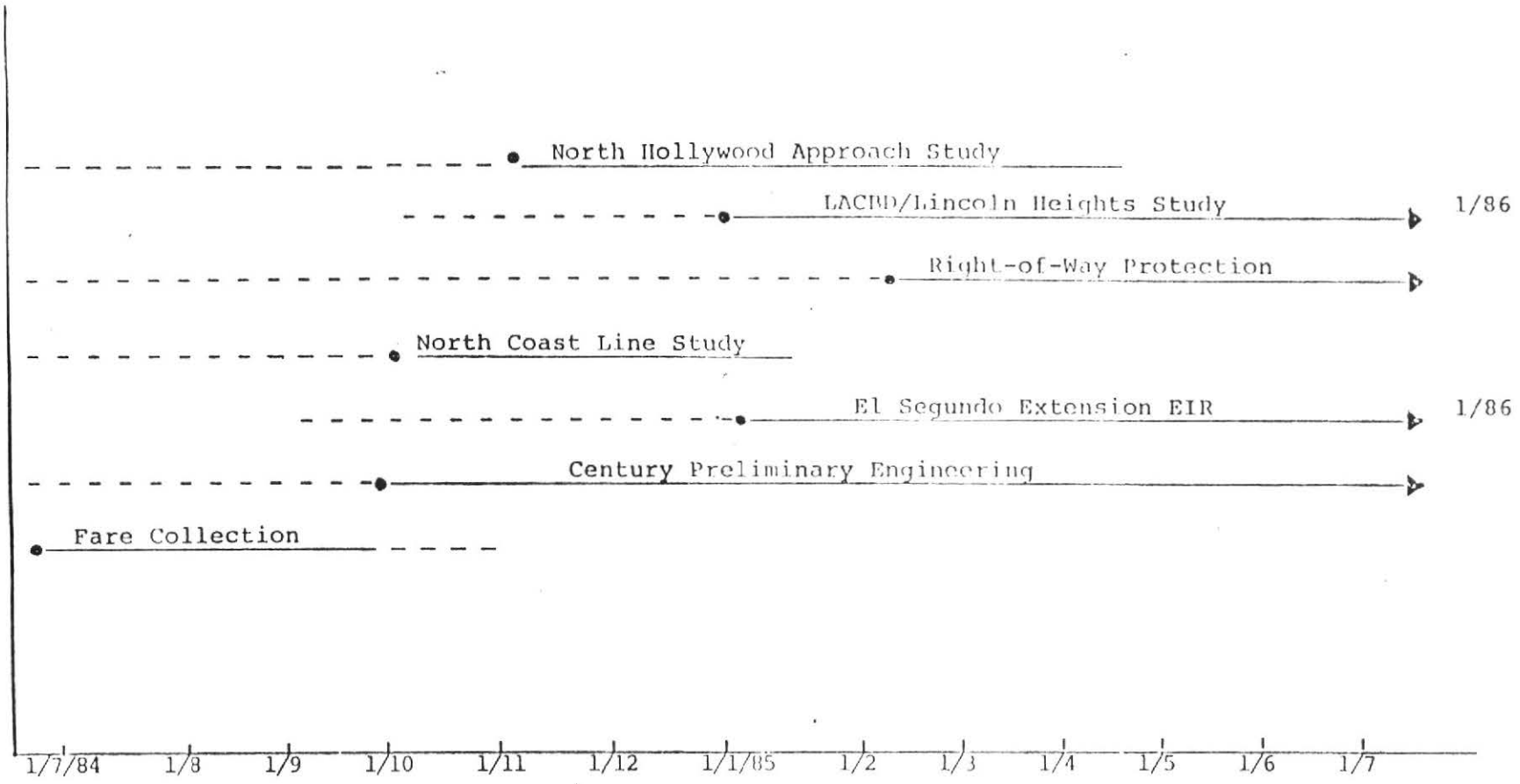
The staff recommends to the Commission that it concur with the need to do this work over the next year and one-half and budget the $700,000 expected to be needed to perform this work. Our intent would be to perform much of this work with consultants at the direction of our present rail development staff; however, combining this workload with engineering of the Century Freeway rail transit project may warrant adding two staff positions in rail development, details on which will be brought before the Committee in the near future. The expected schedule for this activity is attached.

Because of its critical time path, the staff also requests that it be authorized to issue an RFP for the North Coast Line Alignment Study, the specific contract for which will be brought to the Committee at a later date. The expected schedule for undertaking the other studies is shown in the attached chart.

Report Prepared by: RICHARD M. STANGER
Project Director,
Rail Development

PAUL C. TAYLOR
Deputy Executive Director

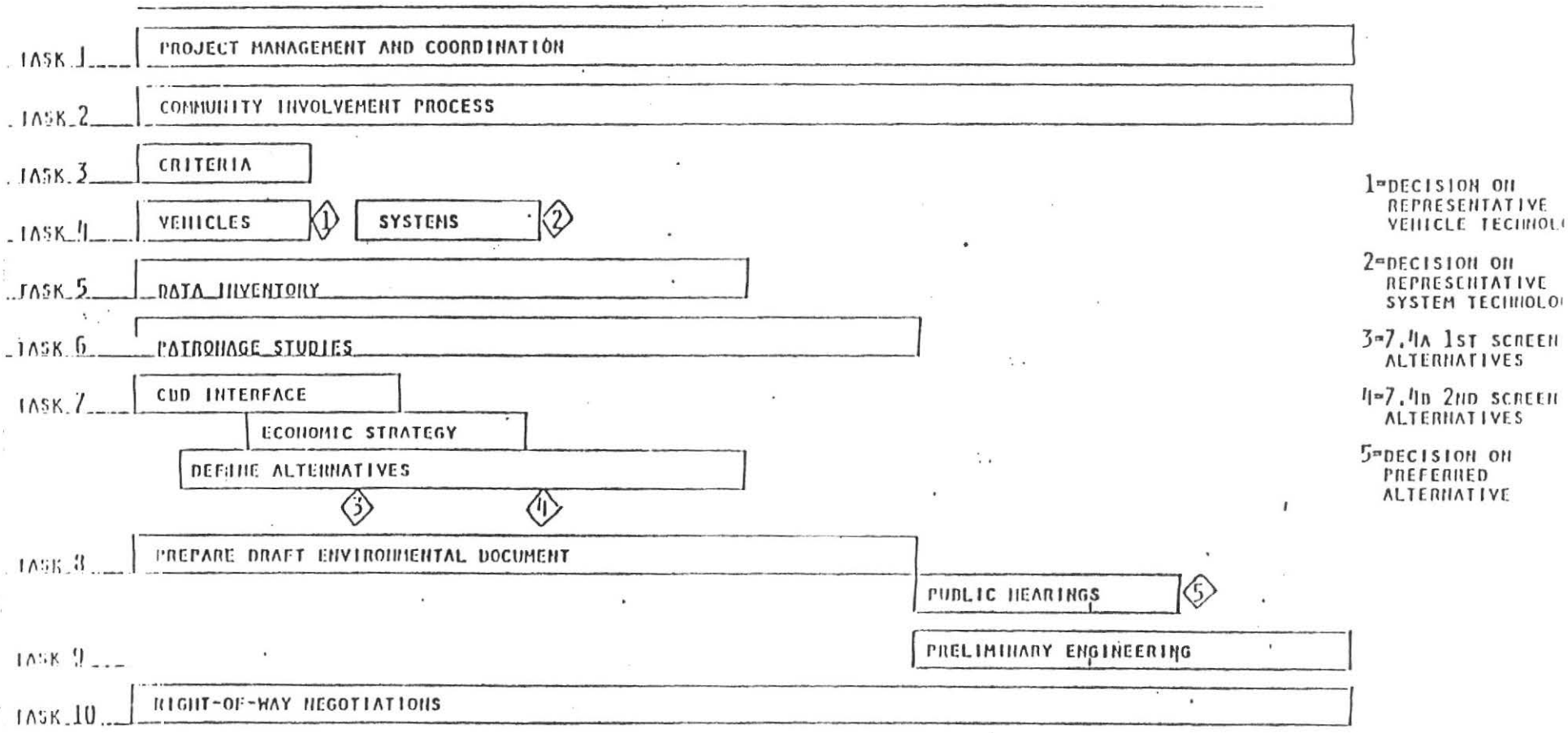
RMS:gb



RAIL TRANSIT IMPLEMENTATION STRATEGY: WORK PROGRAM FOR FY'85

TYPICAL PROJECT DEVELOPMENT PROCESS

(Duration: 18 months - 5 years)



STAGES IN DEVELOPMENT OF LACTC'S
RAIL TRANSIT IMPLEMENTATION STRATEGY

Stage 1: In April, 1983, LACTC identified 7 high-priority corridors for future rail construction after Metro Rail Starter Line and Long Beach - Los Angeles projects.

Stage 2: Based on engineering feasibility, costs, ridership potential and land use compatibility, in October, 1983, LACTC identified one representative rail route for further work in each corridor:

Corridor	Route	Mode
San Fernando Valley (E/W)	Burbank Branch	Light Rail
Santa Ana	Santa Ana Freeway	Metro Rail
Western Los Angeles (E/W)	Wilshire Extension	Metro Rail
Western Los Angeles (N/S)	Marina to Torrance	Light Rail
Pasadena	(To Be Determined)	Light Rail
Harbor Freeway	Harbor Freeway	Busway/HOV initially
Century Freeway	Century Freeway	(To Be Determined)

Stage 3: During the next several months, the Commission will be evaluating the network of rail routes composed of the Metro Rail Starter Line and Long Beach-Los Angeles projects plus the representative rail routes in the other high-priority corridors. The effort will analyze conceptually system operation, financial feasibility and phasing alternatives. At the end of this work in early 1984, the Commission will have a better understanding of its ability to implement more of the Proposition A rail system; then it may decide when to initiate further work on several other rail projects.

Implementation: If a decision is made to proceed to "project development" in any corridor, LACTC will work with those individuals, officials and organizations which enable it to establish a meaningful working relationship at the neighborhood level before deciding on specific details (e.g., streets travelled, station locations) of the project. It will also hold open community meetings and make use of mass media within its means. An example of this process is currently underway in project development for a rail transit line between Long Beach and Los Angeles. Currently, this entire process of project decisions lasts 18 months; if such a process goes ahead in another corridor, the earliest it could begin is the summer of 1984.

PCT:gb
11/9/83

Stage 4: What service improvements are needed in non-rail areas

THE DEVELOPMENT OF A RAIL TRANSIT PLAN AND IMPLEMENTATION STRATEGY FOR LOS ANGELES COUNTY

PREPARED BY:

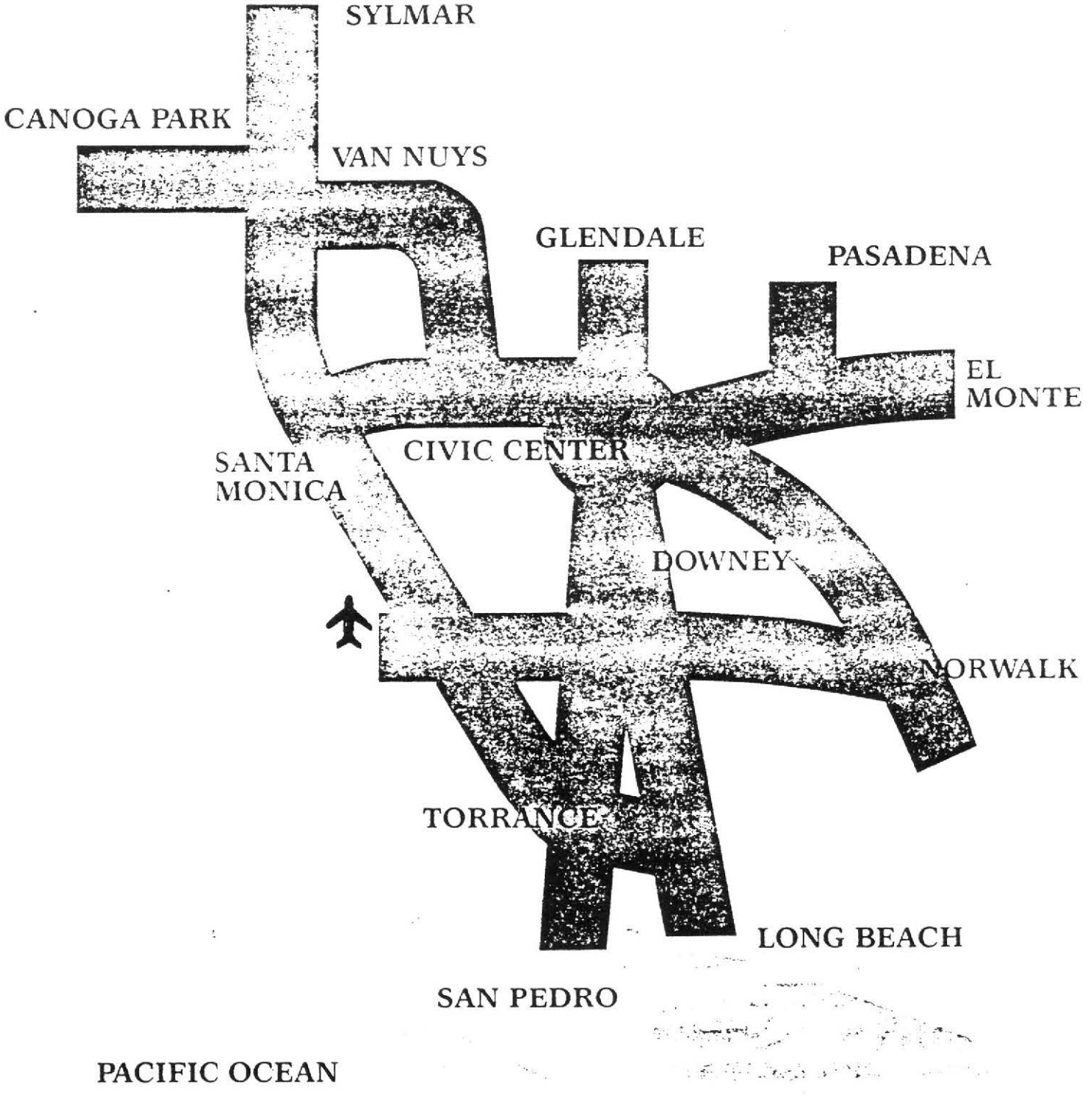
BEN DARCHE
RAIL DEVELOPMENT OFFICER

RICHARD STANGER
PROJECT DIRECTOR,
RAIL DEVELOPMENT

FOR:

1984 APTA RAPID TRANSIT CONFERENCE
BALTIMORE, MARYLAND
JUNE 12, 1984

Future Rail Transit Network



LOS ANGELES COUNTY TRANSPORTATION COMMISSION

Figure 1

THE DEVELOPMENT OF A RAIL TRANSIT PLAN AND IMPLEMENTATION STRATEGY FOR LOS ANGELES COUNTY

INTRODUCTION

In November 1980, the Los Angeles County Transportation Commission (LACTC) sponsored an initiative, locally known as Proposition A, to improve transit services. The Proposition A program will help LACTC carry out its mandate to improve the transportation decision-making process and resolve long-standing transportation problems in Los Angeles County. The Commission board consists of top political representatives from the Los Angeles County and city governments.

The Proposition A initiative, validated by the State Supreme Court in 1982, increased the county's sales tax half a cent. The proceeds from the tax will go toward reducing bus fares, improving local jurisdictions' transit services and building a county-wide rail system.

The first line in the county-wide rail system, Metro Rail is part of a "starter line" corridor that the Southern California Rapid Transit District had identified in previous rail planning studies. An Alternative Analysis sponsored by the Urban Mass Transportation Administration identified Metro Rail as the appropriate transit mode to improve transportation services in the densely populated Starter Line Corridor.

The Los Angeles County Transportation Commission had studied the rapid implementation of a light rail line before the Proposition A referendum was validated by the State Supreme Court. The Commission selected the Long Beach-Los Angeles project to help complete the initial Los Angeles Starter Line Corridor, and because the line could be constructed quickly and at a moderate cost.

The passing of Proposition A and its subsequent legal validation has made it more likley that a rail rapid transit network will be built in Los Angeles County. But not certain. In early 1983 the Commission still faced the following uncertainties:

- what rail routes and modes composed the overall rail system?
- how should they most effectively be implemented? and
- when could they be financed?

These questions were more than academic; the Proposition A sales tax ordinance specifically stated that:

"a. The Commission will determine the System to be constructed and operated.

b. The System will be constructed as expeditiously as possible."

APPROACH

The task at hand was approaced in three stages each logically nested into each other. The starting point was the map of the "Future Rail Transit Network." It outlines in broad strokes thirteen generalized corridors. The Wilshire Metro Rail Starter Line and the Long Beach-Los Angeles Light Rail Line serve two of the corridors.

Realizing that rail transit projects could not be built in all thirteen corridors within the foreseeable future, the first step was to designate certain high-priority corridors, corridors which warranted rail transit service in the near-term. Relevant statistics were derived for each of the remaining eleven corridors from both past studies and future projections. The corridors were then stratified using criteria in the draft Regional Transportation Plan prepared by the Southern California Association of Governments. In April, 1983, the Commission adopted seven high-priority corridors.

The work in Stage 2 evaluated a number of possible rail routes and modes within the first five high-priority corridors. This work involved engineering studies, cost estimates, patronage forecasts, land use analyses, and the continued involvement of community officials and representatives. In October 1983, the Commission adopted the representative route and mode in four of the corridors; in Janaury 1984, it did the same for the fifth corridor.

By combining the five representative routes and modes together with the Wilshire Metro Rail Starter Line, the Long Beach-Los Angeles Light Rail Line, the El Monte Busway, the Harbor Busway, and the Century Freeway transitway, an interim system of rail lines and busways was formed.

A system of such facilities acts differently from the simple combination of its isolated parts. Therefore, the first step in Stage 3 was to evaluate this system to better understand how it might operate, what design requirements are needed where rail lines or busways intersect, and how the attractiveness of the system of routes might affect the patronage estimates for the individual lines.

TABLE 1: RESULTS OF TECHNICAL ANALYSIS

CORRIDOR	CONGESTION (2000 V/C RATIO)	COST PER MILE (1982 MILLIONS DOLLARS) CAPACITY HIGH	CAPACITY LOW	PATRONAGE (DAILY 2000 DOMESTICS)	GROWTH CENTERS PER ROUTE MILE	LAND USE DISTRIBUTION SCORE	1980 TRANSIT DEPENDENTS PERCENT OF POP.	PERCENT OF LINE EXISTING FACILITIES
CENTURY	1.5-1.0*	16-35	< 15	61-100,000	< .25	< 30	> 3.00	100
EL MONTE	1.0-1.2	16-35	< 15	61-100,000	.25-.50	30-50	< 1.75	100
EXPOSITION	1.2-1.5		< 15	< 30,000	> .50*	30-50	> 3.00	100
GLENDALE	1.0-1.2	36-60	16-35	< 30,000	< .25	> 50*	> 3.00	50-99
HARBOR	1.0-1.2	36-60	16-35	61-100,000	.25-.50	30-50	> 3.00	100
PASADENA	1.0-1.2	16-35	< 15	61-100,000	.25-.50	> 50*	1.75-3.00	100
ROUTE 2	1.0-1.2	-	16-35	< 30,000	> .50*	> 50*	1.75-3.00	50-99
SAN FERNANDO (E/W)	1.0-1.2	36-60	< 15	31-60,000	.25-.50	< 30	1.75-3.00	100
SAN FERNANDO (N/S)	1.2-1.5	36-60	-	31-60,000	< .25	< 30	< 1.75	50-99
SANTA ANA	> 1.8*	36-60	16-35	61-100,000	< .25	< 30	< 1.75	50-99
SOUTH BAY/HARBOR/LB	1.2-1.5	36-60	-	< 30,000	.25-.50	30-50	< 1.75	50-99
WEST LOS ANGELES (N/S)	1.5-1.0*	36-60	16-35	< 30,000	> .50*	> 50*	1.75-3.00	< 50
WILSHIRE WEST	1.5-1.8*	> 60	-	> 100,000	> .50*	> 50*	> 3.00	< 50

*Top-rated corridors

To determine the rail patronage range of values presented in Table 1 we first determined an average value for these variables in each corridor. The different studies used different assumptions to forecast ridership and we did not have the information documenting these assumptions. Therefore, we could not adjust one study's results with the assumptions from another study. Consequently we averaged the ridership values from each study for each corridor.

The cost information from previous studies presented problems similar to the ridership data. To estimate costs we first determined unit costs for heavy and light rail lines (elevated, subway, surface) in 1983 dollars and applied these costs to the alignment descriptions for rail routes identified in the previous studies. Again, the costs of each of the routes described in a corridor were averaged to determine the "cost" of the rail line. We also used the averaging method to assess the percent of a line using existing highway and railroad rights-of-way facilities.

To assess corridor congestion we used a recent SCAG report. The report listed volume/capacity ratios for screenlines in specific corridors. But, many of the Proposition A rail corridors had more than one screeline. Consequently, we took the average of all screenlines within a corridor.

For the remaining variables in Table 1, growth centers per route mile, land use distribution, and 1980 transit dependents we had current information. To develop the ranges illustrated in the chart we calculated the mean and standard deviation of the values for each variable in each of the 13 corridors. Ranges were than determined based on the variation from the mean.

System Definition Criteria

To bring regional goals and objectives into the Stage 1 process we decided to use system criteria developed for the Regional Transportation Plan by the SCAG. While all criteria are important at any given level of decision, certain groupings are more important depending on whether corridors are being chosen, routes within corridors are being chosen, or specific design decisions are being made. Descriptions of the first two groups of criteria are listed below. The criteria are essentially goals and therefore are qualitative in nature. They need to be applied judiciously in specific situations. Also, while it is possible to measure certain aspects of each criteria, a solely quantitative evaluation is inappropriate. As a final note, it should be clear that a project which has an assured source of outside funding should be treated with higher-priority than its rating by System Criteria alone might indicate.

Criteria with Emphasis for the Selection of Corridors

Below are the definitions of each of the system criteria. Included as appropriate is an indication of how they are measured. The order of the criteria generally reflects their sequence of use although, as noted, specific situations may require compromises.

1. Support Development of Centers - A basic objective of both the Los Angeles County and Los Angeles City general plans is the connection of centers of high population or employment by transit lines. Supporting the development of centers also takes maximum advantage of existing infrastructure and, in the case of transit, may afford the best joint development opportunities. One partial measure of this criteria is the number of centers a rail line would traverse in a given corridor on a "per mile" basis.

2. Relieve Capacity Deficiencies - This is perhaps the most important priority of SCAG's Regional Transportation Plan. Capacity deficiencies measure the ability of the transportation system to accommodate travel. We have already used the SCAG 1982 Regional Line Haul Study's year 2000 highway volume-to-capacity ratios to indicate those corridors likely to have the most traffic congestion. The higher the V/C ratio the more needed is a transportation improvement.

3. Promote Balanced Subregions - Promoting balanced subregions means encouraging travel within a subregion as opposed to travel between subregions which favors crosstown trips as opposed to downtown-oriented commuter trips. We selected land use distribution and transit dependency as a reflection of this criteria. The higher the density of mixed residential and commerical uses in a corridor, the greater the number of potential intra-subregion travel. We have also used the number of transit dependent riders assuming that a corridor that has more transit dependent riders would probably have more intra-corridor travel.

Criteria with Emphasis on Analysis within Corridors

1. Meeting Existing Needs First - To meet existing needs first we would construct lines in corridors that have the greatest travel demand and capacity deficiency at the present time. However, transportation needs must be balanced by the cost of the improvement; the construction cost per mile.

2. Maximize Transit Ridership - Maximizing transit ridership would help transit achieve a higher share of total travel throughout Los Angeles County, an important regional transportation goal. The year 2000 daily rail ridership, employment and population per corridor mile relate to this criteria.

3. Use Existing Facilties - The mandate of Proposition A is to build a rail rapid system as expeditiously as possible. In this regard, the use of freeway, railroad and other rights-of-way is important. The percent of freeway/railroad rights-of-way a rail line would use in a given corridor indicates the extent that existing facilities are used.

Criteria with Emphasis at Project Level

There are an additional four criteria which are important at any level of analysis, but seem to be most useful in selecting project options. At the corridor analysis level, which is the primary concern of Stage 1, they would be important only if significantly adverse. For example, a corridor with any route alternative financially infeasible would not be attractive as a high-priority corridor. These criteria are:

1. Be Cost-effective

2. Be Environmentally Sound

3. Be Financially Feasible

4. Be Acceptable to the Public

Table 1 also illustrates which corridors scored the highest in each of the system criteria. From this Table (supplemented by additional information from other Los Angeles County Transportation agencies, local jurisdictions and a review of current rail planning efforts, for the Long Beach-Los Angeles and Metro Rail projects planning efforts) the LACTC selected the following high-priority corridors:

Century
Pasadena
San Fernando (E/W)
Santa Ana
West Los Angeles (N/S)
Wilshire West

The Stage 1 process including adoption by the Commission took four months. To further define the initial, or interim, Proposition A rail system, LACTC staff began working on Stage 2 of the Implementation Strategy.

STAGE 2 - IDENTIFYING "REPRESENTATIVE" ROUTES WITHIN THE HIGH PRIORITY CORRIDORS

Introduction

The first step in Stage 2 was to derive possible rail alignments which might serve the rail transit needs of each high-priority corridor. These were selected using past studies and in consultation with representatives of both local jurisdictions and transportation-oriented community groups. Any reasonable rail alignment suggested was included and became a candidate for detailed study. Once these candidate routes were agreed upon, each route was driven and appraised for engineering feasibility and rough cost-effectiveness. The intent of this step was to eliminate from further, more detailed and costly study those candidate rail routes which were agreed to be in some way infeasible. Six routes of the 26 candidates were dropped at this point.

The alternative rail routes remaining were then studied in some detail. These routes are indicated in Figure 1. Estimates were made of the civil construction necessary to build each alternative. Included were any necessary street improvements, grade-separations and major railroad or highway relocations. Based on this engineering work, cost estimations were prepared for each route. Another phase of the work involved the estimation of future patronage for each route. A final effort involved assessing the land use along each route alternative for the purpose of determining its ability to attract a range of trip types.

Engineering/Cost

This work was divided into three phases. The first phase performed what is called a "windshield" appraisal of each of the candidate routes. The intent at this stage was to weed out those route which were clearly not feasible and/or too expensive to build. Of the 26 candidate routes looked at, 6 were eliminated by concensus of the Commission and the groups in each corridor the Commission staff worked with throughout this study. The remaining 20 routes then became official rail route alternatives.

The next phase of the work was to detail, at a conceptual level, what reconstruction would have to be done to existing freeway, streets, and railroads to construct each of the route alternatives. The route and its approximate station locations were superimposed on an aerial map of the entire route. Typical cross-sections were then drawn to indicate how the new rail line would fit. Subway sections, aerial sections, intersection flyovers, street widenings, etc. were also indicated on the aerial maps. The result was a conceptual-level representation of the new rail lines in place.

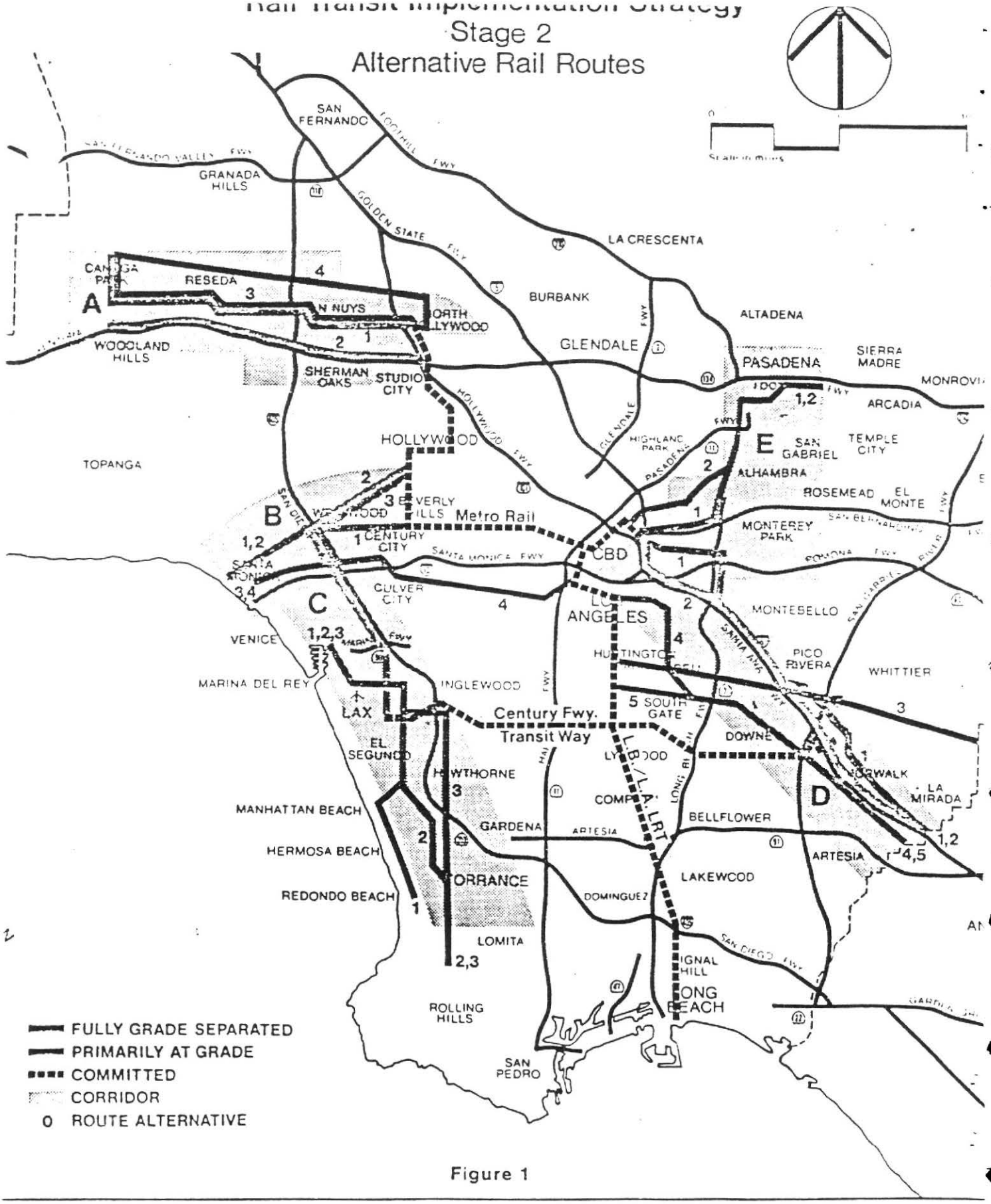

Rail Transit Implementation Strategy
Stage 2
Alternative Rail Routes
SAN FERNANDO
GRANADA HILLS
WOODLAND HILLS
RESEDA
NORTH HOLLYWOOD
BURBANK
GLENDALE
LA CRESCENTA
ALTADENA
PASADENA
SIERRA MADRE
ARCADIA
SHERMAN OAKS
STUDIO CITY
HOLLYWOOD
TOPANGA
BEVERLY HILLS
Metro Rail
CENTURY CITY
CBD
SAN GABRIEL
TEMPLE CITY
ALHAMBRA
ROSEMEAD
EL MONTE
MONTEREY PARK
CULVER CITY
LOS ANGELES
MONTEBELLO
VENICE
MARINA DEL REY
INGLEWOOD
LAX
Century Fwy.
Transit Way
PICO RIVERA
WHITTIER
SOUTH GATE
DOWNEY
NORWALK
LA MIRADA
EL SEGUNDO
HAWTHORNE
COMPTON
L.B./L.A. LRT
BELLFLOWER
MANHATTAN BEACH
GARDENA
ARTESIA
HERMOSA BEACH
TORRANCE
LAKEWOOD
REDONDO BEACH
DOMINGUEZ
LOMITA
SIGNAL HILL
LONG BEACH
ROLLING HILLS
SAN PEDRO
A
B
C
D
E
FULLY GRADE SEPARATED
PRIMARILY AT GRADE
COMMITTED
CORRIDOR
0 ROUTE ALTERNATIVE

Figure 1

Table 2: Summary Comparison of Alternative Routes

Corridor and Route	Cost-Effectiveness*	Land Use** Support	Community*** Support
San Fernando Valley (E/W)			
A1. Burbank Branch (HRT)	654,000	fair	high
A2. Ventura Freeway (HRT	502,000	fair	low
A3. Burbank Branch (LRT)	1,282,000	fair	high
A4. SP Main Line (LRT)	1,149,000	poor	low
West Los Angeles (E/W)			
B1. Wilshire Extension (HRT)	311,000	very good	very high
B2. Wilshire/Santa Monica (HRT)	240,000	good	medium
B3. Route 2 (LRT)	415,000	fair	medium
B4. Exposition (LRT)	581,000	fair	lower
West Los Angeles (N/S)/South Bay			
C1. South Bay Trolley (LRT)	685,000	good	medium
C2. Marina/AT&SF (LRT)	586,000	very good	very high
C3. Marina/Imperial (LRT)	305,000	fair	low
C4. I-405/Sepulveda (HRT)	193,000	fair	low
Santa Ana			
D1. East L.A./AT&SF (HRT)	324,000	good	medium
D2. Santa Ana Freeway (HRT)	481,000	fair	medium
D3. Yorba Linda (LRT)	377,000	fair	low
D4. Firestone/UPRR (LRT)	425,000	good	medium
D5. Firestone (LRT)	348,000	good	lower
E1. El Monte/Route 7 (LRT)	800,000	fair	medium
E2. Lincoln Heights/Rte.7 (LRT)	513,000	good	high

*Based on 1983 annualized costs which do not include vehicle or yard costs which may be shared between two lines. The figure indicates the number of annual riders attracted by each $1,000,000 in capital investment.

**Based on route's ability to support or foster development of centers.

***Based on discussions with officials of corridor cities and others in the working groups involved in the study as interpreted by Commission staff.

The final phase of the engineering/cost effort was to estimate costs for each of the rail route alternatives. This was done using the maps and typical cross-sections derived in the second phase of the work. Unit costs for each type of work were developed from experience on other rail projects around the United States. Using their costs and the mapping, the cost estimators were able to calculate the approximate cost of each line in 1983 dollars. Typical percentages were used for overhead, design fees, construction management fees, and contingencies. Right-of-way costs were added as a percentage increase it being virtually impossible to estimate even approximate right-of-way costs at this level of project development.

Ridership Estimation

The purpose of the patronage modelling effort was to give LACTC staff an estimate of the potential ridership demand each rail alternative would have, assuming the alternatives would be operating in the year 2000. To build the transportation system, SCAG constructed a "baseline" highway and transit network to which each alternative was added. The highway network was the 1995 improved highway system, the same system SCAG used in the RTP modelling effort. The baseline bus network was also the same as the bus network used for RTP patronage estimations. None of the bus networks included feeder bus routes to rail stations, but where existing bus lines were intersected a transfer was allowed. The baseline rail network consisted of the Wilshire Starter Line and the Long Beach-Los Angeles Light Rail Line. The Century Freewy transitway was coded for bus or rail vehicles.

To code the alternative rail networks, LACTC provided SCAG with route descriptions of each of 20 alternatives, including assumptions about station locations and parking facilities. These descriptions were used to develop a rail alternatives network map which was then keypunched into the trnsit network component of the LARTS computer model. To estimate patronage demand for each alternative, the complete LARTS model was run adding, one at a time, each rail alternative. This procedure was carried out until the year 2000 ridership was estimated for all alternatives.

The model necessarily emphasizes work trips because much more is known about their travel patterns than those of shopping or recreational trips. Daily ridership was obtained by factoring up work trip volumes by an overall average factor which is known. In some cases this procedure may over-estimate or under-estimate expected trips.

It is again important to emphasize that the modelling effort done for the Stage 2 effort was at the conceptual level. The ridership estimates, although seemingly precise because the computer provided

a specific number, nevertheless give us only an approximation of the rail ridership demand for each alternative. The important thing is that the procedure is identical for all alternatives.

Land Use Assessment

The City and County's work focused on generalized land use impacts and development potentials of route alternatives in each corridor. They did not evaluate specific impacts because the precise alignment of the altnerative routes are not known.

In the first phase of the network, the City and County did a "windshield" survey of properties one-half block on either side of a route to describe the existing land uses. The windshield survey considered 10 basic land uses. Maps were prepared illustrating the ten uses along each route. The City and County then estimated the percentage of residential, industrial, and commerical uses the route passed through.

An effort was also made to determine for each tentative station location, its potential to attract additional development or to support any high-intensity land uses already near the station. A very simple rating system was used because of the conceptual nature of the route and study: 0 meant no potential, 1 meant normal growth, and 2 meant a strong potential for fostering existing growth or for support major new growth.

Community Involvement

The LACTC community involvement program for the Rail Transit Implementation Strategy used a hierarchy of organizations to represent different levels of community interests for different phases of the strategy. In Stage 1, determining high-priority corridors, LACTC worked with regional level community groups, agencies and politicians to discuss the county-wide development of the rail system. Stage 2, selecting a representative route within corridors, identified groups that had interest in the general location of the rail line within a corridor. Local jurisdictions, chambers of commerce, political representatives, and other community groups approved the "representative" route chosen in the Stage 2 process. The last level of the community involvement process occurs during the environmental impact reporting stage of project development. At this point LACTC will work with any group and individuals affected by alternative route alignments for a specific project. The Long Beach-Los Anglees Light Rail Project is a good example of this community involvement effort. The LACTC has worked with over 60 groups during the Long Beach-Los Angeles environmental impact analysis.

Selection of Representative Routes

Table 2 compares the cost-effectiveness, land use support and community support of the alternative routes within each high-priority corridor. Based on the results shown in this table and in collaboration with the community groups working with LACTC, the Commission selected the following candidates as "representative" routes in the high-priority corridors:

CORRIDOR	RECOMMENDED ROUTE AND MODE
San Fernando Valley (E/W)	A3 Burbank Branch (LRT)
West Los Angeles (E/W)	B1 Wilshire Extension (HRT)
West Los Angeles (N/S) South Bay	C2 Marina/ATSF (LRT)
Santa Ana	D2 Santa Ana Freeway (HRT)
Pasadena	E2 Lincoln Hgts/Rte 7 (LRT)

The decisions in the Harbor Freeway and Century Freeway corridors concern which mode, rail or busway, should be built in each. The Commission approved in August a request by Caltrans to proceed with the Harbor Freeway Transitway Final Environmental Impact Statement. It recommends the Busway/HOV alternative as the locally preferred alternative. The decision whether rail should be built first in the Century Freeway transitway or whether a busway should be built initially with later conversion to rail is part of the Stage 3, systems analysis, work.

STAGE 3 - OPERATION AND FINANCING OF THE PROPOSITION A INTERIM SYSTEM

Stages 1 and 2 identified high-priority rail corridors and "representative" routes within each corridor. The objective of Stage 3 was to determine how the representative routes, comprising the "interim" Proposition A rail system, could be more effectively operated. Stage 3 also addresses the question of how the interim system could be financed. Figure 2 illustrates the combination of "respresentative" routes which form the "interim" rail network.

Stage 3 Work Program

By combining the five representative routes and modes together with the Wilshire Metro Rail Starter Line, the Long Beach-Los Angeles Light Rail Line, the El Monte Busway, the Harbor Busway, and the Century Freeway transitway, an interim system of rail lines and busways was formed.

A system of such facilities acts differently from the simple combination of its isolated parts. Therefore, the first step in Stage 3 was to evaluate this system to better understand how it might operate, what design requirements are needed where rail lines or busways intersect, and how the attractiveness of the system of routes might affect the patronage estimates for the individual lines.

The second task in Stage 3 was to evaluate the system implications of either a busway/HOV facility or a rail line/HOV facility within the Century Freeway transitway. This question was the only one not answered by the work of Stage 2 because in order to evaluate it, the results of Stage 2 were needed. The Century transitway mode decision has not been made at this time. But, we describe the methods and initial findings staff will use to analyze whether the transitway should initially be a busway or rail line.

The third step in Stage 3 is to take the estimated costs of all these rail lines (including a Century Freeway line if adopted) and compare them with the Commission's projected revenue stream for rail capital. The Commission's ability to construct more of the Proposition A rail system will depend on this plus the order in which the Commission may wish to implement the system's segments (i.e., less than a complete line in a corridor). Thus, an evaluation has been made of the cost-effectiveness of each segment as well.

The ability of the Commission to construct more of the Proposition A rail system is directly related to the amount of Proposition A funds programmed for the two top priority lines. especially the Metro Rail Starter Line. That in turn may depend on the level of federal funds committed to the Starter Line, which is not known at this time. Therefore, the discussion of the financial evaluation and consequent recommendations for further work cannot be completed at this time.

Conceptual System Operating Plan

A systemwide operating plan was developed for the full interim rail system including a Century Freeway rail line and assuming connection to an Orange County light rail line. The intent was not to prejudge certain decisions, but the needs for future rail yards and interline connections with as much foresight as possible. The approach taken was to assume a certain preliminary operating plan, estimate line patronage levels based on this plan, and then to modify the plan based on the initial patronage results. A final operating plan was then assumed and the ridership estimates recalculated.

TABLE 3
CONCEPTUAL OPERATING PLAN SUMMARY
FULL INTERIM RAIL TRANSIT SYSTEM
(based on probable maximum ridership)

ROUTING	PEAK-HOUR HEADWAYS (MIN.)	TRAIN LENGTH	PEAK-FLEET (WITH 16% SPARES)
METRO RAIL:			
North Hollywood-Norwalk	3.5	6	195
Santa Monica-Norwalk	3.5	4	143
TOTAL METRO RAIL FLEET			338
LIGHT RAIL:			
Long Beach-Los Angeles			
Long Beach-Route 7/Colo.	9	3	55
Compton - Route 7/Colo.	9	2	28
Compton - Pasadena	9	3	45
			128
Century:			
Norwalk To Torrance	6	3	38
Coast:			
Marina To Palos Verdes	8	1	11
San Fernando Valley:			
Chatsworth To North Hollywood	3.5	3	63
TOTAL LIGHT RAIL FLEET			240

The result is a sound--though conceptual-- understanding of how an interim rail system might operate. Using it, train yards can be generally located to minimize non-revenue car-miles (deadheading) and to get a projection of system operating costs. Table 3 summarizes the findings on headways, train size, and fleet size by routings.

Century Freeway Transitway Mode Choice

The Century Freeway crosses east-west through the Los Angeles Basin from just south of the Los Angeles Airport to the San Gabriel Freeway in Norwalk. It has been a contested project since its inception. To help move the project forward the presiding Court issued a Consent Decree in September 1981 which included certain design features. Chief among these was the requirement to incorporate a transitway within the median of the freeway. The transitway is to be constructed as a bus/HOV facility, designed for convertibility to light rail, or if funds are committed for the extra cost, the transitway could be constructed initally as light rail. This section of the Stage 3 analysis describes the method LACTC staff used to determine whether a rail line or bus facility should operate in the transitway when the freeway opens.

Technical Evaluation Process

The first step in the analysis was to develop an agreed operating plan, both for the interim system and specifically for the Century/Harbor busway. This was done initially by an operations consultant and then reviewed by Caltrans, SCRTD and the City of Los Angeles Department of Transportation (for downtown bus routings). From this review a final plan was developed and patronage projections calculated. These projections were next translated to vehicle requirements and a total operating cost calculation was derived based on required vehicle-miles of operation. This was done for each of the alternatives.

Meanwhile, required design elements were developed for both the busway/HOV and the light rail alternatives. These served as the basis for calculating the capital costs for each alternative. The cost of later converting a busway/HOV facility to light rail was also estimated and the specific construction impacts described.

The results of the evaluation are not complete. However, initial analyses have lead to the following conclusions. First, the difference in patronage estimates between the bus and rail alternatives are not significant when compared to the accuracy of the patronage forecasting process itself. Second, the total net cost increment to initially build rail on the Century transitway, including a necessary extension to El Segundo, is $113 million in 1984 dollars. Third, the light rail alternative, as compared to the busway, may save up to $9 million dollars a year on operating expenses.

The LACTC staff has presented these initial findings to the community groups participating in the Rail Transit Implementation Strategy, in addition to the corridor cities participating in the Century Freeway Consent Decree. After a discussion with these groups and the public agencies involved in transportation planning in Los Angeles County, staff is recommending to the Commission an initial rail line in the Century Freeway median.

Cost-Effectiveness Evaluation of Light Rail Lines

There are a number of criteria which could be used to determine what order the light rail lines should be built in. Some of the technical criteria would include "least cost", "most passengers", or "greatest cost-effectiveness." Staff chose the last one for presentation. Cost-effectiveness indicates how many annual passengers would be attracted sytemwide by a certain level of capital investment. The greater the cost-effectiveness the more benefits for the cost.

At the time of writing this paper, the cost-effectiveness analysis has not been completed. However, for purpose of illustration we describe how the analysis will be carried out. To derive cost-effectiveness, each line segment will be added to a base transit system (composed of the Metro Rail Starter Line, the Long Beach-Los Angeles Line, and the El Monte Busway) and the increase in systemwide patronage determined. The most cost-effective segment is then added to the base system and all other projects added in turn as before. This procedure is repeated until all segments are ranked.

Two lines will not be divided into segments. The Century Freeway Light Rail Line, if built, will be in the median of that freeway and must be built in its entirety. The San Fernando Valley Burbank Branch Light Rail Line is the only independent light rail line in the system. its yard must be located at its western terminus to reduce long-term operating costs. A short segment is not feasible without a yard.

The two other lines could be broken into operable segments. The Coast Line could be divided into a central segment, from El Segundo to the Airport Station, which works off the Century Freeway Line, and then the remaining north and south segments. The Pasadena Line could also be divided into a southern segment from the Long Beach-Los Angeles Line downtown through Lincoln Heights to the Route 7 intersection, and a northern segment from there to the eastern terminus.

Because of their cost, extensions of the Metro Rail Starter Line will require additional Federal and State funds, which cannot realistically be expected to be committed before the Starter Line is well into its construction: staff is assuming that incremental extension of Metro Rail both to the east and to the west will be pursued as fast as federal funding permits.

Financial Analysis

The purpose of the financial analysis is to evaluate the Commission's financial ability to build the Interim Rail Transit System. Important factors affecting this ability include: rail capital revenues, estimated cost of the rail projects, the construction schedule for building the projects, and the ability of the Commission to issue revenue bonds to advance construction. For the purposes of this paper we will only describe the analysis' general methodology.

The analysis begins with a projection of all revenues available for rail construction. These revenues are then compared, on an annual basis, with the escalated cost of each construction project using a cash flow model. The sequence of construction is known from the cost-effectiveness evaluation for the light rail lines. The specific schedule, or construction period, for building each light rail project is one result of the cash flow model. The Metro Rail extensions are treated differently. Realizing that these extensions can only be built with Federal and State funding assistance, a reasonable level of this on-going assistance is assumed and Proposiiton A funds are set aside to match it.

Given the projected revenues, the escalated project costs, the assumptions of Section 3 funds for the Metro Starter Line, and the order the light rail lines should be built, the cash flow model was finally used to determine specifically what projects and when the Commission might be capable of implementing.

CONCLUSIONS

The LACTC is well on its way toward implementing the regional rail system approved by the voters. In two years after the State Supreme Court validated the increased sales tax, the Commission is ready to begin final design of the Long Beach to Los Angeles Light Rail Line this fall. In addition, the SCRTD expects to begin constuction of the Wilshire Starter Line this fall pending committed construction funds from UMTA.

To determine construction phasing beyond the Long Beach and Wilshire Lines, LACTC began the Rail Transit Implementation Strategy. Notwithstanding the importance of deciding how the regional system should be built, the strategy has also been very useful to the designers of the Long Beach and Wilshire lines to insure that future connections of the rail system are compatible with the first two lines.

The Strategy's Stages 1 through 3, the focus of this paper, has given the Commission a solid foundation to continue construction of the Proposition A rail system. The strategy has selected high-

priority rail corridors, defined representative routes and developed an operational plan to insure that the selected routes and modes will function as a viable system.

The next step for any of the high-priority routes is to undergo an environmental impact review of alignment alternatives. The work of the Rail Transit Implementation Strategy has established the groundwork for that next step.

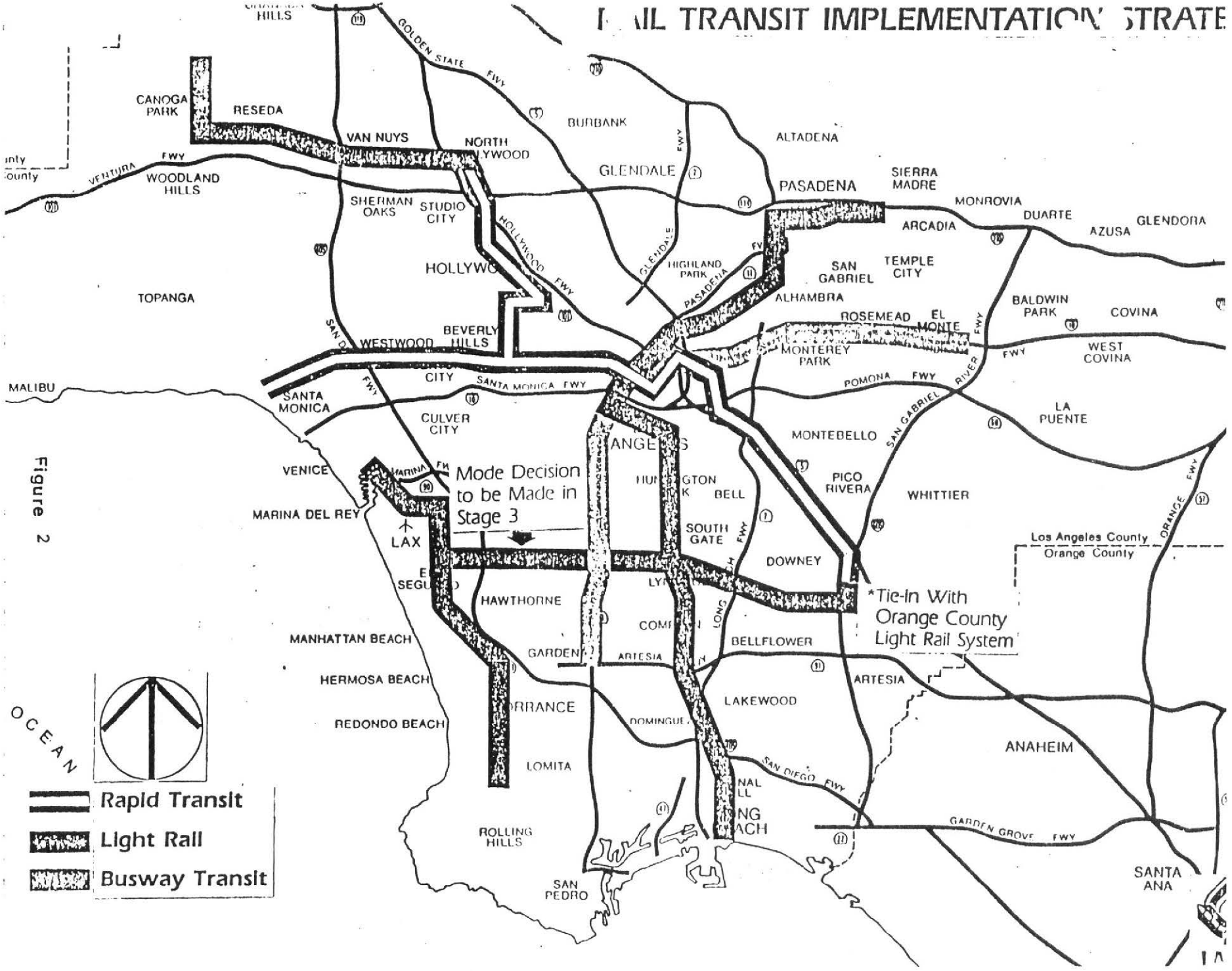

RAIL TRANSIT IMPLEMENTATION STRATE
CANOGA PARK
RESEDA
VAN NUYS
NORTH HOLLYWOOD
BURBANK
GLENDALE
ALTADENA
PASADENA
SIERRA MADRE
MONROVIA
DUARTE
AZUSA
GLENDORA
ARCADIA
WOODLAND HILLS
SHERMAN OAKS
STUDIO CITY
HOLLYWOOD
TOPANGA
SAN GABRIEL
TEMPLE CITY
ALHAMBRA
ROSEMEAD
EL MONTE
BALDWIN PARK
COVINA
WEST COVINA
MONTEREY PARK
BEVERLY HILLS
WESTWOOD
MALIBU
SANTA MONICA
CULVER CITY
LA PUENTE
MONTEBELLO
VENICE
MARINA DEL REY
LAX
Mode Decision to be Made in Stage 3
PICO RIVERA
WHITTIER
SOUTH GATE
DOWNEY
Los Angeles County
Orange County
*Tie-In With Orange County Light Rail System
HAWTHORNE
MANHATTAN BEACH
HERMOSA BEACH
REDONDO BEACH
GARDEN
BELLFLOWER
ARTESIA
LAKEWOOD
ANAHEIM
LOMITA
ROLLING HILLS
SAN PEDRO
SANTA ANA
OCEAN
Rapid Transit
Light Rail
Busway Transit

Figure 2

ATTACHMENT #2

LOS ANGELES COUNTY TRANSPORTATION COMMISSION • 311 SOUTH SPRING STREET – SUITE 1206, LOS ANGELES, CALIFORNIA 90013 • (213) 626-0370

March 11, 1982

MEMO TO: CITIZENS ADVISORY COMMITTEE

FROM: LIGHT RAIL TASK FORCE

SUBJECT: RECOMMENDATION TO LACTC FOR LIGHT RAIL DEVELOPMENT

Members of the CAC had a working session on March 10 to discuss the consultants' reports analyzing light rail development opportunities in Los Angeles County. The task force drafted the following recommendation for your consideration.

RECOMMENDATION TO LACTC

The Citizens Advisory Committee has reviewed the Preliminary Analysis and Summary Report prepared by Parsons Brinckerhoff Quade & Douglas, Inc. While there is a considerable amount of information presented there, we are concerned that nagging questions still remain. We believe that a final decision to construct a line would be premature at this time.

We, therefore, offer the following recommendations to your Commission:

1. Preliminary engineering work should begin simultaneously on the three routes which show the most promise. These are:

   - o Los Angeles - Long Beach;
   - o Exposition Boulevard;
   - o Firestone Boulevard.

2. The preliminary engineering work should focus initially on environmental issues such as impacts on the CBD areas in affected cities.

In addition, the preliminary engineering process should seek to determine whether or not any acceptable operating agreements can be reached with the Southern Pacific Railroad for these routes.

CAC SCHEDULE

Attached for your information is a chart prepared by Steve Lantz, which uses a numerical rating system to compare the five light rail alternatives.

The Citizens Advisory Committee must develop final language for a recommendation on this subject at the meeting on March 17. If you have other points you would like the CAC to consider, please bring draft language to the meeting so that the CAC can deal with this subject in a timely fashion.

Becky

REBECCA REARDON
Public Affairs Officer

RR:ahh
Attachment

ALTERNATIVES ANALYSIS LONG BEACH - LOS ANGELES LIGHT RAIL PROJECT

RATING: 1=Worst 6=Best

ISSUES	Line 1 LRT Long Beach	Rat.	Line 4 LRT Exposition	Rat.	Line 5 LRT Santa Monica	Rat.	Line 8 LRT S.F. Valley	Rat.	Line 11 LRT LAX	Rat.	Line 13 LRT Firestone	Rat.
DAILY PATRONAGE	21,000	5	18,500	2	17,200	1	20,000	4	22,300	6	19,400	3
RAILROAD INTERFERENCE	N/A	2	Relatively few	4	Very few, if any	5	Considerably more	3	None	6	Substantial	1
VEHICLE INTERFERENCE		5		2		1		4		6		3
AVERAGE SPEED (MPH)	20.1*	1	21.9	2	24.2	3	29.1	6	26.6	4	27.9	5
ANNUAL OPERATIONS & MAINT. ($ MILLIONS)	5.615	3	4.532	5	3.471	6	6.849	2	6.754	1	5.104	4
CAPITAL COST ($ MILLIONS)	194	4	130	6	182*	5	385	2	399	1	195	3
CAPITAL COST PER MILE ($MILLIONS)	8.62 x22.5	4	7.30 x17.8	6	16.40 x11.1	2	11.60 x33.2	3	22.93 x17.4	1	7.71 x25.3	5
ANNUAL CAPITAL & OPER. ($MILLIONS)	27.111	3	19.073	6	23.099	5	48.370	2	49.715	1	26.523	4
ANNUAL OPERATIONS SUBSIDY/PASSENGER (@75¢ FARE:$PER PASS)	0.30	3	0.21	6	0.29***	4	0.59	1	0.44	2	0.28	5
TOTAL RATINGS		30		39		32		27		28		33
OVERALL RATING		3		6		4		1		2		5
NOTES	*SCRTD bus= 23.8 mph on route				*includes $69mil. for R.O.W. acq. *$20mil. for street couplet in S.M. **Needs subway to con. to Starter Line at Farifax ***Assumes 50¢ fare		Aerial structures or tunnels are needed; R.O.W. allocation; movement of S.P. main tracks		Requires CST technology		R.O.W. or use of aerial structures needed at west end.	

Rail Transit Implementation Strategy

Stage 1

Prepared by:

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

TRANSIT DEVELOPMENT DIVISION

May 1983

STAGE 1 REPORT

ON DEVELOPMENT OF A RAIL TRANSIT IMPLEMENTATION STRATEGY

INTRODUCTION

In November, 1980 the residents of Los Angeles County voted to increase the general sales tax from 6 to 6-1/2 percent to finance development of the countywide rail transportation system. The measure, commonly referred to as Proposition A, gave the Los Angeles County Transportation Commission (LACTC) the mandate to improve and expand existing public transit countywide, reduce fares, and construct and operate a rail transit system serving approximately 13 corridors. The corridors are depicted in Figure 1. In two of the corridors work has already advanced to the engineering stage. These are the Wilshire/North Hollywood Metro Rail corridor and the Long Beach/Los Angeles Light Rail corridor; they are not addressed in this document.

The Purpose of the Rail Transit Implementation Strategy

The full Proposition A system will be a 150-mile network of rail lines in the thirteen designated corridors. Clearly rail lines cannot be built in all 13 corridors at once. The required construction effort would be monumental, and the Proposition A revenues alone would not be enough to construct all 13. The purpose of the Rail Transit Implementation Strategy Program is therefore to develop a defined plan for systematically constructing the Proposition A rail system using a combination of local, state, federal and private financing resources.

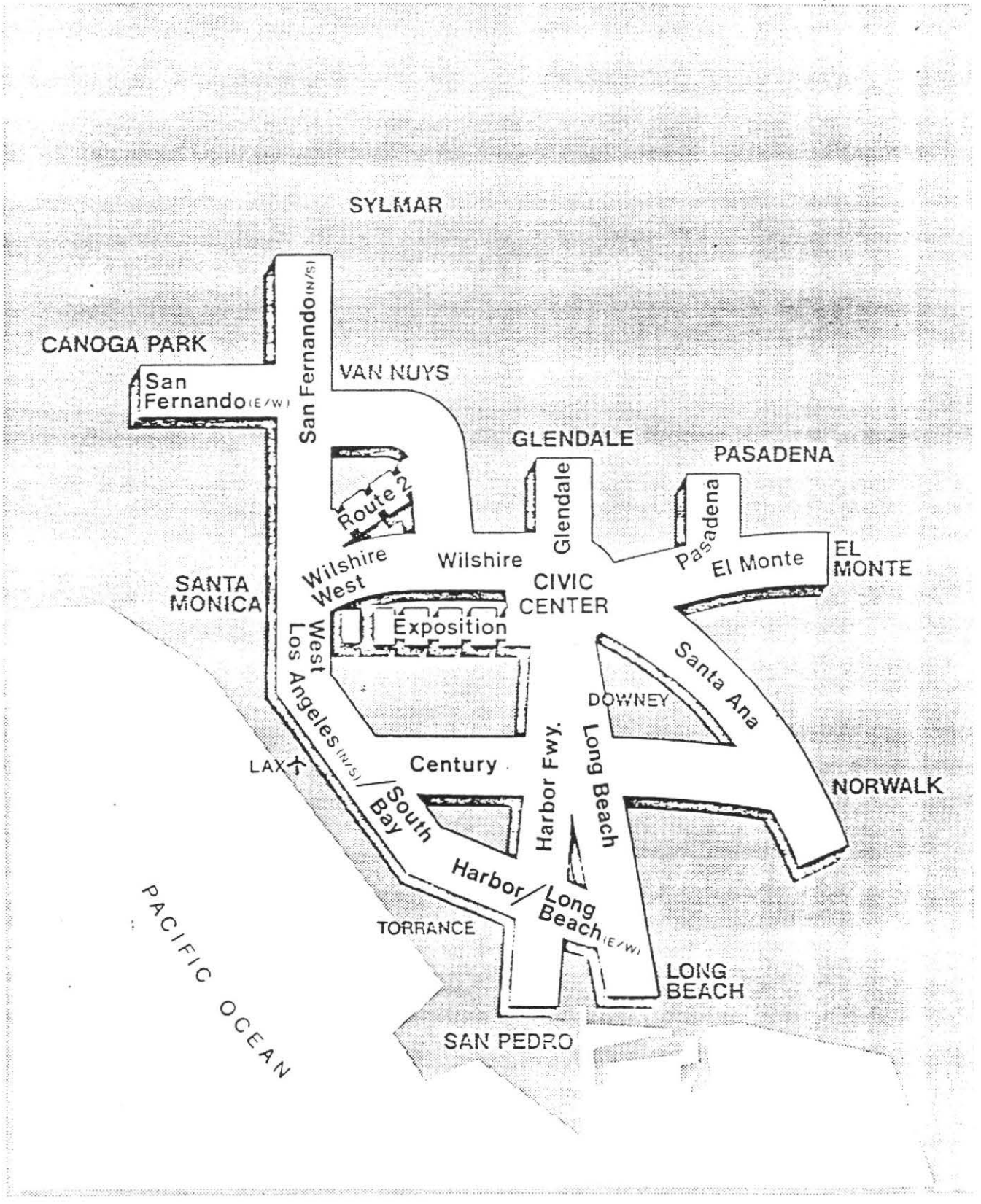
Description of the Four-Stage Process

Development of the Rail Transit Implementation Strategy is divided into four stages. The purpose of Stage 1, the present stage, is to select for further definition those corridors which most warrant rail service by the year 2000. These are called the "high-priority rail corridors." The purpose of Stage 2 is to further define alternative projects in the high-priority corridors so that a route, mode, and construction sequence can be selected. Stage 3 is the approval phase of Stage 2, deciding on the order in which projects will proceed to preliminary engineering. Stage 4 develops the Rail Transit Implementation Strategy for the overall 13-corridor system, including non-rail transit improvements that will serve each corridor prior to initiation of rail operation.

The Stage 1 Report

The work in Stage 1 progressed as follows. First we reviewed previous technical reports to derive future congestion levels, transit patronage, and cost, adding to these needed demographic and land uses information. We then discussed certain policy issues important in the consideration of systemwide priorities. The next step was to use a set of criteria developed by the Southern California Association of

Candidate Rail Transit Corridors



Los Angeles County Transportation Commission

Governments to rate each corridor. The results were discussed and recommendations were made for further work. As a final check, the financial feasibility of the chosen set of high-priority corridors was made using reasonable funding, staging and banking assumptions.

Summary of Recommendations

The Recommendations chapter of this report discusses the findings for each corridor in turn and recommends for each further work which needs to be done. The results, in summary form, are as follows:

Recommended for Stage 2 Refinement: (Stage 2):

Century Freeway

Pasadena (potentially high-priority as part of Route 7 implementation)

San Fernando Valley (E/W)

Santa Ana

Western Los Angeles (E/W) choosing among Route 2, Exposition Boulevard and Wilshire West routings

Western Los Angeles (N/S), extended to include South Bay subcorridor

Essentially Complete Stage 2: Harbor

Recommended for Stage 4 Analysis (Stage 4):

El Monte

Glendale

Harbor/Long Beach (E/W)

San Fernando Valley (N/S)

RESULTS OF TECHNICAL ANALYSIS

INTRODUCTION

To help determine transportation needs in the Proposition A corridors, we reviewed previous technical reports (from 1968 to the present) that studied rail transit for Los Angeles County. The reports, listed in the bibliography, varied tremendously in scope, detail and technical method. We used those technical analyses that were the most consistent: rail patronage, costs, and corridor congestion; and added others which complement the more technical issues with recent socio-economic and land use information. Table 1 summarizes the results of the technical analyses. We will refer to it in the discussions of each technical area which follows.

Congestion

When the existing highway network can no longer accommodate the number of vehicles traveling throughout the system without traffic congestion, the system limits overall mobility and requires improvements. The degree of congestion will vary from corridor to corridor. More severe congestion occurs in those corridors that have a larger number of vehicles than the capacity of the highway system to carry the vehicles; this measure is called the volume/capacity (v/c) ratio. The V/C ratio used to measure highway deficiencies does not necessarily indicate rail corridor travel demand.

We used the 1982 SCAG Regional Line Haul Transit Report to determine V/C ratios within corridors. The SCAG report projected the year 2000 total person travel along each corridor for the peak hour in the peak direction using the "LARTS" travel demand model. The SCAG procedure assumed no rail transit usage, except for the Wilshire Metro Rail Line, and used the existing freeway system augmented by the Century Freeway. As Table 1 shows the corridors with a V/C ratio above 1.5 are the Wilshire West, Century and Western Los Angeles (N/S) corridors; the heaviest congestion takes place in the Santa Ana corridor.

Cost-Per-Mile

The most significant limiting factor affecting the extent and schedule for the countywide rail system is the cost of constructing the rail lines. To determine the cost of rail lines within corridors, we used a cost-per-mile measure. This allows us to compare construction costs among rail lines in all of the corridors on an equal basis. Four cost ranges were used, from $15 million per mile and less to more than $60 million per mile.

Because of the great variation among previous technical work regarding the cost of high and medium capacity lines in the corridors, we used two approaches to obtain the costs. The first approach used the construction estimates indicated in the previous reports adjusted for an inflation (cost escalation) factor based on the annual average

TABLE 1: RESULTS OF TECHNICAL ANALYSIS

CORRIDOR	CONGESTION (2000 V/C RATIO)	COST PER MILE (1982 MILLIONS OF DOLLARS) CAPACITY HIGH	CAPACITY LOW	PATRONAGE (DAILY 2000 BOARDINGS)	GROWTH CENTERS PER ROUTE MILE	LAND USE DISTRIBUTION SCORE	1980 TRANSIT DEPENDENTS PERCENT OF POP.	PERCENT OF LINE EXISTING FACILITIES
CENTURY	1.5-1.8*	16-35	< 15	61-100,000	<.25	< 30	> 3.00	100
EL MONTE	1.0-1.2	16-35	< 15	61-100,000	.25-.50	30-50	< 1.75	100
EXPOSITION	1.2-1.5	-	< 15	< 30,000	>.50*	30-50	> 3.00	100
GLENDALE	1.0-1.2	36-60	16-35	< 30,000	<.25	>50*	> 3.00	50-99
HARBOR	1.0-1.2	36-60	16-35	61-100,000	.25-.50	30-50	> 3.00	100
PASADENA	1.0-1.2	16-35	< 15	61-100,000	.25-.50	>50*	1.75-3.00	100
ROUTE 2	1.0-1.2	-	16-35	< 30,000	>.50*	>50*	1.75-3.00	50-99
SAN FERNANDO (E/W)	1.0-1.2	36-60	< 15	31-60,000	.25-.50	< 30	1.75-3.00	100
SAN FERNANDO (N/S)	1.2-1.5	36-60	-	31-60,000	<.25	< 30	< 1.75	50-99
SANTA ANA	> 1.8*	36-60	16-35	61-100,000	<.25	< 30	< 1.75	50-99
SOUTH BAY/HARBOR/LB	1.2-1.5	36-60	-	< 30,000	.25-.50	30-50	< 1.75	50-99
WEST LOS ANGELES (N/S)	1.5-1.8*	36-60	16-35	< 30,000	>.50*	>50*	1.75-3.00	< 50
WILSHIRE WEST	1.5-1.8*	> 60	-	>100,000	>.50*	>50*	> 3.00	< 50

*Top-rated corridors which also appear as the first three lines of Table 2

increase in the Department of Commerce's Construction Index. The second approach used a per mile estimation taking into account track type, right-of-way acquisition, vertical alignment, vehicle cost, yard cost, station type, and design and engineering costs.

The Pasadena (Route 7), San Fernando (E/W), Century Freeway and Exposition lines would be the least expensive rail lines to construct assuming they are built as medium-capacity lines.

Patronage

Similar to the difficulties in comparing costs across different timeframes, the patronage estimates reported in previous rail studies also have comparability problems. Although all of the patronage projections in the reports used the "LARTS" model, the ability of the model to project rail ridership improved between 1968 and 1982. As a result, the projections done in earlier studies will differ from projections in later studies. More importantly, the assumptions used in the models changed from year to year. For comparability, we used general patronage categories to reflect the magnitude of rail demand in the corridors. Wilshire West, Pasadena, El Monte, Santa Ana, Century and the northern segment of the Harbor corridor have the highest rail demand, followed by the San Fernando corridors.

Growth Centers

A number of public agencies have policies to channel urban development into centers. The Southern California Association of Governments and the Los Angeles County and City Development Plans all support an urban form which emphasizes the growth of multi-purpose centers. Centers are characterized by high-density population and employment, and have a variety of functions to support major shopping, office, recreational and other activities. Rail lines which link centers would encourage these growth centers policies. Private developers would also be more likely to continue to invest in development around centers, as opposed to other nearby locations, because of the improved access provided by a rail line.

To measure the ability of a rail line to support the growth of centers we used the indicator "centers per route-mile." Centers designated by each of the above agencies were located on a map. The rail routes were overlayed on top of the map and the number of centers traversed by each rail route was counted. Because of the difficulty in defining center boundaries, any center within one-half mile was counted. As Table 1 indicates, the highest ranking corridors in centers per route-mile are Route 2, Wilshire West, and Western Los Angeles (N/S).

Transit Dependency

Transit dependency, measured by the percentage of each corridors' population who ride transit to work, gives us a good indication of transit need. People who most ride public transit would tend to select a place of work closer than people who have a car. Their non-work

trips would also be shorter. In short, the more transit dependency, the more intra-subregional travel.

Table 1 shows the percentage of each corridor's population that are transit dependent. Those that score high are the Century, Glendale, Exposition, Harbor and Wilshire West corridors. Rail lines built in these corridors may serve more subregional travel especially if there is high-density, mixed use land patterns.

Land Use Distribution

An area (or subregion) that is high-density with a good mixture of land uses tends to generate shorter trips than does an area with low-density, single-purpose uses, such as a suburban bedroom community. The higher-density, mixed use area also generates more transit trips.

To determine the ability of rail lines in the 13 corridors to support a high-density, mixed-use land pattern, we used the Los Angeles County Assessor's file to describe land uses along routes. To show the relationship between the land uses and trip making patterns, we then weighted the uses by a traffic generating factor to arrive at a land use distribution score. The traffic generating factor was based on the number of trips per acre for 16 different land uses, adjusted for transit trips. Table 1 shows the corridor scores. Route 2, Glendale, Wilshire West and Western Los Angeles (N/S) had the highest scores. These corridors have a relatively large number of multifamily residential, office, retail, and service uses compared to the other corridors. Rail lines located in these corridors would promote subregional travel.

Use of Existing Facilities

Using existing freeway and railroad rights-of-way will facilitate the construction of the Proposition A mandated countywide rail system. Also, rail lines built on existing rights-of-way would most likely be more environmentally compatible than lines using other types of rights-of-way, especially streets.

The "percent of a route potentially using an existing freeway or railroad right-of-way" is the measure for the use of existing facilities. Routes from previous studies were analyzed to determine the proportion of the route using a freeway or railroad right-of-way. Table 1 shows the range of the existing right-of-way use. Six corridors--Century, El Monte, Exposition, Harbor, Pasadena, and San Fernando (E/W)--might have 100 percent of their right-of-way in an existing facility. Most of the other routes partially use freeway or railroad rights-of-way.

POLICY ISSUES

INTRODUCTION

There are certain policy issues important in addressing priorities for the construction of rail lines. These issues are listed and briefly discussed below. We felt it important to air the policy option during the Stage 1 work, pointing out the probable pros and cons of each. They are presented as diametrically opposed policy choices for clarification; in reality choosing one of the pair of options does not necessarily exclude the other. They are presented in no particular order of priority.

Usable Segments Vs. Completed Lines

The future county rail system can evolve by incrementally and concurrently extending a number of shorter workable segments or by building in series fashion a lesser number of completed lines. There are several benefits of the usable segment approach. Service is started toward most parts of the county and advances equitably in several sectors. The higher cost central portions of the lines are built first and therefore less expensively. Full central area distribution is provided sooner to the most congested area. Benefits of the completed lines approach are that full sector transit improvements can be made sooner within chosen corridors; priority can be given to badly congested corridors; and at least some completed lines exist if future support for the full system slackens.

Downtown Focus Vs. Crosstown Focus

An implementation strategy using a radial downtown focus serves the important downtown commuter market which also helps relieve the most critical central congestion problem. It also assures continued vitality of the downtown itself because its accessibility is enhanced. An implementation strategy using a crosstown approach has certain advantages: rail service in outlying corridors can be provided sooner. the planned center's concept is enhanced; crosstown rail service can conform better to outlying travel patterns; and opportunities for less expensive construction afforded by rail abandonments, etc., in outlying areas can be seized sooner.

Serving Existing Development Vs. Encouraging New Development

Aware of the two-sided interrelationship between land use and transportation, we can use the evolving rail lines to serve existing growth centers or steer future development. Selecting one or the other requires trade-offs. A policy decision to serve only established growth centers has the advantages of: assuring the continued viability of these centers; maximizing ridership; and more easily justifying costs. A policy decision to use rail transit to encourage development has the advantages of attracting development to areas needing a catalyst for redevelopment, and reducing the cost of construction in less built-up areas.

Use of Available Rights-of-Way Vs. Link Activity Centers

A number of available rights-of-way appear preliminarily suitable for rail transit. Chief among these are freeways and freight railroad lines though others exist including river channels, drainage basins, power lines. The positive benefits are generally lower costs and environmental disruption. Unfortunately activity centers are typically offset from these rights-of-way along arterial streets. The desire to connect development centers with transit is a cornerstone of planning done by the City and County of Los Angeles. Benefits include assuring the continued viability of those centers, encouraging more intra-regional travel, and minimizing land use dispersal.

Freeway Alignments Vs. Railroad Alignments

Sensitivity to the urban environment and financial realities have tended to locate new rail projects within existing freeway or railroad rights-of-way whenever possible. In favor of the freeway alignment approach is the relative ease of obtaining rights-of-way, the proximity of the line to development clusters beyond freeway interchanges, and the already built grade separations. Rail transit using existing under-utilized railroad tracks is generally more accessible to surrounding land uses and could be far less costly to build.

"Fixed Plan" Vs. "Flexible Plan" Implementation Strategy

There are definite advantages to constructing the system according to a specific implementation plan and schedule. Design efforts and funds are concentrated on the adjacent next phase of the system because having unconnected outer segments of the system makes no sense. It also husbands available funds better, concentrating them into the immediate project at hand. A flexible approach allows unforeseen opportunities such as rail abandonments to be grasped sooner resulting in less overall cost. It also allows upgrading of the line from whatever could be most easily built initially and incrementally to the one which is ultimately warranted.

"Pay-As-You-Go" Vs. Issuing Bonds

Paying-as-you-go generally reduces the cost of construction by eliminating debt service and increasing efficiency (because dollars are fewer). It also eliminates any risk associated with the uncertainties of the bond markets. "Pay-as-you-go" tends to favor low-cost, high-mileage routes where more progress can be made sooner. The chief advantage of issuing bonds is that it provides larger sums of short-term capital. However, more of the cost of the system is borne by future system users--which can be viewed as an advantage or disadvantage.

Minimum Cost Vs. Maximum Need

Constructing rail lines in already congested areas--congested because the need is greatest for rail--costs more than building rail in areas

not yet congested. With limited dollars that means less of the system can be built. Even here there is concern that rail will add to congestion by fostering development which will attract added auto trips. Favoring the minimum cost approach of building rail lines in less congested areas is that more of the rail system can be built countywide.

SYSTEM DEFINITION CRITERIA

INTRODUCTION

The purpose of the Stage 1 analysis is to select those corridors that justify rail lines in the near term. To help select the appropriate corridors, we've analyzed technical and policy issues relevant to developing the interim rail system. However, a general framework to integrate the findings of the previous chapters would be helpful. Many of the technical and policy issues we developed either overlap or conflict with each other. For example, the technical issue of capacity deficiency generally supports a policy decision in favor of serving commuters, but may well conflict with a policy decision to serve transit dependents, who have different travel patterns. Similarly, the technical need to relieve capacity deficiencies on certain freeways may conflict with a policy decision to foster the development of centers. Expensive rail facilities within freeways may in fact not serve the travel needs of the auto commuters. In short, the assessment of needs and priorities is a multi-faceted exercise requiring trade-offs and compromises.

Te help resolve this complexity and to bring regional goals and objectives into the Stage 1 process we decided to use system criteria developed for the Regional Transportation Plan by the Southern California Association of Governments.

While all criteria are important at any given level of decision, certain groupings are more important depending on whether corridors are being chosen, routes within corridors are being chosen, or specific design decisions are being made. Descriptions of the first two groups of criteria are listed below. The criteria are essentially goals and therefore are qualitative in nature. They need to be applied judiciously in specific situations. Also, while it is possible to measure certain aspects of each criteria, a solely quantitative evaluation is inappropriate. As a final note, it should be clear that a project which has an assured source of outside funding should be treated with higher-priority than its rating by System Criteria alone might indicate.

Criteria with Emphasis for the Selection of Corridors

Below are the definitions of each of the System Criteria. Included as appropriate is an indication of how they are measured. The order of the criteria generally reflects their sequence of use although, as noted, specific situations may require compromises.

1. Support Development of Centers - A basic objective of both the Los Angeles County and Los Angeles City general plans is the connection of centers of high population or employment by transit lines. Supporting the development of centers also takes maximum advantage of existing infrastructure and, in the case of transit, may afford the best joint development opportunities. One partial measure of this criteria is the number of

centers a rail line would traverse in a given corridor on a "per mile" basis.

2. Relieve Capacity Deficiencies - This is perhaps the most important priority of SCAG's Regional Transportation Plan. Capacity deficiencies measure the ability of the transportation system to accommodate travel. We have already used the SCAG 1982 Regional Line Haul Study's year 2000 highway volume-to-capacity ratios to indicate those corridors likely to have the most traffic congestion. The higher the V/C ratio the more needed is a transportation improvement.

3. Promote Balanced Subregions - Promoting balanced subregions means encouraging travel within a subregion as opposed to travel between subregions which favors crosstown trips as opposed to downtown-oriented commuter trips. We have selected land use distribution and transit dependency as a reflection of this criteria. The higher the density of mixed residential and commercial uses in a corridor, the greater the number of potential intra-subregion travel. We have also used the number of transit dependent riders assuming that a corridor that has more transit dependent riders would probably have more intra-corridor travel.

Criteria with Emphasis on Analysis within Corridors

1. Meeting Existing Needs First - To meet existing needs first we would construct lines in corridors that have the greatest travel demand and capacity deficiency at the present time. However, transportation needs must be balanced by the cost of the improvement; the construction cost per mile.

2. Maximize Transit Ridership - Maximizing transit ridership would help transit achieve a higher share of total travel throughout Los Angeles County, an important regional transportation goal. The year 2000 daily rail ridership, employment and population per corridor mile relate to this criteria.

3. Use Existing Facilities - The mandate of Proposition A is to build a rail rapid system as expeditiously as possible. In this regard, the use of freeway, railroad and other rights-of-way is important. The percent of freeway/railroad rights-of-way a rail line would use in a given corridor indicates the extent that existing facilities are used.

Criteria with Emphasis at Project Level

There are an additional four criteria which are important at any level of analysis, but seem to be most useful in selecting project options. At the corridor analysis level, which is the primary concern of Stage 1, they would be important only if significantly adverse. For example, a corridor with any route alternative financially infeasible would not be attractive as a high-priority corridor. These criteria are:

1. Be Cost-Effective
2. Be Environmentally Sound
3. Be Financially Feasible
4. Be Acceptable to the Public

RECOMMENDATIONS

INTRODUCTION

Table 2 arrays the corridors by system criteria and indicates which four corridors (the top one-third) best achieve the objectives embodied in the criteria as defined in the previous section. Under each criterion is an indication of how it was measured and the specific measurement(s) found in Table 1. For example, the criterion "Support Development in Centers" is measured by the number of growth centers per mile of rail line. Table 1 indicates that the top corridors in growth centers per mile are Exposition, Route 2, Western Los Angeles (N/S) and West Wilshire. These then are the corridors shown in Table 2 for that criterion. Rather than use a quantitative ranking approach and then summing the resulting scores, we felt it more appropriate to note the four top corridors under each criterion and leave it at that. Numerical analyses overly simplify the complex issues involved, rely on artificial weighting factors between levels of criteria, and result in a rigid numerical score less suitable to the "real world" arena in which the required decisions are made.

The subsections which follow qualitatively evaluate each of the corridors and discuss why each would or would not be a good candidate for further work in Stage 2 or for further work in Stage 4 which develops the overall implementation strategy for all 13 corridors as discussed in the Introduction. The corridors are discussed in alphabetical order.

Century Freeway

The six-lane Century Freeway is being designed with a transitway within its median. Money for both the freeway and a bus transitway is assured. For a relatively small incremental cost a rail line can be placed in the median initially. Implementation of a rail line (with necessary treatment at either end of I-105) must be evaluated in detail for its cost-effectiveness.

The SCAG Line Haul Transit Study (1982) indicated that even with the Century Freeway, the Century corridor will retain a high capacity deficiency in the year 2000. High-priority consideration as a rail corridor may be in order for this reason even if the marginal cost of a high-quality rail line is shown not to be low. Further work needs to be done determining what would be the specific routing(s) of the Century corridor rail line at its eastern and western ends. Possible tie-ins could be the Santa Ana Corridor and Orange County on the east, the South Bay, the airport and points north on the west.

Recommended Further Work: Stage 2 analysis of trade-offs between bus and rail (including route options and costs at the eastern and western ends of the freeway).

El Monte

The potential rail line is already a busway/HOV facility. The corridor overlaps with the Pasadena corridor at its western end, becoming a separate corridor east of the Long Beach Freeway interchange.

The corridor did not score high, relative to the other corridors, in any of the top categories. For this reason it is not clearly a high-priority rail corridor and should not be selected for further Stage 2 refinement. Furthermore, it already has the only existing transitway service in the county.

Recommended Further Work: Continued operation of the busway/HOV facility with an emphasis on improving distribution downtown and timed-transfer potential at El Monte Terminal.

Exposition Boulevard

This is actually a route which is potentially a part of a broader Western Los Angeles (E/W) corridor, which also includes Wilshire West and Route 2. It is primarily south of I-10 centered on the old "Santa Monica Air Line" of Pacific Electric.

An Exposition Boulevard route scored high in "supporting development in centers." Because it might use an existing rail line it may be relatively low in cost to construct, depending on the railroad's willingness to abandon current operations. It has good potential as a rail route in the broad Western Los Angeles (E/W) corridor and should have additional work done as part of Stage 2.

Recommended Further Work: Stage 2 refinement of technical information on this rail line and exploration of feasibility with Southern Pacific Transportation Company as part of the broader Western Los Angeles (E/W) corridor.

Glendale

There is not yet a clearly feasible routing for this corridor between downtown and the City of Glendale. The corridor is rated well for "promoting balanced subregions" but does not rate too highly in other areas. It is not a clearly high-priority rail corridor relative to some of the other candidates.

Recommended Further Work: Stage 4 analysis of multi-modal options to determine what is the best mix of improvements within this corridor.

Harbor Freeway

This corridor is centered on the Harbor Freeway and uses its right-of-way for all but one of the alternatives detailed by Caltrans in a Draft Environmental Impact Statement which has been prepared on a Harbor Freeway busway/HOV facility; federal funding for such an improvement is possible.

Harbor Freeway was not one of the highest ranking corridors in the three criteria most emphasized in corridor selection. However, because of its relatively high patronage estimates and federal funding potential, it must be regarded as a high-priority corridor for project development.

Recommended Further Work: A great deal of work has been done on the Harbor transitway already. No further work needs to be done on it during Stage 2. A final decision on it will be made at the end of this year in conjunction with decisions on the Century and Los Angeles-Long Beach corridors.

Harbor to Long Beach (E/W)

This corridor starts in the beach cities area and proceeds east through the Harbor area and Long Beach. A few routes have been studied in this corridor; none seemed preferred. The corridor never rates high in any area and cannot be considered a high-priority rail corridor.

Recommended Further Work: Stage 4 analysis with emphasis on bus improvements in the near term.

Pasadena

The Pasadena corridor extends from downtown Los Angeles to Pasadena. Part of its routing could use the El Monte busway to reach the right-of-way of the proposed Route 7 extension into Pasadena, which Caltrans is designing to include a transitway.

The Pasadena corridor did not rank highest in the top three criteria relative to the other corridors. However, there is a need to have improved transit in the corridor and it does appear to have good patronage potential. Once a Route 7 implementation program is resolved, this corridor would become high-priority for a rail project.

Recommended Further Work: The corridor is a high-priority corridor. Further work as part of Stage 2 should address the suitability of a rail line in the median of the Route 7 Extension.

Route 2

Technically and realistically a part of a larger Western Los Angeles (E/W) corridor is Route 2, Santa Monica Boulevard, from Fairfax Avenue to I-405. It has been evaluated separately because of the special analysis being done for it by Caltrans.

The corridor ranks high in "supporting development in centers" and may depend on using the unused freight rail line along Santa Monica Boulevard. The corridor is close enough to the extended Wilshire Boulevard corridor as to be directly competitive.

Recommended Further Work: Stage 2 analysis as part of the Western Los Angeles (E/W) corridor.

San Fernando Valley (E/W)

There are a number of possible routings within this large corridor. The corridor scores high in "promoting balanced subregions" (intra-subregional travel) and could well be inexpensive because of apparent available rights-of-way. The corridor is a good candidate for a

high-priority corridor and should be studied further in relation to Metro Rail service from central Los Angeles to North Hollywood.

Recommended Further Work: Stage 2 analysis for possible staged implementation in preparation for Metro Rail start-up.

San Fernando Valley (N/S)

This corridor extends from the Western Los Angeles (E/W) corridor north through San Fernando Valley. The corridor did not rank with the top corridors in any criteria and cannot be considered a high-priority rail corridor.

Recommended Further Work: Stage 4 analysis of multi-modal options to determine what is the best mix of improvements within the corridor.

Santa Ana

The Santa Ana corridor is expected to have the highest capacity deficiency in the year 2000 of any corridor. The corridor also rates well in expected transit ridership. Caltrans has already studied a transitway on the Santa Ana Freeway itself. There are, however, a number of other possible ways to serve this corridor all of which need to be analyzed further.

Wilshire West

This route extends from the Metro Rail Line to the ocean. It is part of the larger Western Los Angeles (E/W) corridor. The route consistently received high ratings and is clearly a high-priority corridor.

Recommended Further Work: Stage 2 analysis for rail route options for possible implementation following Metro Rail.

Western Los Angeles (N/S)

This corridor extends from the beach cities to the Western Los Angeles (E/W) corridor. Several routes have been proposed but there is no preferred route at this point. One project in the South Bay portion of the corridor is the "South Bay Torlley," subject of a recent outpouring of letters asking LACTC to proceed with a rail project. The corridor scored high in "supporting development in centers" and in "promoting balanced subregions" among other good ratings. It is a high-priority corridor, to be studied in conjunction with potential extensions south of LAX in the beach cities area.

Recommended Further Work: Stage 2 analysis of alternative rail route options.

Summary of Recommendations

Table 3 summarizes the recommendations of the Stage 1 analysis. Some corridors are declared high-priority rail corridors and recommended for Stage 2 refinement. These are Century Freeway, San Fernando Valley (E/W), Santa Ana, Western Los Angeles (E/W) (including the

TABLE 3: RECOMMENDATIONS FOR FURTHER WORK

Corridor	Recommended for Rail Corridor Refinement	Recommended for Multi-Modal Corridor Analysis
Century	X	
El Monte		X
Glendale		X
Harbor	(1)	
Harbor/Long Beach (E/W) (2)		X
Pasadena	X	
San Fernando Valley (E/W)	X	
San Fernando Valley (N/S)		X
Santa Ana	X	
Western Los Angeles (E/W) (3)	X	
Wilshire West Exposition Route 2		
Western Los Angeles (N/S)/South Bay (2)	X	

Notes:

(1) Rail corridor refinement work on the Harbor corridor is essentially complete.

(2) The South Bay subcorridor will be studied as an extension of the Western Los Angeles (N/S) corridor.

(3) Route 2, Exposition Boulevard, and Wilshire West will all be included as alternative routings in the Western Los Angeles (E/W) corridor.

2, Wilshire West and Exposition Boulevard routes) and Western Los Angeles (N/S) extended to include the South Bay subcorridor. The Harbor Freeway corridor already has had adequate study and only awaits a decision when other corridors (Long Beach and Century) are brought up to an equivalent level of study. The Pasadena corridor is also high-priority and should be included in further Stage 2 work.

We recommend that the remaining corridors--El Monte, Glendale, San Fernando Valley (N/S) and Harbor/Long Beach (E/W)--enter Stage 4 multi-modal analysis, which may well recommend interim bus improvements. In conjunction with SCAG's Regional Transportation Plan, LACTC will be setting priorities for Stage 4 analyses in the context of countywide needs for improvements of all modes of transportation.

Description of Further Work

Those corridors in the "Recommended for Rail Corridor Refinement" column of Table 3 will enter the next step of the Rail Transit Implementation Strategy which is called Stage 2. The purpose of Stage 2 is to select a preferred route and mode in each corridor and to assign a construction sequence for the selected routes. This work will not preclude studies on other kinds of transportation improvements in the Stage 2 corridors, nor does it mean rail is the only solution to the transportation problems in those corridors. Furthermore, each Stage 2 corridor is different and the specific nature of the Stage 2 work will vary accordingly. In the Century Freeway corridor, for example, the route is basically established (the transitway median of the freeway) but the decision to have a busway or rail line needs to be made. Thus the nature of the Stage 2 work in the Century Freeway corridor will be quite multi-modal.

Those corridors in the "Recommended for Multi-Modal Corridor Analysis" in Table 3 will undergo what is called Stage 4 of the Rail Transit Implementation Strategy. That work is multi-modal in nature and more than likely will result in recommendations for highway and bus improvements. It does not mean, however, that a rail project cannot be studied or recommended; a Stage 4 designation only says that as a result of the preliminary work there is not as clear a need for a rail line in the short-term as there appears to be in other corridors. If Stage 4 analysis indicates the strong attractiveness of a rail line then it will be reassessed as a possible high-priority corridor.

FINANCIAL CONSTRAINTS

INTRODUCTION

The reason for the Stage 1 financial analysis is to check the size and construction schedule of an interim rail system to see if it is affordable. The 100 million dollars* a year expected from the Proposition A sales tax revenues will not be sufficient to build a large number of rail lines concurrently. The sales tax revenues alone may not even be enough to complete the proposed system in any time frame. State and federal revenues, if allocated to Los Angeles County, could help the Commission complete the system. However, the availability of these additional revenues beyond the assumed commitment to Wilshire Metro Rail cannot be projected.

Financial Analysis

Figure 2 shows the expected Proposition A revenue stream, required state and federal funds, and periods of revenue surplus or deficit. The purpose of the graph is to illustrate the probable rate at which an interim system might be constructed and the financial implications of the construction schedule.

The graph depicts one possible staging scenario for the interim system already recommended. Rather than list the corridors themselves, we've abstracted them as Project 1, Project 2, etc; they include Metro Rail and Long Beach-Los Angeles Projects as committed. The large blocks represent the time and high cost of high-capacity rail, the smaller blocks possible medium-capacity rail projects. We have assumed the large projects require 75% federal funds, the smaller projects 100% local funds. These assumptions are fine for this illustrative purpose; however, much more rigorous analysis will be done as part of the Stage 2 work.

The graph does indicate that under the given assumptions a period of high construction exists when bonds will have to be issued to pay for the work. It also indicates the high and sustained need for federal and state funds for the larger projects. Because of this, the work in Stage 2 will be oriented to and followed by a a federal-funding clearance process entailing alternatives analyses and environmental impact assessments for the larger projects.

It is clear in fact that many of these projects cannot be constructed without a great deal of outside funds for the high-capacity lines or without bonding for the medium-capacity lines. Under our staging scenario, bond payback would begin in 1993 and continue for many years

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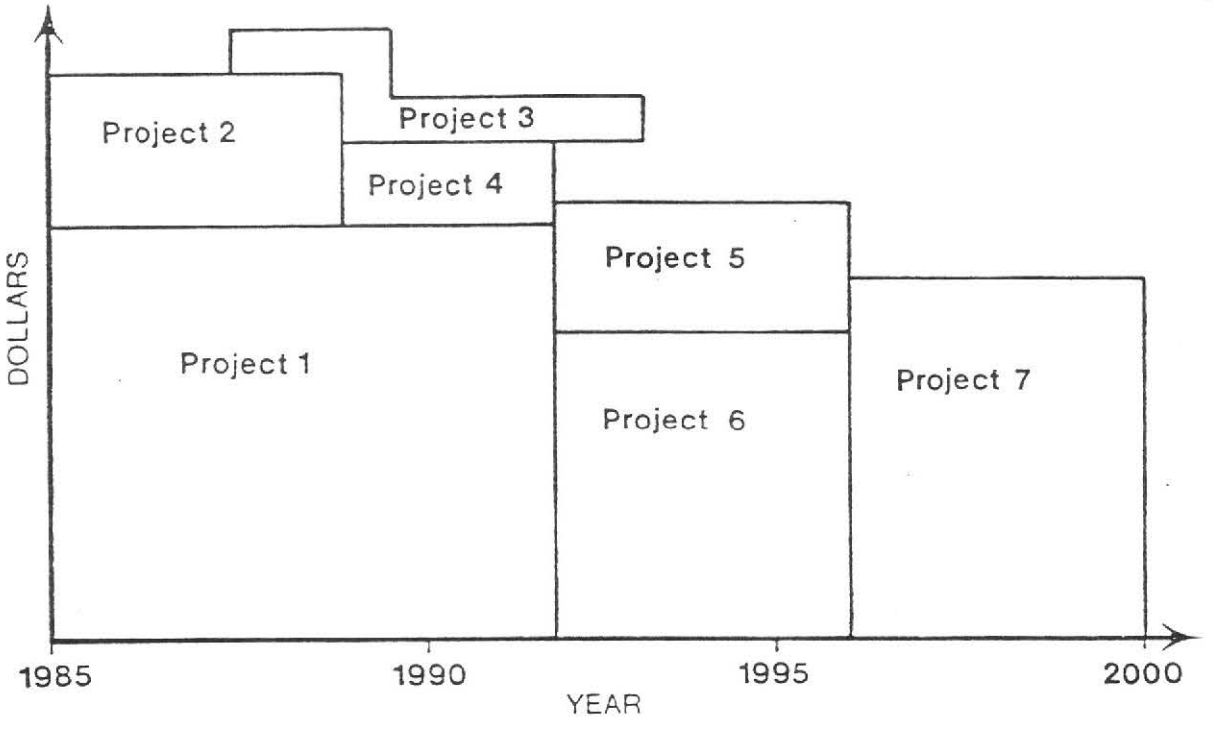
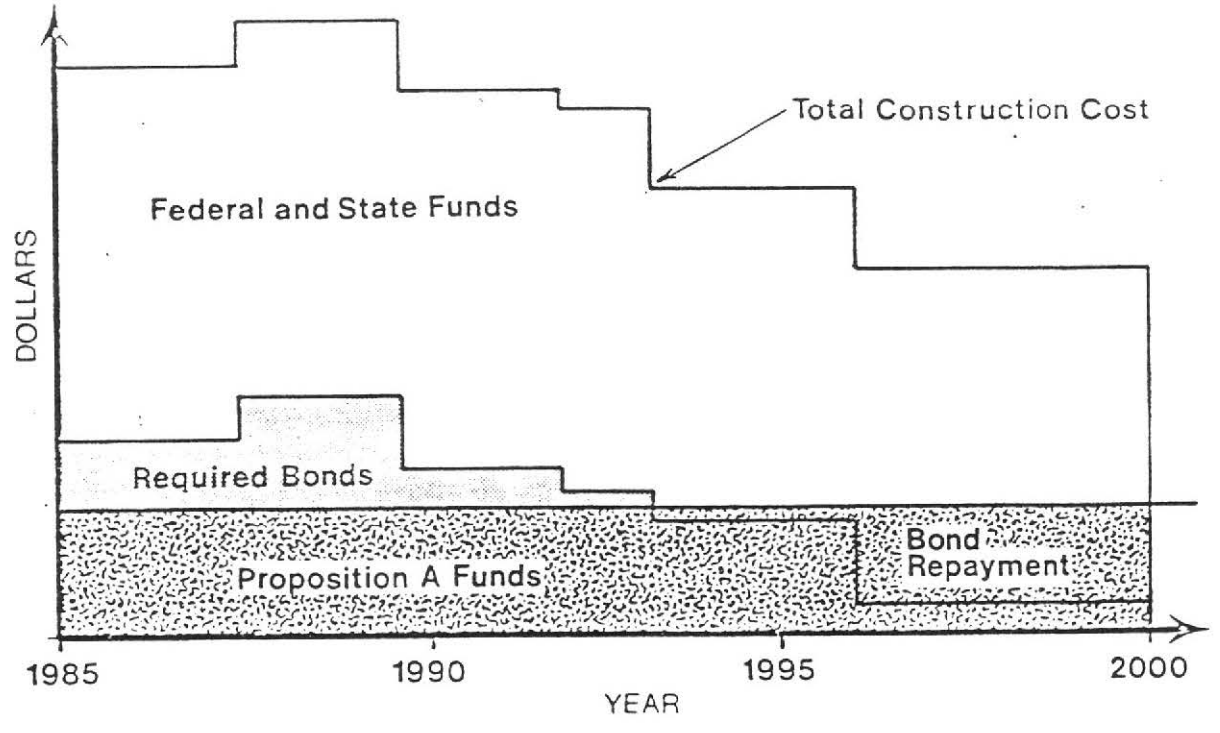
* The $100 million figure is derived from the State Board of Equalization sales tax revenue estimates for 1993. We assumed that 35% of the total sales tax revenues would go to rail capital development after 1985 and none of the 40 percent discretionary funds from the fare reduction program. The 40 percent discretionary funds would be used to subsidize bus and rail operations.

Figure 2

Financial Feasibility of Recommended System





thereafter. That pledge of repayment will have a constraining influence on our ability to build new lines later either on a pay as-you-go basis or on a bonding basis.

RMS:esk

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December 11, 1984

Memo To: Betty Bryant, Paul Taylor

From: Stephen Lantz

Subject: Rail Transit Implementation Strategy Milestones

<u>Issue</u>

What aspects of future rail corridor projects (Project Scoping, Concept Design & EIR) should be subject to public participation?

<u>Recommendation</u>

1. RTC should adopt a milestone program for the Rail Transit Implementation Strategy that clearly identifies the issues and concerns on future rail projects on the program topics of which public participation is sought (during project Project Scoping, Conceptual Design & the Formal EIR process.)

2. RTC should confirm policy and engineering decisions (identified by staff) that have been made for the Century or Long Beach projects that will predetermine important aspects of future projects (i.e.) Systemwide design criteria & for safety, security & system ___, vehicle design, station & yard design, train control, fare collection, alignment alternative limitations, right-of-way / relocation policy, development and land use policy, supporting service plan,

3. Public affairs staff should prepare a public participation orientation brochure for Rail Transit projects approval processes, which will be distributed to concerned citizens as each project seeks public participation.

Issues to Be Resolved
VIA a public Review
~~[illegible]~~

Se m#	Category	Pre-determined by LB/LA or Systemwide Requirements	Design/Engineering Issues Not Involving the Public	Needing Public Participation/Review
1	Guideways, Structures, Station Facilities			
2	Maintenance Facilities			
3.	Railroad Relocations			
4.	Utilities Relocations			
5.	~~Veh~~ Light Rail Vehicles			
6.	Electrification			
7.	Auxiliary Equipment			
8.	Vehicular Control Systems			
9.	Transit Track Construction/Maintenance			
10.	Insurance/Risk Management			
11.	Testing and Operation Mobilization			
12.	Construction Management			
13.	Affirmative Action ~~Risk Management~~ Program			
14.	Real Estate Acquisition			
15.	Right-of-Way Protection			
16.	Residential/Commercial Relocation			
12	Safety, Security, System Assurance			
18.	Route/Alignment Selection			
19.	Construction Authorization			
20.	DEIR Review			
21.	Project Scoping			
22.	Concept Design			
23	Final EIR Review			
24	Construction Costs			
25	Supportive Services			
26	Park & Ride Lot Sizes			

27. Traffic
28. Joint Development Policies
29. Benefit Assessments
30. ~~Resources~~ Physical Environment ∴ air pollution
31. Cultural Resources
32. Noise

Transit/
Transportation / Traffic / Parking
Land Use & Development / Zoning around Stations (Specific Plans)
Economic & Fiscal Considerations
Land Acquisition & Displacement
Social & Community Changes

LACTC

Steve Lantz

Los Angeles County
Transportation
Commission
403 West Eighth Street
Suite 500
Los Angeles
California 90014
(213) 626-0370

May 16, 1985

MEMO TO: RICK RICHMOND

FROM: PAUL TAYLOR PT

SUBJECT: INSPECTION TOUR OF LIGHT RAIL SYSTEMS

Early in May, Commission Chairwoman Jacki Bacharach, Vice-Chairman Deane Dana and Commissioners Chris Reed and Marc Wilder and I participated in an inspection tour of light rail systems in the Federal Republic of Germany and France. It was organized by the California Foundation on the Environment and the Economy. While I am preparing a more detailed trip report, I wanted to provide an overview of observations for each of the cities inspected.

Hamburg: In 1965, the city/state of Hamburg pioneered the development of an integrated system of transit modes, with an overall "federation" responsible for setting service standards and allocating revenues and the "partners" (operators) responsible for operations, maintenance, ownership and fare collection. Today, Hamburg has a single fare structure among the many operators and completely integrated planning and public information activities. In Hamburg we were briefed by a rolling stock manufacturer, LHB, which has made metro cars and commuter rail cars for Hamburg and light rail vehicles for Hannover and Braunschweig; in the U.S.A., LHB is linked with Ferrostaal in marketing rail vehicles.

Berlin: Berlin is experimenting with new approaches for its rail transit system. ITT-Seltrac has installed automatic train control for a five-station section of the subway system; they are testing the potential for driverless operation of subway trains. AEG Telefunken and Magnetbahn GmbH are developing a magnetically-propelled small-vehicle system to act as a 1.5 kilometer shuttle by the end of 1986; the vehicles have no motor on the cars and are carried by magnets instead of wheels. In Berlin, we were briefed by Waggon Union, which has built light rail vehicles for Karlsruhe and metro cars for Berlin; Waggon Union is owned by the same German company which owns the Budd Company, now called Transit America.

Hannover: An urban area of one million people, Hannover saw great increases in passenger usage when a light rail system was begun (in the 1960's) as a central subway with at-grade and streetcar operation on eight legs outside the downtown area. The central station is a two-level subway interchange point. Hannover's objectives are (1) to provide a separate right-of-way for light rail, (2) to operate light rail on a "green wave" of traffic signals as the LRV progresses along the line and (3) to use computerized train control to locate each vehicle on the line. With 200 light rail cars, Hannover has developed a system of light rail that closely resembles the system we have outlined for Los Angeles. The Hannover area has a transit governing structure like Hamburg's but it includes private operators on an equal basis with public operators.

Rhine-Ruhr Area: The tour inspected systems in two cities in the Rhine-Ruhr area: Essen and Dusseldorf. Essen has a light rail system, including an underground portion in downtown, and a bus system. They want to use rail tunnels for buses to speed them through the downtown area; therefore, they have developed and begun testing a "dual-mode" bus which would operate as a diesel bus away from downtown and switch to electric power (from overhead wires) before entering the downtown tunnel. Testing outside of tunnels is going well and they expect to fully operate buses in tunnels in 1987. In Dusseldorf, we inspected the 380-car light rail system operating over 155 kilometers of right-of-way, 1.6 kilometer of which is in tunnel. The transit governing structure in the Rhine-Ruhr area is the largest in Germany with about four dozen different operators. In Dusseldorf, we met with Duewag, which has provided light rail vehicles for most of the German light rail cities, and five cities in North America.

Brussels: Some members of the group were able to use the Brussels rail system, which has a significant component of "pre-Metro" or light rail using a central subway and surface operation away from the center. The group was struck by the importance of careful and clear directional and instructional signing in making such a system usable by the public.

Lille: In the northeast of France, MATRA, a French high-technology company, has constructed and is operating a fully-automated guideway transit line known as VAL. The fully grade-separated (largely subway) system has capacities comparable to or slightly greater than conventional light rail transit.

Paris: Most of the tour group was able to ride the super-high-speed TGV train from Paris to the southeast of France. A distance of over 200 kilometers can be covered in about one hour on the TGV.

In Paris, the group was briefed on the extensive, long established Paris transit system (RATP) by staff of SOFRETU, the subsidiary of RATP which conducts consulting assignments in the transit industry. The Paris system has 7.5 million daily riders (5 million on the 17 lines of the Metro and 2.5 million on the 200 bus lines, which use 100 kilometers of reserved bus lanes in the area). In Paris and its suburbs, transit carries some 60% of all travel, making the RATP, a creation of the French Republic, an extremely important element of government in the region. Comprehensive refinement and integration of routes and fares over the last 20 years (including private bus lines) have resulted in the Paris system being highly usable by even newcomers such as our group.

Nantes: On the west coast of France, the port city of Nantes has been operating since January of this year the first new light rail line in France. The project shares right-of-way with an operating railroad for one-third of its seven-mile length. The project took about 7 years from planning to operation. Nantes is now building a busway designed to be convertible to rail transit.

PAUL TAYLOR
Deputy Executive Director
Transit Development

PCT:bn

RICK RICHMOND
EXECUTIVE DIRECTOR

LACTC

Los Angeles County
Transportation
Commission
354 South Spring Street
Suite 500
Los Angeles
California 90013
(213) 626-0370

I N T E R O F F I C E M E M O R A N D U M

July 8, 1986

TO: SUSAN, ERICA, STEVE L., ROBIN, USHA
FROM: ANN
SUBJECT: "RAIL ON FREEWAYS" ARTICLE

Paul wanted you each to have a copy of the attached "You Asked Us" article on the subject of rail transit on/above freeways. This was prepared for "The Rail Way" newsletter, and, space permitting, will appear in the next issue.

cc: P. Taylor

"You asked Us" column for THE RAIL WAY

Q: Why can't we have rail transit on freeways, or on elevated structures above freeways?

A: Wherever practical, rail transit in Los Angeles County has been planned along or above freeways.

Proposition A specified 13 transportation corridors to be included in the eventual rail transit network. In each corridor, transit planners thoroughly studied possible routes and transit modes--light rail, heavy rail (Metro Rail), or busway convertible to rail--to determine which was most technically feasible, most likely to attract riders, and most cost-effective. The system now being developed combines all three types of transit.

Some corridors--such as the Wilshire Boulevard and coastal corridors--had no freeways on which rail projects might be built. LACTC's plan calls for these to be served by Metro Rail and light rail respectively.

In four cases, studies showed rail transit along freeways to be the best approach: in the median of the Century Freeway, now under construction (scheduled to open with the rail line in 1993); on the planned Harbor Freeway Transitway (to be built as a busway convertible to rail); on the San Bernardino Freeway (by converting the existing El Monte busway to rail); and on an aerial structure above the Santa Ana Freeway, envisioned as an eventual extension of the Metro Rail starter-line.

(cont.)

In another case--that of the Pasadena Corridor--a significant portion of the rail line may be located along a planned continuation of the Long Beach Freeway into the City of Pasadena.

In other corridors that have studies revealed that putting rail on existing freeways would not fulfill the planners' criteria as well as other routes would.

In two cases--that of the Long Beach-Los Angeles Rail Transit Project, now under construction, and that of an east-west San Fernando Valley line, now under study--planners felt that using parts of existing railroad rights-of-way was the preferable approach.

In the San Fernando Valley, for instance, a possible aerial structure along the Ventura Freeway was fully analyzed. The final report stated that such a project would have fewer riders and would cost more than other alternatives. Locating the necessary stations and park-and-ride lots would also be a problem; and an aerial structure would require land beyond the existing freeway right-of-way. Taking land on either side would not be feasible, since the immediately adjacent areas are heavily developed, so space would have to come from the freeway itself. As this is the most heavily traveled freeway in the country, reducing traffic lanes did not seem justified.

Three other corridors--roughly, along the San Diego Freeway from Marina del Rey to the Simi Valley Freeway, along the Santa Ana Freeway from Norwalk to the Orange County line, and along the Glendale Freeway from the downtown Los Angeles area to Glendale--have been set

(cont.)

aside for more detailed study in the future. Rail transit along those freeways will be considered carefully, together with other possibilities, after rail projects have been developed for higher-priority corridors.

In a similar way, LACTC's planners looked at each corridor and gave first consideration to the use of existing rights-of-way, either on freeways or along railroads. Wherever use of these rights-of-way did not clash with other objectives of good planning, they have been selected as the underpinnings of our new rail transit system.

# # #

Rail Transit Implementation Strategy

Stage 2

Prepared by:

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

TRANSIT DEVELOPMENT DIVISION

January, 1984

STAGE 2 REPORT

ON DEVELOPMENT OF A RAIL TRANSIT IMPLEMENTATION STRATEGY

INTRODUCTION

In November, 1980 the residents of Los Angeles County voted to increase the general sales tax from 6 to 6-1/2 percent to finance development of the countywide rail transportation system. The measure, commonly referred to as Proposition A, gave the Los Angeles County Transportation (LACTC) the mandate to improve and expand existing public transit countywide, reduce fares, and construct and operate a rail transit system serving approximately 13 corridors. In two of the corridors work has already advanced to the engineering stage. These are the Wilshire/North Hollywood Metro Rail corridor and the Long Beach/Los Angeles Light Rail corridor; they are not addressed in this document.

THE PURPOSE OF THE RAIL TRANSIT IMPLEMENTATION STRATEGY

The full Proposition A system will be a 150-mile network of rail lines in the thirteen designated corridors. Clearly rail lines cannot be built in all 13 corridors at once. The required construction effort would be monumental, and the Proposition A revenues alone would not be enough to construct all 13. The purpose of the Rail Transit Implementation Strategy Program is therefore to develop a defined plan for systematically constructing the Proposition A rail system using a combination of local, state, federal and private financing resources.

DESCRIPTION OF OVERALL PROCESS

The development of the Rail Transit Implementation Strategy is divided into several stages. In Stage 1 those corridors which have a greater need for rail service in the near term were selected for further definition. Those corridors are:

San Fernando Valley (East/West)
West Los Angeles (East/West)
West Los Angeles (North/South)/South Bay
Santa Ana
Pasadena
Century Freeway
Harbor Freeway

Stage 2, the subject of this report, analyzes a number of possible alternative rail routes and modes in each high-priority corridor and recommends in each one the route and mode which best represents the rail transit needs of that corridor. It is important to keep in mind that the route selected in Stage 2 is only "representative" and that further study will be necessary to establish a specific alignment and set of station locations.

Once a representative rail route and mode is selected in each high-priority corridor they will all be combined into a system of routes and analyzed as a system. This will be done in Stage 3. Work in this stage will determine operating costs, phasing options, and financial possibilities. The results of Stage 3 may be used to advance one or two of the representative routes toward preliminary engineering.

Stage 4 develops a strategy for the overall 13-corridor system, including possible non-rail transit improvements to serve each corridor prior to initiation of rail service. The development of the Stage 4 strategy is an on-going effort.

STAGE 2 PROCESS

The first step in Stage 2 was to derive possible rail alignments which might serve the rail transit needs of each high-priority corridor. These were selected using past studies and in consultation with representatives of both local jurisdictions and transportation-oriented community groups. Any reasonable rail alignment suggested was included and became a candidate for detailed study. Once these candidate routes were agreed upon, each route was driven and appraised for engineering feasibility and rough cost-effectiveness. The intent of this step was to eliminate from further, more detailed and costly study those candidate rail routes which were agreed to be in some way infeasible. Six routes were dropped at this point.

The alternative rail routes remaining were then studied in some detail. These routes are indicated in Figure 1. Estimates were made of the civil construction necessary to build each alternative. Included were any necessary street improvements, grade-separations and major railroad or highway relocations. Based on this engineering work, cost estimations were prepared for each route. Another phase of the work involved the estimation of future patronage for each route. A final effort involved assessing the land use along each route alternative for the purpose of determining its ability to attract a range of trip types.

Rail Transit Implementation Strategy
Stage 2
Alternative Rail Routes

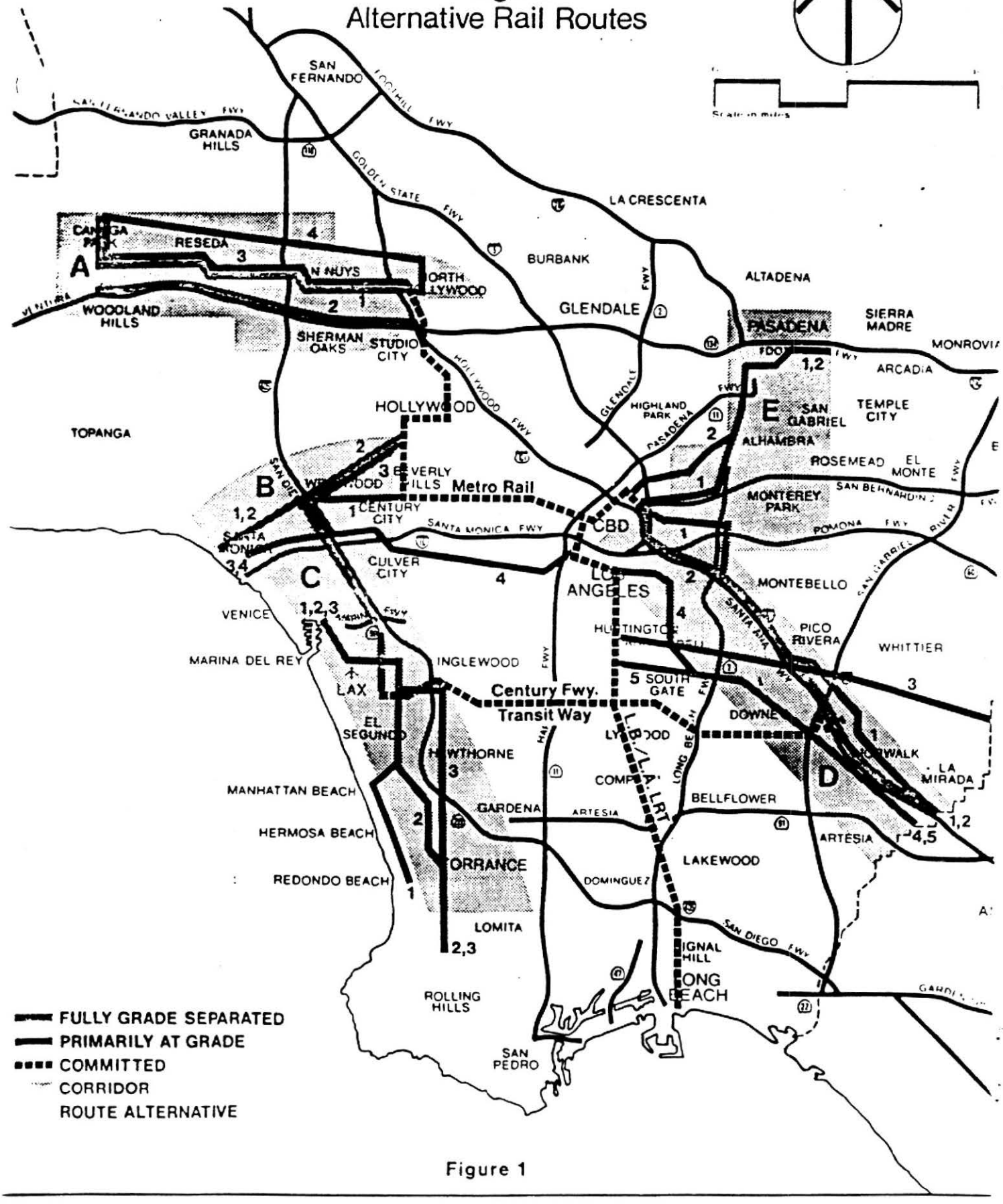


Figure 1

SUMMARY OF RECOMMENDATIONS

The Recommendations chapter of this report discusses the findings within each corridor in turn and recommends for each one rail route which best serves the rail needs of that corridor. These recommendations are as follows:

CORRIDOR	RECOMMENDED ROUTE AND MODE
San Fernando Valley (E/W)	A3 Burbank Branch (LRT)
West Los Angeles (E/W)	B1 Wilshire Extension (HRT)
West Los Angeles (N/S)/South Bay	C2 Marina/ATSF (LRT)
Santa Ana	D2 Santa Ana Freeway (HRT)
Pasadena	E2 Lincoln Hgts/Rte 7 (LRT)

The decisions in the Harbor Freeway and Century Freeway corridors concern which mode, rail or busway, should be build in each. The Commission approved in August a request by Caltrans to proceed with the Harbor Freeway Transitway Final Environmental Impact Statement. It recommends the Busway/HOV alternative as the locally preferred alternative. The decision whether rail should be built first in the Century Freeway transitway or whether a busway should be built initially with later conversion to rail is part of the Stage 3, systems analysis, work.

METHODOLOGY

INTRODUCTION

Nineteen alternative rail routes were studied to estimate three things: 1) engineering requirements and project costs, 2) ridership, and 3) land use compatability. To perform this work the Commission was assisted by consultants and local agencies as follows:

Engineering/Cost -	Daniel, Mann, Johnson, & Mendenhall with DKS Associates, and CSCC, Inc.
Ridership -	Southern California Association of Governments, Programming and Evaluation;
Land Use -	Los Angeles County, Department of Regional Planning; City of Los Angeles, Department of City Planning.

Before describing the work and results, it is important to realize that the work being done is between the corridor-level analysis (done in Stage 1) and specific alignment work needed during preliminary engineering. The routes studied are still conceptual in nature and are meant only to represent a certain need for rail transit at what amounts to a sub-corridor level. Later, each route will require further definition to select a specific alignment. Although some specifics were assumed for purposes of deriving cost estimates, and although certain alignments are fairly clear-cut, the routes should nevertheless be viewed as representative.

SELECTION OF CANDIDATE ROUTES

Before any work could be done, possible rail routes had to be selected. Depending on the corridor, up to five routes were chosen for preliminary assessment. In all, 25 routes were chosen in 5 of the high-priority corridors. (In the Century Freeway and Harbor Freeway corridor only the freeway rights-of-way were considered.) In developing these candidate rail routes discussions were held with officials of most of the cities in each corridor as well as with several larger, transit-oriented community groups. One route was added once the study started.

ENGINEERING/COST

This work was divided into three phases. The first phase performed what is called a "windshield" appraisal of each of the candidate routes. The intent at this stage was to weed out those routes which

were clearly not feasible and/or too expensive to build. Of the 25 candidate routes looked at, 6 were eliminated by concensus of the Commission and the groups in each corridor the Commission staff worked with throughout this study. The remaining 19 routes then became official rail route alternatives.

The next phase of the work was to detail, at a conceptual level, what reconstruction would have to be done to existing freeway, streets, and railroads to construct each of the route alternatives. The route and its approximate station locations were superimposed on an aerial map of the entire route. Typical cross-sections were then drawn to indicate how the new rail line would fit. Subway sections, aerial sections, intersection flyovers, street widenings, etc. were also indicated on the aerial maps. The result was a conceptual-level representation of the new rail lines in place.

The final phase of the engineering/cost effort was to estimate costs for each of the rail route alternatives. This was done using the maps and typical cross-sections derived in the second phase of the work. Unit costs for each type of work were developed from experience on other rail projects around the United States. Using their costs and the mapping, the cost estimators were able to calculate the approximate cost of each line in 1983 dollars. Typical percentages were used for overhead, design fees, construction management fees, and contingencies. Right-of-way costs were added as a percentage increase it being virtually impossible to estimate even approximate right-to-way costs at this level of project development.

RIDERSHIP ESTIMATION

The purpose of the patronage modelling effort was to give LACTC staff an estimate of the potential ridership demand each rail alternative would have, assuming the alternatives would be operating in the year 2000. To estimate ridership demand the basic Regional Transportation Model, often referred to as the "LARTS" model was used. All the assumptions recently used for the modelling effort in producing the Regional Transportation Plan were incorporated in the Stage 2 modelling effort with, changes in the rail network discussed below.

To build the transportation system, SCAG constructed a "baseline" highway and transit network to which each alternative was added. The highway network was the 1995 improved highway system, the same system SCAG used in the RTP modelling effort. The only change made to the highway network was to remove HOV lanes from the I-110 and I-5 freeways. The baseline bus network was also the same as the bus network used for RTP patronage estimations; (i.e. the 1980 Sector Improvement Plan.) None of the bus networks included feeder bus routes to rail stations but where existing bus lines were intersected a transfer

was allowed. The baseline rail network consisted of the Wilshire Starter Line and the Long Beach-Los Angeles Light Rail Line. The Century freeway transitway was coded for bus or rail vehicles.

To code the alternative rail networks, LACTC provided SCAG with route descriptions of each alternative, including assumptions about station locations and parking facilities. These descriptions were used to develop a rail alternatives network map which was then keypunched into the transit network component of the LARTS computer model. LACTC also provided SCAG with the following operating characteristics for LRT and HRT alternatives.

OPERATING CHARACTERISTICS OF RAIL ALTERNATIVES

CHARACTERISTICS	LRT	HRT
Maximum Cruising Speed	38 mph*	70 mph
Accel./Decel Rates	3.0 mph/s	3.0 mph/s
Dwell time at stations	20 seconds	20 seconds
Headway (Peak)	6 minutes	3.5 minutes

*The Pasadena El Monte Alternative used a 50mph maximum cruising speed because it is primarily grade-separated.

To estimate patronage demand for each alternative, the complete LARTS model was run adding, one at a time, each rail alternatives. For example, in the San Fernando Valley (E/W) corridor a computer run was made adding the Southern Pacific Main Coast Line (the alternative) to the baseline highway, bus, and rail (Metro Rail, Long Beach-Los Angeles, Century Transitway) network. The result of the computer run was an estimation of the average daily patrons riding on the Southern Pacific Main Coast Line and the other baseline rail and transitway lines. Another run was then done adding the Burbank Branch LRT alternative to the baseline rail and transitway network and estimating average daily patrons on this line. This procedure was carried out until the year 2000 ridership was estimated for all alternatives.

The model necessarily emphasizes work trips because much more is known about their travel patterns than those of shopping or recreational trips. Daily ridership is obtained by factoring up work trip volumes by an overall average factor which is known. In some cases this procedure may over-estimate or under-estimate expected trips.

It is again important to emphasize that the modelling effort done for estimates, the Stage 2 effort was at the conceptual level. The ridership estimates, although seemingly precise because the computer provides us with a specific number, nevertheless give us only an approximation of the rail ridership demand for each alternative. The important thing is that the procedure is identical for all alternatives.

LAND USE ASSESSMENT

The City and County's work focused on generalized land use impacts and development potentials of route alternatives in each corridor. They did not evaluate specific impacts because the precise alignment of the alternative routes are not known at this time.

In the first phase of the network, the City and County did a "windshield" survery of properties one-half block on either side of a route to describe the existing land uses. The windshield survey considered 10 land uses:

- Housing - Single-Duplex, Multiple Dwelling, High Rise
- Commercial - Community and Regional
- Office
- Industrial
- Open Space
- Institutional
- Airport

Maps were prepared illustrating the ten uses along each route. The City and County then estimated the percentage of residential, industrial, and commercial uses the route passed through.

An effort was also made to determine for each tentative station location, its potential to attract additional development or to support any high-intensity land uses already near the station. A very simple rating system was used because of the conceptual nature of the route and study: 0 meant no potential, 1 meant normal growth, and 2 meant a strong potential for fostering existing growth or for supporting major new growth.

FINDINGS

INTRODUCTION:

It is the intent of Stage 2 to compare routes only within a single corridor, as opposed to comparing routes between corridors. That will be done in Stage 3 after the single representative rail route has been chosen in each high-priority corridor. Therefore the Stage 2 findings will be discussed on a corridor-by-corridor basis.

The presentation highlights only the summary findings. Supplemental reports detail specifics for each route on engineering/costs, patronage estimation, and land use assessment. These are available for review at the Commission offices, but are too voluminous to incorporate in a appendix to this report.

SAN FERNANDO VALLEY (E/W) CORRIDOR

Four rail alternatives were evaluated in this corridor in detail. Two are perceived as extensions of the Metro Rail rapid transit line west across the Valley. Two are perceived as light rail feeder routes connecting the western part of the Valley to the North Hollywood Metro Rail station. The first two routes are fully grade-separated, primarily in aerial structure, the second two are predominantly at-grade. All routes are shown in Figure 2A.

Table 1A summarizes the technical findings.

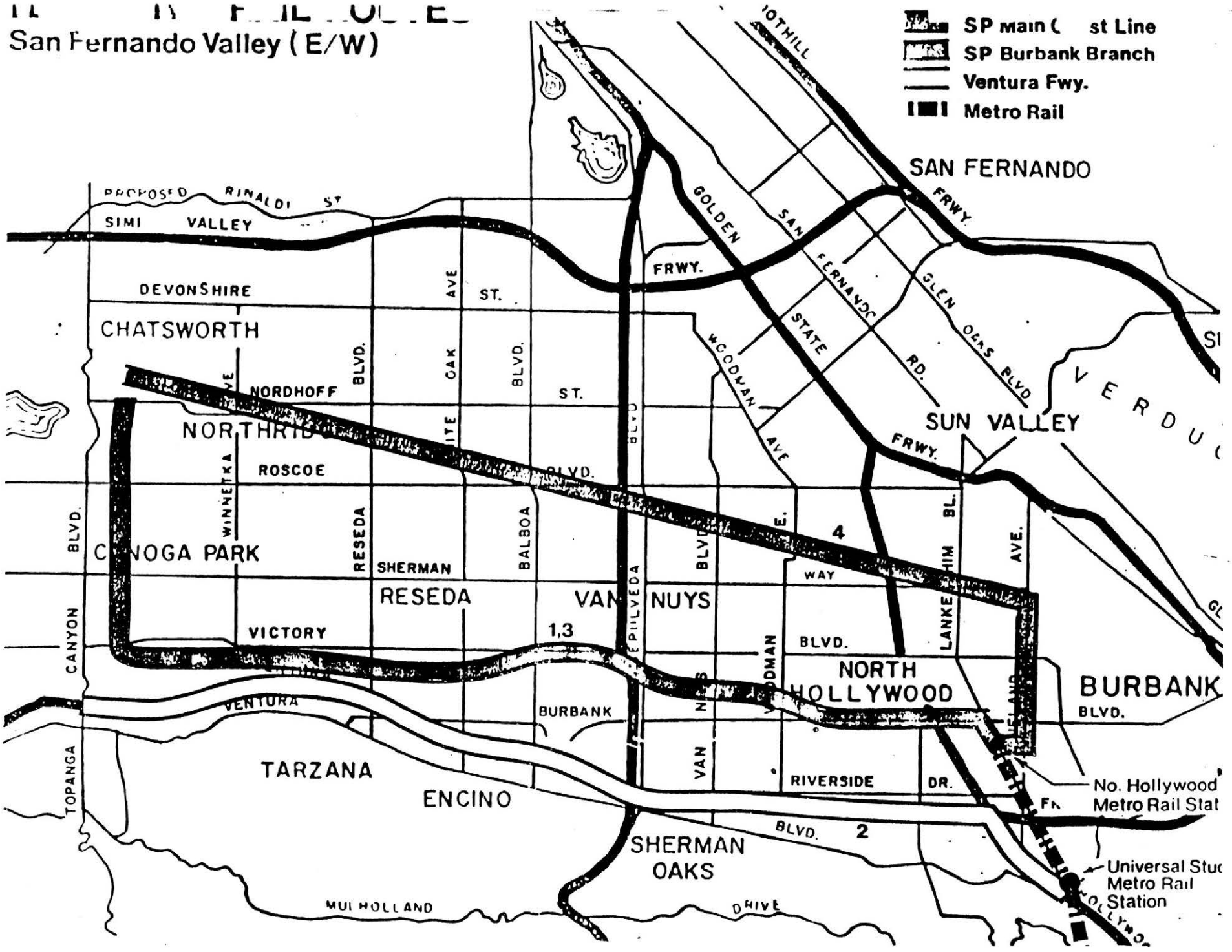
Table 1A: Summary of Stage 2 Findings
San Fernando Valley E/W Corridor

Alternative	Length (Miles)	Cost* (1983 $)	Ridership (Yr. 2000)
A1 Burbank Branch (Metro Rail)	16.5	560 Million	86,860
A2 Ventura Fwy	14.1	636 Million	76,490
A3 Burbank Branch (Light Rail)	16.5	173 Million**	52,910
A4 SP Main Line	15.1	223 Million	60,220

* Cost to complete will be substantially higher depending on when the line is built.

**Additional aerial sections may be found warranted during more detailed design; these additions would add to the estimate.

San Fernando Valley (E/W)



Burbank Branch (Metro Rail)

This route is an extension of the Metro Rail Line and starts with a shared Metro Rail Station at Lankershim and Chandler in North Hollywood. It continues north in subway under Lankershim and west under Burbank Boulevard (or a paraleel major street). It would transition from a subway to an aerial configuration near a Laurel Canyon station and remain elevated following the north side of the Southern Pacific's "Burbank Branch" railroad right-of-way to Sepulveda. West of Sepulveda the line is at-grade, but becomes elevated again west of Balboa and follows the railroad right-of-way north on Canoga, terminating at Nordhoff and Canoga Avenues.

This route attracts the most patrons in the corridor because it is directly connected to the Metro Rail line and uses a fully protected right-of-way which improves travel times. The high cost of constructing a subway and elevated guideway reduces the line's cost-effectiveness compared to the light rail lines.

This route traverses relatively low-density residential areas and large tracts of open space near the Sepulveda Dam and recreation area. Existing community plans designate that much of the area remain zoned for low-density housing. This is contrary to high-density development a Metro Rail line should induce at station locations. However, the line does connect to the major mixed use project in the Valley, Warner Center, which would further strengthen that center's designation as a regional employment and residential growth area.

Ventura Freeway

This route begins with a subway transfer station to the Metro Rail Line at Lankershim and Riverside Drive and continues in subway under the Ventura Freeway. It portals West of the Hollywood Freeway and enters the Ventura Freeway median in an aerial configuration until the Balboa Boulevard station. After this station the line is at-grade, in the freeway median, until it transitions to an aerial guideway west of Louise Avenue It remains in an elevated configuration in the freeway median to the end-of-the-line at Topanga Canyon Blvd.

The Ventura Freeway route has the lower ridership than A1 and is more expensive to build making it the least cost-effective route in the Valley. The high cost is primarily due to building an elevated guideway in the median of the Ventura Freeway. The patronage is lower than other alternatives probably because of few transit dependent households at the southern end of the

Valley and an access barrier created by the Santa Monica Mountains.

The primary land use found along the Ventura Freeway Route is low-density housing. The single family housing characteristic of the route does not lend itself to high-density development one would want to encourage with a Metro Rail line. The development potential of stations located on or along a freeway right-of-way is also limited, perhaps to air rights development of office or retail projects. The circulation requirements for autos entering and exiting the freeway, combined with feeder bus and pedestrian access to the transit stations along the freeway, make construction and operation of a commercial development difficult. In sum, the potential for creating significant developments, either residential or commercial, in conjunction with a freeway transit line is limited.

Burbank Branch (Light Rail)

This route begins with an at-grade station at the North Hollywood end of the Metro Rail line and proceeds north in the median of Lankershim Blvd. It turns west along the median of Burbank Boulevard (or a parallel major street) until it transitions to an aerial configuration over the Burbank Branch railroad right-of-way at Los Angeles Valley College. It remains elevated until after the grade separation at Woodman Ave. The line follows the railroad right-of-way, at grade, for the remainder of its length, except for a grade separation at the Los Angeles River crossing at the west end of the Sepulveda Dam Recreation Area. The route ends at Canoga Avenue and Nordhoff Street. It may well be determined that addition aerial sections may be necessary as design evolves.

The Burbank Branch route has highest light rail patronage in this corridor. It connects with the Metro Rail line serving commuters and also provides service to other commercial and residential centers in the Valley, most notably Warner Center and Van Nuys. The line's high patronage attraction and low cost give it the best cost-effectiveness rating of the corridor's rail alternatives, even should some additional aerial sections be found warranted in future work.

The land use patterns and joint development opportunities of this line are virtually the same as the Burbank Branch Metro Rail option with one distinction. The Metro Rail line, because of its greater carrying capacity and elevated stations, would act as a greater incentive for high-density residential or commercial projects along the route than the light line.

Southern Pacific Main Line

The route begins at the North Hollywood Metro Rail station and proceeds east along the north side of the Burbank Branch railroad right-of-way to Vineland. From there it turns north in the median of Vineland to the Southern Pacific's Main Line right-of-way. It runs mostly within the the railroad right-of-way until the terminal station on De Soto, between Knapp Street and the Main Line. Grade separations are required for the transition from Vineland to the railroad right-of-way; flyovers at Lankershim, Sherman Way, Laurel Canyon, the Hollywood Freeway, the Tujunga Wash, Reseda, Winnetka; and elevated segments along portions of the railroad right-of-way.

The Southern Pacific Main Line route is very similar to the Burbank Branch route in cost and patronage. The Line is slightly more expensive to build because of the required grade separations. It also carries slightly more passengers but has a lower cost-effectiveness rating than the Burbank Branch light rail.

This route travels mostly through industrial areas which use the Southern Pacific's freight service. Consequently, the route would support primarily industrial manufacturing development, especially at the western end of the route. The location of industrial centers and residential areas along the route and its connection to Metro Rail would make the line useful as a rail facility that serves employment-related trips.

WEST LOS ANGELES (E/W) CORRIDOR

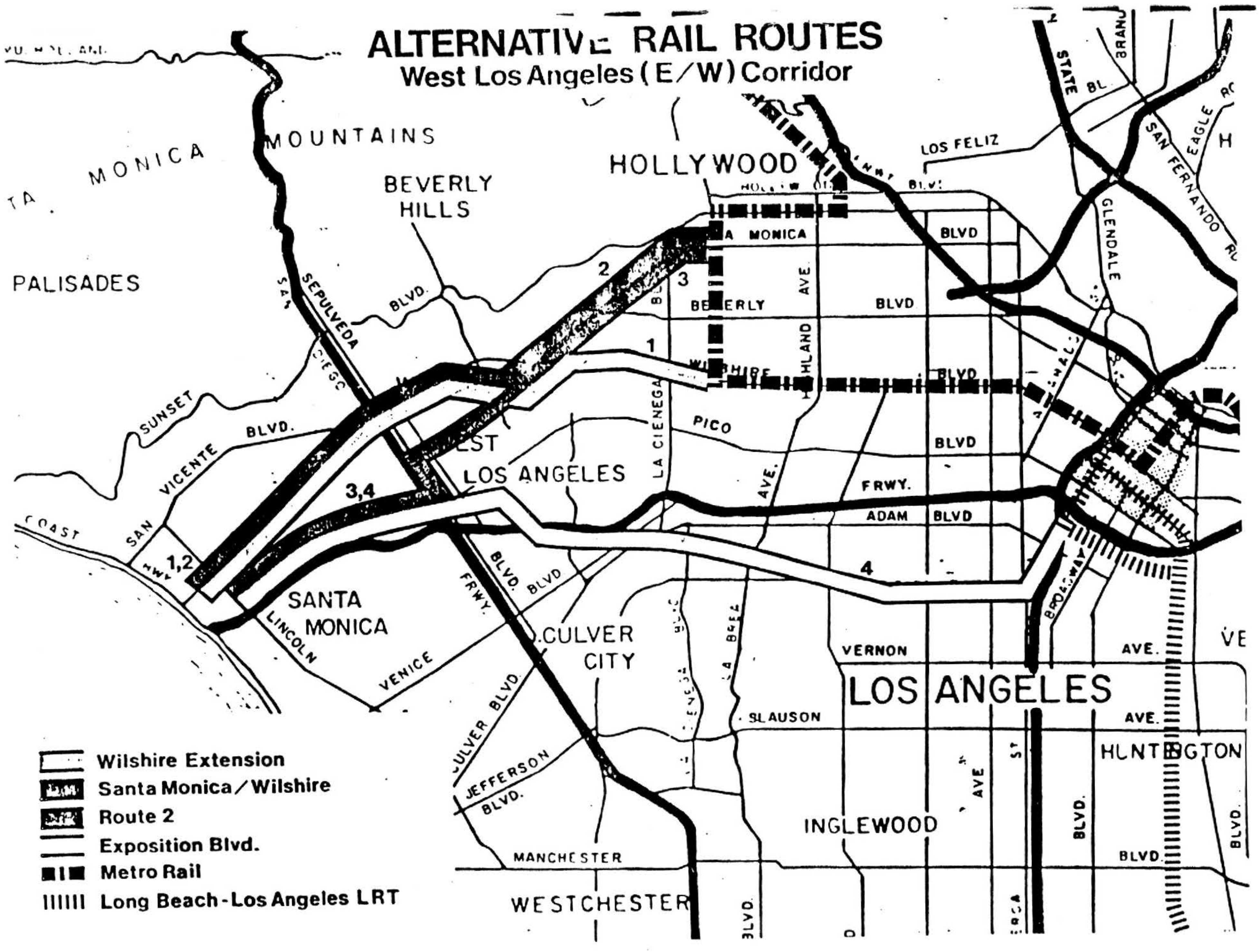
Four rail route alternatives were evaluated in this corridor. Two of the routes are extensions of the Metro Rail rapid transit line west into Santa Monica. Two of the rail routes are light rail, one a feeder route to the Metro Rail line, the other a separate route connecting downtwon Los Angeles with Santa Monica. The route alternatives are shown in Figure 2B

TABLE 1B: SUMMARY OF TECHNICAL FINDINGS
WEST LOS ANGELES (E/W) CORRIDOR

	Route Alternative	Length (Miles)	Cost* (1983 $)	Ridership (Yr. 2000)
B1	Wilshire Extension	9.1	$1,340 Million	99,980
B2	Santa Monica/Wilshire	9.7	$1,404 Million	80,610
B3	Route 2	9.5	$ 301 Million	29,900
B4	Exposition	13.2	$ 263 Million**	36,630

* Cost to complete will be substantially higher depending on whe line is built.

** Cost includes added cost to up-grade northern end of Long Beach-Los Angeles project to handle increased capacity. This cost is estimated to be $71 Million.


ALTERNATIVE RAIL ROUTES
West Los Angeles (E/W) Corridor
MONICA
MOUNTAINS
PALISADES
BEVERLY
HILLS
HOLLYWOOD
LOS FELIZ
STATE
BL.
GLENDALE
SAN FERNANDO
EAGLE
SEPULVEDA
BLVD.
SUNSET
BLVD.
SAN
VICENTE
COAST
HWY
1,2
3,4
2
3
1
4
BEVERLY
BLVD
WILSHIRE
BLVD
PICO
BLVD
LA CIENEGA
AVE.
FRWY.
ADAM
BLVD
SANTA
MONICA
LINCOLN
VENICE
FRWY.
BLVD.
CULVER
CITY
CULVER BLVD.
JEFFERSON
BLVD.
LOS ANGELES
LOS ANGELES
VERNON
AVE.
SLAUSON
AVE.
HUNTINGTON
INGLEWOOD
MANCHESTER
BLVD.
WESTCHESTER
BROADWAY
AVE
Wilshire Extension
Santa Monica / Wilshire
Route 2
Exposition Blvd.
Metro Rail
Long Beach - Los Angeles LRT

Wilshire Extension

'ternative B1 is a tunnel extension of Metro Rail under Wilshire ɔulevard into downtown Santa Monica. It deviates from Wilshire Boulevard only to serve the Century City, and its construction cost is comparble to that of the Metro Rail project on a per-mile basis.

This alternative attracts the most riders in the corridor. It links the major regional traffic generators in Beverly Hills, Century City, Westwood and Santa Monica with the Metro Rail Starter Line which serves the Los Angeles Regional Core.

The Wilshire West extension of the Metro Starter Line follows the major regional commercial developments located on Wilshire Boulevard, west of Fairfax Avenue. The western portion of the Wilshire corridor has recently experienced a boom in high-density office, retail and condominium developments. This route would continue to support the trend toward intensifying commerical and residential uses in the corridor.

Santa Monica/Wilshire

Alternative B2 differs from the Wilshire extension alternative only in that the route starts at the Fairfax/Santa Monica Station of Metro Rail and proceeds under Santa Monica Boulevard to its intersection with Wilshire Boulevard. From that point west the two routes are common. Because the route is longer it cost more than the Wilshire :tension, but is comparable to it and the Metro Rail project on a ɔst-per-mile basis.

This alternative's patronage is lower than that of Alternative B1. The Santa Monica route does not connect the major regional centers in West Los Angeles as directly as the Wilshire West Extension and, as a result, has fewer patrons using the line.

This extension of the Metro Rail Starter Line traverses the same regional commercial and office centers as Alternative B1. The eastern segment of the Santa Monica route, however, travels along Santa Monica Boulevard using the railroad right-of-way making more land available for new commerical developments than the Wilshire Extension. The Santa Monica extension would also support the trend toward high-density residential and commercial developments in the West Los Angeles corridor and would serve employment, retail, educational, cultural and other trip types.

Route 2

Alternative B3 is a light rail line starting in tunnel at the Fairfax/Santa Monica Metro Rail Station then heading west under Santa Monica Boulevard. Beyond La Cienega it proceeds at-grade in the median or along the side of Santa Monica Boulevard to Sepulveda. There is an underpass from Canon Drive to west of Wilshire. From ›pulveda the route turns south to the Exposition freight line, then ɔst to 16th Street. Because of its lengthy grade-separated sections,

this route is, on a cost-per-mile basis, an expensive light rail alternative.

This alternative also has the lowest ridership of the corridor alternatives because its slower at-grade service limits the ridership attractivenss of this route.

This route shares its eastern portion with the Santa Monica HRT line and western segment with the Exposition line. The mixture of land uses includes high-density office, and retail along Santa Monica Boulevard and industrial uses along the eastern Olympic portion of the line. Commercial, office and residential developments can occur along Santa Monica Boulevard, although the density of development associated with the LRT line would be less than that associated with an HRT facility. The LRT would also encourage additional industrial and mixed-use development along its western portion.

Exposition

Alternative B4, the Exposition route, serves a completely different sub-corridor than the other three alternatives. It starts in downtown Los Angeles in a common tunnel section with the Long Beach-Los Angeles light rail project. It proceeds south on Figueroa to USC at Exposition Boulevard, then turns west and follows the Southern Pacific tracks to 16th Street in Santa Monica. It has one subway section in downtown and one as it crosses under I-10.

This route has the higher patronage of the two LRT lines. It serves the Exposition Center and the transit dependent areas in Southwest Los Angeles in addition to attracting commuter patrons from the Santa Monica area.

The predominant land uses along this route are equally divided between light industrial and low-density housing. The line may support additional commerical development in the Exposition Park area. The western portion of the route travels through Santa Monica's industrial zone and would probably encourage additional industrial and mixed-use development in this area.

WEST LOS ANGELES (N/S)/SOUTH BAY CORRIDOR

Four rail route alternatives were evaluated in this corridor. Three of the routes are primarily at-grade (light rail) and serve a distribution function within the corridor. All light rail alternatives are assumed to be on the surface from Marina del Rey through the LAX-Northside area. Aerial (or tunnel) sections are possible and may be considered later depending on additional revenue sources, perhaps from the private sector, and opportunities for integration into new development. The fourth route is designed to be more a regional connection between the West Los Angeles (E/W) corridor and the Century Freeway Corridor. This route is fully grade-separated. All route alternatives are shown in Figure 2C. Table 1C below summarizes the technical findings.

ALTERNATIVE RAIL ROUTES

West Los Angeles (N/S) / South Bay Corridor

Table 1C: Summary of Stage 2 Findings
West Los Angeles (N/S)/South Bay Corridor

Route Alternative	Length (Miles)	Cost* (1983 $)	Ridership (Yr. 2000)
C 1: South Bay Trolley	12.8	$197 Million	32,360
C 2: Marina/ AT&SF	15.9	$292 Million	39,630
C 3: Marina/ Imperial	15.4	$333 Million	24,230
C 4: I-405/ Sepulveda	10.7	$946 Million	43,600

*Cost to complete will be substantially higher depending on when the line is built. The possibility also exists of adding more aerial segments to portions of the light rail alternatives; these additions would add to the costs.

South Bay Trolley

This route starts at Lincoln Boulevard and Route 90 in Marina del Ray and follows Lincoln Boulevard south to the Airport's Lot C. It then skirts the eastern boundary of the Airport down to the El Segundo area where it uses the abandoned Santa Fe Railroad right-of-way into Redondo Beach. The line is primarily at-grade with some aerial ections through the airport area. The route attracts a significant idership.

The route traverses employment-related land uses in El Segundo and the airport area and residential and mixed-use developments in Marina del Rey and the Beach Cities. The distribution of residential, office, industrial, retail and recreational uses along this route makes it a good line for serving a wide variety of trips. The route will also encourage further development of the South Bay/West Los Angeles employment and residential growth centers located throughout the Airport area.

Marina/AT&SF

This route is the same as the South Bay Trolley from Marina del Rey to El Segundo. From Rosecrans and Aviation, the line proceeds southeast following the AT&SF "Harbor District" right-of-way to Hawthorne Boulevard. At this point it proceeds south in the Hawthorne Boulevard median to Pacific Coast Highway. The route is primarily at-grade. Because it is longer and requires more street reconstruction and aerial structures it is more expensive than the South Bay Trolley.

The line does serve most of the larger traffic generators in the South Bay area and therefore has the highest LRT ridership. Because of their similar routing north of the AT&SF Junction in El Segundo, this ine has almost the same land use pattern and develoment potential as ie South Bay Trolley. The Hawthorne Boulevard segment passes through

residential and commerical uses. The variety of land uses along this route would also encourage multi-purpose trips.

Marina/Imperial

This route is again the same as the above routes north of the Airport area. However, at Imperial Avenue, the route turns east to Hawthorne Boulevard, then south to Pacific Coast Highway. Because it has the most aerial structure it is the most expensive of the routes.

The route skirts the El Segundo employment area and has the lowest patronage of the routes as a result. Its cost-effectiveness is subsequently poor.

Because of the common segments north of the Airport and south of Manhattan Beach Boulevard with the above routes, the land use pattern and joint development opportunites for the Marina/Imperial route are similar to the preceeding lines with one exception. The route does not serve the growing El Segundo employment area.

I-405/Sepulveda

This route starts in Westwood at UCLA and proceeds south to Sepulveda either under or over I-405 as conditions require. It goes under Sepulveda through the Airport then turns east on Imperial to connect with the Century Freeway transitway. Because this line is fully grade-separated, it is quite expensive to construct.

This line was designed to tie together the Century Freeway transitway with a West Los Angeles (E/W) rail project. However, as a "stand alone" project built before the West Los Angeles project it will attract a relatively low volume of riders. Its cost-effectiveness is very poor; this alternative will not compete as an early start rail project.

Over half the route uses the I-405 right-of-way which makes it a poor candidate for joint development opportunities. Residential land use patterns predominate, but the route connects important regional commercial centers such as the airport and Westwood. The I-405/Sepulveda line would contribute to the further growth of these centers.

SANTA ANA CORRIDOR

Five rail route alternatives were evaluated in this corridor. Two of the routes are extensions of the Metro Rail rapid transit line east and southeast from Union Station. The other three routes (two of which are substantially common) are primarily at-grade and can be viewed as branches of the Long Beach-Los Angeles light rail line. All route alternatives are shown in Figure 2D. Table 1D summarizes the technical findings.

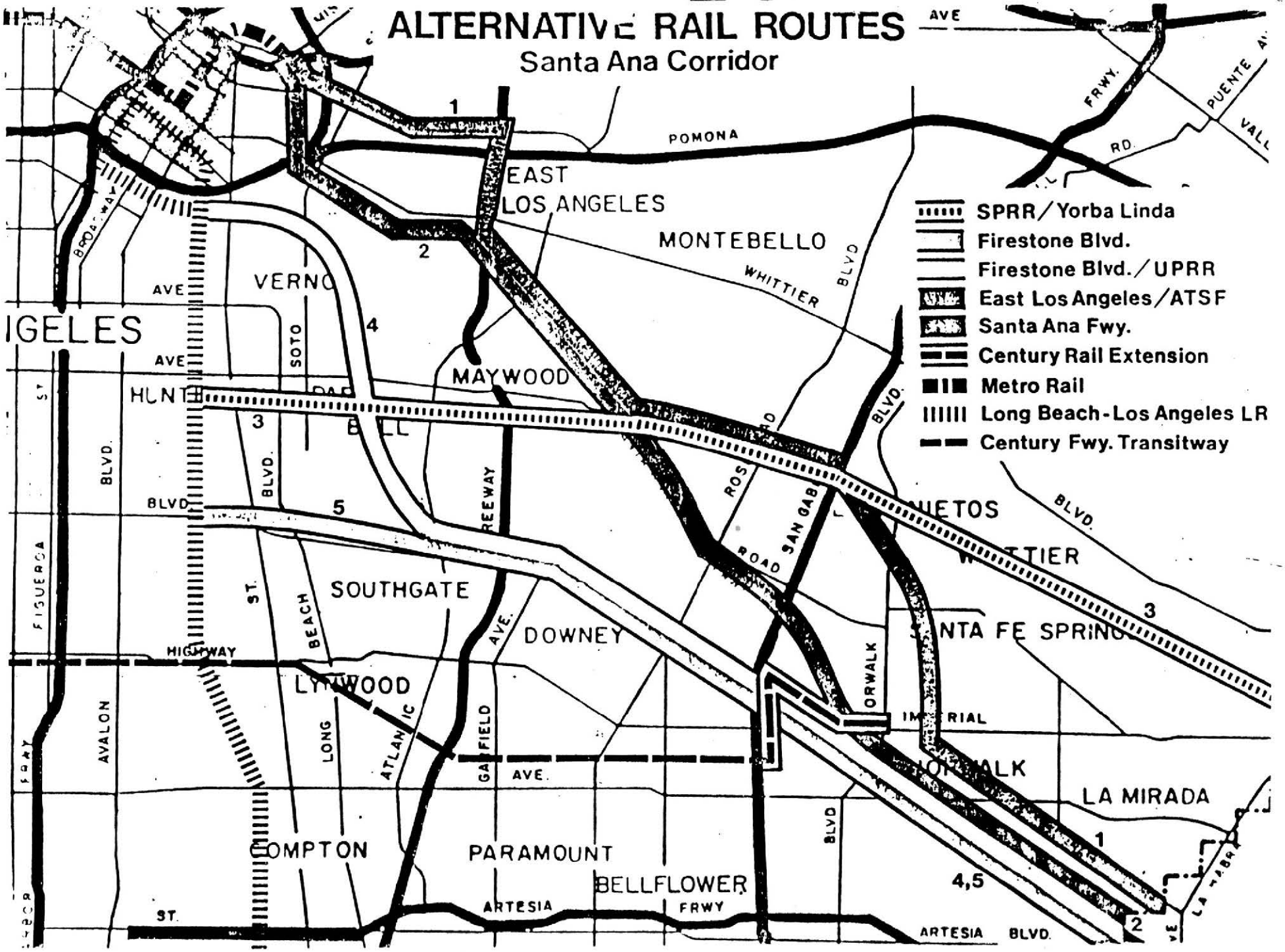

ALTERNATIVE RAIL ROUTES
Santa Ana Corridor
SPRR/Yorba Linda
Firestone Blvd.
Firestone Blvd./UPRR
East Los Angeles/ATSF
Santa Ana Fwy.
Century Rail Extension
Metro Rail
Long Beach-Los Angeles LR
Century Fwy. Transitway
POMONA
EAST LOS ANGELES
MONTEBELLO
WHITTIER BLVD.
MAYWOOD
SOUTHGATE
DOWNEY
LA MIRADA
COMPTON
PARAMOUNT
BELLFLOWER
ARTESIA FRWY
ARTESIA BLVD.
1
2
3
4
5
4,5

Table 1D: Summary of Technical Findings
Santa Ana Corridor

Route Alternative	Length (Miles)	Cost* (1983 $)	Ridership (Yr. 2000)
D 1: East LA/ AT&SF	19.5	$1,130 Million	87,400
D 2: Santa Ana Freeway	19.0	$ 761 Million	87,800
D 3: Yorba Linda	16.0	$ 348 Million**	31,350
D 4: Firestone/UP	18.5	$ 416 Million**	42,240
D 5: Firestone	15.7	$ 385 Million**	32,020

*Cost to complete will be substantially higher depending on when the line is built.

**Costs include added costs to up-grade northern end of Long Beach-Los Angeles project to handle increased capacity. These are estimated to be $87 Million for D3, $39 Million for D4, $124 Million for D5.

East Los Angeles/AT&SF

Alternative D1 extends the Metro Rail Line through Boyle Heights and East Los Angeles in tunnel section before turning southeast toward Orange County. It follows the Santa Ana Freeway for a while, then picks up the AT&SF freight tracks. The line is an aerial structure beyond East Los Angeles.

The estimated patronage is quite high virtually equal in fact to Alternative D2's. However each route attracts ridership in different ways. Alternative D1 attracts twice as many patrons through East Los Angeles, but does relatively less well off the Santa Ana Freeway to the southeast. Alternative D2 does the opposite.

Residential and retail uses characterize the East Los Angeles portion of this route. The route may well encourage revitalization of the area. The southern portion of the route passes through industrial areas served by freight operations, although a significant part of the AT&SF portion does traverse residential properties.

Santa Ana Freeway

Alternative D2 extends the Metro Rail Line in the median of the Santa Ana Freeway. It is an alignment already being studied by Caltrans. It is designed to serve the commuter better and its ridership figures reflect this. Most of its ridership is generated at the outlying stations; it attracts relatively few patrons through East Los Angeles.

The line within the freeway right-of-way does not directly serve adjacent land uses. However, there is a high proportion of industrial uses along its length which the route may help to revitalize in some fashion.

Yorba Linda

:ernative D3, a light rail route branching from the Long Beach-Los ..geles light rail line, travels almost due east along the Southern Pacific's Huntington Park Branch freight tracks. The route is :imarily at-grade though portions of its western half are in aerial .:ructure.

"ecause the route travel through a relatively less built up corridor : is both less expensive to construct and less attractive to ride. Its east-west orientation also deviates from basic northeast-southeast travel needs of the corridor.

..ost of this route, particularly in its western half, serves primarily industrial areas. The eastern portion of the route is primarily esidential. The line may help attract higher-intensity use of the and. It would be expected to serve primarily employment-related trips.

irestone/UPRR

Alternative D4 also follows Firestone Boulevard as does Alternative 5, but at the Union Pacific Railroad, the route curves north to ashington Boulevard, then west to the intersection with the Long Beach-Los Angeles line. Although a much longer alternative than D5, Alternative D4 costs only marginally more because far less of the Long each Line needs to be up-graded to handle the combined passenger lumes.

lternative D4 carries the most ridership of the three light rail lternative because it is a longer line accessible to more communities.

ike the other Santa Ana routes along freeway rights-of-way this route lso serves mainly industrial uses with some residential communities interspersed.

irestone

Alternative D5 follows Firestone Boulevard along the Southern Pacific reight tracks. Its cost is most burdened by the need to rade-separate (aerial) the Long Beach line north of where the two routes merge. Its patronage lower than Alternative D4's because it is shorter route and because it is quite close to the Century Freeway ays.

Its land use impacts are similar to the other light rail routes in his corridor.

PASADENA CORRIDOR

Two rail routes alternatives were evaluated in this corridor. One route, the El Monte/Route 7 alternative, is totally within freeways to downtown Pasadena. The second route, the Lincoln Heights/Route 7 alternative, serves the neighborhoods to the north of I-10 and to the west of Route 7. Both alternatives are common north of Huntington Drive on Route 7, and both include a subway section through downtown Pasadena. Two alternatives are shown in Figure 2E, and Table 1E summarizes the technical findings.

Table 1E: Summary of Technical Findings
Pasadena Corridor

Route Alternative	Length (Miles)	Cost* (1983 $)	Ridership (Yr. 2000)
E1: El Monte/Route 7	16.1	$295.6 Million	56,000
E2: Lincoln Heights/ Route 7	16.0	$355.0 Million	43,100

*Cost to complete will be substantially higher depending on when the line is built. The cost of this line does not include the $150 million cost of extending the Long Beach - Los Angeles light rail project in subway to Union Station.

El Monte/Route 7

Alternative E1 extends the Long Beach light rail line north in subway through downtown to Union Station then east on the converted El Monte Busway to Route 7. From this interchange the rail line extends north in the median of the Route 7 Extension to Colorado Boulevard. It is in subway under Colorado Boulevard to Wilson where it continues east along the AT&SF rail branch. It is shown ending at Rosemead Avenue.

The patronage is higher on this route than on the one running through Lincoln Heights. This reflects the alternative's higher operating speed and therefore its higher attractiveness to commuters. The cost of this alternative is slightly lower than that of Alternative E2, but both are expensive projects because of the subway sections assumed.

Except for serving the Pasadena downtown and several miles east of there, Alternative E1 only indirectly serves other land uses, especially those south and west of Pasadena.

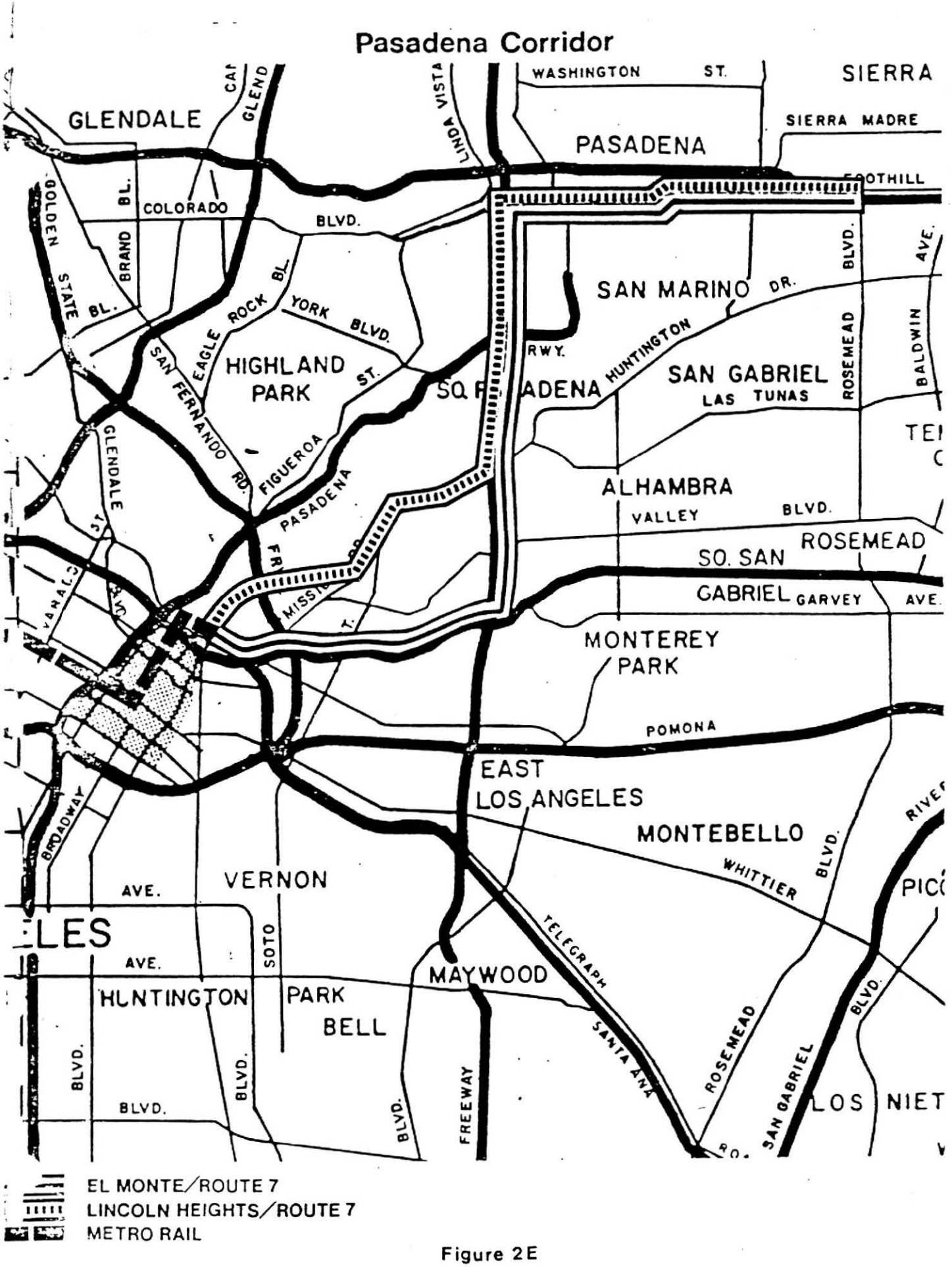

Pasadena Corridor
GLENDALE
PASADENA
SIERRA MADRE
WASHINGTON ST.
LINDA VISTA
FOOTHILL
COLORADO BLVD.
GOLDEN STATE BL.
BRAND BL.
EAGLE ROCK BL.
YORK BLVD.
HIGHLAND PARK
SAN FERNANDO RD.
FIGUEROA
GLENDALE
PASADENA
SAN MARINO DR.
HUNTINGTON
SAN GABRIEL
LAS TUNAS
ROSEMEAD BLVD.
BALDWIN AVE.
ALHAMBRA
VALLEY BLVD.
ROSEMEAD
SO. SAN GABRIEL
GARVEY AVE.
MONTEREY PARK
POMONA
EAST LOS ANGELES
MONTEBELLO
WHITTIER BLVD.
VERNON
BROADWAY
AVE.
SOTO
MAYWOOD
TELEGRAPH
SANTA ANA FREEWAY
HUNTINGTON PARK
BELL
BLVD.
ROSEMEAD BLVD.
SAN GABRIEL BLVD.
EL MONTE/ROUTE 7
LINCOLN HEIGHTS/ROUTE 7
METRO RAIL

Figure 2E

Lincoln Heights/Route 7

is alternative also extends the Long Beach light rail line north in ..bway through downtown to Union Station. From here it proceeds north in aerial section up Main Street to Alameda Street. It then proceeds at-grade up North Spring Street to North Broadway. It is on a reserved median within Broadway to Mission Road, and then in the reserved median in Huntington Drive. From Route 7 north the route is the same as that of Alternative E1.

This alternative appears to generate fewer patrons than does the El Monte/Route 7 alternative because it is slightly slower and does not intercept the El Monte buses. It is also more expensive than Alternative E1. The line must be in aerial (or in subway) leaving Union Station because of the automobile and freight railway traffic north of Union Station. It will also require the reconstruction of the North Spring Street bridge and another aerial section at Broadway and Mission Road.

The strength of this Alternative E2 is that it directly serves the Lincoln Heights and El Sereno communities, as well as Pasadena. In doing so the construction of the line will cause impacts to the adjacent business, along Broadway in particular. It will require at least the removal of street parking.

One alignment variation that was checked for feasibility continues the Long Beach-Los Angeles subway section north from the 7th and Flower Station through Chinatown and then connects it with the Lincoln Heights/Route 7 ternative. This alternative alignment appears to be slightly less costly d may offer more benefits than the Lincoln Heights/Route 7 Alternative into Union Station. As it is within the representative nature of the Alternative E2 route and does not seem to provide significant cost savings, it is not being pursued further at this point.

It should also be noted that the El Monte Busway will continue to serve the lower portion of the Pasadena Corridor with Alternative E1. Should Alternative E1 be built, on the other hand, it is unlikely that guideway service would be provided through Lincoln Heights, El Sereno, and Chinatown for quite some time.

EVALUATION OF RAIL ROUTE ALTERNATIVES

INTRODUCTION

The alternatives will be evaluated using the following four criteria: cost, ridership, support of land use policies, and community support. The alternatives will be compared only with other alternatives in the corridor. It is the objective of Stage 2 to select the single rail route in each corridor which best serves the needs of that corridor. In Stage 3 the selected routes will be analyzed as a system of rail routes. Relationships between routes in different corridors will change when the dynamics of the system come into play, and only then can routes in different corridors be compared.

Moreover, it is not proper to select two routes in each corridor. Two routes compete, and the ridership and subsequent cost-effectiveness of each route change dramatically from what each would be in isolation.

COST:

Cost is an important criteria because money is limited. Cost alone, however, cannot be used as a criteria because a low-cost route may not be able to do the job required by the corridor's needs. Nevertheless, if cost were the sole criterion the routes selected in each corridor would be as follows:

Table 3: Evaluation Based on Least Cost

Corridor	Least Cost Alternative
San Fernando Valley (E/W)	A3. Burbank Branch (LRT)
West Los Angeles (E/W)	B4. Exposition Boulevard (LRT)
West Los Angeles (N/S)/South Bay	C1. South Bay Trolley (LRT)
Santa Ana	D3. Yorba Linda (LRT)
Pasadena	E1. El Monte/Route 7 (LRT)

RIDERSHIP:

Similarly, ridership, although a very important criteria, cannot be used as the sole criterion. Because of the better service rapid transit provides, routes with the highest ridership would be heavy rail routes. Unfortunately, we cannot afford to build in the foreseeable future as many heavy rail routes as we would like. Nevertheless, if maximum ridership was the only criterion, the routes selected in each corridor would be as follows:

Table 4: Evaluation Based on Highest Patronage

Corridor	Highest Patronage Alternative
San Fernando Valley (E/W)	A1. Burbank Branch (HRT)
West Los Angeles (E/W)	B1. Wilshire Extension (HRT)
West Los Angeles (N/S)/South Bay	C4. I-405/Sepulveda (HRT)
Santa Ana	D2. Santa Ana Freeway (HRT)
Pasadena	E1. El Monte/Route 7 (LRT)

COST-EFFECTIVENESS

The best approach is to use an indicator of cost-effectiveness, that is, how many riders would be attracted by a certain level of investment. This can be done by simply dividing the total project cost by the estimated daily ridership, but a better figure results by converting dollars to an annual basis. This is shown in Table 5 and calculated in Table 7.

Table 5: Evaluation Based on Highest Cost-Effectiveness

Corridor	Highest Cost-Effectiveness Alternative
San Fernando Valley (E/W)	A3. Burbank Branch (LRT)
West Los Angeles (E/W)	B4. Exposition (LRT)
West Los Angeles (N/S) South Bay	C1. South Bay Trolley (LRT)
nta Ana	D2. Santa Ana Freeway (HRT)
sadena	E1. El Monte/Route 7 (LRT)

SUPPORT OF LAND USE POLICIES

It is a major tenet of the Regional Transportation Plan that transportation projects, specifically rail projects, support desired land use policies. The basic land use policy of Los Angeles City, County, and Region is to foster the development of centers. Thus using this criterion, rail routes selected in each corridor are those that serve the most existing or planned centers. The extent they do so is somewhat reflected in the patronage figures which, all else being equal, are higher for routes that serve more centers. However, serving built-up areas costs more - usually requiring heavy rail - so that the cost-effectiveness of such a route may be worse. Finally, a rail line within a freeway right-of-way generally does not serve many centers because in Los Angeles most centers are not along freeways.

n short, the rail route in each corridor which serves the most centers is a follows:

Table 6: Evaluation Based on Serving Growth Centers

Corridor	Alternative Serving the Most Centers
San Fernando Valley (E/W)	A1, A3. Burbank Branch (HRT or LRT)
West Los Angeles (E/W)	B1. Wilshire Extension (HRT)
est Los Angeles (N/S)/ South Bay	C2. Marina/AT&SF (LRT)
Santa Ana	D1. East Los Angeles/AT&SF (HRT)
asadena	E2. Lincoln Heights/Route 7 (LRT)

COMMUNITY SUPPORT

uring Stage 1, which had as its objective designating the high-priority corridors, the Commission staff dealt primarily with egional agencies, major cities, and Los Angeles County staff. During tage 2, which evaluated route alternatives in each corridor, the Commission staff has dealt primarily with all interested corridor cities, larger transportation-oriented groups and regional agencies. hese contacts were kept informed throughout the Stage 2 work effort. gency staffs have had an opportunity to review the results of the Stage 2 effort with Commission staff. Agency positions which follow re derived from those informal discussions. LACTC staff have not en able to review the study findings with SCRTD staff.

A summary of community and agency support by corridor is as follows:

San Fernando Valley (E/W)

he Valley-wide Committee on Streets and Transportation, with which we ave worked throughout Stage 2, has not provided a formal recommendation. They appear to support the Burbank Branch (LRT), Alternative A3, as the representative route.

he City of Los Angeles Planning Department favors the SP Main Line, the most northern route of the three studied. It is also a light rail lternative A4, route. All other agencies appear to favor the Burbank ranch (LRT). The City of Los Angeles' Department of Transportation does feel that this line needs to have more grade-separations to be iable.

West Los Angeles (E/W)

he Westside Forum, the primary contact group in this corridor during tage 2, supports the Wilshire Extension, Alternative B1, in subway, but also recommends a light rail link on Route 2 through Beverly Hills and West Hollywood. Santa Monica staff prefers the use of the xposition (Olympic Boulevard) freight right-of-way within that city nly as an alternative Metro Rail extension.

o agency disagrees with the designation of the Wilshire Extension.

West Los Angeles (N/S)/South Bay

e South Bay Cities Association will formally support the arina/AT&SF/Hawthorne light rail route, Alternative C2. No city in the South Bay disagrees although three cities preferred both that route and a Beach Cities Branch. Culver City favors the I-405/Sepulveda (HRT) route, Alternative C4.

All other agencies favor the Marina/AT&SF/Hawthorne route as the representative route for the corridor. The City of Los Angeles' Department of Transportation feels more aerial segments need to provided in the line's northern section.

Santa Ana

Few cities have stated a position in this corrdior. The City of South Gate has formally supported the Firestone Boulevard route (LRT), Alternatives D5, and it is believed that Downey and other smaller cities along the two variations of this route would favor them as well. Cerritos supports either the I-5 or Firestone Boulevard routes.

No agency appears to disagree with using the Santa Ana Freeway, Alternative D2, as the basic route, although interest in modifying the line to serve Boyle Heights/East Los Angeles was indicated by several as well as the United Neighborhood Organization.

Pasadena

ıe Lincoln Height/Route 7 alternative (E2) has the strong support of the United Neighborhood Organization which represents the Hispanic communities of greater East Los Angeles, including Lincoln Heights and El Sereno. Local political leaders also support this route alternative. The City of Alhambra and Cal State Los Angeles support Alternative E1. The City of Pasadena favors an emphasis on regional transportation.

SUMMARY

Table 7 summarizes the findings by comparing cost-effectiveness, land use support, and community support. (Community support does not necessarily mean neighborhood-level support, but support shown by city officials and others in the corridor groups Commission staff has worked with.) The ratings for land use support and community support are necessarily qualitative and subjective.

Table 7: Summary Comparison of Alternative Routes

Corridor and Route	Cost-Effectiveness*	Land Use** Support	Community*** Support
an Fernando Valley (E/W)			
A1. Burbank Branch (HRT)	654,000	fair	high
A2. Ventura Freeway (HRT	502,000	fair	low
A3. Burbank Branch (LRT)	1,282,000	fair	high
A4. SP Main Line (LRT)	1,149,000	poor	low
Jest Los Angeles (E/W)			
B1. Wilshire Extension (HRT)	311,000	very good	very high
B2. Wilshire/Santa Monica (HRT)	240,000	good	medium
B3. Route 2 (LRT)	415,000	fair	medium
B4. Exposition (LRT)	581,000	fair	lower
Jest Los Angeles (N/S)/South Bay			
C1. South Bay Trolley (LRT)	685,000	good	medium
C2. Marina/AT&SF (LRT)	586,000	very good	very high
C3. Marina/Imperial (LRT)	305,000	fair	low
C4. I-405/Sepulveda (HRT)	193,000	fair	low
anta Ana			
D1. East L.A./AT&SF (HRT)	324,000	good	medium
D2. Santa Ana Freeway (HRT)	481,000	fair	medium
D3. Yorba Linda (LRT)	377,000	fair	low
D4. Firestone/UPRR (LRT)	425,000	good	medium
D5. Firestone (LRT)	348,000	good	lower
E1. El Monte/Route 7 (LRT)	800,000	fair	medium
E2. Lincoln Heights/Rte.7 (LRT)	513,000	good	high

*Based on 1983 annualized costs which do not include vehicle or yard costs which may be shared between two lines. The figure indicates the number of annual riders attracted by each $1,000,000 in capital investment.

**Based on route's ability to support or foster development of centers.

***Based on discussions with officials of corridor cities and others in the working groups involved in the study as interpreted by Commission staff.

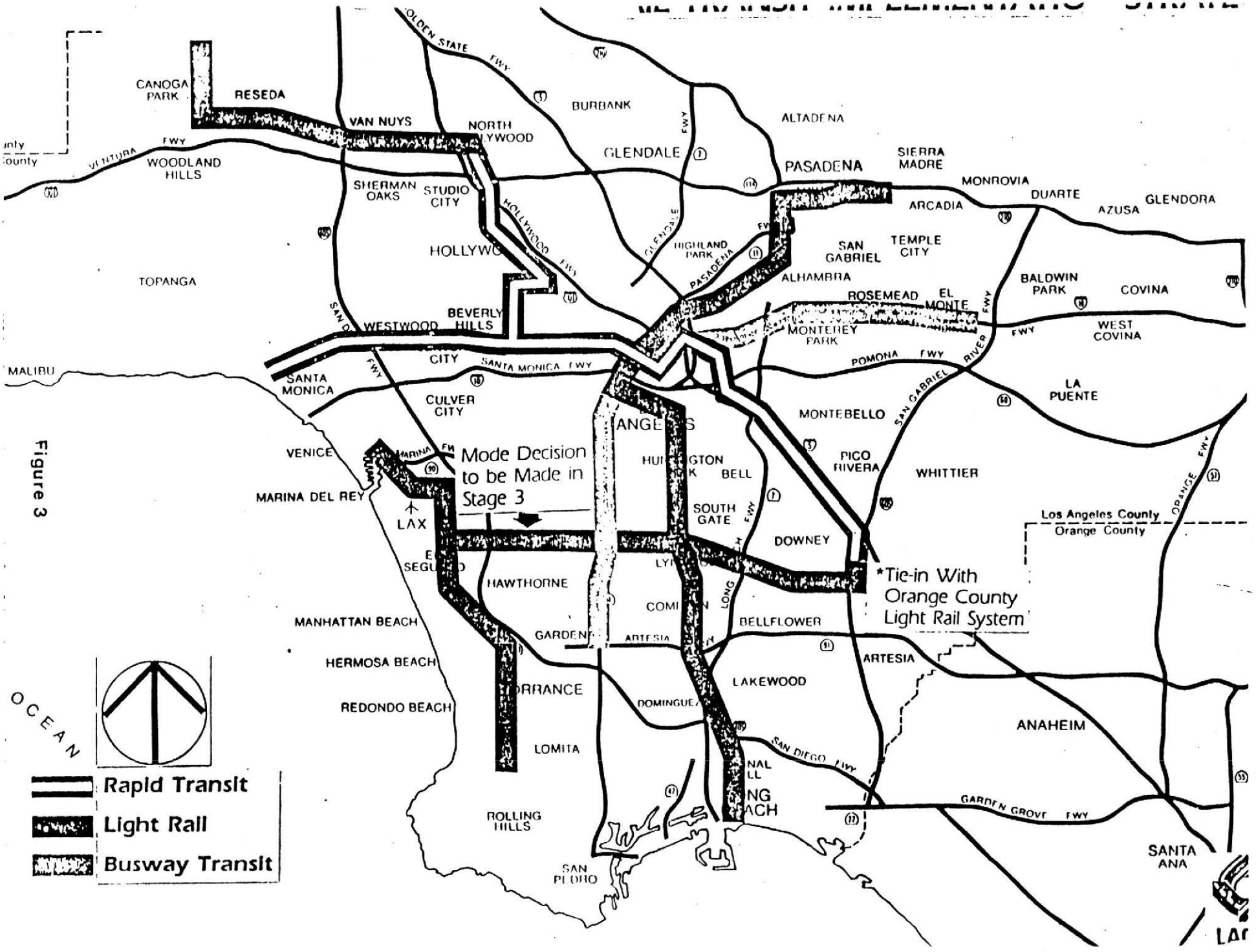


Figure 3
Mode Decision to be Made in Stage 3
*Tie-in With Orange County Light Rail System
Los Angeles County
Orange County
Rapid Transit
Light Rail
Busway Transit
OCEAN
CANOGA PARK
RESEDA
VAN NUYS
NORTH HOLLYWOOD
BURBANK
GLENDALE
ALTADENA
PASADENA
SIERRA MADRE
MONROVIA
DUARTE
AZUSA
GLENDORA
ARCADIA
WOODLAND HILLS
SHERMAN OAKS
STUDIO CITY
HOLLYWOOD
TOPANGA
SAN GABRIEL
TEMPLE CITY
ALHAMBRA
ROSEMEAD
EL MONTE
BALDWIN PARK
COVINA
WEST COVINA
MONTEREY PARK
BEVERLY HILLS
WESTWOOD
MALIBU
SANTA MONICA
CULVER CITY
POMONA FWY
LA PUENTE
MONTEBELLO
VENICE
MARINA DEL REY
LAX
PICO RIVERA
WHITTIER
SOUTH GATE
DOWNEY
HAWTHORNE
BELLFLOWER
ARTESIA
MANHATTAN BEACH
HERMOSA BEACH
REDONDO BEACH
LAKEWOOD
ANAHEIM
LOMITA
ROLLING HILLS
SAN PEDRO
SANTA ANA
SAN DIEGO FWY
GARDEN GROVE FWY

RECOMMENDATIONS

The recommendations which follow are based on four criteria: cost, patronage, support of land use policies, and community support. The selected representative routes were also checked to make sure that together they formed a logical system of routes. This system will be studied further in Stage 3.

SAN FERNANDO CORRIDOR (E/W) CORRIDOR

The recommended representative route in this corridor is Alternative A3, the Burbank Branch light rail route. It is the most cost-effective route in the corridor, serves a reasonably high estimated ridership, is more accessible to more of the Valley than any other route, and appears to have a consensus of the working group and agencies supporting it.

The City of Los Angeles' Planning Department favored the northern SP Main Line in conjunction with a Ventura Boulevard subway line. The two would serve as two legs of a ladder with bus routes acting as the rungs. While valid in concept, the probability of building a Ventura Boulevard subway line is extremely remote and has not been studied. The best solution everyone else feels is to build a high-quality light rail line that could be up-graded in time to pull Metro Rail standards.

EAST LOS ANGELES (E/W) CORRIDOR

The recommended representative route in this corridor is Alternative B1, the Wilshire Extension of Metro Rail in subway. This route has the highest patronage and serves the most growth centers. It has strong community and agency support. It is an expensive route, but the high cost is justified in this case. Light rail would not serve the needs of this corridor.

WEST LOS ANGELES (N/S)/SOUTH BAY CORRIDOR

The recommended representative route in this corridor is Alternative C2, the Marina/AT&SF/Hawthorne light rail route. It has the highest estimated ridership of the three light rail lines and serves the most centers. It was not the least expensive light rail line nor the most cost-effective, however, its cost-effectiveness is close to that of the lowest route. The line best serves the overall corridor and has virtually unanimous support.

SANTA ANA CORRIDOR

The recommended representative route in this corridor is Alternative D2, the Santa Ana Freeway Metro Rail Extension route. The future

estimated ridership is high. The route also best serves the travel needs of what is expected to be the corridor with the highest future capacity deficiency. The light rail lines are attractive candidates but are quite close to either the Long Beach-Los Angeles light rail alignment or the Century Freeway transitway leaving too much of the corridor unserved. The Santa Ana Freeway route is the less expensive of the two Metro Rail extensions considered. Serious consideration should be given to bringing the chosen route through some part of the Boyle Height/East Los Angeles area as future studies evolve.

PASADENA CORRIDOR

The recommended representative route in this corridor is Alternative E2, the Lincoln Heights/Route 7 Alternative. This route serves a number of additional communities which are very transit dependent. Although less costly and attracting higher patronage, Alternative E1 serves land uses less directly and provides little new guideway service. It still remains possible to convert the El Monte Busway to rail sometime in the future; this alternative also remains an option in case further "project development" work indicates Alternative E2 is no longer feasible.

DOWNTOWN LOS ANGELES

No second downtown rail route--tunnel or aerial--was studied as part of Stage 2. The reasons for this are several. First, until the end of Stage 2 it will not be known what are the representative rail routes entering downtown, that is, what routes would be tieing into each other. Second, the work on the Long Beach-Los Angeles light rail project is addressing certain aspects of this question. Finally, it was felt more appropriate to add to the cost of any alternative the cost of up-grading the Long Beach-Los Angeles line or adding to that line what tunnel or aerial sections were needed to make the combined lines viable. This was done in each relevant case. Thus the costs are included in the Stage 2 work, but not the specifics of the downtown alignment.

Work in Stage 3 will evalute the best time to phase in any additional downtown grade separations. That decision rests on such considerations as when the Pasadena line can be afforded and when the Harbor Busway will be built.

THE RECOMMENDED SYSTEM

Figure 3 shows the recommended "interim rail system." Its keystone is the Wilshire Metro Rail Starter Line which will branch at Fairfax Avenue north to the Valley and west toward Santa Monica. To the east the Starter Line will extend southeast toward Orange County and its future rail transit system. (A future branch to El Monte would be possible although that corridor is not a high-priority rail corridor.) The Metro Rail Line in the San Fernando Valley will be fed by a east-west light rail line.

The south basin is bisected north-south by the Long Beach-Los Angeles light rail line and the Harbor busway, is bisected east-west by the ıtury Freeway transitway. (A mode choice on that facility will be ıade by the Commission during Stage 3.) Along the Pacific coast corridor distribution is provided by a light rail line, and to the east, the Century Freeway transitway connects via the Santa Ana Line to Orange County.

EPILOGUE: STAGE 3

Stage 3 will analyze the Interim System composed of the Wilshire Metro Rail Line, the Long Beach-Los Angeles Line, the Century Freeway Transitway, the El Monte Busway, the expected Harbor busway, and the five selected representative routes. It will have several objectives.

First, the work in Stage 3 will evaluate the operation of the Interim System. It will develop operating costs, but will also provide guidance for the design of the Metro Rail, Long Beach, and Century Freeway transit way at the points where they intersect future lines.

Second, the work in Stage 3 will evaluate various phasing alternatives. It will indicate which route construction sequences provide the most system benefits most cost-effectively. Twelve phasing alternatives will be evaluated.

Third, the work in Stage 3 will analyze the costs and benefits of a busway or rail line on the Century Freeway transitway initially. A proper evaluation of this question has awaited the selection of the Interim Rail System.

Fourth, the work in Stage 3 will analyze various financing scenarios to help determine how much of the Interim Rail System can be built by the Year 2000 and what types and amounts of financing will be needed to accomplish this. As a result of this work it may be possible to consider the advancement of one or more other projects.

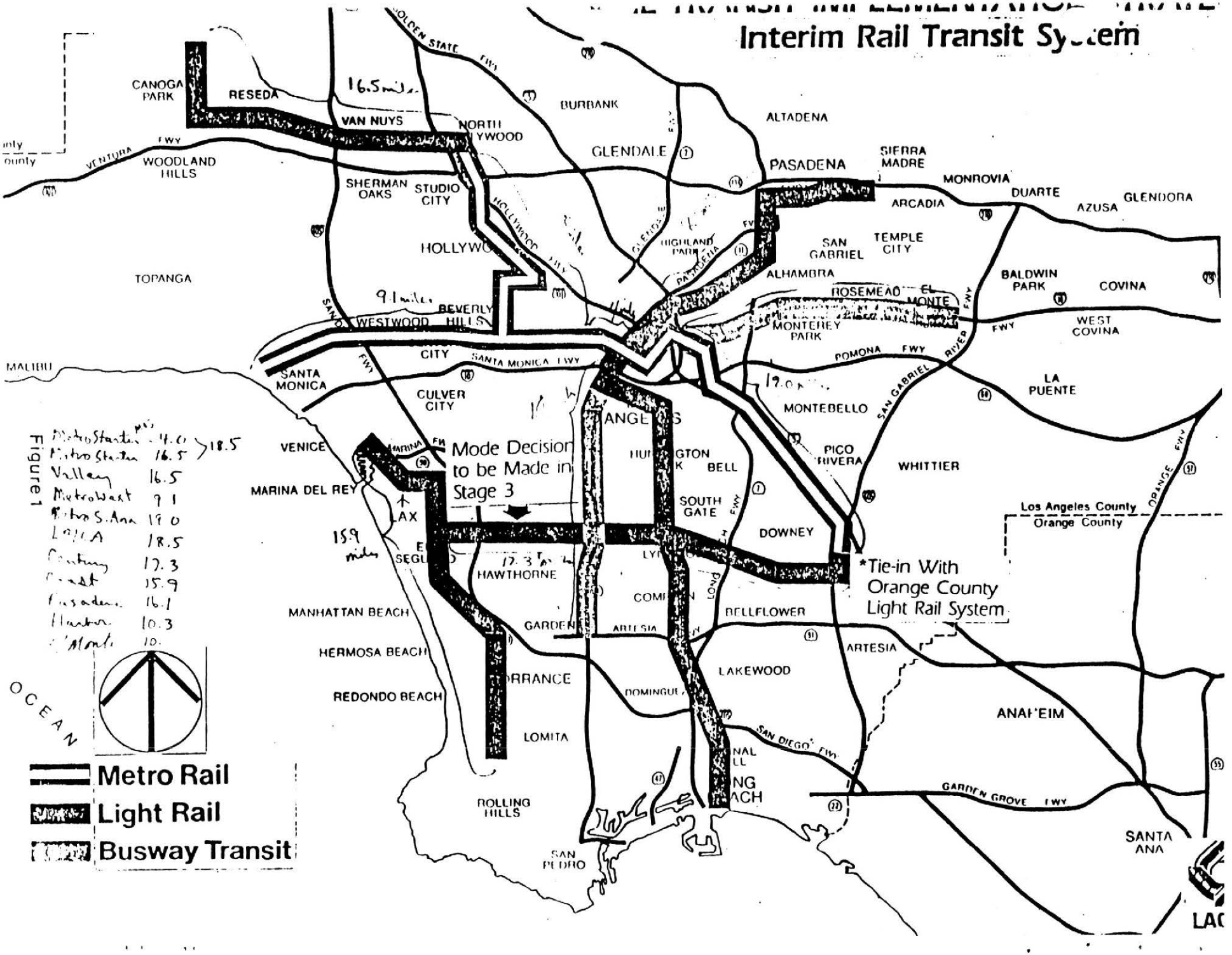
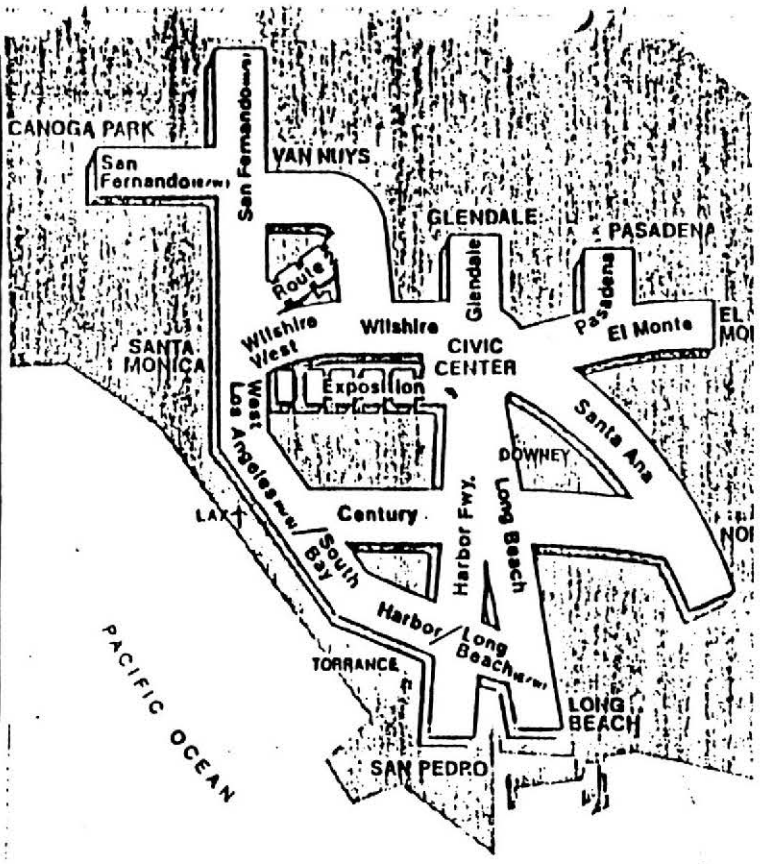

Interim Rail Transit System
CANOGA PARK
RESEDA
16.5 miles
VAN NUYS
NORTH HOLLYWOOD
BURBANK
GLENDALE
ALTADENA
PASADENA
SIERRA MADRE
MONROVIA
DUARTE
AZUSA
GLENDORA
ARCADIA
SAN GABRIEL
TEMPLE CITY
ALHAMBRA
ROSEMEAD
EL MONTE
BALDWIN PARK
COVINA
WEST COVINA
MONTEREY PARK
WOODLAND HILLS
SHERMAN OAKS
STUDIO CITY
HOLLYWOOD
TOPANGA
9.1 miles
BEVERLY HILLS
WESTWOOD
SANTA MONICA CITY
SANTA MONICA
MALIBU
CULVER CITY
VENICE
MARINA DEL REY
LAX
15.9 miles
Mode Decision to be Made in Stage 3
SOUTH GATE
DOWNEY
WHITTIER
PICO RIVERA
MONTEBELLO
LA PUENTE
POMONA FWY
SAN GABRIEL RIVER
Los Angeles County
Orange County
*Tie-in With Orange County Light Rail System
HAWTHORNE
MANHATTAN BEACH
HERMOSA BEACH
REDONDO BEACH
LOMITA
ROLLING HILLS
SAN PEDRO
BELLFLOWER
ARTESIA
LAKEWOOD
ANAHEIM
SAN DIEGO FWY
GARDEN GROVE FWY
SANTA ANA
OCEAN
Metro Rail
Light Rail
Busway Transit

Figure 1

SYSTEM CRITERIA	[illegible]	EL MONTE	[illegible]	[illegible]	[illegible]	PASADENA	ROUTE 2	SAN FERNANDO (E/W)	SAN FERNANDO (N/S)	SANTA ANA	SOUTH BAY/HARBOR	WEST L.A. (N/S)	[illegible] WEST
Support development in centers . number of growth centers per mile			X				X					X	X
Relieve capacity deficiencies . year 2000 volume/capacity ratios	X									X		X	X
Promote balanced subregions . degree of land use mix				X		X		X				X	X
Meet existing needs first : percent transit dependency : [illegible] orientation : patronage	X					X				X			X
Maximize transit ridership : volume/capacity ratio : cost per mile . patronage					X	X				X			X
Use existing facilities . percent of line along existing facility	X	X	X		X			X					
Recommended for further study in Implementation Strategy Phase	3	4	2	4	2	2	2	2	4	2	4	2	2



Criteria with Emphasis for the Selection of Corridors

Below are the definitions of each of the System Criteria. Included as appropriate is an indication of how they are measured. The order of the criteria generally reflects their sequence of use although, as noted, specific situations may require compromises.

1. Support Development of Centers - A basic objective of both the Los Angeles County and Los Angeles City general plans is the connection of centers of high population or employment by transit lines. Supporting the development of centers also takes maximum advantage of existing infrastructure and, in the case of transit, may afford the best joint development opportunities. One partial measure of this criteria is the number of centers a rail line would traverse in a given corridor on a "per mile" basis.

2. Relieve Capacity Deficiencies - This is perhaps the most important priority of SCAG's Regional Transportation Plan. Capacity deficiencies measure the ability of the transportation system to accommodate travel. We have already used the SCAG 1982 Regional Line Haul Study's year 2000 highway volume-to-capacity ratios to indicate those corridors likely to have the most traffic congestion. The higher the V/C ratio the more needed is a transportation improvement.

3. Promote Balanced Subregions - Promoting balanced subregions means encouraging travel within a subregion as opposed to travel between subregions which favors crosstown trips as opposed to downtown-oriented commuter trips. We have selected land use distribution and transit dependency as a reflection of this criteria. The higher the density of mixed residential and commercial uses in a corridor, the greater the number of potential intra-subregion travel. We have also used the number of transit dependent riders assuming that a corridor that has more transit dependent riders would probably have more intra-

Phase 2 Analysis Criteria:

The alternatives were evaluated using the following four criteria: cost, ridership, support of land use policies, and community support.

Purpose of Stage 2 analysis is to select a representative route in each corridor so that systemwide analysis can be made in Stage 3. Route selection may change as a result of the systemwide analysis.

Cost/Ridership: One good measure of the relative financial merits of routes is to calculate the cost effectiveness, which is the number of riders attracted to the line for each $1,000,000 in capital investment.

Land Use: L.A. city, county and the regional plans call for the fostering of growth by development of centers. Using this criterion, rail routes selected in each corridor are those that serve the most existing or planned centers.

Community Support: A preliminary review of the routes, with the larger transportation-oriented groups and with all cities affected resulted in a preliminary evaluation of community support.

LACTC

Transportation
Commission
354 South Spring Street
Suite 500
Los Angeles
California 90013
(213) 626-0370

RAPID TRANSIT COMMITTEE
Meeting of October 17, 1983

MINUTES

COMMITTEE MEMBERS PRESENT

JACKI BACHARACH, CHAIR
MAS FUKAI
TED PIERCE

OTHER COMMISSIONERS PRESENT

ROBERT GEOGHEGAN

STAFF MEMBERS PRESENT

PRINCESS GOLDTHWAITE (representing Pat Russell)
PAUL TAYLOR
RICHARD STANGER

I. CALL TO ORDER

II. APPROVAL OF MINUTES

The minutes of October 6, 1983 were approved as submitted.

III. RAIL TRANSIT IMPLEMENTATION STRATEGY: COMMENTS BY AGENCIES AND ORGANIZATIONS ON STAFF RECOMMENDATIONS IN EACH HIGH-PRIORITY CORRIDOR (STAGE 2)

Paul Taylor presented an overview of the decision recommendations before the Commission in October: staff is requesting the Commission to identify in each high-priority corridor the rail mode and route best representing that corridor. Staff and a consultant will examine and evaluate each one of these representative routes and modes as part of an "interim system" of rail lines. The evaluation will be from the standpoint of system operation; ridership and financing. Paul said that after hearing the results of this examination in January, LACTC will be able to consider how to go about building the rail system, that is, whether, when and where to develop a rail project in each high-priority corridor.

Chairwoman Bacharach suggested that comments by agencies and organizations be presented according to corridor. The corridor with the largest number of persons requesting to speak was the West Los Angeles (E/W) corridor; Ms. Bacharach suggested that the Committee begin with that corridor. Richard Stanger briefly summarized the route and mode options evaluated by staff and presented the staff recommendation for a Metro Rail Extension underneath Wilshire Boulevard to Westwood, with the precise route west of Westwood to be determined in conjunction with the cities of Los Angeles and Santa Monica during the engineering phase on the corridor.

Chairwoman Bacharach opened the meeting to comments on the West Los Angeles (E/W) corridor. Following are the comments offered:

Caroline Westheimer representing State Senator Herschel Rosenthal: The Senator supports the corridor as high-priority.

Arnold Charitan representing the Westside Forum: The Westside Forum supports the staff recommendation but requests parallel priority for a 4-mile light rail link between the Fairfax/Santa Monica Boulevard Metro Rail Station and the future Wilshire Boulevard/Santa Monica Boulevard Metro Rail Station.

Jack McGrath representing West Los Angeles for Metro Rail, Inc.: This committee recommends looking at the tourist factor in judging among corridors and also suggests a routing along the Olympic Boulevard corridor west of the the San Diego Freeway.

Councilman Zev Yaroslavsky: The Councilman supports the Wilshire Corridor Extension as the logical choice because of both present and future density considerations. He would support the light rail proposal on Santa Monica Boulevard only if it can use the Southern Pacific right-of-way and does not encourage unwanted development, but feels it is best considered as part of a later rail expansion.

Chuck Schneider representing Tishman West Management Corp.: Of the 5,000 employees in the Tishman West Buildings in Westwood, 28% have indicated they would use public transportation; therefore Tishman supports a rail transit line connecting to Westwood.

Cass Ben-Levi representing Assemblyman Tom Hayden: Lacking community input, the Assemblyman has not taken a position on routes, but recommends the Commission give high-priority to the West Los Angeles Corridor all the way into Santa Monica.

Ken Naramura of the Sawtelle Community Association: He recommends the Olympic Boulevard corridor be used west of the San Diego Freeway and presented documentation of new development to support his recommendation.

The next corridor to be discussed was San Fernando Valley (E/W) Corridor; Richard Stanger presented an overview of options and the staff recommendation for a light rail route and mode in the Burbank Branch subcorridor. He summarized the position of the City Planning Department of Los Angeles favoring two lines, one light rail in the Southern Pacific mainline corridor and one subway beneath Ventura Boulevard. Comments were made by the following persons:

Dennis Archambault representing the Mayor's San Fernando Advisory Committee on Transportation: The Committee endorses the Burbank Branch light rail recommendation and encourages high-priority for the San Fernando Valley Corridor. They also ask that an additional analysis be conducted of needs and opportunities for rail transit in the northern San Fernando Valley.

Marsha Mednick representing the Valleywide Transportation Committee: The Executive Board of the Committee concludes that the Burbank Branch light rail option should be selected based on population, available right-of-way, service to centers (Warner and Van Nuys), service to colleges (Valley and Pierce), service to communities via feeder buses, minimum disruption and cost-effectiveness.

Alice Lepis representing the Department of Transportation of the City of Los Angeles: The Department is concerned about traffic impacts of the Burbank Branch light rail option, so they do not recommend dropping other alternatives at this stage. They express the same concerns in the West Los Angeles (N/S)/South Bay Corridor.

Dolly Wageman representing the North Hollywood Committee of Forty-five: The Committee expresses concern about using Burbank Boulevard east of Fulton Avenue, but has no objection to the east-west light rail option mentioned.

Millie Wasdon representing Chandler Boulevard Residents: The neighborhoods around Chandler Boulevard would reject a heavy rail line, but probably would like a surface light rail line, perhaps using Oxnard Street or Victory Boulevard.

The next corridor to be discussed was the West Los Angeles (N/S)/South Bay Corridor. Richard Stanger summarized the options evaluated and staff recommendation of a light rail route between Marina Del Rey and Torrance, using Hawthorne Boulevard south of Manhattan Beach Boulevard. Comments were received by the Committee from the following people:

Don Torleumke representing the El Segundo Employers' Association: The Association supports staff's recommendation in general. They believe that north-south transit in the South Bay area is critically needed. Light rail as recommended can be developed in conjunction with facilities which will generate the patronage; he believes that no other corridor has such an extensive opportunity.

Arthur Horkay representing the City of Torrance: The City of Torrance supports the staff's recommendation with an extension to a terminus at the landfill on the Palos Verdes Peninsula.

Nancy Mandoky representing Coastal Transportation Coalition: She proposes a "joint venture" to develop a coastal light rail line and emphasized that this corridor must be given highest priority. The Coalition has no position on route, feeling that more analyses and education are needed before a route can be selected. She offered to help with the education process and participate in the analyses and lend the Coalition's support to private funding mechanisms such as the one the City of Los Angeles has initiated with the corporate headquarters of Hughes Aircraft Corporation.

A representative of the City of Lawndale indicated that the City expects to take an official position on a route in the near future, probably supporting a variation of the staff recommendation.

Richard Stanger summarized the options evaluated in the Santa Ana Corridor and staff's recommendation of a Metro Rail Extension through East Los Angeles utimately reaching the Santa Ana Freeway right-of-way and following that right-of-way in the direction of Orange County. There was no one present to comment on the recommendation in this corridor.

Richard Stanger reported that the evaluation of options in the Pasadena Corridor, expanded by recent Commission action to include an alternative recommended by United Neighborhood Organization, would not be completed for several more days. He suggested that the Committee not take a position on a representative route and mode in this corridor until its next meeting.

Chairwoman Bacharach then opened up the discussion to general comments. Councilman John F. Day of the City of Glendale asked the Committee why the Glendale Corridor had not been included in the Stage 2 analyses. Richard Stanger explained the Stage 1 analyses and decision process conducted by the Commission in the spring of 1983. Councilman Day asked the Rapid Transit Committee to direct staff to take a second look at the Glendale Corridor's "needs for public transportation" at the earliest date. Staff offered to provide Councilman Day with the documentation of the previous analyses and decisions. No action was taken by the Committee on the Councilman's request.

Based on the commentary presented at the meeting, Mas Fukai moved and Ted Pierce seconded that the Committee adopt the staff recommendations (except in the Pasadena Corridor where none was made).

Bob Geoghegan suggested as an addition that the Committee consider further study devoted to the proposal of the Westside Forum for a 4-mile light rail project under Santa Monica Boulevard through Beverly Hills. After some discussion the Committee concluded that it should provide for such analysis in the engineering and environmental work that would be done for the corridor during project development in later years and also to ask staff to talk to Caltrans about including such considerations in project development studies and right-of-way protection for the Route 2 Highway Corridor.

By unanimous vote the Committee approved staff's recommendation; it also decided to cancel its previously scheduled meeting of October 21, 1983 (1:30 p.m.).

moving well. A number of questions were raised in today's IRC meeting and arrangements are being made to have legal counsel at the next IRC meeting where IRC will present formal language to the Commission. If any Commissioners have questions on the material concerning this item, contact the Executive Director.

- o SCA 37 (Foran: The Committee still feels that the Commission should keep the initial position of opposition due to lack of clarity on return to source provisions and forward to Senator Foran our suggestion that he amend the bill to say 60% of the Board of Supervisors rather than two-thirds since most boards are comprised of 5 members and 60% would be more workable.

Federal Legislation

- o Section 504 Federal Handicapped Transportation Regulations: The IRC received a letter from the Los Angeles County Commission on Disability, giving new information that the deadline for comments has been extended 30 days. The Committee will look at the Commission of Disability's information as well as the staff report at its next meeting and report back at the next LACTC meeting.

Mr. Remy reported that the IRC had no formal recommendations.

RAPID TRANSIT COMMITTEE

Mrs. Bacharach reported on the RTC's meeting of October 17, 1983.

Rail Transit Implementation Strategy: Stage 2

The Committee heard testimony on the Rail Transit Implementation Strategy, Stage 2 recommendations. The meeting was well attended and the comments were supportive. Certain speakers asked the Committee to consider modification during any subsequent refinement of the routes.

Mrs. Bacharach explained that the Rail Transit Implementation Strategy process was started by the commission almost a year ago in order to develop a better understanding of its ability to implement the Proposition A rail system. To do this, the process has evolved into three stages. Stage 1 led to the selection of certain corridors which warranted rail service first. Stage 2 selects which of several route and mode alternatives in each Stage 1 corridor best represents that corridor. Stage 3, which follows, will take these representative routes and study them from the point of view of system operations, phasing, and financing. After this work, the Commission may decide that certain representative routes may be worth refining into specific projects.

The unanimous endorsement of the Rapid Transit Committee and of the community is as follows:

Corridor	Representative Route (Mode)
San Fernando Valley (E/W)	A3 Burbank Branch (LRT)
West Los Angeles (E/W)	B1 Wilshire Extension (HRT)
West Los Angeles (N/S)- South Bay	C2 Marina/AT&SF/Hawthorne (LRT)
Santa Ana	D2 Santa Ana Freeway (HRT)

The Commission's Citizens Advisory Committee took a position unanimously in support of these recommendations. Many letters have been received by the Committee in support of these recommendations.

Mrs. Bacharach moved for approval; seconded by Mr. Pierce.

Mrs. Reed asked for public comment on this item before the Commissioners voted.

Mr. Jack McGrath from the West Los Angeles for Metro Rail Committee, Inc., commended the staff and raised the question about the level of ridesharing forecast for the Wilshire West Extension. He suggested staff re-examine the factors used in the forecasts.

Hearing no objections, Mrs. Bacharach's motion was carried.

Mrs. Bacharach also mentioned that a letter of commendation for Dan Caufield was received from Councilman Warren Harwood of Long Beach.

She also reminded the Commissioners of two remaining design concept review public meetings: one, this evening at Jordan High School at 7:00 p.m. and two, at 11 o'clock on October 28 at the Hall of Administration, Supervisors' Hearing Room. The Committee will formally report on the public meetings after they have all been concluded.

SERVICE COORDINATION COMMITTEE

Mr. Cox reported on the SCC's meeting of October 21. The committee's recommendations are as follows:

UMTA Section 16(b)(2) Protest Resolution Procedure and Criteria

Approve the proposed UMTA Section 16(b)(2) protest resolution procedure and criteria.

THE RAIL TRANSIT IMPLEMENTATION STRATEGY
STAGE 3
EVALUATION OF SYSTEM OPERATIONS

BACKGROUND

The passing of Proposition A and its subsequent legal validation has made it more likely that a rail rapid transit network will be built in Los Angeles County. But not certain. In early 1983 the Commission still faced the following uncertainties:

- what rail routes and modes composed the overall rail system?
- how should they most effectively be implemented? and
- when could they be financed?

These questions were more than academic; the Proposition A sales tax ordinance specifically stated that:

"a. The Commission will determine the System to be constructed and operated.

b. The System will be constructed as expeditiously as possible."

APPROACH

The task at hand was approached in three stages each logically nested into each other. The starting point was the map of the "Future Rail Transit Network". It outlines in broad strokes thirteen generalized corridors. In two of the corridors rail projects had already been advanced: the Wilshire Metro Rail Starter Line and the Long Beach-Los Angeles Light Rail Line.

Realizing that rail transit projects could not be built in all thirteen corridors within the foreseeable future, the first step was to designate certain high-priority corridors, corridors which warranted rail transit service in the near-term. Relevant statistics were derived for each of the remaining eleven corridors from both past studies and future projections. The corridors were then stratified using criteria in the draft Regional Transportation Plan prepared by the Southern California Association of Governments. The three principal criteria selected were: 1) number of growth centers served,

2) projected Year 2000 capacity deficiency and 3) rail transit's potential for serving intra-corridor trips (fostering balanced subregions) thus minimizing long-distance commuting. In April 1983 the Commission adopted seven high-priority corridors. These are listed below with an indication of what follow-up work was needed.

Results of Stage 1

High-Priority Corridor	Follow-up Decision
San Fernando Valley (E/W)	Route and Mode
West Los Angeles (E/W)	Route and Mode
Western Los Angeles (N/S)/ South Bay ("Coast")	Route and Mode
Santa Ana	Route and Mode
Pasadena	Route and Mode
Harbor Freeway	Mode (Initial Busway Adopted Sept. 1983)
Century Freeway	Initial Mode

The work in Stage 2 involved work necessary to evaluate a number of possible rail routes and modes within the first five high-priority corridors. This work involved engineering studies, cost estimates, patronage forecasts, land use analyses, and the continued involvement of community officials and representatives. In October 1983 the Commission adopted the representative route and mode in four of the corridors; in January 1984 it did the same for the fifth corridor. Listed below are those representative routes and modes.

Results of Stage 2

High-Priority Corridor	Representative Route and Mode
San Fernando Valley (E/W)	Burbank Branch Light Rail
West Los Angeles (E/W)	Wilshire Metro Rail Extension
Western Los Angeles (N/S)/ South Bay ("Coast")	Marina/AT&SF/Hawthorne Blvd. Light Rail
Santa Ana	Santa Ana Metro Rail Extension
Pasadena	Lincoln Heights/Route 7 Light Rail

STAGE 3 WORK PROGRAM

By combining the five representative routes and modes together with the Wilshire Metro Rail Starter Line, the Long Beach-Los Angeles Light Rail Line, the El Monte Busway, the Harbor Busway, and the Century Freeway transitway, an interim system of rail lines and busways was formed (Figure 1).

A system of such facilities acts differently from the simple combination of its isolated parts. Therefore, the first step in Stage 3 was to evaluate this system to better understand how it might operate, what design requirements are needed where rail lines or busways intersect, and how the attractiveness of the system of routes might affect the patronage estimates for the individual lines.

The second task in Stage 3 was to evaluate the system implications of either a busway/HOV facility or a rail line/HOV facility within the Century Freeway transitway. This question was the only one not answered by the work of Stage 2 because in order to evaluate it, the results of Stage 2 were needed. A decision on this issue is needed this Spring by Caltrans if its design work on the Century Freeway is not to be delayed. The Century transitway mode evaluation is discussed in a separate document.

The third step in Stage 3 is to take the estimated costs of all these rail lines (including a Century Freeway line if adopted) and compare them with the Commission's projected revenue stream for rail capital. The Commission's ability to construct more of the Proposition A rail system will depend on this plus the order in which the Commission may wish to implement the system's segments (i.e., less than a complete line in a corridor). Thus an evaluation has been made of the cost-effectiveness of each segment as well.

The ability of the Commission to construct more of the Proposition A rail system is directly related to the amount of Proposition A funds programmed for the two top priority lines, especially the Metro Rail Starter Line. That in turn may depend on the level of federal funds committed to the Starter Line, which is not known at this time.

PATRONAGE ESTIMATES

The first work element in Stage 3 was to estimate future ridership for the rail/busway system as a whole. Figure 1 shows the network formed by combining the representative routes and modes adopted in Stage 2. Patronage estimates were made for this network by the Data Processing staff of the Southern California Association of Governments using its regional model and growth forecasts. Because there are more possible destinations on the full interim system, individual line patronage levels were expected to rise. With one exception they did. In the case of the Marina/AT&SF/Hawthorne Boulevard light rail line, however, daily patronage fell by about 5%. Apparently this results from the attractiveness of a) the Harbor busway to South Bay residents, and b) the Wilshire Metro Rail Extension to West Los Angeles residents.

Figure 2 shows the A.M. peak-hour direction ridership using the interim system under the assumed operating plan (see next section). It clearly indicates the importance of the Metro Rail system in moving high volumes of people across major regional corridors. It also indicates rather substantial volumes for the Long Beach and Pasadena light rail line as each approaches downtown.

STAGE 3: Interim Rail Transit System

Peak Hour Ridership

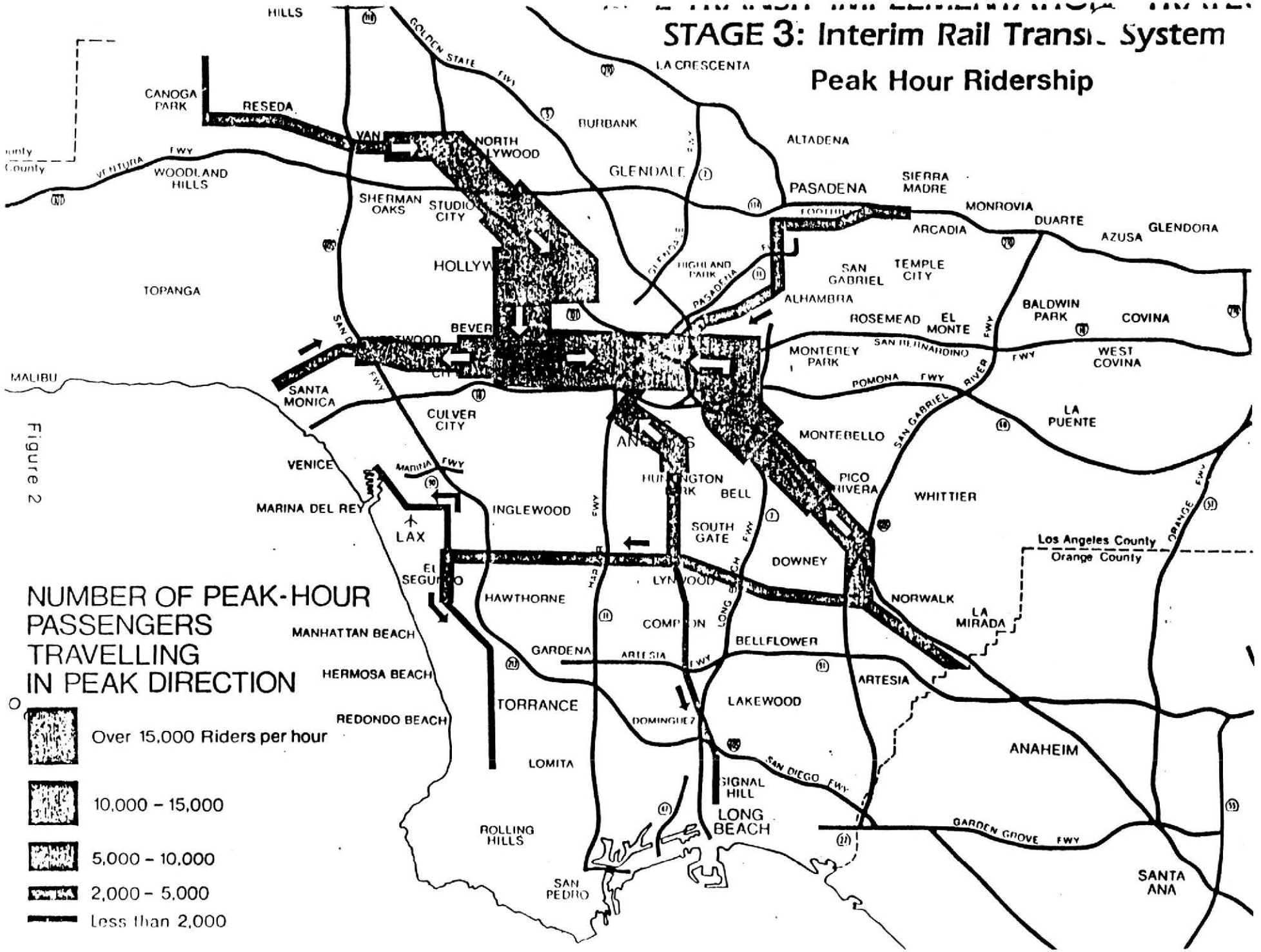


Figure 2

The patronage analysis brings out several other useful patterns. Between Stage 2 and Stage 3, the patronage estimate for the Burbank Branch Line in San Fernando Valley jumped from 60,000 to 81,000 passengers per day. The reason appears to be the addition of the western Metro Rail Extension to the network. The model indicates that the Valley LRT Line will be a very important means of getting Valley residents to destinations such as Century City and Westwood. The outbound A.M. peak hour peak direction on the western Metro Rail Extension underlines this. The San Fernando Valley Line will be discussed further in the next section.

On the Century Freeway Line, the peak direction is also westbound and then southbound to the El Segundo employment area. The airport and its employment area did not seem to be as important a destination. to some extent, this may reflect the work trip orientation of the model being used; it also emphasizes the regional importance of the El Segundo employment area.

The patronage estimates also raises questions about two areas where future subway construction is assumed. These areas are the western extremity of the Wilshire Metro Rail Extension in Santa Monica and in Pasadena. In both these areas further work should include studies of other ways of introducing rail transit, either at-grade, aerial, or by long-range phased construction.

A word of caution should be introduced: these ridership estimates are only approximate. The model being used to calculate ridership is best used when comparing estimates between lines. To derive more accurate projections much more work will be needed reconfiguring buses to feed the rail stations, and reworking analysis zones to better reflect access potential, station site designs and parking lot sizes. As a conceptual-level evaluation tool, however, the patronage model used is adequate.

CONCEPTUAL SYSTEM OPERATING PLAN

A systemwide operating plan was developed for the full interim rail system including a Century Freeway rail line and assuming connection to an Orange County light rail line. The intent was not to prejudge certain decisions, but the needs for future rail yards and interline connections with as much foresight as possible.

The approach taken was to assume a certain preliminary operating plan, estimate line patronage levels based on this plan, and then to modify the plan based on the initial patronage results. A final operating plan was then assumed and the ridership estimates recalculated. For example, for the expanded Metro Rail system a routing from North Hollywood to Union Station and a routing from Santa Monica to Norwalk was assumed. The results, however, showed that both routings would have to end at Norwalk to handle the in-bound volumes in the Santa Ana corridor. Similarly, it was determined that in order to handle the

approach volumes and downtown distribution volumes from the Long Beach-Los Angeles and Pasadena Lines, their routings should continue through downtown before turning back. This effectively doubles the frequency and capacity of the downtown segment. For this reason and to provide effective maintenance capability the Long Beach and Pasadena light rail lines were joined operationally. These new routings were used in the final model. In similar fashion headway changes, routing changes, and train size adjustments were made.

The result is a sound -- though conceptual -- understanding of how an interim rail system might operate. Using it, train yards can be generally located to minimize non-revenue car-miles (deadheading) and to get a projection of system operating costs. Figure 3 reproduces the final operating plan and yard location needs in visual form. Table 1 summarizes the findings on headways, train size, and fleet size by routings for the probable maximum ridership on the full system.

Interline Connections:

Direct service connections between lines will be provided at the Wilshire/Fairfax Station on the Metro Rail system and between the Century and Coast Line on the light rail system. All other interline connections will require patrons to physically transfer from one line to another. The reasons for this are either because the transferring volumes do not warrant direct service between two line segments or because two modes were involved. The principal transferring stations on the future network will be these in expected order of importance:

Transfer Station	Modes Involved
1. Wilshire/Fairfax Station	Metro Rail to Metro Rail
2. Norwalk Station	light rail to Metro Rail light rail to light rail
3. North Hollywood Station	light rail to Metro Rail
4. Union Station	busway to Metro Rail
5. Harbor/Century Station	light rail to busway
6. Seventh & Flower Station	light rail to Metro Rail
7. Imperial Station	light rail to light rail
8. Washington & Flower Station	busway to light rail

For a number of reasons it is necessary to provide direct connecting track for maintenance purposes between all rail lines. These required connections are as follows:

1. A surface track connecting the Long Beach light rail line at Washington Blvd. to the Metro Rail downtown shops. This connection need not be powered. It is presently being studied.

2. An interline connection track between the Long Beach Line and the future Century Line. Caltrans is making provisions for this as part of the Century Freeway design.

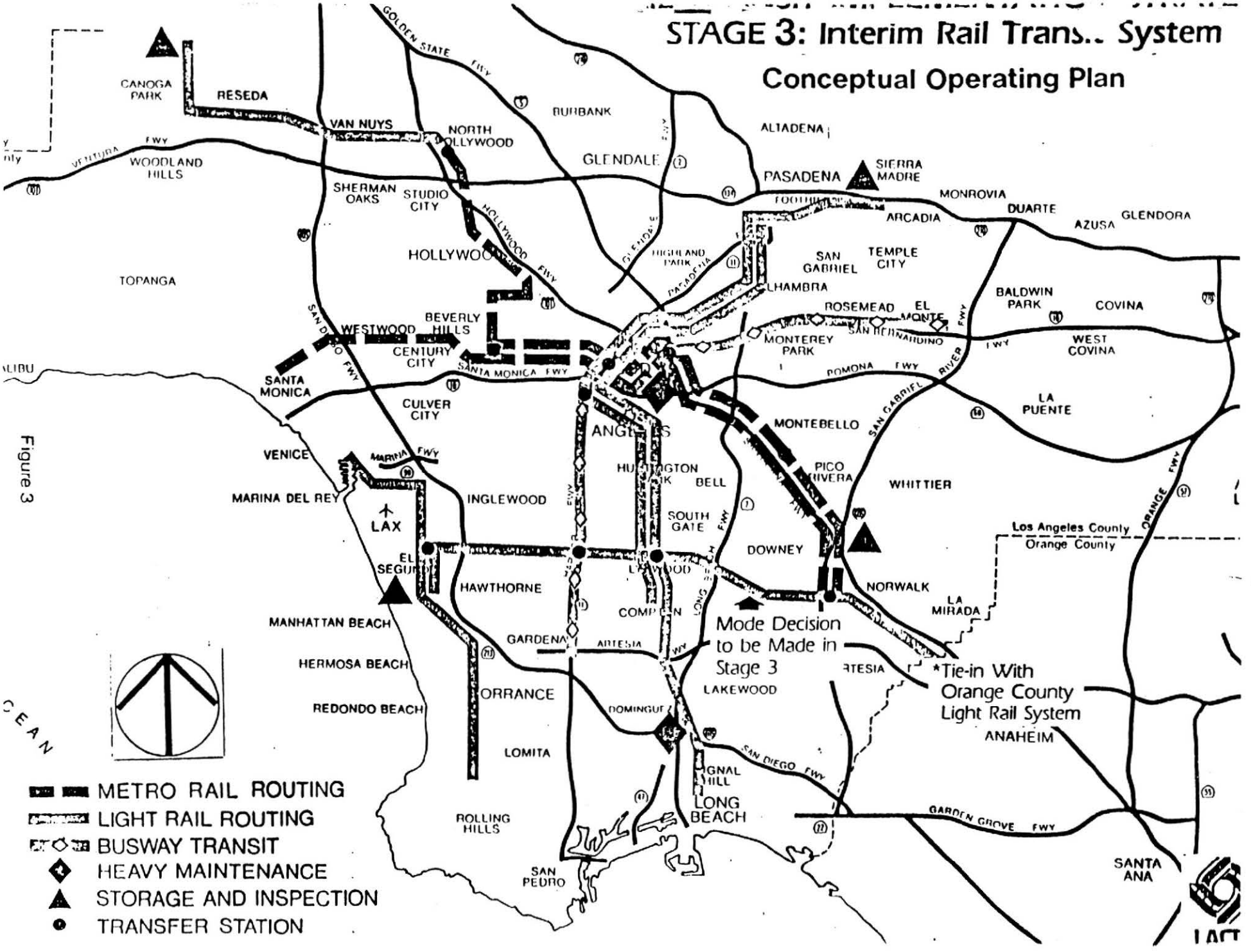

STAGE 3: Interim Rail Trans.. System
Conceptual Operating Plan
CANOGA PARK
RESEDA
VAN NUYS
NORTH HOLLYWOOD
BURBANK
GLENDALE
ALTADENA
PASADENA
SIERRA MADRE
MONROVIA
DUARTE
AZUSA
GLENDORA
ARCADIA
WOODLAND HILLS
SHERMAN OAKS
STUDIO CITY
HOLLYWOOD
TOPANGA
SAN GABRIEL
TEMPLE CITY
ALHAMBRA
ROSEMEAD
EL MONTE
BALDWIN PARK
COVINA
WEST COVINA
MONTEREY PARK
BEVERLY HILLS
WESTWOOD
CENTURY CITY
SANTA MONICA
CULVER CITY
LA PUENTE
MONTEBELLO
VENICE
MARINA DEL REY
INGLEWOOD
LAX
PICO RIVERA
WHITTIER
SOUTH GATE
BELL
DOWNEY
Los Angeles County
Orange County
NORWALK
LA MIRADA
EL SEGUNDO
HAWTHORNE
MANHATTAN BEACH
GARDENA
HERMOSA BEACH
REDONDO BEACH
TORRANCE
LOMITA
LAKEWOOD
ANAHEIM
LONG BEACH
SIGNAL HILL
ROLLING HILLS
SAN PEDRO
SANTA ANA
Mode Decision to be Made in Stage 3
*Tie-in With Orange County Light Rail System
METRO RAIL ROUTING
LIGHT RAIL ROUTING
BUSWAY TRANSIT
HEAVY MAINTENANCE
STORAGE AND INSPECTION
TRANSFER STATION

Figure 3

TABLE 1
CONCEPTUAL OPERATING PLAN SUMMARY
FULL INTERIM RAIL TRANSIT SYSTEM
(based on probable maximum ridership)

ROUTING	PEAK-HOUR HEADWAYS (MIN.)	TRAIN LENGTH	PEAK-FLEET (WITH 16% SPARES)
METRO RAIL:			
North Hollywood-Norwalk	3.5	6	195
Santa Monica-Norwalk	3.5	4	143
TOTAL METRO RAIL FLEET			**338**
LIGHT RAIL:			
Long Beach-Los Angeles			
Long Beach-Route 7/Colo.	9	3	55
Compton - Route 7/Colo.	9	2	28
Compton - Pasadena	9	3	45
			128
Century:			
Norwalk To Torrance	6	3	38
Coast:			
Marina To Palos Verdes	8	1	11
San Fernando Valley:			
Chatsworth To North Hollywood	3.5	3	63
TOTAL LIGHT RAIL FLEET			**240**

3. An interline connection track at the North Hollywood Station. This connection is presently being studied.

4. A future interline connecting track(s) between the Metro Rail Santa Ana Extension, the Century Line, and the assumed Orange County Line.

Maintenance Facilities:

The full interim system will require six rail storage and inspection facilities. Two of these will have major maintenance capabilities: the Metro Rail yards along the Los Angeles River east of downtown, and the Long Beach-Los Angeles light rail yards along the Los Angeles River in Long Beach. The downtown Metro Rail yard will provide heavy maintenance and overhaul capability for the full heavy rail/light rail system.

The downtown Metro Rail yard presently has a storage capacity of about 180 rail cars. This is not enough for the full Metro Rail system. An additional storage facility should be constructed along the Santa Ana Extension as far toward Norwalk as possible. This added storage capacity is critical for the effective operation of the extended Metro Rail system.

There will also need to be three additional light rail storage and inspection yards in addition to the Long Beach-Los Angeles yards. One should be at the northern end of the Long Beach-Pasadena Line. One should be just south of the junction of the Century and Coast light rail lines. The third should be at the western end of the San Fernando Valley light rail line. Each of the four yards will have a storage capacity of about 60 rail cars and basic servicing facilities.

Capacity Constraints:

There appear to be four sections which will approach capacity limits sooner than others. One is the North Hollywood Branch of the Metro Rail Line as it approaches Wilshire/Fairfax. There are two reasons for this. First, the light rail line in the Valley will be feeding the North Hollywood Station high patronage levels. Second, with the introduction of the western Metro Rail Extension, there will be fewer trains to serve the North Hollywood Branch.

The second section of the the network to approach capacity is the San Fernando Valley Line from Balboa Blvd. east to the North Hollywood Station. The patronage volumes require 3-car trains operating at 3 1/2-minute headways (in part to match the Metro Rail headway). This frequency may cause disruption to surface traffic at certain cross streets and on the approaches to the North Hollywood Station. This will not be the case until the Wilshire Metro Rail Line is extended to Century City and Westwood. The problem may not be easily resolved. Up-grading the alignment to aerial or by extending Metro Rail farther into the Valley will increase passenger volumes that much more and add

to the overload in the Hollywood to Wilshire/Fairfax segment. The problem of too much demand on the Valley Line is best solved by providing more transit capacity through the Sepulveda Pass thereby feeding patrons onto the less congested eastbound Wilshire trains. Since the demand on the Valley Line seems to be caused by commuters wishing to distribute along the Wilshire Line, in particular its westward extension, the Sepulveda alternative appears to be the most compatible solution.

A third segment of the network to approach capacity will be the Pasadena Line once that line extends north and east of the Route 7 Extension. The large number of commuters will cause required headways to approach three minutes. It will be very difficult to operate up to twenty 3-car trains during the peak hour in each direction at-grade on North Broadway through Lincoln Heights. An aerial section may be required between the downtown connection and Huntington Drive, a consideration which was not made in Stage 2. It is questionable whether an aerial section in this area will be acceptable on either environmental or cost effectiveness grounds. At the point of project development, if the system status and ridership projections confirm the present indication of overload for any surface operation, all reasonable alternatives, including the conversion of the El Mone Busway, will have to be evaluated.

The fourth section of the rail network which might approach capacity is the northern half of the Long Beach-Los Angeles Line from Century Freeway into downtown Los Angeles. This rail line, unlike the San Fernando Valley and Pasadena Lines, is very much part of a network of transitways which includes the Century and Harbor transitways, the Orange County light rail line extended to Norwalk, and the Metro Rail connection southeast to Norwalk. For this study the operating speed of the Long Beach-Los Angeles Line was up-graded to determine the probable maximum ridership on the line. That maximum would require grade-separation. Continued at-grade operation of the line as envisioned would not attract these ridership volumes; riders would use the alternative facilities. In summary, upon completion of the full network of transitways, we must consider grade-separation of the northern end of the line if it is to carry all the project demand (as opposed to conversion of the Harbor transitway to rail).

FINANCIAL ANALYSIS

The purpose of the financial analysis is to evaluate the Commission's financial ability to build the Interim Rail Transit System. Important factors affecting this ability include: rail capital revenues, estimated costs of the rail projects, the construction schedule for building the projects, and the ability of the Commission to issue revenue bonds. Once this information was obtained, primarily from the Stage 2 work, alternative phasing scenarios could be evaluated.

Another major factor in determining how much of the System might be built by the year 2000 (an arbitrary date, but one with psychological importance) is the amount of federal funds committed to the Metro Rail project and specifically its implication for Proposition A rail funds. The Commission can conservatively borrow future Proposition A rail funds up to the point where annual interest and premium repayments total one half of annually available funds. Making up a shortfall of federal funds for Metro Rail by bonding higher amounts in the early years has a significant effect on the Commission's ability to build more of the Proposition A rail system.

If the federal government commits to 62% of the Metro Rail project in the amounts needed to complete the Starter Line in 1991, then a substantial portion (up to 100 miles) of the full Interim Rail Transit System can be built by the year 2000 and some of the remainder started, with completion possible by 2005. Should a lesser amount of federal funds be forthcoming, one option would be to extend the schedule for completion of the Starter Line. The general effect on other lines would be a substantially slower construction schedule on federally-assisted projects (Metro Rail extensions) and slightly slower construction of locally-funded projects. Another option would keep close to the current Starter Line schedule by increased non-federal funding (i.e., including Proposition A). The general effect of this option would be a substantially slower construction schedule on locally-funded projects.

Conjecture about specific scenarios without knowledge of the Federal Metro Rail commitment is not useful. We are prepared to lay out various options at such time as the Metro Rail financing package is confirmed.

FINDINGS

The Stage 3 evaluation provides the Commission with a much better understanding of the Interim Rail Transit System and how it might be financed. As a result of this work certain general findings can be made. The first is an overall appraisal of the Commission's ability to construct the Proposition A rail transit system.

1) Should the Metro Rail project receive the level of federal funding it has presumed, the Commission will be able to construct a substantial portion (as much as 100 miles) of the Interim Rail System by the year 2000. It appears that the approximately 130-mile Interim Rail System could be built by 2005. However, if the level of federal funding for the Metro Rail project drops, the result is an extended schedule for the overall rail construction effort.

Three findings relate to the physical and financial interdependency of certain segments of the network. These are as follows:

2) To maximize operating effectiveness and passenger convenience, the Long Beach Line and the Pasadena Line should be connected. The cost of this connection, however, is substantial and therefore difficult to justify on its own. It will, on the other hand, benefit the Long Beach, Pasadena and Metro Rail Lines and perhaps certain future lines. Its inclusion delays the eventual implementation of the Pasadena Line. Scheduling the construction incrementally as early as possible minimizes the burden of inflation. In fact, it accelerates the overall time to build the Interim Rail System although work on some lines is necessarily delayed.

3) The viability of the Coast light rail line is closely linked with the Century Freeway light rail line. The cost-effectiveness of the Coast line would be further lowered if the line must "stand alone".

4) The high attractiveness of the San Fernando Valley light rail line is in large measure tied to the reality of the Metro Rail Line. It would obviously be a far less attractive project without the Metro Rail project. It should also be kept in mind that the importance to the Metro Rail project of a light rail feeder in the Valley is pronounced. The two projects in a sense are symbiotic.

The decisions made in Stage 2 remain valid and implementable. Nevertheless two findings relate to sections of the System which exceed or approach capacity at probable maximum ridership levels.

5) The analysis indicates a high level of patronage on the Pasadena Line when that line is extended into Pasadena. The necessary train frequencies to handle the ridership demand projection may make surface operation difficult. If further work during project development confirms this, then all reasonable alternatives will have to be evaluated.

6) The ridership volumes on the San Fernando Valley Line could increase significantly when the Metro Rail is extended west along Wilshire to Century City and Westwood. That increase will cause the Metro Rail Branch to the Valley to approach capacity into the Wilshire/Fairfax Station. Up-grading the San Fernando Valley Line to aerial will only compound the problem. The solution appears to be more transit capacity through the Sepulveda Pass.

The last finding underlines the need to study the operations and maintenance aspects of each line as part of an integrated whole.

7) The interim rail network is very much a system and certain interconnections are critical. These are either now being provided for or studied. More work will be needed to assure integration of rail maintenance functions and certain operations functions. Stage 3 establishes a good base for this work.

THE RAIL TRANSIT IMPLEMENTATION STRATEGY
STAGE 3
THE CENTURY FREEWAY TRANSITWAY

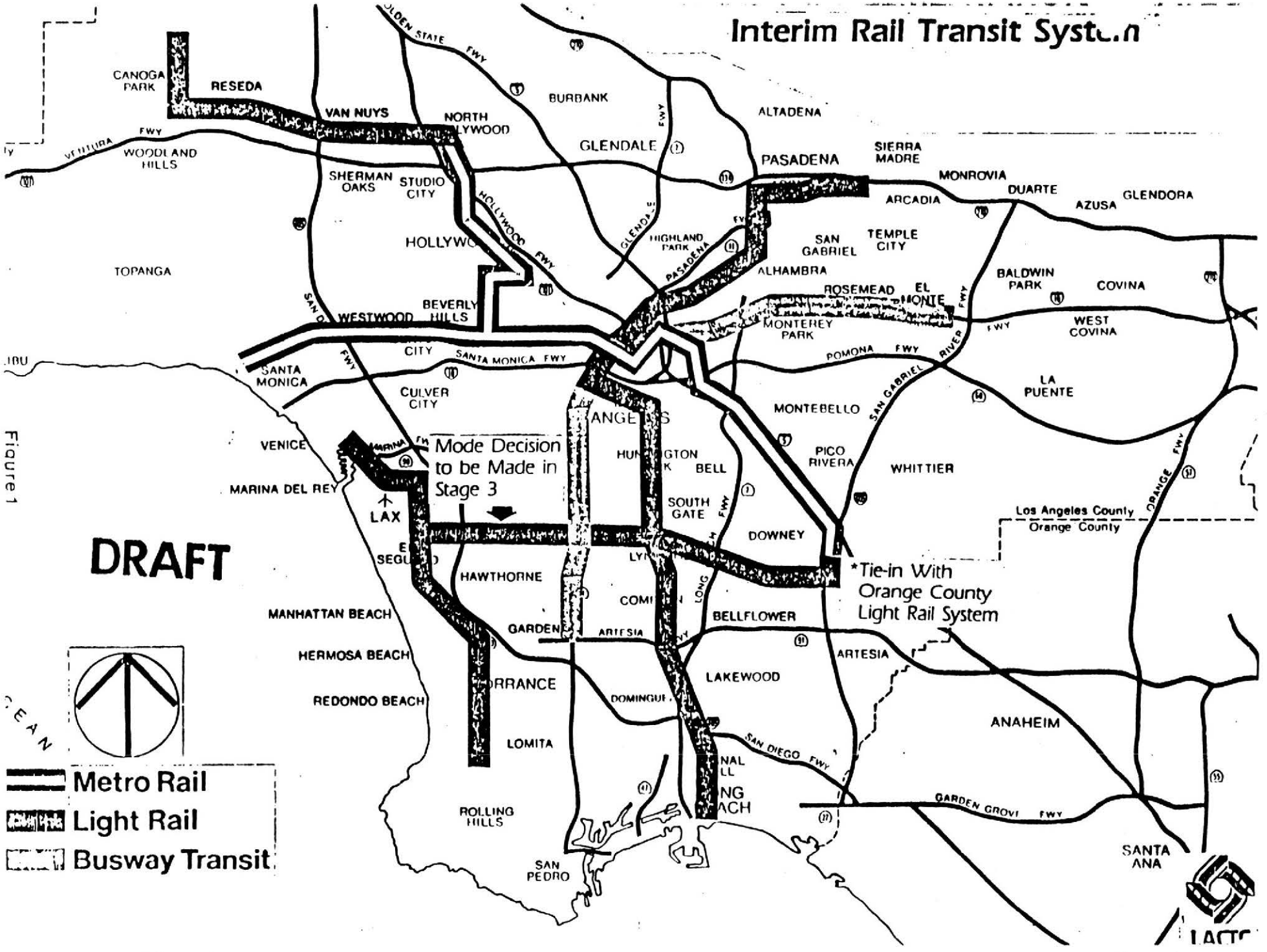
May 25, 1984

I. BACKGROUND:

The Century Freeway crosses east-west through the Los Angeles Basin from just south of the Los Angeles Airport to the San Gabriel Freeway in Norwalk. It has been a contested project since its inception. To help move the project forward the presiding Court issued a Consent Decree in September 1981 which included certain design features. Chief among these was the requirement to incorporate a transitway within the median of the freeway. The transitway is to be constructed as a bus/HOV facility, designed for convertibility to light rail, or if funds are committed for the extra cost, the transitway could be constructed initially as light rail. It was not certain at the time of the Consent Decree that these additional funds could in fact be obtained.

The voters of Los Angeles County had approved a 1/2¢ sales tax in November 1980 to be used partly for rail construction. (Only in April, 1982 was the validity of the tax upheld by the State Supreme Court.) The ballot clearly stated that the tax was to be used to build rail in the Century Freeway Corridor at some point. The decision at hand is therefore whether light rail will be built initially within the Century Freeway transitway or whether it will be built in the future. Caltrans has asked that the Los Angeles County Transportation Commission make this decision in June, 1984, to allow design of the freeway to proceed on scheduled.

Until this point in time a comprehensive evaluation of the busway/rail issue was not possible. The Century transitway, like the Century Freeway itself, will be part of a system of interconnecting facilities. In the case of the Freeway, it was already known what would be the connecting freeways; they already existed. In the case of the transitway, it was not known what these connecting facilities would be. The Commission now has adopted a set of representative routes and modes in each of five high-priority rail corridors. The Commission has also approved the Harbor Freeway Busway as the Locally Preferred Alternative within that corridor (specifically recognizing that this action did not preclude building rail initially within the Century Freeway transitway.) By putting these six facilities together, along with the Metro Rail Starter Line and the Long Beach-Los Angeles light rail line, an interim system of rail and busway lines is formed (see Figure 1). It is in this context that the mode choice decision is best evaluated.


Interim Rail Transit System
DRAFT
Mode Decision to be Made in Stage 3
*Tie-in With Orange County Light Rail System
Metro Rail
Light Rail
Busway Transit
CANOGA PARK
RESEDA
VAN NUYS
NORTH HOLLYWOOD
BURBANK
GLENDALE
ALTADENA
PASADENA
SIERRA MADRE
MONROVIA
ARCADIA
DUARTE
AZUSA
GLENDORA
WOODLAND HILLS
SHERMAN OAKS
STUDIO CITY
HOLLYWOOD
HIGHLAND PARK
SAN GABRIEL
TEMPLE CITY
ALHAMBRA
ROSEMEAD
EL MONTE
BALDWIN PARK
COVINA
WEST COVINA
TOPANGA
BEVERLY HILLS
WESTWOOD
MONTEREY PARK
SANTA MONICA
CULVER CITY
POMONA FWY
LA PUENTE
MONTEBELLO
VENICE
MARINA DEL REY
LAX
PICO RIVERA
WHITTIER
SOUTH GATE
DOWNEY
Los Angeles County
Orange County
HAWTHORNE
MANHATTAN BEACH
HERMOSA BEACH
REDONDO BEACH
GARDEN
ARTESIA
BELLFLOWER
LAKEWOOD
LOMITA
ROLLING HILLS
SAN PEDRO
ANAHEIM
SAN DIEGO FWY
GARDEN GROVE FWY
SANTA ANA
Figure 1

II. PROPOSITION A AND THE CONSENT DECREE LANGUAGE

Proposition A states the 1/2¢ sales tax will be used "to improve and expand existing public transit countywide, reduce fares, construct and operate a rail rapid transit system serving at least:

San Fernando Valley
West Los Angeles
South Central Los Angeles/Long Beach
South Bay/Harbor
Century Freeway Corridor
Santa Ana Freeway Corridor
San Gabriel Valley Corridor"

Language in Ordinance No.16 which establishes the tax further states that "the system will be constructed as expeditiously as possible."

Portions of the Consent Decree relevant to this issue are as follows:

> "Transit/High-Occupancy Vehicle (HOV) lanes carrying buses and carpools in the median of the freeway shall be incorporated in the initial construction of the freeway and shall be operational at the time the freeway is opened to traffic. (These lanes may hereafter be referred to as a "transitway".) Although the transitway is presently designed for buses and carpools, the facility shall be designed to be convertible to light rail. Nothing in this Decree shall preclude the substitution of light rail as an alternative mode of public transportation for the bus/HOV/carpool facility which would otherwise have operated within the transitway.
>
> "The design will include provision for a transit/HOV connection to the Harbor Freeway although this connection will not be included as part of the initial construction of the I-105 project. Plaintiffs do not favor the use of buses as permanent or long-term public transportation in Los Angeles. Plaintiffs would prefer to have the light rail alternative constructed from the beginning but recognize the limitations on funding. In the event State defendants find that a rail alternative is appropriate, State defendants may modify the project without court order to provide: (a) for a light rail facility as a

substitute for the busway/HOV/carpool obligations contained herein; (b) that the light rail transitway will be completed at a time certain, which date may be after the freeway is opened to automobile traffic; and (c) that FHWA will participate in the initial construction of a light rail and transit station facility only to the extent of the costs of the (i) transit/HOV facility/carpool facility...; and (ii) the support facilities....

"To the extent consistent with applicable state and federal laws, the Federal defendants will use their best efforts to authorize and provide funding for a transitway on the Harbor Freeway from the proposed intersection with the I-105 Freeway to a point approximately 7.5 miles north. When federal authorization and funding has been provided, the State defendants shall construct this transitway. It is intended that this transitway be funded from the Interstate Highway Trust Fund. Although the transitway is presently designed for buses and carpools, the facility shall be suitable for transition to rail. Nothing in this Decree shall preclude the substitution of rail for buses as an alternative mode of transportation. The transitway, therefore, shall be built in such a way that engineering, design and physical features necessary in the event of conversion to rail are incorporated into the initial construction to the fullest extent feasible. The design of this transitway shall provide for direct linkage to the Century Freeway transitway. This transitway shall be funded by Federal-Aid Interstate funding. State defendants shall make their best efforts to obtain said funding and to have said transitway operating at the same time as the I-105 Freeway is opened to traffic."

III. THE TECHNICAL EVALUATION PROCESS

The evaluation of the technical merits of busway/HOV versus initial light rail was lead by the LACTC staff as part of its Rail Transit Implementation Strategy work. The effort was well supported by Caltrans staff who did all of the necessary design and costing work, and by SCRTD staff who helped develop the operating plans. Operating costs were calculated by an operations planning consultant LACTC retained to assist it in this and other work. Finally, patronage estimates were developed by the SCAG data processing staff.

The first step in the analysis was to develop an agreed operating plan, both for the interim system and specifically for the Century/Harbor busway. This was done initially by the operations consultant and then reviewed by Caltrans,

SCRTD and the City of Los Angeles Department of Transportation (for downtown bus routings). From this review a final plan was developed and modelled. Patronage projections were then calculated. These projections were next translated to vehicle requirements and a total operating cost calculation was derived based on required vehicle-miles of operation. This was done for each of the alternatives.

Meanwhile, required design elements were developed for both the busway/HOV and the light rail alternatives. These served as the basis for calculating the capital costs for each alternative. The cost of later converting a busway/HOV facility to light rail was also estimated and the specific construction impacts described.

IV. DISCUSSION OF EVALUATION:

A. Operating Concept:

A schematic of each alternative network and operating plan is shown in Figure 2. The Long Beach-Los Angeles light rail transit (LRT) line is included and is assumed to be extended to Pasadena using the Lincoln Heights/Route 7 route. The Marina/AT&SF/Hawthorne Boulevard LRT Line is included as well. There is a direct, revenue connection between this line and the Century light rail alternative. Both LRT lines share a common maintenance yard. In Norwalk the Century alternatives will connect with the Metro Rail Santa Ana Extension as well as with an express bus from the Fullerton park-ride lot.

The Light Rail Alternative assumes a transfer is necessary with the Fullerton express bus and/or Metro Rail, the Long Beach-Los Angeles LRT Line at Willowbrook, the Harbor Freeway busway at the Century/Harbor Interchange, and potentially with the northbound Marina/AT&SF/Hawthorne Boulevard LRT line. The Century LRT line itself is routed through to El Segundo Boulevard because of the large demand for this movement. There will also be a non-revenue, single-track maintenance connection between the Long Beach Line and the Century Line at Willowbrook. (Caltrans has suggested recently that it will look into a full revenue service connection at this location. This concept has been considered in the past; operational considerations and constraints on capacity limit its applicability. Yet, designs should not preclude a future decision to include a connection.)

The Century Busway/HOV Alternative assumes the following bus routings: a) Fullerton park-ride to the employment areas near the Airport, b) Norwalk (Metro Rail) to downtown Los Angeles via the Harbor Busway, c) the Airport area to downtown Los Angeles viathe Harbor Busway, and d) San Pedro to downtown Los Angeles via the Harbor Busway. As the buses approach downtown Los Angeles, one-third of the buses proceed through downtown to Union Station, one-third first proceed east through the Garment District before turning up Main Street to Union Station, and one-third terminate at the 18th & Flower Long Beach-Los Angeles light rail station.

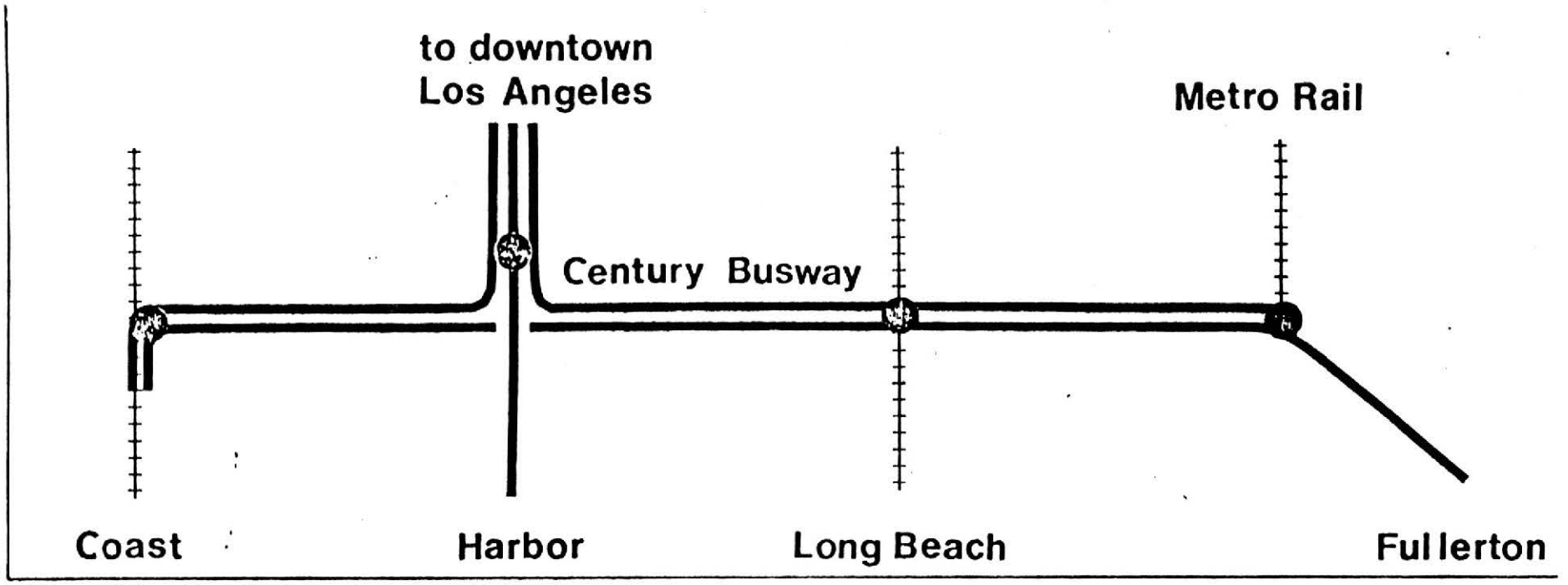
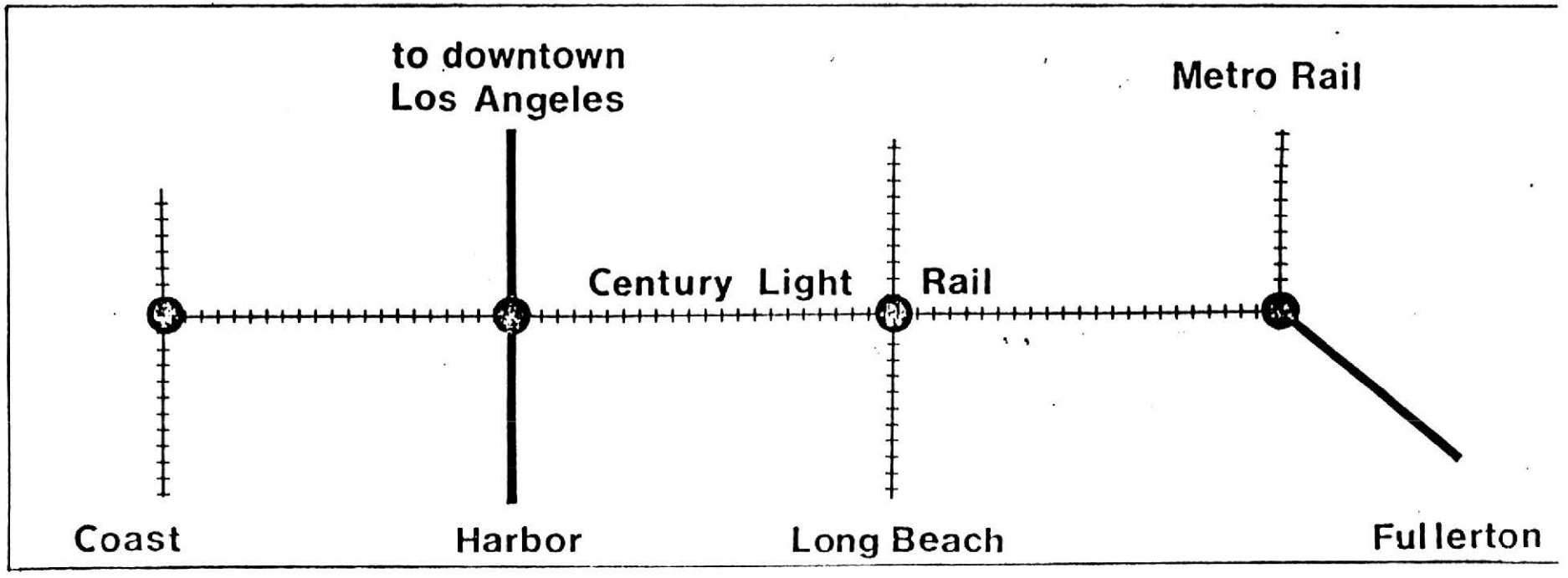

to downtown
Los Angeles
Metro Rail
Century Busway
Coast
Harbor
Long Beach
Fullerton

Figure 2


to downtown
Los Angeles
Metro Rail
Century Light Rail
Coast
Harbor
Long Beach
Fullerton

The conceptual design of the rail alternatives prepared by Caltrans indicates carpool lanes can be a part of this alternative. However, the Federal Highway Administration has not yet been asked to approve the provision of carpool lanes as part of the rail alternative. The discussion of this issue which follows assumes the carpool lanes will be provided under both alternatives.

A difference between the two alternatives may be the design and operation of their high-occupancy vehicles lanes. In the Busway/HOV alternative buses, carpools, etc. on the Century transitway proceed directly on exclusive ramps to the Harbor Busway/HOV facility if going to or coming from the north. Within the Century transitway, the buses and carpools use the same lanes. The only point where they separate are at the ten busway stations which are for bus use only. Otherwise buses and carpools, etc. use the same travelled way, the same entry points, and the same Century/Harbor connecting ramps.

With the rail/HOV alternative; the rail right-of-way must be kept physically separate from the carpool lanes. As a result, buffer lanes and shoulder widths are less generous and room may not exist to build direct Century/Harbor HOV connecting ramps. Caltrans is presently evaluating the possibility of direct connecting ramps. Carpools, etc., wishing to transition from Century to Harbor (and vice-versa) may have to leave the HOV lanes well before the interchange, cross three lanes of normal traffic and then take the regular connecting ramps. (This procedure is necessary even on the busway/HOV alternative to and from the Harbor Freeway southbound.) The HOV lanes on Century do, however, proceed continously through the Harbor/Century interchange. Transit patrons wishing to transfer will have to get off one vehicle at the Harbor/Century rail station, go up (or down) to the connecting platform, and then take the second vehicle.

The Busway/HOV alternative will operate throughout the day, while it is expected that the carpool lanes of the Light Rail/HOV alternative will be operational only during peak periods. Off-peak, the safety of the added shoulder space is needed, and perhaps some maintenance space. Because the light rail trains are operating in the transitway, there will be no scheduled regional transit bus operations parallel to them in the carpool lanes.

B. Patronage Estimations:

The patronage for each alternative was calculated using the basic LARTS model. The future growth forecasts, method of computing, etc. were also the same as was used in Stage 2 of the Rail Transit Implementation Strategy. The coding used for both the Long Beach-Los Angeles light rail line and the Harbor busway was the same as that of previous work on those projects done by LACTC and Caltrans respectively. The resulting

patronage estimates on those facilities were also consistent with previous estimates, given the different operating plans which were assumed.

There are at least two ways of comparing the patronage estimates (Table 1). One way is to compare the number of riders on just the facility itself. In this case the busway alternative attracts about 5,300 more trips per day than does the rail alternative. This would be expected because boarding a bus for downtown Los Angeles at a Century busway stop provides direct service. A similar trip on the rail would require a transfer.

A second way of comparing the two estimates is on a systemwide basis. In this case system interrelationships become important. For example, a trip from a Century rail station may involve a transfer to the Long Beach-Los Angeles light rail line, but the trip from there to downtown Long Beach might be quicker overall than the same trip made through bus-to-bus transfers. The result is that the light rail on Century increases systemwide patronage by about 5,700 daily trips.

Both of these ridership increases are very small compared to the total. A 5,700 increase is less than 1% of systemwide ridership and is 5% of the total daily patronage expected on the Century transitway. In fact, the large uncertainties in the accuracy of the modelling process itself make differences in the ranges we are talking about even less significant.

Table 1 is divided into two sections. The top section, the one just described, assumes the full interim rail transit system in place. The bottom section assumes no Metro Rail extensions, especially to Norwalk, and no light rail line along the coast. The result is consistent with the top section.

<u>The differences in patronage estimates between the two alternatives are not significant when compared to the accuracy of in the modelling process itself; they should not be used as a basis for a mode decision on the Century transitway.</u>

However, although total systemwide patronage (assuming full interim system) is comparable for light rail or bus/HOV on Century, it is important to note that the mode choice on Century has an effect on patronage of the Harborbus/HOV transitway.

Table 1: Comparison of Transit Patronage Estimates
(number of daily trips)

I. Full Interim System

Route	Light Rail Alternative	Busway Alternative
A. Century Transitway*	98,700	103,970
B. Full Interim System	1,282,200	1,276,500

II. System without Metro Rail Extensions or Coast Line

Route	Light Rail Alternative	Busway Alternative
A. Century Transitway*	97,300	102,700
B. Partial Interim System	969,000	962,000

* Daily boardings at only the Century transitway stations.

C. Capital Costs:

Table 2A summarizes the capital cost estimates for the two alternatives. Section A compares the estimated cost to build the busway/HOV facility versus the estimated cost to build the rail/HOV facility initially just on Century Freeway. The difference is $52.5 million.

The Century Freeway busway and the Habor Freeway busway operate as a system. It is very difficult to separate the respective operating and vehicle costs for each. Therefore, the analyses in this report treat both together. In order to compare the two alternatives, the busway operation on the Harbor Freeway busway must continue to be included even with the light rail line on the Century Freeway. That is why Table 2A has bus vehicle costs and bus garage costs in the "Rail/HOV Alternative" column.

Section B is an economic comparison of these vehicle costs including the necessary bus replacement costs. Typically a bus lasts 12 years, a rail vehicle 30 years. Over the first 30-year life of the project with the light rail vehicle costs are only slightly greater than with the busway/HOV alternative.

Section C compares the necessary bus garage and rail yard costs for the two alternatives. The difference is $16.1 million. Table 2A concludes that just over $70 million more is required to provide light rail on the Century Freeway transitway initially and buses on the Harbor Freeway busway than buses on both freeways.

Section D of Table 2A indicates that an extension of the Century light rail line into the El Segundo Employment Area will add $30 million more to the project. This extension is important for two reasons: a) most of the transit patrons approaching the western end of Century Freeway want to continue one or two more stations to the south, and b) the extension provides access to the most probable rail yard locations. Eventually this yard will be required; it is advisable that it be built initially. If not, the early years of the Century transitway service could be maintained -- with some operational constraints -- out of the Long Beach-Los Angeles yards and shops facility.

In addition to the economic comparison above, it is useful to compare the minimum cost necessary to start service on the Century Freeway alternatives (and Harbor Freeway) assuming completion in 1992. A tentative assumption has been used that the Century Freeway facility attracts initially only 80% of the patronage of the mature facility. Table 2B indicates it will take about $98 million to start

Table 2A: Economic Comparison of Capital Costs [1]
(in millions of 1984 dollars)

Cost Element	Bus/HOV Alternative	Rail/HOV Alternative	Cost Net Difference
Section A: Estimate of Initial Transitway Costs for Century Only			
Transitway [2]	$177.0	$229.5	$ 52.5
Section B: Estimate of Vehicle Costs for combined Century and Harbor System 3			
Buses [3]	$137.9	$101.2	$-36.7
Rail Cars	-	$ 38.3	$ 38.3
Subtotal	$137.9	$139.5	$ 1.6
Section C: Estimate of Bus Garage and Rail Yard Costs for combined Century [4]			
Bus Garage	$ 33.7	$ 24.8	$ -8.9
Rail Yard	-	$ 25.0	$ 25.0
Subtotal	$ 33.7	$ 49.8	$ 16.1
TOTAL NET COST DIFFERENCE FOR TRANSITWAY:			$70.2
Section D: Estimated Cost of Extension to El Segundo Employment Area: (to complete desireable projects) [5]			$30.0
TOTAL NET COST DIFFERENCE:			$100.2

1] Costs, especially of conversion, may be significantly higher due to escalation prior to construction period.

2] The $52.5 million added cost for the rail could increase to approximately $62 million, depending on how much FHWA agrees to contribute to the cost of HOV roadways parallel to the rail transitway.

3] Replacement cost with present value of future costs included. A rail vehicle typically lasts 30 years, a bus 12 years.

4] Bus garage estimates include a salvage value in 30 years of one-half the present value.

5] The $30 million estimate is very rough, more detailed engineering will have to be done before an accurate estimated is possible.

Table 2B: Capital Cost Comparison for Initial Service (1993) [1]
on Century Freeway and Harbor Freeway Transitway
(in millions of 1984 dollars)

Cost Element	Bus/HOV Alternative	Rail/HOV Alternative	Cost Net Difference	
Century Transitway	-	$ 52.5	$52.5	
Vehicles:				
Buses	$69.3	$ 50.9		
Rail Cars	-	$ 30.6		
	$69.3	$ 81.5	$12.2	
Yard/Garage:				
Buses	$28.9	$ 21.2		
Rail Cars	-	-		
	$28.9	$ 21.2	$-7.7	
Estimated Total Start-Up Cost for Century/Harbor Transitway System [2]	$98.2	$155.2	$ 57.0	"minimum commitment"
Estimated Cost El Segundo Extension and Yard:			$ 55.0	
Total Net Cost Difference at Start-Up:			**$112.0**	"desirable project"

[1] Assumes that initial patronage will be 80% of full system patronage.

[2] Assumes initial Century LRT vehicles maintained temporarily in Long Beach-Los Angeles Yards and Shops Facility.

transit service on the Century/Harbor busway/HOV system, $155 million to start service on the Century light rail/Harbor busway system (both with HOV lanes).

Therefore, rail service on the Century transitway may be started for a net difference of $57 million more than bus service; $55 million more would complete the desirable project. In the long term, the cost difference is reduced because the busway alternative requires a substantial bus replacement program.

D. Operating Cost Estimations:

The Century transitway is one line in a network of interactive busway and rail lines. A comparison of operating costs must therefore be done based on this larger network. The marginal operating costs of each alternative are then compared. This way such systemwide costs as management, shared maintenance, joint policing, etc. are properly shared between lines.

The approach was straight-forward. First the patronage of each alternative was estimated and from this an operating plan was derived. This plan - one for each alternative - resulted in fleet sizes, rail car-miles and bus-hours for the peak and off-peak periods. The operating plans are described in Tables 3A and 3B.

The operating costs for the busway services were then calculated using the average peak and off-peak per-hour cost of operating an SCRTD regular bus factored up using nationally derived relationships between regular and articulated buses. These costs are $78/bus-hour during the peak periods, $66/bus-hour off-peak. The per-mile costs include all associated costs, except the cost of operating the Century Freeway and busway stations which were calculated separately. The light rail operating costs were estimated differently because there is no present SCRTD light rail service. These costs were determined by developing a staffing plan and unit costs necessary to administer, operate, and maintain a light rail network. Wage rates, etc. were based on SCRTD levels.

It should also be mentioned that both alternatives assumed the same background and feeder bus network. Since all patrons using this network would have to transfer at the transitway stations no matter what the mode on the Century transitway, and since both alternatives attract about the same number of riders, there is no reason to think one background and feeder bus network would be different from the other. As a result, these operating costs are common and can be ignored for our purposes.

TABLE 3A: OPERATION PLAN FOR CENTURY MODE EVALUATION

LINE	FROM	TO	MODE	RUN TIME	DISTANCE	HEADWAY PEAK	HEADWAY BASE	HEADWAY E/L	CONSIST PEAK	CONSIST BASE	CONSIST E/L	TRAINS PEAK	TRAINS BASE	TRAINS E/L	FLEET PEAK	FLEET TOTAL
A) CENTURY LIGHT RAIL ALTERNATIVE:																
	North Hollywood	Norwalk	RRT	44.1	30.1	3.5	7	12	6	6	2	59	30	18	292	338
	Santa Monica	Norwalk	RRT	48.8	32.2	3.5	7	12	4	4	2					
	Pasadena	LACBD	LRT	36.9	16.6	6			2							
	Pasadena	Artesia	LRT	65.6	26.9	12			2			43	16	10	86	100
	Pasadena	Long Beach	LRT	86.7	37.5	12	12	20	2	2	1					
	Norwalk	El Segundo	LRT	27.5	18.7	6	12	20	3	3	1	11	6	4	33	38
	Marina	Torrance	LRT	30.9	15.5	8	16	20	1	1	1	10	5	4	10	12
	Chatsworth	N. Hollywd.	LRT	27.7	15.5	3.5	7	12	3	3	1	18	9	6	54	63
	San Pedro	LACBD	BUS	51.9	24.4	.6	1.2	2.5	1	1	1	180	90	44	180	209
	Fullerton	Norwalk	BUS	26.7	9.7	1.2	2.5	5	1	1	1	48	23	12	48	56
B) CENTURY BUSWAY ALTERNATIVE:																
	North Hollywood	Norwalk	RRT	44.1	30.1	3.5	7	12	6	6	2	59	30	18	292	338
	Santa Monica	Norwalk	RRT	48.8	32.3	3.5	7	12	4	4	2					
	Pasadena	LACBD	LRT	36.9	16.6	6			2							
	Pasadena	Artesia	LRT	65.6	26.9	12			2			43	16	10	86	100
	Pasadena	Long Beach	LRT	86.7	37.5	12	12	20	2	2	1					
	Marina	Torrance	LRT	30.9	15.5	8	16	20	1	1	1	9	5	4	9	10
	Chatsworth	N. Hollywd.	LRT	27.7	15.5	3.5	7	12	3	3	1	18	9	6	54	63
	San Pedro	LACBD	BUS	51.9	24.4	1	7	14	1	1	1	108	54	22	108	125
	Fullerton	El Segundo	BUS	54.6	28.4	1.1	2.5	5	1	1	1	103	46	23	103	119
	Norwalk	LACBD	BUS	53.6	22.2	1.5	3	6	1	1	1	75	38	19	75	87
	El Segundo	LACBD	BUS	23.8	15.1	2	4	8	1	1	1	26	13	7	26	30

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TABLE 3B: ESTIMATED OPERATING COST COMPARISON

ROUTE	ANNUAL BUS-HOURS PEAK	OFF-PEAK	ANNUAL CAR-MILES	ANNUAL RIDERS	ANNUAL OPERATING COST*
Light Rail Alternative:					
Century Light Rail	--	--	3,114,000	28,600,000	$10,200,000
Fullerton/Norwalk Bus	60,500	104,300	--	8,700,000	$11,600,000
Harbor/LACBD Bus	226,800	398,900	--	28,500,000	$44,000,000
Total Light Rail and Bus					$65,800,000
Busway Alternative:					
Fullerton/El Segundo Bus	129,800	205,500	--	21,400,000	$24,500,000
Harbor/LACBD Bus	136,100	225,500	--	21,700,000	$25,500,000
Norwalk/LACBD Bus	94,500	169,800	--	12,900,000	$18,600,000
El Segundo/LACBD Bus	32,800	59,600	--	9,500,000	$ 6,500,000
Total Bus					$75,100,000

DIFFERENCE = $ 9,300,000

* Based on marginal cost of operation given existing background bus service and Interim Rail System. Assumes a 2:1 peak-to-base frequency ratio.

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A final note concerns the level of off-peak bus service assumed. Typically about half as many buses are run off-peak as during the peak for example; a bus service of once every 10 minutes during the rush becomes once every 20 minutes midday. However, with peak-period headways averaging one minute on the busways one is somewhat reluctant to assume one bus every two minutes off peak. Initially a five times lower frequency was assumed, but this capacity proved inadequate to meet the estimated off-peak demand; a one-to-two ratio was required. The evaluation was done for both assumptions; the one shown in Table 3B is for the 2:1 peak-to-base ratio.

Table 3B summarizes the cost comparison. The light rail alternative would be as much as $9.3 million less costly to operate each year. A 5:1 peak-to-base frequency ratio results in the light rail alternative being $5.2 million per year less costly to operate.

E. Operating Impacts in Downtown Los Angeles:

The Century Freeway Busway/HOV alternative combines with theHarbor Freeway Busway/HOV facility to provide direct service to downtown Los Angeles for both bus patrons and carpools. The Busway/HOV alternative requires 121 articulated buses to meet peak hour demand on the north section of the Harbor Busway. This is a bus every 30 seconds; this heavy bus volume will require special attention to policies on carpool usage (e.g., higher occupancy requirement).
North of the Harbor Busway, on Figueroa the number of buses will increase as local routes are added to the Harbor Freeway buses. However, as the buses approach downtown, one-third are expected to turn back at the Washington & Flower light rail station. (This station has been assumed for the Long Beach-Los Angeles rail project.) The remaining two-thirds of the buses proceed up Olive or Main Streets to Union Station where they turn around. Accommodating forty additional buses on Olive and Main, even though they are articulated, is expected to be possible.

The Century Freeway Light Rail/HOV alternative allows transit patrons access to downtown Los Angeles by transferring to the Harbor Freeway Busway/HOV facility. The Rail/HOV alternative also requires a large number of buses on the Harbor busway: 98 buses during the peak hour. All of the buses are assumed to proceed up Olive Street to Union Station. It may be prudent, nevertheless, to also turn back some of these buses at the Washington & Flower light rail station.

F. Busway-to-Rail Conversion:

One possibility for an implementation strategy is to build the busway/HOV facility initially then some time in the future to reconstruct the transitway as a light rail/HOV facility. Whether this should be done depends on several factors, primarily the cost of conversion.

The cost of conversion is estimated in Table 4 as $181 million. To compare it to the cost of building the rail alternative initially $30 million must be added for the needed El Segundo segment. The total cost of conversion is thus $211 million in 1984 dollars compared to the $112 million initial cost. The final cost of conversion will also obviously escalate with time and depends on when in the future conversion might take place.

There will also be a construction period during which conversion takes place. This may be two years depending on how it is done. It is expected that limited transitway operation will continue throughout reconstruction.

TABLE 4: ESTIMATED COST TO CONVERT INITIAL CENTURY FREEWAY BUSWAY/HOV TO RAIL/HOV LATER
(in millions of 1984 dollars)

Estimated Element	Estimated Conversion Costs
Transitway	$118.0
Rail Yard	$ 25.0
Rail Cars	$ 38.3
TOTAL	$181 + $30 El Segundo Extension = $211

V. SUMMARY OF TECHNICAL EVALUATIONS:

Patronage:

The Century Freeway Busway/HOV Alternative combined with the Harbor Freeway Busway/HOV facility provides direct service to downtown Los Angeles for bus patrons. Because of this it seems to attract slightly more transit users than the Light Rail/HOV Alternative, although the difference is not significant.

The Century Freeway Light Rail/HOV Alternative appears to provide marginally better regional connectivity. The apparent increase in systemwide ridership brought about by the light rail line, however, is also not significant.

Capital Cost:

The net cost difference between the busway/HOV alternative and the light rail/HOV alternative and the minimal light rail/HOV alternative (operating out of the Long Beach-Los Angeles lines maintenance yard temporarily) is $ 57 million in 1984 terms. This means an actual dollar commitment of or $133 million assuming a 7% cost escalation rate to the midpoint of construction (early 1991).

To provide a fully satisfactory light rail line, $55 million more would be required to extend the line into El Segundo to better serve many users and to connect with a new maintenance yard. This $112 million net cost difference today means an actual dollar commitment of $222 million by completion of construction.

Conversion Cost:

The cost of converting an initial busway/HOV facility to a light rail/HOV facility is estimated to be $211 dollars including the El Segundo extension. This cost in 1984 dollars compares with $112 million for initial construction.

Operating Cost:

The light rail line is expected to reduce the cost of operating the larger network of busway and light rail lines by up to $9.3 million each year. The amount varies depending on what operating assumptions are used but the network cost is consistently lower with rail in the Century transitway than with a busway there.

Carpool Lanes:

Both alternatives allow for designated carpool lanes on both the Harbor and Century Freeways. However, the light rail/HOV alternative may not allow for direct connecting ramps between the Century Freeway carpool lanes and the Harbor Freeway carpool lanes. The Federal Highway Administration has not yet approved the provision of carpool lanes as part of the rail/HOV alternative.

Cost of Busway/HOV Alternative

It will cost $98 million in transit funds to provide buses and support facilities for the Century and Harbor busway system, although the busways themselves are paid for out of highway funds.

VI. RECOMMENDATION

The Proposition A referendum called for the development of a countywide rail system which included a line on the Century Freeway. The decision at hand is whether the Commission should commit the extra funds now so that the transitway will be rail initially, starting in 1992. Caltrans has asked LACTC to make this decision in June, 1984, so that design of the freeway may proceed on schedule.

The Commission staff recommends that for the time being the Commission make the minimum commitment necessary to construct a light rail line on the Century Freeway transitway to be completed the same time the Freeway begins operation and agree to move forward toward completion of the desirable project at the same time [1].

A Commission decision in favor of light rail will expand by one-third the number of miles of Proposition A rail service available by the early 1990's at a price which is substantially lower than any other potential project. The very low relative cost of the minimum commitment does not reduce in any significant way the opportunity to build any other of the Proposition A rail lines. (The cost of this project represents no more than one-half the cost of any other rail project.) This conclusion is strengthened if the Commission has revenue bonding authority as has been assumed in our financial planning for all rail projects.

A Commission decision in favor of light rail initially will save 60% of the cost of converting an initial busway to light rail in the future. While this decision may be viewed as committing money otherwise useable for any of several other rail porjects in the interim systems, the cost of conversion represents an even more significant proportion of the cost of other rail projects. It can be argued, in this light, that future conversion is therefore far less likely and that when it is considered the priority of its impacts on other unbuilt lines will be even greater than it is now.

A Commission decision in favor of light rail will reduce the cost of operating transit services within the Century and Harbor Freeway corridors. The level of that savings depends on several assumptions, but could well be over $9 million per year in future years. Such savings are important as the Commission considers lower operating subsidies.

---

[1] Either rail or busway has been cleared environmentally (as one result of the Consent Decree) for any construction within the limits of the Century Freeway. The desirable extension and yard to El Segundo however, must undergo an environmental impact review, a process which will take one or two years. If this work is started within the next year, it will not affect the 1992 completion schedule.

The analysis in this report was done using a net economic approach in constant 1984 dollars. The actual level of Proposition A rail dollars which would have to be committed to start operation of the Century light rail line $133-222 million translates to a maximum annual level of disbursement of between $39 million and $63 million, during the same year that Proposition A rail funds are estimated to exceed $125 million. At the time of expenditure, we should consider other potential fund sources as well. Construction on the Century light rail line will also follow completion of the Long Beach-Los Angeles light rail project.

It is important to understand that the alternative -- buses on a Century busway -- will require $93 million in capital funds, or 70% of the minimum rail commitment. The buses are also expected to cost millions more each year in operating costs. Exactly where such level of bus funding will come from is not clear at this time.

Report Prepared by: RICHARD M. STANGER
Project Director
Rail Development

BENJAMIN DARCHE
Senior Analyst
Rail Development

RMS:gb

ITEM #1

Los Angeles County
Transportation
Commission
354 South Spring Street
Suite 800
Los Angeles
California 90013
(213) 626-0371

LACTC

MINUTES

TECHNICAL ADVISORY COMMITTEE
JULY 20, 1984

(Attendance List is Attached)

Call to Order

Minutes of July 6, 1984 Meeting - approved

Rail Development - Discussion of Proposed Work for the Year Ahead

Ben Darche stated that as a result of the Rail Transit Implementation Stage 3 process, a decision on the Century Freeway and a recommendation to look at an incremental approach toward connecting the Long Beach project with the Pasadena line through downtown have been made. This and ongoing Long Beach and Metro Rail activities will lead to subsequent work in the coming year:

a) Century Freeway Preliminary Engineering - An RFP has been issued, and it is hoped that a consultant will be selected shortly.

b) El Segundo Extension - The Commission has approved work to begin on an EIR document for an extension of the Century Freeway into the El Segundo employment area. The work to begin in January, 1985 is a separate contract and not part of the preliminary engineering work on the Century Freeway.

c) Study of the North Coast Line in Marina Area - The reason for the study is to coordinate work that is proceeding with the City of Los Angeles on its Coastal Corridor Specific Plan. The City anticipates developing an ordinance for that corridor by the end of the year. The boundaries are Venice Boulevard (north), Imperial or Century (south), San Diego Freeway (east), and the ocean (west). The boundaries include the coastal alignment which was one of the representative routes approved in Stage 2. An alignment alternatives analysis for a section in the north from approximately the Sepulveda and Lincoln Boulevard area to the Marina will be performed. There has been much development in this area so staff will coordinate with the City in determining an alignment for that part of the coastal route. This is important to ensure that the development that proceeds does not preclude any alternative LACTC might want to include in that area. The primary objective is to help the City and County develop a policy for the Coastal Corridor Fund. The purpose of the ordinance is to help determine how the City might raise revenues from private

developers. The RFP is to be issued shortly and work should be completed by the end of 1994.

d) Develop an Approach to the North Hollywood Metro Rail Station from the West San Fernando Valley - This work is important, given the Robbins Bill which requires the SCRTD to begin construction in North Hollywood at least one year after the construction begins on the initial segment. Staff will work with SCRTD in order to maximize the efficiency of both lines.

e) Approval of Downtown Long Beach Alignments - Once the downtown alignment is decided for Long Beach, then staff can proceed with a study which will look at an alignment in the Pasadena corridor (Lincoln Heights or El Monte) and an alignment connecting Pasadena and Long Beach. Whichever downtown alignment is selected does not change the ability to serve the city of Pasadena by rail.

f) Monitor Rights-of-Way - Staff needs to monitor the development process that is continuing throughout the County to protect rights-of-way in the high priority corridors.

g) Fare Collection Study - This will be a joint LACTC/SCRTD study for Long Beach, Metro Rail, and the overall system. Recommendations should be ready in October.

Dave Barnhart asked when LACTC would decide how to spend the next $400 million. It was his feeling that the process is vague at present. Jim Sims stated that after revenue bonding is approved, Long Beach final costs are determined, and a better feel for Metro Rail funding is achieved, then staff will bring the various options before the Commission. Priscilla Adler asked for clarification of the Century Freeway decision by the Commission. Ben Darche stated that the resolution committed $133 for construction of a light rail facility within the 16.5 mile transitway and that the El Segundo extension is not the next priority but will have to enter the priority list.

Cecil Bugh questioned whether the Jarvis Bill would affect the development fee the City of Los Angeles is seeking. Anik Jimenez of L.A. City Planning, felt that although certainly challengeable, the fee would be upheld in court.

Proposition A Discretionary Fund Discussion Papers

- Role of Local Return - Nancy Whelan summarized her paper. Comments received by TAC members focused upon

transfer agreements, public hearing requirements, and the need of cities to have enough information concerning bus service changes in their community. Cecil Bugh stated that LACTC needs to grab the attention of decision-makers if this process is to be successful.

- Rail Operating Issues - Jim Sims summarized the paper which recommended that rail transit be considered when decisions on methods of allocating transit subsidies are made. Discussion focused upon estimated patronage of the total rail system and the diversion of riders from bus and autos to rail.

New Business - None

Adjournment

AEP:esk
Attachment

STANDARD CONTRACT PROVISIONS

ARTICLE II - GENERAL PROVISIONS

A. Direction of the Work/Responsibilities

1. Notice-to-Proceed: Consultant is not authorized to perform and will not be paid for performing any work under this contract until the effective date of the Notice-to-Proceed. Consultant shall begin work under the contract within five (5) days of the effective date of Notice-to-Proceed and shall diligently pursue the work to completion in accordance with the schedule and under the terms and conditions set forth herein.

2. Consultant agrees to perform the scope of services described by the text and schedule contained in Article I of this contract. Consultant will report to the Commission's representative (Project Director).

3. Consultant's Representative: Consultant hereby designates _____ to represent Consultant, unless Commission consents to a substitute in writing.

4. Commission's Representative: Commission hereby designates Richard Stanger, Project Director, Rail Development, and hereby delegates to said Project Director the required authority to manage and coordinate this contract.

5. Substitute Personnel: If one or more of the Consultant's personnel proposed for work under this contract should become unavailable, others of equal competence may be substituted only upon prior approval by the Commission.

6. Travel: Out of State travel by the Consultant under this contract must be approved in advance by the Commission.

7. Preliminary Review of Work: Where the Consultant is required to prepare/submit reports, working papers, etc., to Commission as products of the work described in Article I, these shall be submitted in draft, and opportunity provided for the Commission to direct revisions, prior to formal submission.

8. Appearance at Hearings: The Consultant shall, when requested by the Commission, render such assistance as necessary, including making arrangements for hearings and preparation and explanation of sketches of plans, at or for any hearing or conference held by the Commission.

9. Appearance as a Witness: If and when required by the Commission, the Consultant shall prepare for and appear in any litigation concerning its services performed under this contract in behalf of the Commission, and the Consultant shall be paid reasonable and agreed upon costs incurred by it in relation thereto, including profit, which shall not be considered as covered by the contract price.

10. Responsibility of Consultant: The Consultant shall be responsible for the professional quality, technical accuracy and the coordination of all services furnished by the Consultant under this contract. The Consultant shall without additional compensation, correct or revise any negligent errors or deficiencies in his services. Neither the Commission's review, approval or acceptance of, nor payment for, any of the services required under this contract shall be construed to operate as a waiver of any rights under this contract or of any cause of action arising out of the performance of this contract and the Consultant shall be and remain liable to the Commission in accordance with applicable law for all damages to the Commission caused by the Consultant's negligent performance of any of the services furnished under this contract.

11. Inspection of Work: It is understood that authorized representatives of the Commission and any State or Federal agencies involved, if applicable, may inspect or review the Consultant's work in progress, at any reasonable time.

B. Schedule

1. The Consultant and Commission will determine the schedule for the Scope of Services set forth in Article I on a task by task basis. In the event the schedule of work is so modified, Consultant will prepare a revised schedule to be substituted in Article I upon approval by the Commission. The Consultant is responsible for reporting in a timely manner, through progress reports or correspondence, whenever it appears the established work schedule will not be met, whether or not the reasons for anticipated delay are within the Consultant's control.

2. Term: Each tasks to be performed by the Consultant under this contract shall be completed in accordance with the agreed upon the schedule set forth in Article I - Scope of Services.

3. Delays: Neither party hereto shall be considered in default in the performance of its obligations with respect to schedule performance, to the extent that the performance of any obligation is prevented or delayed by an excusable delay. Should the Consultant's services be delayed by any mutually agreed upon excusable cause, the Consultant's schedule for completion of tasks affected by such delay shall be extended, as necessary. In any event, the Consultant shall minimize any schedule extension or additional cost to the Commission resulting from such delay.

   Excusable delays may include, but are not limited to, acts of God or of the public enemy, acts or failures to act of other agencies or the Commission in either their sovereign or contractual capacity; fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; but, in every case, the failure to perform must be reasonably beyond the control, and without the fault or negligence of, the Consultant.

4. Notice of Potential Delay: As a condition precedent to the approval of an extension of time to complete the established work schedule, Consultant shall give written notice to Commission within 10 working days after Consultant knows or should know of any cause or condition which might, under reasonably foreseeable circumstances, result in delay for which Consultant may claim an extension of time.

C. Termination

1. The Commission may, by written notice to Consultant, terminate this contract in whole or in part at any time, either for the Commission's convenience or because of the failure of the Consultant to fulfill his contract obligations. Upon receipt of such notice, the Consultant shall: (a) immediately discontinue all services affected (unless the notice directs otherwise), and (b) deliver to the Commission all data, drawings, specifications, reports, estimates, summaries and such other information and materials as may have been accumulated by the Consultant in performing this contract, whether completed or in process.

2. If the termination is for the convenience of the Commission, the Commission shall pay the Consultant the allowable costs incurred prior to termination and other costs reasonably incurred by the Consultant to implement the termination.

3. If the termination is due to the failure of the Consultant to fulfill his contract obligations, the Commission may take over the work and prosecute the same to completion by contract or otherwise. In such case, the Consultant shall be liable to the Commission for any reasonable cost or damages occasioned to the Commission thereby.

4. If, after notice of termination for failure to fulfull contract obligations, it is determined that the Consultant had not so failed, the termination shall be deemed to have been effected for the convenience of the Commission. In such event, adjustment shall be made as provided in paragraph 2 of this section.

5. The rights and remedies of the parties provided in this section are in addition to any other rights and remedies provided by law or under this contract.

6. Consultant, in executing this agreement, shall be deemed to have waived any and all claims for damages in the event of Commission's termination for convenience as provided in paragraph 2 of this section except if such termination for convenience is the result of paragraph 4 of this section.

7. Final Acceptance: When the Commission determines that the Consultant has satisfactorily completed the Scope of Services, the Commission shall give the Consultant written Notice of Final Acceptance, and the Consultant shall not incur any further costs hereunder, other than reasonable costs to implement termination. Consultant may request this determination when, in its opinion, it has satisfactorily completed the Scope of Services, and if so requested, the Commission shall make this determination within two months of such request.

D. Revisions in Scope of Services

1. Commission may, from time to time, make minor changes in Article I-Scope of Services under this contract, through a Change Order which is mutually agreed to in writing and which does not modify the overall purpose, term, or compensation provisions of this contract.

2. Extra Work: At any time during the term of this contract, Commission may order extra work to be performed by Consultant. Extra work is defined as work which was not anticipated and/or contained in the contract; is determined by the Commission to be necessary for the project addressed by the contract; and bears a reasonable subsidiary relation to the full execution of work originally described in the contract. Upon receipt of an Extra Work Change Order approved by the Commission, Consultant shall continue performance of the Scope of Services as changed. Necessary changes in the description of the Scope of Services, and equitable adjustments in allowable costs, fixed fee, ceiling price, term and schedule shall be incorporated in written amendments to this contract, either prior to or subsequent to Commission's issuance of an Extra Work Change Order.

The fixed fee shall be adjusted due to an Extra Work Change Order only if it has an impact on costs or term of this contract.

E. Rights in Technical Data

1. All materials and data prepared by the Consultant under this contract, together with all materials and data furnished to the Consultant by the Commission relative to this contract shall be returned to the Commission upon the completion of the term of this contract as being the property of the Commission; and the Commission shall not be limited in any way in its use thereof at any time, provided that any such use not within the purposes of this agreement shall be at the sole risk of the Commission, and provided that the Commission shall indemnify Consultant against any damages resulting from such use. If the Consultant shall desire later to use any of the data prepared by him in connection with this project, he shall first obtain the written approval of the Commission. The Consultant may retain copies of all data prepared by him and use the same for reference purpose.

2. No materials or data prepared by the Consultant under this contract are to be released by the Consultant to any other person or agency except after prior approval of the Commission, except as necessary for the performance of the services. All press releases or information to be published in newspapers, magazines, electronic media, etc., are to be handled only through Commission sources.

F. Consultant's Status/Subcontractors

1. Independent Contractor: In the performance of the services to be provided hereunder, Consultant is an independent contractor and is not an employee, agent or other representative of the Commission.

2. Assignment or Transfer: Services to be furnished hereunder shall be deemed to be unique personal services and except as herein provided, Consultant shall not assign, sublet, transfer or otherwise substitute its interest in this contract or its obligations hereunder without the prior written consent of the Commission. This consent shall in no way relieve the Consultant from his primary responsibility for performance of the work.

3. Subcontractors: The Consultant is authorized to subcontract to the following firms for the specific services shown:

Firm	Services
_____	
_____	
_____	
_____	
_____	
_____	
_____	
_____	
_____	

Commission reserves the right of prior approval of all subcontractors, and retains the right to request Consultant to terminate any said subcontractor, for any reason deemed appropriate by the Commission, by so notifying Consultant in writing. Should said notification be submitted to Consultant, it shall terminate said subcontractor immediately.

Commission shall have no liability to any subcontractor(s) for payment for services under this contract or other work performed for Consultant, and any subcontract entered into by Consultant pursuant to the conduct of services under this contract shall duly note that the responsibility for payment for the technical services or any other work performed shall be sole responsibility of Consultant.

G. Indemnification

1. Consultant agrees to defend, indemnify and hold harmless Commission, its agents, employees and officers against any and all damages, claims, liabilities, costs, suits or expenses, to the extent arising out of any negligent acts, errors, omissions of Consultant, or its agents or employees arising from or connected with Consultant's operations or services hereunder, including workers compensation suits, liability, or expense arising from or connected with services by any person pursuant to this contract. The Consultant's total liability for all aforesaid matters shall be limited to the amounts recovered by or paid on behalf of Consultant, or its agents, employees or subcontractors under Section I (Insurance).

H. Prohibited Interests

1. The Consultant warrants that he has not employed or retained and company or person, other than a bonafide employee working solely for the Consultant, to solicit or secure this

contract and that he has not paid or agreed to pay any company or person, other than a bonafide employee working solely for the Consultant, any fee, commission, percentage, brokerage fee, gifts or any other consideration, contingent upon or resulting from the award or making of this contract. For breach of violation of this warranty, the Commission shall have the right to annul this contract without liability.

2. Consultant agrees that, for the term of this contract, no member, officer, or employee of the Commission, or of a local public body during his/her tenure or for one (1) year thereafter, or member or delegate to the Congress of the United States, shall have any interest, direct or indirect, in this contract, or to any benefit arising thereof.

3. The employment by the Consultant of personnel on the payroll of the Commission will not be permitted in the execution of this contract, even though such employment may be outside of the employee's regular working hours or on Saturdays, holidays, or vacation time; further, the employment by the Consultant of personnel who have been on the Commission payroll within one year prior to the date of contract award, where this employment is caused by and/or dependent upon the Consultant securing this or a related contract with the Commission, is also prohibited.

I. Insurance

1. The Consultant shall carry Comprehensive General Liability insurance with limits not less than $1,000,000 per occurrence for bodily injury and $250,000 per occurence for property damage and Automobile Liability insurance with limits not less than $250,000 per person and $1,000,000 per occurrence for bodily injury and $250,000 per occurrence for property damage covering all work performed under this contract. Such insurance shall name the Los Angeles County Transportation Commission, its officers and employees while acting within the scope of their employment, as additional insured. Such insurance shall include the following:

   a. All operations <u>including</u> use of all vehicles.

   b. Contractual liability covering this contract.

   c. "Personal" injury (in lieu of, or in addition to, "bodily" injury).

   d. Use of watercraft/aircraft, where applicable.

2. The Consultant shall carry Workers' Compensation Insurance as required under California law covering all work performed by him under this contract, and all Consultant's personnel performing services under this contract.

3. Insurance similar to that required of the Consultant shall be required of the subcontractors to cover their operations performed under this contract. The Consultant shall be held responsible for any modifications in these insurance requirements as they apply to subcontractors, unless such modifications have the Commission's approval. Individual consultants shall not be considered subcontractors for purposes of this paragraph.

4. Insurance certificates evidencing the above are to be furnished to the Commission and provide for not less than 30 days prior written notice to the Commission of any cancellation or major change in the policies.

J. EEO/DBE/WBE

1. Affirmative Action: In connection with the execution of this contract, the Consultant shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Consultant shall take affirmative action to insure that applicants are employed and that employees are treated during their employment, without regard to their race, religion, color, sex or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment, or recruitment advertising; layoff or termination; rates of pay or other forms of compensation, and selection for training, including apprenticeship.

2. Disadvantaged and Women-owned Business Enterprise: In connection with the performance of this contract, the Consultant shall cooperate with the Commission with regard to the maximum utilization of disadvantaged and women-owned business enterprises, and will use its best efforts to insure that disadvantaged and women-owned business enterprises shall have the maximum practicable opportunity to compete for subcontract work under this contract.

   The Consultant states that to its knowledge, that subcontractors under this contract represented as Disadvantaged Business Enterprises and/or Women-owned Business Enterprises are certified as such under applicable definitions of the United States government.

Where the Commission has approved termination of a DBE or WBE subcontractor, the Consultant shall make every effort to propose and enter into an alternative subcontract for the terminated portion of the work to be performed with another qualified DBE or WBE for a contract price not less than the unexpended amount of the terminated subcontract. Satisfactory evidence of reasonable efforts shall be furnished to the Commission.

K. Notification

All notices hereunder and communications regarding interpretation of the terms of this contract or changes thereto shall be effected by the mailing thereof by registered or certified mail, return receipt requested, postage prepaid and addressed as follows:

Consultant	Commission:
_____	Los Angeles County Transportation Commission
_____	403 West Eighth Street
_____	Suite 500
_____	Los Angeles, CA 90014
_____	
Attention: _____	Attention: Richard M. Stanger
_____	Project Director

L. Compliance with Law

1. The Consultant shall perform the work required under this contract in conformity with requirements and standards of the Commission, municipal and public agencies, public and private utilities, special districts, and railroad agencies whose facilities and services may be affected by the construction of the project addressed by work under this contract. The Consultant shall also comply with all Federal, California and local laws and ordinances applicable to any of the work involved in this contract.

2. In the event of an irresolvable disagreement, or dispute arising between the parties under this contract, this contract shall be construed and such dispute(s) shall be settled in accordance with the laws of the State of California. Pending final resolution of a dispute hereunder, Consultant shall continue diligently with the performance of services under this contract and in accordance with the Commission's decision or position.

M. Future Contracts

The Consultant acknowledges the right of the Commission to limit eligibility for, or negotiate future contracts which may be related to work performed under this contract.

N. Entire Contract

This contract constitutes the entire agreement between the parties hereto relating to the subject matter hereof and supercedes any previous agreements or understandings.

ARTICLE III - COMPENSATION AND PAYMENT

Consultant agrees to provide all personnel, facilities, effort, materials and equipment required to complete, to the full satisfaction of the Commission, all of the work described in Article I-Scope of Services; and the Commission agrees to pay the Consultant as full compensation for said services, including all allowable expenses incurred and incident thereto, and estimated amount not to exceed a ceiling price of Two Hundred Thousand dollars ($200,000),in accordance with the schedule shown in Exhibit "A".

The ceiling price is the maximum compensation to be paid for completion of all services, subject to the provisions of paragraph 8 of this Article, including consultant's profit and amounts payable to Consultant for its subcontracts, leases, materials and costs arising from or due to termination of this contract.

1. The Commission shall reimburse the Consultant for the actual salaries paid technical employees by the Consultant, not including salaries or other payments to partners or principals, unless otherwise specifically provided, for the time such employees are directly utilized on the work.

   If it is the usual practice of partners or principals to perform certain basic technical work, they may be compensated for the time when they are actually engaged on the work, but only at a rate of pay commensurate with the type of work performed providing that written approval is obtained from the Commission previous to the use of said principals. Payment of partners and principals for their administrative duties in these positions will not be allowed, it being considered that their salaries are included under indirect expenses.

   The Consultant's overtime policy shall be subject to review and approval by the Commission.

2. Allowable Costs: The Commission shall reimburse the Consultant for such costs incurred by the Consultant in the performance of the services as are allowable in accordance with Federal Procurement Regulations, Part 1-15, Subpart 2, in effect on the date of this contract.

3. Overhead Rate: The Commission shall pay the Consultant allowances for the indirect expenses of the home and branch offices of the Consultant at a rate computed in accordance with the applicable

cost principles of the Federal Procurement Regulations, Part 1-15, Subpart 2, in effect on the date of this contract. The rate used for such computation shall be the audited rate established for the Consultant by its cognizant U.S. Government Audit Agency, by other audit acceptable to the Commission or based upon a final negotiated rate. Pending final determination of such rate, a provisional rate shall be applied. The provisional rate to be applied until the audited rate is determined is set forth in "Exhibit A".

4. Billings: For work not related to the sale of a bond or note issue. Partial payments against the Consultant's compensation shall be due and payable monthly for the work performed by the Consultant to the end of the preceding period including a proportionate amount of the fixed fee, as shown on the Consultant's bill accompanied by copies of payroll data certified by authorized employees of the Consultant. The Commission will compensate the Consultant for all work associated with a bond and/or note issue upon the successful sale of the bonds and/or notes.

   Copies of payroll data submitted by the Consultant shall include the name, classification, dates and hours of all engineering and technical personnel, clerical and printing labor incurred that were directly employed on the work. If overtime work is required to maintain the desired time schedule, the overhead factor shall apply only to the straight time portion of the premium time rate.

   Payment in reimbursement of the Consultant for other direct cost incurred by the Consultant shall be due and payable upon submission and approval of the Consultant's bill accompanied by copies of invoices or other supporting documentation satisfactory to the Commission.

   Commission agrees to pay Consultant amounts billed, less retainage, promptly upon receipt, for all satisfactorily performed services.

5. The Commission will retain from the last invoice(s) submitted by the Consultant six percent (6%) of all amounts due for partial payments made against work performed under this contract, except for amounts due for other direct costs (which shall be paid in full), as part security for fulfillment of this contract by Consultant. All amounts due and retained will be paid to the Consultant within two months after completion and acceptance of the work.

6. At Consultant's option, in lieu of retainage, Consultant shall provide to the Commission as security for the Consultant performance of its obligations herein, United States Treasury obligations with a face value of Ten Thousand Dollars ($10,000) which shall remain in the possession of the Commission for safekeeping throughout the term of this agreement.

7. Records and Audit: The Consultant shall permit the authorized representatives of the Commission, the State of California, and if applicable, the U.S. Department of Transportation and the Comptroller General of the United States to inspect and audit all records of the Consultant relating to its and its subcontractors' performance under the contract from date of contract through and until expiration of three years after completion of the contract. Contracts with the Consultant's subcontractors shall include such provisions for such audits, as applicable. For purposes of audit, the date of completion of the contract shall be the date of the Commission's payment for the Consultant's final billing (so noted on the invoice) for costs and fixed fee under this contract, or a period of 90 days from the date of Commission's Notice of Final Acceptance, as defined in Article II, Section C, paragraph 7 of this contract, whichever date is earlier. Final billings for the contract shall be based on the audited overhead rates.

   The Consultant agrees to keep and maintain records showing actual time devoted and all costs incurred in the performance of the contract services for a period of 3 years from the accepted completion date.

8. The Consultant, with the approval of the Commission shall be permitted to transfer or carrover the total of any unexpended funds from one Task of the Scope of Services to another Task providing that in doing so, the Consultant must remain within the estimated amount of the Contract.

RAPID TRANSIT COMMITTEE

Right-of-Way Protection Policies

As requested by the Commission in April, 1985, staff has solicited comments from affected cities and incorporated them into a final version of policies. The City of Los Angeles' Planning Department was particularly helpful to staff. The Committee recommended that the Commission adopt the following policies with regard to right-of-way protection for the future rail transit lines in high-priority corridors:

1. Request local jurisdictions to adopt right-of-way protection designations on their general plan maps and ordinances as necessary for future rail lines which serve them once route refinement studies have been done by LACTC. Protection actions can range from "specific planning" to land purchase; if purchase is involved, Local Return funds may be used with Commission concurrence.

2. Purchase land in high-priority corridors when it cannot otherwise be protected. LACTC would purchase a parcel only after determining that it meets specified criteria; LACTC will adhere to the following priority: (1) maintenance yard sites, (2) trackway sections, and (3) stations sites.

3. Support the affected cities in the development and implementation of their right-of-way protection programs. This would be in the form of technical guidance, streamlining review of potential conflicts, and timely action when protection may require the Commission to acquire certain properties.

Mrs. Bacharach moved for approval, seconded by Mr. King.

Mr. Bryan Allen appeared before the Commissioners and commented on his proposed version of the Right-of-Way Protection Policies.

Much discussion followed.

Hearing no objection to the recommended policies, motion was carried.

Century-El Segundo Extension: Recommendations of Alignment and Length Alternatives to Carry Forward into Environmental Clearance

The Committee adopted the following alternatives as the ones to be further studied:

1. Alternative B1 (at-grade along Nash Street),

2. Alternative B2 (aerial over Nash Street),

Item #3

LACTC

Los Angeles County
Transportation
Commission
403 West Eighth Street
Suite 500
Los Angeles
California 90014
(213) 626-0370

October 11, 1985

MEMO TO: RAPID TRANSIT COMMITTEE - 10/18 MEETING

FROM: EXECUTIVE DIRECTOR

SUBJECT: RIGHT-OF-WAY PROTECTION POLICIES

ISSUE

In April of this year, the Commission reviewed a draft discussion paper outlining a rationale and recommending policies for transit right-of-way protection. The Commission asked that the policies be sent out for review by affected cities. The comments received have been incorporated into the attached revised paper.

RECOMMENDATIONS

Staff recommends that the Committee and Commission adopt the following policies with regard to right-of-way protection for the future rail transit lines in high-priority corridors:

1. Request local jurisdictions to adopt right-of-way protection ordinances as necessary for future rail lines which serve them once route refinement studies have been done by LACTC. Protection actions can range from "specific planning" to land purchase; if purchase is involved, Local Return funds may be used with Commission concurrence.

2. Purchase land in high-priority corridors when it cannot otherwise be protected. LACTC would purchase parcels only after determining that it meets specified criteria; LACTC will adhere to the following priority: 1) maintenance yard sites, 2) trackway sections and 3) station sites.

3. Support the affected cities in the implementation of their right-of-way protection programs. This would be in the form of technical guidance, streamlined review of potential conflicts, and timely action when protection may require the Commission to acquire certain properties.

A PROPOSAL TO ESTABLISH

RIGHT-OF-WAY PROTECTION POLICIES

FOR

HIGH-PRIORITY RAIL TRANSIT LINES

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

OCTOBER 1985

The experience in the Coastal Corridor illustrates the need to protect right-of-way for representative routes in this and other high-priority corridors. Developments in these corridors are presently being planned, and soon buildings may be constructed which could obstruct the use of the particular right-of-way. At a minimum, obstruction of a certain alignment may significantly increase rail construction costs.

Consequently, staff recommends that the Commission adopt right-of-way protection policies for its high-priority routes to keep the most reasonable alignment alternative viable.

II. STEPS INVOLVED IN RIGHT-OF-WAY PROTECTION

Protection of high-priority routes is primarily a land use monitoring process. It would involve several steps. First, the Commission would undertake engineering studies, similar to the Coastal Route study, to refine high-priority route rights-of-way. The Commission would then provide the resulting engineering drawings of the route's horizontal and vertical alignment to municipalities, redevelopment agencies, and political subdivisions responsible for community and general plans. These jurisdictions would include the route in their up-dated plans. They would also establish procedures both 1) to determine when a proposed improvement might conflict with the needs of the rail line, and 2) to protect the rail transit right-of-way from consequent encroachment. In certain cities, particularly Los Angeles, planners are presently reviewing what procedures are available to protect right-of-way.

What follows is a description of the possible steps involved:

station sites where right-of-way needs expand from just that needed for the tracks. At the conclusion of the refinement studies, the involved municipalities, redevelopment agencies, and other jurisdictions will have drawings which show the selected alignment. The Commission will request local jurisdictions to amend the relevant plans to include the rail alignment. City planners of some cities are already assessing on their own various right-of-way protection strategies they may ask their city councils to adopt. A number of possible strategies are being evaluated from land dedications to the transferring of development rights to the establishment of new zoning categories. There may need to be a set of such tools developed to deal with different circumstances. These efforts show initiative and interest on the part of city agencies and should be encouraged by the Commission.

Often, rail transit alignments are along or within street rights-of-way. Agencies which deal with streets, typically the departments of transportation and engineering, must also be aware of rail protection. Driveways, turn lanes, street widenings, and utility relocations can all have a major impact on the rail facility and its operation. Here, as well, the needs of the rail line should be incorporated into appropriate or new street standards. Some transportation staffs are also already addressing new street standards which could define rail transit rights-of-way.

d) a major development is being planned on a cleared site designated for a future transit station precluding the station from being built at that location.

Actions to resolve such conflicts will vary. In certain cases, such as (b) above, the LACTC staff would recommend no action. In (a), let us say, the city agrees to ask the owner to modify the building's addition in order to obtain the permit, which the owner does. In (c) the driveway permit might be denied and a second entrance elsewhere allowed. Finally, in (d) the development cannot be allowed but the parcel must be purchased with public funds.

If the local jurisdiction and LACTC disagree on what measures to take on a conflict, or no resolution can be found for the conflict, it or the Commission can either purchase the parcel or an easement or allow the improvement to take place. The latter action may mean the abandonment of a particular station site or even the rail alignment through the area. The effect of this may be so costly it is worthwhile to purchase the property.

Step 4: Acquisition of Property for Right-of-Way

As already noted, right-of-way protection through application of land use controls, especially within designated station areas, is the primary responsibility of the local jurisdictions. A city, however, may further wish to purchase land for a station site on its own. If so it may use some of its Proposition A Local Return Funds for this purpose with Commission concurrence.

primarily at-grade and metro rail is by definition grade-separated, conflicts are expected to arise more frequently on light rail corridors.

In making a recommendation to the Commission to purchase a parcel, staff will provide the following information:

a. the specific use to which the parcel in question be put;

b. steps which have been taken by both the local jurisdiction and the Commission to reserve the parcel short of acquisition;

c. the impact on the rail project's design and cost of not acquiring the parcel; and

d. the price range the Commission can expect to pay for the parcel.

Staff identifies the following priority categories for consideration of right-of-way acquisition within future high-priority rail transit corridors:

Maintenance Yard Sites: These larger sites are difficult to find and protect over time; yet they have major long-term impacts on operating costs. The protection of these sites--once identified and deemed environmentally acceptable--is so important that the Commission may have to acquire sites even in advance of a development conflict. Because of the issue of inverse condemnation, there may be no way a local jurisdiction can protect such large parcels through land use controls.

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refinement studies have been done. Local Return funds may be used for such purposes with Commission concurrence.

2. The Commission should adopt a policy to purchase land in high-priority corridors when it cannot otherwise be protected; LACTC would purchase a parcel only after determining that it meets specified criteria adhering to the following priorities: 1) maintenance yard sites, 2) trackway sections and 3) station sites.

3. The Commission should support the affected cities in the implementation of their right-of-way protection programs. This would be in the form of technical guidance, streamlined review of potential conflicts, and timely action when protection may require the Commission to acquire certain properties.

RICK RICHMOND
EXECUTIVE DIRECTOR

LACTC

Los Angeles County
Transportation
Commission
403 West Eighth Street
Suite 500
Los Angeles
California 90014
(213) 626-0370

August 20, 1986

Honorable Peter F. Schabarum
Chairman
Board of Supervisors
County of Los Angeles
Hall of Administration
500 West Temple Street
Los Angeles, CA 90012

Dear Supervisor Schabarum:

This letter is in response to your August 6 request for clarification of the term "rail transit". Your letter quotes the County Counsel's opinion of September 4, 1981 on this issue. The opinion was solicited to determine whether a cable-suspended transit system qualified for Proposition A rail funds. It did not. Nevertheless, the term "rail transit" does encompass a number of technologies, many of which you listed in your ballot amendment proposal.

The County Counsel, in the enclosed September 4, 1981 opinion, reviewed verbatim excerpts from the Commission meeting of August 20, 1980 in which rail systems were discussed. There was no clear consensus of whether the term "rail" meant light rail, heavy rail or perhaps monorail. Counsel goes on to say "the word 'rail', in my opinion, was then, and should be now considered as being used in a generic sense. As such, it would include all kinds of rail systems ... or any other type of line that uses a rail as a means of guidance".

RESPONES TO QUESTION 1

Included in this interpretation would be traditional rail systems such as streetcar, light rail, heavy rail and commuter rail. Also included would be systems such as monorail and ALRT (Advanced Light Rapid Transit) where it uses rails for guidance as is the case in Vancouver's Skytrain and London's Docklands project. People movers (a generic term) which use rail(s) for guidance would also be eligible.

Not included in this definition of rail is any technology which uses rubber tires for support and guidance: busways, some types of people movers, and a number of AGT (Automated Guideway Transit) systems. Uncertain would be magnetic levitation systems which employ linear steel plates for support and guidance. Maglev systems might be considered a special application of rail technology. This technology, though promising, is just entering the early demonstration phase of its development for local use (as opposed to high speed intercity applications) and probably will not be ready for urban transit application in the next 10-15 years.

RESPONSE TO QUESTION 2

There is no legal opinion which clearly and definitively supports technology other than "rail transit". However, County Counsel's opinion emphasizes the generic interpretation of "rail", which encompasses far more than "conventional" rail technologies.

RESPONSE TO QUESTION 3

The Commission is presently looking into the use of automated light rail transit on the Century/Coast Line. In fact, such technology was studied for the Long Beach-Los Angeles corridor before LACTC decided on the design concept we are now building. All automated modes require a completely grade-separated alignment because they are driverless. The cost of such guideways is very high, unless an opportunity like the Century Freeway median presents itself. Where such affordable opportunities exist, we will continue to carefully consider advanced technologies.

I hope this letter clarifies our position on this matter. County Counsel's interpretation allows for a range of technologies from traditional to advanced. Where it is possible and cost-effective to consider a technology other than conventional light or heavy rail, we will.

Please let me know if you have any further questions.

Sincerely,

RICK RICHMOND
Executive Director

RR:cm
Enclosure

bcc: P. Taylor
S. Lantz
R. Stanger

COUNTY OF LOS ANGELES

OFFICE OF THE COUNTY COUNSEL

648 HALL OF ADMINISTRATION

LOS ANGELES, CALIFORNIA 90012

JOHN H. LARSON, COUNTY COUNSEL

September 4, 1981

226-8119

Los Angeles County Transportation
Commission
311 South Spring Street, Suite 1206
Los Angeles, California 90013

Attention Mr. Rick Richmond
Executive Director

Re: Interpretation of "rail" as used in Proposition A

Gentlemen:

You have asked whether a suspended-vehicle system, such as the so-called "Sky-Shuttle" which was demonstrated at a recent Commission meeting, would qualify for funding under the rail transit portion of Proposition A.

The "Sky-Shuttle" as conceptualized at the Commission meeting is essentially a series of self-propelled transit passenger cars which are suspended from and run on a cable which, in turn, is stretched between and supported by a series of towers or columns. The cable line runs through a series of stations where passengers enter and leave the cars.

In my opinion, a system of transit cars suspended from and running on a cable is not a rail rapid transit system as contemplated by Proposition A. It would not, therefore, qualify for Proposition A funding.

The answer to your question requires that the term "rail" as used in Proposition A (Commission Ordinance No. 16, sales tax ordinance, hereinafter "Ordinance") be defined.

As you know, a portion of the revenues derived from the sales tax imposed by the Ordinance is to be used for the construction and operation of a "rail rapid transit system" (Section 5 (b), Ordinance).

The Ordinance does not define the term "rail"; rather the word is used in conjunction with other words. Thus the Ordinance defines "system"

or "rail rapid transit system" as "all land and other improvements and equipment necessary to provide an operable, exclusive right-of-way or guideway, for rail transit." (Section (d) 1, Ordinance)

The primary purpose in interpreting the meaning of words used in an enactment is to ascertain legislative intent. If the language used is clear, its plain meaning should be followed (Great Lakes Properties, Inc. v. City of El Segundo (1977), 19 Cal. 3d 152, 155).

However, if the legislation is "either ambiguous on its face or leaves some doubt as to the purpose behind its enactment", then courts may use extrinsic aids to assist in determining intent (58 Cal. Jur. 3d Statutes, sec. 160, p. 560; Morse v. Municipal Court (1974), 13 Cal. 3d 149, 156).

Therefore, the language of the Ordinance must be examined to determine whether the word "rail" unequivocally expresses the commission's intent. If there is no ambiguity, uncertainty or doubt about the meaning of "rail", then the word is to be applied according to its terms without more (See: Morse v. Municipal Court, supra, at page 156).

I have, on several occasions in the past, noted that the meaning of the provisions of the Ordinance are "admittedly imprecise and ambiguous". Nowhere is this imprecision and ambiguity more apparent than in this situation. There are many types of "rail" as used in the railroad sense; elevated rail, heavy rail, light rail, monorail, to name a few. It is impossible to determine, on the face of the Ordinance, just what type of "rail" the Commission had in mind when it drafted the words of the Ordinance.

Under these circumstances, the use of extrinsic aids, such as the history of the enactment, Commission debates or discussions and statements and arguments to the voters may be useful in determining Commission intent.

"It is established that in interpreting a statute a court may properly rely on extrinsic aids, such as the history of the statute, committee reports, the legislative debates, and statements to the voters on initiative and referendum measures." (Rich v. State Board of Optometry (1965), 235 Cal. App. 2d 591, 603, citing People v. Knowles (1950), 35 Cal. 2d 175, 183)

A review of the Proposition A ballot summary and arguments and analysis presented to the electorate offers no insight as to what type of "rail" system was envisioned. However, a review of the Commission dabate that immediately preceded the adoption of the Ordinance is of assistance.

Verbatum excerpts from the Commission meeting of August 20, 1980, regarding the rail system are enlightening:

....

MR. ZIMMERMAN: Is it the consensus that the rail which we are referring to, is it restricted to heavy rail, such as BART?

MR. WARD: I would hope so, even though that might offend you.

MR. SCHNEIDER: If I may, it just says rail, so that could be light or heavy or anything that is characterized by rail.

MR. HAHN: With that, I think we could work it out.

MR. WARD: Well, that might even go to a monorail.

MR. SCHNEIDER: Under this wording, that's right.

MR. HAHN: I think we can work rail. The longer we talk the worse because everybody has something to add to it.

MR. WARD: I'm going to bow out if it is not heavy rail. I have believed in that since I have come to Los Angeles. I think the people are entitled to it. I believe this measure is going to fail terribly because we are not giving a minimum of 50% to heavy rail; we are only giving 35%.

MR. ZIMMERMAN: People out here don't care if it is light or heavy rail. They just want to get a ride to where they want to go.

MR. WARD: Light rail was the order of business of the Pacific Electric and involved stopping frequently at intersections to allow pedestrians and autos to cross. Light rail can be made successful in some limited instances, and I would like to see some of the old PE tracks restored, and I think we could. I think if you are building a new system, it should be 80 m.p.h. and as good as Atlanta's. Mr. Hahn is hoping to duplicate the

success in Atlanta and is basing his proposal on the guaranteed ceiling on fare costs. Well, that's fine. But Atlanta also had a high-speed rail system and the other half of that is heavy rail.

MR. HAHN: I think we can use the word rail and interpret it after that.

MR. WARD: Well, I want to be honest.

MR. SCHNEIDER: Right now put rail.

MR. RUBLEY: I think that's sufficient.

....

It seems self-evident from this discussion that there was no clear Commission consensus as to what the term "rail" meant or as to what type of rail rapid transit system was to be offered the voters. Under these circumstances, the word "rail", in my opinion, was then, and should be now, considered as being used in its generic sense. As such, it would include all kinds of rail systems, whether street railways, cable car lines such as used in San Francisco, electric trolley lines, suburban lines, heavy or light rail, monorail or any other type of line that uses a rail as a means of guidance.

The word "rail" when used as a noun is defined as "a bar originally of wood but now usually of rolled steel forming a track for vehicles whose wheels run in a depression in the bar (as in street railways) or on the top of the bar .." When used as an adjective, this word "rail" is defined as "of or relating to railroads" (both definitions taken from Webster's Third New International Dictionary).

In conclusion, it is my opinion that only a rail transit system that utilizes a line of rails which provide a track for passenger transit cars would qualify for Proposition A rail transit funding.

Very truly yours,

JOHN H. LARSON
County Counsel

By
Ronald L. Schneider
Principal Deputy County Counsel
Public Works Division

RLS:bs

LACTC

Los Angeles County
Transportation
Commission
403 West Eighth Street
Suite 500
Los Angeles
California 90014-3096
(213) 626-0370

July 28, 1986

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AND ALTERNATES

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DONALD L. WATSON
RICK RICHMOND

Honorable Joan Milke Flores
Councilwoman, 15th District
City of Los Angeles
City Hall, Room 237
200 North Spring Street
Los Angeles, California 90012

Dear Councilwoman Flores:

This letter is in response to the Santa Fe Real Estate Corporation's proposal to build two rail transit lines on its right-of-way. One of the proposed lines is from Chatsworth to Union Station, the other from Santa Monica to Union Station. These proposals are certainly intriguing, especially under the assumptions put forth. The issues, however, are not as simple as they have been presented, and we would like to discuss some of our concerns with you.

First, these lines should not be considered as substitutes for the Metro Rail project. That project is designed to serve the Wilshire corridor and to connect the Valley with that corridor and downtown Los Angeles. Both of these elements represent major mobility requirements for Los Angeles. Identified by the federal government as the most cost effective new transit system in the county, Metro Rail is expected to serve over 300,000 daily trips. In contrast, the Chatsworth-to-downtown proposal would serve only a small portion of the travel demand that the Metro Rail project will satisfy. Moreover, Santa Fe's proposal is far less cost-effective; for an assumed tenth of the Metro Rail cost, only one-twentieth of the rider-ship will be served.

Second, the Proposition A rail system is based on a corridor map approved by the voters. That map shows the San Fernando Valley (E/W) corridor stopping in the east at the Metro Rail station in North Hollywood. Between this point and Glendale, there is no Proposition A

corridor. Thus, the railroad's proposal would require us to construct rail transit in an area we are clearly not authorized to build in -- at least until the other Prop. A corridor lines have been built. While there may be a way around this obstacle, it is clearly a problem.

Finally, we have been working with the Santa Fe's staff and its consultants on the Valley-to-downtown proposal. We are reviewing these costs, and see a number of areas where the Chatsworth-Union station estimate is low. We believe that the $310 million estimate quoted by Santa Fe could be as little as half the amount that will be needed, even as a baseline figure. We are also concerned that were a rail line to pass close to Burbank and Glendale, these cities would expect the line to deviate into their downtown area. It would be a natural desire, but would also add hundreds of millions of dollars to the cost estimate.

In bringing up these points, our intent is not to cast aspersions on the railroad's proposals. Their proposals are indeed provocative; their attitude and cooperation praiseworthy. We are, and wish to continue, working with them to protect a portion of the Burbank Branch and other rights-of-way for future rail transit development. Although it is not one of the LACTC's adopted rail routes, the future use of the Exposition Boulevard right-of-way to Santa Monica is an additional opportunity we all need to carefully consider.

I applaud your involvement in bringing the railroad's proposals to the attention of the City Council and other interested parties. The LACTC stands ready to offer any assitance you may need in assessing the impact of those proposals.

Sincerely,

RICK RICHMOND
Executive Director

RR:db

RICK RICHMOND
EXECUTIVE DIRECTOR

LACTC

Item 11b

Los Angeles County
Transportation
Commission
403 West Eighth Street
Suite 500
Los Angeles
California 90014
(213) 626-0370

February 26, 1986

MEMO TO: RAPID TRANSIT COMMITTEE

FROM: EXECUTIVE DIRECTOR

SUBJECT: SUMMARY OF PAST STUDIES INVOLVING RAIL TRANSIT ON FREEWAYS

In response to Commissioner Donley's request for consideration of a freeway-based rail transit system, I indicated staff would provide a summary of past consideration of freeway rail routes in various corridors. It is attached.

This item will be on the agenda for your next Committee meeting.

Rick Richmond

RICK RICHMOND
Executive Director

RR:kyt

Attachment

The original paper inadvertently left out cost-effectiveness figures from the tables on the last page. This new copy includes them.

RAIL TRANSIT ON FREEWAYS: A REVIEW OF COMMISSION DECISIONS

Over the last three years the Los Angeles County Transportation Commission has taken a number of steps to implement the Proposition A rail transit system. It has committed funds for three rail projects now in final design or early construction. It has established a set of high-priority corridors for early rail implementation; and it has adopted, in each of those corridors, representative rail routes. Combined, these routes form the interim rail system shown in Figure 1. Table 1 indicates the extent to which freeway or railroad rights-of-way have been designated for use by rail transit in each of those corridors. The purpose of this discussion is to review how these designations were made and the extent to which freeway rights-of-way were considered.

It would first, however, be helpful to review two ground rules the Commission followed in this process.

1. Existing Rights-of-Way: Ordinance #16, establishing the Proposition A 1/2¢ tax, stated that "use of existing rights-of-way for rail transit will be emphasized. The most obvious such rights-of-way would be freeway and railroad rights-of-way. As the process evolved, candidate rail routes using such alignments were specifically studied.

2. Support the Development of Centers: The Southern California Association of Governments (SCAG), as well as the City the and County of Los Angeles, all have development plans and policies which emphasize the growth of multi-purpose centers. Rail lines which link centers support these growth center policies. For this reason, this criterion was one of three LACTC by SCAG to use during the selection of the high-priority corridors. It was also one of the criteria used to select representative rail routes.

Corridor Decisions

During 1983, the Commission staff evaluated a number of route alternatives in five high-priority corridors. The result of this work was to adopt, in each corridor, the representative route which seemed to best serve the needs of that corridor. These representative routes form the basis for present studies which evaluate alignment alternatives within the general routing. In most of the corridors evaluated, at least one candidate route selected used an existing freeway right-of-way. In some cases the freeway route was adopted, in others it was not. The reasons for this in each corridor studied are explained below:

A. San Fernando Valley (E/W) Corridor

In this corridor four alternative routes were studied. One, a Metro Rail candidate, was on aerial structure within the freeway right-of-way. Another Metro Rail candidate was on aerial structure along the Burbank Branch of the Southern Pacific; the third used that railroad right-of-way at-grade. Table II summarizes the findings:

In this corridor, the freeway alternative was not chosen. The evaluation of this route in the Stage 2 Report is quoted below:

> "The Ventura Freeway route has lower ridership than Al and is more expensive to build making it the least cost-effective route in the Valley. The high cost is primarily due to building an elevated guideway in the median of the Ventura Freeway. The patronage is lower than other alternatives probably because of few transit dependent households at the southern end of the Valley and an access barrier created by the Santa Monica Mountains.
>
> The primary land use along the Ventura Freeway Route is low-density housing. The single family housing characteristic of the route does not lend itself to high-density development one would want to encourage with a Metro Rail line. The development potential of stations located on or along a freeway right-of-way is also limited, perhaps to air rights development of office or retail projects. The circulation requirements for autos entering and exiting the freeway, combined with feeder bus and pedestrian access to the transit stations along the freeway, make construction and operation of a commercial development difficult. In sum, the potential for creating significant developments, either residential or commercial, in conjunction with a freeway transit line is limited."

B. Western Los Angeles (E/W) Corridor

In this corridor no freeway route candidates were studied for several reasons. First, the line in this corridor was to be an extension of, or interchange with, the Wilshire subway line. That project is not near a freeway. Secondly, the Santa Monica Freeway within the corridor serves no growth centers: Beverly Hills, Century City and Westwood are all off the freeway.

C. Western Los Angeles (N/S) Corridor

In this corridor four alternatives were studied. One was a Metro Rail line from the Century Freeway north to transitway.

D. Westwood

The other candidate alternatives were light rail lines which directly connected growth centers within the corridor. (The San Diego Freeway, like the Santa Monica Freeway, does not serve growth centers directly.)

Table IV summarizes the technical evaluation. The high costof the freeway alternative ocurred because that line had some underground as asll as aerial segments.

E. Santa Ana Corridor

Five rail alternatives were studied in this corridor. One of them was an extension of the Metro Rail Starter Line over the Santa Ana Freeway. Table IV summarizes the technical evaluation. The freeway alternative was selected by the Commission because of its relatively high cost-effectiveness. Its summary discussion in the Stage 2 Report is as follows:

> "Alternative D2 extends the Metro Rail Line in the median of the Santa Ana Freeway. It is an alignment already being studied by Caltrans. It is designed to serve the commuter better and its ridership figures reflect this. Most of its ridership is generated at the outlying stations; it attracts relatively few patrons through East Los Angeles.
>
> The line within the freeway right-of-way does not directly serve adjacent land uses. However, there is a high proportion of industrial uses along its length which the route may help to revitalize in some fashion.

F. Pasadena Corridor

It was the Pasadena Corridor decision which brought the commuter (freeway) vs. community (off-freeway) issue to a clear focus for the Commission. Staff had assumed only one rail route: conversion of the El Monte busway from Union Station to the Long Beach Freeway, then rail in the median of the planned Long Beach Freeway extension into Pasadena. It was commuter-oriented rail transit at its most logical application because the busway/HOV right-of-way existed in the El Monte Freeway.

Community leaders, however, voiced concern that their communities were not being served. They requested a rail route through the Lincoln Heights and El Sereno communities be evaluated and the Commission agreed. The resulting analysis showed the El Monte (El) alternative to be less costly as Table V shows. It also seemed to attract more riders, although the extent to which the patronage model reflected off-peak riders was validly questioned.

In January 1984, after careful consideration of the Pasadena Corridor options, the Commission adopted the Lincoln Heights alternative, not the El Monte alternative.

Rail on Freeways:

In June 1984, the Commission committed funds to build the Century Freeway rail transit project. Much of the cost of this project, however, is being borne by Caltrans and the federal Highway Administration as part of the freeway project. As a result, the cost of this rail project to the Commission is a relative bargain at $13 million/mile.

Not wishing to commit $500 million for a Harbor Freeway rail project, the Commission approved the Harbor Freeway Transitway Final Environmental Impact Report which recommends a busway/HOV facility. This facility is planned to be constructed with 90% federal funds. It is being designed for convertibility to rail. The El Monte busway/HOV facility is also convertible to rail.

The Santa Ana Freeway cannot use federal interstate funds for reconstruction. It is not known from where funds will come to pay for this work. It may need to come from several sources so that no single funding source bears the brunt of the high cost. If that happens, then the cost of rail transit in the Santa Ana Corridor may be affordable to the Commission. Clearly, the Metro Rail Starter Line needs to be built first.

Finally, should the Route 7 (Long Beach Freeway) Extension be built, there will be room provided for rail in its median.

Summary:

Of the 9 high-priority rail routes adopted by the Commission, 3 substantially use freeway rights-of-way: the Century, Harbor and Santa Ana rail lines. Another - the Pasadena Line - will use a significant amount of freeway right-of-way. Two projects will make substantial use of railroad rights-of-way: the Long Beach and San Fernando Valley rail lines.

However, in three other corridors there are neither freeways nor railroad rights-of-way which serve the corridor's center. One is the Metro Rail Starter Line Corridor serving the built-up central core of Los Angeles. Another is the westward extension of that line towards Santa Monica. Finally, the concentrations of development north/south along the coast can be served only by a rail line which deviates from both the freeway and railroad rights-of-way.

TABLE I:
EXPECTED USE OF EXISTING RIGHTS-OF-WAY
IN HIGH-PRIORITY RAIL CORRIDORS

High-Priority Corridor	Freeway Rights-of-Way	Railroad Rights-of-Way
Wilshire-N. Hollywood	-	-
Long Beach-Los Angeles	-	75%
Century	100%	-
San Fernando Valley(E/W)	-	up to 95%
Western Los Angeles(E/W)	-	nominal
Western Los Angeles(N/S)	-	20%
Santa Ana	75%	-
Pasadena	30%	-
Harbor	90%	-

TABLE II:
SUMMARY OF STAGE 2 FINDINGS
SAN FERNANDO VALLEY (E/W) CORRIDOR

Alternative	Length (Miles)	Cost* (1983$)	Cost/Mile (1983$)	Patronage (Yr 2000)	Cost*** Effec-tiveness
A1. Burbank Branch(MRT)	16.5	$560Mill	$ 34Mill	86,860	654,000
A2. Ventura Fwy (MRT)	14.1	$636Mill	$ 45Mill	76,490	503,000
A3. Burbank Branch(LRT)	16.5	$173Mill**	$10.5Mill	60,220	1,450,385
A4. SP Mainline (LRT)	15.1	$223Mill	$ 15Mill	52,910	988,602

* See note TABLE II
** Additional aerial sections may be found warranted.

TABLE III:
SUMMARY OF STAGE 2 FINDINGS
WEST LOS ANGELES (N/S)/SOUTH BAY CORRIDOR

Alternative	Length (Miles)	Cost* (1983$)	Cost/Mile (1983$)	Patronage (Yr 2000)	Cost*** Effec-tiveness
C1: South Bay Trolly	12.8	$197Mill	$15Mill	32,360	685,000
C2: Marina/AT&SF	15.9	$292Mill	$18Mill	39,630	586,000
C3: Marina/Imperial	15.4	$333Mill	$22Mill	24,230	305,000
C4: I-405/Sepulveda	10.7	$946Mill	$88Mill	43,600	193,000

* See note TABLE II
*** See note TABLE II

TABLE IV:
SUMMARY OF STAGE 2 FINDINGS
SANTA ANA CORRIDOR

Alternative	Length (Miles)	Cost* (1983$)	Cost/Mile (1983$)	Patronage (Yr 2000)	Cost*** Effec-tiveness
D1: East LA/AT&SF	19.5	$1130Mill	$58Mill	87,400	324,000
D2: Santa Ana Fwy	19.0	$ 761Mill	$40Mill	87,800	481,000
D3: Yorba Linda	16.0	$ 348Mill	$22Mill	31,350	377,000
D4: Firestone/UP	18.5	$ 416Mill	$22Mill	42,240	425,000
D5: Firestone	15.7	$ 385Mill	$24Mill	32,020	348,000

* See note TABLE II
*** See note TABLE II

TABLE V:
SUMMARY OF STAGE 2 FINDINGS
PASADENA CORRIDOR

Alternative	Length (Miles)	Cost* (1983$)	Cost/Mile (1983$)	Patronage (Yr 2000)	Cost*** Effec-tiveness
E1: El Monte Route 7	16.1	$295.6Mill	$18Mill	56,000	800,000
E2: Lincoln Heights Route 7	16.0	$355.0Mill	$22Mill	43,100	513,000

* See note TABLE II
*** See note TABLE II

WHY METRO RAIL IS THE RAIL SOLUTION ON THE WILSHIRE CORRIDOR

1. Buses on the Wilshire corridor currently carry 190,000 passengers per day. Metro Rail expects ridership demand by the year 2000 to be 364,000 boardings per day. A light rail line could only accommodate 55,000 to 70,000 boardings daily.

2. Metro Rail will add the equivalent of 24 freeway lanes in passenger carrying capacity to the Wilshire/Fairfax/Sunset/Hollywood Freeway corridor. Light rail would require the removal of curbside parking and at least three traffic lanes on these busy thoroughfares, or the acquisition of a costly right-of-way, and/or the construction of a tunnel under the Santa Monica Mountains to North Hollywood. Light rail is only cost effective if there is an existing surface right-of-way (either a railroad line or wide streets with relatively low congestion).

3. Metro Rail serves the urban core of Los Angeles. The route serves 12 of the growth centers designated by Los Angeles City Council for Los Angeles. One million additional residents are expected in the regional core by the year 2000, a 25% increase. Each of the Metro Rail stations will serve these growth centers. Nearly one-half of SCRTD's current daily boardings are made in the core area.

4. Recent proposals for a Light Rail on the freeways would not serve the Wilshire corridor at all, since there is no freeway in the corridor on which rail can be placed. (The Route 2 Beverly Hills freeway was abandoned in 1973.)

5. The length of an LRT train is limited to three cars, since longer trains would block intersections while the train stops for stations or stoplights at the next intersection.

6. Subway trains can be added as demand warrants to as close as 2.5 minutes apart. LRT, which operates in traffic can only operate every six minutes. ~~With twice as many cars in each train, and more than twice as many trains each hour,~~ Subway trains can carry more than five times as many passengers each peak hour

	PREFERRED ALTERNATIVE	LIGHT RAIL (LRT) BASELINE	NOTES
Description	18.5 mile, high-speed, high capacity commuter railroad line in subway the entire route length	22.5 mile, medium speed, medium capacity commuter railroad line, operating in traffic and on existing railroad track rights-of-way on the surface	In areas like Wilshire, Fairfax and Sunset, where excess congestion already exists and growth is anticipated, grade-separation is essential for speed of operation and system capacity. Grade separation is the most expensive element of rail construction, since no existing surface rights-of-way exist. In areas like the LB-LA corridor, where patronage growth is moderate and where existing right-of-way will accommodate a two-track LRT line, construction costs can be significantly lower by compromising system capacity, travel speed and service frequency for minimal grade separation.
Vehicle Size	75'	80'	Vehicles are approximately the same size
Passenger Capacity Per Train	1,000-1,400 (6 car trains)	348-522 (2-3 car trains)	The LRT Train length is limited to less than a city block to avoid blocking intersections. Metro Rail trains are not limited by intersections, since there is no cross traffic in the subway tunnel.
Maximum Number of train per hour	17 (3.5 min. headway)	10 (6 min. headway)	Subway trains can be added as demand warrants to as close as 2.5 minutes apart. LRT, which operates in traffic and requires stoppage of cross traffic, can only operate every six minutes
Passenger Capacity each rush hour	23,800	4,500	With twice as many cars in each train and nearly double the train frequency, Metro Rail can carry more than 5 times as many passengers as LRT during rush hour.
Estimated daily Patronage	364,000 boardings	54,446 boardings	Metro Rail will carry more than 6½ times as many passengers as LB/LA throughout the day. Since 190,000 passengers already ride buses on Wilshire each day, by 1990 RTD expects travel demand in Metro Rail to be double the current surface street demand.
Rail Travel End-to-End	35 min. (over 18.5 miles)	60 minutes (over 22 miles)	Travel time is heavily dependent on grade separation. Metro Rail will average 36 mph, LRT will average 11.7 - 34.4 mph and buses in Wilshire corridor average 6.7 - 14 mph.
Bus Travel Time over same route	Not Available	86 minutes	