

DRAFT

BUS OPERATING PLANS
FOR THE
HARBOR AND CENTURY TRANSITWAYS

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Prepared by
Southern California Rapid Transit District
425 South Main Street
Los Angeles, California 90013

October, 1985

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BUS OPERATING PLANS FOR THE HARBOR AND CENTURY TRANSITWAYS**Background**

In 1978, the U.S. Department of Transportation awarded \$7.8 million to CALTRANS to study the freeway transit element of the Regional Transportation Development Plan (RTDP). CALTRANS together with SCRTD, selected two existing freeway corridors, the Harbor and the Santa Ana, plus the proposed Century Freeway, for initial study. The development of a transitway facility for the Harbor took place concurrently with planning for the Century Transitway, since a strong intertransitway patronage link was anticipated. Both facilities, it was assumed, would initially be constructed as bus/HOV (with later conversion to light rail possible). bus/HOV mode was selected because patronage sufficient to mandate rail was not foreseen and local funds for rail construction were not available.

With the implementation of Proposition A, in 1982, the funding picture for rail starts in L.A. County reversed. At this time the LACTC selected the Los Angeles-Long Beach corridor for the initial light rail line and began consideration of a rail alternative for the Century Freeway Transitway. Finally, in 1984, light rail was selected as the mode for the Century Freeway.

The District has been involved in the development of the proposed Harbor and Century Freeway Transitways, since the corridor analysis began. Preliminary engineering is now well underway on both facilities. To coincide with their final phases of design, RTD has developed a suggested initial operating plan for the Harbor bus/HOV facility and identified the background bus system to serve the Century Light Rail Stations.

When a combined Harbor/Century Operating Plan Study was first proposed for the FY 1985 work program, the Century Transitway's mode was assumed to be the same as the Harbor's. Therefore, their operating plans were to be linked. Now that light rail has been selected for the Century, the two projects, though sharing a transfer facility, do not require integrated planning. In light of this change, the following report is in two independent parts; Part I contains the operating plans for the Harbor Busway, and Part II presents the Century Light Rail background bus system.

PART I: INITIAL BUS OPERATING PLAN FOR THE HARBOR TRANSITWAY

RTD's Current Bus Operations on the Harbor Freeway

At present, the District operates six express bus lines on the Harbor Freeway (See Figure I-1: Present Harbor Corridor Express Service). These are:

- Line 442 Hawthorne-Union Station Express
- Line 443 L.A.-Torrance-Redondo Beach-Palos Verdes Express
- Line 444 L.A.-West Torrance-Rolling Hills-Marineland Express
- Line 445 San Pedro Park-Ride Express
- Line 446 L.A.-Carson-Wilmington-San Pedro Express
- Line 448 L.A.-Palos Verdes Peninsula Express

These six lines have over 13,000 total boardings each weekday. However, only 5,000 of these boardings actually ride on the Harbor Freeway portion of the routes.

Lines 442, 443, 445, and 448 provide service during the weekday peak commuting hours only. Lines 444 and 446 operate seven days a week and throughout the day. Line 445 is a park-ride line serving two off-line park-ride lots, one at Battery and Gaffey Streets in San Pedro and one at Alpine Village. These lots have a combined capacity for about 300 automobiles. All lines except Line 445 operate in local service on the South Bay portion of their routes, using the Harbor Freeway to access the Los Angeles Central Business District (LACBD). Over half of the total person trips taken on Lines 444 and 446 occur solely on the South Bay local portions of the routes and do not include freeway travel. Presently, there are two on-line Harbor Freeway stops. One is at Manchester Avenue and the other at Slauson Avenue. These freeway stops have a neglected appearance and are not well signed or well lit after dark. Neither of these two stops are well utilized by transit riders.

Proposed Transitway Design

The Harbor Freeway Transitway, when completed, will include separate bus/HOV lanes extending from 23rd Street to Artesia Boulevard, with mixed flow occurring on the remainder of the freeway. Seven on-line transit stations, which will include parking facilities, have been planned at Exposition Boulevard, Slauson Avenue, Manchester Avenue, Rosecrans Avenue, Carson Street, Pacific Coast Highway, and Battery Street (San Pedro). In addition, there will be a transfer facility between the Harbor Busway and the Century Light Rail. An off-line transit center is also planned at Artesia Boulevard and Vermont Avenue (Artesia Transit Center).

Due to funding uncertainties it is possible that the transitway will have to be built incrementally. The Final Environmental Impact Statement (FEIS) for the Harbor Transitway described the possible phases of construction. Phase I, the minimum operable segment (MOS) would consist of a shortened bus/HOV facility extending south of the LACBD to the Century Freeway, I-105. The MOS would include three on-line stations, Exposition, Slauson, and Manchester, and the I-105 transfer facility. The second phase, according to the FEIS, would complete the bus/HOV lane to Artesia Boulevard and also construct the Rosecrans Station and Artesia Transit Center. The third and final phase would build the remaining three on-line stations.

The Harbor Transitway bus operating plan that follows, as a minimum, requires the construction of the MOS plus the Artesia Transit Center. The transit center is necessary for staging the freeway buses and allowing local services to conveniently meet with the Harbor Transitway buses. Essentially, the MOS for the District's operating plan must include a transit center facility at Artesia Boulevard. Therefore, if incremental funding is eventually selected, additional funding for the Artesia Transit Center would be necessary. Without the transit center, no substantial change in the present system of Harbor Express lines would be anticipated. Neither would an appropriate level of growth in transit patronage be expected to occur.

The remainder of this report presents the proposed Harbor Operating Plan, assuming the entire facility is built at once. It is likely that interim operating plans would be necessary if the incremental development (including the necessary Artesia Transit Center) occurs.

Objectives of the Harbor Busway Operating Plan

RTD has two objectives in developing the following Harbor Busway proposal:

1. To provide an initial freeway transit capacity sufficient to accommodate the first two years expected growth in patronage.
2. To design a system of bus service that would be operationally efficient and have the flexibility for expansion to meet long range patronage increases.

The first objective, to initially provide freeway capacity adequate for the first two years demand, is intended to attract patronage by providing reasonably frequent and stable level of service. This objective translates into providing capacity for double the present patronage level. (The 1984 diurnal patronage for the Harbor Freeway portion of the express lines is presented in Appendix A.) Expecting a doubling of patronage in two years is based on the District's prior experience with patronage growth on the El Monte Busway. Although the San Gabriel Valley-El Monte Corridor may not be comparable in that it has experienced a much higher population growth rate than the Harbor Freeway Corridor, the Harbor Freeway is expected to become increasingly congested as office development in the LACBD progresses. This congestion will stimulate demand for the Harbor Transitway bus service.

To meet the second objective for operational efficiency, the District proposes a line-haul express service on the Harbor Freeway and feeder services covering the local portions of the present express routes (Figure I-2: Proposed Harbor Transitway Operating Plan). This type of system has the advantage of allowing service frequencies to be adjusted individually for the local and express routes. It is particularly appropriate to separate the local and express services on lines 444 and 446 where a significant level of local patronage exists independent of the express portion of the route. Lines 443 and 448, while they are more typical peak hour only express lines, have very low patronage at present. The two lines could potentially gain patronage when the busway is built, but it is more likely that their patronage would be eroded by the provision of park and ride lots on the Harbor Transitway. The conservative approach for the initial operating plan is to assume that the patronage would not grow substantially and operate the local portion of these lines as feeder services. These routes could eventually be through routed anytime demand should warrant it.

This proposed line-haul system does require an additional transfer for the patrons who would be taking local feeder lines to the Harbor Freeway buses. This disadvantage is actually minimized since the improved frequency of the line-haul service considerably reduces the expected passenger wait time for the transfer. Travel time from boarding a feeder line to arrival in the LACBD, including transfers, is expected to be about the same as is presently experienced without a transfer.

The majority of the future Harbor Busway patrons are expected to access the line-haul service via the park and ride lots located at Artesia Transit Center and the seven on-line stations. Therefore, a line-haul plan which enhances the trunk line service will benefit the greatest number of transit riders. In addition, a trunk line service on the Harbor Busway should offer improved service for all the corridor's patrons since it will operate at fairly uniform intervals and maintain its schedule more reliably than is presently possible with each express line operating individually into the LACBD. Over the longer term, a line-haul bus system for the Harbor Transitway will be flexible and will allow for future modifications to be made in an efficient manner.

Proposed Initial Bus Operating Plan

The proposed initial operating plan calls for two line-haul routes. One, Line 440, will operate from the proposed Artesia Transit Center north to the LACBD. The second, proposed Line 441 will operate from San Pedro at Pacific and 7th Streets, to the Battery Street Station, then, north on the Harbor Freeway to the LACBD. The present Lines 443, 444, 446 and 448 would become local feeder services that would have their northbound terminals at either Artesia Transit Center (Lines 443, 444, and 446) or Pacific Coast Highway Station (Line 448).

Under the operating plan Line 445 would be canceled since the proposed line-haul service would take its place. Also, Line 442 would remain unchanged and continue to operate on the Harbor Freeway into the LACBD.

This exception to the local feeder concept is made since Line 442 operates more efficiently at present, as part of Line 40, than it would if terminated at the proposed Manchester Station. Also, Line 442 is quite close to the LACBD at the point it enters the Harbor Freeway. Transferring this close to the LACBD would be an unnecessary inconvenience to full bus loads of existing patrons.

In conjunction with instituting the four local feeder lines, minor route changes to present local Lines 51, 351, 127, and 12B would be made. Lines 51, 351 and 127 would be extended to terminate at the proposed Artesia Transit Center. This would serve a route segment on Avalon Boulevard that will be abandoned by Line 446 under the proposal. Line 128 would then be extended to terminate at California State University Dominguez Hills where Line 127 presently terminates (see map in Figure I-3). These changes will not effect headways or equipment requirements on these lines.

The two proposed line-haul services, Lines 440 and 441, would self-distribute in the LACBD with Olive Street between 12th and 1st Streets forming the backbone of their route. Figure I-4 shows the detailed routing through the LACBD. Capacity on Olive Street for the proposed initial Harbor Freeway bus service levels will be adequate. The El Monte bus lines, that use Olive Street presently, will have been rerouted to a downtown loop using Spring and Hope-Flower Streets, leaving capacity on Olive for the additional service.

The LACBD layover terminal for the line-haul routes will be at Union Station. In conjunction with Metro Rail development at Union Station, sufficient layover has been planned to accommodate the Harbor Transitway bus lines, as shown in Figure I-5.

The District, as explained above, expects a doubling of current weekday boardings on the Harbor Express services, within two years of the transitway's opening. The actual bus capacity to be provided for the initial operation will exceed two times present patronage. This is due to a provision of express services to San Pedro in the midday and evening when none currently exists. Present weekday patronage (excluding Line 442) and proposed initial capacity are as follows:

Table I-1: Weekday Patronage Comparison

	<u>Present</u>	<u>Proposed Initial Seat Capacity</u>
Daily Freeway Boardings	4,200	11,000
Peak Hour/Peak Direction Boardings	530	1,060

Weekday one-way bus trips on the Harbor Freeway would also increase under the initial operating plan as follows:

Table I-2: Weekday Northbound Bus Trip Comparison

	<u>Present 1985 Schedules</u>	<u>Initial Operating Plan</u>
All Day	85	130
Peak Hour	14	23

The four bus lines that will be shortened to become feeder services, will operate at somewhat increased frequencies while still saving five A.M. and four P.M. peak buses over their present weekday requirements. Tables I-3 and I-4 display the weekday service frequencies and bus requirements of the present Harbor Express lines in contrast with the proposed initial service of the line-haul system.

Weekend bus service under the proposed Harbor line-haul plan will also operate at relatively improved levels, based on an assumed doubling of current weekend patronage and provision of new service to San Pedro. Present weekend freeway patronage and proposed initial capacity are as follows:

Table I-5: Weekend Patronage Comparison

	<u>Present</u>	<u>Proposed (Seat Capacity)</u>
Saturday	1943	6900
Sunday	1446	5100

Since no express service to San Pedro currently exists on the weekends, initial policy headways, which are twice the demand headway of the other Harbor line-haul route, Line 440, have been assumed. The Saturday and Sunday one-way trips would increase from current levels as follows:

Table I-6: Weekend Northbound Bus Trip Comparison

	<u>Present 1985 Schedules</u>	<u>Proposed Initial Operating Plan</u>
Saturday	53	81
Sunday	44	55

On weekends, only two feeder lines operate (Lines 444 and 446). The proposal calls for maintaining these services at their present headways since excess capacity already exists on each line. Tables I-7 and I-8 contain weekend service frequencies and bus requirements for the present and proposed systems.

Operating Costs of Initial Plan

Two assumptions have been made in assessing the operating costs of this initial Harbor bus operation plan. First, it was assumed that the District's current local lines, which will serve the proposed Harbor Freeway Stations, will not experience large patronage increases due to the bus operation on the facility. Thus, additional operating costs would not be incurred on these lines. Eventually, some local intersecting services may experience demand sufficient to require additional service. However, effects on operating costs are expected to be insignificant during the initial years of operation.

The second operating cost assumption involves the municipal bus operators. Currently, three municipal lines, operated by Torrance and Gardena, utilize the Harbor Freeway to access the LACBD. These lines carry over 1,100 patrons each weekday. The District's cost estimate has assumed that these carriers will continue to operate their own service on the busway. If, as final decisions are made regarding operations on the busway, the municipal carriers elect not to operate into the LACBD, the District would be required to provide additional service and incur higher costs to serve these patrons. This plan has not been discussed with the municipal carriers at this time, and their opinions on this matter are unknown.

Operating costs, developed for the proposed initial Transitway operation, are compared to the present Harbor Freeway line's cost estimate. All costs are in 1984 dollars.

Table I-9: Initial Plan Annual Operating Cost
(in millions of dollars)

	<u>Present Harbor Express Lines</u>	<u>Proposed Line Haul Plan</u>	
		Total (Local Feeder/Line Haul)*	
Daily	6.20	9.50	(4.30/5.20)
Weekend	1.09	1.45	(.62/.83)
Total	7.29	10.95	

The overall \$3.3 million weekday operating cost increase is attributable to an increase of 45,000 operating hours per year and one million revenue miles. Weekend service would increase by 6,500 annual operating hours and 60,000 miles.

* Local feeder = local portions of existing Lines 443, 444, 446, and 448, and Line Haul = proposed trunkline services Lines 440 and 441.

Capital Costs of Initial Plan

There will be a need for some additional equipment to operate the proposed initial Harbor line-haul service. Assuming 40 foot conventional buses, the present and proposed plan's vehicle requirements are as follows:

Table I-10: Present and Proposed Systems Bus Requirements - Initial Harbor Operation

	<u>Present Bus Requirements</u>	<u>Proposed Bus Requirements</u>
Buses - in service	37	60
Buses - including spares	45	72

Thus, 27 additional buses would be needed over present Harbor Express requirements. Using the estimated 1984 coach bus cost (from the Twelve-Year Bus Procurement Plan, FY 1986-97) of \$200,969 yields a total capital equipment cost of \$5.43 million. Assuming a standard twelve-year life span, the annual cost would then be \$0.45 million (in 1984 dollars).

The initial operating plan calls for the Harbor Transitway express and local feeder lines to be primarily housed at South Bay Division 18. This is the most efficient location from which to operate these services. The District could experience a reduction in fleet size during the next twelve years, in which case, these necessary additional vehicles could probably be accommodated within the existing facility. Therefore, it appears that added capital costs to build a new division may not be necessary during the initial years of operation. This, of course, will be subject to further review when future effects of funding and fare increases are taken into consideration.

Summary and Comments

In summary, the initial operating plan described above, would be expected to increase the District cost of operation by about \$4.1 million annually. However, consideration of the expected increased revenue from the farebox will partially mitigate these additional operating costs. The actual subsidy that the District will require will be substantially less, but will depend on the fare structure in effect at that time.

At this point, it is important to emphasize that the proposed bus operation on the Harbor Transitway raises the issue of identifying committed funding sources to subsidize it. During the initial operating plan, patronage growth would occur slowly over the first two years until the designed capacity is reached. Therefore, farebox revenues would offset a greater portion of the operating cost the second year than the first. Also, in the future as the demand for transit on the facility continues to grow, the miles and hours operated will increase. Required subsidies would also be expected to increase, plus additional costs would be incurred for additional equipment and, eventually, construction of an operating division. The District would not be able to operate any increased service on the Harbor Transitway without obtaining a satisfactory funding commitment(s).

HARBOR OPERATING PLAN INITIAL WEEKDAY SERVICE FREQUENCIES

<u>Line</u>	<u>Present</u>	<u>Proposed</u>
	<u>Headway</u>	<u>Headway</u>
	A.M./BASE/P.M.	A.M./BASE/P.M.
443	30/0/45	20/0/20
444	25/45/25	15/30/15
445	25/0/25	N.A. (See 441)
446	12/25/15	8/15/12
448	25/0/30	20/0/20
440	N.A.	4/20/4
441	N.A.	9/30/8

Evening service on Lines 440 and 441 has also been extended and increased in frequency over present freeway service levels.



HARBOR OPERATING PLAN
INITIAL WEEKDAY SERVICE
FREQUENCIES

TABLE I-3

COMPARISON OF PRESENT AND PROPOSED WEEKDAY BUS REQUIREMENTS

LINE	T I M E O F D A Y					
	A.M.		BASE		P.M.	
	Present (Proposed)		Present (Proposed)		Present (Proposed)	
443	5	(4)	0	(0)	4	(4)
444	9	(8)	5	(4)	9	(8)
445	4	(0)	0	(0)	4	(0)
446	16	(13)	8	(9)	14	(11)
448	3	(3)	0	(0)	3	(3)
440	N.A.	(19)	N.A.	(5)	N.A.	(22)
441	<u>N.A.</u>	<u>(12)</u>	<u>N.A.</u>	<u>(4)</u>	<u>N.A.</u>	<u>(12)</u>
Total	37	(59)	13	(22)	34	(60)

Note: Without Interlining.



COMPARISON OF PRESENT
AND PROPOSED WEEKDAY
BUS REQUIREMENTS

TABLE I-4

HARBOR OPERATING PLAN INITIAL WEEKEND SERVICE FREQUENCIES

<u>Line</u>	<u>Present Base</u>		<u>Proposed Base</u>	
	<u>Period Headway</u>		<u>Period Headway</u>	
	<u>Sat.</u>	<u>Sun.</u>	<u>Sat.</u>	<u>Sun.</u>
440	--	--	15	20
441	--	--	30	40
444	40	60	40	60
446	30	30	30	30



HARBOR OPERATING PLAN
 INITIAL WEEKEND
 SERVICE FREQUENCIES

TABLE I-7

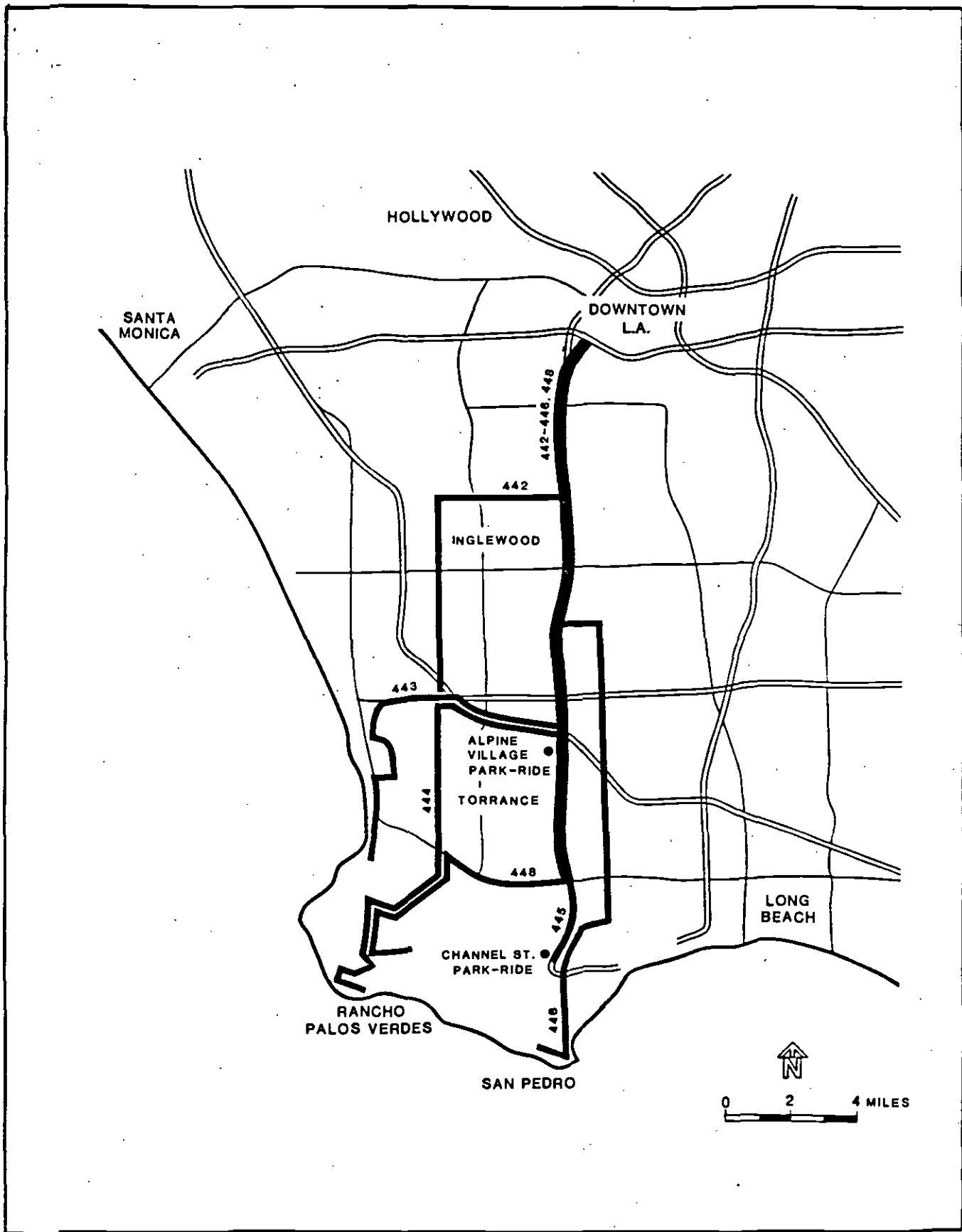
COMPARISON OF PRESENT AND PROPOSED WEEKEND BUS REQUIREMENTS

<u>Line</u>	<u>S a t u r d a y</u>		<u>S u n d a y</u>	
	Present	(Proposed)	Present	(Proposed)
440	0	(6)	0	(5)
441	0	(4)	0	(3)
444	6	(4)	3	(2)
446	<u>7</u>	<u>(4)</u>	<u>8</u>	<u>(4)</u>
Totals	13	(18)	11	(14)



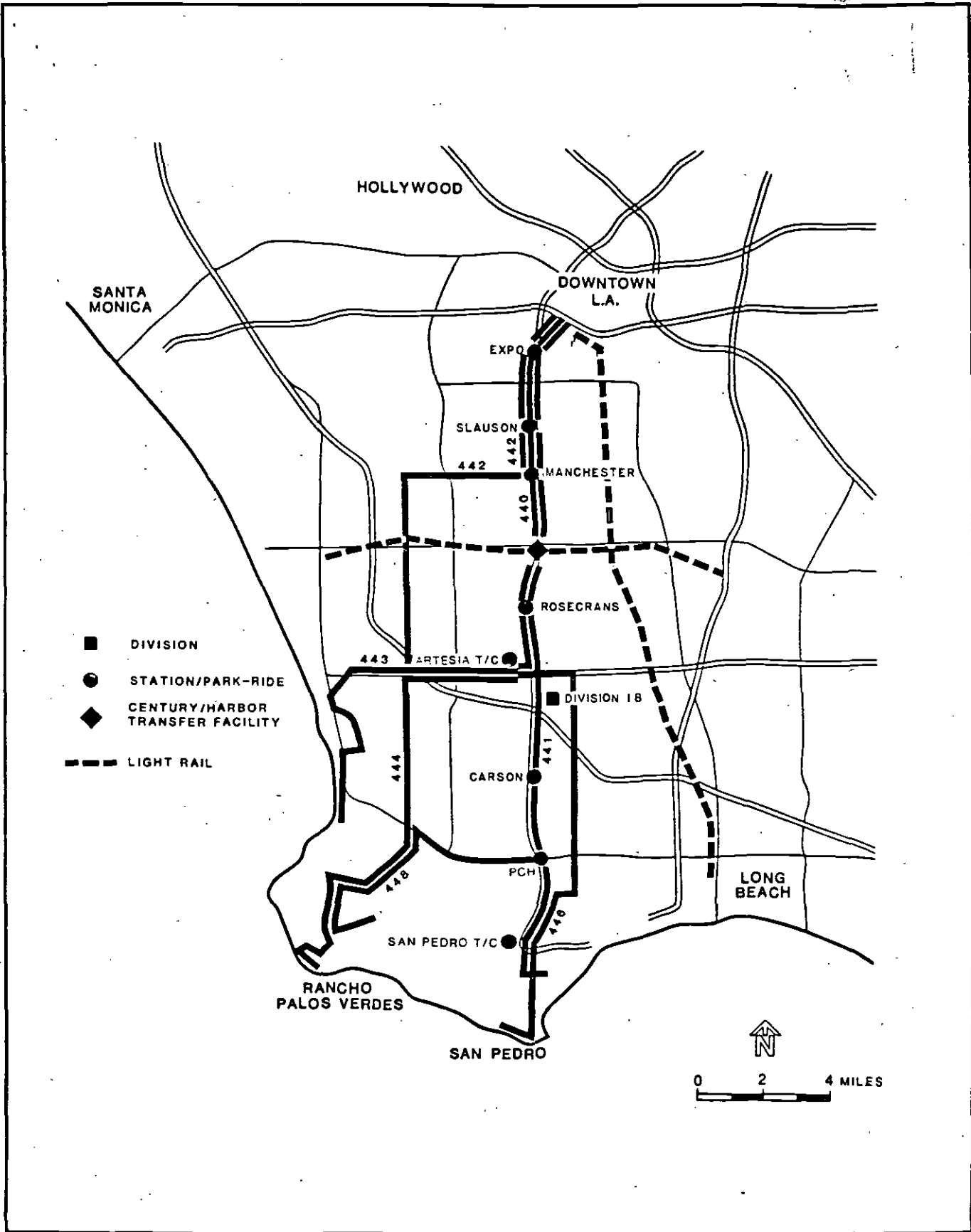
COMPARISON OF PRESENT
AND PROPOSED WEEKEND
BUS REQUIREMENTS

TABLE I-8



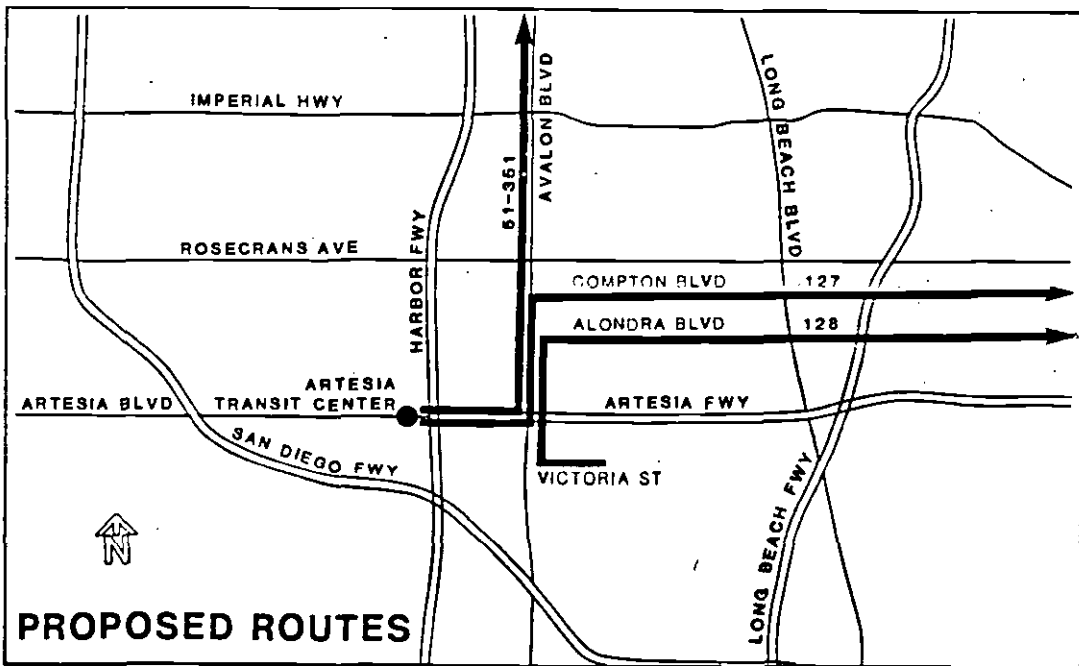
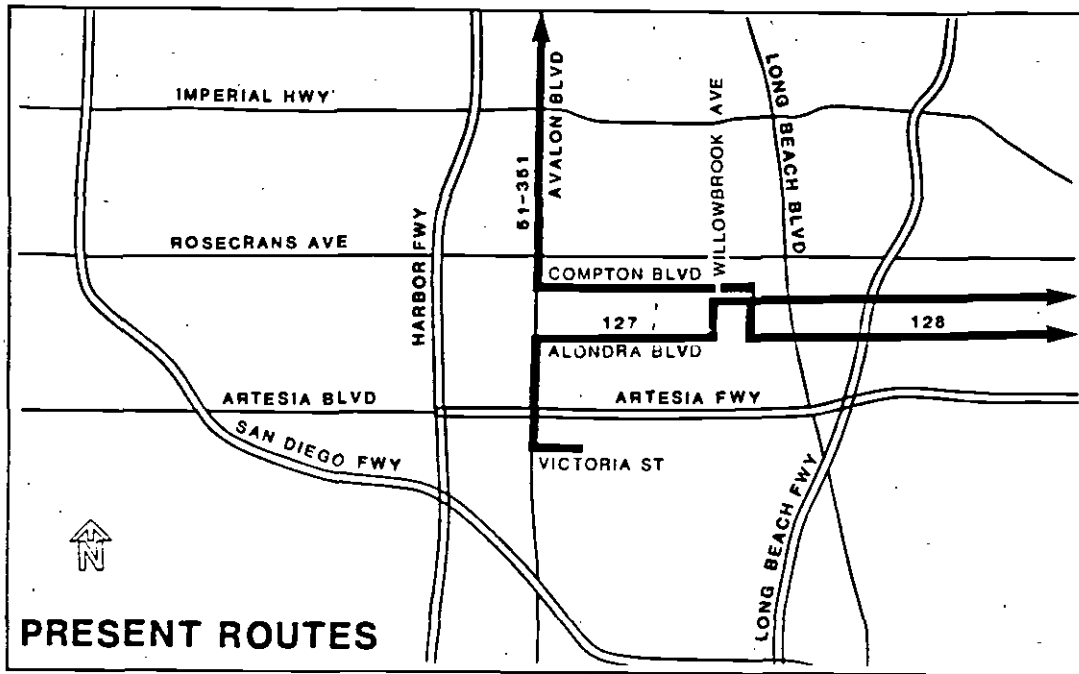
**PRESENT HARBOR CORRIDOR
EXPRESS SERVICE**

FIGURE I-1




**PROPOSED HARBOR TRANSITWAY
OPERATING PLAN**

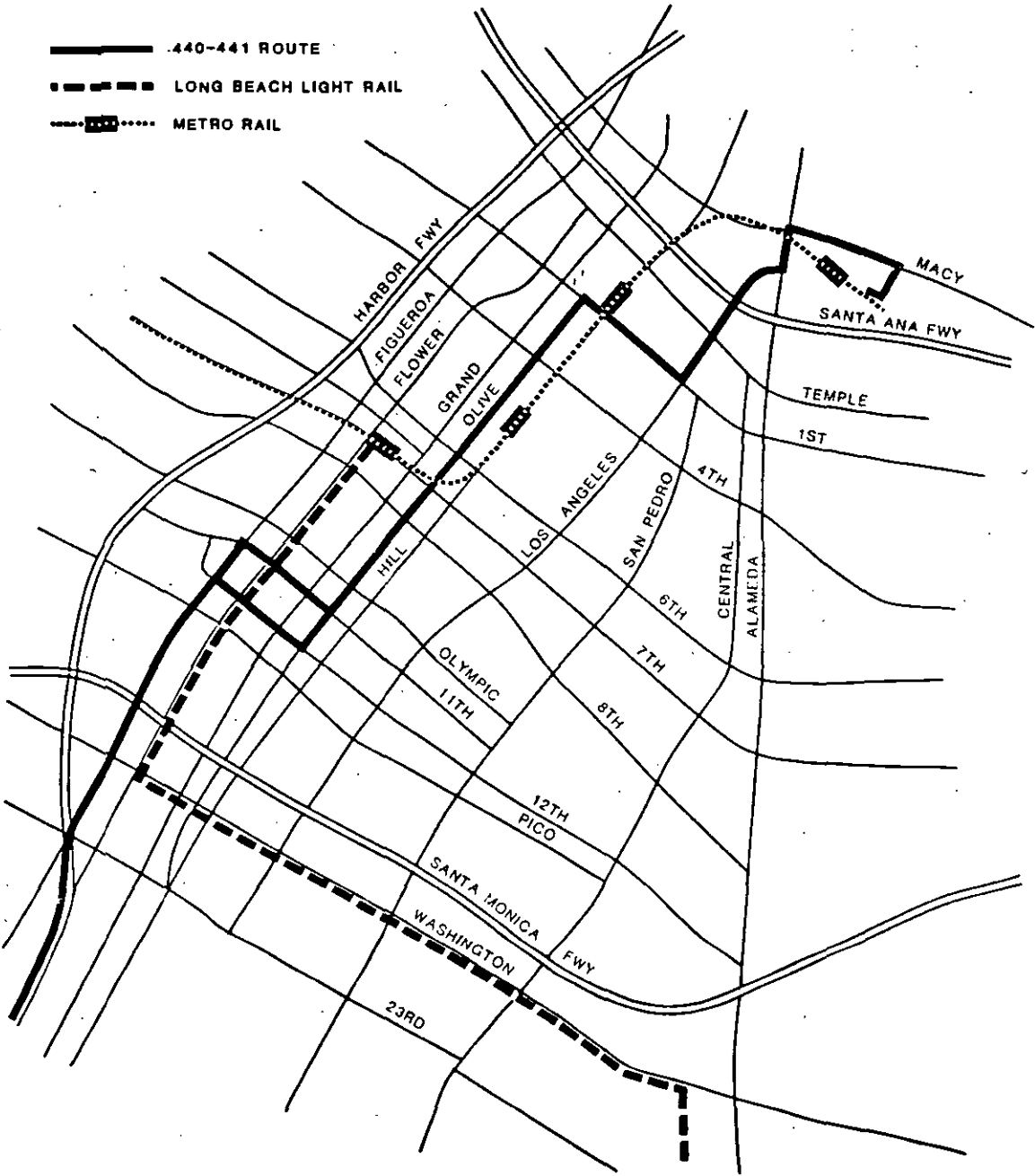
FIGURE I-2



**PROPOSED REROUTE OF LINES
127, 128 & 51/351 TO
SERVE ARTESIA TRANSIT CENTER**

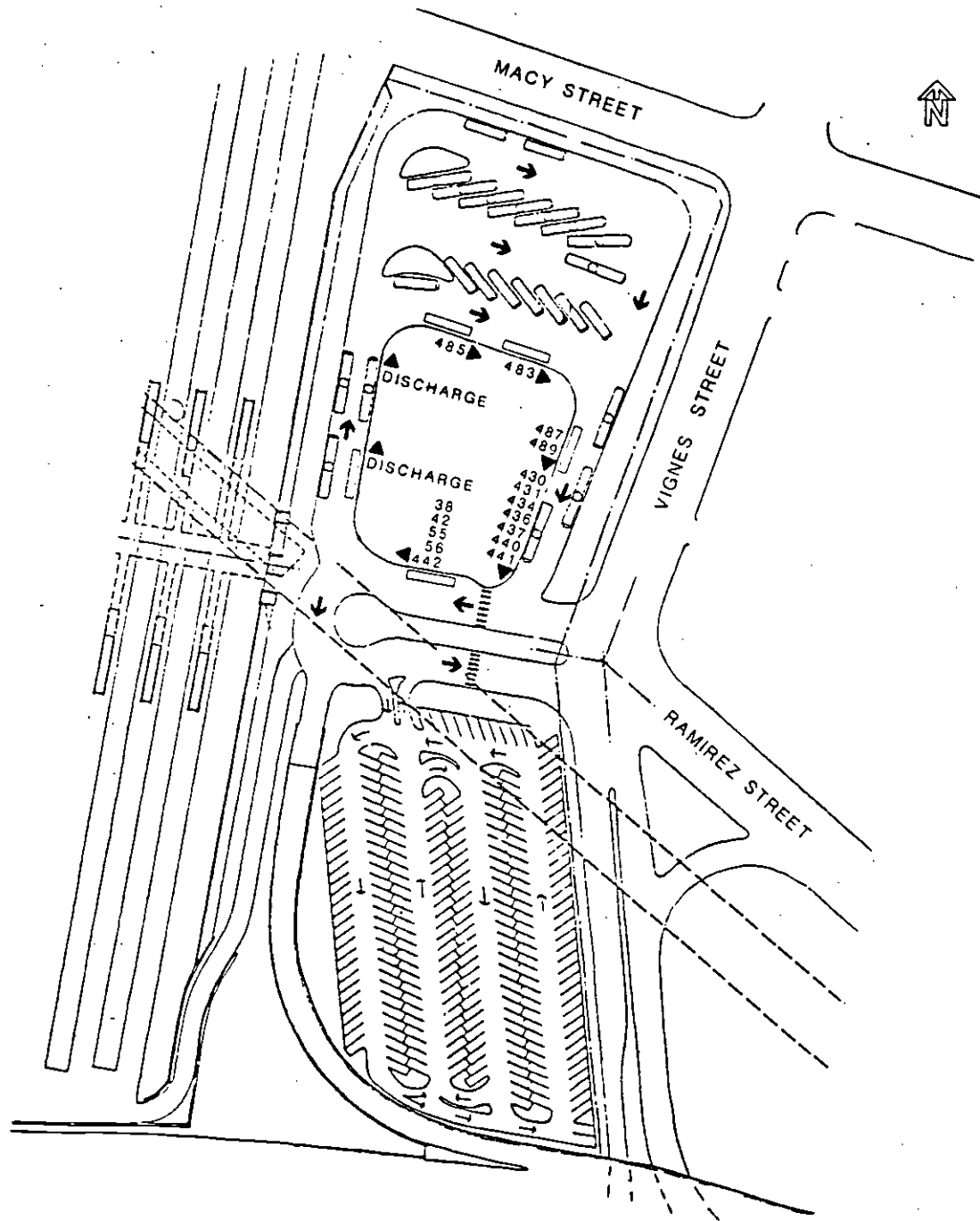
FIGURE I-3

-  .440-441 ROUTE
-  LONG BEACH LIGHT RAIL
-  METRO RAIL



**PROPOSED DOWNTOWN
DISTRIBUTION**

FIGURE I-4



**UNION STATION
TERMINAL OPERATIONS**

FIGURE I-5

Appendix A

DIURNAL ANALYSIS - HARBOR FREEWAY 1984 PATRONAGE

N o r t h b o u n d

<u>Time</u>	<u>Line</u>					<u>Total</u>
	<u>443</u>	<u>444</u>	<u>445</u>	<u>446</u>	<u>448</u>	
5-6 _A	0	0	0	25	0	25
6-7 _A	69	94	77	113	0	353
7-8 _A	59	59	79	139	85	421
8-9 _A	21	47	22	80	34	204
5-9 _A	149	200	178	357	119	1,003
9 _A -3 _P	0	129	0	367	0	496
3-4 _P	6	46	0	113	0	165
4-5 _P	11	47	0	128	0	186
5-6 _P	0	70	0	81	0	151
6-7 _P	0	42	0	61	0	103
3-7 _P	17	205	0	383	0	605
7-12 _A	0	31	0	134	0	165
TOTAL						2,269

DIURNAL ANALYSIS - HARBOR FREEWAY 1984 PATRONAGE

S o u t h b o u n d

<u>Time</u>	<u>Line</u>					<u>Total</u>
	<u>443</u>	<u>444</u>	<u>445</u>	<u>446</u>	<u>448</u>	
5-6 _A	0	13	0	36	0	49
6-7 _A	0	57	0	124	0	181
7-8 _A	11	81	0	89	0	181
8-9 _A	2	72	0	53	0	127
5-9 _A	13	223	0	302	0	538
9 _A -3 _P	0	143	0	264	0	407
3-4 _P	0	62	0	116	0	178
4-5 _P	34	47	24	94	69	268
5-6 _P	41	125	113	115	31	425
6-7 _P	24	25	25	73	0	147
3-7 _P	99	259	162	398	100	1,018
7-12 _A	0	17	0	134	0	151
TOTAL						2,114

Note: The following are the dates of the checks used to produce this analysis:

<u>Line</u>	<u>Date</u>
443	8/28/84
444	8/28/84
445	12/06/84
446	12/14/84
448	8/28/84

PART II: THE BACKGROUND BUS SYSTEM FOR THE CENTURY LIGHT RAIL LINE

The following report describes the proposed feeder bus system for the Century Light Rail Line. The report includes the estimated additional cost to the District of the feeder bus operation, but operating costs for the rail line, itself, are not covered.

Background

The Century Light Rail Line will be located in the median of the planned Century Freeway (I-105). The freeway and rail line will extend eastward from Aviation Boulevard and Imperial Highway, near LAX, about 16 miles to the San Gabriel Freeway (I-605) just south of Imperial Highway in Norwalk. Nine stations with parking facilities are proposed for this rail alignment. They are located at Aviation Boulevard, Hawthorne Boulevard, Crenshaw Boulevard, Vermont Avenue, Avalon Boulevard, Willowbrook Avenue and Imperial Highway (shared with the Long Beach Light Rail Line), Long Beach Boulevard, Lakewood Boulevard, and Studebaker Road (Norwalk). In addition, there will be a transfer facility at the Harbor Freeway Busway (I-110). The system described above has received the necessary funding approvals and is planned to be built by about 1993.

In addition to the freeway alignment, two extensions are under consideration. One would run south from the Aviation station along part of the proposed Coast Light Rail Line alignment to a station at Rosecrans Boulevard or Compton Boulevard. This extension is proposed in order to better serve the El Segundo employment center and provide necessary access to a light rail maintenance facility and storage yard that is planned in the near vicinity of the extension. The second extension of the Century Light Rail would run north from the Aviation Station to a terminal near the LAX transit center. This extension will allow for a more operationally efficient bus/rail interface. Neither of these extensions were included in the original Century Freeway Transitway plans, so they will require special alignment and environmental impact studies before they can be considered for funding. Due to the time required for these studies, the extensions may not be built as soon as the primary freeway alignment. However, the Rosecrans extension is expected to receive a high priority for development, due to its capacity to reduce Century Light Rail deadhead operating costs by accessing the El Segundo rail yard and its capacity to provide direct access into the El Segundo employment area.

This report will address the bus operating plans for the Century Light Rail Line alignment with and without extensions, since the extensions may significantly impact background bus operation when built.

Objective of the Bus Interface Proposal

There are three objectives in selecting the bus lines to serve the Century stations. The first objective is to provide regional bus transit connectivity with the rail line. To accomplish this all current north-south bus lines that pass in the vicinity of a Century station site, will serve the station. The east-west local line, Line 120, which serves a similar corridor as the Century, will serve selected Century stations. In

addition to these existing bus lines, a new bus line, Line 468, is proposed to operate from the Fullerton Park/Ride lot to the eastern terminal of the Century Line in Norwalk. This proposed line would provide an important link with the heavily traveled Santa Ana Corridor. The proposed route for this line is shown in Figure II-1.

The second objective is to provide a level of bus service at the Century stations consistent with expected patronage. Due to passengers transferring at the Century Light Rail stations, some increase in patronage on these background bus lines is expected. However, excess capacity already exists on the background buses in the vicinity of the Century stations, because the station locations are not near the peak patronage points of these lines. Therefore, no increase in the present service frequencies of the background bus lines are anticipated.

The last objective of the Century background bus system is to enhance Los Angeles' transit system by developing transit centers at Century Line station sites, where appropriate. Three stations on the initial Century Line (the freeway alignment) are planned to operate as transit centers, Aviation, Willowbrook/Imperial, and Studebaker Road (Norwalk).

The Proposed Background Bus System

The proposed background bus system for the initial Century Line is shown on the map in Figure II-2. The system consists of 29 existing local lines and the proposed new Line 468 (Fullerton to Norwalk). Table II-1 lists the bus lines by the stations they serve and Table II-2 lists these selected background bus lines in line order.

As can be seen from these tables and the map, the three stations designated as potential transit centers require a larger number of bus routes to be modified in order to serve them. Each of the two terminal stations, Aviation and Norwalk, are logical sites for transit centers. The eastern terminal, Norwalk Station, which is situated at a freeway junction, must connect to the existing local bus lines so that passengers can access the rail line by other than automobile.

The Aviation Station, as discussed above, is considered the interim western terminal. However, the time frame for the development of the proposed extensions is not set and there may be some time between completion of the initial Century Rail Line to Aviation Station and the building of the Rosecrans and LAX extensions. Meanwhile, passenger connections to the coastal corridor, LAX, and the El Segundo employment center must be provided. Therefore, during this interim period, bus lines that serve this area, most of which currently terminate at LAX Transit Center, will have their routes modified to serve Aviation Station. When the Rosecrans extension is built, three of these lines can more economically serve one of its proposed stations, El Segundo or Rosecrans, than the Aviation Station. The approximate alignment of the Rosecrans extension and the affected bus lines, Lines 225, 226, and 439, are shown in Figure II-3. Eventually, when both the Rosecrans and LAX extension are built, the remaining route modifications required to serve Aviation Station may be significantly reduced or no longer necessary. These two Century Rail extensions and their proposed background bus service are shown in Figure II-4.

The level of service to be provided at each station is the same as the existing service frequencies, as explained above. A breakdown of the number of trips per day and per peak hour at each station on the initial alignment (without extensions) is given in Table II-3. In addition to the District's background bus service, some municipal bus lines will also be likely to serve Century Line stations. Gardena's Line 2 and Norwalk's Blue Line (Line 2) already pass future station sites, Vermont and Norwalk stations, respectively. In addition, these and other municipal carriers may decide to create or alter routes to serve the Century Rail Line.

Operating Cost Estimate

As proposed, nineteen bus routes will need to be modified to serve the initial Century Rail Line. Ten of these bus line reroutes are associated with the Aviation Station alone. As discussed above, when both the Rosecrans and LAX extensions are completed, all ten of these lines could be restored to their present operating routes. This would be dependent, to some extent, on the frequency of Century Line service at the LAX station relative to Aviation Station and the patronage patterns that will have been established at that time.

The additional operating costs for the total 19 route changes and the proposed new Line 468 were calculated based on the additional miles and hours to be operated and the additional equipment required to serve each station. The costs of the bus service changes to serve Willowbrook/Imperial Station were actually divided in half since the Century and Long Beach Light Rail lines share the station. Additionally, a savings, attributable to reduced service frequencies on Lines 55 and 56, is credited entirely to the Long Beach Line and is not reflected in these Century background bus cost calculations.

Since not all rail station designs have been completed, some minor route alterations that will be required to actually interface at the station have not been included in the calculations. However, the effects of these changes are expected to be relatively minor. The following table shows the estimated increase in the District's weekday bus operations resulting from the proposed Century background bus service.

Table II-4: Increase in Daily Bus Operating Statistics

	<u>Miles</u>	<u>Hours</u>	<u>Buses Operated</u>
Reroutes	1,713	93.9	7
New Line	856	44.4	4
Total	2,569	138.3	11

Table II-5 presents the operating cost summary for the background bus lines. The annual cost incurred, including weekend service, is expected to be about \$2.66 million. The detours to the Aviation Station alone represent over \$1.25 million. As discussed above, a significant reduction in the cost of Aviation Station detours could eventually occur when the Century Line extension to LAX is built.

<u>Station</u>	<u>Line</u>	<u>Route Modification Required</u> ¹
Aviation	42 Los Angeles-Westchester-Redondo Beach	Yes
	111 LAX-Florence Avenue-Leffingwell Road	Yes
	112 LAX-Florence Avenue-Otis Street	Yes
	117 Century Boulevard	Yes
	120 Imperial Highway	No
	220 Robertson Boulevard-Culver Boulevard-LAX	Yes
	225 Aviation Boulevard-Palos Verdes Peninsula	Yes
	226 Aviation Boulevard-Palos Verdes Drive West	Yes
	232 Long Beach-LAX	Yes
	439 Los Angeles-Redondo Beach Freeway Express	Yes
560 San Diego Freeway Express	Yes	
Hawthorne	40 Hawthorne-Union Station-L.A. County Jail	No
	119 108th Street-Fernwood Avenue	Yes ²
	126 Yukon Avenue-Manhattan Beach Boulevard	Yes ²
	442 Centinela Valley Freeway Express	No
Crenshaw	207 Western Avenue	Yes
	210 Vine Street-Crenshaw Boulevard	No
Vermont	204 Vermont Avenue	No
Avalon	51 West 7th Street-San Pedro Street-Avalon Boulevard-Compton Boulevard	No
	351 San Pedro Street-Avalon Boulevard Limited	No

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**BUS LINES SERVING THE CENTURY
LIGHT RAIL LINE - BY STATION**

TABLE II-1

<u>Station</u>	<u>Line</u>	<u>Route Modification Required</u> ¹	
Willowbrook/ Imperial	55	Wilmington-Compton-Downtown Los Angeles	Yes
	56	Carson-Wilmington Avenue-Los Angeles	Yes
	120	Imperial Highway	Yes
	124	El Segundo Boulevard-Santa Fe Avenue	Yes
	254	120th Street-Gage Avenue	Yes
	576	South Los Angeles-Pacific Palisades	Yes
Long Beach	60	Long Beach Boulevard-Santa Fe Avenue	No
	119	108th Street-Fernwood Avenue	No
Lakewood	266	Lakewood Boulevard-Rosemead Boulevard	No
Norwalk Transit Center	120	Imperial Highway	Yes
	125	Rosecrans Avenue	Yes
	270	El Monte-Cerritos	Yes
	468	Proposed Fullerton Park/Ride Express	--

¹Route modification, as used here, refers to a significant route extension or a rerouting of a short segment of the existing line in order to access a rail station. Not all station designs have as yet been completed, so a line that presently passes one of these station locations is assumed to serve the station. However, station design will usually still require some minor route alteration to reach the bus drop off area of the station.

²The modification of Lines 119 and 126 (which operate on a combined schedule) requires only a change of layover terminal and renumbering of one line segment of Line 119 to 126.



**BUS LINES SERVING THE CENTURY
LIGHT RAIL LINE - BY STATION
(CONT'D)**

TABLE II-1

<u>Line</u>	<u>Station(s)</u>	<u>Route Modification Required¹</u>
40	Hawthorne-Union Station- L.A. County Jail	Hawthorne No
42	Los Angeles-Westchester- Redondo Beach	Aviation Yes
51	West 7th Street-San Pedro Street- Avalon Boulevard-Compton Boulevard	Avalon No
55	Wilmington-Compton- Downtown L.A.	Willowbrook/Imperial Yes
56	Carson-Wilmington Avenue- Los Angeles	Willowbrook/Imperial Yes
60	Long Beach Boulevard- Santa Fe Avenue	Long Beach No
111	LAX-Florence Avenue- Leffingwell Road	Aviation Yes
112	LAX-Florence Avenue- Otis Street	Aviation Yes
117	Century Boulevard	Aviation Yes
119	108th Street-Fernwood Avenue	Hawthorne Long Beach Yes ² No
120	Imperial Highway	Aviation Willowbrook/Imperial Norwalk Transit Center No Yes Yes
124	E1 Segundo Boulevard- Santa Fe Avenue	Willowbrook/Imperial Yes
125	Rosecrans Avenue	Norwalk Transit Center Yes
126	Yukon Avenue-Manhattan Beach	Hawthorne Yes ²
204	Vermont Avenue	Vermont No
207	Western Avenue	Crenshaw Yes
210	Vine Street-Crenshaw Boulevard	Crenshaw No
220	Robertson Boulevard- Culver Boulevard	Aviation Yes

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BUS LINES SERVING THE CENTURY
LIGHT RAIL LINE - BY LINE NUMBER

TABLE II-2

<u>Line</u>		<u>Station(s)</u>	<u>Route Modification Required¹</u>
225	Aviation Boulevard- Palos Verdes Peninsula	Aviation	Yes
226	Aviation Boulevard- Palos Verdes Drive West	Aviation	Yes
232	Long Beach-LAX	Aviation	Yes
254	120th Street-Gage Avenue	Willowbrook/Imperial	Yes
266	Lakewood Boulevard- Rosemead Boulevard	Lakewood	No
270	El Monte-Cerritos	Norwalk Transit Center	Yes
351	San Pedro Street- Avalon Boulevard-Limited	Avalon	No
439	Los Angeles-Redondo Beach- Freeway Express	Aviation	Yes
442	Centinela Valley Freeway Express	Hawthorne	No
468	Proposed Fullerton Park/Ride Express	Norwalk Transit Center	--
560	San Diego Freeway Express	Aviation	Yes
576	South Los Angeles- Pacific Palisades	Willowbrook/Imperial	Yes

¹See notes on Table II-1: Bus Lines Serving The Century Light Rail Line - By Station.

²See notes on Table II-1: Bus Lines Serving The Century Light Rail Line - By Station.



**BUS LINES SERVING THE CENTURY
LIGHT RAIL LINE - BY LINE NUMBER
(CONT'D)**

TABLE II-2

<u>Station</u>	<u>Line</u>	<u>B u s T r i p s P e r D i r e c t i o n</u>	
		<u>Peak Hour</u>	<u>Total</u>
<u>Aviation</u>	42	3	30
	111-112	3	25
	117	5	70
	120	5	55
	220	1	15
	225-226	3	25
	232	3	45
	439	2	15
	560	2	25
Total		27	305

<u>Hawthorne</u>	40	8	100
	119	2	20
	126	2	15
	442	5	10
Total		17	1

<u>Crenshaw</u>	207	14	140
	210	11	100
Total		25	240

<u>Vermont</u>	204	17	130

<u>Avalon</u>	51-351	9	75

<u>Willowbrook/ Imperial</u>	55	4	50
	56	3	40
	120	5	60
	124	2	20
	254	2	25
	576	3	5
Total		19	200



**WEEKDAY BUS SERVICE FREQUENCIES
AT CENTURY STATIONS**

TABLE II-3

<u>Station</u>	<u>Line</u>	<u>Bus Trips Per Direction</u>	
		<u>Peak Hour</u>	<u>Total</u>
<u>Long Beach</u>	60	7	65
	119	2	15
<u>Total</u>		9	80

<u>Lakewood</u>	266	2	25

<u>Norwalk</u>	120	2	25
	125	4	35
	270	1	15
	468 (proposed)	5	45
<u>Total</u>		12	120



WEEKDAY BUS SERVICE FREQUENCIES
AT CENTURY STATIONS (CONT'D)

TABLE II-3

<u>Station</u>	<u>Line Modifications</u>	<u>New Lines</u>	<u>Total</u>
Aviation	1,253	0	1,253
Hawthorne	0	0	0
Crenshaw	414	0	414
Vermont	0	0	0
Avalon	0	0	0
Willowbrook/Imperial ¹	10	0	10
Long Beach	0	0	0
Lakewood	0	0	0
Norwalk	84	894	978
Total	1,761	894	2,655

¹A cost saving for two lines serving Willowbrook/Imperial was omitted, since the savings is attributed solely to the Long Beach Light Rail Line. The remaining costs for detours to this station were divided equally between the Century and Long Beach lines.



CENTURY BACKGROUND BUS
ANNUAL OPERATING COST SUMMARY
(IN THOUSANDS OF 1984 DOLLARS)

TABLE II-5

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FIGURE II-1

PROPOSED LINE 468 FULLERTON PARK/RIDE TO CENTURY NORWALK STATION

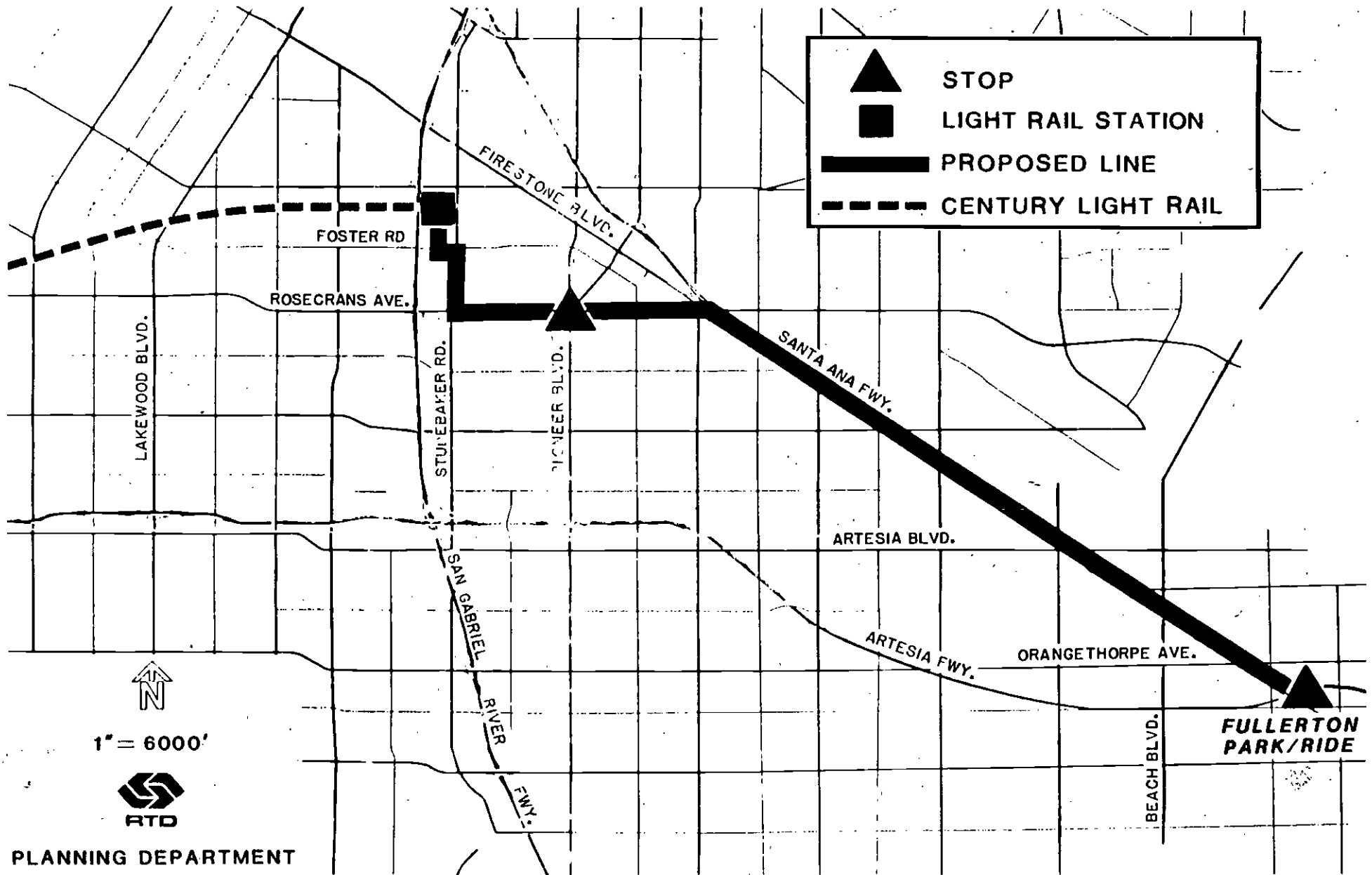
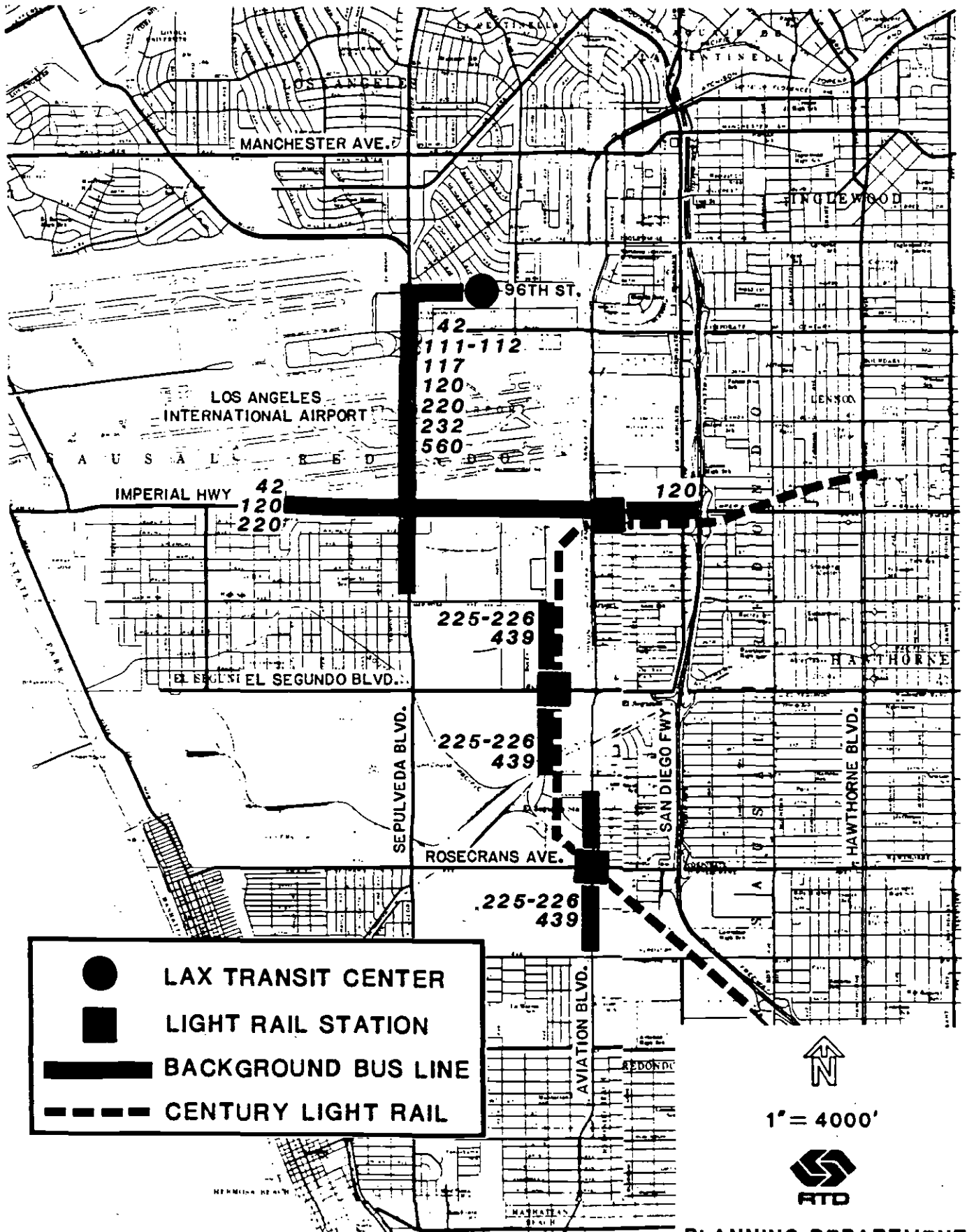



FIGURE II-3

CENTURY LIGHT RAIL - ROSECRANS EXTENSION



	LAX TRANSIT CENTER
	LIGHT RAIL STATION
	BACKGROUND BUS LINE
	CENTURY LIGHT RAIL



1" = 4000'



PLANNING DEPARTMENT

FIGURE II-4

CENTURY LIGHT RAIL ROSECRANS & LAX EXTENSIONS

