VEHICLE REQUIREMENTS FOR THE CENTURY LRT LINE

Prepared for

Los Angeles County Transportation Commission

by Manuel Padron and George Krambles

February 1986

VEHICLE REQUIREMENTS FOR THE CENTURY LRT LINE

A. Introduction

This report documents estimates of vehicle requirements for the Century Line under three scenarios: (1) for 1993 with the Century Line operating from Norwalk to Aviation; (2) for 1993 with the Century Line extended to Compton; and (3) for 2000 with the Century Line to Compton.

B. Ridership Forecasts

Scenarios (1) and (2) were based on patronage forecasts provided by the SCAG and LACTC for a 1990 network consisting of the Metro Rail Starter Line, the Long Beach - Los Angeles LRT Line and the Century LRT Line from Norwalk to El Segundo.

For scenario (1) -- with the Century Line operated to Aviation -- the ridership forecasts were scaled down to account for trips with origins or destinations between Aviation and El Segundo. One-half of these trips were assumed to board or alight at Aviation via feeder buses. The remaining one-half of the trips were assumed to be made on the local bus system (or not made by transit at all), and were not assigned to the rail system. The adjusted peak line load for the Century Line was thus calculated to be 3,220 passengers.

For scenario (2) it was assumed that the peak load volume on the Century Line would be 3,622 passengers in 1993. This volume actually corresponds to the peak load obtained with the line extending to the El Segundo Station. No adjustment was made for the inclusion of two additional stations on this line: Douglas and Compton. (Ridership forecasts for scenarios (1) and (2) are the same as those used in the Operations and Maintenance Analysis: Long Beach/Los Angeles and Century LRT Lines, August 1984.)

Scenario (3) was based on patronage forecasts provided by the SCAG and LACTC for the year 2000 Interim Regional Rail System which consists of the Metro Rail Lines from Norwalk to Santa Monica and North Hollywood and LRT lines in the Long Beach to Pasadena, San Fernando Valley, Century Freeway, Coast and Harbor Freeway corridors. The peak line load for the Century Line was 4,380 passengers. (These are the same ridership forecasts as those used in the Analysis of Alternative Operating Strategies: Century LRT Line, August 1985.)

C. Travel Time Simulations

Running times for the Long Beach and Century Lines were simulated based on the maximum operable speed, line plans including number of stations and distances between stations, and acceleration and deceleration rates corresponding to vehicle specifications identified for the LB/LA car. The Century Line was assumed to operate with a maximum speed of 55 mph from Norwalk to Compton.

A train performance curve was developed based on the most recent LACTC vehicle specifications (refer to Appendix B). The maximum acceleration rate (from 0 to 20 mph) was 3.0 mphps and the average acceleration from 0 to 55 mph was 1.22 mphps. A constant deceleration rate of 3.5 mphps was used. It was assumed that no signal and street crossing delays would apply to the Century Line, which would operate in a completely grade separated alignment.

The simulated running times for the Century Line from Norwalk to Aviation and Compton were 25.3 and 31.8 minutes, respectively. The simulated running time from Norwalk to Compton was about 1.4 minutes longer than that used in the Operations and Maintenance Analysis. The average running speeds were 38.7 and 36.21 mph to Aviation and Compton, respectively. (Refer to Appendix A).

D. Operating Plans

Operating plans were developed for each of the three scenarios based on the above ridership forecasts and travel time simulations. Also, in this analysis it was assumed that the capacity of the 90-foot long LRT vehicle is 145 passengers (rather than 128 passengers for an 80-foot vehicle, as assumed in previous studies).

Tables 1A, 1B and 1C summarize the operating plans for the three scenarios. Because of the differences in LRT car capacity and travel times noted above, the operating plans differ from those of the Operatons and Maintenance

TABLE 1A. 1993 RAIL OPERATING PLAN - CENTURY LINE - NORWALK TO AVIATION

LINE	FROM	TO	RUN TIME	DIST	HEADWAY PEAK	HEADWAY BASE	HEADWAY E/L	CONSIST PEAK	CONSIST BASE	CONSIST E/L	VEHICLES PEAK	VEHICLES TOTAL	ANNUAL VEH-MI	ANNUAL TR-HRS.
4	Norwalk	Aviation	25.28	16.29	8.00	16.00	20.00	3	3	1	24	28	2.42	30.87

TABLE 1B. 1993 RAIL OPERATING PLAN - CENTURY LINE - NORWALK TO COMPTON

LINE	FROM	TO	RUN TIME	DIST	HEADWAY PEAK	HEADWAY BASE	HEADWAY E/L	CONSIST PEAK	CONSIST BASE	CONSIST E/L	VEHICLES PEAK	VEHICLES TOTAL	ANNUAL VEH-MI	ANNUAL TR-HRS.
4	Norwalk	Compton	31.76	19.17	7.25	14.50	20.00	3	3	1	30	35	2.95	39.42

TABLE 1C. 2000 RAIL OPERATING PLAN - CENTURY LINE - NORWALK TO COMPTON

LINE	FROM	TO	RUN TIME	DIST	HEADWAY PEAK	HEADWAY BASE	HEADWAY E/L	CONSIST PEAK	CONSIST BASE	CONSIST E/L	VEHICLES PEAK	VEHICLES TOTAL	ANNUAL VEH-MI	ANNUAL TR-HRS.
4	Norwalk	Compton	31.76	19.17	6.00	12.00	20.00	3	3	1	36	42	3.45	44.64

Analysis of the Long Beach/Los Angeles and Century LRT Lines, August 1984 and the Rail Line Interconnection Study, June 1985.

Three-car trains would be operated in peak periods on the Century Line in each scenario. The peak service headway would decrease from 8.0 minutes in 1993 with the Century Line operated from Norwalk to Aviation, to 7.25 minutes in 1993 from Norwalk to Compton, and to 6.0 minutes in 2000 -- again from Norwalk to Compton.

E. Vehicle Requirements

Table 2 summarizes the peak and total fleet vehicle requirements for the Century Line for the three operating scenarios. The peak vehicle requirements range from 24 to 36 and the total fleet requirements range from 28 to 42 for the three scenarios.

APPENDIX A. CENTURY LINE - NORWALK TO COMPTON: RUNNING TIMES & DISTANCES

Operating Assumptions:
(1) Max. speed=25 mph; Ave. acc.=2.94 mphps; Ave. dec.=3.5 mphps.
(2) Max. speed=30 mph; Ave. acc.=2.91 mphps; Ave. dec.=3.5 mphps.
(3) Max. speed=35 mph; Ave. acc.=2.87 mphps; Ave. dec.=3.5 mphps.
(4) Max. speed=55 mph; Ave. acc.=1.22 mphps; Ave. dec.=3.5 mphps.

STATION	MAX.SPEED (MPH)	DIST. (MILES)	CUMUL. DIST. (MILES)	RUNNING TIME (MIN)	DELAY TIME (MIN)	DWELL TIME (MIN)	ELAPSED TRAVEL (MIN)
Norwalk						0	0.00
	55	2.10		2.80	0.00		
Lakewood Blvd.			2.10			0.33	3.13
	55	4.20		5.09	0.00		
Long Beach Blvd.			6.30			0.33	8.54
	55	1.71		2.37	0.00		
Wilmington			8.01			0.33	11.24
	55	1.57		2.22	0.00		
Avalon			9.58			0.33	13.79
	55	0.87		1.45	0.00		
"arbor			10.45			0.33	15.57
	55	0.65		1.21	0.00		
vermont			11.10			0.33	17.12
	55	2.03		2.72	0.00		
Crenshaw			13.13			0.33	20.16
	55	1.58		2.23	0.00		
Hawthorne			14.71			0.33	22.72
	55	1.58		2.23	0.00		
Aviation			16.29			0.33	25.28
	55	0.95		1.54	0.00		
Mariposa			17.24			0.33	27.15
	55	0.61		1.17	0.00		
El Segundo			17.85			0.33	28.65
	55	0.66		1.22	0.00		
Douglas			18.51			0.33	30.21
	55	0.66		1.22	0.00		
Compton			19.17			0.33	31.76
				---	---	---	---
TOTALS:				27.47	0.00	4.29	31.76

Average running speed = 36.21

NOTES:
No delay time for the Century Line since all segments are grade separated.

TABLE 2. CENTURY LINE VEHICLE REQUIREMENTS

YEAR	CENTURY LINE EXTENSION	---VEHICLES--- PEAK	TOTAL
1993	Norwalk to Aviation	24	28
1993	Norwalk to Compton	30	35
2000	Norwalk to Compton	36	42

NOTES:
(1) Total fleet includes 16.7 percent spare vehicles.