

**DRAFT FOR  
INTERNAL  
REVIEW**

**Crenshaw/Prairie  
Transportation Corridor  
Preliminary Planning Study  
Task 4 Technical Memorandum  
OPERATIONS/PATRONAGE ANALYSIS**

November 30, 1993

Submitted to:

**County of Los Angeles  
Metropolitan Transportation Authority**

Submitted by:

**Korve Engineering, Inc./  
Terry A. Hayes Associates**

in association with:

**R A W Architecture  
Manuel Padron & Associates  
Bragg & Maddox  
The Planning Group**

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**CRENSHAW/PRAIRIE**  
**TRANSPORTATION CORRIDOR PRELIMINARY PLANNING STUDY**  
**TASK 4 TECHNICAL MEMORANDUM**

November 30, 1993

Submitted to:

**County of Los Angeles**  
**Metropolitan Transportation Authority**

Submitted by:

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**Terry A. Hayes Associates**

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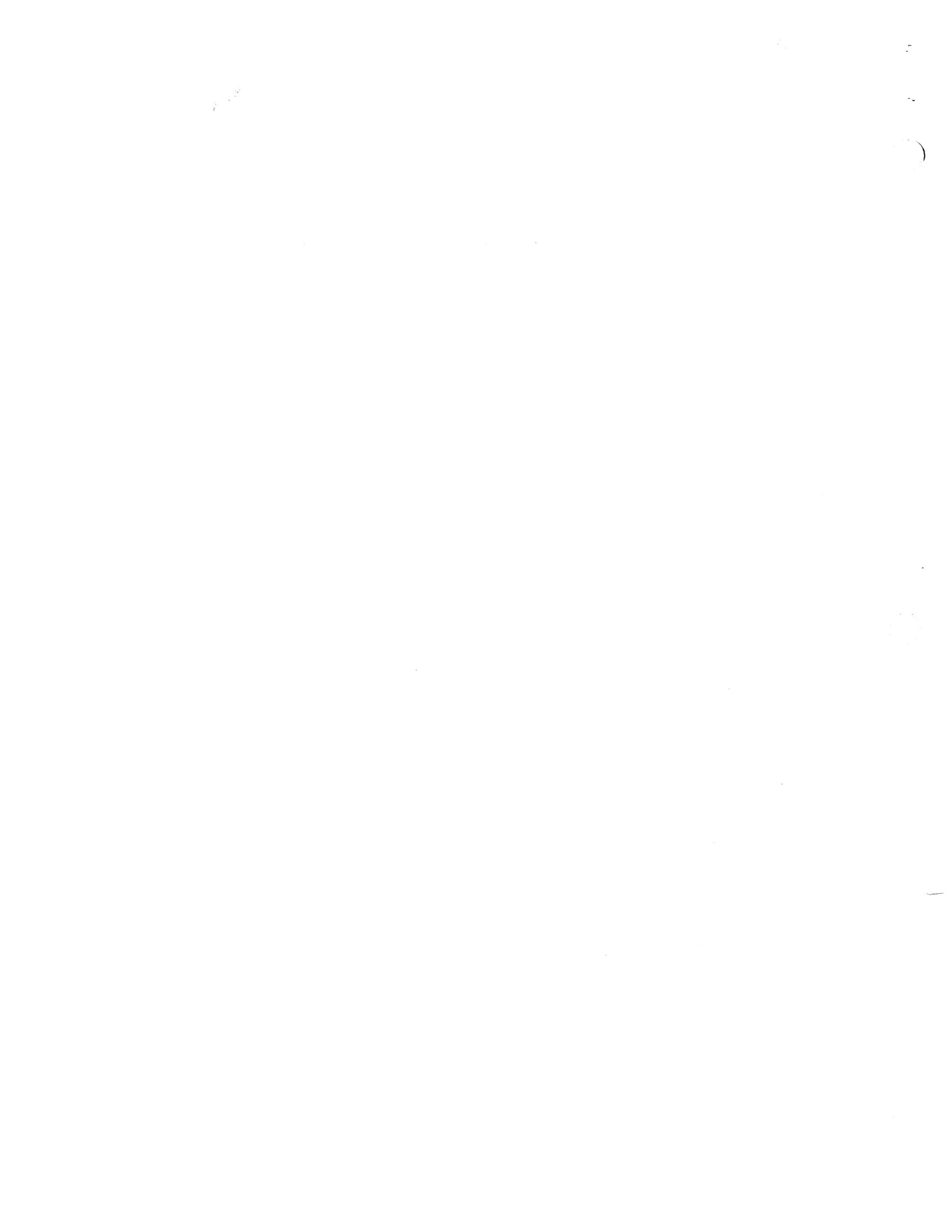
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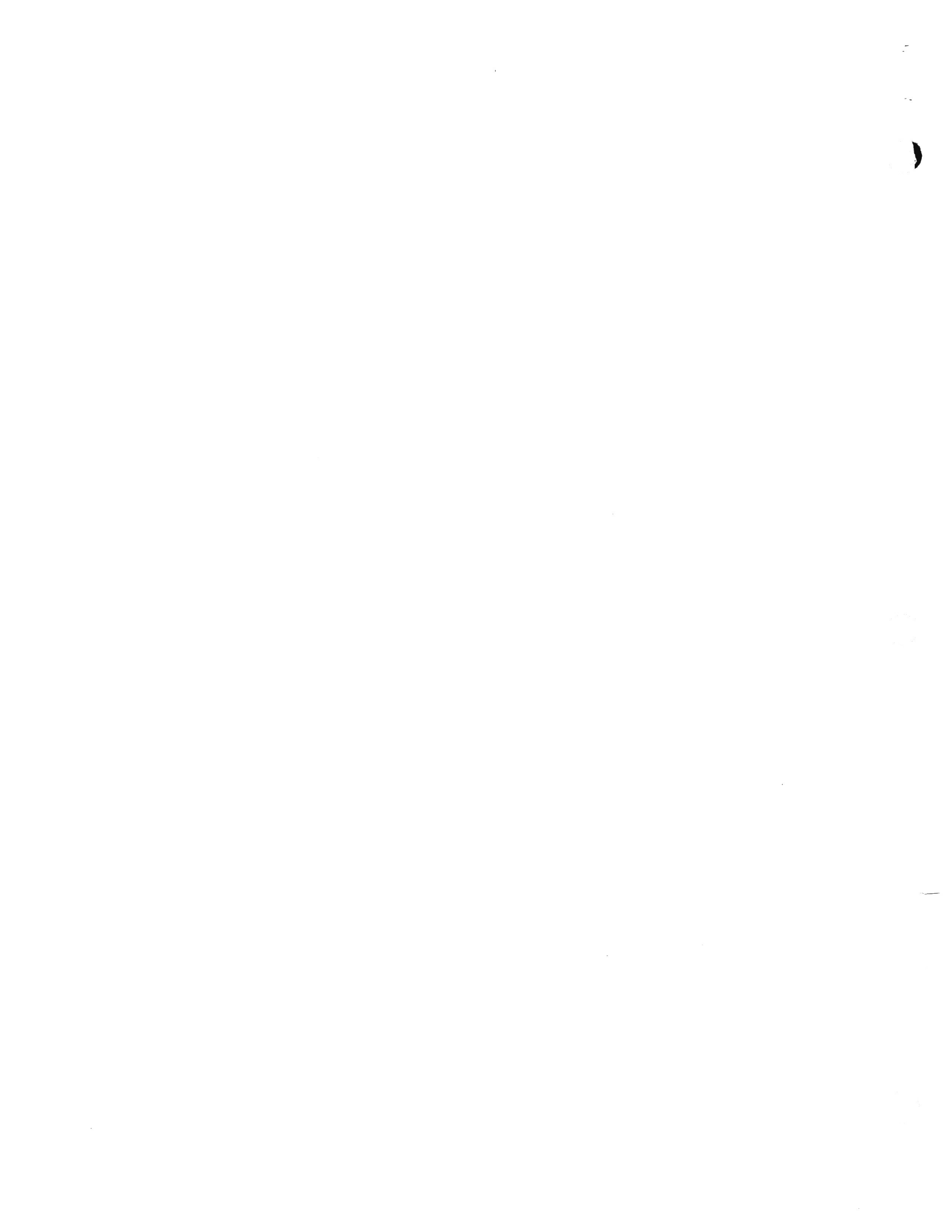
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## **1. Operations Planning**



## 1.0 Operations Planning

Travel times and operating plans were developed for use by LACMTA in patronage forecasting. The operating plans were also used later in the estimation of operating costs, and in the calculation of fleet sizes and associated capital costs.

### 1.1 Travel Times

Train running times have been estimated for each of the Crenshaw alternatives. The station-to-station run times were estimated using train performance models developed by MPA for Los Angeles. Alternatives 1 and 3 are based on existing Blue Line (light rail) vehicle performance. New cars now being procured will have higher top speeds: 65 mph vs. 55 mph. However, the combination of the proposed station spacing and curve restrictions would not allow the higher speed to be obtained. The light rail alternatives are mostly aerial; we have assumed that the trains will have full priority at the few at-grade crossings. Alternative 2 assumes use of Red Line (heavy rail) vehicles, and MPA's Red Line train performance model was used to estimate running times.

Tables 1, 2, and 3 list the station-to-station running times for each alternative. Station dwell times of 20 seconds are assumed for both modes.

The end-to-end travel time for Alternative 2 (heavy rail) is just under 21 minutes. This is slightly faster than the 24 minute time for Alternative 1 (light rail), which follows the same general alignment. This reflects fewer sharp curves, slightly higher train performance, and one less station stop with the subway alignment. These times compare to a current bus travel time along the corridor of about 50 minutes. Driving the length of the corridor would take over 30 minutes, assuming an average speed of 20 mph. The end-to-end time for Alternative 3, which follows a shorter route to LAX, is estimated to be just over 20 minutes.

Table 4 summarizes travel times from the middle of the Crenshaw corridor (Leimert Park), to several sample destinations. The travel times are shown for each of the three alternatives; current bus travel times are shown for comparison. The number of transfers required to complete each trip is also shown.

The table shows two alternate routes to downtown Los Angeles, via the proposed Blue Line (Exposition Branch) and via the Red Line. The fastest route would be to transfer to the Exposition Branch if it is built. The combination of more frequent service, fewer station stops, and shorter distance (no backtracking) offset the faster speed of the Red Line.

Alternative 2 is slightly faster than Alternative 1 to most destinations, for the reasons cited above. Alternative 3 is identical to Alternative 1 for destinations to the north, but

Crenshaw/Prairie Corridor Preliminary Planning Study  
 Run Time Estimate – Alternative 1, Aerial LRT

Table 1

<u>Station/Line Section</u>	<u>Max. Speed</u>	<u>Dist. (miles)</u> <i>(STA-STA)</i>	<u>Cumul. Dist. (miles)</u>	<u>Running Time (min.)</u>	<u>Sta. – Sta. Time incl. Dwell</u>	<u>Elapsed Run Time (min.)</u>
<b>PICO/SAN VICENTE (Red Line)</b>			<b>0.00</b>			<b>0.0</b>
	45	0.47		0.89		
curve Venice to Crenshaw	25	0.15	0.47	0.38		
			0.63			
	45	0.49		0.92		
<b>CRENSHAW/WASHINGTON</b>		<b>1.12</b>	<b>1.12</b>		<b>2.53</b>	<b>2.5</b>
	35	0.24		0.57		
			1.35			
curve @ I-10	25	0.23		0.57		
			1.58			
	55	0.81		1.30		
<b>CRENSHAW/EXPOSITION (Blue Line)</b>		<b>1.28</b>	<b>2.40</b>		<b>2.77</b>	<b>5.3</b>
curves	45	0.76		1.42		
<b>CRENSHAW/KING</b>			<b>3.15</b>		<b>1.75</b>	<b>7.1</b>
curves, Leimert Park	35	0.19		0.47		
			3.34			
	45	0.44		0.79		
<b>CRENSHAW/VERNON</b>		<b>0.63</b>	<b>3.78</b>		<b>1.60</b>	<b>8.7</b>
	55	0.97		1.61		
<b>CRENSHAW/SLAUSON</b>			<b>4.74</b>		<b>1.94</b>	<b>10.6</b>
	45	0.70		1.19		
			5.45			
curve Crenshaw to railroad	35	0.11		0.20		
			5.56			
	45	0.28		0.58		
<b>WEST/FLORENCE</b>		<b>1.10</b>	<b>5.84</b>		<b>2.31</b>	<b>12.9</b>
	55	1.11		1.64		
curves			6.95			
	35	0.25		0.58		
<b>LA BREA/QUEEN</b>		<b>1.35</b>	<b>7.20</b>		<b>2.55</b>	<b>15.5</b>
	45	0.59		1.03		
curves			7.78			
	35	0.19		0.46		
<b>PRAIRIE/98TH/FORUM</b>		<b>0.78</b>	<b>7.97</b>		<b>1.83</b>	<b>17.3</b>
	45	0.78		1.44		
<b>PRAIRIE/CENTURY/HOLLYWOOD PARK</b>			<b>8.75</b>		<b>1.78</b>	<b>19.1</b>
	45	0.80		1.48		
<b>PRAIRIE/111TH</b>			<b>9.55</b>		<b>1.82</b>	<b>20.9</b>
	45	0.27		0.57		
curves			9.82			
	45	0.21		0.45		
<b>HAWTHORNE/IMPERIAL (Green Line)</b>		<b>0.47</b>	<b>10.03</b>		<b>1.35</b>	<b>22.2</b>
	55	1.06		1.72		
<b>HAWTHORNE/EL SEGUNDO</b>			<b>11.09</b>		<b>2.05</b>	<b>24.3</b>

Average station spacing = 0.92 miles

Avg speed = 27.4 mph

NOTES:

- Distances for Alternative 1 from Korve Engineering 5/13/93; elevated LRT assumed..
- Run and dwell times based on actual Blue Line (LB-LA) performance; dwell time = 20 seconds.

LA\#CRNALT1.wk1

Prepared by Manuel Padron & Associates

25-May-93

Crenshaw/Prairie Corridor Preliminary Planning Study  
 Run Time Estimate – Alternative 2, Subway

Table 2

<u>Station/Line Section</u>	<u>Max. Speed</u>	<u>Dist. (miles) (sta – sta)</u>	<u>Cumul. Dist. (miles)</u>	<u>Running Time (min.)</u>	<u>Sta – Sta Time incl Dwell</u>	<u>Elapsed Run Time (min.)</u>
<b>PICO/SAN VICENTE (Red Line)</b>			<b>0.00</b>			<b>0.0</b>
curve Venice to Crenshaw	55	0.78		1.34		
<b>CRENSHAW/WASHINGTON</b>			<b>0.78</b>		<b>1.68</b>	<b>1.7</b>
curves	55	0.61		0.94		
	45		1.38			
	55	0.66		1.00		
<b>CRENSHAW/EXPOSITION (Blue Line)</b>		<b>1.27</b>	<b>2.05</b>		<b>2.27</b>	<b>3.9</b>
curve	45	0.69		1.32		
<b>MARLTON/KING</b>			<b>2.74</b>		<b>1.65</b>	<b>5.6</b>
curves	45	0.25		0.51		
	45		2.98			
	45	0.42		0.76		
<b>LEIMERT PARK</b>		<b>0.66</b>	<b>3.40</b>		<b>1.61</b>	<b>7.2</b>
	55	1.14		1.76		
<b>CRENSHAW/SLAUSON</b>			<b>4.54</b>		<b>2.09</b>	<b>9.3</b>
curve, Crenshaw to RR	55	0.69		1.03		
	45		5.23			
	45	0.37		0.70		
<b>WEST/FLORENCE</b>		<b>1.06</b>	<b>5.60</b>		<b>2.06</b>	<b>11.4</b>
curve, RR to Market	70	1.04		1.34		
	45		6.64			
	45	0.25		0.52		
<b>MARKET/QUEEN</b>		<b>1.29</b>	<b>6.88</b>		<b>2.19</b>	<b>13.6</b>
curves	45	0.38		0.70		
	45		7.26			
	45	0.36		0.68		
<b>PRAIRIE/98TH/FORUM</b>		<b>0.74</b>	<b>7.62</b>		<b>1.72</b>	<b>15.3</b>
curves close to stations	55	0.76		1.32		
<b>PRAIRIE/CENTURY/HOLLYWOOD PARK</b>			<b>8.38</b>		<b>1.66</b>	<b>16.9</b>
	55	1.10		1.71		
<b>HAWTHORNE/IMPERIAL (Green Line)</b>			<b>9.48</b>		<b>2.05</b>	<b>19.0</b>
	55	0.91		1.50		
<b>HAWTHORNE/EL SEGUNDO</b>			<b>10.39</b>		<b>1.83</b>	<b>20.8</b>

Average station spacing = 1.04 miles

Average speed = 30.0 mph

NOTES:

- Distances for Alternative 2 from Korve Engineering 5/13/93.
- Run times assume grade-separated subway.
- Run times based on Red Line car performance.
- Station dwell time = 0.33 minutes (20 seconds).

Crenshaw/Prairie Corridor Preliminary Planning Study  
 Run Time Estimate – Alternative 3, LRT to LAX

Table 3

<u>Station/Line Section</u>	<u>Max. Speed</u>	<u>Dist. (miles)</u> <i>(STA-STA)</i>	<u>Cumul. Dist. (miles)</u>	<u>Running Time (min.)</u>	<u>Sta.-Sta. Time incl. Dwell</u>	<u>Elapsed Run Time (min.)</u>
PICO/SAN VICENTE (Red Line)	45	0.47	0.00	0.89		0.0
curve Venice to Crenshaw	25	0.15	0.47	0.38		
			0.63			
	45	0.49		0.92		
CRENSHAW/WASHINGTON		1.12	1.12		2.53	2.5
	35	0.24		0.57		
			1.35			
curve @ I-10	25	0.23		0.57		
			1.58			
	55	0.81		1.30		
CRENSHAW/EXPOSITION (Blue Line)		1.28	2.40		2.77	5.3
curves	45	0.76		1.42		
CRENSHAW/KING			3.15		1.75	7.1
	35	0.19		0.47		
curves, Leimert Park			3.34			
	45	0.44		0.79		
CRENSHAW/VERNON		0.63	3.78		1.60	8.7
	55	0.97		1.61		
CRENSHAW/SLAUSON			4.74		1.94	10.6
	45	0.70		1.19		
			5.45			
curve Crenshaw to railroad	35	0.11		0.20		
			5.56			
	45	0.28		0.58		
WEST/FLORENCE		1.10	5.84		2.31	12.9
	55	0.88		1.32		
curves			6.72			
	45	0.37		0.67		
FLORENCE/LA BREA		1.25	7.09		2.33	15.2
curves	45	0.59		1.02		
			7.68			
	55	0.83		1.19		
MANCHESTER/FLORENCE/AVIATION		1.42	8.51		2.55	17.8
	45	0.61		1.05		
curve			9.12			
curve	45	0.80		1.27		
LOT C/LAX		1.40	9.91		2.65	20.4

Average station spacing = 0.83 miles

Avg speed = 29.1 mph

NOTES:

- Distances for Alternative 3 from Korve Engineering 5/13/93; elevated LRT assumed.
  - Run and dwell times based on actual Blue Line (LB-LA) performance; dwell time = 20 seconds.
- LA\#CRNAL3.wk1

Prepared by Manuel Padron & Associates

25-May-93

Crenshaw/Prairie Corridor Preliminary Planning Study  
 Travel Time Summary

Table 4

Origin	Destination	Existing Bus Service			Alternative 1 Aerial LRT		Alternative 2 Subway		Alternative 3 LRT – LAX		Rail Trips via Crenshaw Line and:
		Time	# Trf's	Via	Time	# Trf's	Time	# Trf's	Time	# Trf's	
Leimert Park	Downtown L.A. (7th Street)	30	0	#40	21	1	21	1	21	1	Expo Line Red Line*
Leimert Park	Hollywood/Vine	39	0	#210	33	2	31	2	33	2	Red Line
Leimert Park	Century City	53	1	#105, #28	21	1	20	1	21	1	Red Line
Leimert Park	LAX Terminals	38	1	#42; shuttle	34	2	32	2	21	1	Green Line (except Alt. 2) & LAX P–M
Leimert Park	El Segundo	50	1	#210, #124	24	1	23	1	27	2	Green Line
<b>Average time / # of transfers:</b>		<b>42.0</b>	<b>0.6</b>		<b>26.6</b>	<b>1.4</b>	<b>25.3</b>	<b>1.4</b>	<b>24.4</b>	<b>1.4</b>	

NOTES:

- Travel times (in minutes) include transfer times, but not first wait or walk times.
- Transfer times based on half of anticipated peak headways for year 2010 patronage.
- \* Averages exclude Red Line time to 7th/Flower (slower than via Expo).

is much faster to LAX. This results in Alternative 3 having the fastest **average** travel time for the selected destinations. However, please note that the averages include only selected destinations, and that they are unweighted; some destinations will have more trip-makers than others, and most destinations are not included in this small sample. The patronage forecasts reflect the effect of travel times for all trip origin/ destinations, as well as the number of trip-makers.

The running times were used to develop operating plans (see below), and were used in coding networks for patronage forecasting.

## 1.2 Intermodal Connectivity

Each of the three alternative alignments will connect with sections of three other planned rail lines: the Red Line, Green Line, and possibly the Blue Line. In some cases the connections will be for passenger transfers only, while in others train connections will also be possible. Passenger connections for each of the Crenshaw corridor alternatives are discussed in more detail below. There will also be connections with numerous bus routes along the corridor. By way of background, the current plan for each of the intersecting rail lines is as follows:

The Red Line will have two branches west of downtown, the Hollywood Branch and the Pico-Wilshire Branch. The Pico/San Vicente Station (subway) will be the northern terminus of all three Crenshaw alignments. It will also be a major bus transfer center for MTA and Santa Monica bus routes. The train operating pattern for the Red Line will have alternating trains on the two branches. Initial headways will probably be 10 minutes on each branch, and five minutes on the downtown trunk, but as the system expands and patronage grows, peak branch headways may get as short as five minutes, with 2.5 minute trunk headways.

Adding a Crenshaw Line as a branch of the Red Line would greatly complicate operations, since it would be the third branch, in addition to the Hollywood and Westwood branches. The situation would be further complicated because the forecast ridership for the Crenshaw line is lower than either of the other branches, which would require uneven headways. This in turn would create irregular schedules along the Westwood Branch from Pico/San Vicente to Vermont. It would also result in **over-serving** the Crenshaw branch; 6-car trains might be needed downtown, while 2-car trains would suffice along Crenshaw.

Another option for connecting Crenshaw to the Red Line would be for Crenshaw trains to continue west to Westwood, instead of running to downtown Los Angeles. This would still require complex scheduling and load balancing, but would not be as difficult as a three-way merging operation into downtown.



For this analysis, it is assumed that Alternative 2 would have independent operations, with Crenshaw trains terminating at Pico/San Vicente Station.

Blue Line: The Exposition Branch is proposed to be one of two Blue Line branches on the south and west side of downtown. The exact configuration of the downtown connection is still under study, as is the Exposition Line itself. The most likely plan is for the Exposition Branch to continue west to Santa Monica, with a mixture of at-grade and elevated light rail construction. A station would be located just east of Crenshaw, probably on aerial structure.

The operating plan for the Exposition Branch will depend on further studies. One option is for 6-minute peak trains, with 2 or 3 cars, to operate all the way to Santa Monica, with 10-minute offpeak service. Another option is for 8-minute peak headways to Santa Monica, with additional trains that would turn back at an intermediate point, which could be either Vermont or Crenshaw; the peak headway east of the turnback location would be 4 minutes. Depending on the plan adopted for the downtown connector, the Expo Branch trains might continue through to Pasadena or Glendale.

The Green Line will operate in the median of the Glenn Anderson (Century) Freeway from Norwalk to Aviation Boulevard, where it will split into northern and southern branches. The southern branch will serve the El Segundo employment area, and possibly continue to Torrance. The northern branch will serve the LAX and Westchester areas. A station at Lot C will connect to the proposed LAX people-mover, which will serve all of the airport terminals. Lot C is also the location of a major bus transit center, a proposed multi-modal transportation center, and may be the southern terminus of the proposed LAX-Palmdale Line.

Green Line operations will be automated, with short trains at frequent headways. Depending on the extent of the system, headways could be five minutes on each branch, with 2.5 minute headways along the trunk portion east of Aviation.

### **1.2.1 Alternative 1 - Aerial LRT via Hawthorne**

The northern end of this alignment is at the Pico/San Vicente Station of the Red Line. Passengers will be able to transfer from the aerial LRT station to the Red Line subway station. Passengers from the Crenshaw Line would be able to ride the Red Line eastbound toward downtown Los Angeles; an additional transfer could be made to the Hollywood Branch at Wilshire/Vermont Station. In downtown, connections could be made to other modes at Union Station. Patrons could ride the proposed western extension of the Red Line to Beverly Hills, Century City, and Westwood. Table 4 summarizes travel time estimates from the Crenshaw corridor to several major destinations.

The Pico/San Vicente Station will also be a major bus interface. The Rimpau bus terminal, currently at the site, is a major transfer point among three Santa Monica bus

routes and five MTA bus routes. Additional routes may be added when the Red Line extension opens.

If the proposed Exposition Branch of the Blue Line is built, the Crenshaw Line would cross it at Crenshaw and Exposition Blvd. Current plans are for a same-level track crossing of the Crenshaw and Exposition lines, with both lines elevated. Further study could result in one or the other line being shifted to a different elevation. Station platforms would be located just east of the crossing on the Exposition Branch, and just south of the crossing on the Crenshaw Line. Passengers would be able to transfer easily from one line to the other. For Crenshaw patrons coming from south of Exposition, travel times via the Exposition Line to downtown would be slightly faster than via the Red Line (see Table 4). However, the difference is slight, and could change depending on actual headways, and on the degree of signal pre-emption along the Expo Branch.

Along the alignment, there are one or more east-west bus routes crossing Crenshaw and Prairie at each of the station locations. These routes will act as feeder routes to the Crenshaw Line for nearby residential areas, as well as distributing passengers from the Crenshaw Line to destinations along streets such as Exposition, Vernon, and Slauson. Several minor bus routes, which currently cross Crenshaw between proposed station locations, will be rerouted to connect with a Crenshaw Line Station. An example is #107, an east-west route along 54th Street, which would turn south to connect with the proposed Slauson Station.

North-south bus service along major portions of the corridor is currently provided by routes #40, #210, and #211. The routes would continue operating, to provide direct access to stops between the rail stations, which are as far as one mile apart. However, the frequency of service on #40 and #210 would be reduced by eliminating some turnback trips, since many current passengers would ride the rail line.

Another major bus transfer center would be located at the LaBrea/Queen Station in downtown Inglewood. Seven MTA routes currently pass within a block or two of the site, and they could be rerouted slightly to permit easier transfer connections.

Near the southern terminal, the Crenshaw Line crosses the Green Line. A passenger could transfer by changing levels. The Green Line Hawthorne Station is in the median of the freeway, which is one level below Hawthorne Blvd. The Crenshaw Line station platform will be elevated above Hawthorne Blvd., just south of the freeway. Therefore some vertical and horizontal travel will be required to make the transfer.

A track connection from the Crenshaw Line to the Green Line could be constructed west of Hawthorne Blvd. It would be a difficult connection to construct, requiring a double-bent crossing of the eastbound freeway lanes, and relocation of a section of the eastbound freeway lanes and both tracks of the Green Line. The connection would allow cars from the Crenshaw Line to travel to the Green Line yard and shop at Marine Blvd,

or by reversing to travel east to the Blue Line, and then to the heavy repair facility at Del Amo.

An alternative would be to use this track connection for revenue service. Crenshaw trains could merge with westbound Green Line trains, and then proceed either north to LAX or south to El Segundo and Torrance. Since the Green Line will be automated, this plan would probably require that the Crenshaw Line also be automated. This in turn would mean providing full grade-separation.

### **1.2.2 Alternative 2 - Heavy Rail Subway**

The Crenshaw Line would be in subway in this alternative. The platforms for the Red Line and Crenshaw Line at Pico/San Vicente would be a short distance apart, with a mezzanine level that would connect to the platforms of both lines. Passengers wanting to transfer would move up one level to the mezzanine, across, and then back down to the other platform. Passengers could also move up another level to the bus transfer center.

Bus route connections for Alternative 2 would be the same as described above for Alternative 1.

At Exposition, the Crenshaw Line would have a subway station. Passengers wanting to transfer to the Exposition Line would have to travel up two levels.

The Crenshaw Line would pass under the Green Line (and freeway) at Hawthorne Blvd. Passengers would travel up to the surface, across the eastbound freeway on a pedestrian bridge, and back down to the Green Line platform in the median.

### **1.2.3 Alternative 3 - Aerial LRT to LAX**

The northern portion of this alignment is identical to Alternative 1. Therefore the passenger and track connections at Pico/San Vicente Station and the Exposition Branch would be as described above. The bus connections from Pico/San Vicente to Inglewood would also be the same.

The southern terminus of this alignment is at the LAX/Lot C Station on the northern extension branch of the Green Line. This is also the proposed site of a Multimodal Transportation Center, which will include:

- A people-mover link to all of the LAX terminals.
- The existing RTD Bus Transfer Center, which serves ten MTA routes, along with routes from the Santa Monica and Culver City systems.
- Airport-related shuttle buses (rental cars & hotels).

- The proposed LAX-Palmdale Line.

Passengers would be able to transfer among all of these modes. Passengers getting off the aerial Crenshaw Line would descend to the ground level, then walk across to the bus area, or to the vertical circulation units leading to the aerial Green Line or People-Mover stations.

An alternative would be to make a revenue connection for Crenshaw trains at Century and Aviation. Crenshaw trains could merge with westbound Green Line trains to reach the LAX area stations. This plan would probably require that the Crenshaw Line also be automated.

### 1.3 Operating Plans

Operating plans were prepared for use in patronage forecasting. The plans define the train routing, and headways by time of day. Six-minute peak and ten-minute off-peak headways were assumed for all three alternatives, to be consistent with assumptions used in the Candidate Corridor Study. After patronage projections were completed, the operating plans were reviewed to determine the appropriate train length ("consist"), and whether headway adjustments were required to balance the capacity and projected peak loads.

Based on the patronage forecasts (see discussion below), possible operating plan options have been identified. These are shown in Table 5. The load factor shown in the right-hand portion of Table 5 is the ratio of passengers to seats. For example, a load factor of 1.5 means that for every 100 seated passengers, there would be 50 standing passengers. The L.A. light rail cars have a seated capacity of 76 passengers. Each Red Line car has 59 seats, or 118 seats in a married-pair of two cars.

Alternative 1 would have a peak-hour, peak-direction line load of 1,610 passengers. With the initial assumption of 6-minute headway, this would mean a load factor over 2.1 with single-car trains, or just over 1.0 with 2-car trains. Since MTA's policy is to plan light rail service with a maximum peak load factor of 2.0, two new headway/consist options were developed. The primary option would be to run single-car trains at 5-minute headways; this would reduce the load factor to an acceptable level of 1.77. However, there may be a desire to operate 2-car trains to improve reliability; in this event, 10-minute headways would suffice, with the same load factor. This option would reduce operator requirements, but increase car-miles. It would also have an adverse effect on ridership, since the forecasts were based on 6-minute headways, and transit ridership is quite sensitive to waiting times.

Alternative 2 is estimated to have a peak line load of 1,840. Red Line cars must operate in increments of two cars (married-pairs). With 2-car trains on 6-minute

# Crenshaw/Prairie Corridor Preliminary Planning Study Rail Operating Plans

Table 5

From		To		Run Time		Distance		Headway		Consist		Vehicles		Annual Statistics:		Patronage & Loading			
				(min.)	(miles)	Peak	E/L	Peak	E/L	Peak	Total	Car - Mi. (million)	Tr - Hrs. (thous.)	MLP	Load Factor	Max. Load Point Location			
<b>Alternative 1 – Aerial LRT</b>																			
Pico/San Vicente (Red Line)	Hawthorne Plaza	24.3	11.1	5	10	10	10	1	1	1	1	12	14	1.18	53.0	1,610	1.77 NB @ Exposition		
		<i>Single-car option:</i>																	
		<i>Two-car option:</i>	24.3	11.1	10	10	10	2	2	2	2	12	14	1.94	43.8	1,610	1.77 NB @ Exposition		
<b>Alternative 2 – Subway</b>																			
Pico/San Vicente (Red Line)	Hawthorne Plaza	20.8	10.4	6	10	10	10	2	2	2	2	18	22	2.07	42.6	1,840	1.56 NB @ Exposition		
<b>Alternative 3 – LRT to LAX</b>																			
Pico/San Vicente (Red Line)	LAX Lot C (Green Line)	20.4	9.9	6	10	10	10	1	1	1	1	8	10	0.99	41.1	1,370	1.80 NB @ Exposition		
		<i>Single-car option:</i>																	
		<i>Two-car option:</i>	20.4	9.9	10	10	10	2	2	2	2	10	12	1.74	36.5	1,370	1.50 NB @ Exposition		

**NOTES:**

1. Distances from Korve Engineering, 5/13/93.
2. Run times estimated by MPA, assuming full grade – separation or signal priority for LRT.
3. 20% spare vehicles added.
4. Patronage estimates for each Alternative by LACMTA 11/93.
5. One – car LRT options used for estimating operating costs.

headways, the load factor would be 1.56. The loading standard for heavy rail service is higher than for light rail, since cars have more standing capacity. Therefore the headway could be increased to 8-minutes, with an acceptable load factor of 2.08.

Alternative 3 would have a peak line load of 1,370. This can be handled with single cars on 6-minute headways, with a load factor of 1.8. If two-car operation is desired, 10-minute headways would result in a load factor of 1.5.

## **2. Patronage Analysis**

## 2.0 Patronage Analysis

### 2.1 Methodology – Forecasting Models

Patronage forecasts were made by LACMTA staff for each of the three Crenshaw alternatives. Manuel Padron & Associates (MPA) assisted in defining the networks, and analyzed the results to produce the summaries that are presented in this report.

The forecasts were made using the forecasting models that were developed for MTA as part of the Eastside Corridor Alternatives Analysis. The model set is fully documented in the *Service and Patronage Methodology Report*, prepared in March 1993 for the Eastside Corridor AA/DEIS/DEIR.

The networks for all of the Crenshaw alternatives in the year 2010 include the Red, Blue, and Green Lines, with those extensions that are most likely to be completed by the forecast year of 2010. Table 6 lists the rail lines that were included in the networks, along with the peak period headways that were assumed in network coding.

The three Crenshaw alternatives were coded by making revisions to a base network. The Crenshaw rail lines were coded using the station-to-station travel times and headways that are discussed in the previous Operating Plan section.

Bus routings were revised in the vicinity of Crenshaw Line stations to facilitate transferring, and to remove bus service that would be largely duplicated by the rail line. Several express routes fall in this category: #442 and proposed new route #435. Local bus service that parallels the rail corridor was reduced; turnback service on routes #40 and #210 was eliminated, thus increasing headways on the segments served by the turnback trips.

Transit assignment model outputs include several categories of trips. The daily peak and daily offpeak assignments were added to produce estimates of total daily boardings for the alternative lines. The AM peak period assignment was factored by 40% to produce the AM peak hour line loads. Three tables in the Appendix list the AM peak hour on's, off's, and line loads by station for each alternative. The line loads were also used in the Operating Plan section to determine peak load factors.

The model forecasts do not include trips to special generators; these are discussed in the following section.

### 2.2 Special Generators

There are three major special generators of trips in the corridor:



LACMTA Crenshaw/Prairie Corridor Study  
 Rail Lines in 2010 Network

Table 6

<u>Line</u>	<u>Network #</u>	<u>Terminus A</u>	<u>Terminus B</u>	<u>Line Headway in Minutes</u>	
				<u>Peak Period</u>	<u>Off-peak</u>
<b><u>BLUE LINE</u></b>					
	1	Long Beach	Irwindale	8	10
	2	Willow (L.B.)	Del Mar (Pasadena)	8	10
	3	Santa Monica	Burbank	6	10
<b><u>GREEN LINE</u></b>					
	4	Norwalk Transp. Ctr.	Westchester	6	6
	5	Norwalk Transp. Ctr.	Torrance	6	6
<b><u>RED LINE</u></b>					
	6	Sepulveda	East L.A.	8	10
	7	Westwood	East L.A.	4	6
	8	North Hollywood	Union Station	8	8

**NOTES:**

Networks coded by LACMTA and used to forecast Crenshaw Line ridership, Nov. 1993.

Networks also include Orange County Urban Rail System, connecting with Green Line at Norwalk Transp. Ctr.

Networks for Crenshaw Alternatives include line #13, Crenshaw, as described in Table 5.

- LAX would be served directly by Alternative 3, which terminates at the Lot C Transit Center, where an automated people-mover link to the terminal area will begin. Alternatives 1 and 2 would serve LAX indirectly; passengers would have to transfer to the Green Line at the Hawthorne/Imperial Station, and then ride a short distance to Lot C.
- Hollywood Park and the Forum would each be adjacent to a station in Alternatives 1 and 2. Alternative 3 bypasses these facilities, but special shuttle buses could be operated along a short route from the rail station at Florence and West.

The traditional ridership forecasting models either fail to include, or under-predict trips to special generators such as these. Therefore a separate analysis was conducted of potential transit trips to or from these locations. Each generator is discussed below, and the resulting estimates are summarized in Table 7 at the end of this section.

LAX Air Passenger Trips The regional models do include employee trips to or from LAX as part of the home-based-work trip table. However, they do not include air passenger trips, which have one end outside the region. Several studies of LAX access trips have been made in recent years.

- The Los Angeles International Airport Multi-Modal Ground Access Study, (Wilbur Smith & Assoc.; 4/91) includes a summary of 1987 air passenger trips by 46 districts in the Los Angeles region. It also includes tabulations of mode share for existing access modes from the same 1987 survey. The survey showed that only 1.5% of air passengers used public transit buses.
- In 1991 Wilbur Smith & Associates estimated the number of air passengers who would use the Green Line and proposed LAX-Palmdale Line: over 5,000 daily air passengers via the Green Line, and over 3,000 via LAX-Palmdale.

Information on transit usage at other U.S. airports that are served by rail systems was also surveyed. Examples include:

- O'Hare Airport is at the end of a direct rapid rail line from downtown Chicago; about 10% of air passengers use the rail line.
- Hartsfield Airport in Atlanta is a 15-minute rail trip from downtown; about 8% of air passengers use rail.
- In Philadelphia, a special rail line links the airport with downtown, where passengers can transfer to rapid transit and other commuter rail lines. The airport line only runs every 30 minutes. The rail usage is about 4% of air passengers.

In Chicago and Atlanta, no transfers are required between downtown and the airport. By contrast, passengers from downtown Los Angeles would have to ride two or three different trains, plus transfer to the people-mover at Lot C. Therefore we do not believe that rail mode share will be as high as in Chicago or Atlanta.

The above information was used to develop estimates of air passenger use for each of the three Crenshaw alternatives. The air passenger trips that would use the Crenshaw Line fall in two categories:

1. Air passengers whose origin or destination lies along the Crenshaw corridor.
2. Air passengers whose origin/destination is in a section of Los Angeles where the shortest transit path to LAX would be via the Crenshaw Line. An example would be trips from the mid-Wilshire area; passengers could transfer from the Red Line to the Crenshaw Line at Pico/San Vicente Station.

For Alternative 3, we estimate that about 5% of all LAX air passenger trips (excluding connecting passengers) would use rail transit, with half of these using the Crenshaw Line, and half using the Green Line, to reach the Lot C Transfer Center. This means that the Crenshaw Line would attract about 3,600 air passenger trips per day. About 1,100 of these are trips to/from the immediate tributary area of the Crenshaw Line, while the other 2,500 are to/from areas such as downtown Los Angeles, Pasadena, etc.

Since Alternative 3 serves Lot C and the proposed LAX people-mover directly, it would attract more air passenger trips than Alternatives 1 or 2. Both Alternatives 1 and 2 would attract about 2,000 air passenger trips.

The above projections do not assume the LAX-Palmdale Line. If that line were added to the rail system, the number of air passenger trips using the Crenshaw Line would decrease slightly, especially in Alternative 1 and 2, since LAX-Palmdale would provide a quicker route for many trips in the West L.A. area.

Hollywood Park would be served directly by the rail station at Prairie and Century in Alternatives 1 and 2. Hollywood Park has summer and winter racing seasons, totalling about five months. Races are held six days a week: five afternoon sessions plus Friday evening. Attendance on weekdays averages 12,000-15,000, and reaches 30,000 on weekends. During the rest of the year, it is used for off-track betting, with several thousand people attending.

MTA currently operates special bus service to and from Hollywood Park during racing seasons. Four special routes (#610-613) operate from downtown Los Angeles and three other locations. During the most recent season, MTA ran an average of 26 round trips on weekdays, and somewhat more on weekends. Average weekday ridership was 1,300 to and from the Park. This represents 650 round-trip riders, or about 5% of

average attendance. On weekends, about 1,700 one-way trips are made, or about 3% of attendance.

With direct rail service in Alternatives 1 and 2, we assume that most or all of the special bus service would be discontinued. We assume that all current bus riders would switch to rail. We also estimate that an equal number of additional track patrons would be attracted by the speed and convenience of rail transit. That is, weekday ridership would increase to about 2,500 trips, reflecting 10% transit usage, and weekend ridership would be about 3,500.

For Alternative 3, we assume that some of the special bus service would be discontinued, and replaced by a new shuttle from the Florence/West Station (or possibly the downtown Inglewood station) to Hollywood Park. The downtown LA route (#610) would probably be continued, since patrons from downtown, many of whom ride one or two transit vehicles to get downtown, would have to ride three transit vehicles to get from downtown to Hollywood Park (Red Line, Crenshaw Line, and special shuttle bus). We therefore assume that few new race patrons would be attracted to transit. Net daily Crenshaw ridership by race fans is estimated at 1,000.

Great Western Forum. The Forum is used by the Lakers, Kings, and for a variety of concerts and other events. Total annual events number about 180, including about 50 each (depending on playoffs) for basketball and hockey. Sellout attendance is 17,500 for basketball, and 16,500 for hockey, with average attendance for both teams in the 15-16,000 range.

No specific data has been collected on transit utilization by Forum attendees. However, unlike next-door Hollywood Park, there is no special bus service. Parking at the Forum is plentiful. With most events occurring at night, use of regularly scheduled bus routes by Forum patrons is considered negligible.

In Alternative 1 and 2 there would be a rail station within a few hundred feet of the Forum. Based on experience of other cities, rail transit is expected to attract a significant portion of attendees. For example, the Omni in Atlanta is located adjacent to one of MARTA's downtown rail stations. Based on near-capacity attendance of about 15,000, MARTA attracts up to 20% of the attendance. The Omni is in downtown Atlanta, and is centrally located in the MARTA rail system. There is a maximum of one rail-to-rail transfer, and a maximum rail trip time of about 25 minutes. Ample free parking is provided at most non-downtown MARTA stations.

In Los Angeles, the Forum is less centrally located. It is more auto-oriented, with ample on-site parking. The Crenshaw Line would provide direct service to a relatively small portion of the overall L.A. region, but passengers could transfer to the Red, Green and possibly Expo Lines to reach other areas. Because of the complexity of the system, average trip times by rail would be longer than in Atlanta. In addition, fewer L.A. rail system stations will have large parking lots. We therefore estimate that average rail

usage for Forum events would be about 5-10%. Using a figure of 7%, this would convert to 1,000 attendees, or 2,000 one-way rail trips on event days. This would be an average of about 1,000 trips per day when non-event days are figured in.

For Alternative 3, which does not serve the Forum directly, shuttle bus service could be run from a nearby Crenshaw Line station. This service would attract far fewer trips than direct rail service, probably only 2-3% of attendance, or about 400 attendees.

The completion of a capacity event at the Forum or Hollywood Park will create a surge load for the rail system. With Alternative 1 (LRT), a large number of 2-car trains would be needed to handle the projected load. This may require special storage tracks to stage the trains for use after an event. Similar provision may be needed with Alternative 2, although the train length would depend on the station length that is constructed. Since most events are at night (or afternoon events which end after the peak), there should not be a problem with vehicle availability.

Table 7 summarizes the additional trips that would be attracted to the three special generators for each of the three rail alternatives. We have also converted the special generator trips to average weekday trips, to reflect the fact that Hollywood Park and the Forum would only contribute to ridership on event days. This factor results in Alternative 3 attracting slightly more special generator trips than Alternatives 1 and 2, on an average day basis. The forecasts for all three special generators have been made on a conservative basis. Changes in travel behavior, or factors such as higher parking charges, could result in higher transit use to all three locations.

## 2.3 Forecasting Model Results

Table 8 summarizes the patronage results. The daily boardings are derived from two sources: the MTA model runs described in Section 2.1, and the analysis of special generators previously presented in Table 7.

The assignment results show that Alternative 2 attracts the most trips to a Crenshaw corridor rail line: 38,100 weekday boardings, including average daily special generator trips. Alternative 1 would attract 34,400 trips, while Alternative 3 would attract 27,100 trips.

- Although Alternatives 1 and 2 follow the same general alignment, Alternative 2 has slightly faster travel time than Alternative 1. It also has one less station, but that station (111th Street) does not attract many trips in Alternative 1.
- Alternative 3 is a shorter line, with three fewer stations than Alternative 1. The boardings per station are approximately the same for Alternatives 1 and 3, about 2,700 boardings per station.

**LACMTA Crenshaw/Prairie Corridor Study  
Special Generator Patronage Estimates**

Table 7

	ALTERNATIVE 1 Aerial LRT	ALTERNATIVE 2 Subway	ALTERNATIVE 3 LRT to LAX
<b>LAX Air Passengers</b>			
Crenshaw Tributary	800	800	1,100
Other Areas	<u>1,200</u>	<u>1,200</u>	<u>2,500</u>
Total:	2,000	2,000	3,600
<b>Hollywood Park</b>			
Typical Weekday Event	2,500	2,500	1,000
<b>Forum</b>			
Typical Weekday Event	2,000	2,000	800
<b>Total for Simultaneous Events:</b>	6,500	6,500	5,400
<b>Average Annual Weekday (1)</b>	3,700	3,700	4,300

NOTE:

(1) Patronage for Hollywood Park & Forum adjusted to reflect days with no events.

**LACMTA Crenshaw/Prairie Corridor Study  
Patronage Forecast Summary**

**Table 8**

	<b>ALTERNATIVE 1</b> Aerial LRT	<b>ALTERNATIVE 2</b> Subway	<b>ALTERNATIVE 3</b> LRT to LAX
<b>Daily Boardings</b>			
Model results:	30,700	34,400	22,800
Average special generators:	<u>3,700</u>	<u>3,700</u>	<u>4,300</u>
Total:	34,400	38,100	27,100
<b>Average Daily Boardings per Station</b>	2,650	3,200	2,700
<b>Annual Boardings (millions)</b>	10.6	11.7	8.3
<b>AM Peak Hour Line Load</b>			
Northbound @ Exposition	1,610	1,840	1,370
Southbound to Green Line	960	1,090	550

The AM peak hour line load occurs northbound at Exposition Station for all three alternatives. The highest line load occurs on Alternative 2, with 1,840 peak hour passengers. See the Operating Plan section above for discussion of adjustments to headways and train lengths.

All three lines also carry significant volumes in the southbound direction in the morning, since there are large concentrations of employment in the LAX and El Segundo areas. This balance means that the peak line load is a smaller proportion of total daily boardings than for other lines that are more downtown-oriented.

We have also analyzed the impact of the Crenshaw Line on peak hour line loads for the Red, Blue, and Green Lines. The addition of the Crenshaw Line would increase the line loads on the Red Line by several hundred passengers per hour. Although this would result in slightly higher load factors, it is not considered a large enough change to require shorter headways or longer trains on the Red Line. The changes in Blue and Green Line volumes are smaller than for the Red Line.

The transit assignments were also analyzed to produce estimates of mode of access for each station. Tables for each alternative are included in the Appendix, showing the total daily boardings for each station, and the percentage that arrive by walk, auto, bus, and rail. (Rail is a mode of access at those stations where the Crenshaw Line intersects the Red, Blue, or Green Lines.) One possible coding anomaly was found in Alternative 3, which attracts very few rail and bus transfers at Lot C, even though this is a major bus transfer center, and the junction with the Green Line.

The estimated boardings by station are summarized in Table 9 for all three alternatives. The individual station figures do not include the special generator trips, since they are not included in the forecasting model outputs, and since the occurrence of special events varies by day.



LACMTA Crenshaw/Prairie Corridor Study  
 Summary of Station Boardings

Table 9

STATION	TOTAL WEEKDAY BOARDINGS		
	ALTERNATIVE 1 Aerial LRT	ALTERNATIVE 2 Subway	ALTERNATIVE 3 LRT to LAX
Pico/San Vicente	7,100	8,900	6,300
Crenshaw/Washington	700	800	700
Crenshaw/Exposition	2,700	3,100	2,400
Crenshaw/King	1,200	1,300	1,100
Crenshaw/Vernon	1,700	1,800	1,600
Crenshaw/Slauson	1,700	1,800	1,500
West/Florence	1,600	1,700	1,500
Downtown Inglewood	1,800	2,000	2,900
Prairie/98th/Forum	3,000	3,300	NA
Prairie/Century/Hollywood Pk.	1,600	1,700	NA
Prairie/111th	900	NA	NA
Hawthorne/Imperial	4,300	5,200	NA
Hawthorne/El Segundo	2,300	2,800	NA
Manchester/Florence/Aviation	NA	NA	2,200
Lot C/LAX	NA	NA	2,600
Subtotal without Special Generators	30,700	34,400	22,800
<i>Average for Special Generators</i>	<i>3,700</i>	<i>3,700</i>	<i>4,300</i>
<b>TOTAL LINE BOARDINGS</b>	<b>34,400</b>	<b>38,100</b>	<b>27,100</b>

Note: Individual station figures do not include special generator trips; totals may not sum due to rounding.  
 Source: LACMTA Model Run 11/2/93, for year 2010.

### **3. Cost Estimates**

## 3.0 Cost Estimates

### 3.1 Capital Costs

Capital costs estimates for each of the alternatives were prepared by the Rail Construction Corporation (RCC) based on input from Korve Engineering, Inc. A summary of the input assumptions is shown in Table 10, including the length of guideway, number and type of stations, maintenance facilities and yards, and number of vehicles.

Tables 11 through 13 summarize the capital cost estimates for each alternative. These cost estimates include all construction costs, professional services, necessary right-of-way acquisition, and contingencies. Inputs to the calculation of right-of-way costs are included in the appendix. The two light rail alternatives, Alternatives 1 and 3, have projected capital costs of about \$977 million and \$834 million. These estimates are less than half the projected capital cost of the subway alternative, Alternative 2, which ranges from \$2.077 billion to \$2.25 billion, depending on station platform length. The lower subway estimate is for 200 foot platforms and the higher estimate for 300 foot platforms. (Shorter platform lengths than the standard 450-foot Red Line platform were used to reflect the likely use of two- to three-car subway trains.)

The majority of the cost differential between the light rail alternatives and the subway alternative is due to the increased cost of guideway and station construction, which require tunneling or cut-and-cover procedures in the subway alternative. The subway alternative also requires a greater number of vehicles and more expensive system-wide features.

### 3.2 Operating Costs

Manuel Padron & Associates (MPA) has developed Operating and Maintenance (O&M) cost models for LACTC's light rail and heavy rail systems. The light rail model was initially developed for the Blue Line (Long Beach/Los Angeles), using costs from other similar West Coast light rail systems. The model has been subsequently revised to reflect the actual operating costs for the Blue Line. The Red Line (heavy rail) model was developed from budget forecasts for Segments 1 and 2. The initial development of the O&M cost models is discussed in an earlier MPA report.<sup>1</sup>

The models are detailed resource build-up models, which include every position classification, and all budget line items for non-labor costs. Each item is related to one or more operating statistics, so that changes in system characteristics and/or levels of service will be reflected in appropriate cost changes. For example, train operators are

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<sup>1</sup> Transit Operating and Maintenance Cost Methodology; Manuel Padron & Associates; August 1990

**Table 10**  
**Summary of Unit Costs and Quantities**

Description	Unit/Price	Unit	Alt. 1	Alt. 2A	Alt. 2B	Alt. 3
<b>Guideway</b>						
<i>Light Rail</i>						
Guideway at Grade	\$1,800	RF	3700			5500
Aerial Guideway-Regular	\$4,500	RF	33300			28700
Aerial Guideway - (H-30 to 40)	\$5,400	RF	18800			16600
Aerial Guideway - Bridge over I-105	\$9,600	RF	1400			
Grade Separated Guideway (Underpass)	\$6,750	RF	2000			2400
Track Removal Sta 300+00 to 380+00	\$65	TF	12000			12000
Special Work at I-10 Freeway	\$2,000,000	LS	1			2
<i>Subway</i>						
Retained cut	\$3,500	RF		2550	2850	
Tunnel Construction (Regular)	\$6,730	RF		29150	29150	
Tunnel Construction (Wet)	\$8,200	RF		24200	24200	
Xover Constructed with Station	\$11,050,000	EA		4	4	
Water Treatment (Dewatering)	\$8,000,000	EA		3	3	
<b>Stations</b>						
At Grade LRT Station (2 Car Platform)	\$1,850,00	EA	1			1
Aerial LRT Station (2 Car Platform)	\$5,200,000	EA	12			9
Parking (Structure)	\$11,000	Space	2450	2300	2300	1900
Parking (Surface)	\$2,200	Space	3300	3300	3300	700
Subway Station in C&C (300 Ft. Platforms)	\$36,950,000	EA		12		
Subway Station in C&C (200 Ft. Platforms)	\$25,000,000	EA			12	
Dewatering (subway)	\$3,500,000	EA		6	6	
<b>Maintenance/Facilities &amp; Yards</b>						
Car Storage Facilities (Allowance) LRT	\$10,000,000	LS	1			1
Car Storage Facilities (Allowance) Subway	\$20,000,000	LS		1	1	
<b>Vehicles</b>						
Standard Revenue Vehicle	\$2,600,000	EA	12	22	22	11

**Table 10**  
**Summary of Unit Costs and Quantities**

Description	Unit/Price	Unit	Alt. 1	Alt. 2A	Alt. 2B	Alt. 3
<b>System Wide Equipment</b>						
<i>Light Rail</i>						
Trackwork (Incl Special Trackwork)	\$421	RF	59200			53200
Train Control Station	\$540,000	EA	13			10
Train Control Guideway	\$500	RF	59200			53200
Traction Power Station (LRT)	\$1,100,000	EA	13			10
Traction Power Guideway (LRT)	\$270	RF	59200			53200
Communications	\$200	RF	59200			53200
Fare Collection	\$250,000	EA	13			10
Signage & Graphics (At Grade)	\$125,000	EA	1			1
Signage & Graphics (Aerial)	\$350,000	EA	12			9
<i>Subway</i>						
Trackwork	\$545	RF		56000	56000	
Train Control (Station)	\$900,000	EA		12	12	
Train Control (Guideway)	\$2,016	RF		56000	56000	
Traction power (XFMR)	\$1,580,000	EA		12	12	
Traction Power (Third Rail)	\$110	RF		56000	56000	
Communications	\$1,330	RF		56000	56000	
Fare Collection (Subway Station)	\$870,000	EA		12	12	
Fare Collection (At Grade Station)	\$250,000	EA		12	12	
Signage & Graphics (Subway Station)	\$580,000	EA		12	12	

**Table 11**  
**Alternative 1 Capital Cost Estimate**

Item Description	1993 Dollars
Guideways and Structures	\$287,750,000
Stations	\$98,460,000
Maintenance Yard and Shop	\$10,000,000
Systemwide Equipment	\$111,242,200
Vehicles	\$31,200,000
Subtotal (A)	\$538,652,200
Pre Revenue Operation	\$13,466,300
Owners Insurance	\$43,092,200
Master Agreements	\$13,466,300
Subtotal (B)	\$70,024,800
Art for Transit (C)	\$2,693,300
Right-Of-Way (D) (Per KORVE Engineering)	\$22,000,000
Professional Services (E)	\$215,345,900
Contingency (F)	
A) of Subtotal (A + B)	\$100,431,700
B) of Subtotal (D)	\$5,500,000
C) of Subtotal Item (E)	\$21,534,588
Subtotal (F)	\$127,466,300
Hazardous Waste Removal (Allowance)	\$1,100,000
Grand Total 1993 Dollars	\$977,282,500

**Table 12**  
**Alternative 2 Capital Cost Estimate**

Item Description	1993 Dollars	
	Option A 300 Foot Platforms	Option B 200 Foot Platforms
Guideways and Structures	\$472,094,500	\$472,094,500
Stations	\$498,960,000	\$353,560,000
Maintenance Yard and Shop	\$20,000,000	\$20,000,000
Systemwide Equipment	\$271,816,000	\$271,816,000
Vehicles	\$57,200,000	\$57,200,000
Subtotal (A)	\$1,318,070,500	\$1,174,670,500
Pre Revenue Operation	\$32,951,800	\$29,366,800
Owners Insurance	\$105,445,800	\$93,973,600
Master Agreements	\$32,951,800	\$29,366,800
Subtotal (B)	\$171,349,200	\$152,707,200
Art for Transit (C)	\$13,180,700	\$11,746,700
Right-Of-Way (D) (Per KORVE Engineering)	\$13,000,000	\$13,000,000
Professional Services (E)	\$515,304,100	\$459,722,300
Contingency (F)		
A) of Subtotal (A + B)	\$163,836,200	\$146,011,600
B) of Subtotal (D)	\$3,250,000	\$3,250,000
C) of Subtotal Item (E)	\$51,530,400	\$45,972,200
Subtotal (F)	\$218,616,600	\$195,233,800
Hazardous Waste Removal (Allowance)	\$650,000	\$650,000
Grand Total 1993 Dollars	\$2,250,171,100	\$2,007,730,500

**Table 13**  
**Alternative 3 Capital Cost Estimate**

Item Description	1993 Dollars
Guideways and Structures	\$249,670,000
Stations	\$71,090,000
Maintenance Yard and Shop	\$10,000,000
Systemwide Equipment	\$96,176,200
Vehicles	\$28,600,000
Subtotal (A)	\$455,536,200
Pre Revenue Operation	\$11,388,400
Owners Insurance	\$36,442,900
Master Agreements	\$11,388,400
Subtotal (B)	\$59,219,700
Art for Transit	\$2,277,700
Right-Of-Way (D) (Per KORVE Engineering)	\$23,000,000
Professional Services (E)	\$183,611,400
Contingency (F)	
A) of Subtotal (A + B)	\$84,934,700
B) of Subtotal (D)	\$5,750,000
C) of Subtotal Item (E)	\$18,361,200
Subtotal (F)	\$109,045,900
Hazardous Waste Removal (Allowance)	\$1,150,000
Grand Total 1993 Dollars	\$833,840,900



modelled as a function of train-hours; fare collection is modelled as a function of the number of stations. The operating statistics that were used as input to the operating cost model are shown in Table 14.

The resulting annual operating cost estimates are shown in Table 6. The cost estimates are for the level of service required to meet year 2010 demand, but are expressed in 1993 dollars.

Alternative 2 (heavy rail) is far more expensive to operate than the light rail alternatives. This is partially due to the need to run more cars and car-miles to provide the same frequency of service, since heavy rail uses married pairs of rail cars. It also reflects much larger stations, with associated costs for maintenance, utilities, and security. The heavy rail cost could be reduced somewhat if the stations were built with less than six-car platforms, but would still be significantly higher than for light rail.

The lower cost for Alternative 3 compared to Alternative 1 reflects the shorter length, fewer stations, and the slightly less frequent peak hour service in Alternative 3.

If two-car trains were used for Alternatives 1 and 3, operating costs would increase by \$0.5 to \$1 million annually. However, as noted above, patronage would likely decrease due to longer headways.

LACMTA Crenshaw/Prairie Corridor Study  
 Rail Operations Summary

Table 14

	ALTERNATIVE 1 Aerial LRT	ALTERNATIVE 2 Subway	ALTERNATIVE 3 LRT to LAX
<b>Number of Stations</b>	13	12	10
<b>System Miles</b>	11.1	10.4	9.9
<b>Peak Headway</b>	5	6	6
<b>Midday Headway</b>	10	10	10
<b>Fleet Vehicles</b>	14	22	10
<b>Annual Veh-Mile</b> (millions)	1.2	2.1	1.0
<b>Annual Tr.-Hours</b> (000)	53	43	41
<b>Annual Oper. Cost</b> (millions)	\$15	\$31	\$12
<b>Cost/Boarding</b>	\$1.37	\$2.65	\$1.39
<b>Cost/Vehicle-Mile</b>	\$12.34	\$15.00	\$11.75

NOTE: Statistics for Alternatives 1 and 3 are based on single-car operations.

## **4. Traffic Impacts**



## 4.0 Traffic Impacts

### 4.1 Transportation Impacts

Each of the alternatives has potential impacts in one or more of the following three areas: roadway configuration (through travel lanes/capacity, ROW needs, on-street parking, sidewalk widths, minor street access); intersection configuration (presence/absence of left-turn lanes, geometrics, ROW needs); and station area impacts. The potential impacts in each of these three areas is reviewed below for each alternative. The most significant traffic impacts will occur in Alternatives 1 and 3, where the light rail guideway supports will affect traffic lanes and cross street traffic. In Alternative 2, the subway alternative, there would be few, if any, traffic impacts, although there may be station area impacts.

### 4.2 Alternative 1 - Aerial LRT

#### 4.2.1 Roadway Impacts

In the aerial light rail alternative, roadway configuration may be impacted by the LRT guideway columns and station footprints. This potential impact will generally be most significant where the alignment is center-running (in the middle of the street), and least significant where the alignment is side-running (along the side of the street). In all cases, it would be possible to retain the same number of through travel lanes as exists today; however, depending on the option selected for accommodating the LRT guideway, impacts may still occur to on-street parking, cross-street and driveway access, sidewalk widths, and required right-of-way.

#### Center-Running Alignment

Those portions of the corridor where the alignment is center-running will have the greatest potential impact because of the need to create a 12-foot center median to support the guideway columns (approximately six feet in diameter) and provide necessary clearance. In street sections without an existing median, either loss of on-street parking, widening of the street, narrowing of sidewalks/parkways or some combination of the three would be necessary to create the median island. These segments (such as on Crenshaw from Pico to Washington) have the least ability to accommodate aerial LRT while maintaining the existing number of through traffic lanes, and are therefore likely to be most impacted.

In sections where there is an existing median (either a concrete median or continuous left-turn lane), the guideway support median would generally replace the existing median, leaving through traffic lanes untouched. Replacing the existing median would eliminate left-turn lanes, however, requiring either loss of on-street parking, narrowing of

sidewalks/parkways or widening of the street to maintain left-lanes (see "Intersection Impacts" below). Examples of this situation include Crenshaw from the I-10 Freeway to Exposition and from Stocker to Vernon.

Finally, in wide street segments (such as Hawthorne Boulevard s/o Imperial), the center-running alignment could be accommodated with almost no roadway configuration impacts; the ROW will accommodate the 12-foot guideway support median and the existing lane configuration, including left-turn lanes. (Some changes would be necessary at stations; see "Intersection Impacts" below.)

In all center-running segments of the alignment, access across the LRT median would be limited to signalized intersections. In these segments, there may be minor streets that would lose access across the median, and all cross-median movements from driveways or from the curb would be eliminated. In most segments of center-running alignment, however, there are numerous existing signalized intersections where the "U-turns" could be made, somewhat easing the severity of this impact.

Specific areas of potential impact in center-running segments include the following:

- Pico, from Muirfield to Crenshaw. Center-running alignment would displace existing left-turn lanes. Retaining left-turns at intersections could be accomplished by eliminating on-street parking or widening the street. Access across the median of Pico from minor streets (unsignalized) would be lost.
- Crenshaw, Pico to Washington. This 4-lane, 56-foot street section could accommodate the 12-foot guideway support median only by eliminating on-street parking (six feet on each side), or by widening the street by taking part of the parkway along each sidewalk. Access across the median of Crenshaw from minor, unsignalized streets and driveways would be lost.
- Crenshaw, I-10 Freeway to Exposition Station. Center-running alignment would displace existing left-turn lanes. Left-turn lanes could be retained by widening the street (additional ROW) or by narrowing lanes and sidewalks, or a combination of the two. Access across the median of Crenshaw from minor, unsignalized streets and driveways would be lost.
- Crenshaw, Stocker to Vernon. Center-running alignment would displace existing left-turn lanes. Because of the existing businesses here, widening of the street is not a realistic option, leading to loss of left-turn lanes at Stocker, 43rd Street & 43rd Place. Some sidewalk impacts are also expected due to tracks crossing over from center to side-running around 43rd Place.

- Crenshaw, Slauson to 60th. Because this section has a wide ROW, left-turn lanes and on-street parking could be retained, even with the center-running alignment. Access across the median from minor, unsignalized streets would be lost.
- Crenshaw, 60th to ATSF ROW. Center-running alignment would displace existing left-turn lanes at 63rd Street, Hyde Park and 67th Street unless the street were widened or traffic lanes and sidewalks narrowed. Access across the median of Crenshaw from minor, unsignalized intersections would be lost.
- La Brea Avenue, downtown Inglewood. If La Brea remains a two-way street, the center-running alignment would result in either the loss of on-street parking or the loss of left-turn lanes. If parking is eliminated to retain left-turn lanes, lane configurations at La Brea/Regent may have to be modified to accommodate track splitting approaching the La Brea Station. Possible sidewalk impacts at crossing locations (Florence/La Brea, Manchester/La Brea).

If La Brea is made into a one-way street (in a couplet with Market), then the guideway would be placed behind the west sidewalk, eliminating the roadway configuration problems. Three travel lanes could be accommodated with turn lanes and on-street parking on both sides, while four travel lanes could be accommodated with parking on at least one side.

- Manchester Blvd., La Brea to Prairie. Center-running alignment would displace existing left-turn lanes. Left-turns could possibly be retained in places by eliminating on-street parking. Access across the median of Manchester at minor, unsignalized streets would be eliminated.
- ATSF ROW, 67th Street to Centinela. While this portion of the alignment is out of the street ROW, cross streets will be impacted. A cul-de-sac would be installed on Victoria Avenue at the ATSF ROW. The at-grade crossings of Brynhurst Avenue and West and Redondo Boulevards will be impacted by frequent LRT crossings at moderate speeds (because of the proximity to the West station and the horizontal & vertical curve e/o Brynhurst).
- Prairie, Century Blvd. to 111th Street. Center-running alignment would displace existing reversible median lane, although spot widening at Century and Lennox could allow left-turns to be made. Minor widening may be necessary throughout to accommodate the guideway support median. (Adjacent redevelopment areas may allow for larger widening that could accommodate both the guideway and reversible left-turn lane.)

Access across the median of Prairie from minor, unsignalized intersections would be lost.

- Hawthorne Blvd., Century Freeway to Imperial. It may be necessary to reroute lanes around guideway support columns in this segment, as the guideway moves into the median from the Hawthorne Station parking area.

### Side-Running Alignment

There will generally be few roadway impacts in side-running segments of the alignment, because the median supports and station footprints will be out of the street. Other impacts may occur, however, to both on- and off-street parking supplies, as well as circulation patterns in off-street parking lots in which guideway support columns would be placed.

In most street segments where the alignment is side-running, the guideway is located above one of the medians that separate the Crenshaw frontage roads from the main Crenshaw roadway. In these segments of Crenshaw (including from Exposition to 39th and from Vernon to Slauson), the primary roadway configuration impact would be the loss of one on-street parking space approximately every 100 to 140 feet to accommodate guideway columns. This would be equivalent to approximately one in every five on-street parking spaces along the inside of the frontage lane. The guideway in these locations would not affect through traffic lanes, left-turn lanes, sidewalk widths, or necessary ROW.

Other side-running segments may have greater roadway configuration impacts because the guideway columns would be located either behind the curb (creating sidewalk impacts) or behind the sidewalk (creating property impacts and potential parking impacts).

Specific areas of potential impact in side-running segments include the following:

- Crenshaw, Exposition to 39th. In this segment, the primary impact will be a loss of one on-street parking space every 100 to 140 feet (one in every five or six spaces) on the west side of the east frontage road, and impacts to the Boys Market shopping center parking lot from Coliseum to Rodeo.
- Crenshaw, 39th to MLK. Current - As the alignment crosses over from the east to west side of Crenshaw just south of 39th, there may be impacts to sidewalk widths due to column supports or straddle bents. There may also be impacts to circulation and parking areas on the west side of Crenshaw due to column placements.



- Crenshaw, MLK to Stocker. There are likely impacts to parking areas and circulation patterns in parking lots west of the curb along this segment due to placement of columns.

### Construction Impacts

The construction of light rail transit in this corridor would also result in temporary construction impacts to roadway configurations, as well as intersection and station area impacts. The most severe impacts would again occur where the alignment is center-running. Construction of the LRT guideway in the median of existing arterials would likely result in the temporary loss of one traffic lane on each side of the median. In side-running locations, the temporary loss of one traffic lane adjacent to the alignment may be required for construction and lay-down areas. Additional locations may be impacted by the need for temporary lay-down areas, and construction areas would also be impacted by the movements of heavy vehicles.

#### **4.2.2 Intersection Impacts**

Intersection impacts will occur primarily where the alignment is center-running, including:

- Pico from Muirfield to Crenshaw
- Crenshaw from Pico to Exposition
- Crenshaw from Stocker to Vernon
- Crenshaw from 60th to 67th
- Manchester from La Brea to Prairie
- Prairie from Century to 111th Street
- Hawthorne from Imperial to El Segundo
- La Brea from Florence to Manchester

Intersection impacts will generally be limited to potential loss of left-turn lanes and revised intersection geometry in some locations. In each of the segments listed above, with the exception of Hawthorne from Imperial to El Segundo, there is inadequate ROW to accommodate the 12-foot guideway support median and the existing through traffic lanes while still maintaining left-turn lanes at intersections and/or on-street parking. In most of these segments, the options are to eliminate left-turn lanes, or to widen the street enough to accommodate additional left-turn lanes at intersections. Widening the street would require additional ROW in most areas. (This could be done in conjunction with narrowing of lane and sidewalk widths, if appropriate, to minimize the additional ROW needed.) In the segments on La Brea and Manchester, removal of on-street parking may provide the needed 12 feet for the median, allowing left-turn lanes to be retained at intersections.

Where widening may be necessary to retain left turns at intersections, two intersection configurations are possible. The first option is to provide a 32 foot median island for the LRT guideway, with 11 foot left turn lanes cut into the island at intersections. This may

require substantial street widening, but would retain the left-turn lanes in their normal configuration, with one on each side of the island. An option which would require less right-of-way would be to utilize a minimum 23 foot median island and offset left-turn lanes so that both would be on one side of the island.

While street widening or elimination of parking may allow left-turn lanes at most intersections, additional ROW at center running stations would be needed to maintain left-turn lanes at these locations. At proposed stations such as Crenshaw/Washington, La Brea/Market, Prairie/111th and Hawthorne/El Segundo, up to an additional 30 feet of ROW could be required to maintain left-turn lanes. At these station locations, room for left-turn lanes would be made by having passengers board and alight via overhead bridges from the sidewalks, rather than from a plaza immediately underneath the station. Instead of the required 40 feet for a station footprint, therefore, only 24 feet would be required for the support columns, leaving 14-16 feet available for use as left-turn lanes. A cross-section of this type of station configuration is shown in Figure 1.

#### 4.2.3 Station Area Impacts

Station area impacts could include reductions/increases in the parking supply (both on- and off-street), changes to bus stop locations or bus routes, street realignment, sidewalk impacts (due to column supports, sidewalks and elevators), property development, and ROW needs. The anticipated off-street parking provided at each station or in adjacent developments is noted in Table 15. Some potential station ROW impacts have been noted above in Section 1.1.2, Intersection Impacts. Other specific station area impacts include:

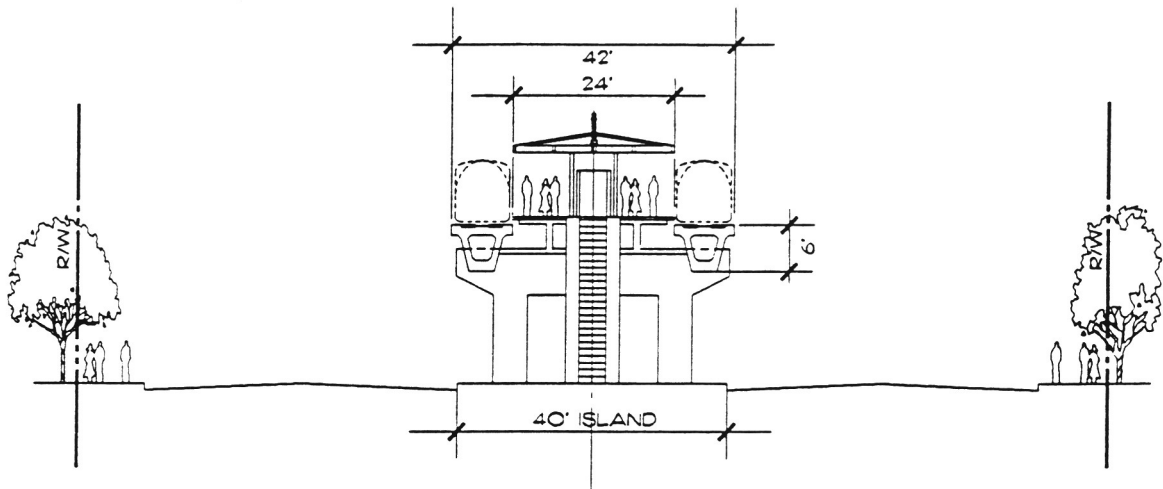
- Crenshaw/Washington Station. An additional 30 feet of ROW would be required to establish a median under station and landing points for stairs/etc. on sidewalks on either side of Crenshaw. Left-turns would be made from under the station as illustrated in Figure 1. No parking will be provided at this station.
- Crenshaw/Exposition Station. The combination of two stations here—the Exposition Line and Crenshaw/ Prairie Line—creates an opportunity for new development which could accommodate 100-200 park-and-ride spaces. Potential sidewalk impacts from the station could be accommodated through redevelopment of adjacent parcels.
- Crenshaw/Slauson Station. The station footprint south of Slauson will result in the need for either approximately 30 feet of additional ROW on the east side of Crenshaw south of Slauson, or realignment of the travel lanes just north of Slauson. Realignment could be accomplished by eliminating part of the southbound frontage road and shifting lanes west just north of the intersection.

**Table 15  
Summary of Station Parking**

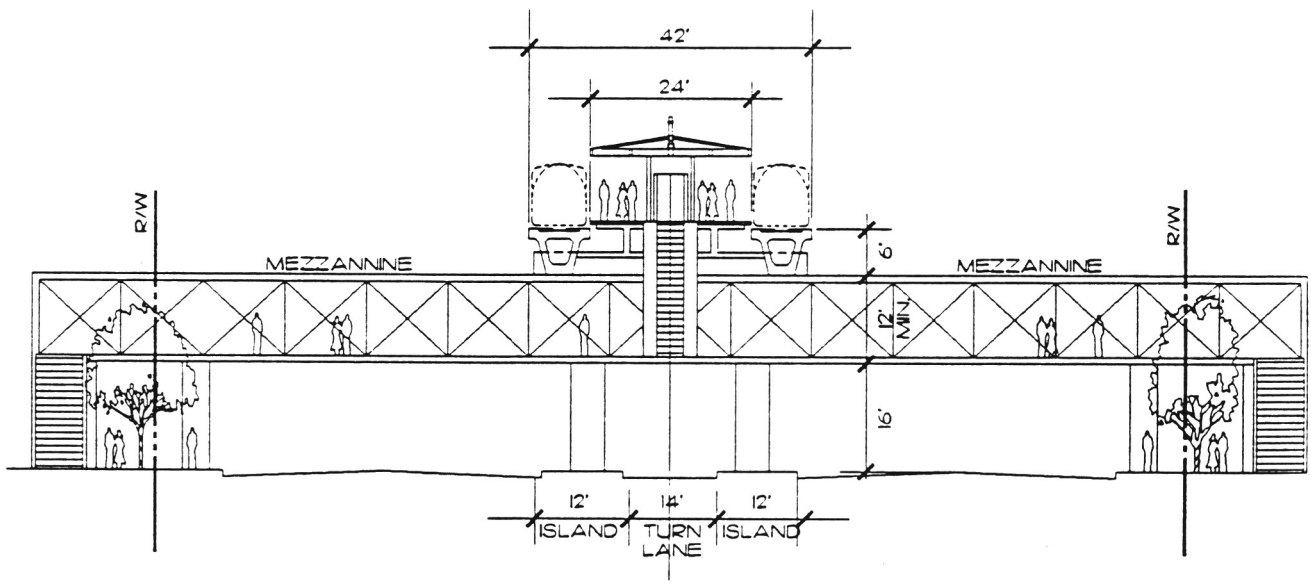
STATION AREA	Alt.1	Alt.2	Alt.3	PARKING SPACES	TYPE OF PARKING
Pico/San Vicente	A	S	A	1000+	Structure
Crenshaw/ Washington	A	S	A	None	N/A
Crenshaw/ Exposition	A	S	A	100 - 200	Structure parking with joint development
Crenshaw/King	A	-	A	500 - 1000	Structure parking with mall
Marlton/King	-	S		500 - 1000	Structure parking with shared parking
Crenshaw/Vernon	A	-	A	None	N/A
Crenshaw/Slauson	A	S	A	50 - 100	At-Grade shared parking
West/Florence	G	S	G	50 - 100	At-Grade shared parking
La Brea/Queen	A	-	-	100 - 200	Structure parking
Market/Queen	-	S	-	100 - 200	Structure parking
Prairie/98th/Forum	A	S	-	500 - 1000	At-Grade shared parking
Prairie/Century/ Hollywood Park	A	S	-	500 - 1000	At-Grade shared parking
Prairie/111th	A	-	-	None	N/A
Hawthorne/ Imperial	A	S	-	600	At-Grade parking with possibility for structured parking in future if demand warrants
Hawthorne/EI Segundo	A	S	-	200 - 300	Structure shared parking
Florence/La Brea	-	-	A	500	At-Grade parking
Manchester/Florence / Aviation	-	-	A	None	N/A
Parking Lot C (LAX)	-	-	A	None	N/A
Total	12A, 1G	12S	9A, 1G		

Note: A - Aerial, S - Subway, G - At-Grade





**'STATION' - CENTER PLATFORM**  
**AT-GRADE ACCESS**



**'STATION' - CENTER PLATFORM**  
**MEZZANNINE ACCESS**

086-1M41.DWG

- **Prairie/111th Street Station.** To accommodate a center-running station, Prairie would have to be widened here by approximately 30-40 feet.
- **Hawthorne/Imperial Station.** The placement of columns in the planned Green Line parking area would result in some lost surface parking. Also, the planned parking at the Green Line station would now be shared between the Green Line and Crenshaw/Prairie Line.

### 4.3 Alternative 2 - Subway

Alternative 2 would have minimal traffic impacts because the alignment is completely grade-separated. The majority of the alignment is in subway, with a portion in a grade-separated open trench along the railroad right-of-way. Because the alignment never crosses or runs within existing roadways, Alternative 2 would have no permanent impacts on roadway or intersection configurations.

Alternative 2 would have some temporary impacts on intersections and traffic lanes, however, during construction. Temporary portals would be constructed to remove dirt during tunneling, and streets in the area of these portals could suffer temporary lane reductions, as well as heavy truck traffic. Construction impacts would also be felt around station areas, where cut-and-cover construction techniques would be used. Roadway surfaces would be replaced by planks covering the construction area while stations were being built.

The primary permanent impacts of Alternative 2 would occur at station areas, and would be caused by the subway portals. The location of portals could impact sidewalks (reducing the width of sidewalks where portals are placed) and adjacent properties.

### 4.4 Alternative 3 - LRT to LAX

The traffic impacts of Alternative 3 are identical to those of Alternative 1 from the Pico/San Vicente station to the intersection of La Brea and Florence. At this point, the alignment of Alternative 3 diverges from the Alternative 1 alignment, continuing along the ATSF ROW and eventually reaching LOT C at LAX. The only traffic impacts reviewed here, therefore, are those from the point where Alternative 3 diverges from Alternative 1.

Because the additional segment of Alternative 3 runs primarily in railroad ROW and in Parking Lot C of LAX, there are few additional roadway impacts in this alternative. Two streets, Cedar and Arbor Vitae, would be impacted by the increased frequency of at-grade LRT crossings. At other crossing locations, the alignment would be grade separated. This includes crossings of La Brea, Ivy, Eucalyptus, I-405 Freeway, La Cienega, Hindry, Isis and Manchester.

The alignment will leave the ATSF ROW at 96th Street, and run down the median of 96th on aerial structure into Lot C. The center-running alignment on 96th Street will prevent left-turns across 96th from Bellanca to Airport Blvd., requiring vehicles trying to reach parking areas north of 96th to use alternate routes. (Several alternate routes are available to these parking areas.) The intersection of Bellanca/96th Street may need to be reconfigured to ensure access to the properties north and south.

Column placements in Lot C will affect the parking supply there, as will the station footprint.

## Appendix





## Appendix

### Alternative 1:

AM Peak Hour On's, Off's, & Line Loads

Daily Boardings and Mode of Access Distribution

### Alternative 2:

AM Peak Hour On's, Off's, & Line Loads

Daily Boardings and Mode of Access Distribution

### Alternative 3:

AM Peak Hour On's, Off's, & Line Loads

Daily Boardings and Mode of Access Distribution

*NOTE: The figures in all six tables in the Appendix are derived from MTA forecasting model results, and do not include the trips estimated for special generators. See Tables 9 and 10 for summaries of boardings by line, with and without special generator trips.*



**CRENSHAW/PRAIRIE LINE 2010 PATRONAGE  
ALTERNATIVE 1 – AERIAL LRT  
AM PEAK HOUR ASSIGNMENT**

NODE	STATION	AM PEAK HOUR ASSIGNMENT						TOTAL PEAK HR ON+OFF
		SOUTHBOUND (Read Down)			NORTHBOUND (Read Up)			
		ON	OFF	LOAD	ON	OFF	LOAD	
12061	Pico/San Vicente	610	0		0	1,315		1,925
12400	Crenshaw/Washington	72	0	610	12	69	1,315	154
12321	Crenshaw/Exposition	318	37	682	125	368	1,372	848
12401	Crenshaw/King	28	82	964	155	32	1,614	297
12402	Crenshaw/Vernon	186	7	910	239	22	1,491	454
12403	Crenshaw/Slauson	74	116	1,090	149	70	1,274	409
12404	West/Florence	84	50	1,047	210	38	1,195	381
12405	LaBrea/Queen	70	133	1,081	202	64	1,023	470
12406	Prairie/98th/Forum	172	261	1,018	240	161	885	833
12407	Prairie/Century/ Hollywood Park	114	88	930	146	58	806	405
12408	Prairie/111th	41	40	955	135	10	718	226
12066	Hawthome/Imperial	50	765	956	326	73	593	1,213
12409	Hawthome/El Segundo	0	241	241	340	0	340	<u>581</u>
								8,197

Source: LACMTA Model Run 11/2/93.  
LA/CRENSHAWPAT-LL1  
Manuel Padron & Associates

18-Nov-93

**CRENSHAW/PRAIRIE LINE 2010 PATRONAGE  
ALTERNATIVE 2 – SUBWAY  
AM PEAK HOUR ASSIGNMENT**

		<b>AM PEAK HOUR ASSIGNMENT</b>						<b>TOTAL PEAK HR ON+OFF</b>
<b>NODE</b>	<b>STATION</b>	<b>SOUTHBOUND (Read Down)</b>			<b>NORTHBOUND (Read Up)</b>			
		<b>ON</b>	<b>OFF</b>	<b>LOAD</b>	<b>ON</b>	<b>OFF</b>	<b>LOAD</b>	
12061	Pico/San Vicente	816	0	816	0	1,608	1,608	2,425
12400	Crenshaw/Washington	81	1	896	3	56	1,662	141
12321	Crenshaw/Exposition	332	63	1,165	205	382	1,839	983
12401	Marlton/King	27	92	1,100	172	30	1,697	321
12402	Leimert Park	199	10	1,290	252	30	1,475	490
12403	Crenshaw/Slauson	84	132	1,242	161	84	1,398	462
12404	West/Florence	110	52	1,300	223	42	1,218	427
12405	Market/Queen	73	140	1,232	204	56	1,069	474
12406	Prairie/98th/Forum	166	333	1,066	277	170	962	946
12407	Prairie/Century/ Hollywood Park	112	90	1,088	164	59	856	425
12066	Hawthorne/Imperial	53	884	257	502	79	434	1,518
12409	Hawthorne/El Segundo	0	257		434	0		691
								9,302

Source: LACMTA Model Run 11/3/93.  
LA\CRENSHAWPAT-LL2  
Manuel Padron & Associates

18-Nov-93

**CRENSHAW/PRAIRIE LINE 2010 PATRONAGE  
ALTERNATIVE 3 – LRT TO LAX  
AM PEAK HOUR ASSIGNMENT**

		<b>AM PEAK HOUR ASSIGNMENT</b>						<b>TOTAL PEAK HR ON+OFF</b>
<b>NODE</b>	<b>STATION</b>	<b>SOUTHBOUND (Read Down)</b>			<b>NORTHBOUND (Read Up)</b>			
		<b>ON</b>	<b>OFF</b>	<b>LOAD</b>	<b>ON</b>	<b>OFF</b>	<b>LOAD</b>	
12061	Pico/San Vicente	545	0		0	1,148		1,692
12400	Crenshaw/Washington	64	0	545	11	58	1,148	134
12321	Crenshaw/Exposition	293	32	608	127	303	1,194	754
12401	Crenshaw/King	20	79	870	152	26	1,370	277
12402	Crenshaw/Vernon	170	5	810	238	17	1,244	430
12403	Crenshaw/Slauson	47	116	976	149	32	1,023	345
12404	West/Florence	85	67	906	208	22	906	382
12405	Florence/La Brea	70	261	924	388	18	720	737
12410	Manchester/Florence/ Aviation	90	272	733	258	14	350	635
12088	Lot C/LAX	0	551	551	106	0	106	657
								6,042

Source: LACMTA Model Run 11/4/93.  
LA\CRENSHAWPAT-LL3  
Manuel Padron & Associates

18-Nov-93

**CRENSHAW/PRAIRIE LINE 2010 PATRONAGE  
ALTERNATIVE 1 – AERIAL LRT  
STATION BOARDINGS & MODE OF ACCESS**

STATION	MODE OF ACCESS PERCENT OF TOTAL				TOTAL WEEKDAY BOARDINGS
	WALK	AUTO	BUS	RAIL	
Pico/San Vicente	17%	1%	3%	79%	7,100
Crenshaw/Washington	67%	21%	12%	0%	700
Crenshaw/Exposition	9%	11%	6%	74%	2,700
Crenshaw/King	54%	16%	30%	0%	1,200
Crenshaw/Vernon	71%	11%	18%	0%	1,700
Crenshaw/Slauson	54%	21%	25%	0%	1,700
West/Florence	31%	26%	43%	0%	1,600
LaBrea/Queen	26%	27%	47%	0%	1,800
Prairie/98th/Forum	50%	8%	42%	0%	3,000
Prairie/Century/Hollywood Pk.	47%	2%	51%	0%	1,600
Prairie/111th	47%	22%	32%	0%	900
Hawthorne/Imperial	5%	1%	3%	91%	4,300
Hawthorne/El Segundo	87%	13%	0%	0%	2,300
<b>Total</b>					<b>30,700</b>

Source: LACMTA Model Run 11/2/93.

Note: Percentages may not sum to 100% due to rounding.

LA\CRENSHAW\PAT-MA1  
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**CRENSHAW/PRAIRIE LINE 2010 PATRONAGE  
ALTERNATIVE 2 – SUBWAY  
STATION BOARDINGS & MODE OF ACCESS**

STATION	MODE OF ACCESS PERCENT OF TOTAL				TOTAL WEEKDAY BOARDINGS
	WALK	AUTO	BUS	RAIL	
Pico/San Vicente	18%	1%	3%	77%	8,900
Crenshaw/Washington	68%	19%	13%	0%	800
Crenshaw/Exposition	12%	12%	5%	71%	3,100
Marlton/King	57%	15%	28%	0%	1,300
Leimert Park	71%	11%	18%	0%	1,800
Crenshaw/Slauson	40%	18%	41%	0%	1,800
West/Florence	33%	25%	42%	0%	1,700
Market/Queen	25%	33%	42%	0%	2,000
Prairie/98th/Forum	53%	7%	40%	0%	3,300
Prairie/Century/Hollywood Pk.	46%	6%	48%	0%	1,700
Hawthorne/Imperial	5%	2%	3%	90%	5,200
Hawthorne/El Segundo	83%	17%	0%	0%	2,800
<b>Total</b>					<b>34,400</b>

Source: LACMTA Model Run 11/3/93.

Note: Percentages may not sum to 100% due to rounding.

LA\CRENSHAWPAT-MA2

Manuel Padron & Associates

18-Nov-93



CRENSHAW/PRAIRIE LINE 2010 PATRONAGE  
 ALTERNATIVE 3 – LRT TO LAX  
 STATION BOARDINGS & MODE OF ACCESS

STATION	MODE OF ACCESS PERCENT OF TOTAL				TOTAL WEEKDAY BOARDINGS
	WALK	AUTO	BUS	RAIL	
Pico/San Vicente	17%	1%	4%	78%	6,300
Crenshaw/Washington	68%	19%	13%	0%	700
Crenshaw/Exposition	10%	11%	7%	72%	2,400
Crenshaw/King	55%	14%	31%	0%	1,100
Crenshaw/Vernon	75%	7%	18%	0%	1,600
Crenshaw/Slauson	37%	18%	45%	0%	1,500
West/Florence	35%	22%	43%	0%	1,500
Florence/La Brea	56%	17%	27%	0%	2,900
Manchester/Florence/Aviation	64%	19%	16%	0%	2,200
Lot C/LAX	60%	0%	15%	25%	2,600
Total					22,800

Source: LACMTA Model Run 11/5/93.

Note: Percentages may not sum to 100% due to rounding.

LA\CRENSHAW\PAT-MA3

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## Land Value Assumptions

Location	Use	Unit	Cost
Pico/Rimpau	Commercial	sf	\$40
Crenshaw/Washington	Commercial	sf	\$40 Verify
Crenshaw/Expo	Commercial	sf	\$30
Crenshaw/King/Mariton	Commercial	sf	\$70
Crenshaw/Vernon	Commercial	sf	\$45
Crenshaw/Slauson	Commercial	sf	\$45
ATSF: Crenshw-Manchestr	Industrial	sf	\$40 Verify
Florence/West	Industrial	sf	\$40 Verify
Florence/La Brea/Market	Commercial	sf	\$50 Verify
Florence/La Brea	Industrial	sf	\$40 Verify
Florence/Manchester	Industrial	sf	\$30 Verify
LAX Lot C	Parking	sf	\$40
Prairie: Manchestr - Century	Parking	sf	\$55
Prairie: Century - 105 Fwy	Mixed	sf	\$30 Verify
Hawthorne/Imperial	Commercial	sf	\$30
Hawthorne/El Segundo	Commerical	sf	\$40 Verify
Corridor Average	Aerial Easement	lf	\$300 Verify – \$10/sf * 30 ft assumed
Corridor Average	Subway Easement	lf	\$200 Verify – \$5/sf * 40 ft assumed

## Alternative 1 – Aerial LRT

### Alignment:

Location	Use	Unit	Quantity	Rate	Amount	Comments
Crenshaw/Pico	Apartments	sf	30,000	\$40	\$1,200,000	Alignment impact
Crenshaw/Pico	Commercial	sf	36,000	\$40	\$1,440,000	Alignment impact
Crenshaw So. of Rodeo	Aerial Easement	lf	500	\$300	\$150,000	Over parking
Crenshaw: 39th - Stocker	Aerial Easement	lf	1,800	\$300	\$540,000	Over parking
Crenshaw @ AT&SF r/w	Industrial	sf	20,000	\$40	\$800,000	Alignment impact
La Brea/Manchester	Commercial	sf	22,400	\$50	\$1,120,000	Alignment impact
Prairie: Manchester - Century	Aerial Easement	lf	4,800	\$300	\$1,440,000	Over parking
Prairie: Century-105 Fwy	Resid'l & Comm'l	sf	92,400	\$30	\$2,772,000	Street widening (mitigation)

### Stations:

Location	Use	Unit	Quantity	Rate	Amount	Comments
Pico/San Vicente	Other			\$0	\$0	Use existing station site
Crenshaw/Washington	Widen Street Commercial	sf	17,600	\$40	\$704,000	
	Vertical Access Commercial	sf	10,000	\$40	\$400,000	Could sell unused portion
Crenshaw/Exposition	Station Site Commercial	sf	90,000	\$30	\$2,700,000	Potential for Joint Dev't.
Crenshaw/King	Footprint Commercial	sf	8,000	\$70	\$560,000	
Crenshaw/Vernon	Station Site Commercial	sf	48,000	\$45	\$2,160,000	Potential for Joint Dev't.
Crenshaw/Slauson	Footprint Other	sf	8,000	\$0	\$0	Access on roadway island
West Blvd n. of Florence	Station Site Commercial	sf	120,000	\$40	\$4,800,000	
La Brea/Queen	Vertical Access Government	sf	1,000	\$0	\$0	Access on city hall lands
Prairie @ Forum	Footprint Commercial	sf	8,000	\$55	\$440,000	
Prairie @ Hollywood Park	Footprint Commercial	sf	8,000	\$55	\$440,000	
Prairie @ 111th Street	Vertical Access Commercial	sf	2,500	\$30	\$75,000	
Hawthorne/105 Fwy	Vertical Access Other	sf	2,500	\$0	\$0	Use existing station site
Hawthorne/EI Segundo	Vertical Access Commercial	sf	2,500	\$40	\$100,000	

**Total for Alternative 1 (thousand \$'s)**

**\$21,841**

## Alternative 2 – Subway

### Segment:

Location	Use	Unit	Quantity	Rate	Amount	Comments
Venice - Crenshaw	Subway Easement	lf	1,700	\$200	\$340,000	
39th - Vernon	Subway Easement	lf	3500	\$200	\$700,000	
Crenshaw - AT & SF r/w	Subway Easement	lf	400	\$200	\$80,000	
La Brea - Manchestr - Prairie	Subway Easement	lf	1,200	\$200	\$240,000	
Prairie: Manchestr - Century	Subway Easement	lf	4,600	\$200	\$920,000	
Prairie/Century - 105 Fwy	Subway Easement	lf	4,800	\$200	\$960,000	

### Stations:

Location	Use	Unit	Quantity	Rate	Amount	Comments
Pico/San Vicente	Other			\$0	\$0	Use existing station site
Crenshaw/Washington	Portal Commercial	sf	10,000	\$40	\$400,000	Could sell unused portion
Crenshaw/Exposition	Station Site Commercial	sf	90,000	\$30	\$2,700,000	Potential for Joint Dev't
King/Mariton	Portal & Access Commercial	sf	10,000	\$70	\$700,000	Potential for Joint Dev't
Crenshaw/Vernon	Portal Commercial	sf	2,500	\$45	\$112,500	Joint development context
Crenshaw/Slauson	Portal Commercial	sf	2,500	\$45	\$112,500	Joint development context
West Blvd n. of Florence	Station Site Commercial	sf	120,000	\$40	\$4,800,000	
Market/Regent	Portal Commercial	sf	2,500	\$50	\$125,000	Joint development context
Prairie @ Forum	Portal Parking	sf	2,500	\$55	\$137,500	Joint development context
Prairie @ Hollywood Park	Portal Parking	sf	2,500	\$55	\$137,500	Joint development context
Hawthorne/105 Fwy	Other	sf	2,500	\$30	\$75,000	Use existing station site
Hawthorne @ El Segundo	Portal Commercial	sf	2,500	\$40	\$100,000	Joint development context
<b>Total for Alternative 2 (thousand \$'s)</b>					<b>\$12,640</b>	

## Alternative 3 – LRT to LAX

### Alignment:

Location	Use	Unit	Quantity	Rate	Amount	Comments
Crenshaw/Pico	Apartments	sf	30,000	\$40	\$1,200,000	
Crenshaw/Pico	Commercial	sf	36,000	\$40	\$1,440,000	
Crenshaw So. of Rodeo	Aerial Easement	lf	500	\$300	\$150,000	
Crenshaw: 39th - Stocker	Aerial Easement	lf	1,800	\$300	\$540,000	
Crenshaw @ AT&SF r/w	Industrial	sf	20,000	\$40	\$800,000	
AT&SF r/w @ 96th St	Industrial	sf	80,000	\$40	\$3,200,000	
AT&SF r/w - 96th St	Aerial Easement	lf	400	\$300	\$120,000	

### Stations:

Location	Use	Unit	Quantity	Rate	Amount	Comments
Pico/San Vicente	Other			\$0	\$0	Use existing station site
Crenshaw/Washington	Widen Street Commercial	sf	17,600	\$40	\$704,000	
	Vertical Access Commercial	sf	10,000	\$40	\$400,000	
Crenshaw/Exposition	Station Site Commercial	sf	90,000	\$30	\$2,700,000	Potential for Joint Dev't
Crenshaw/King	Footprint Commercial	sf	8,000	\$70	\$560,000	
Crenshaw/Vernon	Station Site Commercial	sf	48,000	\$45	\$2,160,000	Potential for Joint Dev't
West Blvd n. of Florence	Station Site Industrial	sf	120,000	\$40	\$4,800,000	
La Brea/Florence	Station Site Industrial	sf	82,500	\$40	\$3,300,000	
Manchester/Florence	Industrial	sf	0	\$50	\$0	On-street drop-off only
LAX Lot C	Footprint & Access Parking	sf	20,000	\$40	\$800,000	

**Total for Alternative 3 (thousand \$'s)**

**\$22,874**

