

Draft Report

**ESEA GREEN LINE CIRCULATOR
FEASIBILITY REPORT**

Prepared for

El Segundo Employers Association

Prepared by

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Table of Contents

I. INTRODUCTION 1

II. SETTING 3

 Existing Bus Service 3

 Existing Transit Service to Each Station 3

 Proposed Changes in Existing Fixed Route Service 7

 Existing Private Shuttle Services 10

 Courtesy Van Service to LAX 10

 El Segundo Employer Shuttle Services 10

 Constraints Identification 12

III. PATRONAGE AND LAND USE ISSUES 20

 Green Line Ridership Estimate 20

 Identification of Major Employers 20

 Employment Concentrations 24

 Patronage Estimate 24

 1990 Census Home-to-Work Data 26

 Analysis Areas 26

IV. ALTERNATIVES CONSIDERED 28

 Service Characteristics 28

 Basic Requirements 28

 Potential Enhancements 29

 Evaluation Criteria 29

 Weighting of Evaluation Criteria 30

 Range of Alternatives 31

 Service Options 31

 Service Delivery Issues 31

 Elements Potentially Common to Any Alternative 31

 Opportunities for Demonstration Projects 32

 Description of Alternative Concepts 33

 Task Force Discussion of Concepts 42

V. EVALUATION OF ALTERNATIVES 44

 Preliminary Evaluation of Green Line Circulator Alternatives 44

 Descriptions of Alternatives 44

 Alternative 1A: MTA Study Lines 8A and 8B 45

 Alternative 1B: Torrance Line T-8 and MAX Lines 2/3 Modifications 48

 Alternative 2: Two Fixed Routes, One in North and One in South 50

 Alternative 3: Three Fixed Routes 53

 Alternative 4: Shuttles serving each El Segundo Station 56

 Alternative 5: Demand responsive shuttles serving zones around each
 El Segundo station 59

 Evaluation Criteria Comment to All Alternatives and Potential Obstacles 62

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ESEA Green Line Circulator Study

DRAFT REPORT

	Summary	65
VI.	RECOMMENDATIONS	67
	Recommendations	67

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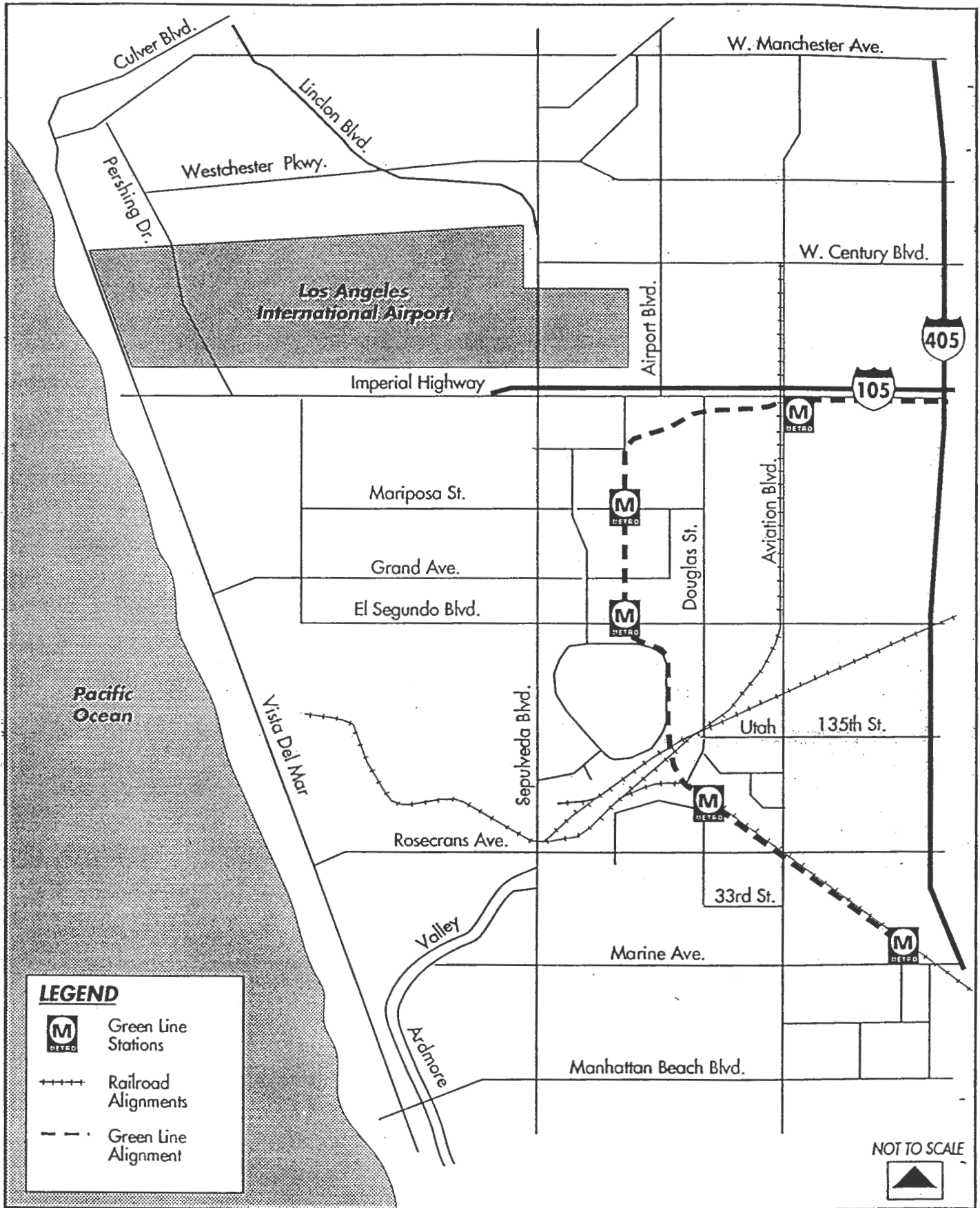
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I. INTRODUCTION

This report has been prepared on behalf of the El Segundo Employers Association (ESEA) with financial support from the Los Angeles County metropolitan Transportation Authority (MTA) to identify ways in which transit service linking the El Segundo employment area to the planned Green Line rail stations can best be coordinated. The Metro Green Line is currently under construction by the MTA, with revenue operations expected to begin in June or July of 1995. Five stations are under construction in the El Segundo area: the Aviation Station, located south of Imperial Highway and east of Aviation Boulevard, the Nash/Mariposa Station, located at the southwest corner of Nash and Mariposa, the El Segundo Station, straddling the intersection of Nash and El Segundo Boulevards, the Douglas Station, on Douglas Street, north of Rosecrans Avenue, and the Marine Station, the terminus of the Green Line at Marine Avenue, near Redondo Beach Avenue (formerly Freeman Street). Figure 1 illustrates the study area for this project and the locations of the Green Line stations which are currently under construction. A potential sixth station in the El Segundo area has been proposed between the Aviation and Nash/Mariposa stations, just south of the Kilroy Center. This station, to be called the Del Norte station, may be added to the Green Line in the future when funding is identified. It is intended that the transit service recommended in this report be capable of expansion/modification to also serve the Del Norte station in the future.

One of the major goals of this study was to identify mechanisms by which the public transit services operated by the MTA and municipal operators could be coordinated with and supported by para-transit services operated by private entities (e.g., employers, hotels). To assist in that spirit of public-private cooperation, a Green Line Circulator Task Force was assembled by the ESEA including representatives of major employers, property owners, City staffs, the MTA, Los Angeles Department of Airports, and other interested parties. This study has been guided by the input of the Task Force, which provided policy direction and input on the recommendations.

Simultaneous to this planning effort by ESEA, the MTA was also preparing a Bus/Rail Interface Plan for the opening of the Green Line. That plan addresses potential changes in fixed route transit services operated by the MTA to better connect the bus system to the rail stations along the entire length of the Green Line, from El Segundo to Norwalk, and suggests some potential changes that might be implemented by municipal carriers. It also suggests that shuttle service be implemented in the El Segundo area and solicits input as to the specifics of such shuttle service. The MTA Bus/Rail Interface Plan has not yet been approved by the MTA Board, but this study has coordinated with MTA staff. It assumes that the proposed changes in MTA fixed route services are likely to be implemented and focuses on how shuttles service in the El Segundo are could best complement those fixed routes.



II. SETTING

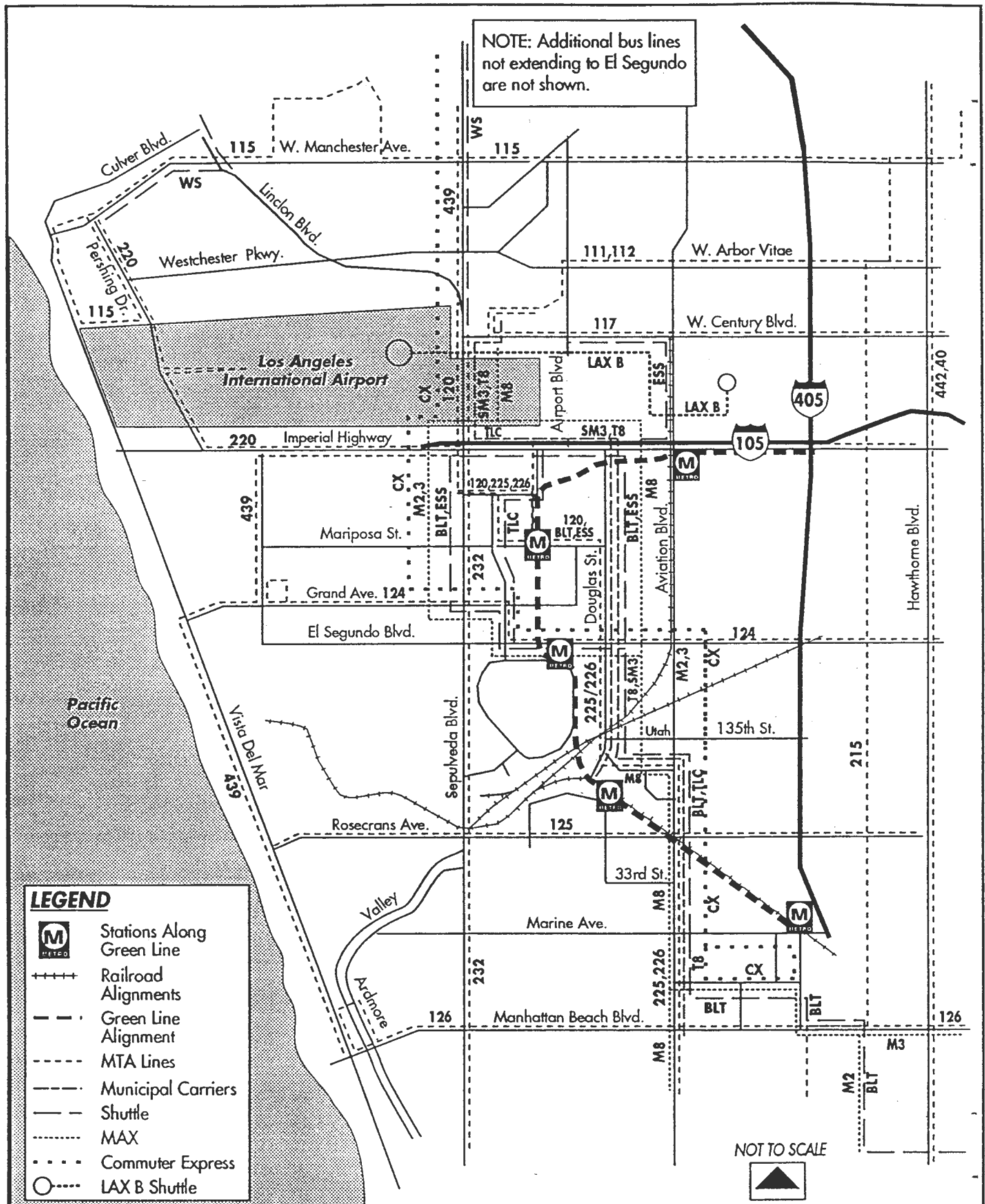
This chapter of the report provides a summary of existing transit service in the study area, both public transit and privately operated shuttles. It is followed by a description of how those services are likely to be modified to serve the green Line stations. It should be noted that some of the potential service changes are still under consideration and many of the private operators are uncertain as to how they may serve the Green Line. Many want to "wait and see" or are interested in the outcome of this study by the ESEA to see how they might participate in a consolidated shuttle system. The setting, or base conditions, to which the shuttle service(s) will be added is an evolving situation.

Existing Bus Service

The primary provider of transit service within the study area is the Los Angeles County Metropolitan Transportation Authority (MTA). A total of 14 MTA lines provide service in this area. Additional bus service within the area is provided by the City of Santa Monica and the City of Torrance. There are a number of additional lines that run in the area including: 1) The Municipal Area Express (MAX) has two lines within the study area. MAX is a South Bay Commuter Bus Service sponsored by the jurisdictions of El Segundo, Lawndale, Los Angeles, Rancho Palos Verdes, Torrance and L.A. County. Funded in partnership with the MTA, the City of Torrance administers the contract for the MAX lines as the lead agency. 2) The Los Angeles Department of Transportation Commuter Express has one line in the area. 3) There is The Lincoln Commuter (TLC) which is a shuttle service which is operated by the Santa Monica Municipal Bus Lines under the administration of the Westchester/LAX TMA. 4) Two shuttles, the Westchester LAX Shuttle and the El Segundo LAX Shuttle which are also referred to as the "Rabbit Transit", are funded by the Business Development Operating Fund and operated by MTA. 5) The Blue Line Transfer (BLT) is operated by MTA and connects the Metrolink Blue Line Artesia Station to the El Segundo Employment area. Funding for the Rabbit and BLT shuttles is scheduled to expire at the end of the current fiscal year (June 30, 1995), so they cannot be assumed as part of the base condition when the Green Line opens. Figure 2 illustrates the existing transit routes in the study area which travel near a Green Line station.

Existing Transit Service to Each Station

This section describes the existing bus lines that currently stop at the intersections adjacent to the Metro Green Line Stations. There are nine different lines which currently serve the stations and would not require rerouting. These include three MTA bus lines, the El Segundo Shuttle or "Rabbit", an LADOT Commuter Express Line, two Municipal Area Express (MAX) lines, The Lincoln Commuter (TLC), and the Blue Line Transfer (BLT). The lines are described by the station they would serve.



Aviation Station

Line 120 is an east/west route that runs from the LAX City Bus Center at Lot C along Imperial Highway to Brea. It passes South West College, the Imperial Blue Line Station, Rancho Los Amigos Medical Center, La Habra Fashion Square and Brea Mall. Monday through Friday the line operates from 5:00 AM to 12:00 midnight with a 15 minute headway during the peak hours and 30 minutes in the off-peak. Saturdays the line operates from 5:00 AM to 12:00 midnight with 30 minute headways. Sundays and holidays the hours of operation are from 6:00 AM to 1:00 midnight with 30 minute headways. East and westbound Line 120 run along Imperial Highway and stop farside of the Aviation Boulevard intersection near the Aviation station. At this stop, the daily boarding and alighting for eastbound Line 120 is 16 and 1, respectively. For westbound the boarding is zero and alighting is 15 on a typical day.

El Segundo Shuttle (Rabbit) currently runs from the Lot C LAX City Bus Center across Century Boulevard to Aviation south on Aviation to El Segundo, west to Continental Boulevard and north to Grand Avenue where it goes west to Imperial Highway then north on Aviation. The Line operates Monday through Friday from 6:00 AM to 9:40 AM and from 3:00 PM to 6:40 PM with 15-20 minute headways. The Line stops farside in the southbound direction and farside for the northbound direction after making the left turn onto Aviation Boulevard.

Nash/Mariposa Station

As noted above, **Line 120** extends from LAX to Brea. In the westbound direction, it diverts off of Imperial Highway through the El Segundo employment center and runs along Mariposa and turns right onto Nash. The Line stops nearside of Nash before the turn. Eastbound Line 120 runs along Nash and turns left (South) onto Mariposa. The Line stops farside of Nash after the left turn. The daily boarding is 19 and alighting is 6 for eastbound and 1 and 32 respectively for westbound on a typical weekday.

Lines 225, 226 are north/south lines that run from LAX to Palos Verdes. Line 225 runs from LAX City Bus Center along Aviation Boulevard to the Palos Verdes Peninsula and San Pedro. Within the study area, they follow the same route. Line 226 runs from LAX City Bus Center along Aviation Boulevard to Palos Verdes Drive West. Line 225 passes Wayfarers Chapel, Peninsula Shopping Center and the Court Yard and Malaga Cove Plaza. Line 226 passes Golden Cove Shopping Center, Peninsula shopping center and the Court Yard and Malaga Cove Plaza. Both Lines 225 and 226 operate Monday through Saturday from 6:00 AM to 8:00 PM with headways of 30 minutes. The line does not operate on Sundays. The lines run on East leg of Nash and North leg of Mariposa. Stops for Northbound are nearside of Mariposa before the right turn and farside of Mariposa after the left turn for Southbound of the intersection. On a typical day southbound Line 225 and 226 has 5 boardings and one alighting. Northbound has zero boardings and 4 alightings.

El Segundo/Nash Station

Line 124 is an east/west line that runs from Richmond Street (west of Sepulveda Boulevard) along El Segundo Boulevard to the Compton Transit Center. It passes the Martin Luther King Hospital, Imperial Blue Line Station, Compton Blue Line Station and Compton Transit Center. Monday through Friday the line operates from 5:00 AM to 8:30 PM with 30 minute headways during the peak hours and 1 hour headways during the off peak hours. Saturdays, Sundays and holidays the hours of operation are from 9:20 AM to 7:00 PM with 1 hour headways all day. The westbound route stops nearside of Nash and

eastbound stops farside. The daily boarding for eastbound Line 124 is six and zero alightings. For westbound there are zero boardings and 7 alightings on a typical day.

Line CX 574 is a north/south commuter express route that runs from the Sylmar Metrolink station and San Fernando Valley to LAX and El Segundo. Line 574 passes near North Hills shopping center, Van Nuys Airport, Balboa Golf Course, Encino Park and Ride, LAX Transit Center and LA International Airport. The route operates Monday through Friday from 5:15 to 8:45 AM and from 3:30 to 7:35 PM with 25-30 minute headways. Stops are made farside for eastbound El Segundo and nearside for westbound. Ridership information, by stop, was not available at this time.

MAX 2,3 are north/south routes that run from El Segundo to Palos Verdes Peninsula (MAX 2), and San Pedro and Torrance (MAX 3). Within the study area, both MAX lines follow the same route. MAX 2 passes the Galleria at South Bay, Little Co. of Mary Hospital, the Del Amo Financial Center, the Peninsula Center and Golden Cove Center. MAX 3 passes El Camino College, Magnavox, Reynolds Metals, Charles H. Wilson Park, the Hi-Shear Corporation, Peck Park, Ft. MacArthur, and USAF Housing. The lines operate Monday through Friday from 5:20 AM to 8:35 AM and from 3:45 PM to 7:00 PM with 25 to 30 headways. The Lines run along El Segundo Boulevard and stop nearside of Nash Street.

El Segundo Shuttle (Rabbit) runs along El Segundo Boulevard and stops nearside of Nash Street.

TLC. The Lincoln Commuter is a commuter shuttle operated by Santa Monica Municipal Bus Lines, under contract to the Westchester/LAX TMA, and connects the El Segundo Employment Center to Santa Monica via Lincoln Boulevard. The line operates Monday through Friday from 6:00 AM to 8:15 AM and 3:30 PM to 5:45 PM with 20 minute headways in the morning and 30 minutes in the afternoon. The TLC runs along El Segundo Boulevard and stops farside of Nash Street.

BLT. The Blue Line Transfer runs from the Artesia Blue Line Station across the Artesia freeway and north along Inglewood Avenue, Freeman Avenue, and Aviation Boulevard to the El Segundo Employment Area. The line makes a clockwise loop along El Segundo Boulevard, Continental Boulevard, Grand Avenue, Sepulveda Boulevard, Imperial Highway and Douglas Street. The line operates Monday through Friday from 4:30 AM to 9:30 AM and from 3:00 PM to 8:00 PM with 20 minute headways. The line does not operate on weekends and Holidays. The BLT runs westbound on El Segundo Boulevard and stops nearside of Nash Street.

Douglas Station

There are no lines that currently stop at this station.

Marine Station

Line CX 574 is a north/south express route that runs from Inglewood to El Segundo. It passes the LAX Transit center and the El Segundo Golf Course. The Line operates Monday through Friday from 5:20 - 8:45 AM and 3:35 - 7:35 PM. The headways are 20-30 minutes. The Line stops farside of Nash going southbound and nearside of Nash in the northbound direction.

Proposed Changes in Existing Fixed Route Service

This section describes MTA bus lines that could be rerouted or extended to stop at one of the Green Line Stations. It is based on proposals developed by MTA staff, as reflected in the Revised Green Line Bus/Rail Interface Plan. The section is again organized by station and then by line within each station area. Lines that were previously described above, as currently serving a station, are only mentioned if they are proposed to be rerouted to better serve the stations. Most of the lines described herein are lines which will be extended to serve Green Line stations. The description of where the line travels is followed by the suggested change to the line so that it stops at the station and then by the lines current hours of operation including days and headways. Figure 3 illustrates the proposed MTA routes in the study area.

Aviation Station

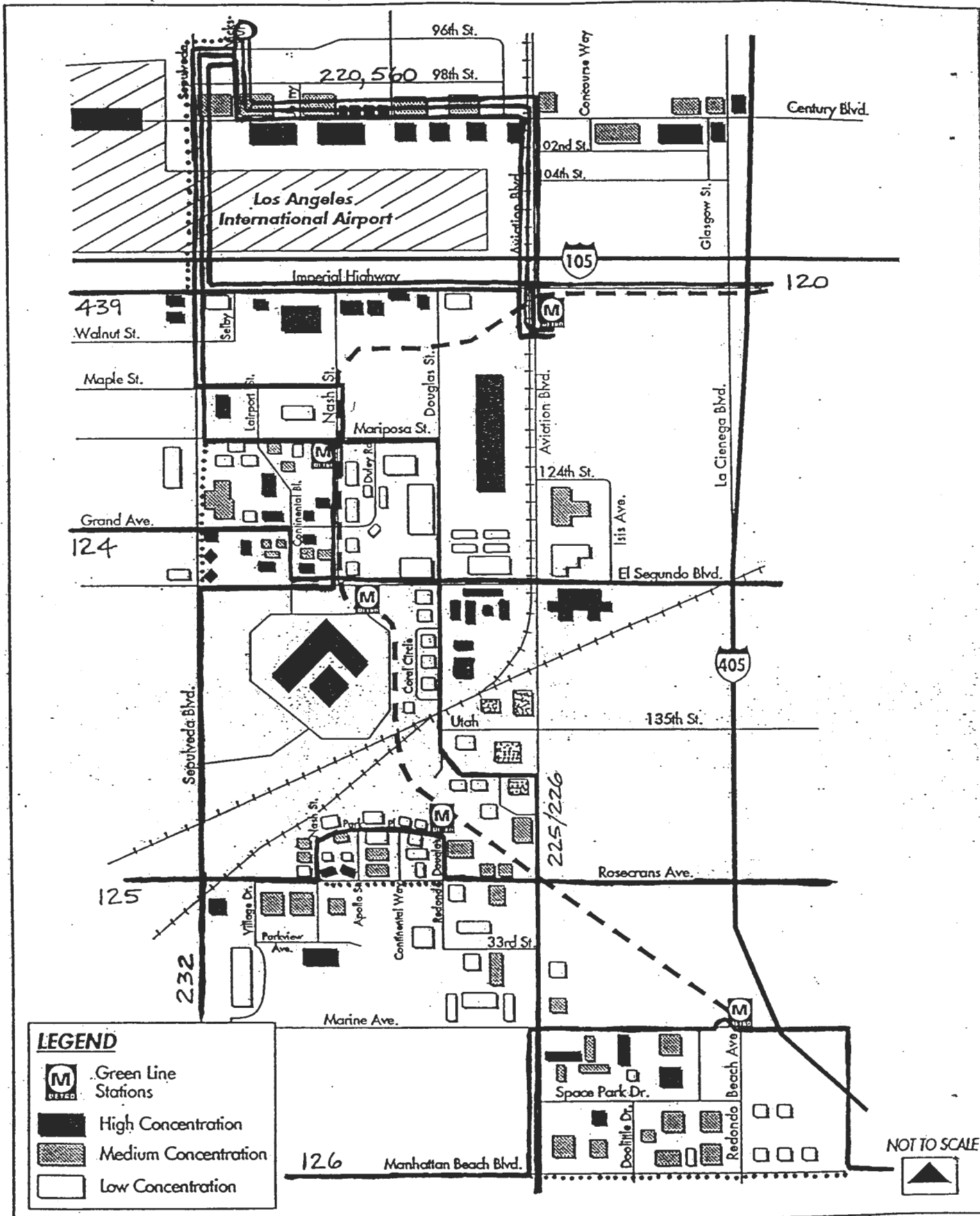
Line 120, on Imperial Highway, is proposed to be diverted off of Imperial Highway via Aviation Boulevard for one block to 116th Street to enter the Aviation station bus layover zone.

Line 560 is an express north/south line that runs from San Fernando to the LAX City Bus Center. It passes Panorama City center, Van Nuys Metrolink Station, Sherman Oaks Galleria, Mulholland Park-Ride Lot, UCLA, Federal Building, and the Fox Hills Mall. Line 560 would be extended from the City Bus Center to Century Boulevard and then south on Aviation Boulevard to the Aviation station. The Line operates Monday through Friday from 4:00 AM to 1:45 AM with 10 to 15 minute headways all day. Saturdays, Sundays, and Holidays the Line operates from 5:30 AM to 1:45 AM with 10 to 20 minute headways.

Line 220 is a north/south route that runs from West Hollywood to Playa Del Rey to LAX. The route passes Fisherman's Village. Line 220 would also be rerouted to Century Boulevard and then Aviation Boulevard instead of traveling on Sepulveda from LAX Lot C to Imperial like it currently does. Hours of operation are from 5:30 AM to 8:30 PM Monday through Friday. There are 35 minute headways during the peak hours and 1 hour off-peak headways. Saturdays, Sundays, and Holidays the Line operates from 7:00 AM to 8:00 PM with one hour headways all day.

Line 439 is a north/south route that runs from Los Angeles Union station to Redondo Beach. Line 439 passes the West LA Transit Center, Kenneth Hahn Recreation Area, Fox Hills Mall and LAX City Bus Center. This Line is proposed to be rerouted from Sepulveda Boulevard between the LAX City Bus Center and Imperial Highway and to divert around the east side of the Airport via Imperial Highway, Aviation Boulevard and Century Boulevard to make a stop at the Aviation station. Hours of operation are from 5:00 AM to 1:00 AM with 15 minute peak hour headways and 1 hour off-peak headways Monday through Friday. Saturdays, Sundays and Holidays the Line operates from 5:45 AM to 1:00 AM with 30 minutes peak hour headways and 1 hour off peak.

The combination of these four MTA lines would provide good connections between the Aviation station and Lot C (three lines) and along Imperial Highway west to Sepulveda (two lines).



Mariposa and Nash Station

Line 232 is a north/south route that runs from Long Beach to LAX City Bus Center. It passes 5 metro Blue Line stations in Long Beach and Manhattan Village. Line 232 would be rerouted from Sepulveda to El Segundo Boulevard, Nash Street, Mariposa Avenue and then back to Sepulveda. Instead of its current route north and southbound on Sepulveda. Monday through Friday the Line operates from 4:15 AM to 12:30 AM with 20-30 minute peak hour headways and 1 hour headways during the off peak hours. Saturdays, Sundays and Holidays the Line operates from 5:30 AM to 12:30 AM with 30 minute peak hour headways and 1 hour off peak headways.

El Segundo/Nash Station

No lines are proposed to be modified to better serve this station.

Douglas Station

Line 125 is a east/west line that runs from Vista Del Mar in Manhattan Beach along Rosecrans to just past La Mirada Boulevard in La Mirada. The line passes the Compton Blue Line Station, and the Compton Transit Center. This line would be rerouted from Rosecrans Avenue, up Douglas to within one block of the station, across East Park Place, down Continental Way back to Rosecrans Avenue. Monday through Friday the hours of operation are from 4:30 AM to 9:15 PM with peak hour headways of 15 to 20 minutes and 30 minute headways during the off peak hours. Saturdays the line operates from 5:15 AM to 9:00 PM with 30 minute headways. On Sundays the headways are 30 minutes and the line operates from 6:30 AM to 8:30 PM.

Marine

Line 126 is an east/west route that currently operates from Highland Avenue in Manhattan Beach to Hawthorne at El Segundo Boulevard and Hawthorne Boulevard. The Line would be routed up Aviation Boulevard from Manhattan Beach Boulevard across Marine Avenue to the station, then back to Manhattan Beach Boulevard across Inglewood Avenue. The hours of operation are 5:40 AM to 8:00 PM Monday through Friday with headways of 1 hour all day. There is no Saturday, Sunday or Holiday service.

Line 215 the Line is a north/south Line that currently runs from Inglewood near the Forum to Torrance at Del Amo Fashion Center. MTA staff have considered diverting the line from Inglewood Avenue across Marine to stop at the station and then down Vail Avenue, returning to Inglewood via Manhattan Beach Boulevard. The additional travel time required for this diversion west to the Marine station appears to make it unlikely that it will be implemented. This Line operates Monday through Friday from 5:00 AM to 8:30 PM with 30 minute peak hour headways and 1 hour off peak headways.

In addition to MTA, the primary operator of fixed route transit service in the study area is Torrance Transit and MAX, which is administered by Torrance Transit. A potential modification to their routes in the study area is under consideration as a means to implement the shuttle service to the Green Line stations suggested by MTA in the Bus/Rail Interface Plan. That proposal is discussed later in this report as one of the alternatives for Green Line Circulator service. The proposed MTA fixed route service modifications described above are not considered an alternative, but rather the base condition to which shuttles would be added.

Existing Private Shuttle Services

Operators of private shuttles were contacted to ascertain whether or not they expected to continue to provide shuttle services and whether they would provide peak period service to the Green Line stations. Two primary sources were utilized to identify private shuttle operators; (1) those operating into LAX and (2) those operated by employers who responded to a survey conducted as part of this study. Those employers surveyed were all members of the Green Line Task Force and all members of the South Bay Transportation Forum.

Courtesy Van Service to LAX

Three types of companies provide courtesy van service into LAX: parking lot operators, rental car agencies and hotels. The Department of Airports issues permits to courtesy van operators and counts the number of airport circuits completed by each company. During September 1994, courtesy vans made a total of 274,027 circuits of the terminal loop at LAX:

Parking Lots	55,217
Rental Care Agencies	122,824
Hotels	<u>95,968</u>
	274,027

Four large hotels on Century Boulevard east of the airport accounted for more than 30 percent of the courtesy van trips provided by hotels. The five hotels in El Segundo that provide courtesy van service operated about 8 percent of the total hotel-based van trips.

The hotels provide service primarily to the LAX terminal loop. The hotels in El Segundo generally also offer service to nearby sites. Some serve the Manhattan Beach Mall as well as local businesses and training sites. The five El Segundo Hotels expressed interest in serving the Green Line. The Century Boulevard hotels either had no interest in operating shuttles to the Green Line or had not yet considered provided such service.

El Segundo Employer Shuttle Services

Mattel

Mattel has three buildings in El Segundo. The Mail Room operates a continuous shuttle between the bigger two buildings (on Continental and on Mariposa) with service to the third (on Maple, directly behind the Mariposa building), when requested. They use one van (seats about 12 passengers) and run from about 8 AM to 5 PM. Mattel would like to modify the route during peak hours (maybe from 7-9 AM and 3-5 PM) to stop in the bus turnout on the west side of Nash at the Mariposa Green Line station. The van would make a clockwise loop, connecting the station and the two main Mattel buildings.

Northrop

Northrop has two facilities: the east complex at Hawthorne and 120th Street, about one block from the Green Line Crenshaw station and the west complex on Aviation Boulevard between Imperial Highway and El Segundo. Northrop has five buses. One 33-passenger bus (the big bus is diesel, the others are

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all propane-powered) is used only for VIP tours and special events. An 18-passenger bus is used for a backup. Three 21-passenger buses operate shuttle service. One runs only in the peak hours between parking lots and the east complex. Two operate all day between the east and west complexes. Northrop's Green Line plans are unclear. Northrop is having cutbacks and bus service may not last long. If the service continues, company shuttles could serve the Aviation Green Line station. Northrop might also have employees use the Green Line instead of their own shuttle. If so, Northrop would run between its east complex and the Crenshaw station as well as between the west complex and the Aviation station.

Aerospace Corporation

Aerospace Corporation is a Federally Funded Research and Development Corporation (FFRDC), a non-profit company created and funded by Congress. They have just been notified of cutbacks which will lead to layoffs. These cutbacks could also jeopardize their shuttle service.

Their employees travel a lot and the company provides shuttles, with paid drivers, to LAX about every 20 minutes. The company will be undergoing some internal reorganization in addition to the expected cutbacks. If the shuttles continue, then they would be available to provide dedicated service from the Green Line to Aerospace Corporation during commute times.

City of El Segundo

The City of El Segundo Parks Department operates an employee shuttle. The shuttle service picks City employees up at their homes in El Segundo and takes them to one of three City destinations: City Hall, the City Yard, or the City Water Facility. The City uses one vehicle for this service, which requires advance reservations. Few employees currently take advantage of this service. If an El Segundo employee commuting on the Green Line wanted to be picked up, the City would accommodate that request.

TRW

TRW operates two 8-passenger gasoline-powered minivans between their buildings. They recently changed from 15-passenger vans to 8-passenger vans to save money. It might be possible to have the vans serve the Green Line, however, van service might be affected by downsizing. TRW will know more after next year's budget has been adopted.

Hughes

Hughes operates shuttle service between its sites in El Segundo with eight old gasoline-powered vanpool buses. They recently discontinued service connecting the El Segundo buildings with Hughes headquarters at Lincoln and Jefferson. Some years ago, the company did discuss serving Green Line stations. However, they have not considered it recently and would prefer to participate in a consolidated shuttle system rather than continuing to operate their own shuttles. It might be possible to divert their vans to Green Line stations at peak hours.

Xerox

Xerox operates shuttles services between its numerous buildings in the El Segundo area, with two fixed routes. Xerox intends to continue to operate these routes following the opening of the Green Line and to have stops at the Douglas and El Segundo stations. They will also reduce the headways on their routes from 15-minutes to 10-minutes. Xerox would consider allowing non-Xerox employees to ride their shuttles if the liability issue can be resolved.

In summary, most of the private employer shuttles currently being operated are geared toward providing connections between multiple facilities operated by large employers, rather than peak hour commute service. Most of the major employers have not yet begun to plan individual shuttle services to the Green Line, but are awaiting the outcome of this study. Several have vehicles which could be utilized for peak hour service, but the vehicles are mixed in seating capacity, age and hours of availability. At the current time, each employer also restricts access to their vehicles to their employees only, for liability reasons.

Constraints Identification

The five Green Line Stations in the study area were examined to identify possible constraints and/or obstructions to transit and para-transit service on the study area's street network. The following is a short discussion relating to circulation constraints noted at each station (Figures 4-9). The following discussions are based on site plans and construction site visits. The stations themselves have not yet been completed. The curbs and medians are in place but the striping for parking and circulation was not in place at the time of the field visits.

Aviation Station: Ample parking is available at this station. There appears to be adequate dwell areas for waiting buses and shuttles directly below the Green Line platform. The MTA Board also recently approved funding to increase the number of bus layover spaces on the south side of the platform. The access and egress points for the station may present some challenges for vehicles entering and exiting the station. The access point on Imperial Highway will accommodate right and left turns in, but only left turns out. To return west, vehicles will have to exit onto Aviation and proceed north to turn left onto Imperial Highway. Buses will enter and exit the station on Aviation at the intersection with 116th Street. This intersection will be signalized to facilitate bus movements into/out of the bus layover area. The proximity of the driveways on Aviation to the intersection of Aviation Boulevard/Imperial Highway may cause difficulties for vehicles on Aviation Boulevard attempting to turn left onto Imperial Highway. Internal circulation for buses is under design in response to the recent MTA Board action.

Nash/Mariposa Station: Parking is not available at this station. It is unclear at this point whether the pull out area by the station will be designated as dwell areas for buses and shuttles-only or will be available, at least partially, for kiss and rides. There appears to be no significant access and egress problems at this location. The pullout area is located a sufficient distance from the intersection of Mariposa Street/Nash Street. Neither Nash Street nor Mariposa Street is a high volume street. Perhaps the only possible source of conflict may be pedestrian traffic that is currently required to cross the street, across Nash Street, to get to the MTA bus stop.

El Segundo Station: This station provides a small amount of parking. There does not appear to be specific dwell areas identified in the site plan for buses and shuttles. This may be a potential problem for buses that serve this station. The only entrance and exit point for vehicles is off El Segundo

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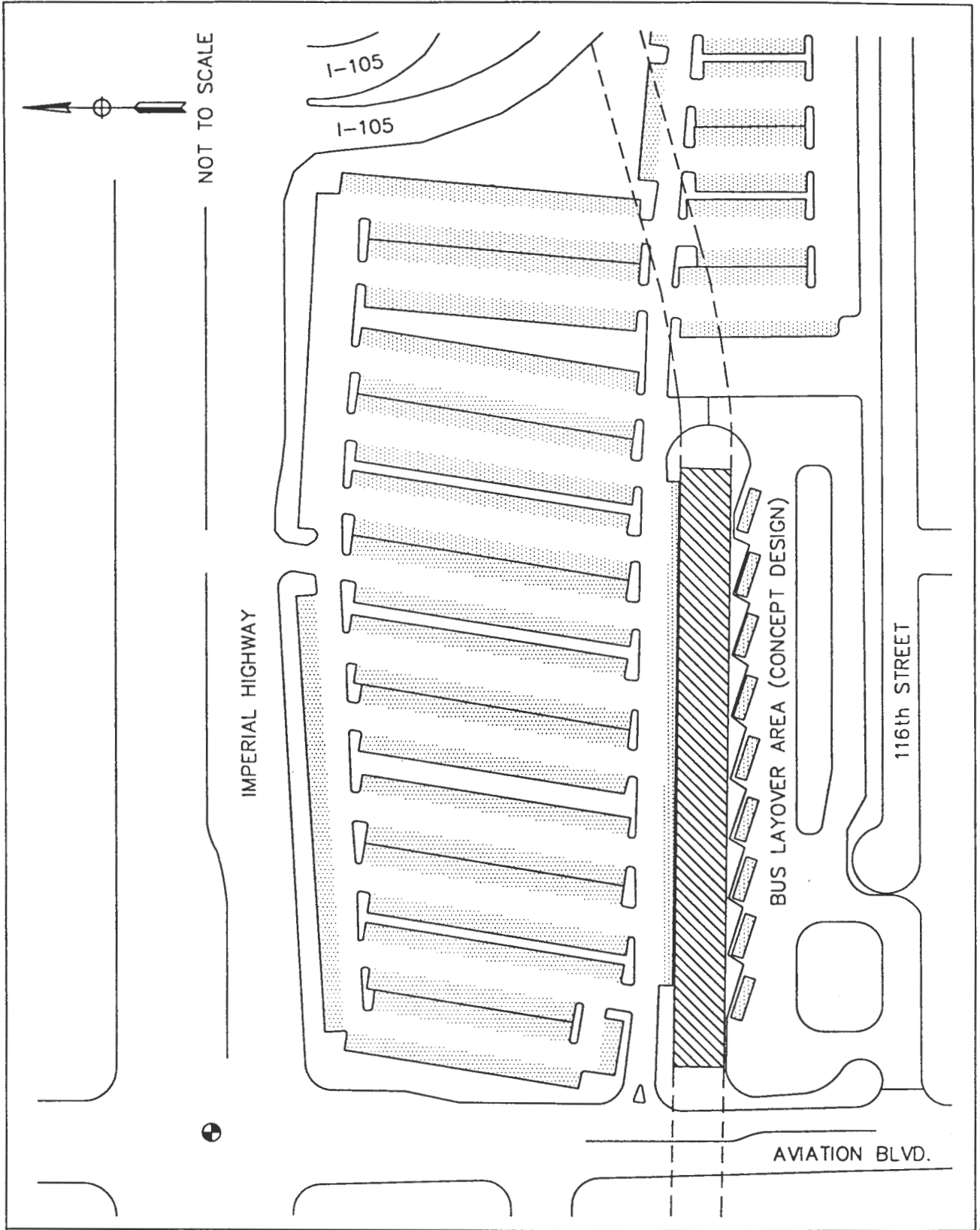
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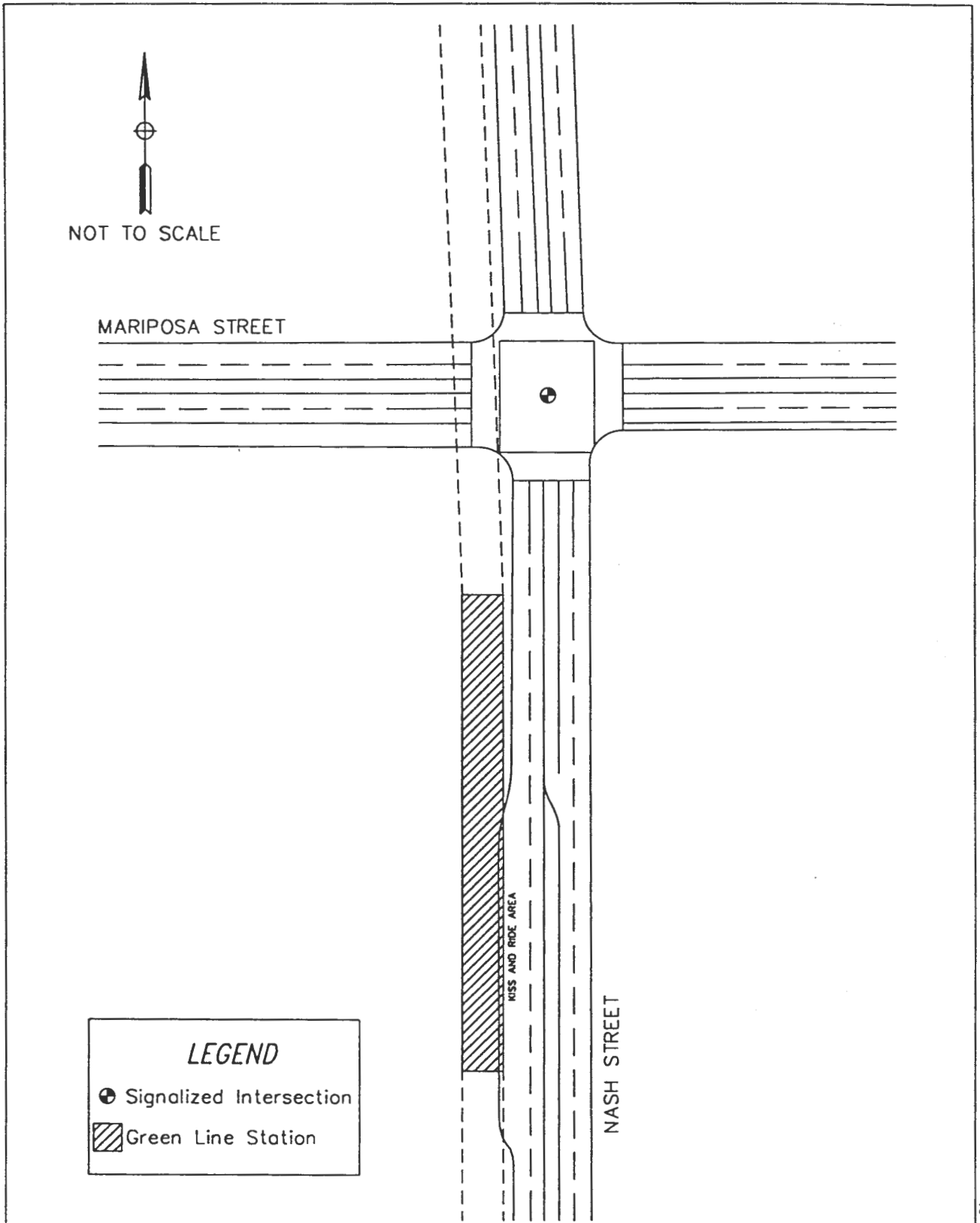
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Boulevard where right-turns-in and right-turns-out are the only moves permitted. There is ample right turn channelization on El Segundo Boulevard to eliminate possible progression conflicts on the main street. However, the entrance does not directly feed into the station. Vehicles entering the station must make another right turn, immediately after entering off El Segundo Boulevard, to enter the station. This is because the entrance off El Segundo is an access road to the Hughes Electro/Optical Facility. This entrance point may be a potential area of conflict for vehicles exiting the station and vehicles entering the access road to continue on to the Hughes facility. Vehicles must make a left turn out of the station, in front of the path vehicles that have just made a right turn from El Segundo Boulevard. As in the Aviation/Imperial station, the internal circulation may be constraining for larger buses because of the turning radii.

Douglas Station: This station does not include any parking. Although the site plan does not show a dwell location for buses and shuttles, it is assumed that there will be sufficient space, off the curb side of the street, for this purpose. Access and circulation at this station should not be a problem. The station street access is essentially a cull-de-sac and vehicles need to turn around at the end to exit. The curb to curb width of the street is approximately 66 feet. If parking is not allowed in the turning area at the end of the street, there should be sufficient room for buses to turn. A pedestrian crossing will be provided across the freight rail tracks adjacent to the station. This will allow pedestrians to access the station from the northern stub end of Douglas Street as well. Buses could drop passengers off there as well, potentially making use of the City of El Segundo owned parking area on Douglas where MAX buses now layover.



Marine Station: This station provides an adequate amount of parking spaces. The plan shows the main parking area on the north side of Marine Avenue. Additional parking is also available, across the street, on the south side of Marine Avenue by the Atchison Topeka and Santa Fe Railway. A total of three bus dwell areas is provided at this station and two kiss and ride areas. Access into the station and egress out of the station is good with three driveways. One is an entrance for bus only. The second is a signal controlled driveway at the intersection of Redondo Beach Avenue and Marine Avenue. The third is a stop controlled driveway, which may limit left turn movements in and out of the driveway during peak hours, but will be a useful compliment to the signal controlled driveway. Internal circulation in the station appears to be good with ample room for larger buses to maneuver and turn.





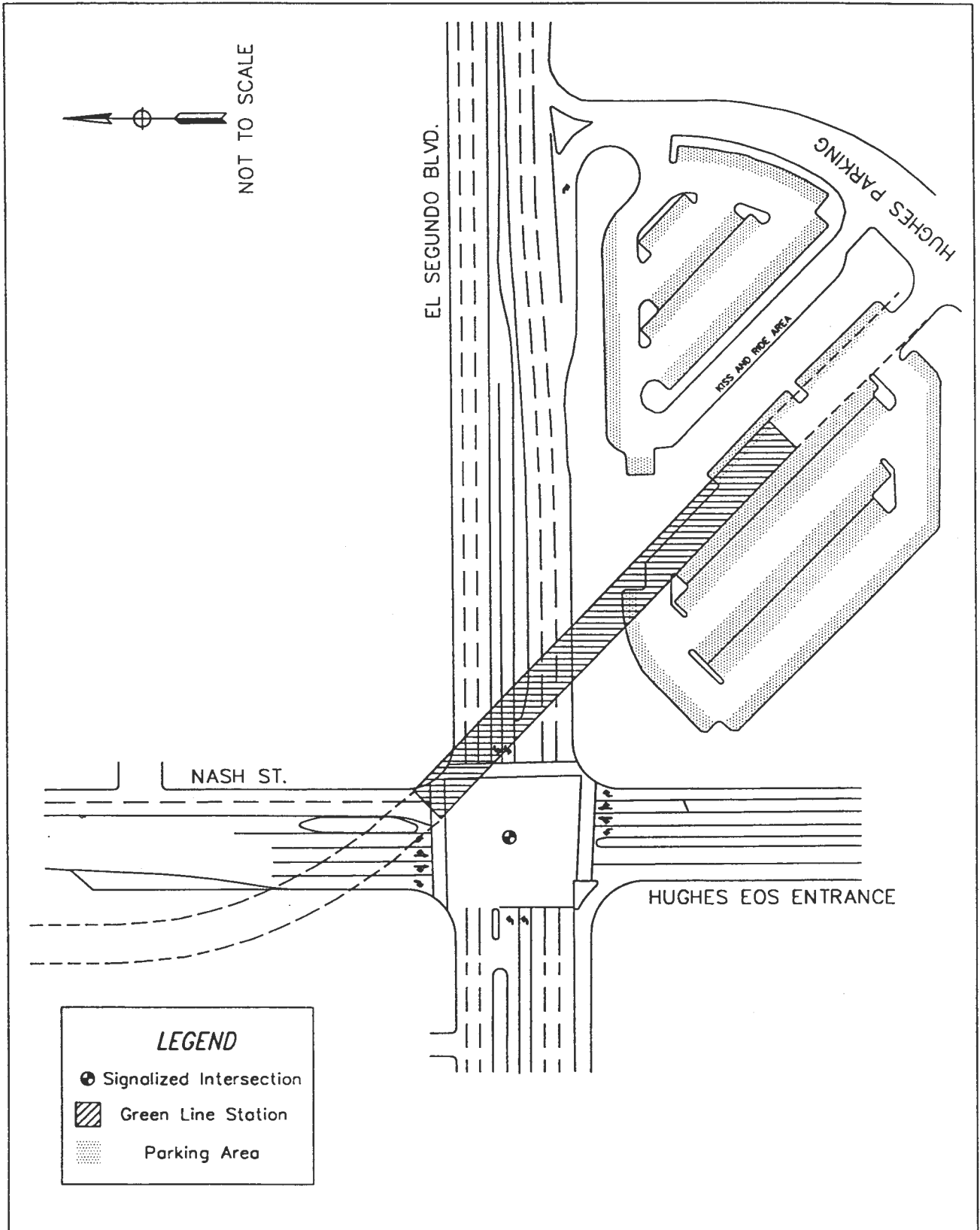

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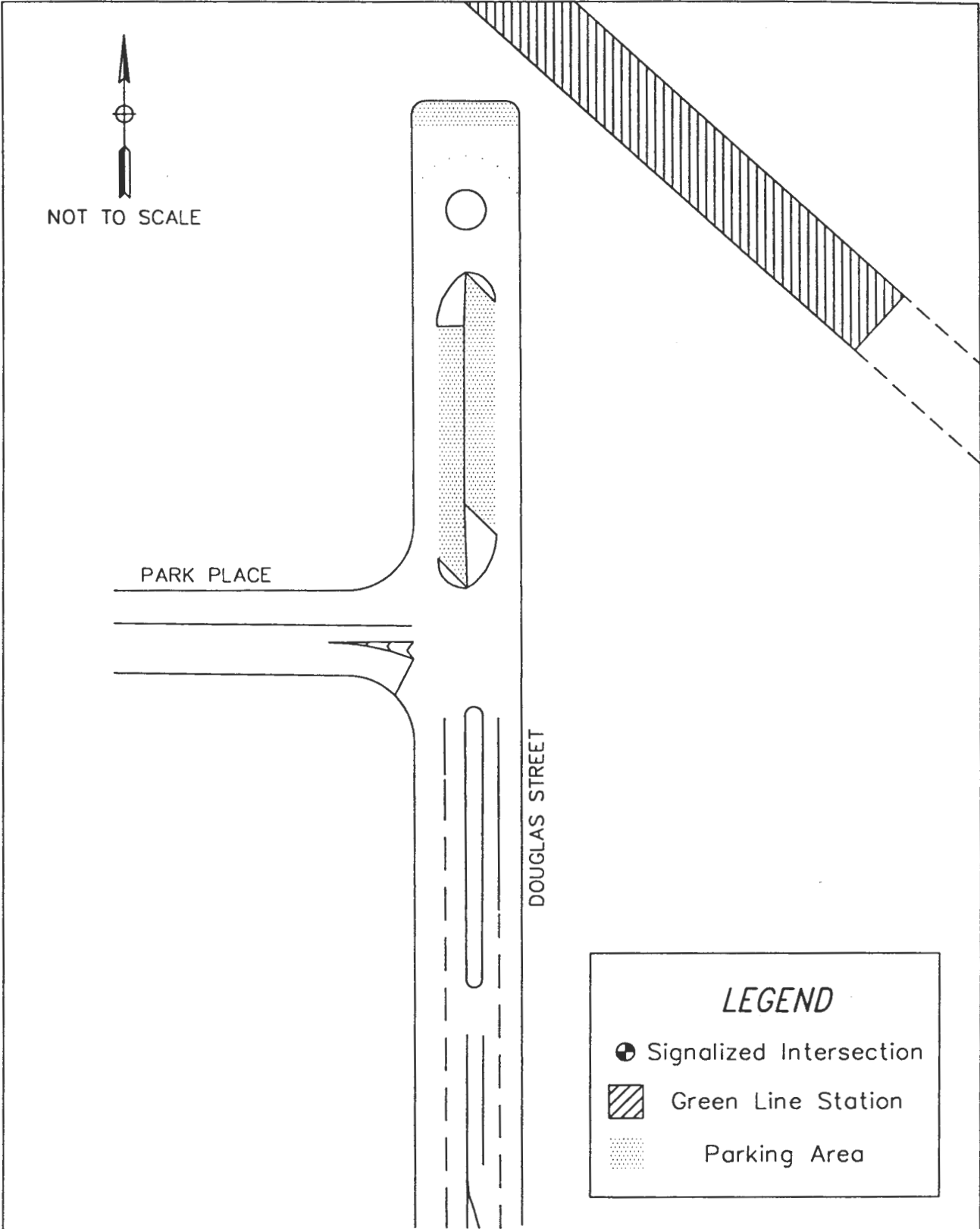
MARIPOSA STREET

LEGEND
 Signalized Intersection
 Green Line Station

KISS AND RIDE AREA

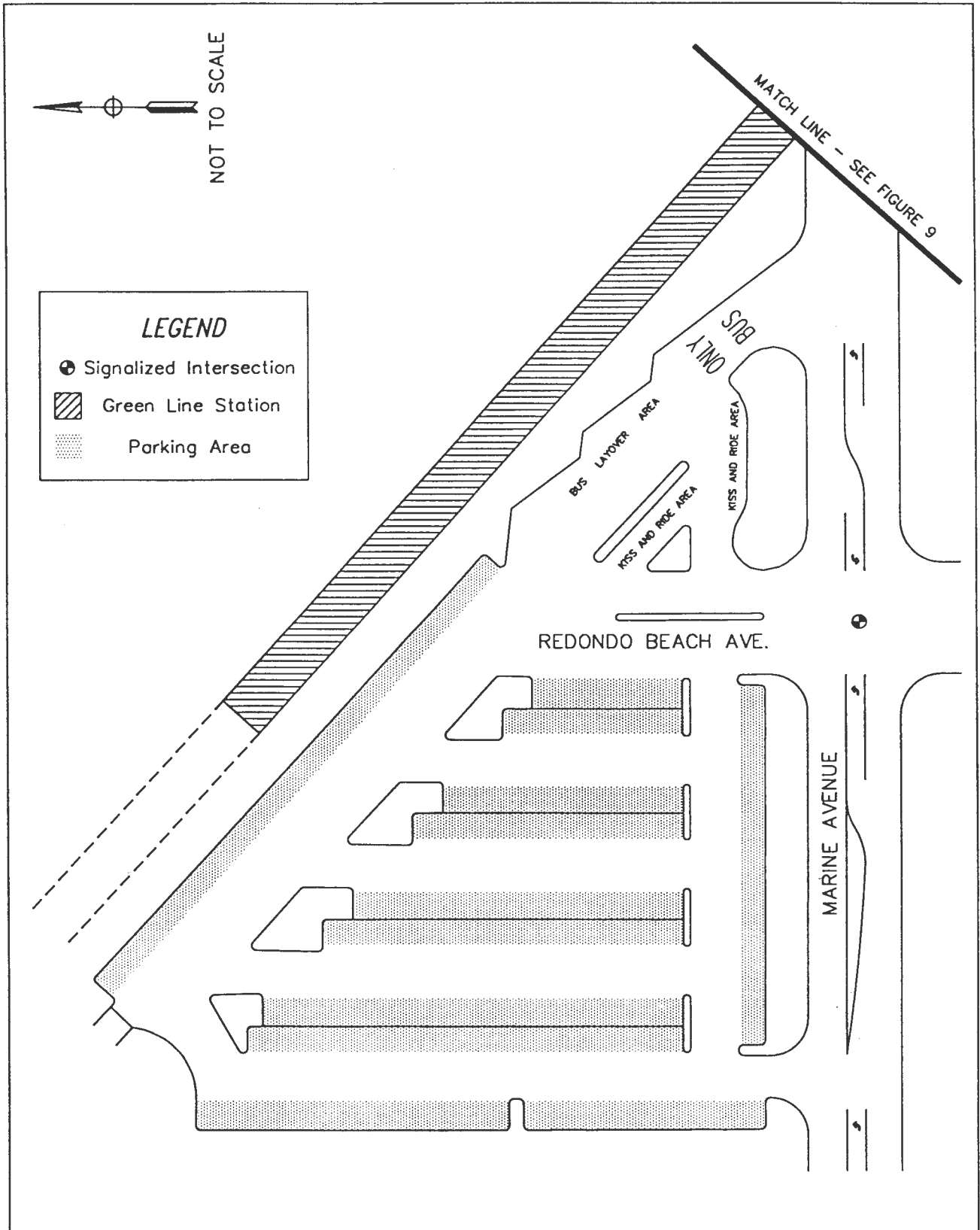
NASH STREET

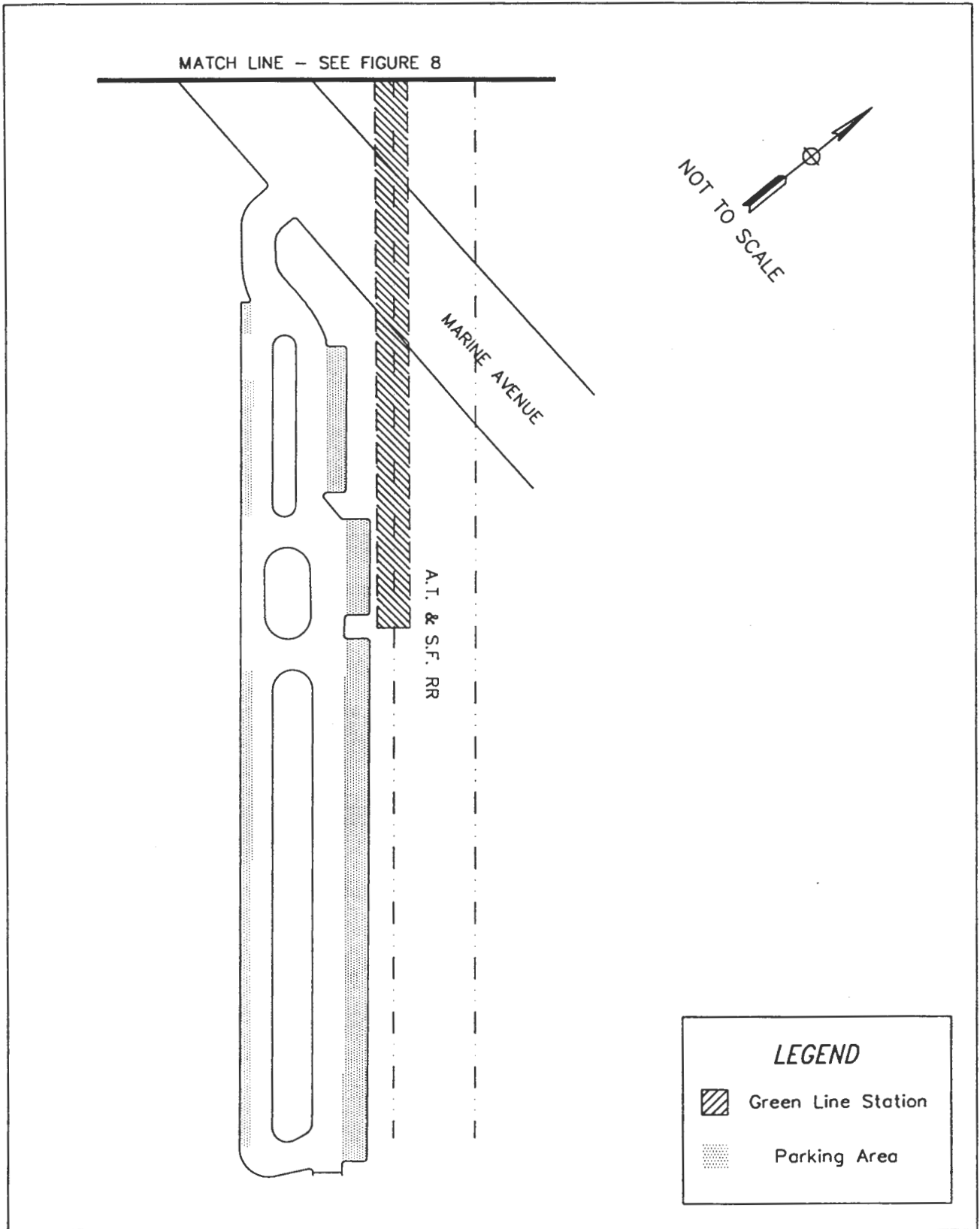




LEGEND

- ⊕ Signalized Intersection
- ▨ Green Line Station
- ⋯ Parking Area





III. PATRONAGE AND LAND USE ISSUES

In order to assess the ability of alternative shuttle systems to meet the travel demands generated by the employment sites in the El Segundo area, an attempt was first made to identify those travel demands. The number of Green Line riders who will desire to transfer at each station from the Green Line to shuttles to reach their final destinations will be effected by a number of interrelated factors:

1. Total Green Line Ridership
2. Distribution of Employees in the El Segundo area
3. Convenience (level of service) of the Shuttle Alternatives.

In this section of the report, the first two factors are addressed. The overall patronage on the Green Line is evaluated and the distribution of employees in El Segundo is discussed, so as to see how many people are likely to ride the shuttles. In the next chapters of the report, the ability of the alternatives to meet those travel demands are evaluated.

Green Line Ridership Estimate

Because the Green Line is not currently in service, existing ridership information is not available. The MTA does not have detailed new ridership estimates available either, at this time. At the time that the Environmental Impact Report (EIR) for the Green Line was prepared, it was estimated that total daily ridership on the Green Line in its initial year of operation would be about 25,000 riders per day. That forecast was developed at a time of high employment in the aerospace and defense industries. The restructuring of the economy and recent recession have resulted in downsizing of many of the companies in the El Segundo area. As a result, the MTA estimate of initial patronage on the Green Line has been reduced to 12,000 in the Bus/Rail Interface Plan, although this is only an estimate and not based on revised patronage forecasts from the MTA's travel demand forecasting model.

Meyer, Mohaddes Associates developed a procedure to estimate El Segundo area based employee patronage on the Green Line to cross check against these estimates. The following are short discussions on the data, analysis and results of this study.

Identification of Major Employers

Three types of surveys were used to identify the number of employees in the study area. The survey information provides a basis for estimating transit and para-transit trip generation. The first survey compiled total employment information from the various regional planning agencies. The second survey conducted a field review of the study area. The third survey solicited employment information from the major employers. Each survey provides a different layer of detail on employment. Together, all three surveys provide an estimate of the number of employees that can, in places, be broken down to almost the block level.

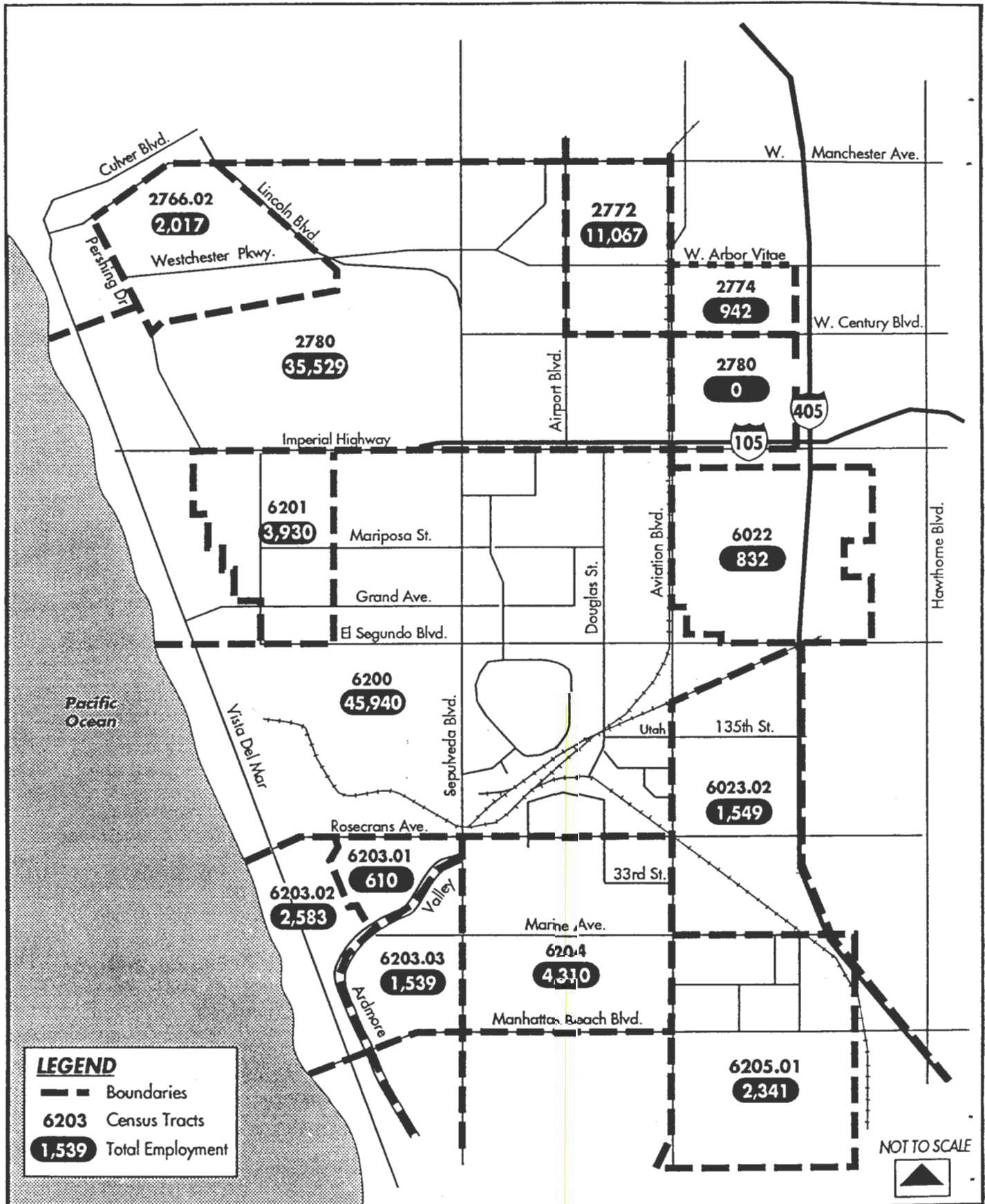
In the first survey, the Metropolitan Transportation Authority (MTA), City of Los Angeles - Department of Transportation, Transportation Studies Division (LADOT TSD) and the Southern California Association of Governments (SCAG) were contacted. Employment information was available only on a census tract level from all three agencies. Although MTA and SCAG have GIS capabilities, employment information finer than the census tract level was not available. In addition, both MTA and LADOT employment information are derived from SCAG data. Because of this fact, only the SCAG data was requested. The information from the other two agencies would be identical to the SCAG information.

On its own, census tract level is not detailed enough for our study purposes but it can serve a useful purpose by providing a control total for the number of employment in the area. Figure 10 displays the information on the total number of employment in the area. As shown in the figure, census tract level of detail is too large for developing a picture of the employee concentration areas. For example, most of the major employment areas in El Segundo are contained completely in census tract 6200.00. This includes all of the Hughes, Xerox, Mattel, Rockwell and Northrop complexes. In 1990, however, the total employment in the study area south of Imperial Highway (excluding Tract 6203, west of Sepulveda in Redondo Beach) was 58,900 jobs. North of Imperial Highway in the LAX-Century Boulevard area, there were 49,500 jobs.

The second survey conducted a field review to identify major employer locations and their size in the study area. The number of counted floors was recorded, where multistory office buildings were present. The relative size of the structure was recorded, where the buildings were low-lying structures such as 1-2 story office buildings or production/manufacturing/warehouse facilities. This data provides a means of refining more general employment information down to the block level. Figure 11 maps the result of the field survey. The locations of the major employers are identified next to the building's footprint on this map.

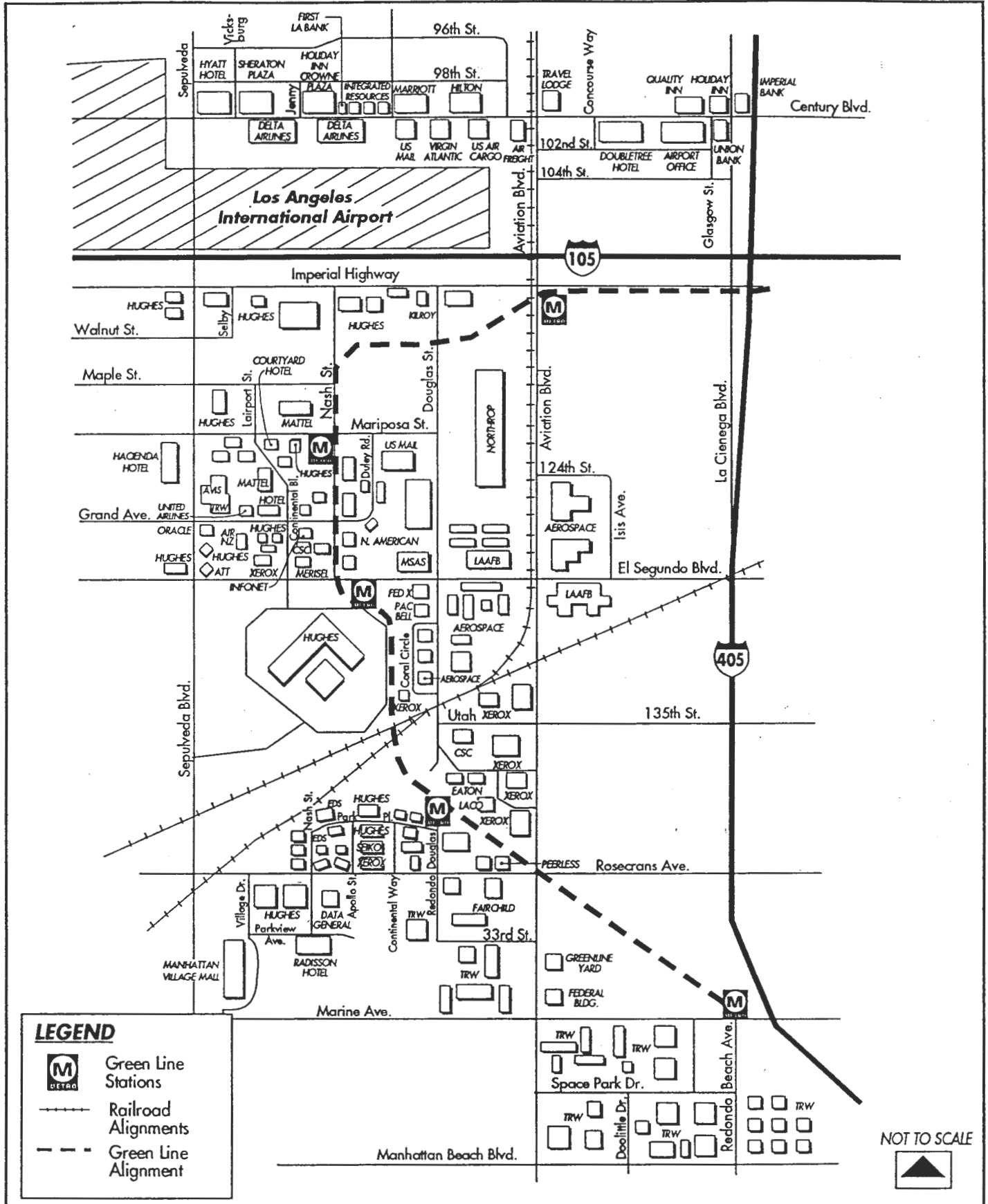
As can be seen from the map, employment in the study area can be categorized by three types that are focused in three general areas. These are LAX airport and airline employees, the hotel land-uses located primarily in the north (along Century Boulevard), and the high-technology engineering/manufacturing dispersed throughout the study area. Interspersed with the aerospace and related firms are an increasing number of commercial office buildings/office parks with a mix of tenants. The area along Sepulveda Boulevard, particularly around the Manhattan Village Mall has a concentration of retail/commercial land uses.

The third survey involved directly contacting the major employers in the area by letter, fax and attendance at a South Bay Transportation Forum meeting to obtain information on their employees. This was done with a letter asking the Employee Transportation Coordinator (ETC) of each company to help identify the number of employees at a company location or locations, if the company had several sites. The response level from the survey was approximately 80%. The surveys provide the most up to date picture of the number of employees at a particular location. Although in some cases, where the employer has multiple facilities and a count of the number of employees per building was not feasible, the field survey was used to develop an estimate at a particular location. This process was used for distributing the number of Hughes, TRW, Xerox and U.S. Air Force Base employees.



LEGEND
 - - - Boundaries
 6203 Census Tracts
 1,539 Total Employment

NOT TO SCALE



Detailed employment information was also obtained from the El Segundo Chamber of Commerce, the General Plan for the City of El Segundo and the General Plan from the City of Redondo Beach. The Chamber of Commerce provided a summary of the top ten employers in the area along with an approximate number of employees per company. This number and break down are used to provide a control total for the employer survey information. The General Plans contain information on the total employment, size and locations of the various land-uses, including hotel size and locations. The General Plan for the City of El Segundo is dated 1992 and the General Plan for the City of Redondo Beach is dated 1993. Although the information provided by these documents may not be the most current considering the recent economic down turn, the information complements the information obtained from the three surveys and fills in gaps in the data.

Employment Concentrations

Figure 12 illustrates graphically the distribution of employment in the study area. The three categories of employment concentration were used as a hybrid representation of data compiled. In some cases it was possible to identify the specific number of employees in a building (e.g., 3,000 Northrop employees in the building complex along Aviation) whereas other times it was only possible to note that it was a fully occupied high-rise building. As such the following categories of employment concentrations were developed to assist in the routing of shuttle alternatives:

Low - One or Two story buildings (relatively small footprint) and/or less than 500 employees

Medium - Three to Five story buildings and/or 500-1,000 employees

High - More than five stories and/or more than 1,000 employees

Buildings that were known to be vacant or occupied by few persons were categorized as "Low" even if large in square footage, as we were attempting to develop a picture of the likely distribution of employment in July, 1995 at the time of Green Line opening, not the potential employment, if each building was fully occupied. It was also noted by several of the employers that the number of employees in each building was an evolving issue, as companies adjust to economic circumstances.

In summary, Figure 12 illustrates that the concentration of employees is fairly well distributed throughout the study area. The total number of employees south of Imperial Highway is likely to fall within the range of 40,000 - 45,000 and to be fairly evenly distributed around each station, meaning that 8,000 - 9,000 employees could be located within the service area around each station.

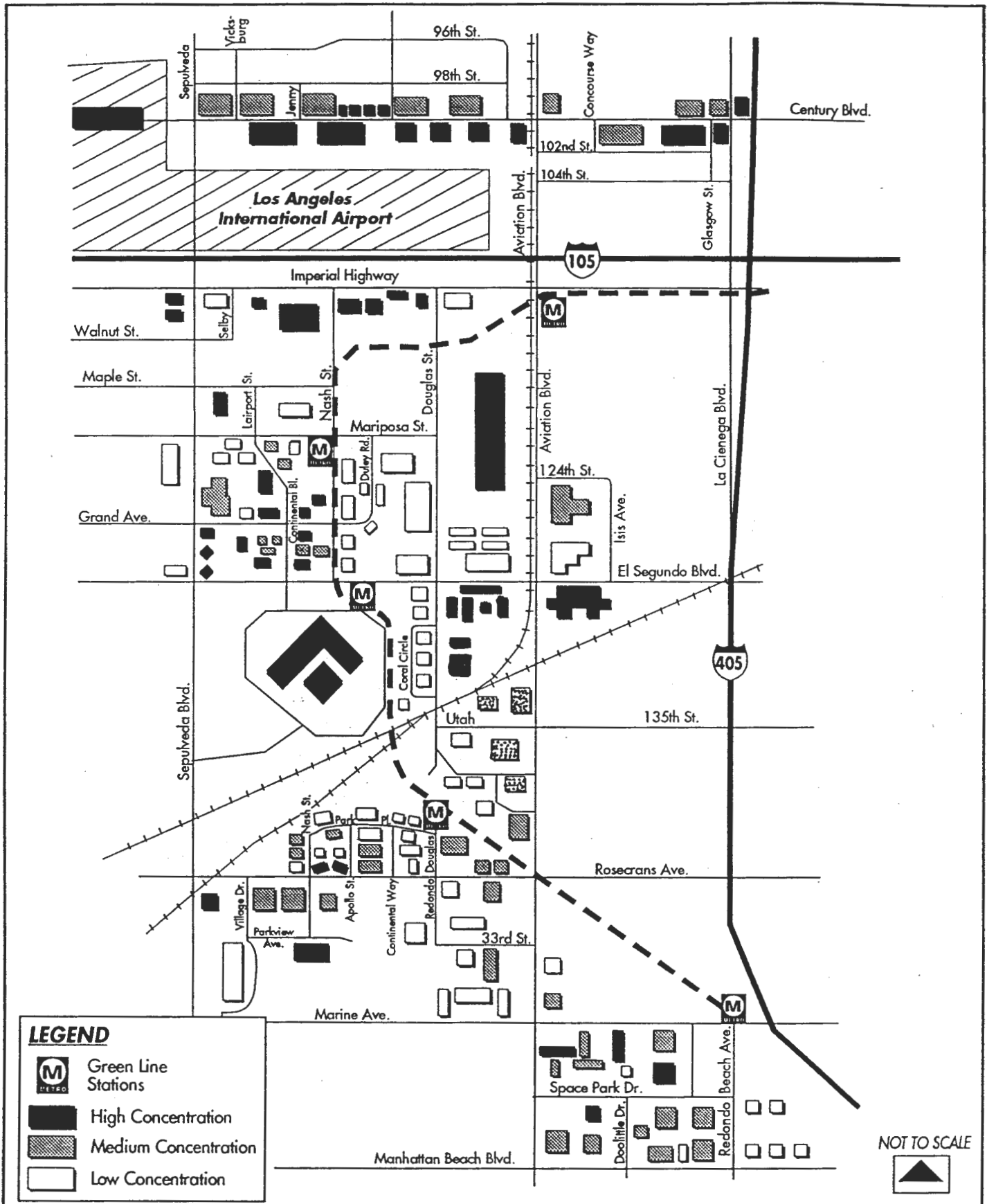
Patronage Estimate

Based on this general distribution pattern of employees, a gross estimate of patronage was made based on the following assumptions:

A. ESEA Area Patronage

1. Approximately 40,000 employees in the ESEA area
2. Assume 5 percent use transit = 2,000 per day
3. Assume 20 percent of transit riders use Green Line = 400 per day

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4. Assume arrival and departure is spread over 2 hours in AM and PM = 200 in peak hour
5. Assume arrivals and departures distributed equally over five Green Line stations = 40 arrivals/departures during peak hour per station
6. At six minute headways (10 trains per hour), ridership per vehicle would be about 4 persons.
7. Assume peak load could equal 3 times the average, 12 riders on peak shuttle load.

Based on this scenario, it could be concluded that smaller buses or shuttles could probably serve the demand between ESEA employment locations and Green Line stations.

B. LAX/Century Boulevard Area Employee Patronage

1. Approximately 46,000 employees
2. Assume 10 percent use transit = 4,600 per day
3. Assume 20 percent of transit riders use Green Line = 920 per day
4. Assume 2 shifts per 16-hour Green Line operations day = 460 per shift
5. Assume arrival and departure is spread over 2 hours in AM and PM = 230 in peak hour
6. All 230 will utilize the Aviation Station
7. At six minute headways, ridership per vehicle would be about 23 persons.
8. Assume peak load could equal 3 times the average, 70 riders on peak shuttle load.

Based on this scenario, it could be concluded that large buses will be required to meet the demand between LAX and the Aviation Station, particularly if airline passengers also use the Green Line to a significant extent.

1990 Census Home-to-Work Data

A second source for patronage estimation was home-to-work data compiled as part of the 1990 Census. Data was obtained from the Southern California Association of Governments (SCAG) with regard to the residential origin of employment trips made to the El Segundo area. In order to narrow the amount of data to be analyzed, the information was summarized by looking at census tracts contained in the study area. This provided a focus on only the trips that are related to the study. The specification eliminated the extraneous details outside of the area.

The format of the data obtained from SCAG corresponds to the following: County, City, Live Tracts, Work Tracts, and Trips. Both the County and City information correspond to the location where the Live Tract resides. The Live Tract is the census tract where the employees live. The Work Tract is the census track where the employees work. The Trips information is the number of trips that are made from the Live Tract zones to the Work Tract zones. Meyer, Mohaddes Associates determined the number of employment trips to the El Segundo are from census tracts that could be served by the Green Line.

Analysis Areas

Two areas were identified that could generate Green Line patronage by El Segundo area employees. These areas are made up of census tracts that surround the Green Line and Blue Line rail alignment. Both of these areas parallel their respective rail alignment and are comprised of census tracts that are within a reasonable short distance from the rail route. In general, the areas extend three census tracts

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on each side of the rail alignment. The approximate boundary of each census tract residential origin area was:

Green Line Area: The area is bounded by the I-405 on the west, Century and Firestone Boulevard to the north, Rosecrans Avenue and SR-91 to the south, and approximately three census tracts beyond the I-605 in the east.

Blue Line Area: The area is bounded by Central Avenue and I-710 on the west, Washington Boulevard to the north, the Pacific Ocean to the south, and Long Beach Boulevard to Cherry Avenue on the east.

The information provided by SCAG could be summarized directly to produce a total El Segundo area work trip generation number. The total number of trips produced by employees in the study area is calculated to be 156,153 trips.

The total number of trips generated by the census tracts covered by the Green Line area is 15,765 trips. The total number of trips generated by the census tracts covered by the Blue Line area is 2,831 trips. These trips could be made by riding the Blue Line, transferring to the Green Line to ride to their place of employment in the study area.

Based on the census data, a total of 18,596 employment-related trips out of the total 156,153 El Segundo area trips (11 percent) could be made on the Green Line. If it is assumed that ten percent of those employees who live along the Green Line/Blue Line service area choose to ride the rail system, the El Segundo employment area would produce 1,860 daily riders on the Green Line. Assuming that employment in the El Segundo area has declined by 20 percent since the census, this daily ridership number is more likely to be about 1,500, about 750 in the AM and 750 in the PM peak periods. SCAG's employment trips are spread over a three hour peak period meaning potentially 250 trips per hour. If these are equally distributed to the five stations, there would be 50 trips per station per hour. At six-minute headways, each shuttle might average 5 passengers, with a peak load of 15, assuming the peak is 3 times the average.

Comparing this patronage estimate to the earlier one, it can be concluded that the typical shuttle trip during the peak period will carry 4 - 5 passengers, but that peak loads within the peak period (i.e., just before or after shift changes) might approach 12 -15 passengers. This would again support the conclusion that smaller vehicles are appropriate for the shuttle service in the El Segundo area.

IV. ALTERNATIVES CONSIDERED

A range of shuttle service concepts was developed and presented to the Task Force for consideration, prior to more detailed evaluation of specific shuttle alternatives.

Service Characteristics

The type of service that Task Force members desire to see implemented in the El Segundo area is described below in terms of the basis service requirements and potential enhancements to that service.

Basic Requirements

1. Provides Access between Green Line Station(s) and Focused Service Area.

The primary purpose of the shuttles to be recommended in this study is to provide access to the five Green Line stations under construction in El Segundo and Redondo Beach from the high density employment areas located west of the San Diego Freeway and east of Sepulveda Boulevard. The southern boundary of the service area is the TRW Space Park complex, and the northern boundary is Lot C and the LAX Central Terminal Area. The fixed route services proposed by MTA, which will connect the Aviation Station to Lot C, and the proposed LAX shuttle from the Aviation station to the Central Terminal Area, which is likely to be operated by LADDA, however, effectively limit the northern boundary of the ESEA shuttle alternatives to Imperial Highway. The shuttles are intended to focus on service to/from the Green Line stations and not to duplicate fixed route services which connect the El Segundo employment area to adjacent areas.

2. ESEA Area Employee and LAX Oriented.

The shuttle service is to be focused on employees in the El Segundo and LAX areas. They are not intended to connect residential areas of the South Bay to the Green Line, but rather are focused on those commuting into the area to work.

3. Limited Station Area Walk Zones.

It was initially felt that a walking zone around each station could be defined and that the shuttle services would be designed to service areas beyond this walk zone. Based on input from the Task Force, it was felt that at certain times of the year, few people would walk to any of the stations, so the shuttles should be geared toward service to/from all employment sites, even those in relatively close proximity to stations.

4. Peak Hour Service.

The basic service parameter for the shuttles is peak period service in the AM and PM commute periods, five days a week. This was generally defined to be three hours of service in the morning and three hours in the evening, but the specific hours may vary at each station. Service from the Aviation Station to the Northrop plant may need to start earlier than at some of the other stations, since Northrop's shifts start at 5:00 AM, 6:00 AM, and 7:00 AM. During non-peak periods, no service would be provided.

5. One Directional (Inbound AM, Outbound PM).

Because it is geared toward El Segundo area employees, service is expected to be one directional; picking employees up at the Green Line stations in the morning and transporting them to their places of employment, and returning them to the Green Line in the evening.

6. Start Up Date June/July, 1995.

An important service characteristic was that the service needs to be implemented by the beginning of service on the Green Line. Revenue operations are expected to begin in July, 1995, but there could be some non-revenue (free) service as early as June, 1995 to begin to attract riders. The service option selected must be able to begin operation potentially as early as June to help attract riders.

In addition to these basic requirements, there were several potential enhancements were also of interest.

Potential Enhancements

1. Mid-Day (Lunch) Service.

The potential use of the shuttles vehicles by employees to reach lunch time destinations, in particular the Manhattan Village Mall and downtown El Segundo, would be desirable enhancements.

2. Connections Outside Study Area.

Connections to destinations outside the study area, in particular the South Bay Galleria, were felt to be desirable.

3. Advanced Technologies/Alternative Fuel Vehicles.

If possible, it was felt that advanced technologies and alternative fuel vehicles should be employed, if readily available.

Evaluation Criteria

A series of evaluation criteria were developed to assist in the selection of a preferred alternative. The initial list of evaluation criteria include the following:

Cost

- Capital
- Annual Operating
- User Cost

Patronage

Barriers to Implementation (Institutional, Regulatory)

Implementation Feasibility by July 1995

Funding Sources

- Capital
- Operating

Availability for Other Uses (e.g., Off Peak)

Convenience (Waiting Time)

ADA Issues

Circulation Issues

Security (Clearance Issues)

Personal Safety

Clean Fuel Vehicles Potential

Advanced Technology Opportunities

Weighting of Evaluation Criteria

As part of a brainstorming session with the Task Force, the evaluation criteria were discussed and the following conclusions drawn. It was a consensus that cost, convenience and implementation feasibility by July 1995 are the most highly weighted evaluation criteria.

Cost primarily relates to the cost to operate the system, since given the time frame for implementation, there would not be sufficient lead time to incur capital costs through purchasing of vehicles. It was also felt that cost to the user should be kept minimal and would not differentiate the alternatives. It was felt that the user cost should be about \$0.25 per ride, certainly no more than it costs to transfer from the Green Line to an MTA bus. MTA's proposed fare structure, which is currently being challenged in court, is a \$1.35 basic bus fare (with \$0.90 tokens available and \$65.00 monthly passes) and \$0.40 transfer. The Green Line itself will have 2 or more fare zones, but the precise fare structure is not decided yet.

Convenience was defined to combine both waiting time and predictability of shuttle arrival/departure schedules. The shorter the waiting time the better, although Task Force members did not object to a slightly longer headway between shuttles (e.g., 12 minutes versus 6 minutes), if the schedule was predictable/reliable so an employee could time his/her departure from work to catch a scheduled shuttle. The potential unpredictability associated with arrivals of a demand-responsive type service was felt to negatively out-weigh the door-to-door convenience of such a service.

The personal security issue was the next most important evaluation criteria, although it may be common to all alternatives. Task Force members felt that people do not like to wait in the dark or in uncomfortable places - any alternatives which would result in more waiting with any unpredictability of shuttle arrival should be rated lower on personal security than those that do not entail waiting.

It was noted that the MTA has an excellent personal safety record and is designing the stations to maximize safety. Shuttle bus stops should be located to take advantage of the safety features (e.g., monitors) being built into the stations.

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Jacki Bacharach and Associates

Patti Post & Associates

Security clearance issues were felt not to be as significant as initially thought. Shuttles, if smaller vehicles, can probably enter even the secure facilities and drop off/pick up riders near the guard posts without having to actually enter the secured areas of each facility.

All of the other criteria were felt to be relatively common to all potential alternatives.

Range of Alternatives

Prior to the discussion of specific routings of shuttles, it is useful to stratify the alternatives by the types of characteristics which distinguish them from one another. The alternatives were described in terms of the following features:

- A. Service Options
- B. Service Delivery Options
- C. Elements Potentially Common to Any Alternative
- D. Opportunities for Demonstration Projects

Service Options

The three basic types of service options include; (1) Fixed Routes, (2) Route Deviation, and (3) Service Zones. Fixed route shuttle services follow a predetermined route. The difference between the fixed route options therefore comes down to the number of routes, the specific alignments of those routes and stop locations, and the headways of the vehicles operating on the routes, all of which effect the cost of the service. Route deviation alternatives can have minor deviations off of a basically fixed route (e.g., in response to a drop off request from someone on the vehicle) or they can be totally demand responsive, developing a customized route for each shuttle run depending upon who had boarded the vehicle at a station or called for the vehicle to pick them up at their place of employment. The service zone concept is similar to a shared ride taxi, with the vehicle operating in a specified service area providing door-to-door service within that area.

Service Delivery Issues

The issue of who will provide the service, a public transit operator, like MTA or Torrance Transit, or a private service provider under contract may or may not be predetermined by the service option selected. Both public transit operators and private contractors operated fixed route and route deviation/demand responsive services. Only taxi services would generally be considered to be solely a private operation.

Elements Potentially Common to Any Alternative

There are several complementary elements which might enhance the shuttle services that could potentially be incorporated in to most any of the alternatives selected. Pedestrian access improvements is one example. No matter what type of shuttle service is implemented, it would be positive to enhance the pedestrian environment for access to the shuttle stops or to allow some Green Line riders to walk to nearby employment sites on nice days. The City of El Segundo has some funds available for pedestrian enhancements which were collected through a developer fee in the El Segundo employment area.

The concepts of Station Cars or Station Bicycles could also complement most any of the alternatives. Station Cars are vehicles assigned to rail stations which can be utilized by authorized users to travel between the stations and their final destinations. It is a concept under consideration in several areas of the country utilizing small electric vehicles. Station Cars could be implemented at the Aviation, El Segundo, or Marine stations where there will be parking lots in which they could be stored over night. Station Bicycles would be similar, except rather than small vehicles, bicycles would be stored at the stations in bicycle lockers for use by assigned employees of nearby employment sites. These would be particularly appropriate at the Nash/Mariposa and Douglas stations where there will be no parking and where bicycle access to nearby employment sites can be made via fairly quiet non-arterial streets.

Alternative fuel vehicles can be implemented under many of the service options and by either public or private transit operators. The only caveat to the use of alternative fuel vehicles for the Green Line Circulator is their potential availability for placement into service by June/July 1995. A transit operator with an existing fleet of alternative fuel vehicles would be required, as there is likely insufficient lead time to purchase new vehicles. MAX has eight such vehicle currently available. Many private operators also have alternative fuel vehicles available.

Opportunities for Demonstration Projects

Many of the firms located in the El Segundo employment center are high-technology/aerospace firms and are involved in research and development of new technologies and alternative forms of transportation. It had been envisioned at the outset of this study that one or more of these firms might have some equipment or technology available that they would want to see demonstrated or incorporated into the plan for the Green Line shuttles.

With regard to any technologies or equipment that might be available from the firms as "demonstration projects" or in-kind contributions to a public-private partnership system, the following comments were made:

- Xerox is implementing a hydrogen fueling center this month and will be operating a hydrogen vehicle as a demonstration project on its shuttle routes. The fueling station could also serve hydrogen fueled buses on the other shuttle routes.
- Hughes has some electric buses available in Torrance which could be leased for the ESEA shuttle. They are also developing a new electric vehicle which could be demonstrated in this service area, but the two vehicles currently under construction are not likely to be ready until the end of 1995.
- Northrop is part of a consortium developing a new prototype electric bus (the stealth bus) at its Hawthorne facility. They would like to see this bus demonstrated in the ESEA area, but it will not be ready in time for the start-up of the Green Line. Northrop's current shuttles are LPG fueled.

The potential for incorporation of new technologies under development by local firms appears to have good prospects, but probably not as part of the initial start-up service.

Description of Alternative Concepts

Figures 13 through 20 illustrate the initial range of shuttle alternatives reviewed by the Task Force. The alternatives were developed at a conceptual level, without detailed operating plans and cost estimates, to obtain feedback on the concepts. They are briefly described below:

Concept 1 - Modified Fixed Route Service

This concept essentially represents a "Do Nothing" alternative in terms of new shuttle services. It relies upon the fixed route service modifications proposed by MTA and some route modifications to Torrance Line 8 and MAX Lines 2 and 3 to serve as the primary access to the Green Line Stations.

Concept 2 - One Fixed Route Shuttle

Two versions of this concept are illustrated. The first, 2A, represents the initial proposal for a shuttle line proposed by MTA in the Draft Bus/Rail Interface Plan. Study Line 8 was conceived to extend from the Aviation station to the Marine station with stops at each intervening station, operating as a two-way fixed route. The second version of this concept, 2B, provided a shorter single fixed route extending from the Aviation station to the Marriot Hotel, south of Rosecrans. It relied on the Torrance and MAX service to provide the shuttle connections to TRW and the FAA in the southern portion of the study area.

Concept 3 - North and South Fixed Shuttle Routes

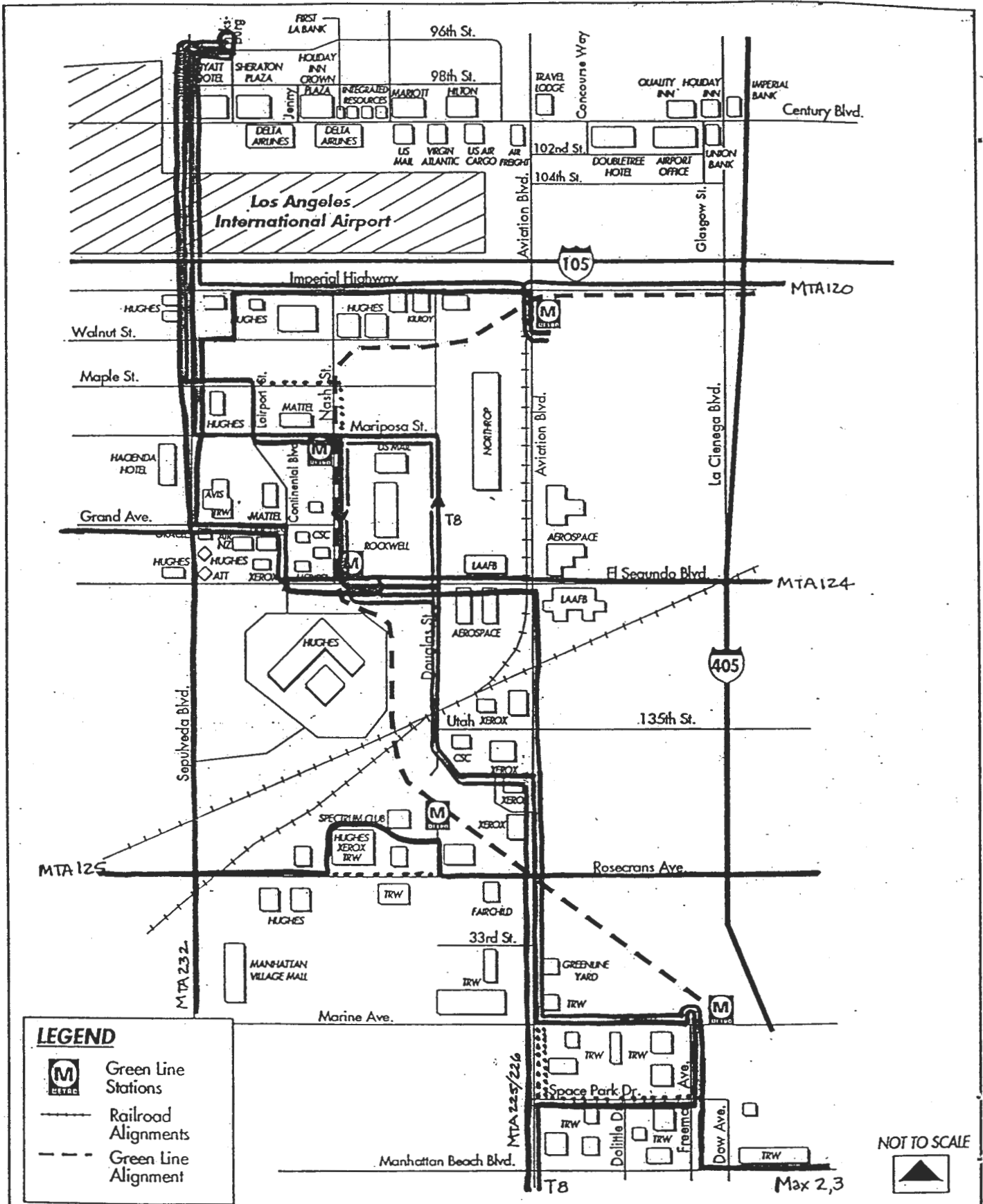
This concept acknowledged the fact that there is somewhat of a geographic separation between the northern and southern halves of the study area and creates separate fixed routes in each area. Concept 3A consisted of two, two-way routes, one large loop in the northern portion of the study area, and one route in the southern portion, leaving the Xerox and Aerospace facilities south of El Segundo Boulevard not well served. Concept 3B broke the northern route into two, one-way loops to better serve the area south of El Segundo Boulevard.

Concept 4 - Shuttles Based at Individual Stations




Concept 4 envisioned shuttles assigned to individual stations, rather than following routes which would link several stations. They would serve smaller service areas and could either operate on short fixed routes, route deviation, or demand responsive mode.

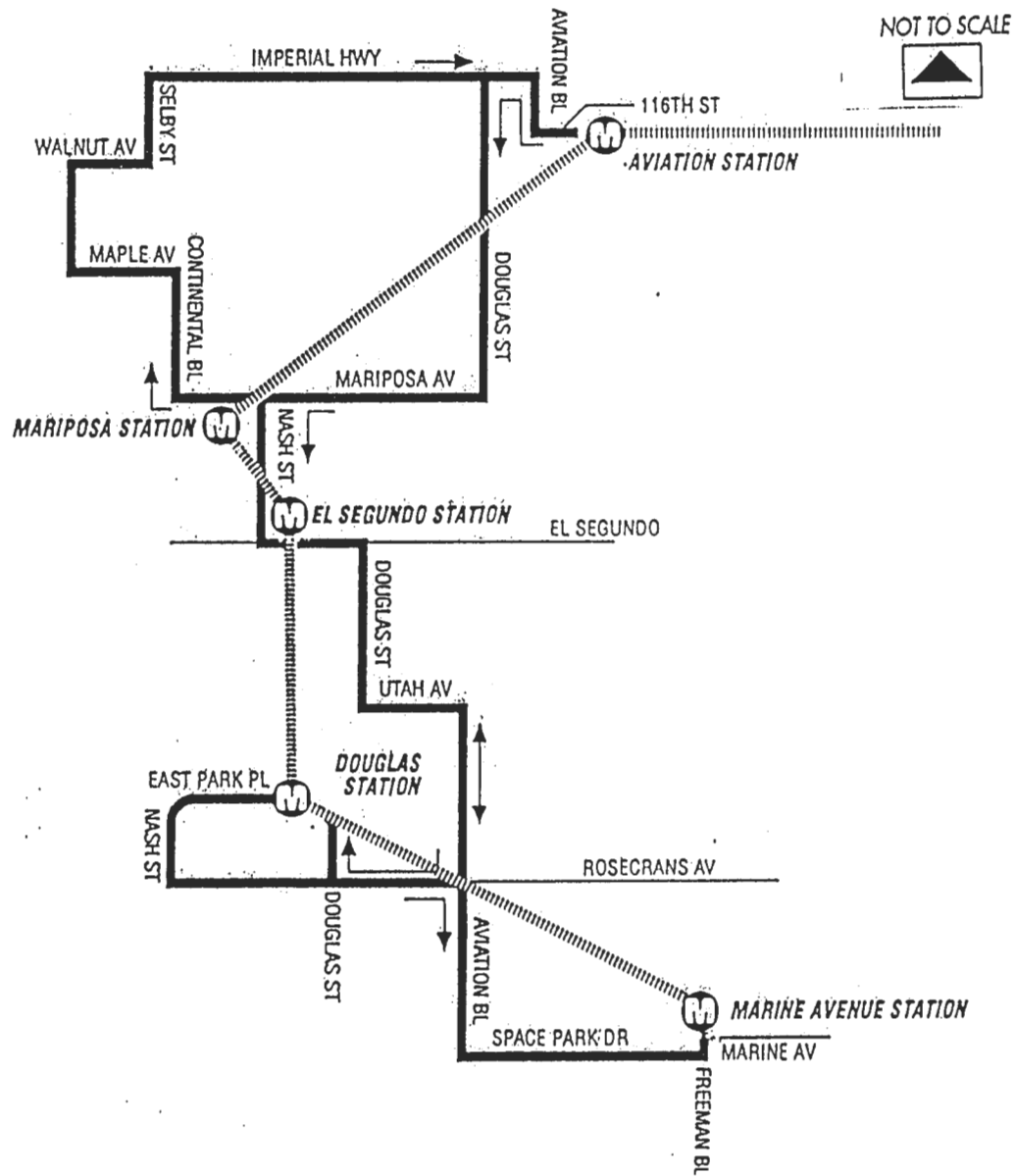
Concept 5 - Flat Fare Taxi Zone

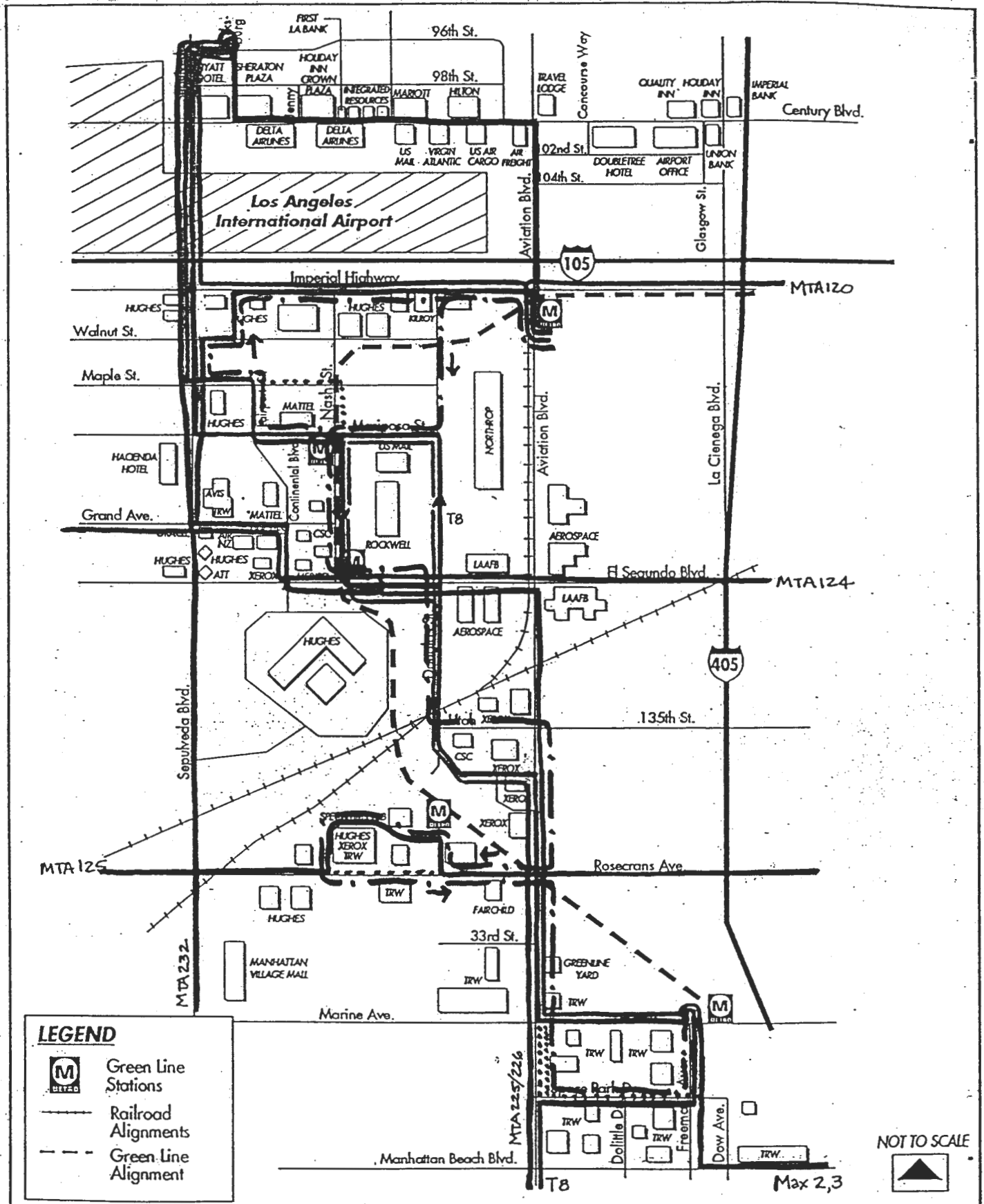
Concept 5 entailed implementation of a flat fare taxi zone within the City limits of El Segundo which would have relied upon subsidized taxis to transport Green Line patrons to/from the stations. The zone was restricted to the City limits, as taxis are regulated by individual cities.



LEGEND

-  GREEN LINE ROUTE
-  ROUTE OF EL SEGUNDO SHUTTLE
-  STATION

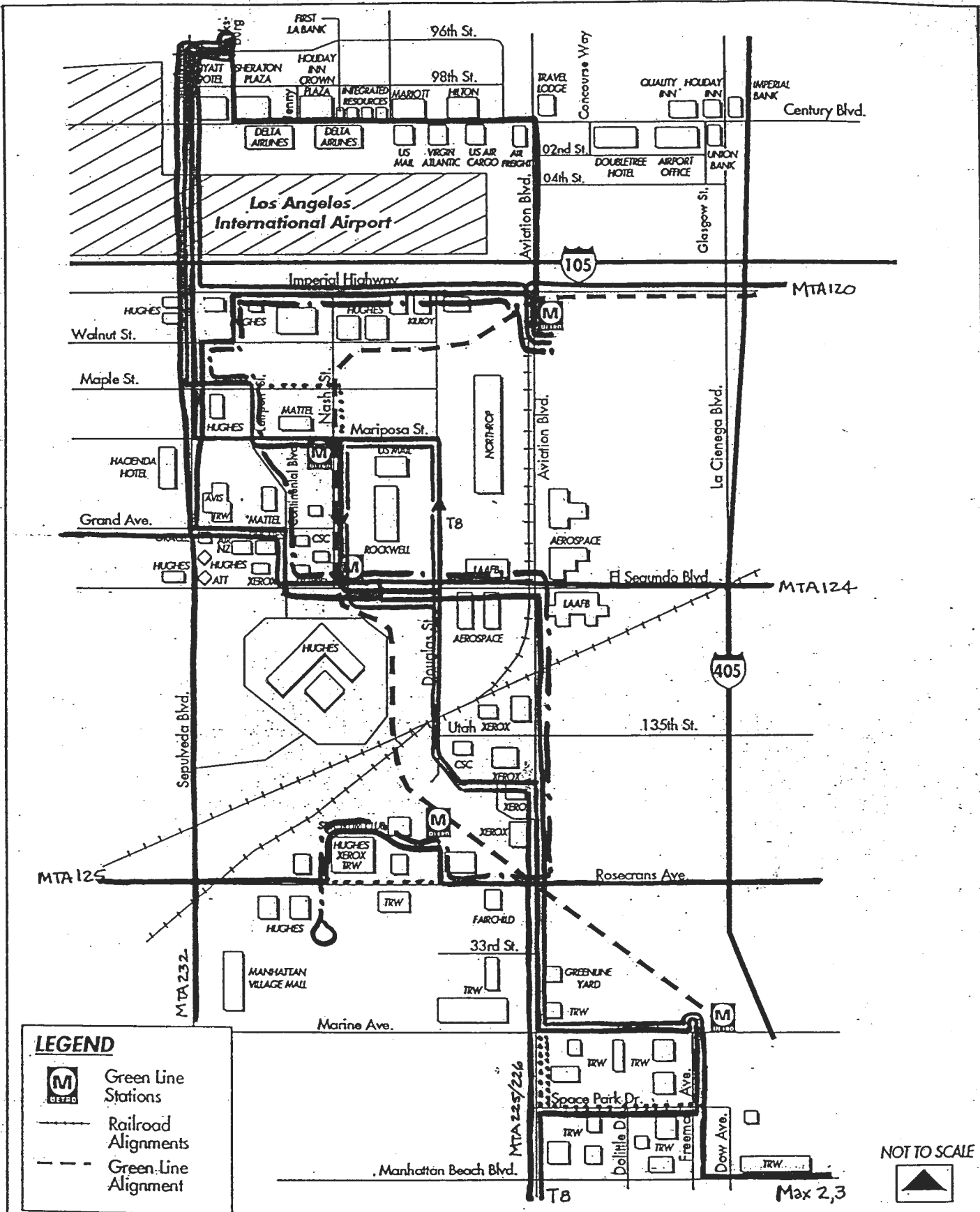







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Concept 2
 MTA Study Line 8
 ESEA Green Line Circulator Study

FIGURE
 14B

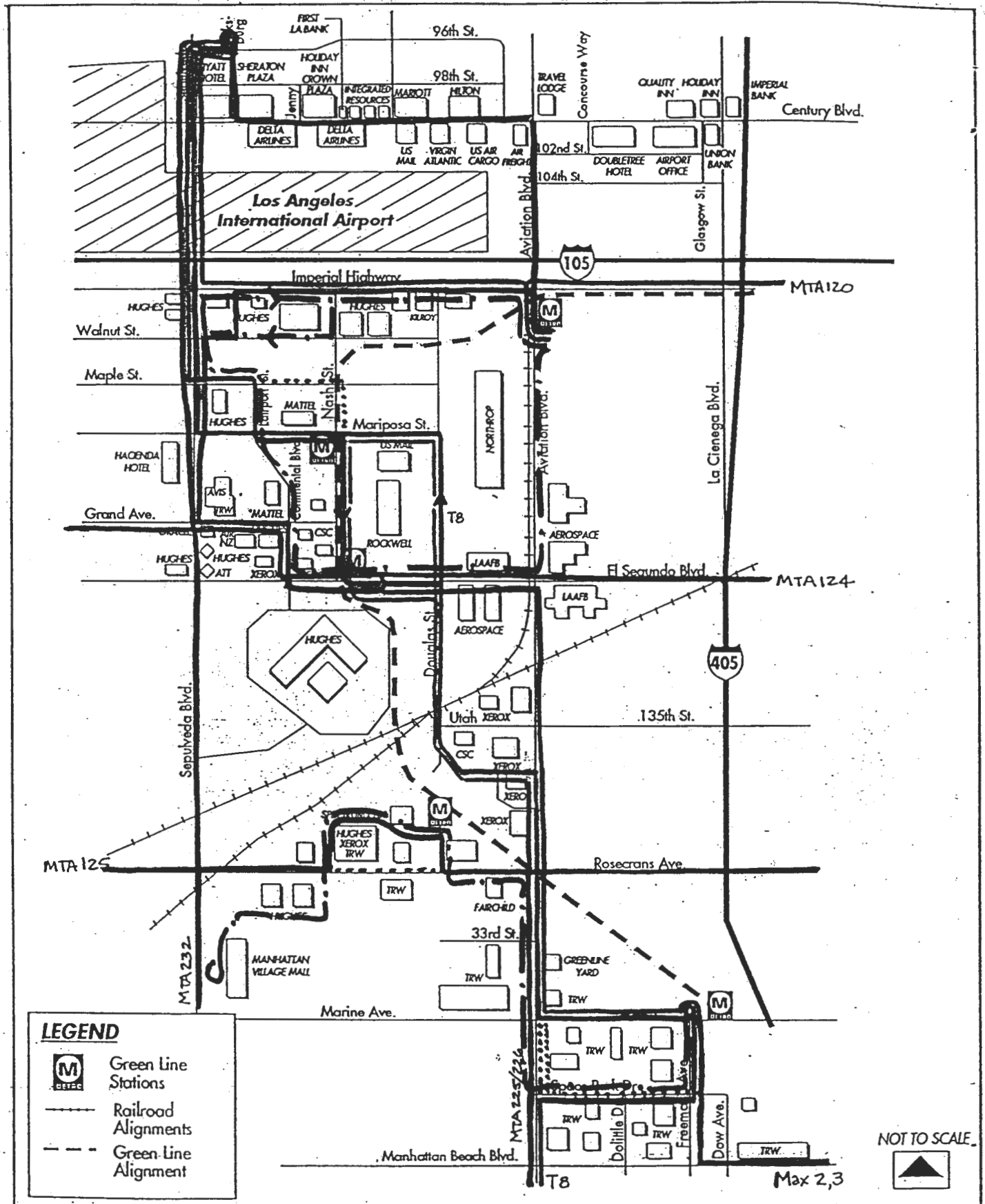


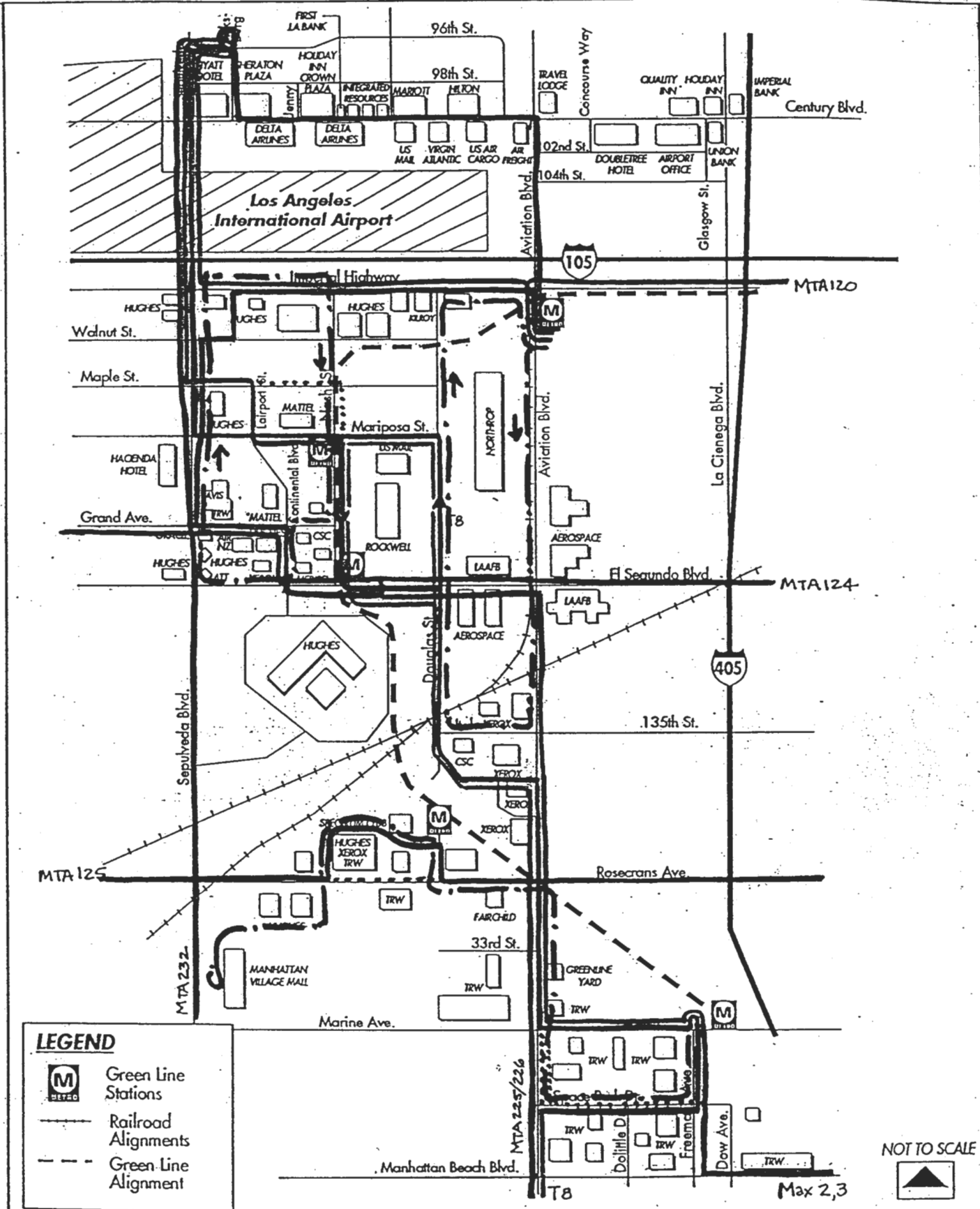
LEGEND

-  Green Line Stations
-  Railroad Alignments
-  Green Line Alignment




NOT TO SCALE

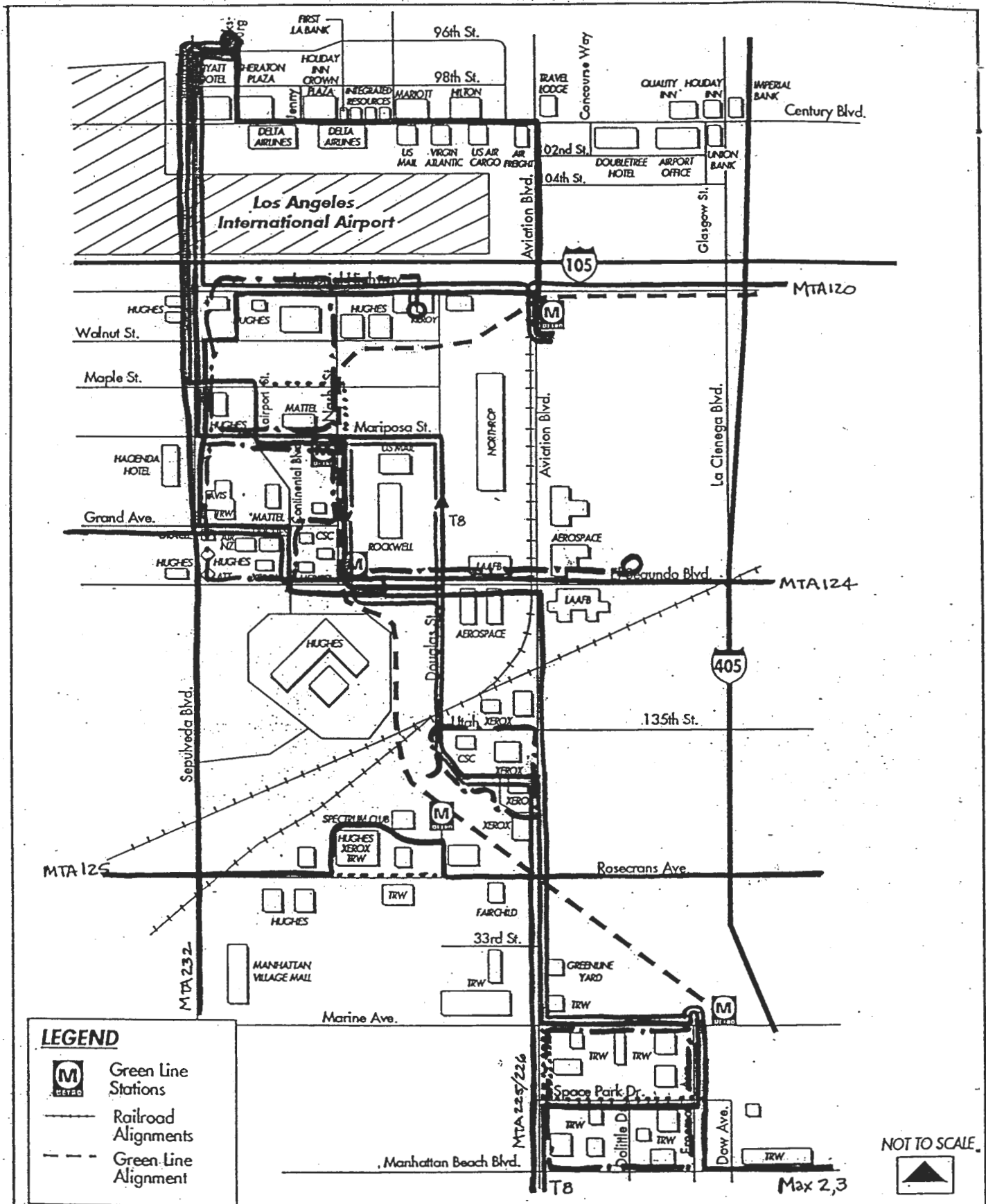









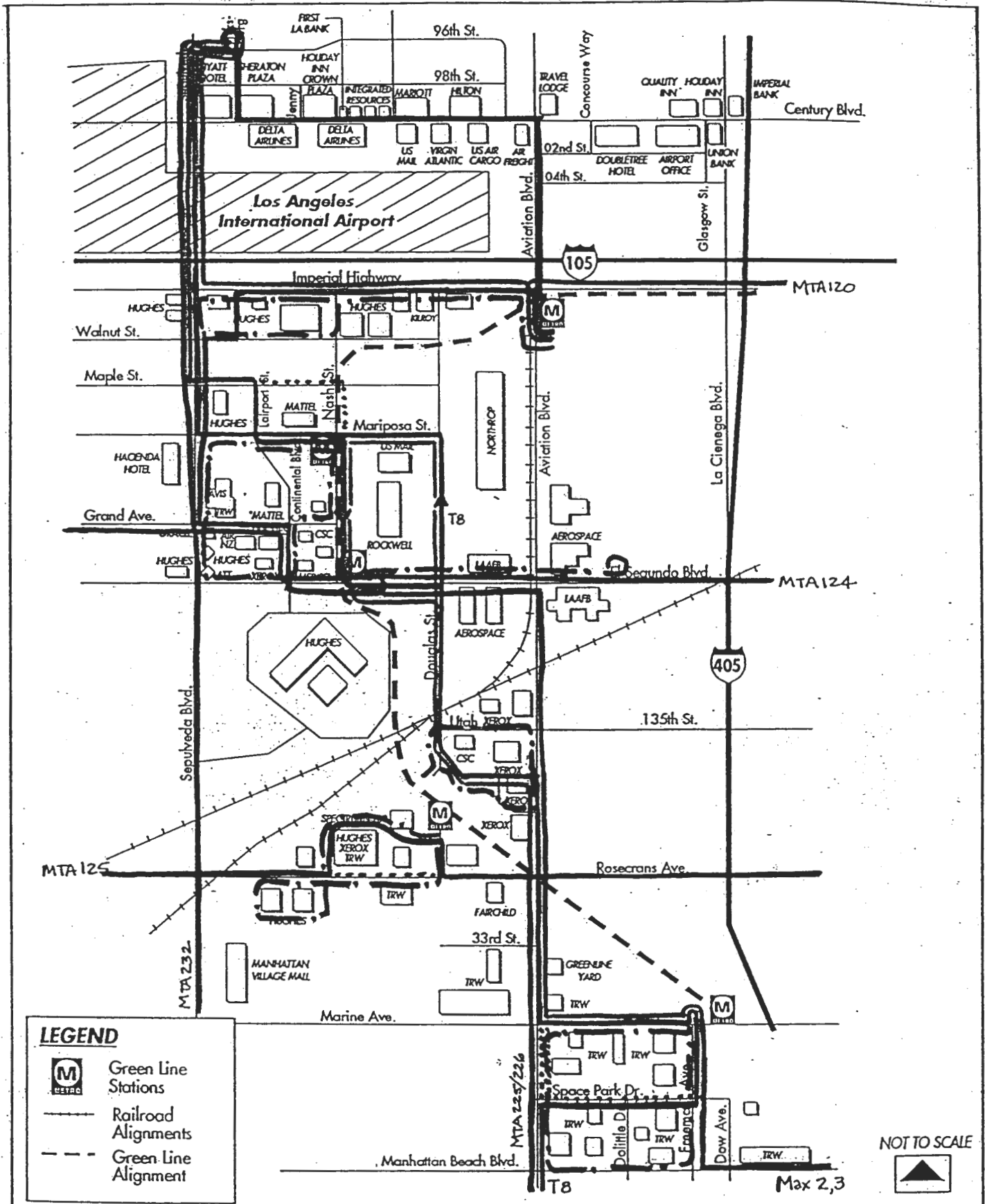
LEGEND

-  Green Line Stations
-  Railroad Alignments
-  Green Line Alignment



LEGEND

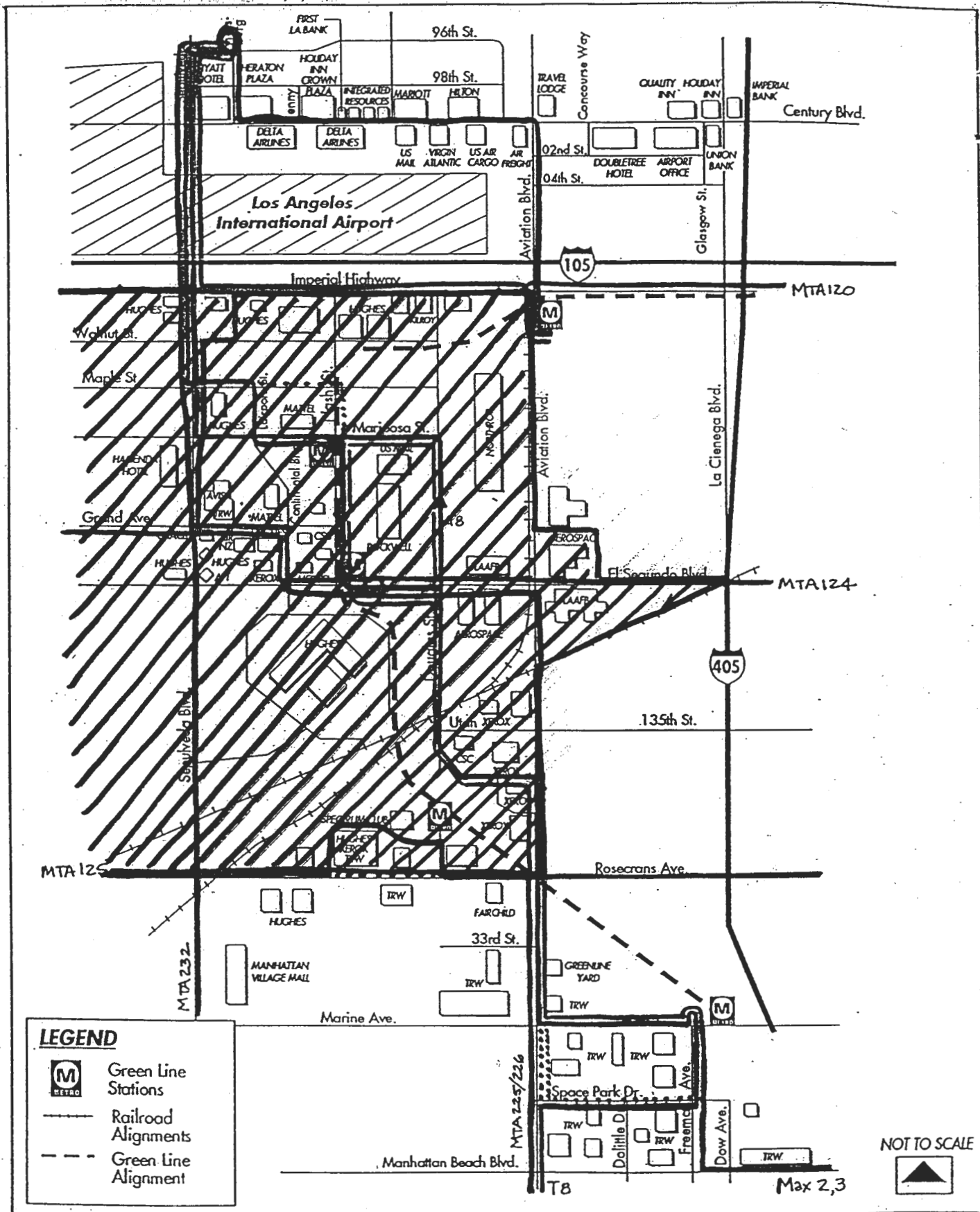
-  Green Line Stations
-  Railroad Alignments
-  Green-Line Alignment



LEGEND

- Green Line Stations
- Railroad Alignments
- Green Line Alignment

NOT TO SCALE



Concept 6 - Smart Shuttles

The smart shuttle concept is not illustrated on a Figure, but it would be similar to a taxi zone covering the entire study area. Radio-dispatched shuttles would provide demand responsive service throughout the study area.

Task Force Discussion of Concepts

A brainstorming session was held with the Green Line Task Force to receive feedback on the concepts described above. Some of the key points of that discussion are described below.

Shuttles on Imperial Highway should divert into the Kilroy Center or travel behind Hughes. A stop on Douglas or Imperial Highway is too far from the buildings and requires pedestrians to cross busy streets. The environment on Imperial Highway, under the I-105 Freeway, is not pedestrian friendly for shuttle riders.

The planned east-west road, south of the Kilroy Center between Nash and Douglas, which will connect to the new Douglas Street on-ramp to the I-105 could be used for circulation. The schedule for the road and the ramps was discussed. It's expected that the combined project will be contracted out in April, 1995 and will take 18 months to complete (June 1996). Even if the access road were built first, it would not be available for use at the start-up of the Green Line. It was concluded that the shuttle routes should not initially be constrained by the future one way operations of Nash and Douglas. They will definitely be converted to one way streets, but not until the on-ramp is complete in the summer of 1996. The shuttle routes could operate on two-way Nash and Douglas for about one year until they would need to be re-routed.

Service to the corner of El Segundo and Sepulveda was supported by Hughes.

Regarding Concept 4 (shuttles at each station) the operations scenario which was identified as most attractive was shuttles departing Green Line stations in the AM following the arrival of a train (not necessarily on a fixed time schedule, but rather waiting at the stations for the trains), but in the PM the shuttles would operate on fixed schedules. Ten minute headways were felt to be acceptable.

An area-wide system would provide vehicle scheduling flexibility and help to cover the peaks within the peak period (e.g., at shift changes). Extra shuttles might be needed on one route for certain runs within the peak period and then they might be needed in another part of the study area later in the peak period.

It was suggested that the employee transportation coordinators (ETC's) at all major employers conduct a survey of employees to see how many will ride the Green Line and the shuttle buses to help in refining the operations plan.

Regarding Concept 5 (taxi zone) it was noted that the taxi zone could be extended beyond one city's boundaries if it was operated with PUC regulated vehicles. If taxi zones were employed, they should be focused around each station, so people could not ride a taxi from one end of the study area to another, rather only within a zone around each station.

Regarding Smart shuttles or other demand-responsive options, most members of the Task Force felt that employees would not want to make a phone call to be picked up and have to wait an unknown period of time for the taxi/shuttle to arrive. Even calling a vehicle via computer or lobby phone/buzzer was felt to be too much trouble. The Task Force prefers to have fixed schedules for the shuttles.

It was suggested that the shuttles have timed departure from specified stops. Many of the employers with shuttles between facilities have scheduled departures, so that's what the employees are used to. Predictability of the schedule was felt to be more important than headway.

Summary comments on the range of alternatives included:

- Fixed route service is preferable to demand-responsive. Several shorter routes seem appropriate rather than one.
- Predictability/regularity are the most important elements of the system.
- It should be an area-wide system. Shuttles based at each station should not have a service area that would make them appear as geared toward one employer. The reallocation of the vehicle fleet to respond to peak demands at individual stations would help achieve this goal.

V. EVALUATION OF ALTERNATIVES

Preliminary Evaluation of Green Line Circulator Alternatives

This chapter of the report presents the findings of the evaluation of five alternatives for the Green Line Circulator. The alternatives are those which survived the preliminary screening of alternatives conducted in a brainstorming session with the Task Force. The service assumptions for each alternative are first described, followed by a narrative discussion as to how that alternative was evaluated on the evaluation criteria judged by the Task Force to be most important. Those key evaluation criteria were:

- Convenience (Amount of Waiting Time)
- Predictability
- Personal Safety
- Operating Cost
- Potential Patronage

Precise patronage numbers could not be developed by station due to uncertainties as to the number of employees likely to ride the Green Line and their distribution amongst the various employment sites in the El Segundo area. A surrogate for patronage was utilized to evaluate the alternatives. That surrogate was Service Area Coverage, a qualitative assessment of the percentage of the study area and percentage of high employment concentration sites were connected to a Green Line station by the alternatives.

Descriptions of Alternatives

The five alternatives are summarized below:

Alternative 1 - Two fixed transit routes as proposed by MTA in the Revised Draft Bus/Rail Interface Plan as Study Lines 8A and 8B, or two fixed routes proposed by Torrance Transit as modifications to Torrance Line 8 and MAX Lines 2/3.

Alternative 2 - Two fixed transit routes, one in the northern half of the study area and one in the southern half.

Alternative 3 - Three fixed transit routes.

Alternative 4 - Shuttles assigned to each of the five stations and operated on fixed routes with potential for some route deviation, primarily in the morning.

Alternative 5 - Shuttle zones around each station with demand responsive service.

More detailed descriptions of the service parameters for each alternative are provided below in the description of the evaluation of the alternative.

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Evaluation of Alternative 1A: MTA Study Lines 8A and 8B

The descriptions of Study Lines 8A and 8B are interpreted from information contained in the MTA Draft and Revised Draft Bus/Rail Interface Plans. The alignments are illustrated in Figure 21. The evaluation was prepared by MMA following a procedure consistent with that applied to the other alternatives, for consistency reasons.

Service Assumptions:

Route 8A

- one way loop
- every 12 minutes with 2 buses
- no midday service
- 6 revenue hours, 3 in the morning and 3 in the afternoon for 255 days per year
- with 12 minute headways - 2 buses x 6 hours/day x 255 days/year = 3060 annual revenue hours
- service provided by contractor, possibly MAX
- service is provided at minimal charge to users (gross costs described herein)

Route 8B

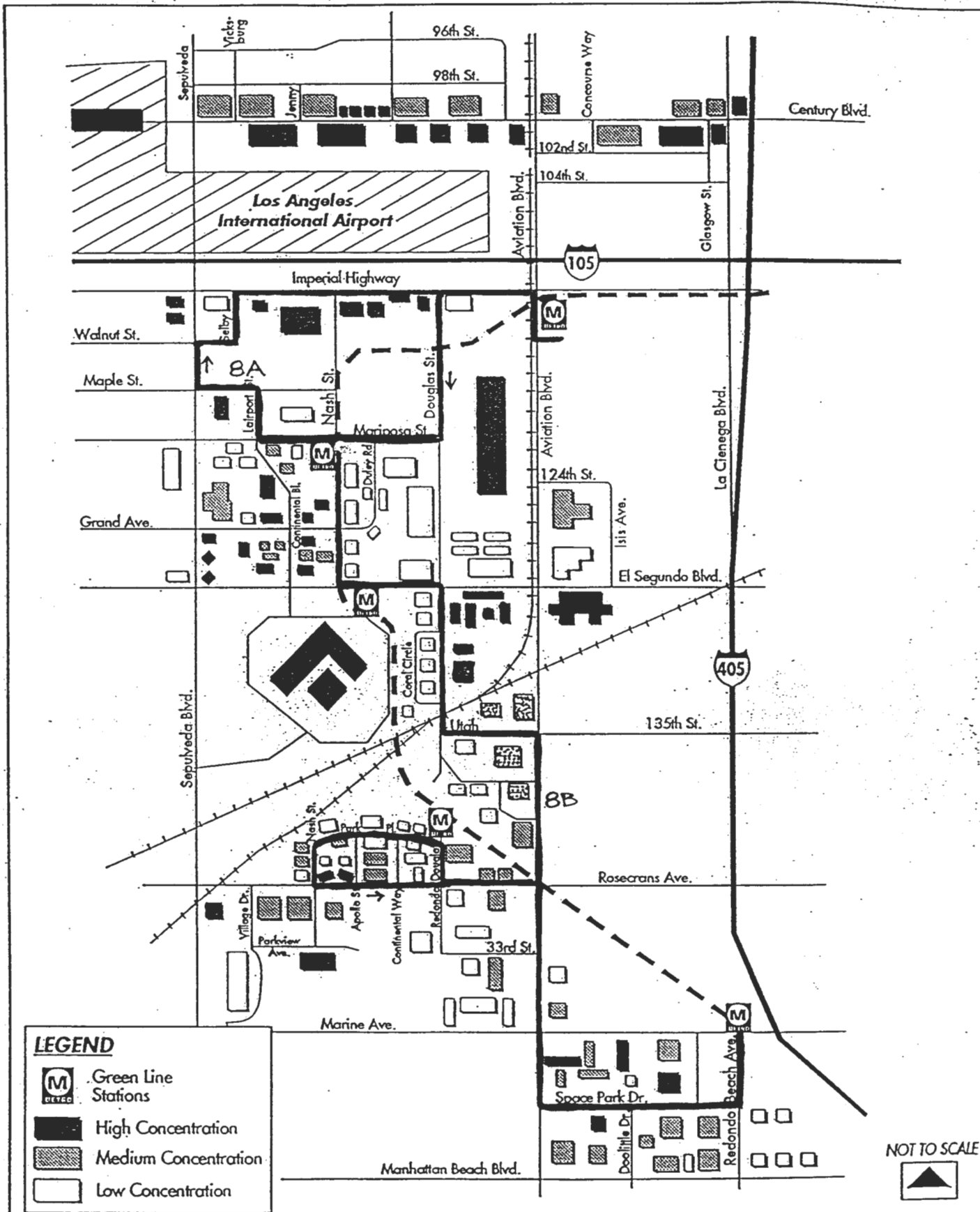
- two way service with one way loop near Douglas Station
- every 12 minutes with 4 buses
- no midday service
- 6 revenue hours, 3 in the morning and 3 in the afternoon for 255 days per year
- with 12 minute headways - 4 buses x 6 hours/day x 255 days/year = 6120 annual revenue hours
- service provided by contractor, possibly MAX
- service is provided at minimal charge to users (gross costs described herein)

Cost - The current MAX contract with a private operator has both fixed monthly costs and variable per-hour operating costs. The fixed cost is \$22,957 per month for a fleet of 13 buses, which equates to an annual fixed cost per bus of \$21,191. The hourly cost is \$33.76 per revenue hour. If MAX-type buses were to operate these routes with a similar cost structure, the annual fixed cost for 6 buses on Route 8A and 8B would be \$127,150 (6 x \$21,191) and the cost for revenue hours of service would be \$309,920 (9180 hours x \$33.76) for a total cost of \$437,070.

If the service were contracted to another operator and MAX-size buses were operated, the contract could be expected to average \$50.00 per hour for this type of service with relatively limited hours of operation and total annual hours. At \$50.00 per hour, the cost of Routes 8A and 8B would be \$459,000. The average of these two cost estimates is \$448,000.

Capacity - The daily capacity of the alternative was estimated to ascertain if the level of transit service could accommodate the potential daily demand of 800 - 1600 passengers. The capacity of the vehicles would be about 25 persons per vehicle. On Route 8A, the one way loop would serve two stations, so theoretically each bus would discharge and pick up a full load of passengers between stations. Each bus would therefore have the capacity to transport up to 50 passengers per loop. To maintain a 12-minute headway, each bus would make 2.5 loops per hour and the daily capacity of route 8A would be 1500

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NOT TO SCALE



passengers (2 buses x 50 pass/loop x 2.5 loops/hour x 6 hours/day). On Route 8B, the buses would each stop at four stations, increasing their potential capacity to about 100 passengers per run. The capacity of Route 8B would be 3000 daily passengers (4 buses x 100 pass/run x 1.25 runs per hour x 6 hours/day), bringing the total daily capacity of this alternative to 4500 passengers, well in excess of the expected daily ridership.

Convenience - This alternative would provide convenient service to some portions of the study area, but no service to other portions. Every other Green Line train would be met during peak hours. Riders might have to wait on average six minutes for a shuttle. The northern Route 8A, would be more convenient for some riders in the morning and less convenient in the afternoon, versus the reverse situation for other riders, due to the one way configuration of the route. Since the route serves both the Aviation and Nash/Mariposa stations, riders could use different stations for their inbound trip in the AM and outbound trip in the PM in order to shorten their ride on the shuttle.

Route 8B would operate as a two-way route at 12 minute headways, so every other train would be met during peak periods. Because each shuttle would be stopping at/near four stations, it would be difficult to schedule the shuttles to wait for Green Line train arrivals without causing delays to passengers on the shuttles, although presumably passengers would get on and off at the appropriate Green Line station and not ride the shuttle past a second station. There would be some out-of-direction travel by some riders due to the loop near the Douglas station.

Availability for Other Uses - Vehicles probably would be available during midday, depending on the agreement with the contractor. Contractor would likely be very interested in having additional uses for the vehicles. Midday service would cost less if all the fixed costs were factored into the peak hour service.

Personal Security - Personal safety is always a concern to transit riders, but this service should pose no unusual problems to riders. Morning commuters will be picked up at the Green Line stations, but the shuttles may not necessarily be waiting for them when they descend the station escalators. They would be taken to a curb-side bus stop near their office. In the afternoon, passengers will need to wait at designated bus stops. The area already has many bus stops, some with shelters. Others can be established, if necessary. With service every 12 minutes, there should not be any long waits.

Other Comments

Implementation Feasibility - This alternative would be easy to implement. ESEA or some other agency would need to take the lead and issue the contract with the shuttle operator. MTA and the municipal operators would need to be notified of the routes and have the opportunity to protest. Selecting a contractor through competitive bid takes about two months. Contractors may need time to acquire vehicles. New vehicles could take three to six months. Used vehicles, if available, would be ready for service with minimal delay.

Circulation Issues - The two routes would operate completely on public streets. Route 8A would operate in a clockwise loop so most of the turns would be right turns. Traffic congestion on Aviation Boulevard near Imperial Highway could cause some delays to this route. Route 8B would likely rely upon on-street bus stops at the El Segundo station as two-way circulation on this route would not permit turns into the station parking area in the northbound direction.

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Jacki Bacharach and Associates

Patti Post & Associates

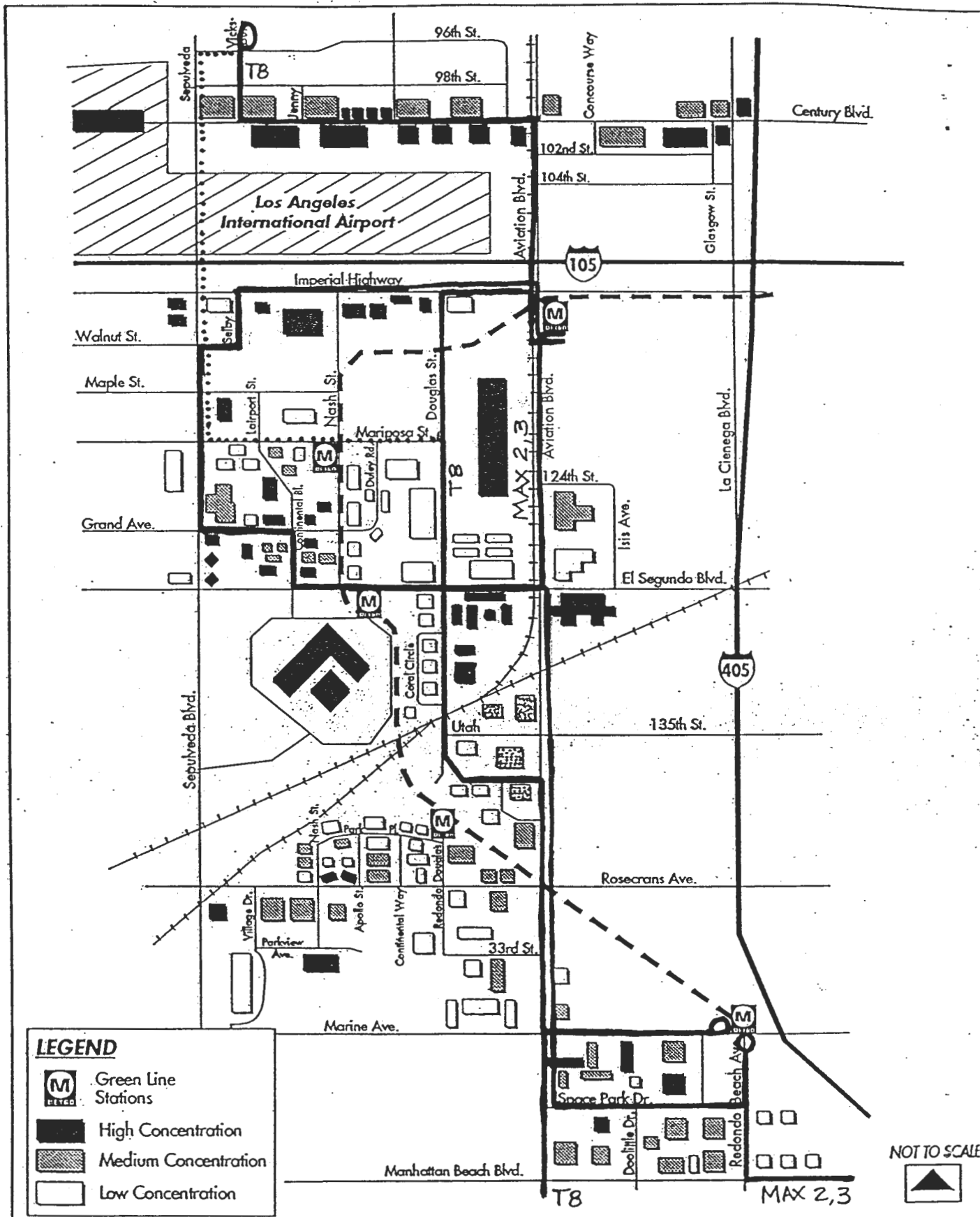
Advanced Transportation Technologies - New vehicles could use clean fuels. Used vehicles would probably use conventional fuels unless the contract is with an operator who has a fleet of alternative fuel vehicles available. Fixed-route, fixed-scheduled services would not gain a lot from advanced technologies.

Evaluation of Alternative 1B: Torrance Line T-8 and MAX Lines 2/3 Modifications

This alternative reflects a proposal under consideration by Torrance Transit to operate the equivalent of Routes 8A and 8B by modifying the current routes and levels of service on Torrance Transit Line 8 and on the MAX lines 2 and 3, which both follow the same route through the El Segundo area. Torrance Line 8, which currently travels north-south through the study area via Aviation Boulevard, Alaska Avenue, Douglas Street, Mariposa Street and Sepulveda Boulevard to reach the Lot C City Bus Center, would be diverted along Marine Avenue to serve the Marine Station, and would be re-oriented toward the east away from the Sepulveda Corridor, to stop at the Aviation Station and then continue north to Lot C via Aviation and Century Boulevards. Headways on Line 8 would also be decreased from 20 minutes to 15 minutes. The MAX Lines 2 and 3 would also be diverted to serve the Marine Station, and additional buses would be added to the routes at their northern end to allow them to serve the Aviation Station and complete the loop around the northern half of the El Segundo employment area. The alignments are illustrated in Figure 22.

Cost - The cost of rerouting Torrance Line 8 and decreasing the headways to 15 minutes was estimated at \$271,600 per year by Torrance Transit. The addition of 3 buses to the MAX service would add 4590 annual revenue hours to MAX service (3 buses x 6 hours/day x 255 days = 4590 annual hours) which was estimated to cost \$63,570 in fixed costs (3 buses x \$21,190) and \$154,958 in operating costs (4590 hours x \$33.76/hour), for a total cost of \$490,128.

Capacity - The capacity of this alternative is not strictly related to the ESEA study area, as the addition of buses to Torrance Line 8 and the reduced headways would provide capacity along the entire line. With 48-passenger buses on Line T8, it can be assumed that about 75 percent of the capacity of the buses might be available to Green Line passengers when the buses reach the study area. Their capacity assumed herein therefore, is 36 passengers per vehicle. Each bus stops at two stations on each trip, with the capacity to transport 72 Green Line patrons per trip. At 15-minute headways, four buses would be available and provide the capacity to transport 1728 daily passengers (4 buses x 72 pass/trip x 6 hours). The addition of MAX service on the northern loop within the study area would result in 25-passenger MAX buses making this loop at 10-minute headways. Some of the capacity of these buses would be devoted to passengers being transported from other portions of the MAX service area, not just to/from Green Line stations. Assuming 50 percent of the capacity of each bus is available for Green Line patrons, each bus could carry 12 passengers between each station. Each MAX bus will stop at five stations and could theoretically transport up to 60 Green Line passengers between stations and destinations between those stations. At 10-minute headways, the MAX service would have the capacity to carry 2160 daily passengers (6 buses x 60 pass/run x 6 hours/day). Combined with the daily capacity of the Torrance Line 8 service, this would provide a total daily capacity of 3888 passengers, well in excess of the expected daily ridership.



Convenience - The Torrance Line 8 buses running at 15-minute headways would provide average convenience to riders at the Aviation and Marine stations. Because Line 8 is serving the Lot C City Bus Center and areas south of the El Segundo employment center, its buses could not be expected to wait at the Green Line stations for the arrival of Green Line trains, therefore the waiting time at Green Line stations in the morning would average between 7.5 and 9 minutes. The buses would also be subject to schedule delays outside of the El Segundo area due to congestion on other parts of the route. The diversion of Torrance Line 8 to the Marine station would also cause a small delay to current riders travelling to El Segundo. The MAX service would operate at 10-minute headways and would therefore provide greater convenience to Green Line riders utilizing the Aviation or El Segundo stations. The northern portion of the MAX routes create a fairly large loop which could result in more than 10 minutes of travel time on the shuttles from the rail stations. The MAX buses are also subject to delays on other portions of their route outside the study area. Both MAX and Torrance Transit buses would operate on public streets with on-street bus stops.

Availability for Other Uses - Both MAX and Torrance Transit have vehicles available during midday. Additional service could be contracted for midday, such as the El Segundo lunchtime shuttle from Downtown El Segundo to LAX which is to be operated by MAX for the City of El Segundo.

Personal Security - Personal safety is always a concern to transit riders, but this service should pose no unusual problems to riders. Morning commuters will be picked up at the Green Line stations, but the shuttles may not necessarily be waiting for them when they descend the station escalators. They would be taken to a curbside bus stop near their office. In the afternoon, passengers will need to wait at designated bus stops. The area already has many bus stops, some with shelters. Others can be established, if necessary. With service every 10 to 15 minutes, there should not be any long waits.

Other Comments

Implementation Feasibility - This alternative would be very easy to implement. MAX and Torrance Transit could request funding from the MTA and operate the service with existing surplus buses.

Circulation Issues - The two routes would operate completely on public streets. Traffic congestion on Aviation Boulevard near Imperial Highway could cause some delays to this route.

Advanced Transportation Technologies - MAX buses are natural gas powered, so the use of available MAX vehicles would incorporate additional alternative fuel vehicles.

Evaluation of Alternative 2: Two Fixed Routes, One in North and One in South

Service assumptions

North Route

- two-way service
- every 12 minutes with 6 buses or every 18 minutes with 4 buses
- no midday service
- 6 revenue hours, 3 hours in morning and 3 hours in afternoon for 255 days/year

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- with 12 minute service - 6 buses x 6 hrs/day x 255 days/ year = 9180 annual revenue hours
- with 18 minute headways - 4 buses x 6 hrs/day x 255 days/ year = 6120 annual revenue hours
- service provided by contractor, potentially MAX (potentially use 8 available MAX buses)
- service is provided at minimal cost to users

South Route

- two-way service
- every 12 minutes with 2 buses
- no midday service
- 6 revenue hours, 3 hours in morning and 3 hours in afternoon for 255 days/year
- with 12 minute service - 2 buses x 6 hrs/day x 255 days/ year = 3060 annual revenue hours
- service provided by contractor, potentially MAX (potentially use 8 available MAX buses)
- service is provided at minimal cost to users

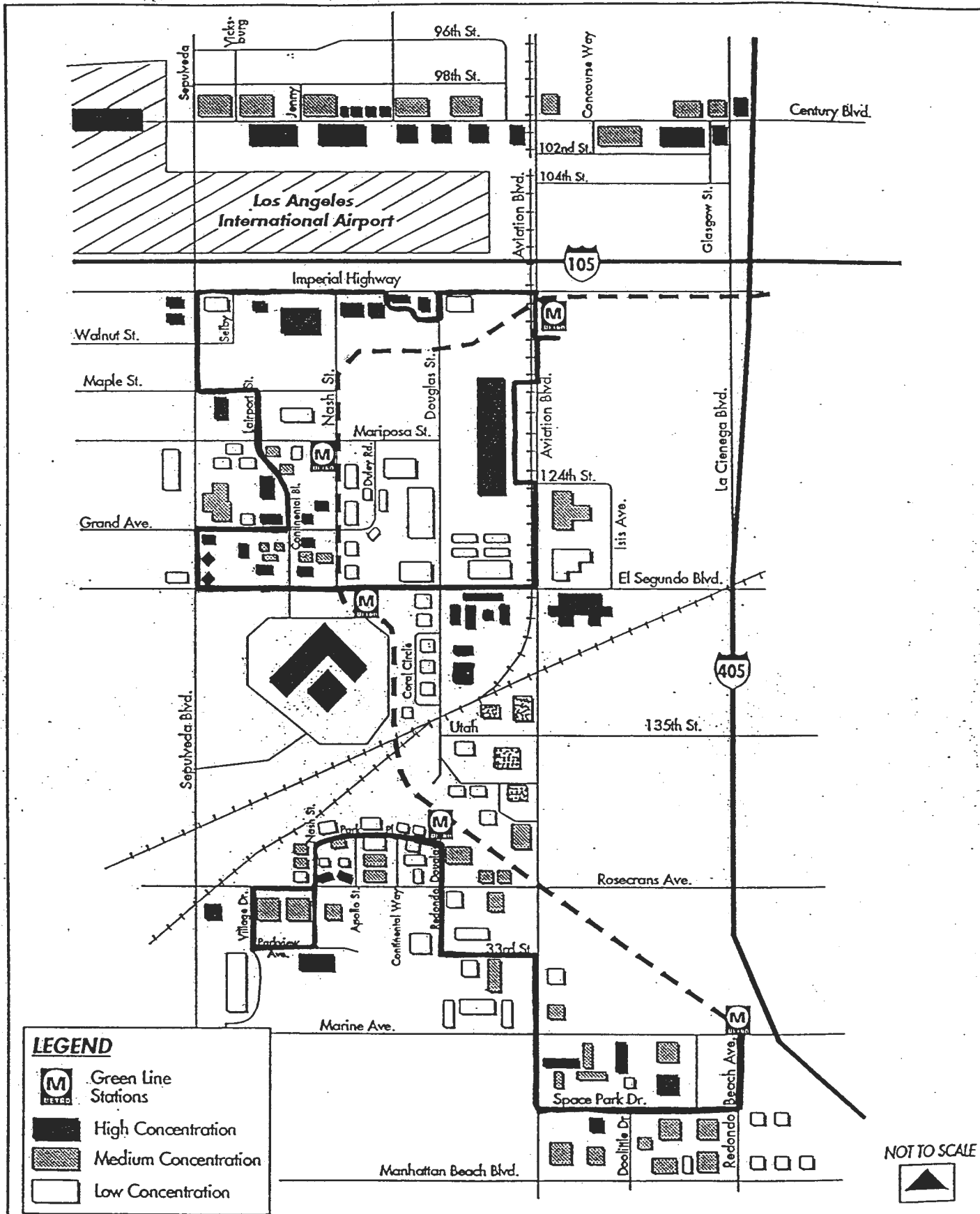
The alignments are illustrated in Figure 23.

Cost - The current MAX contract has both fixed monthly costs and per hour operating expenses. The fixed cost is \$22,957 per month for a fleet of 13 buses, plus \$33.76 per hour. This equates to an annual fixed cost of \$21,191 per bus. If MAX-type buses were to operate these routes and the costs were similar, the annual fixed cost for 12 minute service on both the north and south routes would be \$169,500 (8 x \$21,191) and the cost for revenue hours of service would be \$413,222 (12,240 hours x \$33.76), for a total cost of 582,722.

If the service were contracted out to another operator and could be obtained for the \$50.00, the cost would be almost exactly the same, \$612,000. The average of these two cost estimates is \$597,000.

Convenience - This alternative would provide convenient service. With shuttles operating every 12 minutes, every other Green Line train would be met in the morning commute period, with the vehicle waiting at the stations for patrons to arrive on the next Green Line train. This would be possible with this alternative, since the vehicles are dedicated to Green Line shuttle service and do not have to maintain a schedule outside the study area. In the morning, some Green Line patrons would have to wait six minutes for the next shuttle, whereas others would have virtually no waiting time. In the afternoon, the shuttles would operate on 12-minute fixed schedules, so employees could time their departure from work to meet the next available shuttle with little waiting, but it would not be guaranteed that the shuttles would arrive at the Green Line stations exactly in sync with a train departure. Shuttle riders could have up to a 6 minute wait on the train platform. The routes are designed to include stops within development sites, such as the Kilroy Center and Northrop Plant, thereby increasing convenience for riders in these high employment concentration sites.

Availability for Other Uses - Vehicles probably could be made available for other uses, depending upon the contract with the operator. The southern route could easily be extended to circle the Manhattan Village Mall and the northern route could be extended to serve Downtown El Segundo.



Personal Security - Personal safety is always a concern to transit riders, but this service should minimize problems to riders. Morning commuters will be picked up at the Green Line stations with the shuttles waiting for them to descend the station escalators, at least for every other train. They would be taken to either a curb-side bus stop near their office or to stops within development sites. In the afternoon, passengers will need to wait at designated bus stops, but several of these will be internal to development sites, rather than on the public streets, making them more secure. The area already has many bus stops, some with shelters. Others can be established, if necessary. With service every 12 minutes, there should not be any long waits.

Other Comments

Implementation Feasibility - This alternative would be easy to implement. ESEA or some other agency would need to take the lead and issue the contract with the shuttle operator. MTA and the municipal operators would need to be notified of the routes and have the opportunity to protest. Selecting a contractor through competitive bid takes about two months. Contractors may need time to acquire vehicles. New vehicles could take three to six months. Used vehicles, if available, would be ready for service with minimal delay.

Circulation Issues - The two routes would operate primarily on public streets with some deviations onto private property. These would require written agreements between the property owner and the transit operator. In some locations the internal roadways within the development sites have speed bumps. These will require the shuttles to slow down, causing some delay, but should not cause significant circulation problems. Traffic congestion on Aviation Boulevard near Imperial Highway could cause some delays to this route. The southern route, however, avoids the busy Rosecrans/Aviation intersection by diverting through TRW via 33rd Street and Redondo Avenue.

Advanced Transportation Technologies - New vehicles could use clean fuels. Used vehicles would probably use conventional fuels. Fixed-route, fixed-scheduled services would not gain a lot from advanced technologies.

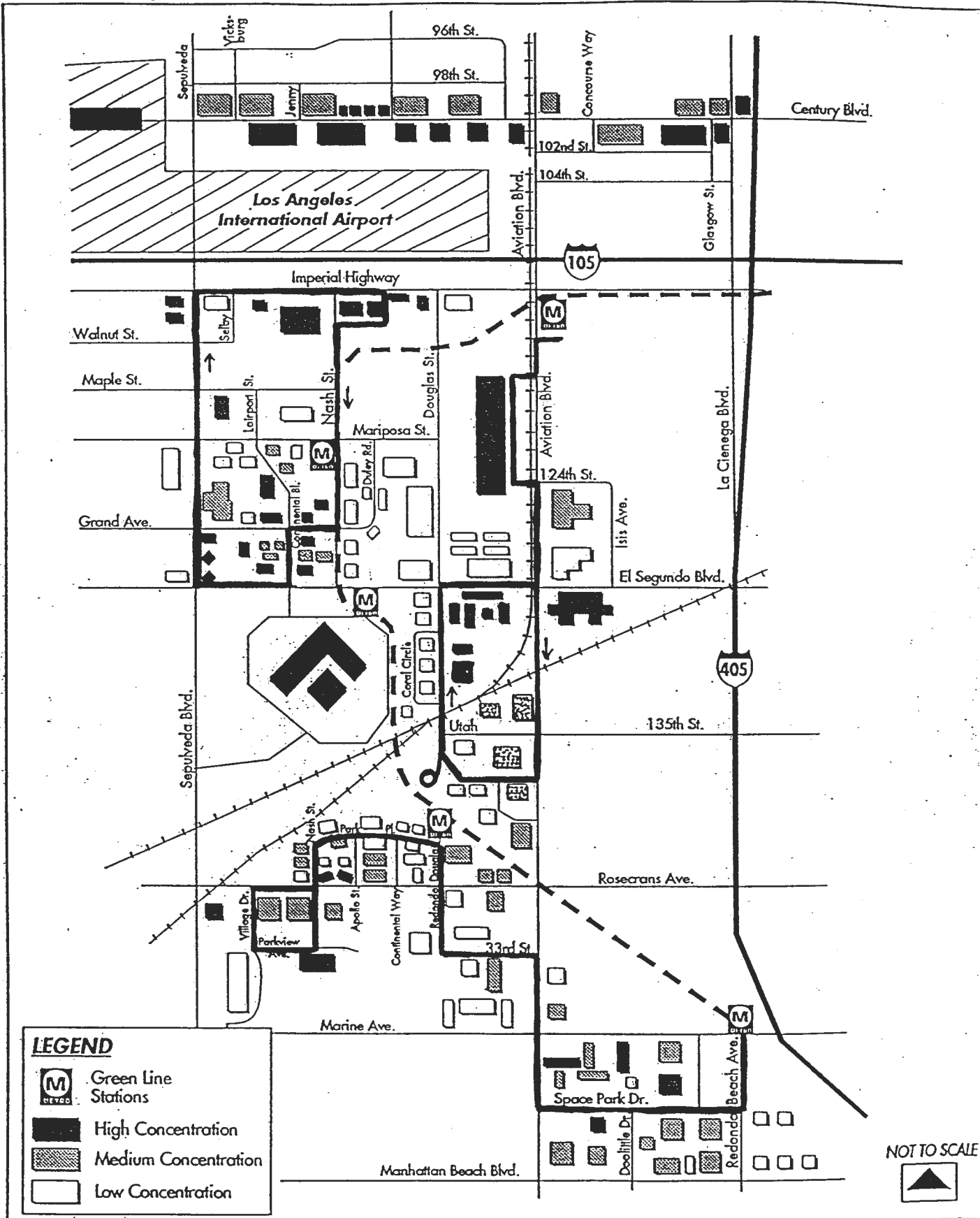
Evaluation of Alternative 3: Three Fixed Routes

Service assumptions:





Each Route

- one-way service
- every 12 minutes with 2 buses on each route
- no midday service
- 6 revenue hours, 3 hours in morning and 3 hours in afternoon for 255 days/year
- with 12 minute service - $6 \text{ buses} \times 6 \text{ hrs/day} \times 255 \text{ days/year} = 9180 \text{ annual revenue hours}$
- service provided by contractor, potentially MAX (potentially use 8 available MAX buses)
- service is provided at minimal cost to users

See Figure 24 for the the alignments of the routes.



LEGEND

-  Green Line Stations
-  High Concentration
-  Medium Concentration
-  Low Concentration

Cost - If MAX-type buses were to operate these routes and the costs were similar, the annual fixed cost for 12 minute service on both the north and south routes would be \$127,150 (6 x \$21,191) and the cost for revenue hours of service would be \$309,920 (9180 hours x \$33.76), for a total cost of 437,070.

If the service were contracted out to another operator and MAX-size buses were obtained for the \$50.00, the cost would be almost exactly the same, \$459,000. If the service were contracted out and smaller van-type buses were obtained for \$30.00 per hour, the cost would be reduced to \$273,400.

The average cost estimate for this alternative, based on MAX size buses is \$448,000 per year.

Capacity - It is assumed that this alternative will utilize small buses, like MAX vehicles, with a capacity of 25 passengers. The northwest route serves only station, Nash/Mariposa, so it will have a 25-person capacity on each loop. The other two routes will each serve two stations and have the ability to transport 50 passengers per run, assuming passengers discharge prior to reaching a second Green Line station. At 12-minute headways, each bus will make 2.5 loops per hour. This will result in a capacity of 750 on the northwest route (2 buses x 25 pass/run x 2.5 runs/hour x 6 hours/day) and 3,000 on the other two routes (4 buses x 50 pass/run x 2.5 runs/hour x 6 hours/day). The total capacity for this alternative is estimated at 3,750 passengers per day, well in excess of the expected demand.

Convenience - Alternative 3 provides above average convenience to riders because it includes two shorter routes in the northern portion of the study area and still provides 12-minute headway service. It also includes some stops within development projects to bring riders closer to their destination. In the morning, the shuttles would wait at the Green Line stations for the next train arrival and depart the station when the riders descended the escalator to the shuttle. This would mean some people would wait 6 minutes, but other would not have any wait at all. In the evening the shuttles would run on fixed schedules. This alternative does not provide service to the El Segundo station, but provides service to the Douglas station from both the north and south sides. Most of the riders who are likely to utilize the El Segundo station initially are likely to be Hughes employees, who can walk to their office complex. The southern route on this alternative is the same as for Alternative 2.

Availability for Other Uses - Vehicles probably could be made available for other uses, depending upon the contract with the operator. The southern route could easily be extended to circle the Manhattan Village Mall. A new route would have to be developed in the northern portion of the study area to link it to Downtown El Segundo.

Personal Security - Personal safety is always a concern to transit riders, but this service should minimize problems to riders. Morning commuters will be picked up at the Green Line stations with the shuttles waiting for them to descend the station escalators, at least for every other train. They would be taken to either a curb-side bus stop near their office or to stops within development sites. In the afternoon, passengers will need to wait at designated bus stops, but several of these will be internal to development sites, rather than on the public streets, making them more secure. The area already has many bus stops, some with shelters. Others can be established, if necessary. With service every 12 minutes, there should not be any long waits.

Other Comments

Implementation Feasibility - This alternative would be easy to implement. ESEA or some other agency would need to take the lead and issue the contract with the shuttle operator. MTA and the municipal operators would need to be notified of the routes and have the opportunity to protest. Selecting a contractor through competitive bid takes about two months. Contractors may need time to acquire vehicles. New vehicles could take three to six months. Used vehicles, if available, would be ready for service with minimal delay.

Circulation Issues - The three routes would operate primarily on public streets with some deviations onto private property. These would require written agreements between the property owner and the transit operator. In some locations the internal roadways within the development sites have speed bumps. These will require the shuttles to slow down, causing some delay, but should not cause significant circulation problems. The route serving the Nash/Mariposa station would operate as a one-way clock wise loop with mostly right turns, which should facilitate circulation. The route serving the Aviation station should avoid some of the congestion on Aviation Boulevard near Imperial Highway by turning south from there at the proposed traffic signal at 116th Street which will minimize delays to this route. The southern route also avoids the busy Rosecrans/Aviation intersection by diverting through TRW via 33rd Street and Redondo Avenue.

Advanced Transportation Technologies - New vehicles could use clean fuels. Used vehicles would probably use conventional fuels. Fixed-route, fixed-scheduled services would not gain a lot from advanced technologies.

Evaluation of Alternative 4: Shuttles serving each El Segundo Station

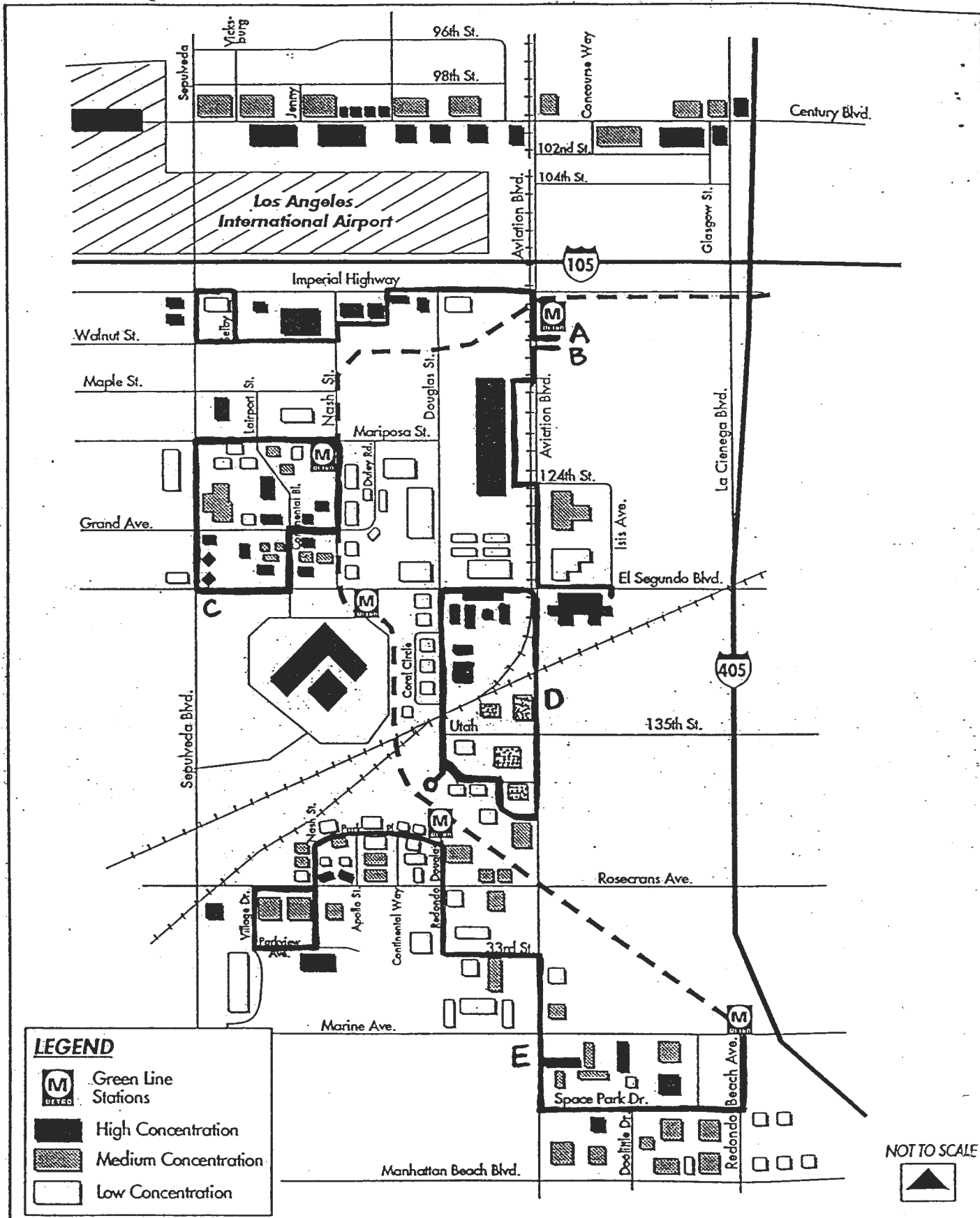
Service Assumptions:

- every 12 or 6 minutes to each station for 2 hours in the morning and 3 hours in the afternoon
- no midday service
- 7 vehicles needed to provide 12 minute headways to each station
- 12 vehicles needed to provide 6 minute headways to each station
- 6 revenue hrs/day for 255 days/year
- with 12 minute service - 7 veh x 6 hrs/day x 255 days/yr = 10,710 annual revenue hours
- with 6 minute service - 12 veh x 6 hrs/day x 255 days/yr = 18,360 annual revenue hours
- service provided by contractor (no existing vehicles used)
- service is provided at minimal cost to users

The alignments are illustrated in Figure 25.

Cost - The larger contractors might charge about \$50 per revenue hour for service with such few annual revenue hours. PrimeTime and SuperShuttle provided similar service in the San Fernando Valley after the Northridge earthquake for about \$30 hour. Using those two figures as the limits of the range, the El Segundo service would cost between \$321,300 and \$535,500 per year to operate with 12 minutes headways and between \$550,000 and \$918,000 per year with six minute headways.. With no fare charged, there would be no revenues from this service.

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Capital costs would be included in the fees charged by the contractor. The contractor would amortize the capital cost over the life of the contract. The longer the contract, the less the contractor would have to add to the hourly operating cost for capital costs. A shorter contract would raise the hourly cost of service to ESEA. This is especially true of alternative fuel vehicles, because there is no established market for used alternative fuel vehicles. If the contract is shorter than the life of the vehicle, the contractor can not be sure of the resale value and would likely try to cover the complete capital costs during the life of the ESEA contract.

Capacity - Capacity with small vehicles would be about 8 per vehicle. With 5 trips per hour and 6 hours of service per day, the shuttles could carry up to 240 riders a day at each station (perhaps, 120 in the morning and another 120 in the afternoon) with 12 minute service and about 480 riders a day per station with six minute service (10 trips per hour). Small buses would hold about 20 people, yielding a capacity of about 600 or 1,200 people per station per day, depending on the headway. The small vehicles might not be adequate to meet the peak period demands at individual stations. Additional small vans might be required to provide 6 minute service at some stations during the peak of the peak, or a mix of small vans and small buses might be required to meet the peak demands at higher-volume stations.

Convenience - This alternative would provide convenient service. Every other Green Line train would be met during peak hours (every train of service operated every six minutes). Shuttle service to work sites would be quick as the distances are short. No rider would be on the shuttle more than ten minutes. In the afternoon, shuttles would circulate and pick up passengers at designated stops. Although the schedule will be based on expected Green Line departures, it will be difficult to coordinate without knowing how well the Green Line will stay on its own schedule.

Both morning and afternoon shuttles could easily operate in the route deviation mode. In the mornings, drivers would determine the destinations of the riders and tailor the route to serve just those sites and not taking time to serve portions of the route not needed by the passengers on board. In the afternoons, drivers would travel a predetermined route unless riders called in to ask for a pick-up nearby but not directly on the route. Vehicles would leave the beginning of the route on schedule. Their departure from individual stops would vary depending on traffic and the number of pick-ups. Given the short distances and number of stops involved, vehicle departures would be quite predictable. Only occasionally would riders need to wait while the shuttle made extra stops.

Availability for Other Uses - Vehicles probably would be available during midday, depending on the agreement with the contractor. Contractor would likely be very interested in having additional uses for the vehicles. Midday service would cost less if all the fixed costs were factored into the peak hour service.

Personal Security - While personal safety is always a concern to transit riders, this service should pose no problems to riders. Morning commuters will be picked up at the Green Line stations and taken either to their door or to the nearest curb. In the afternoon, passengers will need to wait at designated bus stops. The area already has many bus stops, some with shelters. Others can be established, if necessary. With service every 12 minutes, there should not be any long waits.

Other Comments

Implementation Feasibility - This alternative would be easy to implement. ESEA or some other agency would need to take the lead and issue the contract with the shuttle operator. MTA and the municipal operators would need to be notified of the routes and have the opportunity to protest. Selecting a contractor through competitive bid takes about two months. Contractors may need time to acquire vehicles. New vehicles could take three to six months. Used vehicles, if available, would be ready for service with minimal delay.

Circulation Issues - Most of the routes could operate completely on public streets. Service would be more convenient to certain users if shuttles could drop off immediately in front of buildings rather than at curbs.

Advanced Transportation Technologies - New vehicles could use clean fuels. Used vehicles would probably use conventional fuels. Fixed-route, fixed-scheduled services would not gain a lot from advanced technologies.

Evaluation of Alternative 5: Demand responsive shuttles serving zones around each El Segundo station

Service assumptions:

- meet every or every other train at each station for 3 hrs in the morning and 3 hrs in the afternoon
- 7 vehicles needed to meet every other train at each station
- 14 vehicles needed to meet every train at each station
- 6 revenue hrs/day for 255 days/year
- meeting every other train - 7 veh x 6 hrs/day x 255 days/yr = 10,710 annual revenue hours
- meeting every train - 14 veh x 6 hrs/day x 255 days/yr = 21,420 annual revenue hours
- service provided by contractor (no existing vehicles used)
- service is provided at minimal cost to users

See Figure 26 for the approximate locations of the shuttle zones.

Initially, shuttles would meet every or every other Green Line train at each station. Then, as patterns develop, service could be expanded at stations with greater than average demand and reduced at low demand stations. As temporal patterns emerge, shuttles could be sent to certain stations at certain times to serve larger number of riders. The five El Segundo stations would form a system with vehicles being dispatched where and when needed both in the morning and in the afternoon.

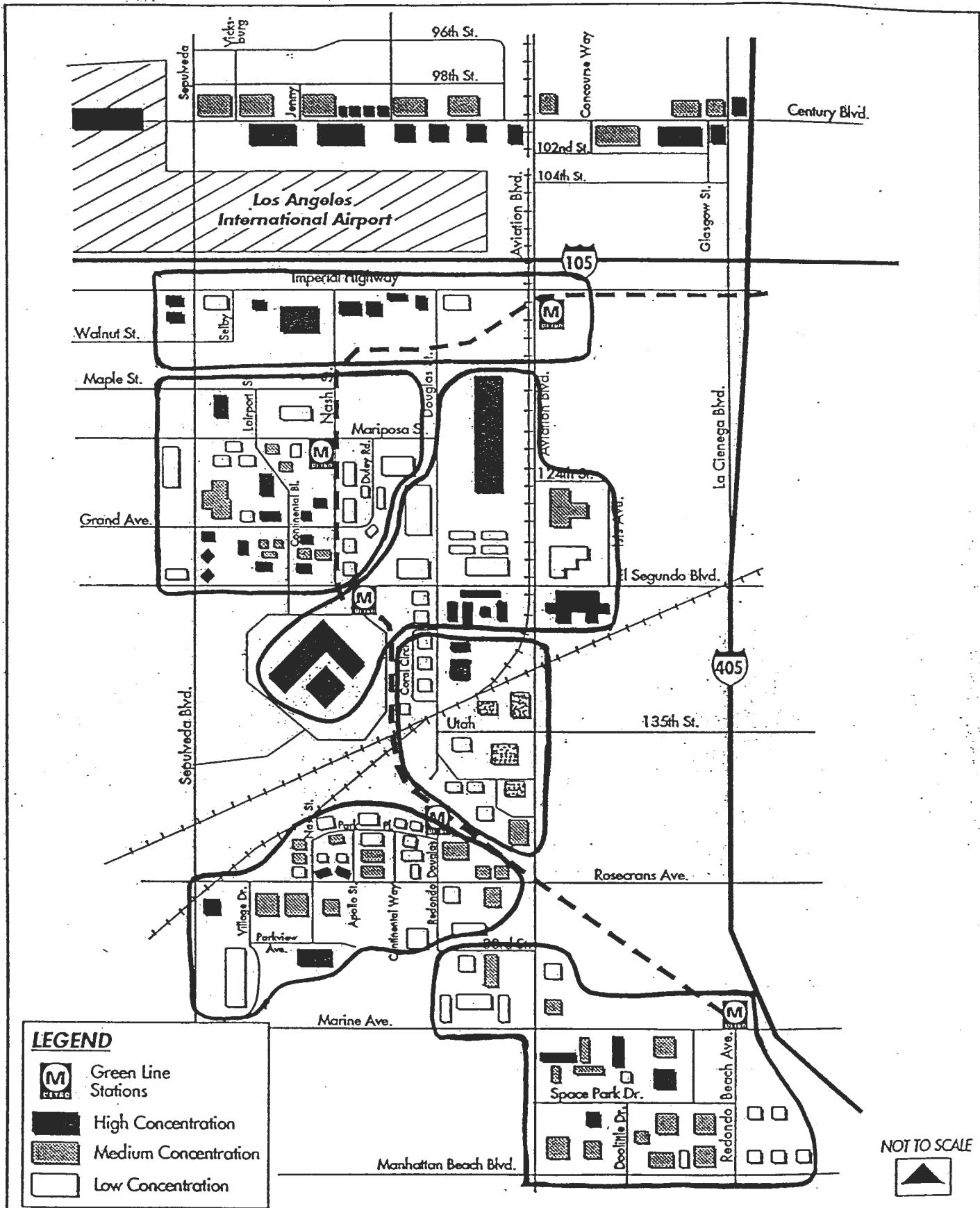
In the mornings, riders would board shuttles destined for their work sites. Drivers would determine the route based upon where the riders needed to go. There would not be a set route or schedule. Service areas would be small, allowing short rides and frequent service.

Cost - PrimeTime and SuperShuttle provided similar service in the San Fernando Valley after the Northridge earthquake for about \$30 hour. Therefore, the service would cost between \$321,300 and \$642,600 per year, depending on the level of service. With no fare charged, there would be no revenue from this service.

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Alternative 5
Shuttle Zones
ESEA Green Line Circulator Study

FIGURE
26

Capital costs would be included in the fees charged by the contractor. The contractor would amortize the capital cost over the life of the contract. The longer the contract, the less the contractor would have to add to the hourly operating cost for capital costs. A shorter contract would raise the hourly cost of service to ESEA. This is especially true of alternative fuel vehicles, because there is no established market for used alternative fuel vehicles. If the contract is shorter than the life of the vehicle, the contractor can not be sure of the resale value and would likely try to cover the complete capital costs during the life of the ESEA contract.

Capacity - Capacity with small vehicles would be about 8 per vehicle. With five trips per hour (meeting every other train) and six hours of service per day, the shuttles could carry up to 240 riders a day at each station (perhaps, 120 in the morning and another 120 in the afternoon) and about 480 riders a day per station meeting every train. Small buses would not be suitable for this type of service. The number of vans assigned to each station might need to fluctuate during the three-hour peak period to meet peak demands. It might be possible to have one or two "floating" vans, not assigned to a particular station at all times, but being available to respond to short-term peaks at individual stations when they arise.

Convenience - This alternative would provide convenient service. Every other Green Line train would be met during peak hours (every train if service operated every six minutes). Shuttle service to work sites would be quick as the distances are short. No rider would be on the shuttle more than ten minutes. Drivers would determine where riders needed to go and make up a route to serve just those destinations. If everyone in the van wanted to go to the same work site, service would be non-stop to that site. All work sites within the zone would be served directly.

Afternoon service offers two options, demand-responsive and fixed route. If service were demand-responsive, riders would need to reserve a return trip. They could do this on the shuttle in the morning, by telephone, by e-mail or by standing reservation. Even so, some riders might find the need to make a return reservation an inconvenience. However, no one would be off-route or need to walk very far to a bus stop. They would then be picked up by a shuttle at the time and place agreed upon. With fixed-route service, shuttles would circulate and pick up passengers at designated stops only. Although the schedule would be based on expected Green Line departures, it would be difficult to coordinate without knowing how well the Green Line will stay on its own schedule.

Availability for Other Uses - Vehicles probably would be available during midday, depending on the agreement with the contractor. Contractor would likely be very interested in having additional uses for the vehicles. Midday service would cost less if all the fixed costs were factored into the peak hour service.

Personal Security - While personal safety is always a concern to transit riders, this service should pose no problems to riders. Morning commuters will be picked up at the Green Line stations and taken either to their door or to the nearest curb. In the afternoon, passengers would be picked up by reservation or would wait at designated bus stops. The area already has many bus stops, some with shelters. Others can be established, if necessary. With frequent service, there should not be any long waits.

Other Comments

Implementation Feasibility - This alternative would be easy to implement. ESEA or some other agency would need to take the lead and issue the contract with the shuttle operator. MTA and the municipal operators would need to be notified of the routes/service and have the opportunity to protest. Selecting a contractor through competitive bid takes about two months. Contractors may need time to acquire vehicles. New vehicles could take three to six months. Used vehicles, if available, would be ready for service with minimal delay. The operator would need to have skilled dispatchers to monitor service demand and adjust service levels as needed.

Circulation Issues - Most of the routes could operate completely on public streets. Service would be more convenient to certain users if shuttles could drop off immediately in front of buildings rather than at curbs.

Advanced Transportation Technologies - New vehicles could use clean fuels. Used vehicles would probably use conventional fuels. This service option could be a type of Smart Shuttle using advanced transportation technologies. Demand-responsive services could use computer-aided dispatch and vehicle locators to better match riders and vehicles. The cost of those technologies is not known at this time. Fixed-route, fixed-scheduled services would not gain a lot from advanced technologies.

Evaluation Criteria Comment to All Alternatives and Potential Obstacles

1. Organization Structure - i.e., who will operate and provide oversight.

There are various ways to operate the proposed shuttle services. They each differ depending on the degree of oversight and control that ESEA as an organization wants to retain.

- a. Status Quo - The option always exists to continue to have each company separately operate their own services for their own employees as they choose. There will also be services provided by MTA, MAX and Torrance Transit which will be modified to serve the Green line. The ESEA Board would have no authority, but would be in the position of monitoring the service as any member of the public.

Concerns: The service would not comprehensively address the needs of ESEA employers and employees and there would be no economies which could be gained from working together.

- b. MTA as service provider - The ESEA Board would ask the MTA to provide the shuttle services that are an outcome of this study. The MTA Board would be responsible for formal oversight. The ESEA Board would be more of an advisory committee to MTA. The services would be subject to MTA's productivity standards for continued operation.

Concerns: If shuttle-type vehicles are preferred, the MTA does not operate them. Also, there is very little flexibility to modify the service with the MTA. Each change usually affects other parts of the system and is part of a long and extensive public participation process.

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- c. Torrance Transit as service provider - Same descriptions as MTA. Some more flexibility is possible, but not significantly because they have the same general guidelines.
- d. MAX as service provider - MAX is already providing commuter bus services to the ESEA area. It is a joint powers authority of six South Bay Cities with a governing board of representatives from each City Council. MAX contracts with Torrance Transit to oversee the operations of a private contractor who provides the service. MAX will also be the contractor for the City of El Segundo for their new lunchtime shuttle service from downtown El Segundo to LAX. ESEA could ask MAX to provide the shuttle services that are an outcome of this study. MAX does have eight extra vehicles. They are larger than shuttles, but smaller than most MTA buses. The MAX governing board would provide policy direction with ESEA in an advisory capacity. This arrangement would increase city interest in the Green Line shuttle services.

Concerns: MAX is currently focused on the over 10 mile commuter trip, although with their new El Segundo contracted service, they will be in the short-range shuttle business. It does appear that at least some of the Board may be interested in working with ESEA to have MAX provide ESEA commuter shuttle service. They definitely do not want to compete.

- e. A designated city as service provider - This would be similar to MAX in that any city alone would have to contract for actual operations since none of the South Bay cities except Torrance have the capacity to operate service on their own. El Segundo is contracting for the lunchtime shuttle and may be interested in assuming this responsibility if it did not cost them any money.

Concerns: This would probably be burdensome for one city alone and if they decided to work with their neighboring cities, they might as well use MAX.

- f. ESEA as service provider contracting with MAX - ESEA would contract directly with MAX to provide the shuttle services recommended as a result of this study. The ESEA Board would become the policy board and could create a working group to provide more active oversight. ESEA would set service standards and policy direction and the MAX Board would be responsible to ESEA for monitoring the operations. This is a way to more directly involve the cities in the Green line shuttle services.

Concerns: ESEA would become an operating entity. ESEA would be the contracting agent and have day-to-day oversight responsibility. Also, it would become the recipient of MTA funds and therefore be responsible for several different reporting requirements as well as procurement procedures that will require special attention. Additional ESEA staff dedicated to this assignment would be needed to accomplish this.

- g. ESEA as service provider contracting with a private contractor - This is similar to contracting with MAX, however, it provides the most flexibility. There are no other governing boards to deal with.

Concerns: Same as f. ESEA would become an operating entity.

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2. Funding Sources

Because of the amount of funding required, it will probably be necessary to use both public and private funds in some circumstances. The sources which could be considered are:

- a. MTA Call for Projects - Rail feeder service should receive priority for funding as they enhance the entire transportation system. The schedule requires applications to be received by April 1995.
- b. AB 2766 funds from SCAQMD - These funds do not become available until after the Green line is scheduled to open, approximately September 1995. This year, however, there was a special category for rail feeder services. Therefore, it could be a potential revenue source after the first few months of services, especially if this project is perceived as unique in some way (i.e., type of vehicle, alternative fuels, etc.)
- c. Cities Proposition A and C and AB 2766 Funds - (The service area is in El Segundo, Los Angeles, Redondo Beach, Manhattan Beach, Hawthorne) - Most cities have committed their Proposition A and C funds to existing services, but there may still be some limited funding available. Since AB 2766 air quality funds are newer, it is possible that the cities have not yet committed these funds. To obtain city funds, a solicitation and presentation will be required before each City Council.
- d. As with the MAX service, ESEA could provide in-kind services by assuming the responsibility for marketing the new shuttle services. This contribution could be considered a local match. In addition, if required to filling for shortfalls of other funds, current contributions of ESEA members to their employee rideshare programs could be diverted to the new Green Line shuttle service.
- e. Vehicle donations for demonstration projects - If service is to be contracted out for a June/July start-up, getting a demonstration vehicle is not viable. More lead time is required. After the first six months of service, this may be possible. Once the type of service has been chosen, working with such groups as Calstart will allow consideration of realistic and timely options. In any event, since specific service characteristics will not fully be known until the service is actually operating, it is prudent that start-up service be as flexible as possible with no initial commitment to using a particular vehicle.

3. Liability

Contracting with some other agency to be the service provider (a-e) removes liability concerns from ESEA. If ESEA wants to chose options f or g, however, it will be important to resolve the issue of liability. We have ascertained from Robert Driver Company, which specializes in paratransit insurance coverage for agencies throughout California, that insurance coverage is possible for an ESEA operated service, but the specific cost would depend on the size of the vehicles and other service characteristics. Since ESEA would use a contractor to actually operate the vehicles, the contractor would have their own insurance also.

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4. Service Duplication Protests

When new service concepts are introduced which will serve the general public, the law requires that they be reviewed by the existing public transit operators to see if they are duplicative of the existing public routes. This has to do with not only maximizing service potential, but also labor protection. It is important that any concept that is agreed to be sent to the public transit operators at the earliest possible time so that the review process can commence. (MAX services were prevented from starting for over one year due to a protest citing service duplications).

Summary

The table following this page provides a summary comparison of the five alternatives evaluated. The cost comparisons were prepared to provide cost data on comparable levels of service for each alternative, approximately 12-minute headways. Alternative 2 represents the most costly alternative because of the need to employ eight vehicles to provide that level of service on two routes covering a large part of the study area. Alternative 4 would be nearly as costly, if buses are utilized rather than vans.

The first four alternatives, with fixed route services provide by buses, provide more than enough capacity to meet the estimate ridership. Alternatives 4 and 5, with vans, might only marginally provide enough capacity. Either Alternative 4 might require the use of some buses, mixed with the vans, or Alternatives 4 and 5 might require the use of several additional van-type vehicles assigned on a roving basis to respond to peak demands at individual stations. The lack of precise patronage estimates makes it difficult to categorically conclude which alternative will be best in provide adequate, but not excess, capacity to serve Green Line patrons.

Alternatives 4 and 5 provide higher levels of personal safety and service area coverage because the service is designed to wait for patrons at the Green Line stations and take them closer to their destinations. Alternative 5 however, requires riders to call for a ride in the afternoon, making it less predictable, in terms of response time than Alternative 4, which would operate on a fixed schedule in the afternoon.

**ESEA GREEN LINE CIRCULATOR STUDY
COMPARISON OF ALTERNATIVES**

Description of Alternative	Annual Cost	Convenience (Headway)	Capacity (Riders/day)	Approx. Service Area Coverage	Predictable Schedule	Personal Safety
1A: MTA Study Line 8A & 8B	\$448,000	Average Convenience (12 min.)	4500 (25-person buses)	60%	Highly Predictable	Average
1B: Torrance/MAX proposal for T-8, MAX 2,3	\$490,000	Average Convenience (10-15 min.)	3900 (25-person MAX, 48-person T-8)	60%	Predictable	Average
2: North and South Routes	\$597,400	Average Convenience (12 min.)	3000 (25-person buses)	60%	Highly Predictable	Average
3: Three Fixed Routes	\$448,000	Above Average Convenience (12 min.)	3750 (25-person buses)	80%	Highly Predictable	Average
4: Fixed Route Shuttles at Each Station	\$321,300 (Vans) \$535,500 (Bus)	Very Convenient (12 min.)	1200 (8-person van) 3000 (25-person buses)	80%	Most Predictable	High
5: Shuttle Zones at Each Station	\$321,300	Very Convenient (12 min.)	1200 (8-person vans)	100%	AM: Highly Predictable PM: Demand Responsive	Very High

VI. RECOMMENDATIONS

Recommendations

The recommended plan for implementation of shuttle service to the five Green Line stations in the El Segundo area is presented in this chapter. The plan is a modified version of Alternative 4, presented earlier, and is designed to have a maximum degree of flexibility to respond to ridership patterns as they develop in the first few months after service is initiated. The same type of service will also be appropriate upon the opening of the proposed Del Norte station, a sixth station in the study area.

The recommendations summarized below, were first presented to the Green Line Circulator Task Force, and have been modified to reflect their input. The primary modifications were in the design of shuttle routes along the Aviation Boulevard corridor, shifting service from the El Segundo Station to the Aviation Station, and including larger "cut-away" van-type shuttles with a center aisle or MAX buses, rather than the smaller eight passenger vans.

The recommended service parameters include the following:

- **Phased Implementation of Alternative 4** - Shuttles will be assigned to routes around each station, other than the El Segundo station, with specific service areas and routes, with 3 hours of service in the AM and 3 hours in the PM. The specific hours at each station may be adjusted to reflect the peak periods of demand at each station. The vehicle fleet is envisioned to be small vehicles, such as cut-away vans or potentially MAX buses, or a combination of the two, so that the small vehicles can enter employment sites and traverse internal roadways. The routes proposed for the shuttle services are shown in Figure X.
- **Service to be Contracted Out** - ESEA will encourage MTA to provide on-going funding for shuttle service to be contracted out to a private operator or municipal operator. Potential private sector matching contributions or in-kind services will be explored.
- **Initial Phase, first two months** - During the first two months, a sufficient number of shuttles should be provided to meet each Green Line train at each station during peak hours (two shuttles per route to provide six-minute headways) in order to encourage ridership. Note: This will probably result in excess shuttle capacity for the initial phase, but will allow for detailed monitoring of travel demands and origin-destination patterns.
- **AM Peak Operating Parameters** - Shuttles will be scheduled to wait for Green Line train arrivals in the morning peak period and to deviate from fixed routes based upon specific destinations of riders on the shuttle. That is, if only a few riders get on a particular shuttle, and they are all bound for the same employment site, the shuttle driver would go directly there, rather than following a fixed route past destinations not desired by the riders. It is anticipated that ridership patterns will stabilize after a few weeks/months and the drivers will begin to know the riders on each trip. The hours of operation for some of the shuttles based at the Aviation Station will be earlier than for shuttles at other stations. Service on the route extending south from the Aviation Station should start with the earliest Green Line trains, potentially as early as 4:45 AM, to serve the 5:00 AM shift at Northrop.

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- **PM Peak Operating Parameters** - Shuttles will operate on fixed routes and with fixed schedules, based on six-minute headways. Drivers will monitor patterns of boardings and alightings to identify peaking characteristics by time of day and station, as well geographic distribution of ridership demand.
- **Monitor Patterns of Demand for two months** - The pattern of ridership will be monitored for two months. Minor adjustments to the distribution of vehicles may be made, if peaking characteristics require such adjustments. For example, if the early morning runs from the Aviation Station require larger vans to meet the demands, but the high demand shifts to the Marine Station later in the morning, the vehicle mix at each station could be adjusted by the dispatcher.
- **Adjust Shuttle Allocation Pattern** - Based on the results of the first two months of monitoring, the number and location of shuttles will be adjusted to reflect ridership patterns. It is anticipated that this will result in a reduction in the number of shuttles at some or all stations and that one shuttle will be permanently assigned to each station for 12 minute headway service, with two additional shuttles on-call in the study area to respond to peak demands at individual stations within the three-hour peak period.
- **Monitor Patterns of Demand for additional four to ten months** - Depending upon the initial contract with the shuttle operator, whether for six months or one year, the pattern of ridership will continue to be monitored to determine if demand warrants conversion to fixed routes with larger vehicles.
- **Re-evaluate service needs and potential for new technologies** - After the first six months or one year of service, the performance of the system will be re-evaluated and the availability of new technologies for implementation as demonstration projects will be investigated. Both Hughes and Northrop have said that they may have new, experimental vehicles available in that time frame. If so, these vehicles could be used to serve one or more of the stations and the contract with the private operator modified to reflect the incorporation of demonstration project vehicles into service.
- **First Year Cost Estimate** - The first two months of service are assumed to include 12 vehicles in service, two on the four northern routes and four on the southern route serving two stations. Based on an assumed mix of vehicles, with some smaller vans (potentially at \$30/hour) and some MAX-type buses (at potentially \$50/hour), an average hourly cost of \$40 was assumed. For two months, this high level of service results in a cost of \$122,400 (12 vehicles x \$40/hr x 6 hrs/day x 42.5 days). For the next 10 months of the year, a reduced level of service with 8 vehicles is planned, assuming six vehicles assigned to the routes and two vehicles available to respond to peak demands on any of the routes. The cost of this level of service for 10 months would be \$408,000 (8 vehicles x \$40/hr x 6 hrs/day x 212.5 days), an average monthly cost of \$40,800. The total first year cost is estimated at \$530,400.

- **Supplemental Recommendations**

Pedestrian Access Improvements - In order to encourage Green Line riders to walk between the stations and their places of employment, at least during those times of the year when the weather is conducive to walking, sidewalks should be provided along streets around the stations. The stations where the greatest levels of pedestrian activity are expected are the Mariposa/Nash, El Segundo and Douglas Street stations. There are a limited number of land uses within walking distance of the Aviation and Marine stations. Pedestrians walking to/from the El Segundo station will primarily be Hughes employees walking within the Hughes complex. The City of El Segundo should therefore consider implementing pedestrian improvements at the Mariposa and/or Douglas Street stations. The Douglas Street station in particular is a good candidate for pedestrian access improvements to facilitate walking to/from the north across the railroad tracks to the shuttles which will access the station from the north, as well as the employment sites along Alaska, Utah and Douglas Streets.

Station Bicycles - The Mariposa and Douglas stations are also good candidate locations for bicycle storage facilities (e.g., lockers) and potentially station bikes. The lockers would allow employees to store their own bicycles at the station for use as a shuttle to/from their offices. The concept of station bikes would include ESEA, the City of El Segundo or MTA providing bicycles as well as lockers at these stations and allowing employees to utilize them. The employees would be able to sign up to utilize the bikes (either for free or at a fee) as non-motorized shuttles to/from their offices. These two stations are good candidates for bicycle access because of the concentration of buildings nearby which can be accessed via comparatively less-heavily traveled roadways (i.e., no need to ride on El Segundo, Rosecrans, Imperial Highway or Aviation).