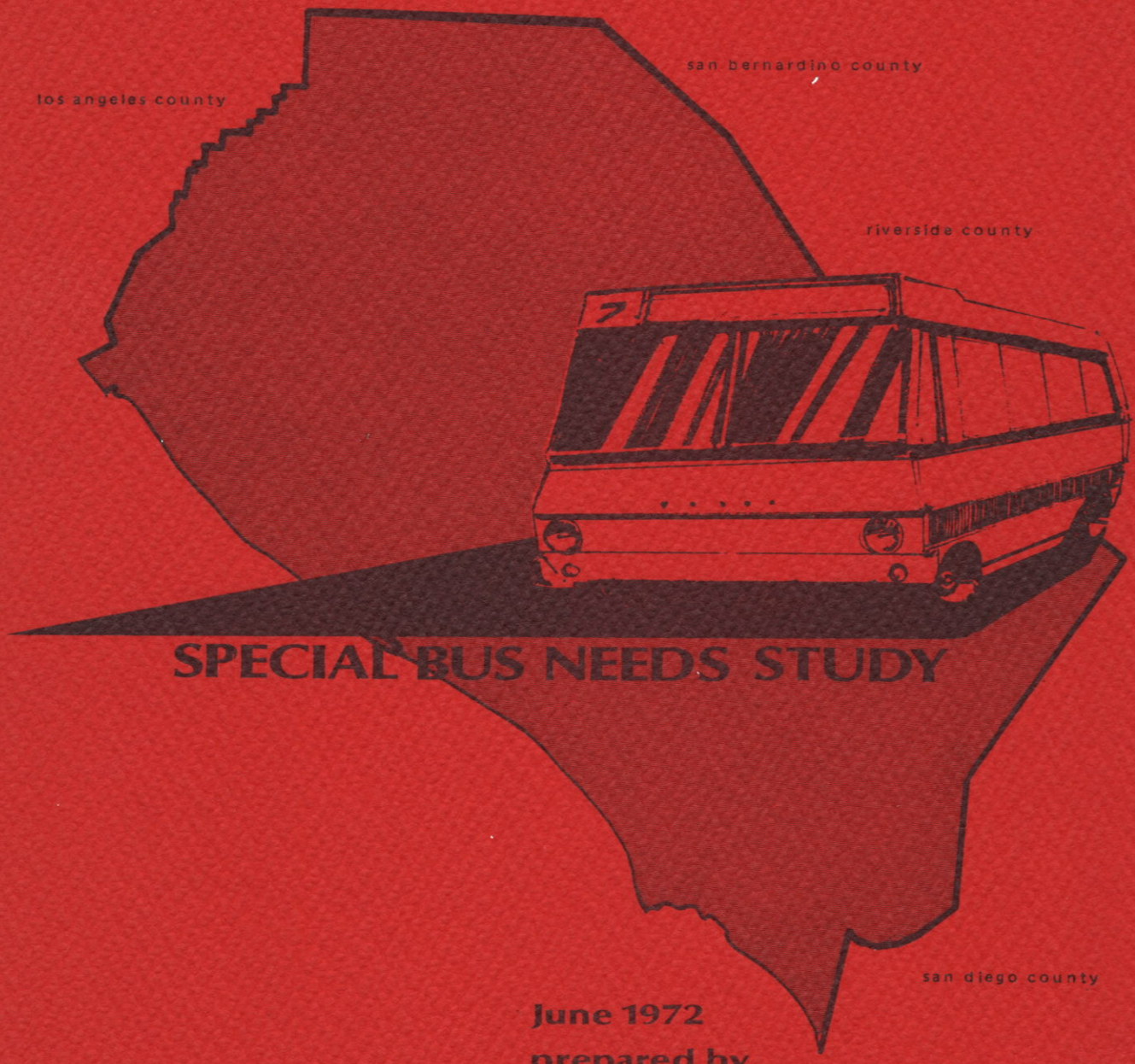
the Orange County Transit District



SPECIAL BUS NEEDS STUDY

June 1972

prepared by

VTN

AMV
ALAN M. VOORHEES
& ASSOCIATES, INC.

THIS STUDY AND REPORT HAS BEEN PREPARED FOR
AND FINANCED BY
THE ORANGE COUNTY TRANSIT DISTRICT

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A JOINT VENTURE OF

VTN orange county

ENGINEERS ARCHITECTS PLANNERS ECONOMISTS

AMV
ALAN M. VOORHEES & ASSOCIATES, INC.
TRANSPORTATION AND PLANNING CONSULTANTS

2301 CAMPUS DRIVE, IRVINE, CALIFORNIA 92664 (714) 833-2450

June 30, 1972

Dr. Gordon J. (Pete) Fielding
General Manager
Orange County Transit District
515 N. Sycamore
Santa Ana, California 92701

Dear Dr. Fielding:

The joint venture of VTN/AMV is pleased to submit herewith, the final report on the Orange County Special Bus Needs Study.

In the performance of the study, and in the preparation of this report, we consistently made reference to our contractual Scope of Service, to insure that all our obligations under the contract would be fulfilled.

We are extremely appreciative of the advisory assistance provided by the Board and staff of the Orange County Transit District, the Technical Advisory Committee, and the various civic groups with whom we met.

It has been our pleasure to perform consulting services for the OCTD.

Very truly yours,

Ray J. Berryman
Vice President
VTN Orange County

Martin J. Bouman
Vice President
AMV & Associates

MJB:RJB:glw

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CHAPTER I

INTRODUCTION AND BACKGROUND

In the last few years, there has been a noticeable public awareness of transit service, or the lack of it. This has been true in Orange County as in scores of other urban areas across the nation. Clearly, there is a strong public feeling that many of the woes associated with contemporary urban living are related to transportation. Some of these are air pollution, noise pollution, waste of natural resources, accident hazard, loss of time and money, and general urban blight. Nationally, urban transportation is near the top of the list of urban problems. Many attempts are being made to find solutions through technical studies, public acquisitions, federal involvement, demonstration projects, mass transit development, and technological advancement. Even while communities are grappling with the problem, there persists the well established cycle of financial loss, fare increases, reduced transit service, and resultant loss of patronage. Throughout the country, citizens are depending upon local government, with state and federal financial assistance, to tackle and solve the massive transportation problems.

A. The Orange County Transit District

The Orange County Transit District (OCTD), was authorized by the voters of Orange County in November, 1970. In California, such action was not without precedent, since San Francisco, Sacramento, Los Angeles, San Diego, and several other areas had previously taken steps to establish publically operated transit districts, authorities, or systems.

The Orange County Board of Supervisors on June 17, 1970, adopted Resolution No. 70-679 which stated in part;

" 1) A transit district is needed to bring the total county problem under one system.

2) A district would immediately provide an agency for receiving funds from any source; a) Federal, b) State, c) Local, d) Private.

3) A District would provide an agency for County participation in regional decisions and systems development.

4) There is need for an agency in the county to be assigned the responsibility of mass traffic development.

5) A transit district would be a vehicle to implement any short term solution to our mass transit problem. "

In a later brochure entitled "Facts Relative to the Formation of an Orange County Transit District," the following excerpt is significant:

> "IMPLEMENTING A SHORT TERM SOLUTION TO THE MASS TRANSIT PROBLEM – It would naturally follow that if the Orange County Transit District is the agency which can respond to the desires of the public and if that demand is for a solution in the near future to serve needs which are immediate and ever-increasing, then the District can be the means of implementation.

One of the goals of the Transit Committee has been to concentrate its efforts toward the early provision of an interim mass transit system. At this time, it appears the most logical system would be one consisting of buses. While the newly formed District is participating in the development of long range solutions, a comprehensive coordinated unified bus system can be formed to respond to those needs already existing in the community. The system itself involves a minimum right of way investment and offers the flexibility which will permit itself to be molded into the pattern of the ultimate long range solution. It is conceivable, of course, that better alternates may be developed which are feasible as a short term solution. Regardless of what they may be however, the existence of the Transit District will assure the public of implementation within a reasonable time."

B. A Plan for Planning

In keeping with what would appear to be a mandate of the people of Orange County, the Transit District adopted a "Plan for Planning" on March 6, 1972. The "Plan" outlined the short range and long range plan for the District. The Short Range Plan reads as follows:

> "The Special Bus Needs Study is the first step. It will enable the District to provide immediate service in those areas in which demand is urgent.
>
> In addition to the bus systems proposed by the consultants, the District should inaugurate systems dedicated to special activity systems. The U.C.I. Bus Study is an example of a dedicated system.
>
> Systems dedicated to other colleges, to hospitals and social service centers, to recreational areas and to industrial and shopping centers ought to be planned. Such systems should be implemented on an experimental basis and on a cost-sharing basis with local sponsors."

C. Scope and Objectives of the Study

From the above, the scope and objectives of this study come sharply into focus. The study must establish an immediate action program which can be swiftly implemented to provide the citizens of Orange County with an efficient public transportation system. The basic elements of the study consist of inventorying existing public transit services in the county, estimating transit service needs to the year 1980, and determining the best operational and management method of meeting those needs. It is aimed at the "now" situation and must be solved with "now" technology. That means utilizing readily available equipment (buses) on readily available rights-of-way (public streets). The study determines where and how such buses should operate.

D. Meeting Study Goals

The consultant has provided herein an eight year "immediate action and transit building program" which, when implemented, will meet the short range needs of Orange County. The program is offered in "close detail" for the first two years, in "planned detail" for the next three years, and in general terms for the last three years. That is as it should be, since the OCTD will desire to exercise flexibility as operational experience is gained. Yet, the program is a sound basis for planning and funding. The consultant feels that the OCTD can launch the recommended program with full confidence of receiving public, state, and federal support.

CHAPTER II

STUDY METHODOLOGY AND CITIZEN PARTICIPATION

The basic objectives of the Special Bus Needs Study were discussed in Chapter I with the prime purpose to implement an efficient public transportation (bus) system at the earliest possible time. The citizens of the County of Orange recognized the imperativeness of developing a "now" system and not to wait for a mass rapid transit system, which would not be likely by 1980.

A. Technical Approach

The study methodology was designed to develop a program which would make bus transit a reality for those who need and want it. This requires a program designed to use readily available equipment (buses), on readily available rights-of-way (public streets). The work program, Exhibit 1, indicates the step-by-step procedure that was followed in the conduct of the study. Following chapters present the study findings, conclusions, and recommendations along with the technical data and explanations which led to the development of the implementation program. The three phases: (1) Inventory and analysis of existing service and needs; (2) Projections of needs to 1980 and development of alternative service levels; and (3) The detailed study and implementation program development, were designed to maximize the input and coordination of technical and citizen groups.

B. Technical Coordination and Citizen Participation

Two major decisions concerning Level of Service and the Implementation Plan were required by the Board of Directors of the Orange County Transit District. These came after Phases I and II were completed and the Interim Report dated March 1972 had been prepared by the consultant and submitted to the OCTD. Each of the decisions by the Board were predicated on the recommendations of the Consultant, the General Manager, and the technical and citizen review groups. Constant coordination between the Consultant and the General Manager was maintained throughout the study. Three organizations representing differing interest groups within the community were asked on two separate occasions to review the information prepared by the consultant and to suggest modifications:

1. The Technical Advisory Committee appointed by the Board of the OCTD.

2. The Transportation Council of the Orange County Chamber of Commerce.

3. Representatives of the following groups:
   Orange County League of Women Voters
   Orange County Human Relations Commission
   American Association of University Women

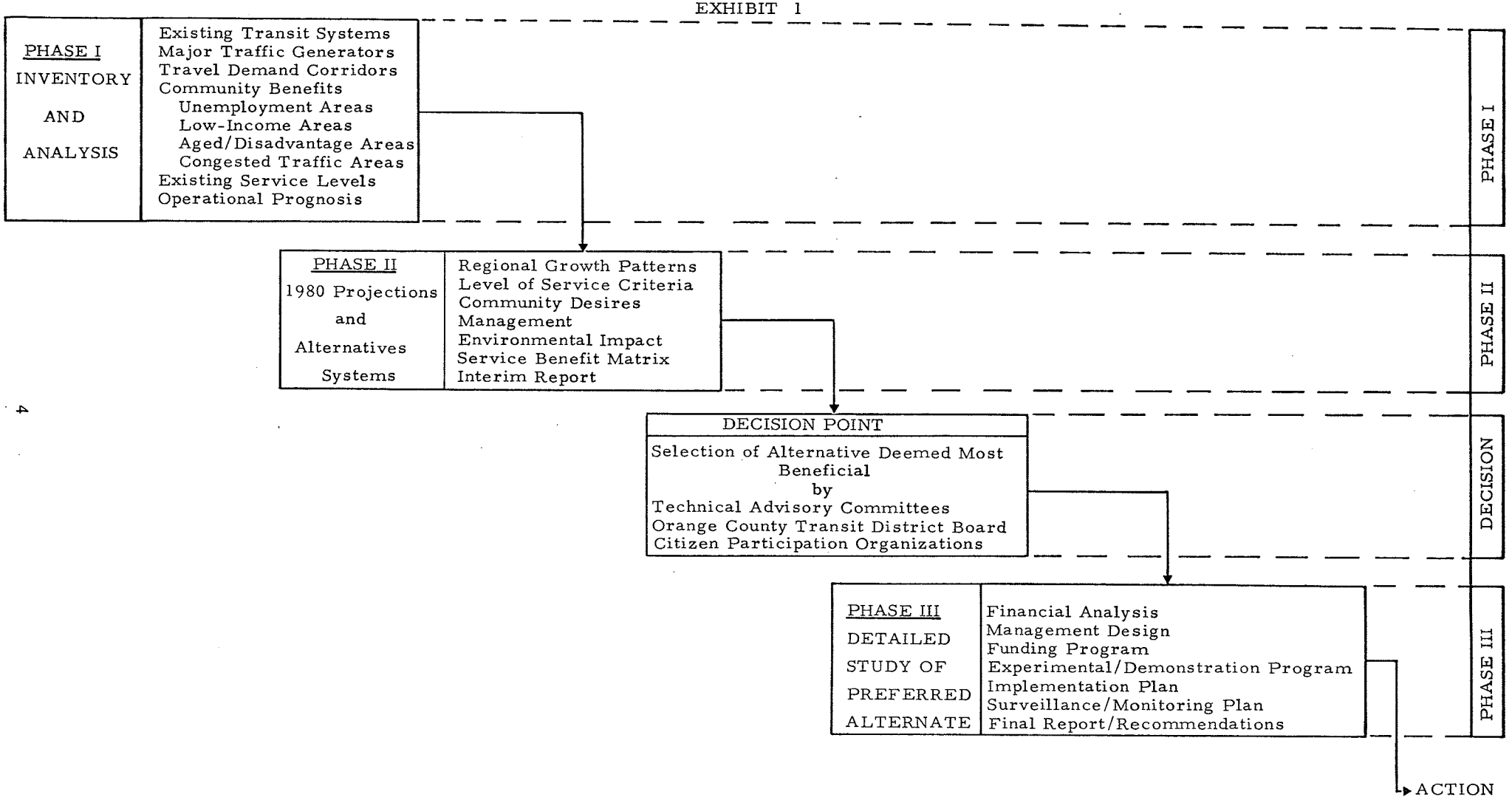
The involvement of these groups projected different perspectives on public transit. The Chamber of Commerce Transportation Council stressed maximum coordination with adjacent counties, recognizing that political boundaries should not be transportation barriers, whereas the women's organizations stressed the social benefits of improved transportation.

The results of these meetings guided the Consultant so that a truly unified and coordinated transportation program was developed. Several changes recommended by these groups have been incorporated in this report.

ORANGE COUNTY TRANSIT DISTRICT SPECIAL BUS NEEDS STUDY

AMV/VTN WORK PROGRAM

EXHIBIT 1



CHAPTER III

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of the findings, conclusions and recommendations resulting from this study.

A. Service

1. Existing transit service in Orange County is rated poor, generally. While there are some 15 public and private transit operations, for the most part they are uncoordinated, provide minimal service, and use antiquated equipment.

2. Growth in the County between now and 1980 will follow traditional patterns which unfortunately are not conducive to highly efficient transit service or patronage. Residential growth will follow the typical low-density "sprawl" pattern. Industrial growth will generally consist of expansions of existing "pockets." Commercial growth will come in fragmented shopping centers (no major "downtowns" are forthcoming).

3. Any bus transportation system for Orange County should have as a goal, the following basic elements of service:

   a) The capability of being phased into a future integrated mass transit system.

   b) Maximum social benefits for the poor, the unemployed, the underprivileged, the handicapped, the aged, the young, minorities, students and other groups.

   c) The ability to supply special supplemental service when there is a demand. Such special service may be centered around the needs of schools, churches, athletic events, shopping centers, industrial plants, etc.

   d) A strong public information program so the benefits of the transit system will be known and utilized by the traveling public.

   e) A basic fare of 25 cents for a ride of any length, a bus at least every 30 minutes, free transfers anywhere on the system and if possible on other systems, and modern air-conditioned buses with the latest and best environmental protection equipment.

   f) Experimentation and demonstration programs leading to enhanced service and patronage.

4. For ease of administration, operation and definition, the County should be divided into seven "Transit Service Areas," defined as Central, North Central, West Central, South Central, North Beaches, South Beaches, and Saddleback Valley.

5. A service level is recommended which includes the basic elements of service outlined above, and more specifically provides a service plan for both intra-area and inter-area service. To define, *intra*-area service would be that provided within the various communities and activity centers, while *inter*-area service would link the various communities and activity centers over longer-haul routes. All existing intra and inter-area routes would be evaluated, and major route modifications made so as to provide coordinated and unified service. There would be no commitment to retain any existing service if removal of such service would generally enhance

and improve the total system. New intra-area service would be provided in practically all communities not presently served. The intra-area routes would operate at basic service (30 minute weekday service, county-wide transfer potential, and reduced week-end and holiday service). New inter-area service would be provided on a schedule justified by potential usage.

This service level was adopted by the OCTD Board as the desired level for detailing and implementation.

B. Organization/Management

1. Any bus transportation system for Orange County should have as a goal, the following elements of organization/management:

   a) Maximum advantage must be taken of federal and state funding opportunities.

   b) No public or private properties will be acquired without proper compensation. Condemnation will be used only if negotiation fails.

   c) Experimentation and demonstration programs aimed at service enhancement and patronage increase must be undertaken. If subsidy or M&O operations are practiced, such experimentation will be by contract. If District operation is practiced, the experimentation will be directly by the District.

   d) The District will set the "level of service" (routes, schedules, fares, special services, etc.).

   e) All operations will be clearly identified with the Orange County Transit District, and as soon as possible, all equipment and facilities should be owned by the District. The District itself will be the monitoring agency for maintenance and public/operational relationships.

   f) Image is important. Service enhancement, leading to increased patronage, must be a primary goal.

2. In the first year, practically all service should be provided under a Maintenance and Operation (M&O) contract to private operators, with the exception of about 570,000 annual bus miles of new inter-area service which should form the first element of operational transit directly by the OCTD. In subsequent years the M&O contractual operations should gradually be phased out to a point where after five years the District itself will have assumed full operation of the transit system.

C. Costs

1. The costs of a transit implementation program extending over an eight year period are estimated at about $2 million in the first year, building to $5 million in the fourth year and leveling in the $4 to $4.5 million range annually thereafter to 1980. The cost figures include capital outlay costs, including rolling stock and maintenance and administrative facilities, in which the local share of such costs shall be 1/3 and the federal share 2/3. Operational support costs (to offset operational losses) are also included in the above figures.

2. There must be heavy reliance on outside sources for financing both the capital outlay portion and the operational support portion of the annual cost of the transit implementation program.

Such financial support must come from the Urban Mass Transportation Administration (UMTA) at the federal level, and from the County Transportation Fund as established under Senate Bill 325 of the 1972 California Legislature.

D. Development Plan

Following are salient features of the recommended service development plan.

1st year – 45 buses operating approximately 2.1 million bus-miles.
2nd year – 88 buses operating approximately 4.5 million bus-miles.
3rd year – 132 buses operating approximately 6.8 million bus-miles.
4th year – 177 buses operating approximately 9.3 million bus-miles.
5th-8th years – 187 buses operating approximately 9.6 million bus-miles.

Generally, the above bus-miles are equally divided between intra- and inter-area service. A dial-a-ride experimentation project during the first two years is not included in the above.

In the case of inter-area service, 30 service corridors have been proposed. These corridors fall generally along major arterials, but the details of the specific streets, bus stops, turns, schedules, etc., must be carefully studied and planned before implementation of service in a corridor can begin.

The Board of Directors of the OCTD has approved the Development Plan and its associated costs outlined in C & D above, stipulating however, that there must be the opportunity for annual review and flexibility, including budgetary control.

CHAPTER IV

EXISTING TRANSIT SERVICE

As a means of gaining a general understanding of the transit characteristics and functions in Orange County, the existing transit operations were examined with respect to the *quality* and *quantity* of service. These characteristics have given a firm basis for developing a responsive transit development program for the Orange County Transit District.

A. Systems, Routes and Coverage

The inventory of existing transit operations in Orange County was limited to operations which provide regularly scheduled services available to the general public. Charter and school bus operations were not inventoried or studied. At a later date an extensive study to determine the usefulness of integrating regular and school bus services may be warranted. Previous inventories were reviewed and used as needed. Notably the *Transit Development Plan and Program* study undertaken by the Southern California Rapid Transit District (SCRTD) under contract with the Southern California Association of Governments (SCAG) was useful in helping to determine existing operations, future plans, and capital equipment requirements. The *Santa Ana Transit* study (April, 1971) prepared by Alan M. Voorhees and Associates for the City of Santa Ana provided the background for the recommendation related to the District's assumption of this operation. The route and area coverage proposed in the City of Santa Ana was used as the basis for forecasting the equipment needs and bus miles operated for the intra-area services.

The transit companies interviewed by the Consultant were the Southern California Rapid Transit District, Long Beach Public Transportation Company, Laguna Beach Municipal Transit Lines, Santa Ana Transit Corporation, South Coast Transit Corporation, Town Tour (Fun Bus) Company, Golden West Transit Lines, Pink Bus Lines, Golden Rain Foundation of Laguna Hills (Rossmoor), San Clemente Stage Lines, Airport Service, Douglas Bus Lines, Western Stages, Continental Trailways, and Greyhound Lines-West. Rail service provided by Amtrak was also investigated. Data from each operator was collected relating to route descriptions, patronage by route (when available), fare structure, operating schedules, operating costs, revenues, terminal/maintenance facilities, number of employees by general classification (drivers, mechanics, etc.), average hourly wages of employees by classification, union affiliation of employees, proposed capital improvements, possible route changes, and a classification of vehicles by type, seating capacity, and age. See Exhibit 2 for an example of the three-page interview/data form. Exhibit 3 shows the existing routes for the Southern California Rapid Transit District, South Coast Transit Corporation, Long Beach Public Transportation Company, Pink Bus Lines (UCI Route Service), and Town Tour Company. Exhibit 4 shows the existing routes for the Golden West Transit Lines, San Clemente Stage Lines, Airport Service, Continental Trailways, Greyhound Lines-West, and Amtrak. Exhibits 5 and 6 show, respectively, the existing bus routes for the City of Santa Ana and the existing bus routes operated by the Laguna Beach Municipal Transit Lines. The routes of the other carriers are not shown graphically but will be explained in general later in this chapter.

Following are summaries of the existing bus service being provided in Orange County.

The *Southern California Rapid Transit District (SCRTD)* provides the majority of transit service to Orange County. The SCRTD bus sytsem is one of the largest in the country operating 1511 buses along 2700 route miles of service (one-way miles). In Orange County approximately 180 daily route miles of service are provided by SCRTD and the average weekday ridership is about 4,000. The service is minimal and little has been done to encourage additional ridership in Orange County. Most routes in Orange County were maintained when taken over by SCRTD and few changes have occured since then.

Part 1

__of__

TRANSIT OPERATOR QUESTIONNAIRE

OCTD - SPECIAL BUS NEEDS STUDY

EXHIBIT 2

Company _____ Date _____
Address _____ Phone _____
Lines Operated _____
General Manager _____ Interviewed _____
ROUTE: _____ NO. _____
Between _____

1. Passenger Volume _____ Peak season: _____
   - Daily _____
   - Week _____
   - Month _____
   - Year _____
2. Route Miles Operated _____
3. Service Miles Operated _____
4. Passengers/Mile _____
5. Fare _____ Minimum _____
6. Transfers _____ Fee _____
7. Frequency/Headway _____
8. Operating Cost _____
   - Cost/Mile Service _____
9. Payroll Cost _____
   - Cost/Mile Service _____
10. Vehicles Owned: _____ Leased _____
    - Make _____ Model _____
    - Mfd. Year _____ Capacity _____
    - Condition _____
    - Make _____ Model _____
    - Mfd. Year _____ Capacity _____
    - Condition _____
    - Make _____ Model _____
    - Mfd. Year _____ Capacity _____
    - Condition _____
11. Employees _____ Union _____ Affiliation _____

	Qty.	Avg. Hrly Wage
Drivers		
Supervisors		
Mechanics		
Clerical		
Other		

Part 2

OCTD - SPECIAL BUS NEEDS STUDY

12. Revenue by Type $ %
    Regular
    Charter
    Other (Advertising, etc.) $ 100

13. Fare Structure
    a. Collection: - Ticket Token Cash Exact Fare
    b. Regular
       Charter
       Special
       Children
       Students
       Servicemen
       Senior Citizen

14. Facilities
    No. of Service Bays
    No. of Parking Spaces

15. Planned Capital Outlay

	What	Qty.	$
Facilities			
Equipment			

16. Planned Route Extensions

17. Schedules - Existing/Planned

Part 3

OCTD - SPECIAL BUS NEEDS STUDY

18. Vehicle Assignment

Route	A.M. Peak	Base	P.M. Peak	Season/Spcl	Headway/ Frequency
1 -					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

19. Rehabilitation Fares? _____

20. Blind Fares? _____

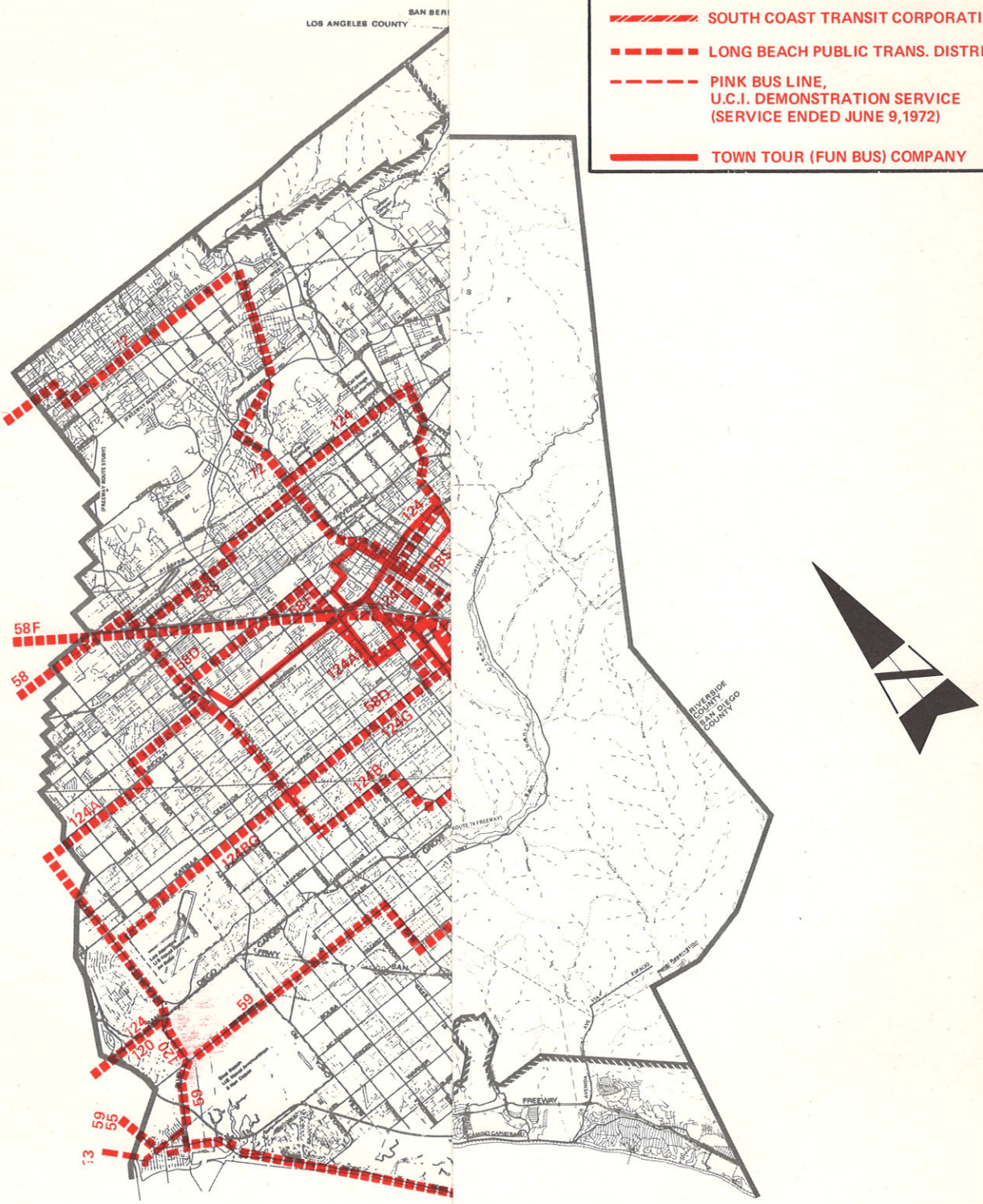
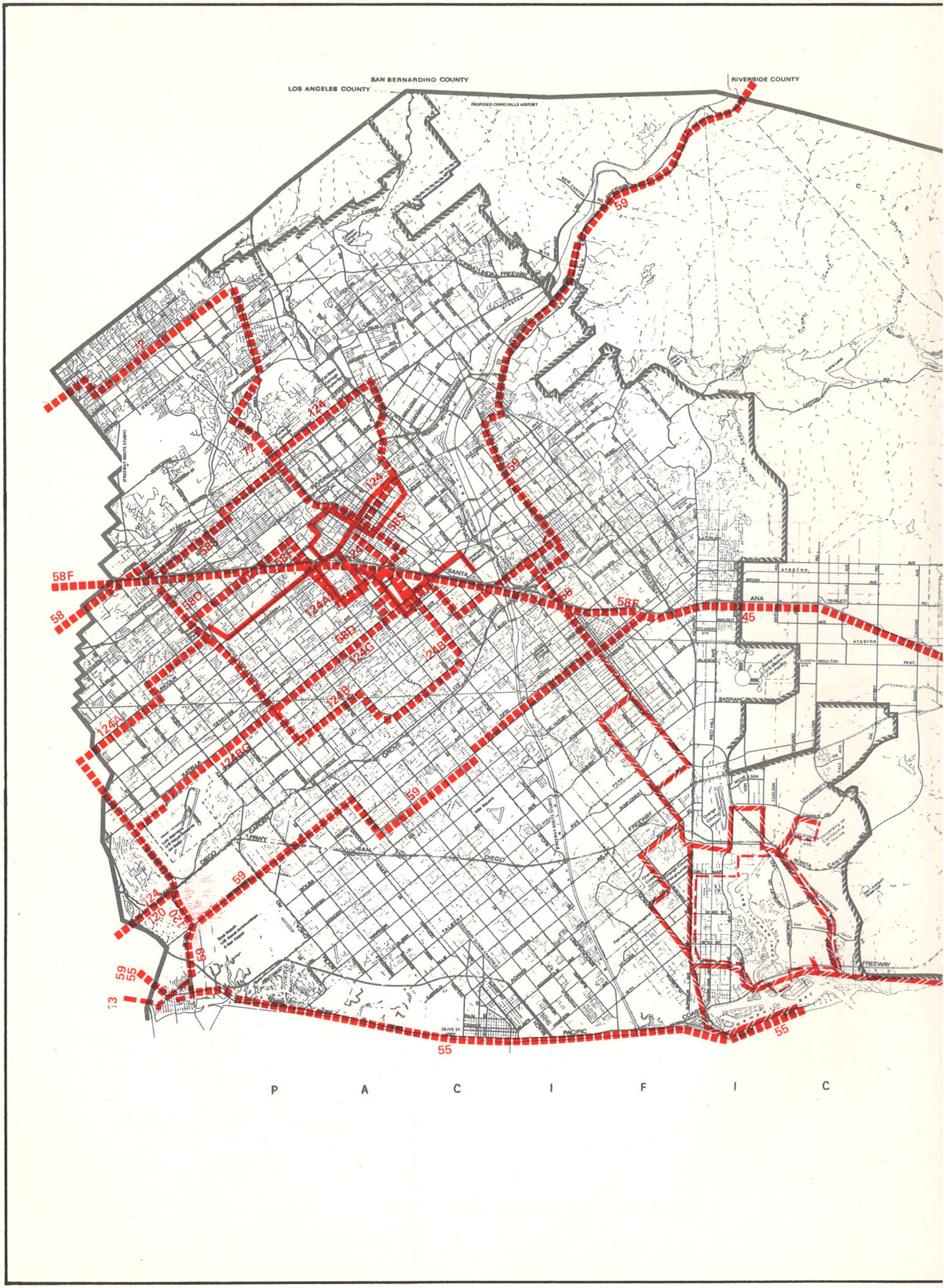


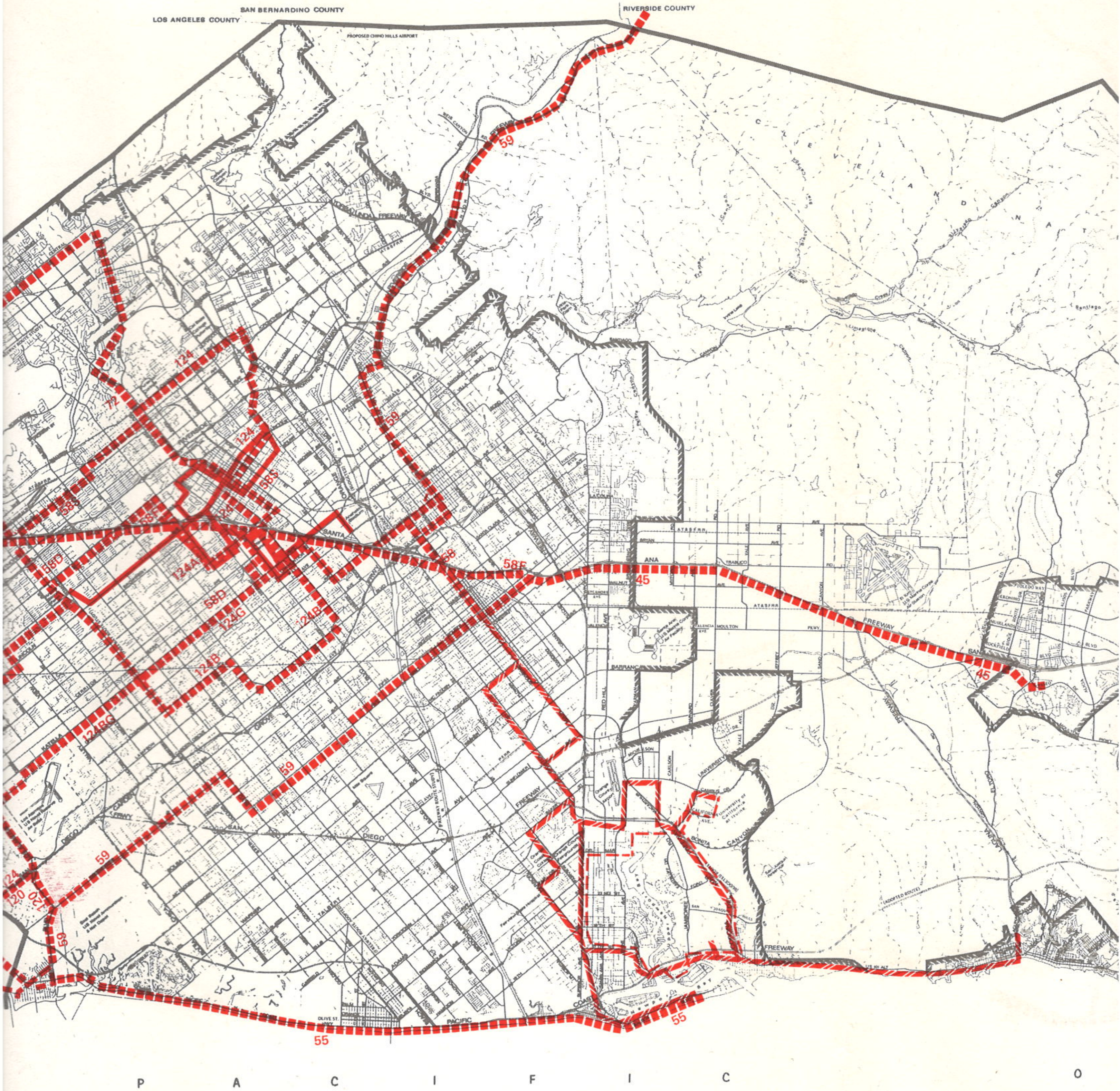
EXHIBIT 3

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

EXISTING BUS OPERATIONS (PARTIAL)

A JOINT VENTURE VTN / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
59
72
124
124A
124B
124BG
124G
58
58D
58F
58S
45
120
13
55
SANTA ANA
FREEWAY
SAN DIEGO
PACIFIC
OLIVE ST.
TALBERT
P A C I F I C



SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
59
72
124
58
58F
58D
124A
124B
124G
45
55
FREEWAY
PACIFIC
P A C I F I C
O

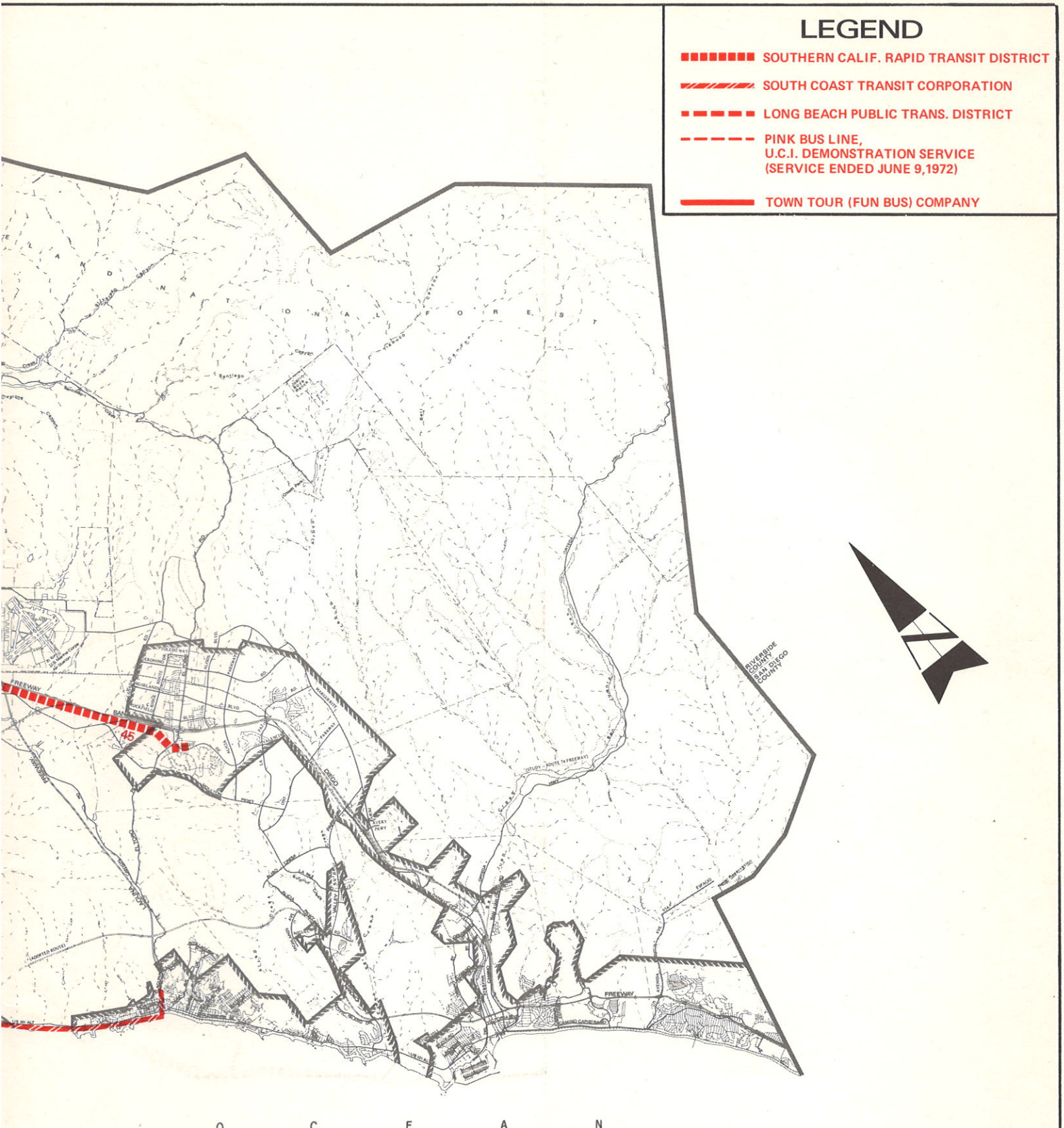
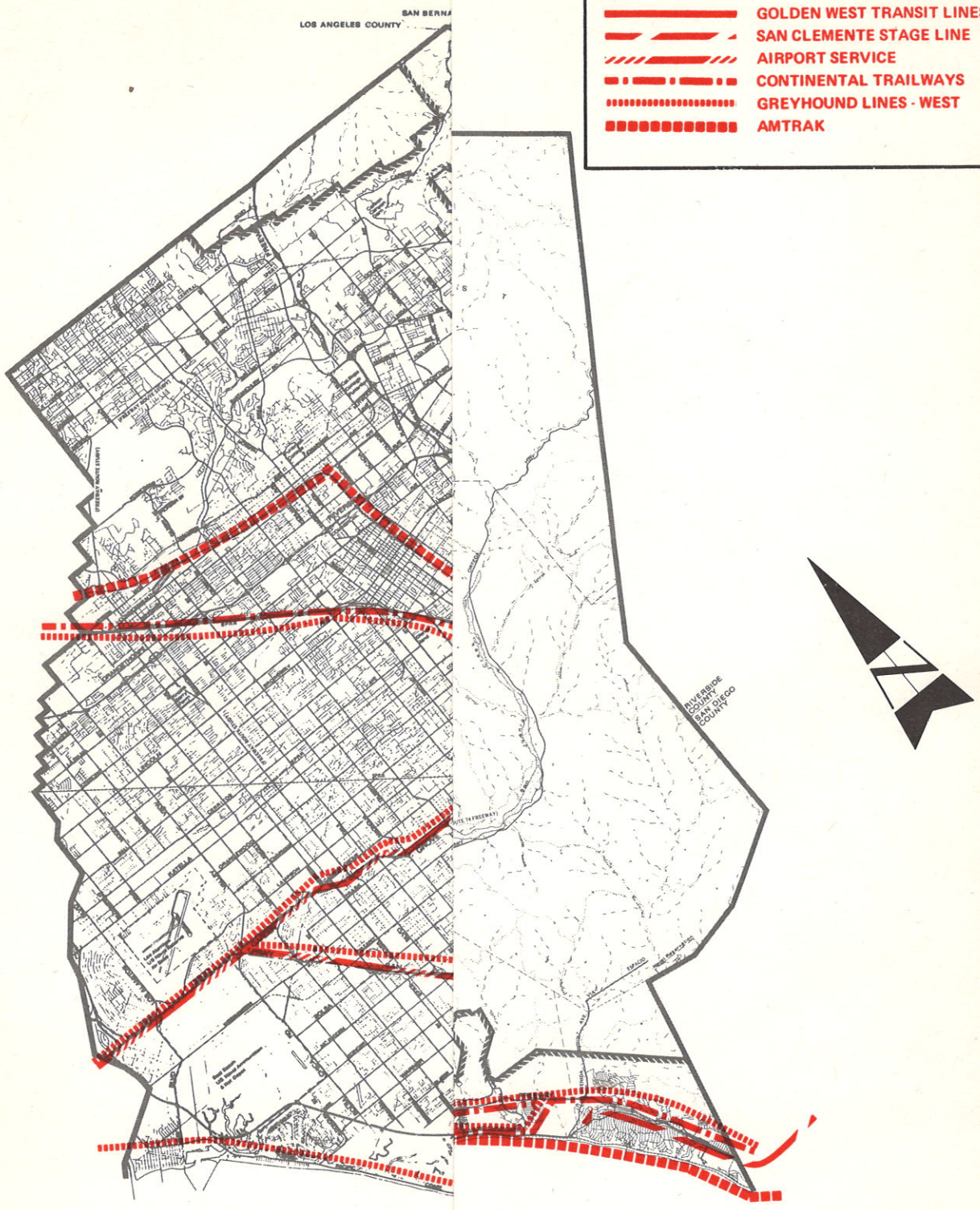


EXHIBIT 3

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

EXISTING BUS OPERATIONS (PARTIAL)

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA



LEGEND

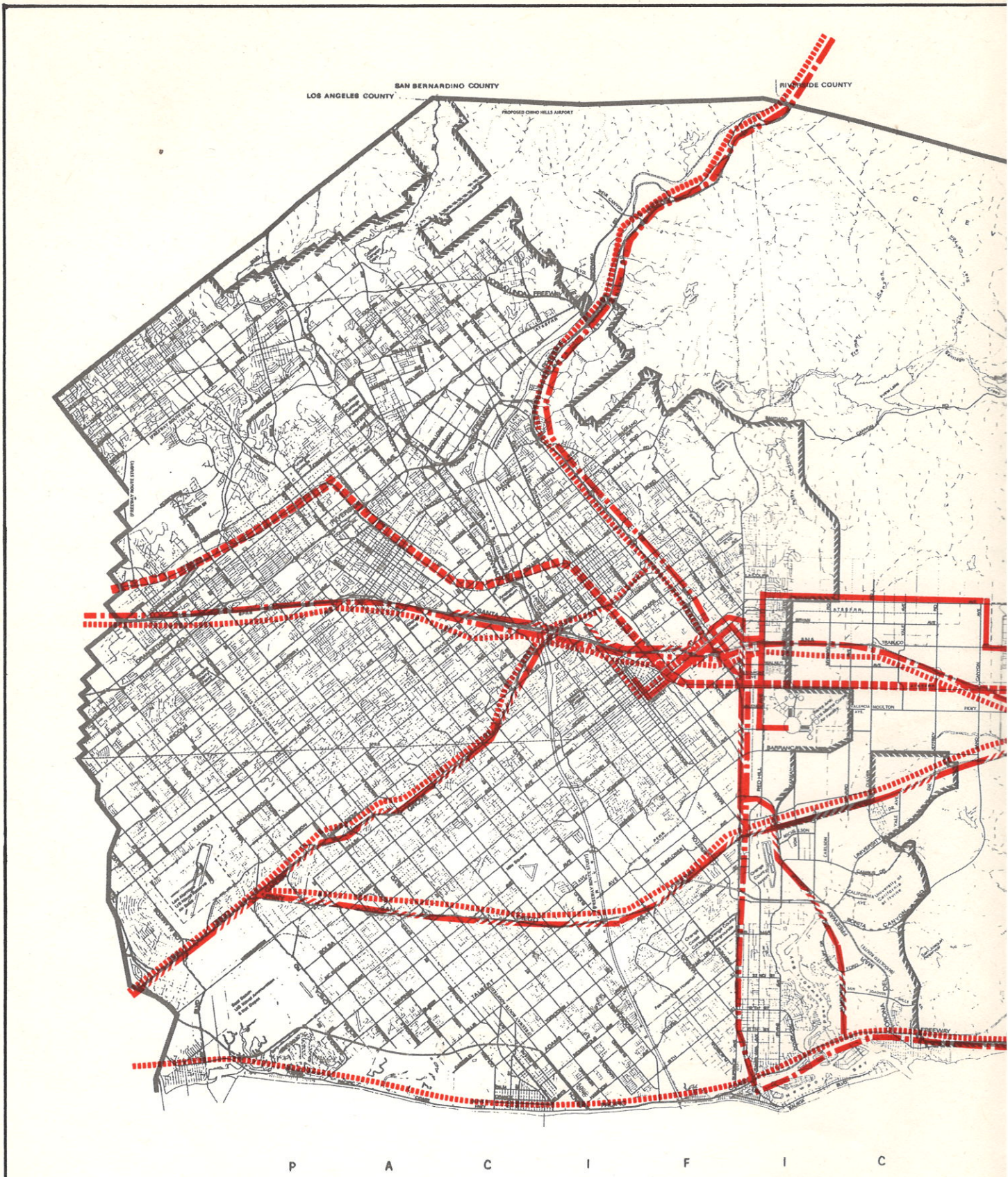
- GOLDEN WEST TRANSIT LINES
- SAN CLEMENTE STAGE LINE
- AIRPORT SERVICE
- CONTINENTAL TRAILWAYS
- GREYHOUND LINES - WEST
- AMTRAK

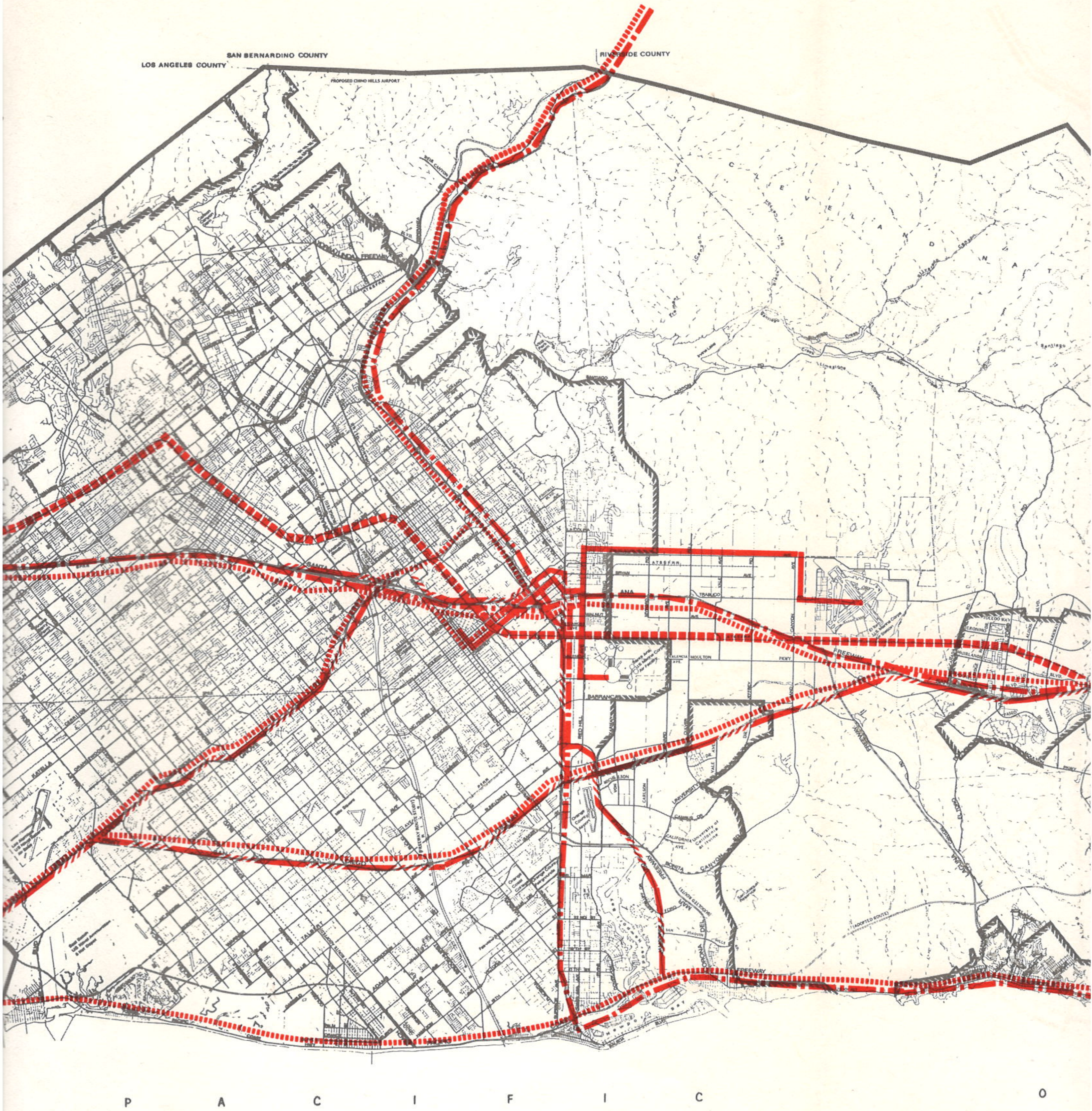
EXHIBIT 4

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

EXISTING BUS OPERATIONS (PARTIAL)

A JOINT VENTURE VTN / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
P A C I F I C


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
P A C I F I C O

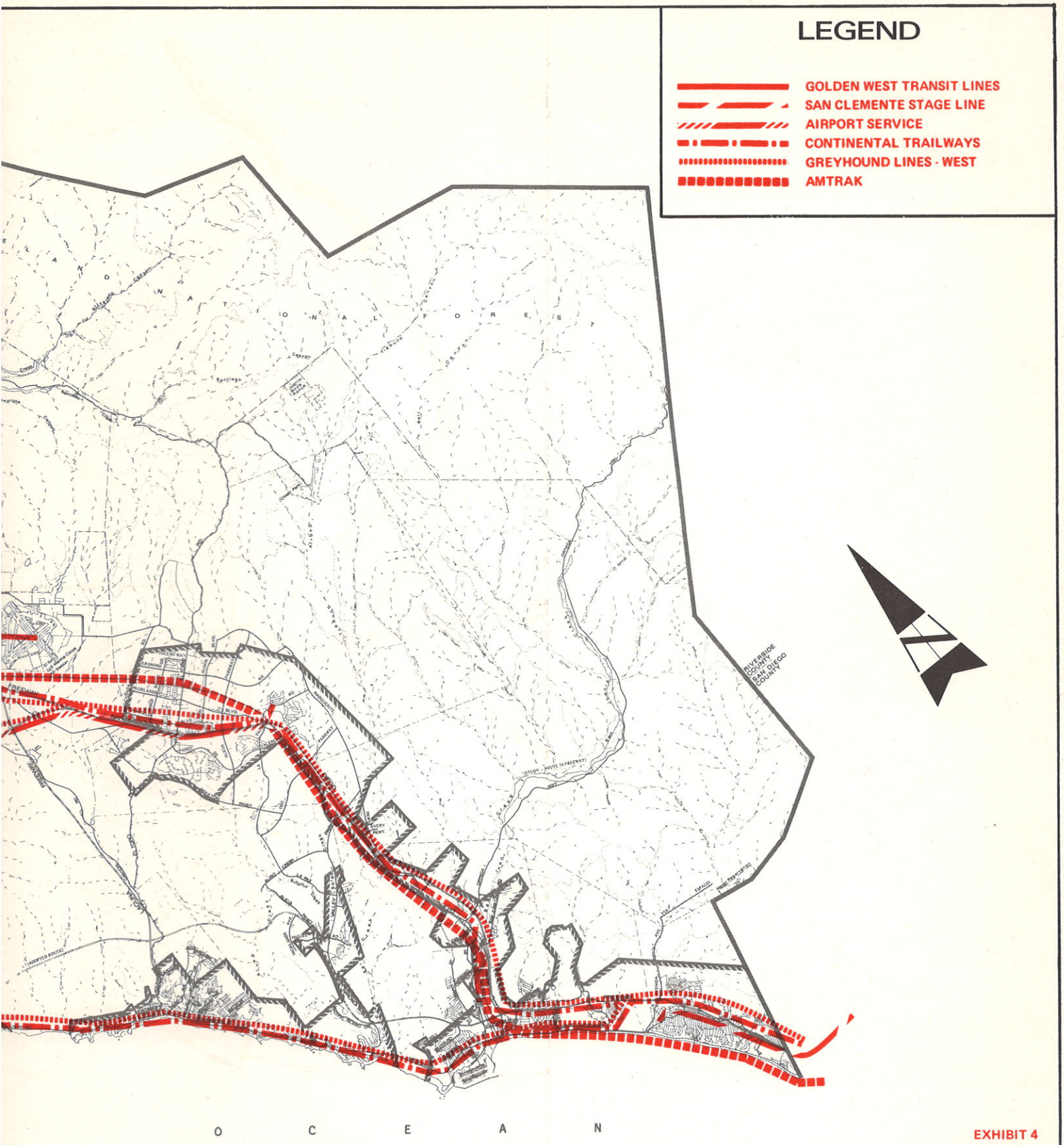


EXHIBIT 4

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

EXISTING BUS OPERATIONS (PARTIAL)

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA

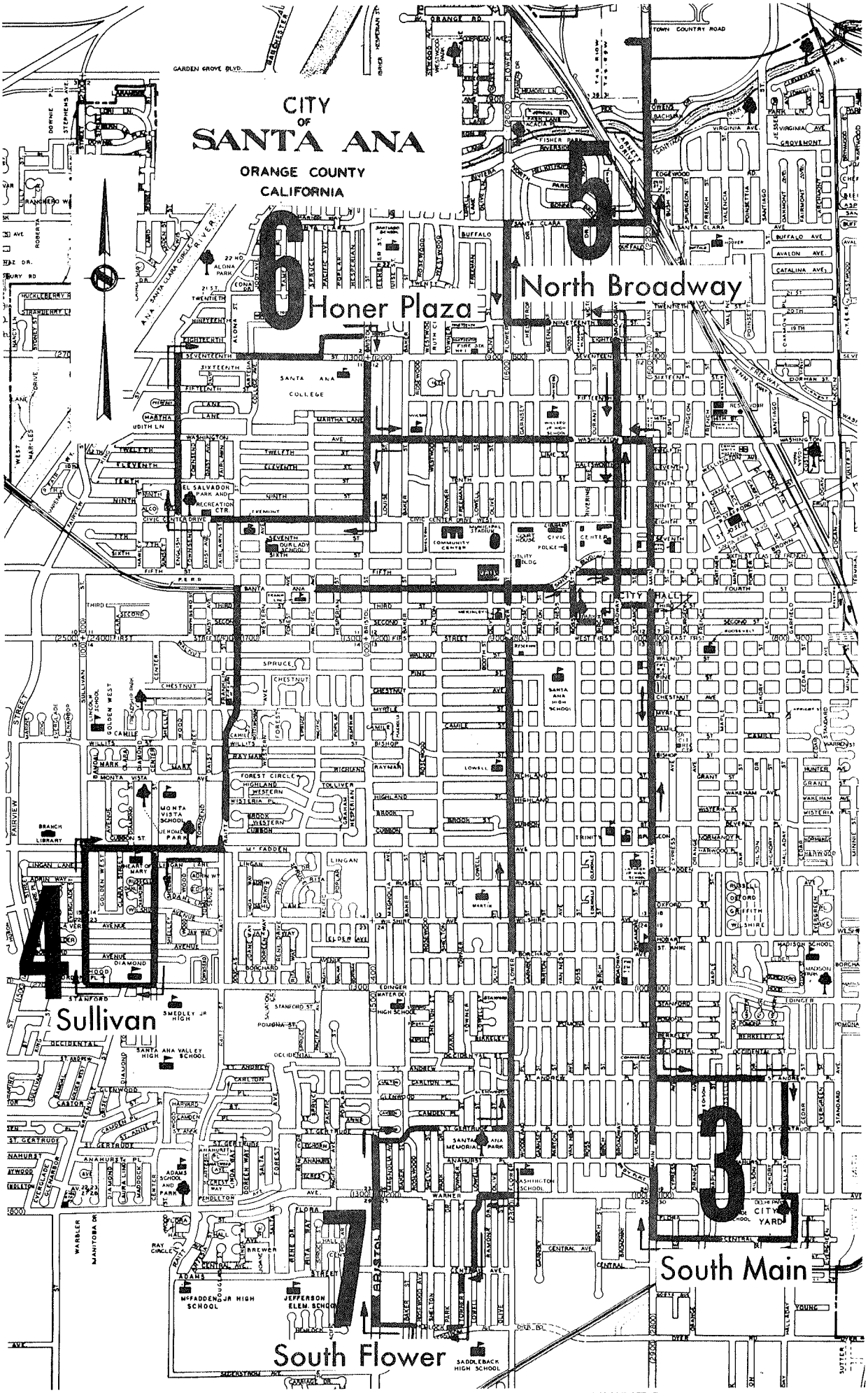

CITY OF SANTA ANA
ORANGE COUNTY
CALIFORNIA
1
North Broadway
2
Honer Plaza
3
South Main
4
Sullivan
5
6
7
South Flower

EXHIBIT 5

FARES

In City and Monarch Bay Plaza

Adult	Child (Under 12 yrs.)
25¢	15¢

Laguna Hills and Niguel Civic Center

Adult	Child (Under 12 yrs.)
50¢	25¢

All day passes - 75¢. Applicable to all routes except 2A and 4.

Adult and child 20-ride passes available at 10% discount.

★

ALL SCHEDULES
SUBJECT TO CHANGE
WITHOUT NOTICE

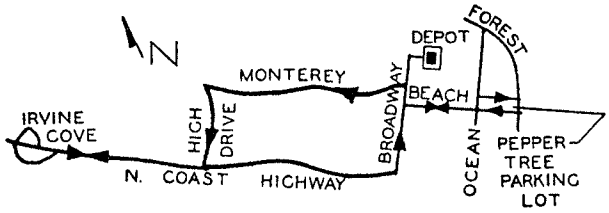
Laguna Beach Municipal Transit Lines

BUS SCHEDULE

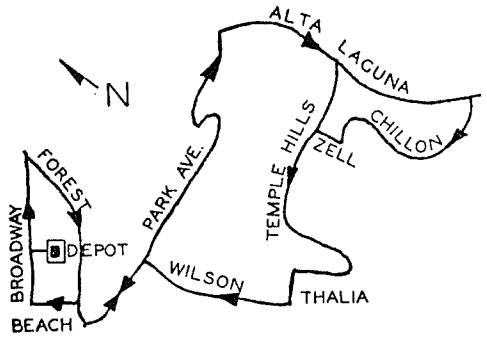
TIME TABLE NO 4
(CANCELS NO. 3)
EFFECTIVE DATE
MARCH 13, 1972

DEPOT

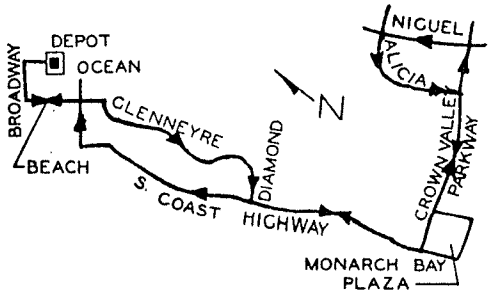
375 BROADWAY
LAGUNA BEACH, CALIFORNIA
TELEPHONE 497-1150



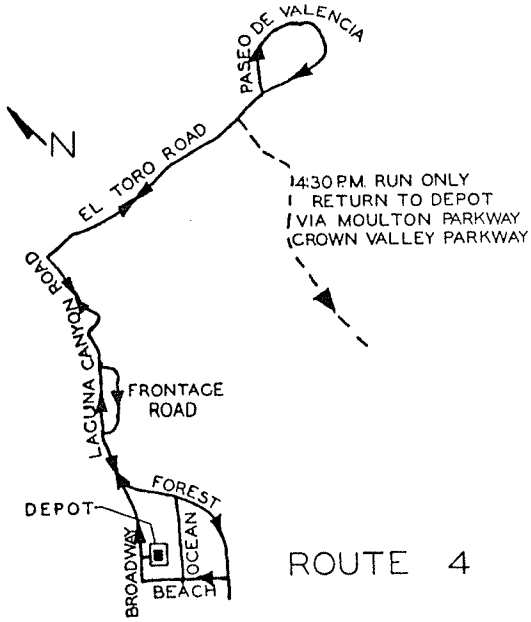
ROUTE 1



ROUTE 3



ROUTE 2 (MONARCH BAY PLAZA)
ROUTE 2A (TO NIGUEL CIVIC CENTER)



ROUTE 4

EXHIBIT 6

The *Long Beach Public Transportation Company* (in Orange County) serves only the City of Seal Beach (including Leisure World) and therefore provides little service to the general populace of Orange County.

The *City of Laguna Beach* recently acquired the local bus line in that city and began municipal operation in November, 1971. Five routes are operated with four new small mini-type buses. Weekday ridership is approximately 250 passengers. The system is currently incurring large deficits but these are expected to lesser as ridership increases.

The *City of Santa Ana* during the past year has taken steps to improve the local bus service in the City of Santa Ana. The Santa Ana Transit Corporation has been providing service in Santa Ana on five routes but due to increased costs and reduced patronage has requested operating assistance from the City. A bus study[1] conducted for the City in 1971 outlined the alternatives available for the City. In December, 1971, the City of Santa Ana entered into a contract with the Santa Ana Transit Corporation to provide 30 minute service on the five routes and institute a twenty-five cent fare. The City would pay the difference between costs and revenues plus pay a management fee. Also the City has received approval from the Urban Mass Transportation Administration to purchase nine new 45-passenger transit coaches to be used on eight routes. These routes are shown on Exhibit 7. Recent developments by the City and the Transit District have led to a study of how the District may help in the operation of this service. The District has agreed in principle to assume this operation and the study will detail the necessary agreement.

South Coast Transit Corporation, which is a subsidiary of Chromalloy American Corporation, as is the Santa Ana Transit Corporation, operates scheduled service to Balboa and Laguna Beach along with charter service. Both Santa Ana and South Coast services are operated out of a common leased facility in Santa Ana. Both routes of South Coast have been losing money over the past few years and South Coast has requested operating assistance from the Transit District. They are presently negotiating a satisfactory operating agreement with provisions for ultimate ownership of the operating rights of these two routes. A deterrent of adequate patronage on these routes has been the fare which varies from $.35 to $.95.

Town Tour Company, which operates in the Anaheim–Buena Park area is presently petitioning the Public Utilities Commission for operating rights in this area. Service is provided regularly on routes between Disneyland and Knott's Berry Farm along with stops at motels and other attractions. The services provided by Town Tour are oriented to recreation activities and there is little use of these routes by local area residents.

Golden West Transit Lines provides service between Santa Ana and El Toro Marine Corps Base via Tustin and Irvine. The service operates hourly and is designed to meet the needs of the military and related personnel.

The Pink Bus Lines operated contract service for the University of California at Irvine until June 9, 1972. This service by UCI was experimental, charged no fare, and was for University *students* only. Approximately 200 riders per day used the service and UCI hopes to increase the service for next year. The response to this service has not been overwhelming and hopefully better operating equipment will be used. The Pink Bus Line was operating the Freedom route in Buena Park but has discontinued service due to lack of patronage and assistance from local businesses. Also trips are made on Beach Boulevard between La Habra and Huntington Beach during the summer season.

The *Golden Rain Foundation* of Laguna Hills provides intra-community service for residents of Leisure World at Laguna Hills. Service is offered on seven routes and is free. More routes will be added as additional units are opened. Small type buses are used for the service.

[1] Alan M. Voorhees & Associates, *Santa Ana Transit*, April, 1971.

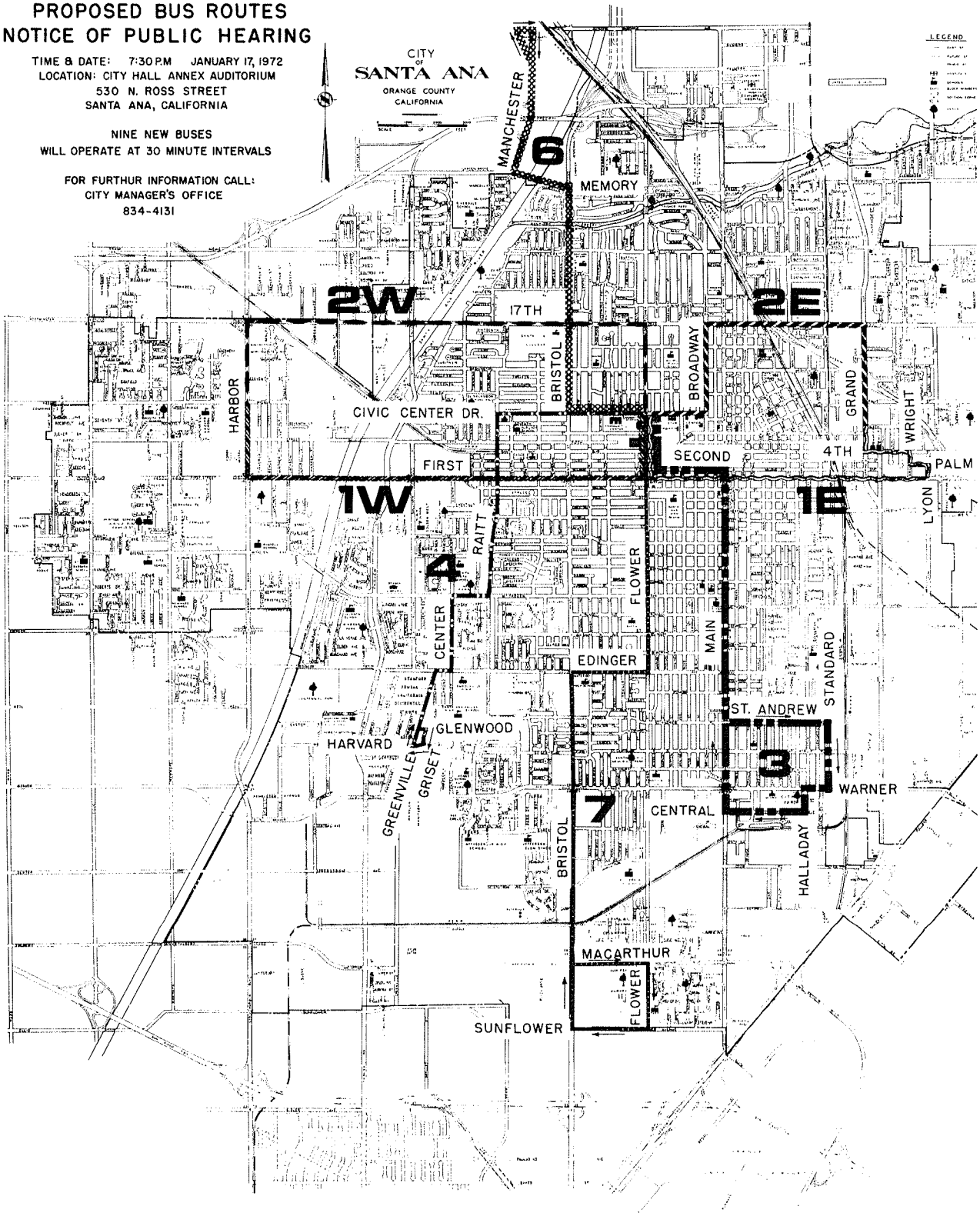
EXHIBIT 7

PROPOSED BUS ROUTES
NOTICE OF PUBLIC HEARING

TIME & DATE: 7:30 P.M JANUARY 17, 1972
LOCATION: CITY HALL ANNEX AUDITORIUM
530 N. ROSS STREET
SANTA ANA, CALIFORNIA

NINE NEW BUSES
WILL OPERATE AT 30 MINUTE INTERVALS

FOR FURTHUR INFORMATION CALL:
CITY MANAGER'S OFFICE
834-4131



San Clemente Stage Lines operates hourly service between San Clemente and various points within Camp Pendleton. On weekends, service is provided between Camp Pendleton and Disneyland, on an as-needed basis. This company is a subsidiary of the Community Enterprises company, a major school bus and charter operator in Orange County.

Airport Service, a subsidiary of Chromalloy American Corporation, operates service between Los Angeles International Airport, Orange County Airport and various communities in Orange County. Communities served include Mission Viejo, Laguna Hills, Anaheim/Disneyland. Also on-call service to Ontario International Airport is available. Scheduled service to Long Beach Airport is also provided.

Douglas Bus Lines is providing contract service for home-to-work trips for many employees in Orange County. This service is contracted for by a group of individuals living in an area and usually one of the workers is the driver. Douglas Bus Lines provides equipment and service for McDonnell-Douglas employees in Huntington Beach and Long Beach, and Autonetics in Anaheim.

The *McDonnel-Douglas (Huntington Beach)*bus commuters have increased from 600 to 1200 since the beginning of 1972. Most of the increase is due to the recent transfer of 1,500 employees from the Santa Monica Plant. Most of the transfers still live in Los Angeles County. Currently 30 buses are used and this is expected to expand to almost 40 by this fall. Various companies run buses including the Douglas Bus Company, Mark IV Company, Leisure Lines-Golden State Charter Company and Associated Bus Lines. In addition to the employee-sponsored buses, McDonnell-Douglas sponsors interplant service for employees attending meetings, mail, etc.

Western Stages provides thirty-minute service between Laguna Hills, Leisure World and Rockfield Shopping Center in El Toro. The service is free and paid for by the local merchants.

Continental Trailways and Greyhound Lines-West provide inter-city bus service from the Orange County area to major cities throughout the county and Southern California. Continental mainly operates San Diego-Santa Ana-Los Angeles route, whereas Greyhound operates locally in Orange County between San Clemente and Fullerton, and Seal Beach and San Clemente on the Coast Highway. Other through routes operate on the San Diego, Garden Grove, Newport, Santa Ana and Riverside freeways.

The *Amtrak System* serves the Fullerton, Santa Ana, and San Clemente stations with three trains a day to Los Angeles and San Diego. None of the trains run at times to satisfy commuter needs and the Orange County Transit District staff is actively pursuing the rescheduling or addition of trains to help commuters. It is also understood that the function of Amtrak is to foster inter-regional or inter-city travel and not intra-regional travel.

B. Selected Operating Statistics

Table 1 is a summary of selected operating statistics for the bus transit operations in Orange County. Due to the immediate requirements for this study, only readily available statistics were collected, and data was given a common base to give realistic comparisons.

C. Present Transit Needs

In order to evaluate the present transit needs and extent of existing transit service, factors relating to the socio-economic characteristics of Orange County were investigated.

Extensive use was made of available statistics from the 1970 Bureau of the Census data and other data available from the Orange County Road and Planning Departments. However, the pertinent factors have not been compiled in a comprehensive manner by any agency or group of agencies in Orange County. The Consultant has prepared exhibits showing areas of elderly people, poverty areas, recreation areas, public facilities, shopping centers, employment areas, educational institutions, and college-age areas. These exhibits and planning factors are described below in detail.

TABLE 1

ORANGE COUNTY PUBLIC TRANSPORTATION OPERATORS AND SELECTED OPERATING STATISTICS

	Southern Calif. Rapid Transit District [g]	Long Beach Public Transportation Company	Laguna Beach Municipal Transit Lines	Santa Ana Transit Corporation	South Coast Transit Corporation	Town Tour (Fun Bus) Company	Golden West Transit Lines	Pink Bus Lines[d]	Golden Rain Foundation of Laguna Hills[e]	San Clemente Stage Lines	Western Stages	Mc-Donnell-Douglas Employee Contract Operations	TOTAL[f]
OWNERSHIP	Public	Public	Public	Private[c]	Private	Private	Private	Private	Private	Private	Private	Private	
NUMBER OF DAILY OPERATING ROUTES	7[a]	1[a]	5	5	2	6	1	1	7	2	1	30	38
ROUTE-MILES, ONE-WAY	180[a]	6[a]	21	20	37	27	21	16 (Loop)	18	25	2	N.A.	373
AVERAGE NUMBER OF PASSENGERS CARRIED PER DAY	3900[a]	N.A.	250	800	500	250	170	220	1400	715	80	2400	8285
DAILY BUS-MILES OPERATED	3750[a]	N.A.	450	670	840	N.A.	220	208	1020	585	70	N.A.	7813
PASSENGERS/BUS-MILE OPERATED	1.0[a] (3.3[b])	N.A. (2.4[b])	0.6	1.2	0.6	N.A.	0.8	1.0	1.4	1.2	1.1	N.A.	
CASH BASE FARE CASH ZONE FARE	30¢ 8¢	30¢ 10¢	25¢ Varies	25¢ None	35¢ 10¢	35¢ Varies	20¢ 5¢	Free None	Free None	35¢ Varies	Free None	Varies None	
NUMBER OF BUSES IN DAILY OPERATION, PEAK PERIOD	11[a]	4[a]	3	5	4	9	1	1	7	4	1	30	50
AVERAGE AGE OF BUSES, YEARS[b]	8.8	6.1	1.0	17.5	20.0	N.A.	N.A.	25.0	6.2	4.0	8.0	N.A.	
OPERATING COST, ¢/MILE[b]	91	74	77	54	59	45	33	58	44	67	85	N.A.	63, ave.
FARE BOX REVENUE, ¢/MILE[b]	92	54	15	30	38	N.A.	28	None	None	86	None	N.A.	
AVERAGE HOURLY WAGE FOR BUS DRIVERS	$4.58	$4.53	$3.91	$3.05	$3.05	$3.00	N.A.	$2.50	$2.00	$2.75	$2.50	N.A.	$3.20, ave.
AFFILIATED WITH LABOR UNION?	Yes	Yes	No	No	No	No	No	No	No	No	No	N.A.	

[a] Orange County Area

[b] System Average

[c] Operation Subsidized by City of Santa Ana

[d] Statistics are for contract operation of UCI Bus Service subsidized by UCI and the Orange County Transit District

[e] Service for residents and guests of Leisure World-Laguna Hills

[f] Does not include McDonnell-Douglas employee operations

[g] Latest available data provided by SCRTD, 1969.

N.A. – Not Available

Elderly People

The areas in which more than ten percent of the population is 65 and over is shown in Exhibit 8. The data was taken from 1970 Bureau of the Census data, and includes known retirement communities such as Rossmoor Leisure World at Seal Beach and Laguna Hills. Approximately 100,000 persons, or 7 percent of the population of Orange County, are 65 and over. Table 2 lists the census tracts with more than ten percent 65 and over. The 55 census tracts shown account for almost 50 percent of the persons 65 and over. The concentrations are typical for an urban area. They include such areas as downtowns (La Habra, Brea, Fullerton, Anaheim, Santa Ana, etc.), and the various retirement communities. Additionally in Orange County because of the pleasant coastal climate, a large number of elderly people live in the coastal communities. Refer to Exhibit 9 for the Census Tract boundaries as supplied by the Orange County Planning Department. The Census Tracts are designed by the Bureau of the Census to have approximately the same population. There are 318 census tracts in Orange County with a 1970 population of 1,420,386.

Poverty Areas

Due to the lack of 1970 income data, an exact measure of low income or poverty areas could not be performed, but a previous study and workshop at the University of California at Irvine (UCI) called "Poverty in Orange County" provided sufficient data for this purpose. The workshop was conducted on June 8, 1968, and utilized 1960 and 1967 survey data. The areas outlined in Exhibit 10 indicate the poverty areas and list the measures of poverty as defined by this workshop. The Consultant met with the Orange County Human Relations Commission during the course of this study to determine if these areas are still valid. They felt that they were, and that new data would verify it when it is available. The areas shown on the exhibit represent sections of Anaheim-Fullerton-Placentia, Santa Ana-Garden Grove-Fountain Valley, Cypress-La Palma, Orange, El Modena, Huntington Beach and Capistrano Beach. If the areas designated in the UCI study are related to the 1970 census tracts, these areas have a total population of approximately 235,000 or 16 percent of the total.

Recreation Areas

Much of the leisure time of Orange County residents is oriented toward the major recreation areas. These areas are shown on Exhibit 11. At the present time transit service to these areas is minimal, especially on the weekends and during vacation periods when the demand is the greatest. Adequate public transportation is a necessity for proper utilization of these facilities to minimize the acreage required to accommodate the private automobile.

Public Facilities

The facilities frequented by many Orange County residents daily are the public facilities shown on Exhibit 12. This exhibit shows the location of the 26 city halls, 3 county complexes, hospitals, airports, and other local, Federal and State offices. Table 3 lists the city halls and county offices with their addresses. Table 4 lists the other government facilities such as the State's Human Resources Development offices, Legal Aid Society, the 14 Community Centers, and other offices. Table 5 lists the hospitals in Orange County which are in operation, under construction, and planned. These facilities are presently inadequately served by public transportation. The Orange County Human Relations Commission expressed great concern about the inadequacy of public transportation to serve the needs of the unemployed and underprivileged.

LEGEND

AREAS WITH MORE THEN 10% OF THE POPULATION 65 YEARS AND OVER.[1]

MAJOR RETIREMENT COMMUNITIES

[1] 1970 BUREAU OF THE CENSUS

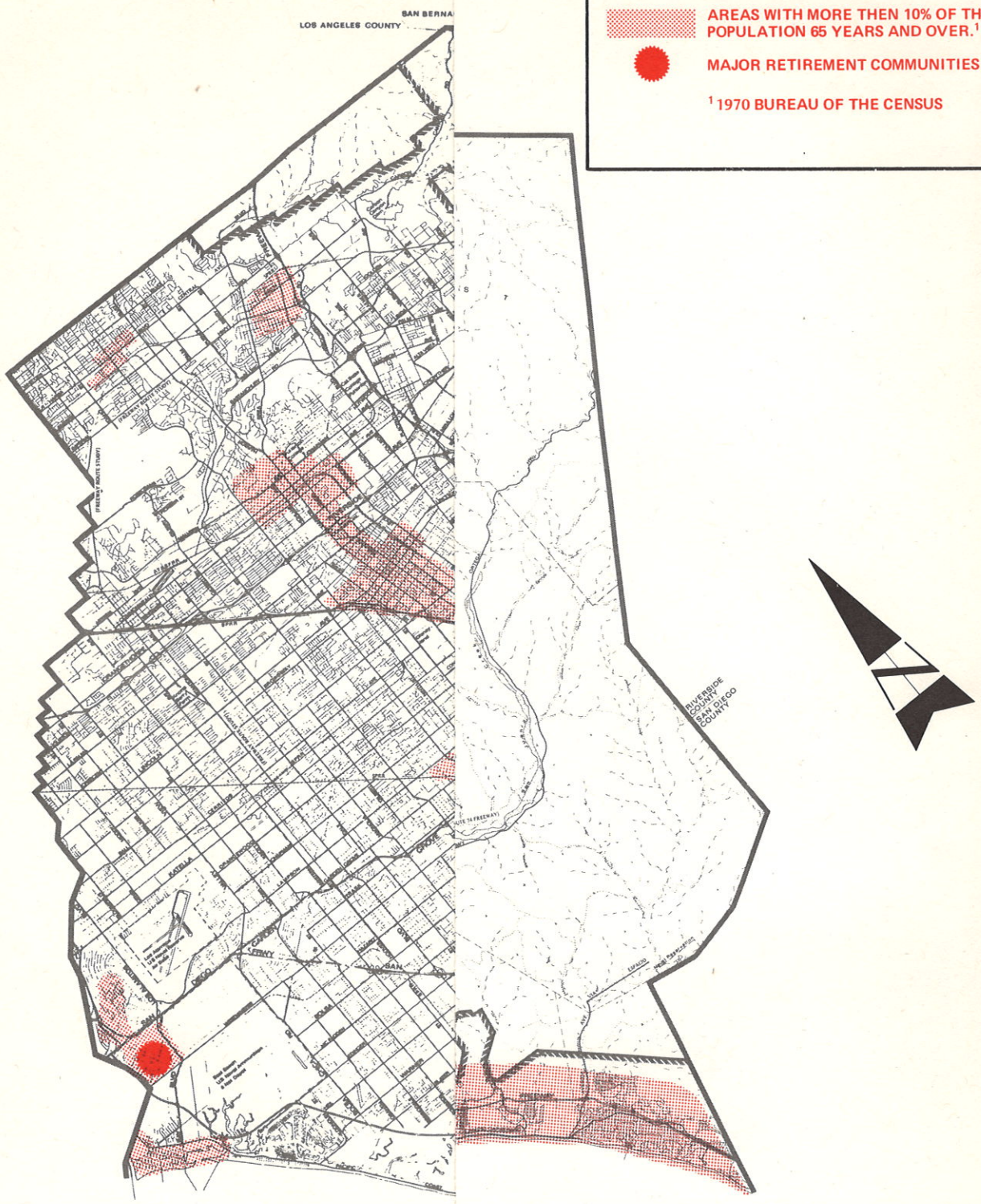
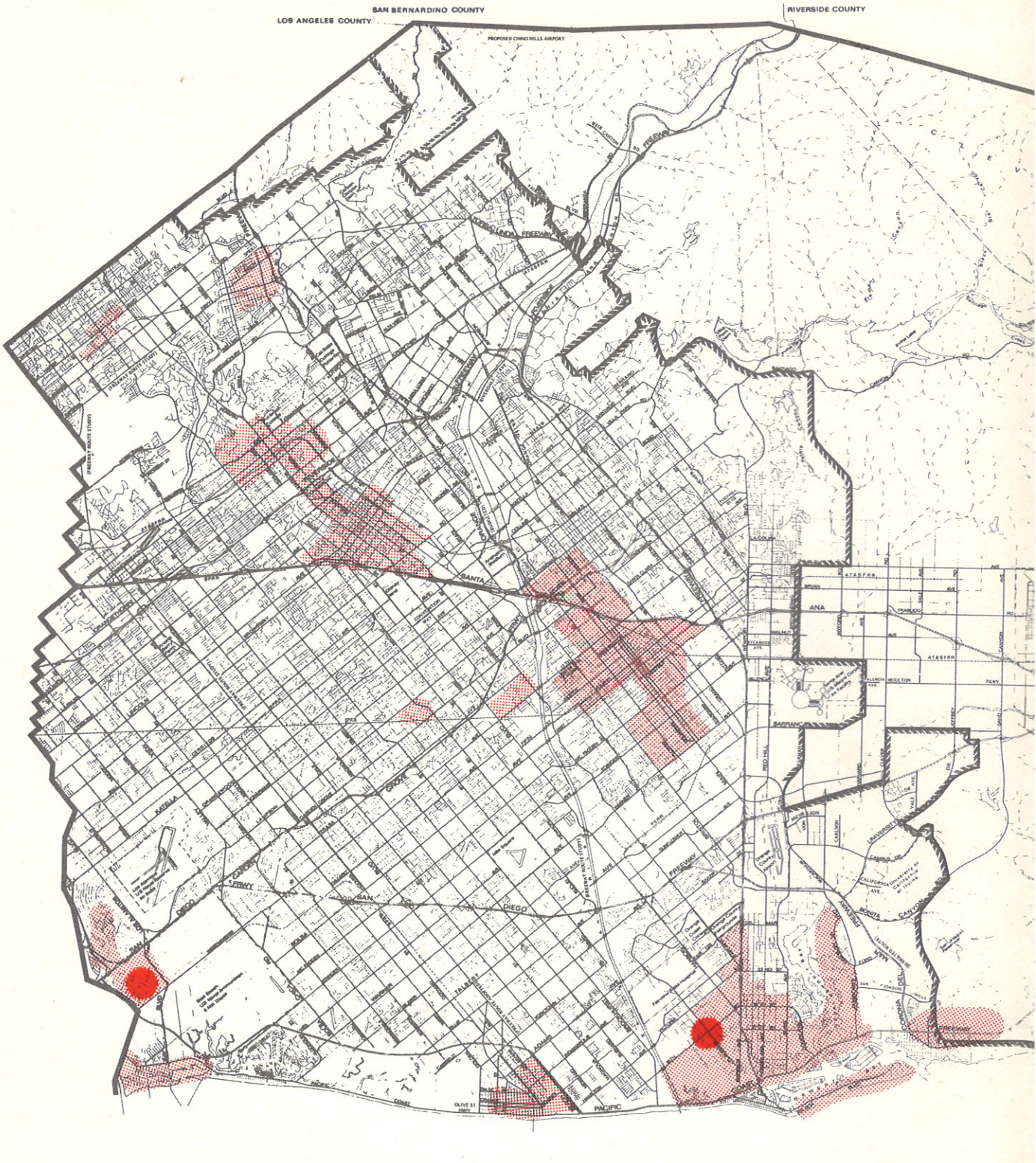


EXHIBIT 8

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

ELDERLY AREAS

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA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PROPOSED CHINO HILLS AIRPORT
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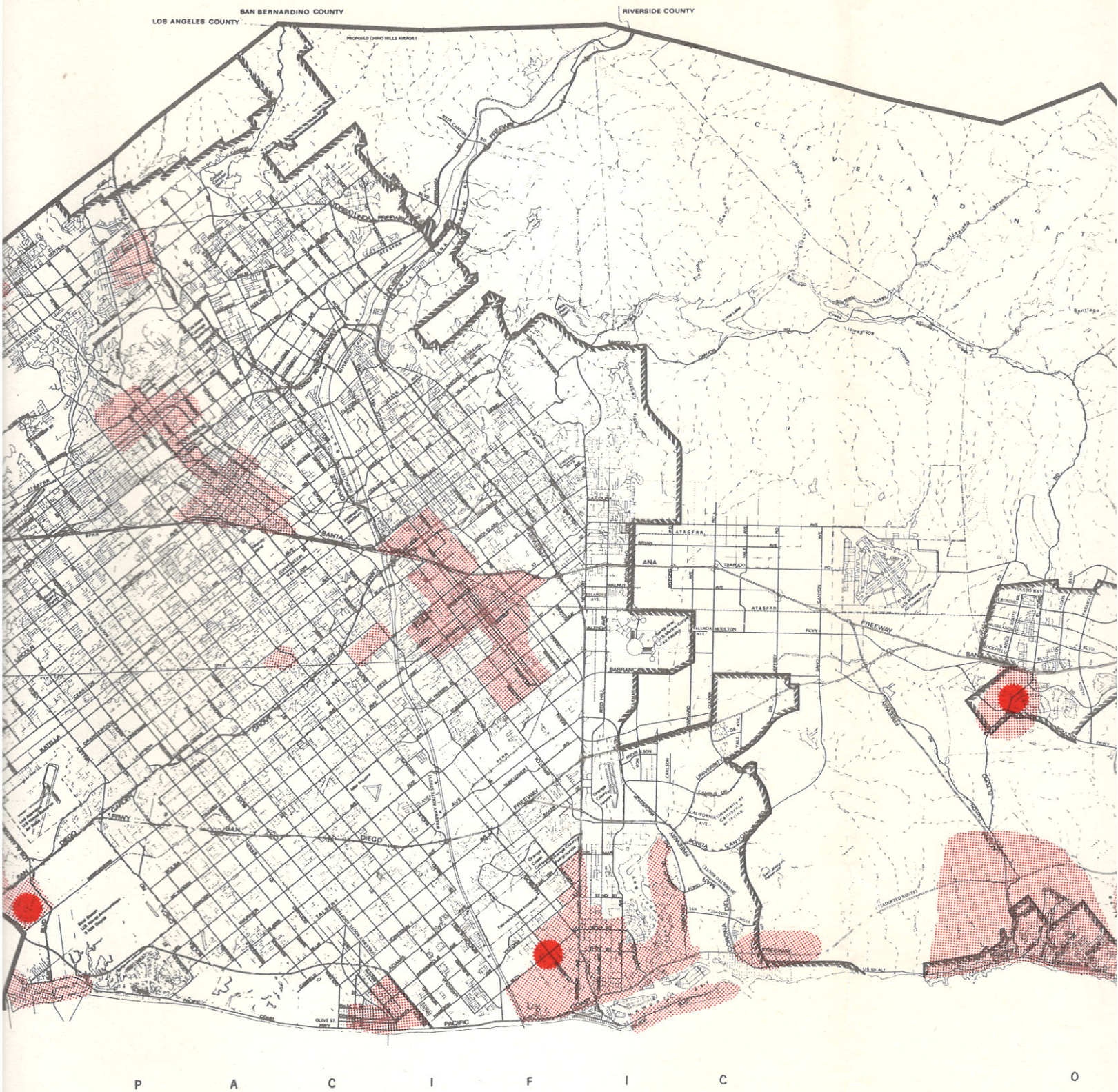
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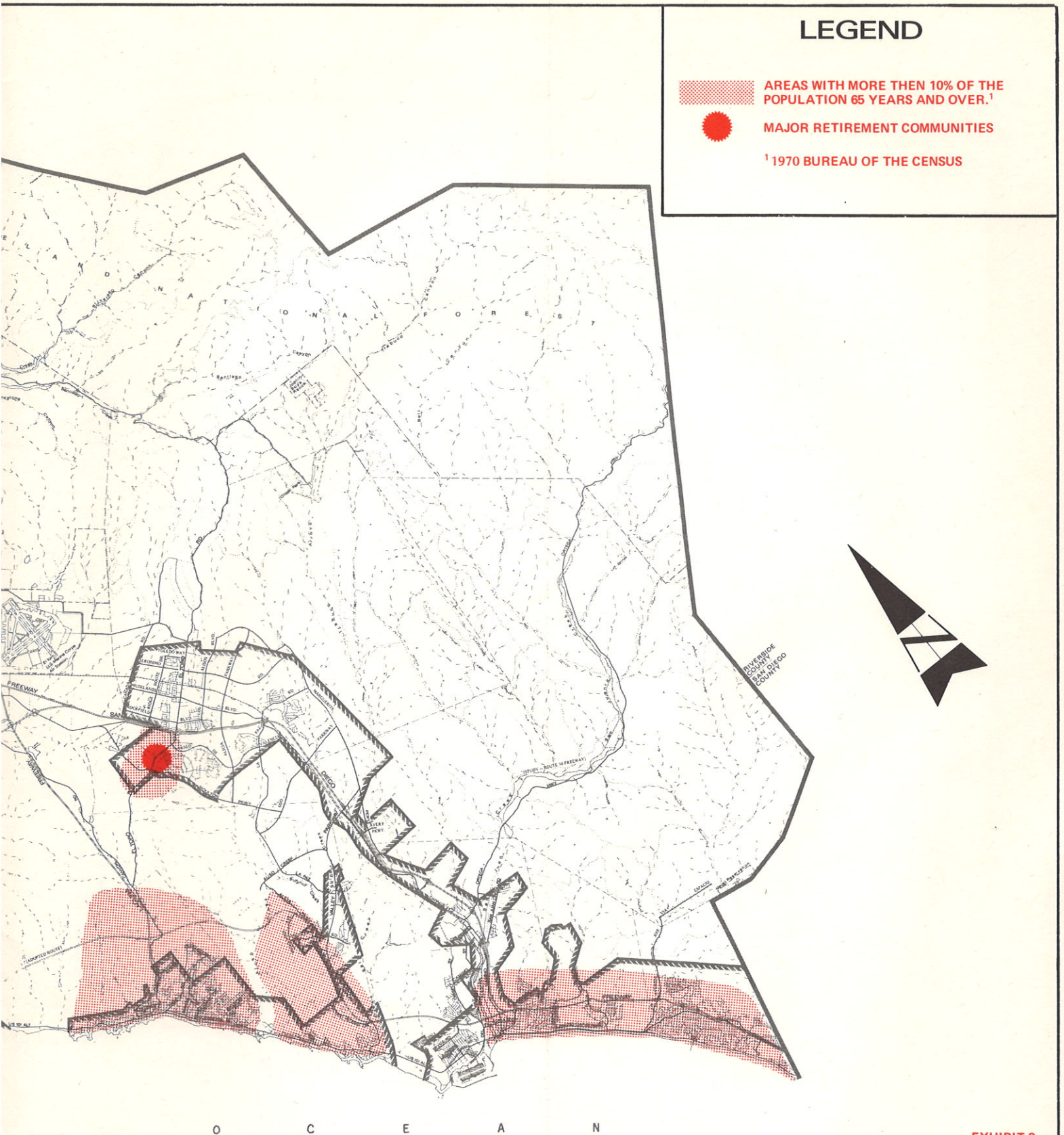


EXHIBIT 8

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

ELDERLY AREAS

A JOINT VENTURE vtm / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA

TABLE 2

CENSUS TRACTS WITH GREATER THAN TEN PERCENT OF THE POPULATION 65 AND OVER

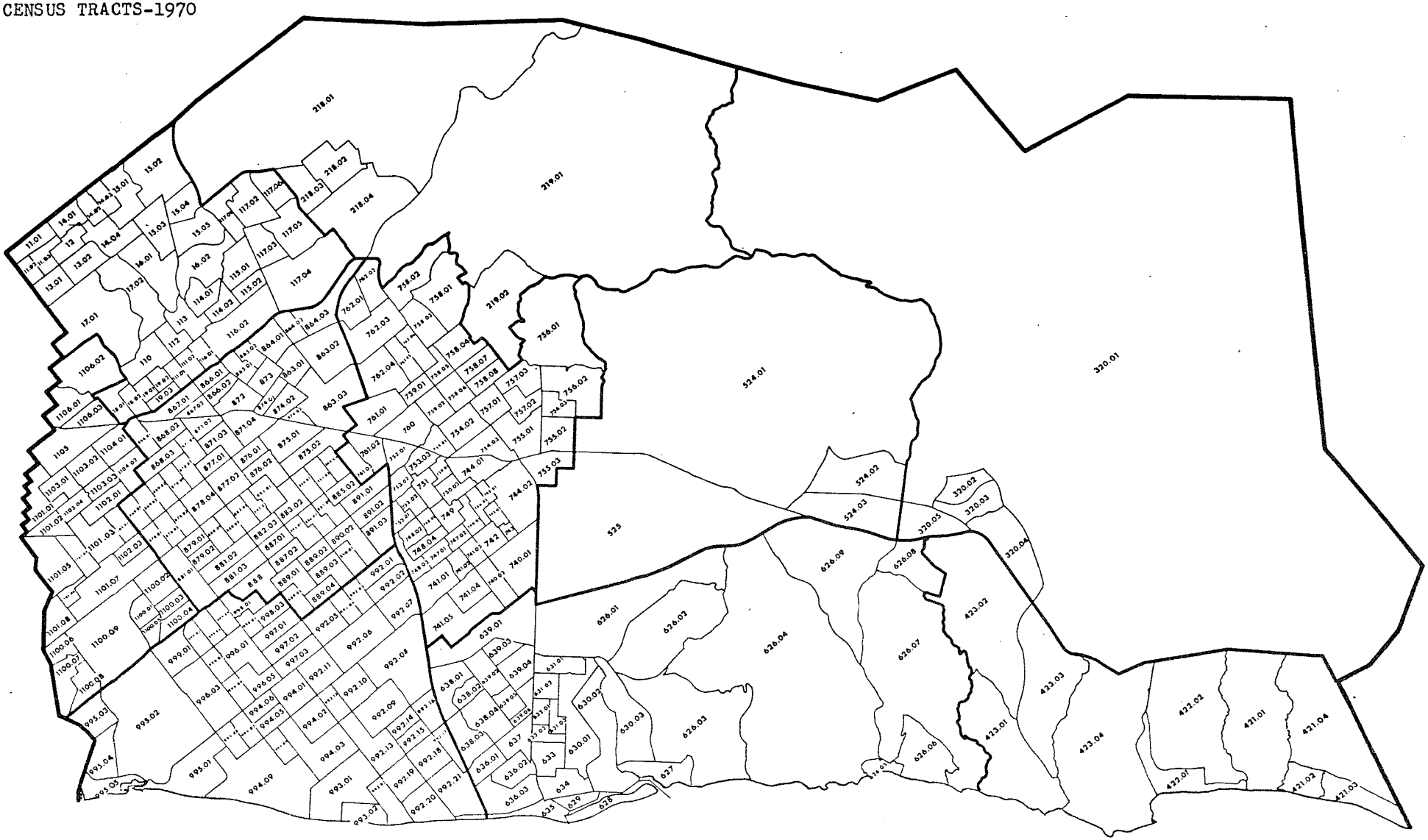
Census Tract	Percent 65 and Over	Census Tract	Percent 65 and Over
12	10.8	742	12.5
15.04	10.2	744.01	11.3
112	15.5	746.01	19.1
113	20.5	746.02	20.5
116.02	13.5	750.01	24.1
421.01	17.4	750.02	10.6
421.02	15.1	751	23.5
421.03	26.3	752.02	10.6
421.04	11.1	753.03	19.1
422.01	21.9	754.01	10.4
422.02	12.1	758.02	11.1
423.01	19.1	759.01	18.1
626.04	20.1	759.02	12.3
626.05	31.0	760	18.6
626.07	17.6	865.01	16.4
626.08	82.9	872	10.6
626.09	11.1	873	15.6
627	14.4	874.01	15.4
628	12.0	874.02	9.0*
630.02	12.1	874.03	11.1
632.02	10.9	886.01	12.8
633	14.1	891.02	10.0
634	11.4	993.02	13.3
636.02	11.7	993.03	14.4
636.03	12.6	995.03	87.0
637	13.7	995.05	10.4
639.06	11.8	1100.07	12.4

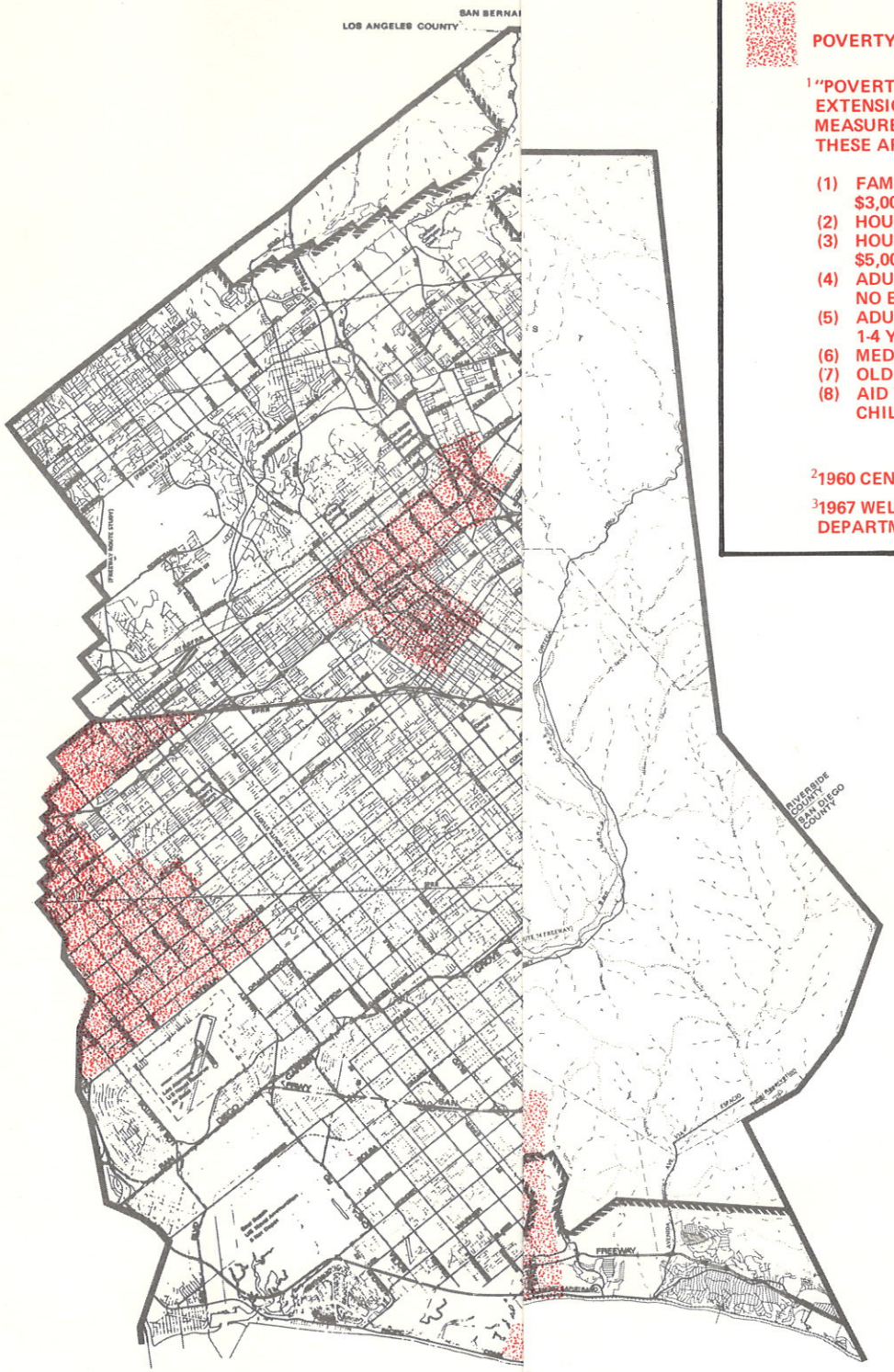
* Same area

EXHIBIT 9

ORANGE COUNTY PLANNING DEPARTMENT

CENSUS TRACTS-1970





LEGEND

POVERTY AREAS[1]

[1] "POVERTY IN ORANGE COUNTY", U.C.I. EXTENSION, JUNE 8, 1968. BASED ON MEASURES OF POVERTY, PAGES 37-38. THESE ARE:

(1) FAMILIES WITH INCOME LESS THAN $3,000 PER YEAR.[2]
(2) HOUSING UNITS DILAPIDATED.[2]
(3) HOUSING UNITS WORTH LESS THAN $5,000.[2]
(4) ADULT, 25 YEARS AND OVER WITH NO EDUCATION.[2]
(5) ADULTS, 25 YEARS AND OVER WITH 1-4 YEARS EDUCATION.[2]
(6) MEDICAL INDIGENCY.[3]
(7) OLD AGE ASSISTANCE.[3]
(8) AID TO FAMILIES WITH DEPENDENT CHILDREN.[3]

[2] 1960 CENSUS DATA

[3] 1967 WELFARE DATA, ORANGE COUNTY DEPARTMENT OF SOCIAL WELFARE

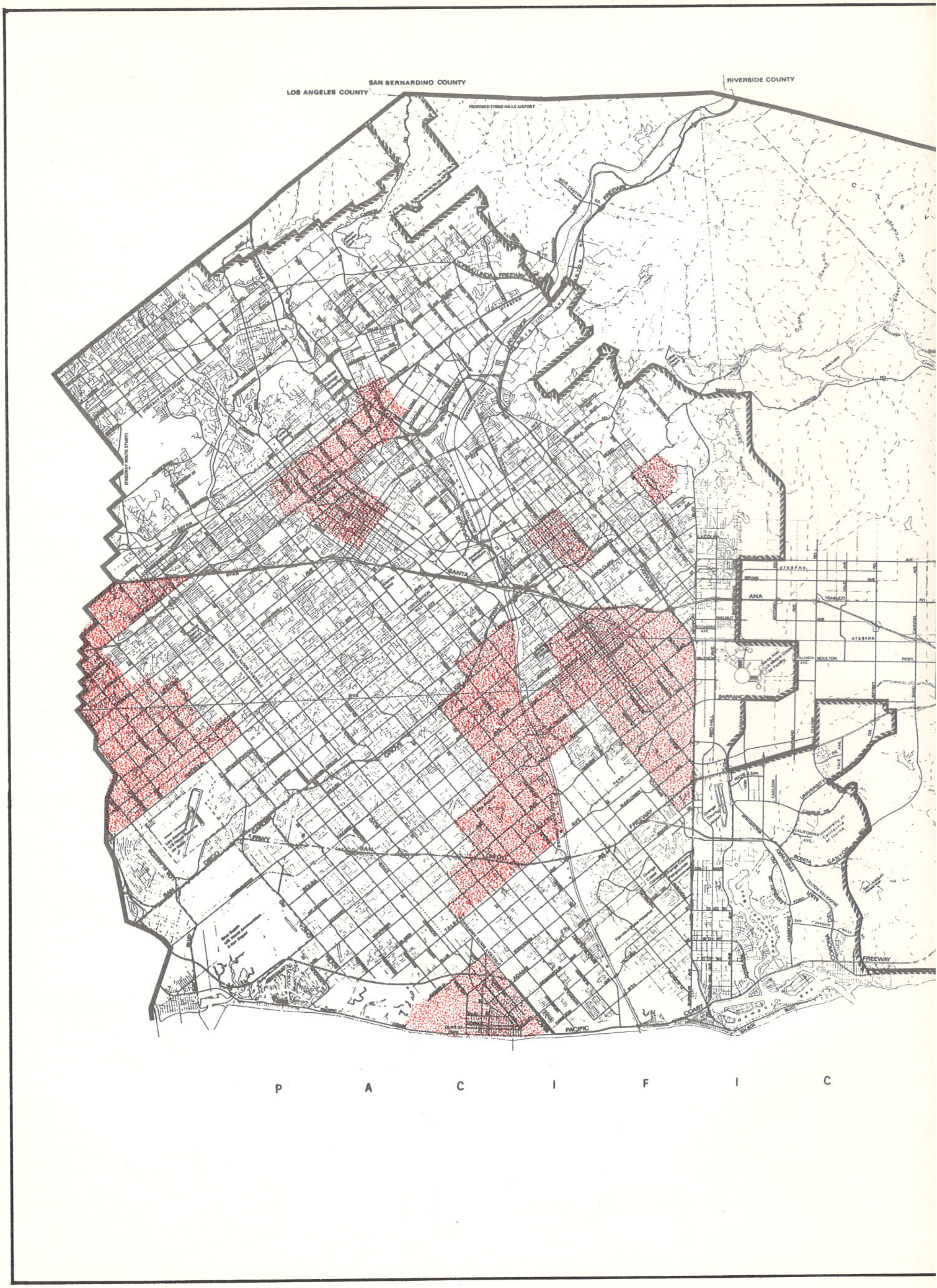
P A N

EXHIBIT 10

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

POVERTY AREAS

A JOINT VENTURE VTN / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA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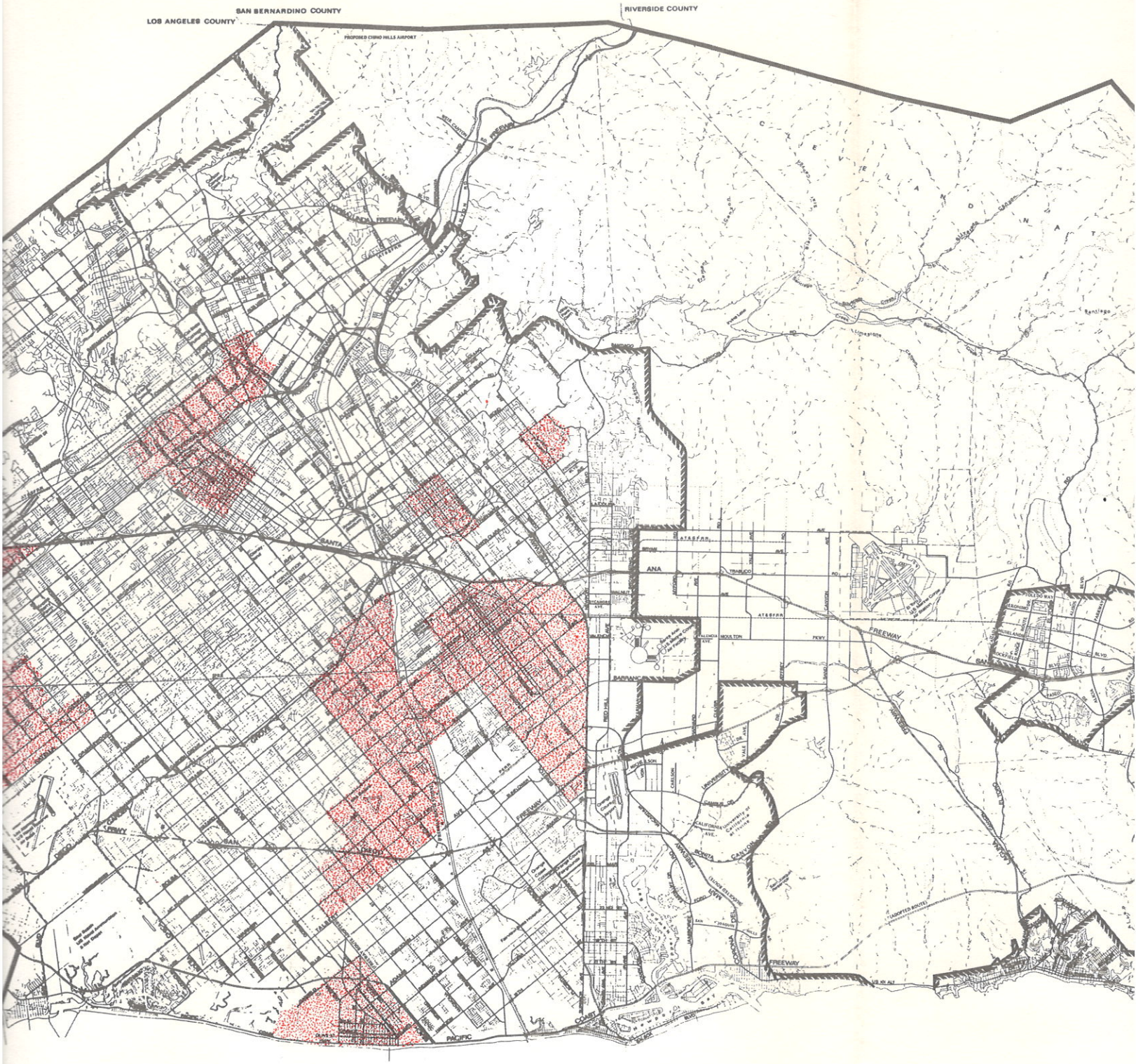
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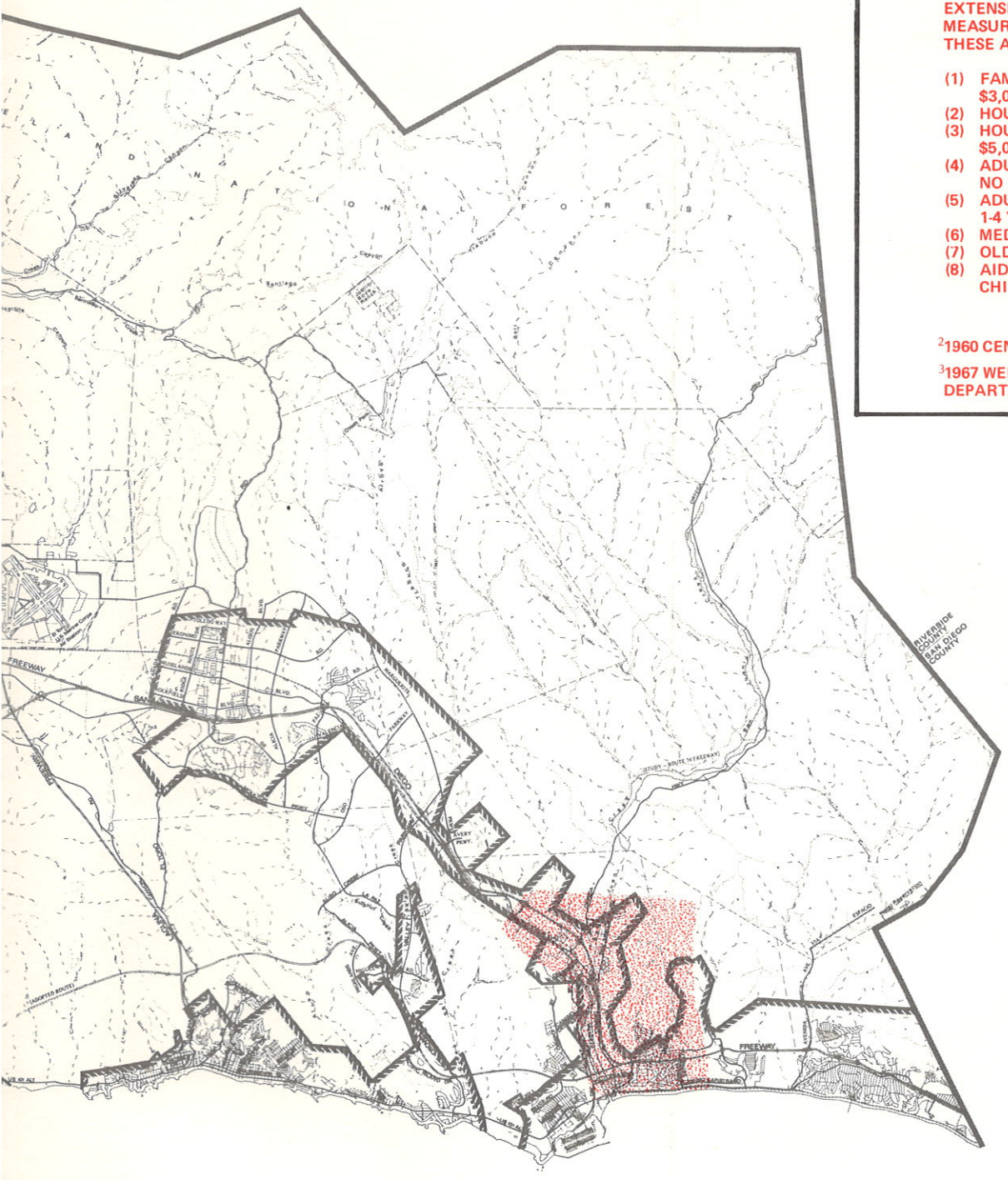

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[2] 1960 CENSUS DATA

[3] 1967 WELFARE DATA, ORANGE COUNTY DEPARTMENT OF SOCIAL WELFARE

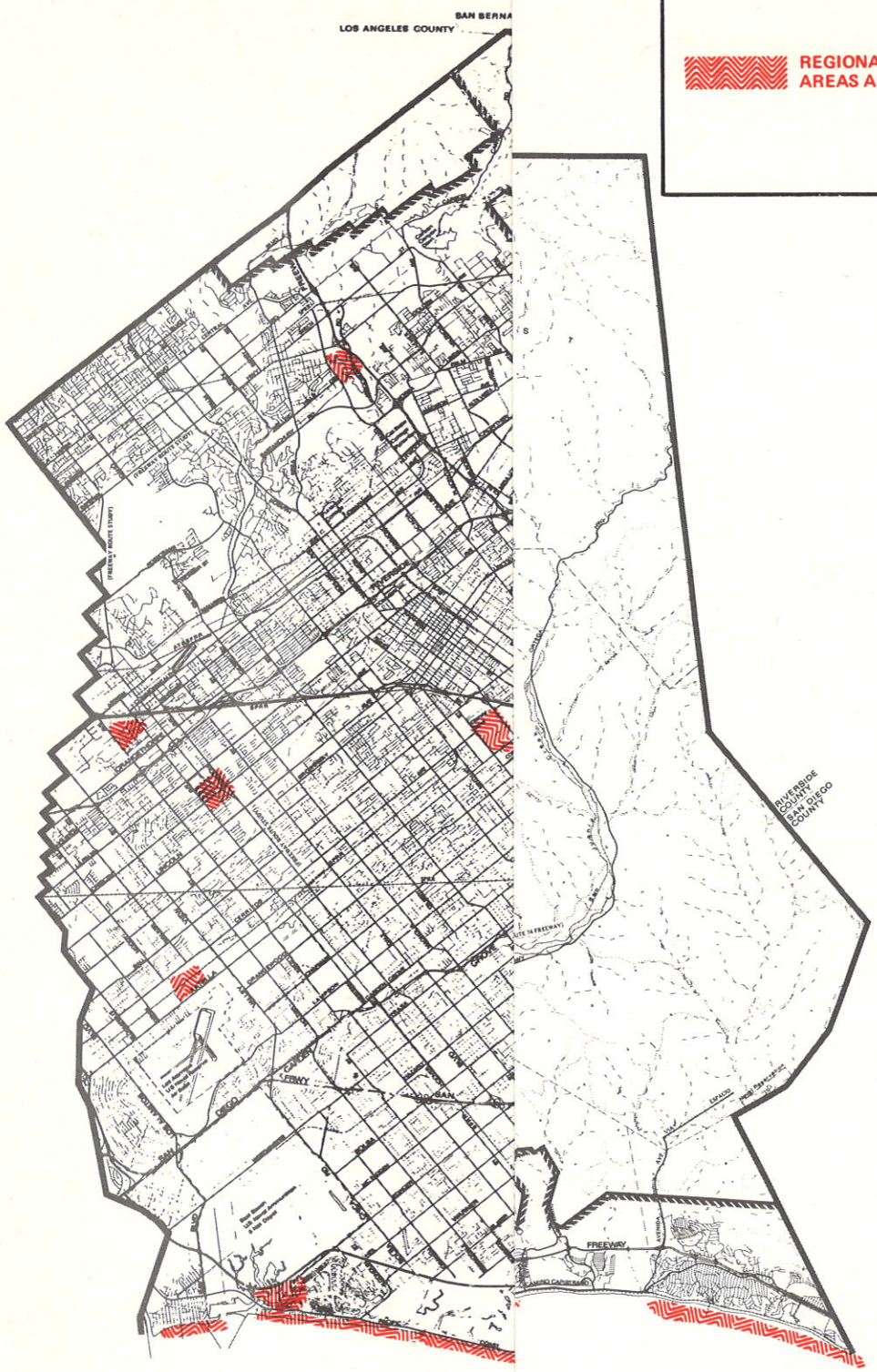
0 1 2 3 4 5
MILES

EXHIBIT 10

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

POVERTY AREAS

A JOINT VENTURE VTN / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA



LEGEND

REGIONAL RECREATION AREAS (FUTURE AREAS ARE CURRENTLY UNDER STUDY)

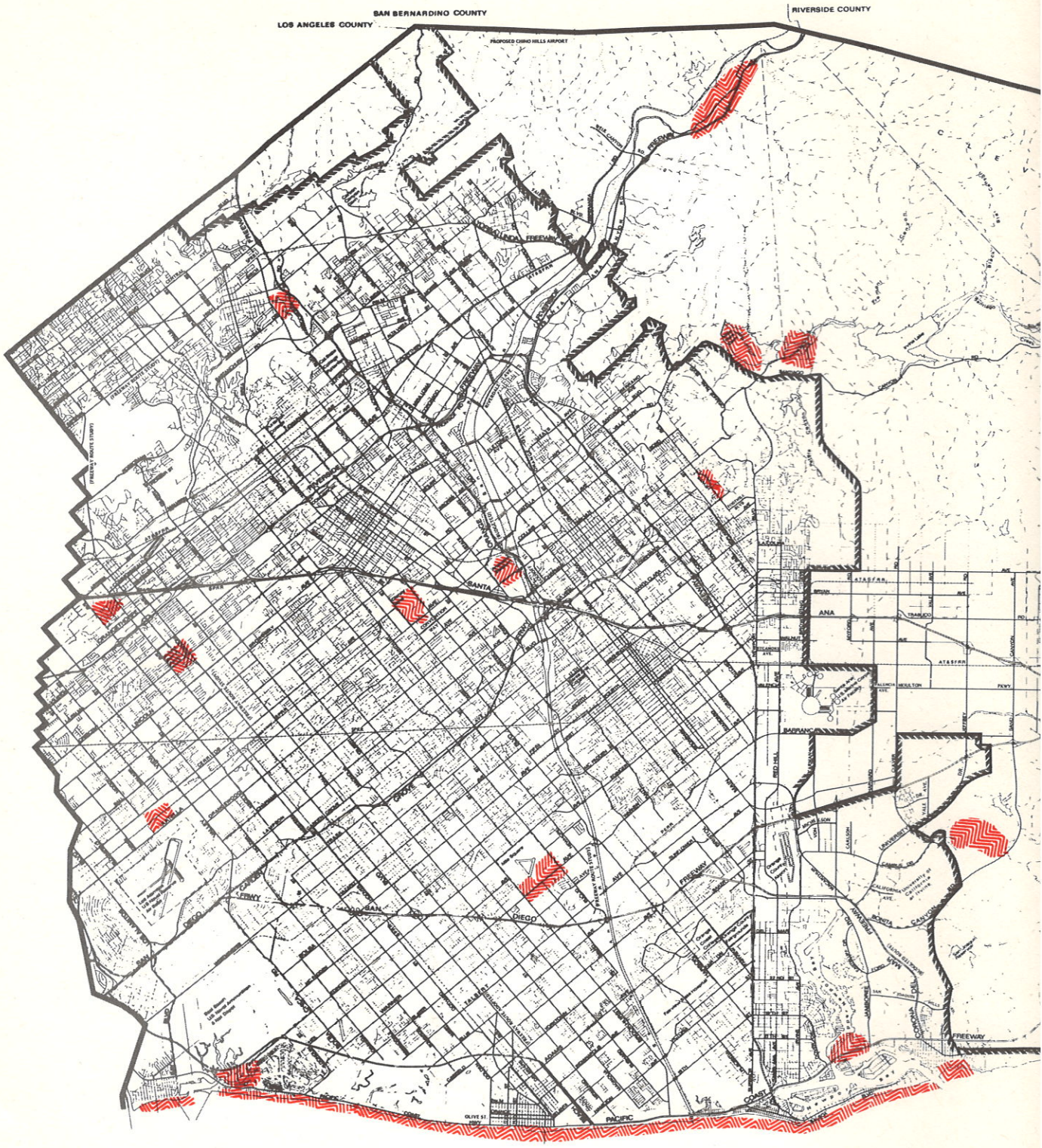
P A N

EXHIBIT 11

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

EXISTING REGIONAL RECREATION AREAS

A JOINT VENTURE VTN / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA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LOS ANGELES COUNTY
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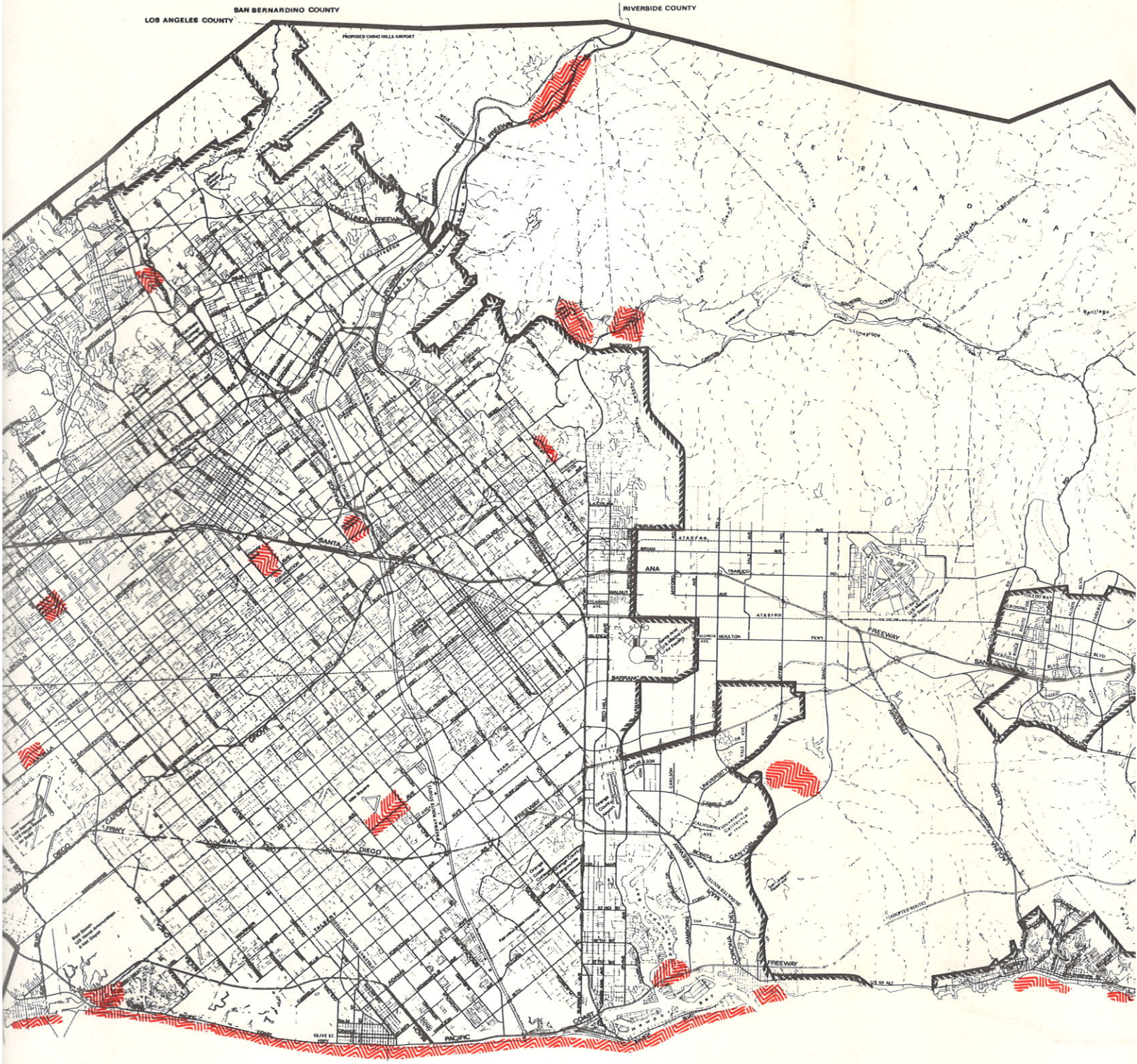
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PACIFIC COAST HIGHWAY
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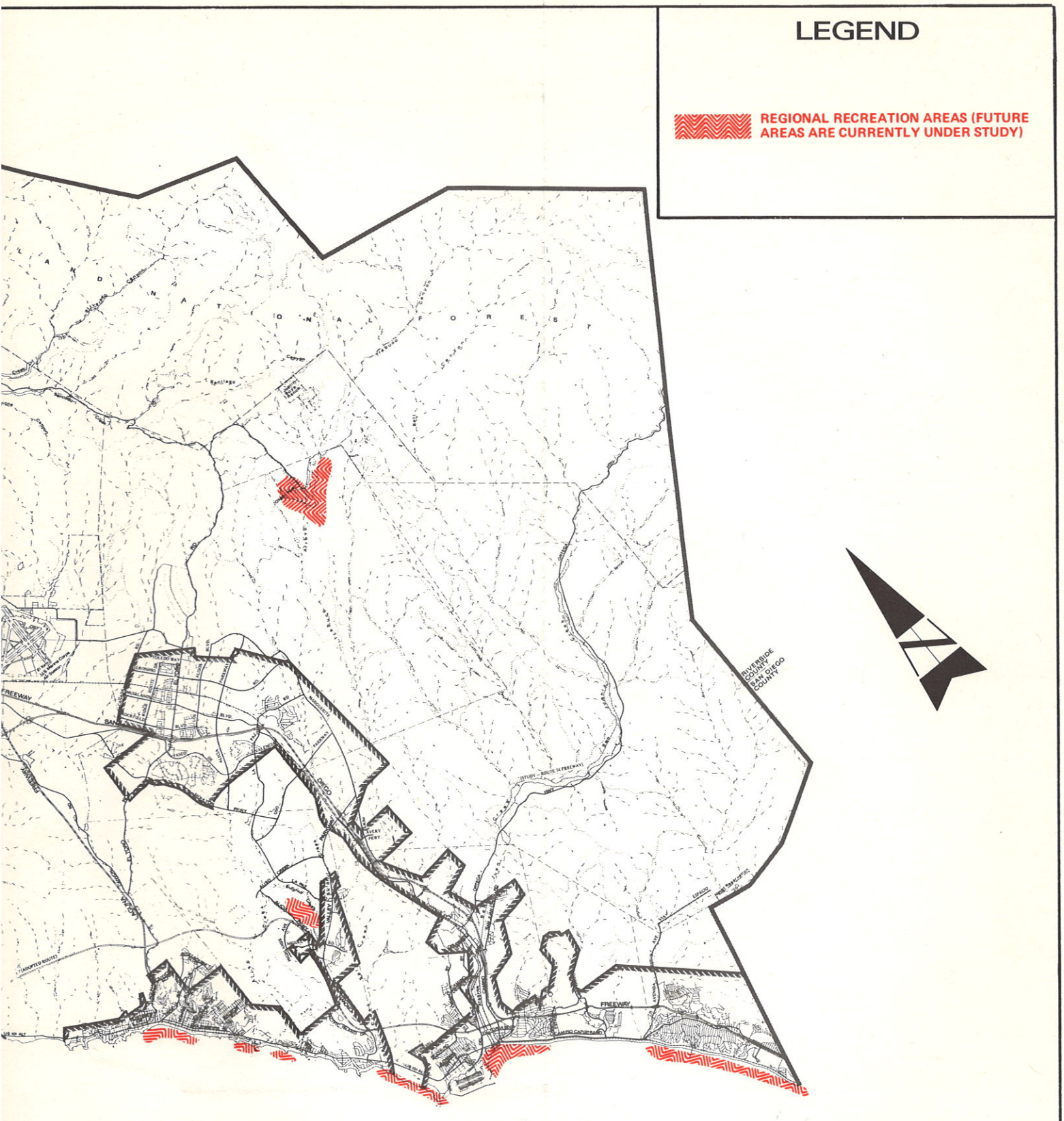


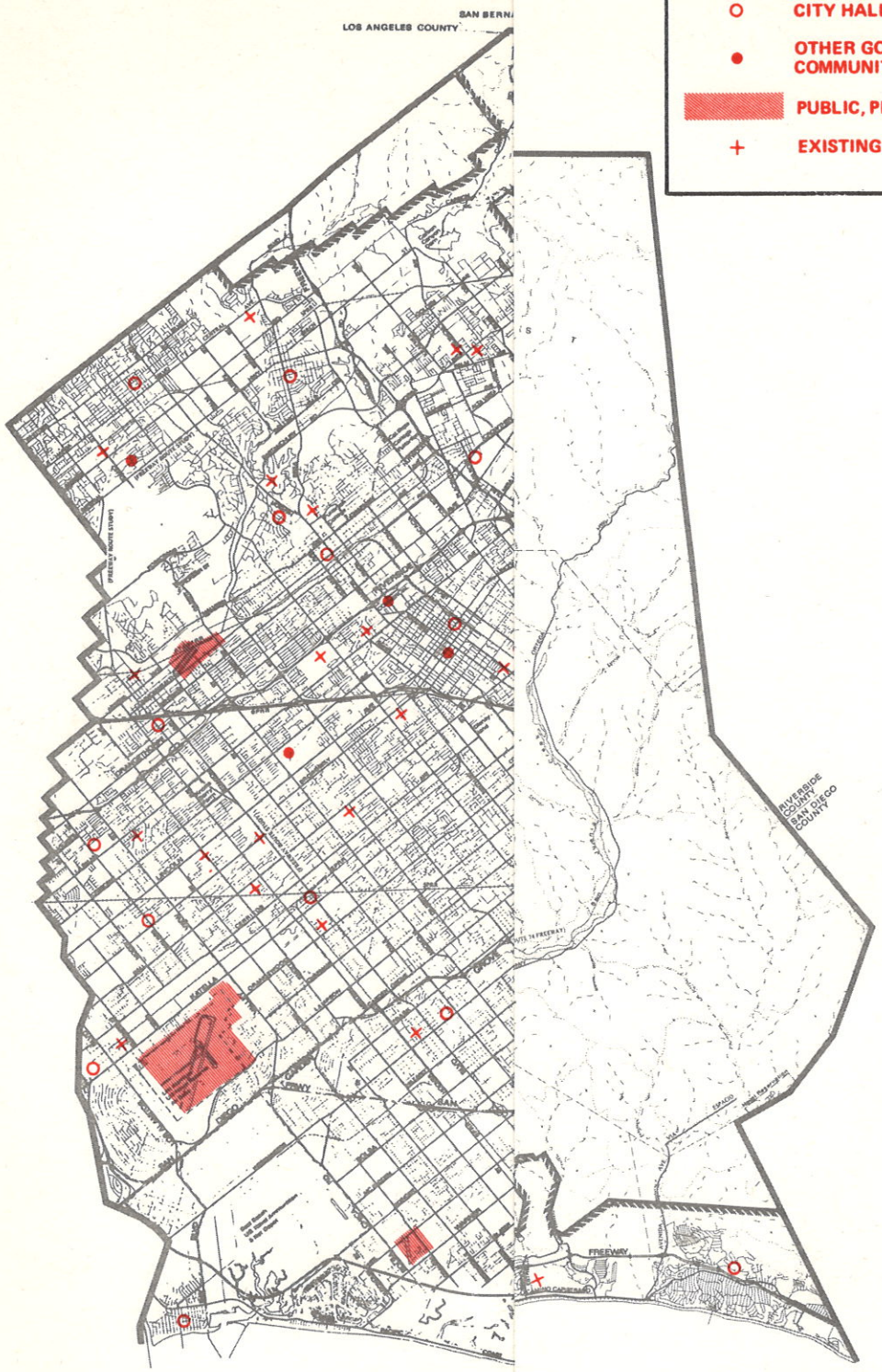
EXHIBIT 11

SPECIAL BUS NEEDS STUDY

ORANGE COUNTY TRANSIT DISTRICT

EXISTING REGIONAL RECREATION AREAS

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA



LEGEND

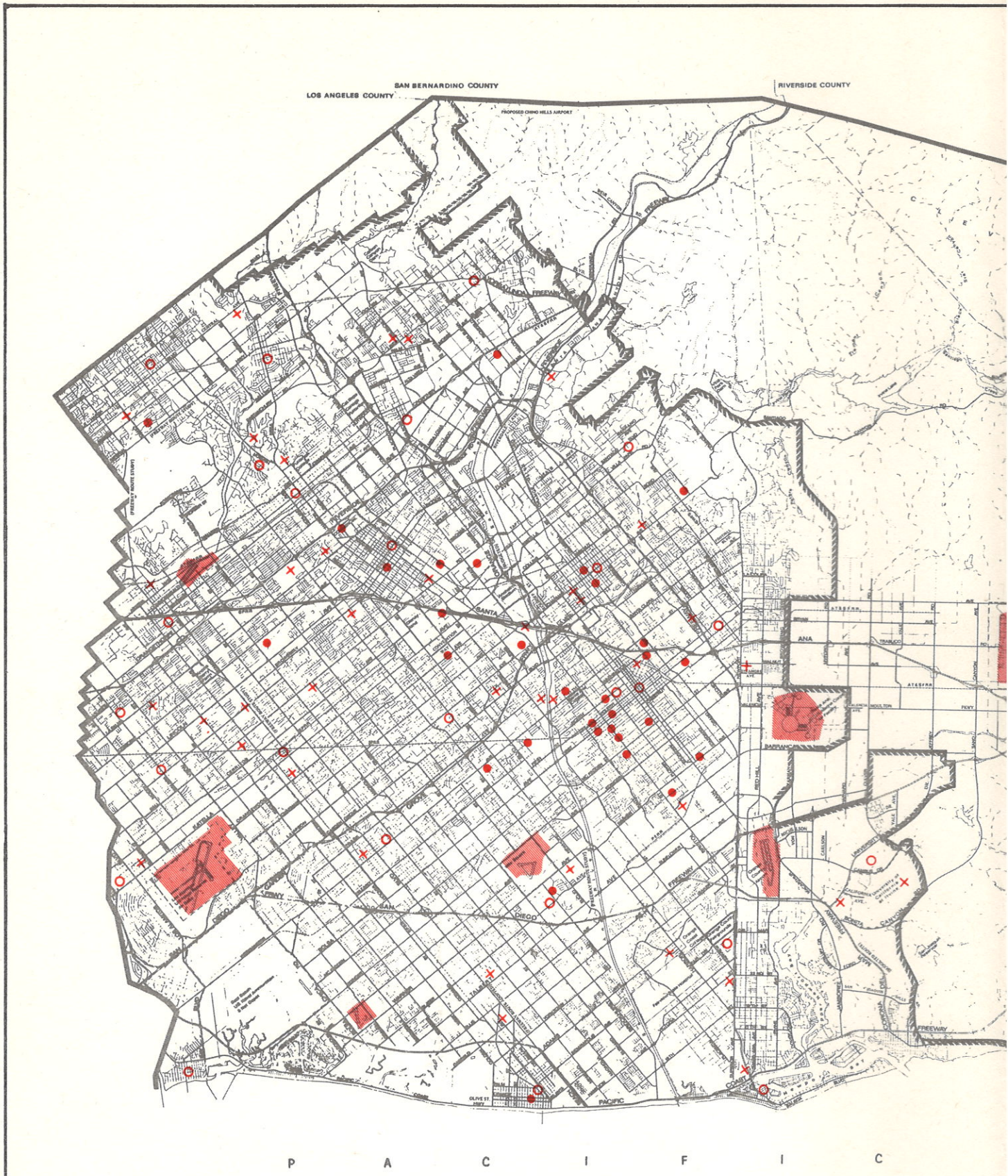
- ○ CITY HALLS AND MAJOR COUNTY COMPLEXES
- ● OTHER GOVERNMENT SERVICE OFFICES AND COMMUNITY CENTERS
- ▬ PUBLIC, PRIVATE AND MILITARY AIRPORTS
- \+ EXISTING AND PLANNED HOSPITALS

EXHIBIT 12

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

PUBLIC FACILITIES

A JOINT VENTURE VTN / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA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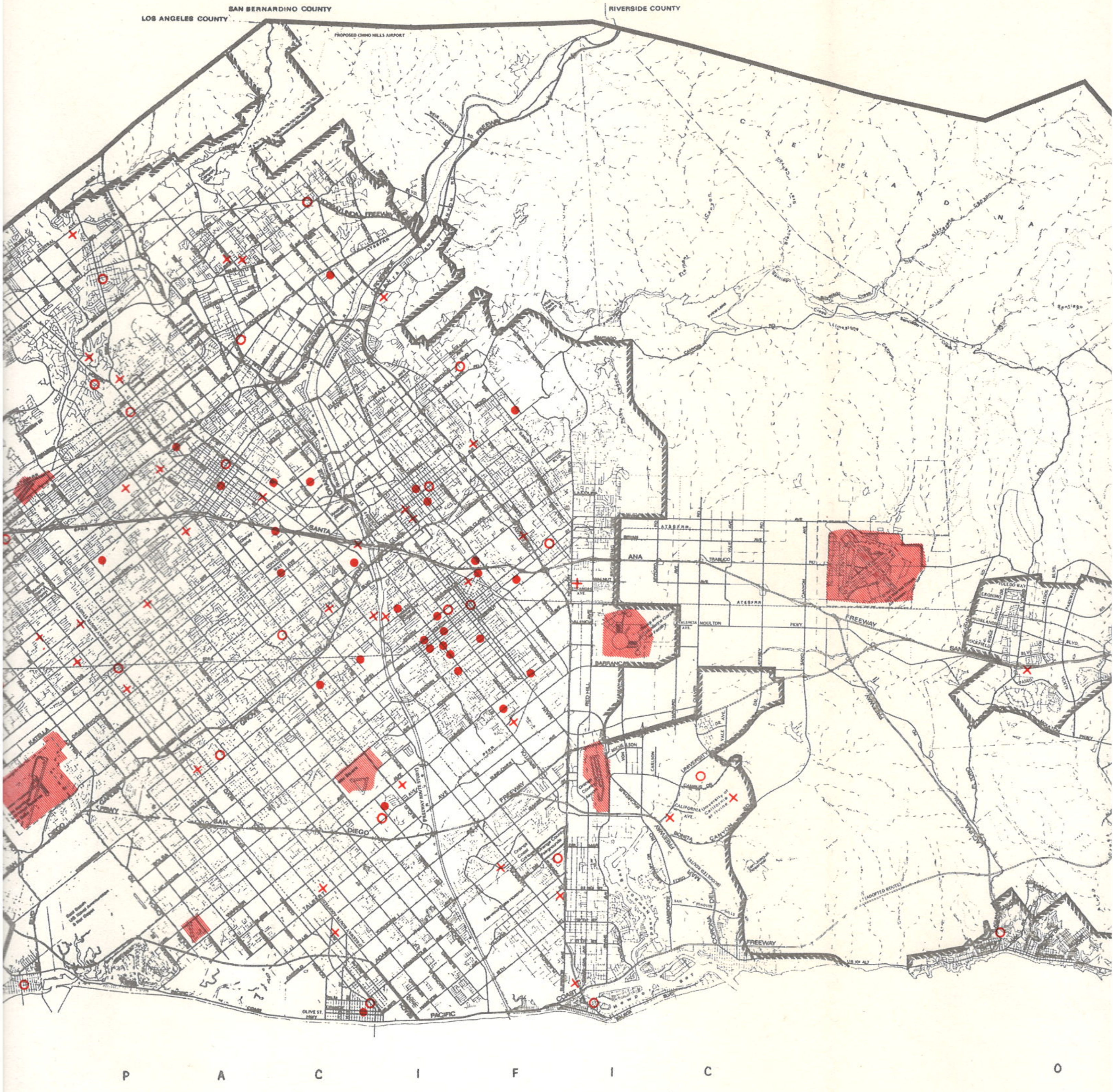
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PACIFIC
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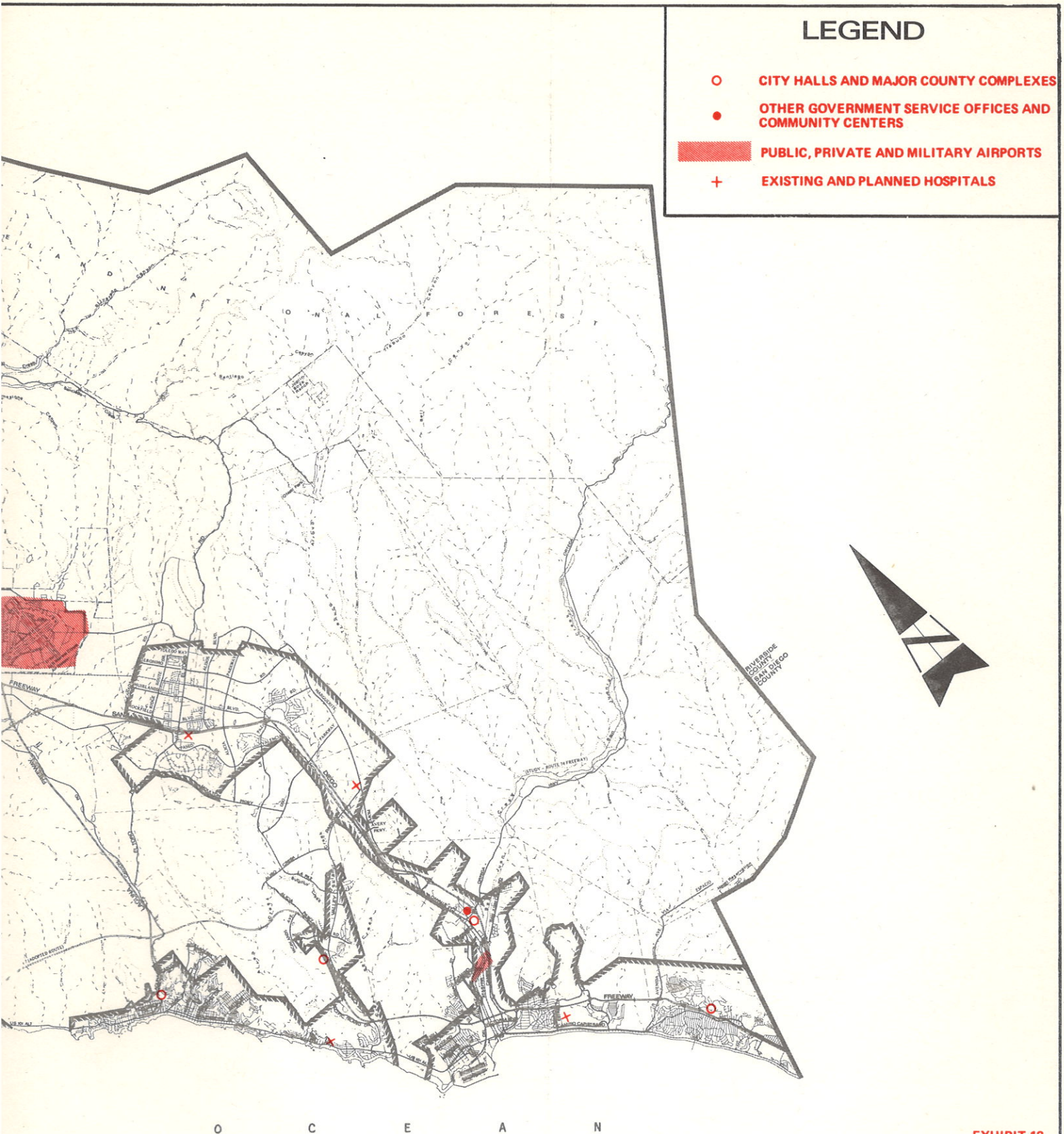


EXHIBIT 12

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

PUBLIC FACILITIES

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA

TABLE 3

PUBLIC FACILITIES

City Halls

1. Anaheim, 204 E. Lincoln
2. Brea, 401 South Brea Boulevard
3. Buena Park, 6650 Beach Boulevard
4. Costa Mesa, 77 Fair Drive
5. Cypress, 5275 Orange Avenue
6. Fountain Valley, 10200 Slater
7. Fullerton, 303 West Commonwealth
8. Garden Grove, 11391 Acacia Parkway
9. Huntington Beach 5th Street and Orange Avenue
10. Irvine, Irvine Town Center
11. Laguna Beach, 505 Forest
12. La Habra, 261 East Erna Avenue
13. La Palma, 27822 Walker
14. Los Alamitos, 3191 Katella
15. Newport Beach, 3300 Newport Boulevard
16. Orange, 300 East Chapman
17. Placentia, 120 South Bradford
18. San Clemente, 100 Avenue Presidio
19. San Juan Capistrano, 31762 Camino Capistrano
20. Santa Ana, 217 North Main
21. Seal Beach, 211 8th Street
22. Stanton, 7800 Katella Avenue
23. Tustin, 140 West 2nd Street
24. Villa Park, 18401 Villa Park Road
25. Westminster, 8200 Westminster Avenue
26. Yorba Linda, 4845 Main

County of Orange Major Complexes

1. North County, Fullerton
2. Central Office, Santa Ana
3. South County, Laguna Niguel

TABLE 4

PUBLIC FACILITIES

Other Government Service Offices

1. Legal Aid Society, 112 N. Homer, Anaheim
2. Public Health Services, 1011 East Street, Anaheim
3. H.E.W., Social Security Administration, 1070 North State College, Anaheim
4. Orange County Management Council, 1477 South Manchester, Anaheim
5. Neighborhood Youth Corps, League of United Latin American Citizens* LULAC, 700 West Orangewood, Anaheim
6. Internal Revenue Service, Two City Boulevard East, Suite 221, Orange
7. Children's Community Nursery, 161 South Orange, Orange
8. Human Resources Development Department, 1932 West 17th Street, Santa Ana
9. Selective Service Local Boards, 1138 West 17th Street, Santa Ana
10. Orange County Fiar Housing Council, 1405 West 4th Street, Santa Ana
11. Creative Day Care Center, First Street and Baker, Santa Ana
12. Operation SER, 309 South Bristol, Santa Ana
13. Partners for Progress, 418 South Bristol, Santa Ana
14. Legal Aid Society, 702 South Broadway, Santa Ana
15. Human Resources Development Department, 2832 South Bristol, Santa Ana
16. HEW, HUD, Social Security Administration, 1440 East 1st Street, Santa Ana

Community Centers of Orange County

17. Anaheim Independence Center, 10862 Harcourt, Anaheim
18. Atwood Center, 17421 East Sierra Vista, Placentia
19. Colonia Juarez Center, 10251 Independencia, Fountain Valley
20. Delhi Center, 541 East Central, Santa Ana
21. El Modeno Center, 18602 Center Street, El Modeno
22. Gary Center, 2211 South Hillcrest, La Habra
23. Huntington Beach Center, 307 Main Street, Huntington Beach
24. Logan Community Park, 1009 Custer, Santa Ana
25. Manzanillo Center, 5103 West 16th Street, Santa Ana
26. Neighborhood Outreach Project (funded by First Presbyterian Church of Anaheim), 310 West Broadway, Anaheim
27. Orange Friendly Center, 424 North Cypress, Orange
28. San Juan Capistrano Center, 26891 Spring Street, San Juan Capistrano
29. Southwest Center, 1601 West Second Street, Santa Ana
30. Santa Anita Community Center, 121 Bewley, Santa Ana

TABLE 5

PUBLIC FACILITIES

Hospitals

From Orange County Health Planning Council
In Operation

1. Anaheim General Hospital, 3350 West Ball Road, Anaheim
2. Anaheim Memorial Hospital, 111 West La Palma Avenue, Anaheim
3. Beach Community Hospital, 5742 Beach Boulevard, Buena Park
4. Broadway General Hospital, 1660 West Broadway, Anaheim
5. Chapman General Hospital, 2601 East Chapman, Orange
6. Children's Hospital, 1109 West La Veta, Orange
7. Costa Mesa Memorial Hospital, 301 Victoria Street, Costa Mesa
8. Fountain Valley Hospital, 17100 Euclid, Fountain Valley
9. Doctors Hospital, 1901 West College Avenue, Santa Ana
10. Fairview State Hospital, 2501 Harbor, Costa Mesa
11. Fullerton Community Hospital, 100 East Valley View Drive, Fullerton
12. Garden Park General Hospital, 9922 South Gilbert Street, Anaheim
13. Hoag Memorial Hospital, 301 Newport Boulevard, Newport Beach
14. Huntington Inter-Community, 17772 Beach Boulevard, Huntington Beach
15. La Habra Community Hospital, 1251 West Lambert Road, La Habra
16. Mission Community Hospital, 27802 Puerte Real Highway, Mission Viejo
17. Lincoln Community Hospital, 6850 Lincoln Avenue, Buena Park
18. Los Alamitos General Hospital, 3751 Katella Avenue, Los Alamitos
19. Martin Luther Hospital, 1825 West Romneya Drive, Anaheim
20. Orange County Medical Center, 101 Manchester Avenue, Orange
21. Pacifica Hospital, 18792 Delaware Street, Huntington Beach
22. Palm Harbor General Hospital, 12860 Palm Street, Garden Grove
23. Riverview Hospital, 1901 North Fairview, Santa Ana
24. Santa Ana Community Hospital, 600 East Washington Avenue, Santa Ana
25. St. Joseph Hospital, 1100 West Stewart Drive, Orange
26. St. Jude Hospital, 101 East Valencia Mesa Drive, Fullerton
27. South Coast Community Hospital, 3182 Coast Highway, South Laguna
28. Stanton Community Hospital, 7770 Katella Avenue, Stanton
29. Tustin Community Hospital, 14662 Newport Avenue, Tustin
30. West Anaheim Community Hospital, 3033 West Orange Street, Anaheim
31. Westminster Community Hospital, 200 Hospital Circle, Westminster

TABLE 5 (continued)

Under Construction

32. Brea Community, Site at Central, Brea
33. Bristol General, Site at Bristol (E.), North of Perr
34. Canyon General, Site at Lake View, at Santa Ana Canyon Road
35. East Anaheim General, Site at Anaheim and Ball
36. Esperanza Intercommunity, Site at Valencia and Yorba Linda Boulevard
37. La Habra, Site at Lambert and Idaho
38. La Palma Community, Site at La Palma and Valley View
39. Placentia Intercommunity, Site at Valencia and Yorba Linda Boulevard
40. Saddleback, Site at Southwest Corner of El Toro and San Diego Freeway
41. San Clemente, Site at Camino Estrella and East City Limits
42. Santa Ana-Tustin, Site at Tustin Avenue

Planned

43. University Irvine, Site at UCI
44. Western Worlds, Site at MacArthur at University

Shopping Centers

One of the most active centers of activity is the regional shopping center. At present 11 shopping centers are classified as regional[2] by the Los Angeles Times Marketing Research Department. In general, centers with 300,000 square feet of gross leasing space fall into this classification. Exhibit 13 shows the shopping centers and Table 6 lists them along with location. These centers should be prime transfer and mode change points for an improved bus system.

Employment Areas

The present major employment areas shown on Exhibit 14 were derived from data provided by the Orange County Planning Department. The data is made available by state agencies for planning purposes and assembled by census tracts. The areas shown on the exhibit are census tracts with more than 5000 employees (14 tracts) and account for 120,000 employees or approximately 28 percent of the total employment in Orange County which is 425,000. These areas will be growing in the future and adequate bus service should be provided. The home-to-work trip is critical to the peak hour congestion problem expected in the future. The dependence on an automobile for the journey to work has been shown to be uneconomical for both the employee and the employer. The employer provides parking spaces along with the associated costs of land and maintenance, whereas this money might be better spent to encourage employees to use an attractive, dependable bus system.

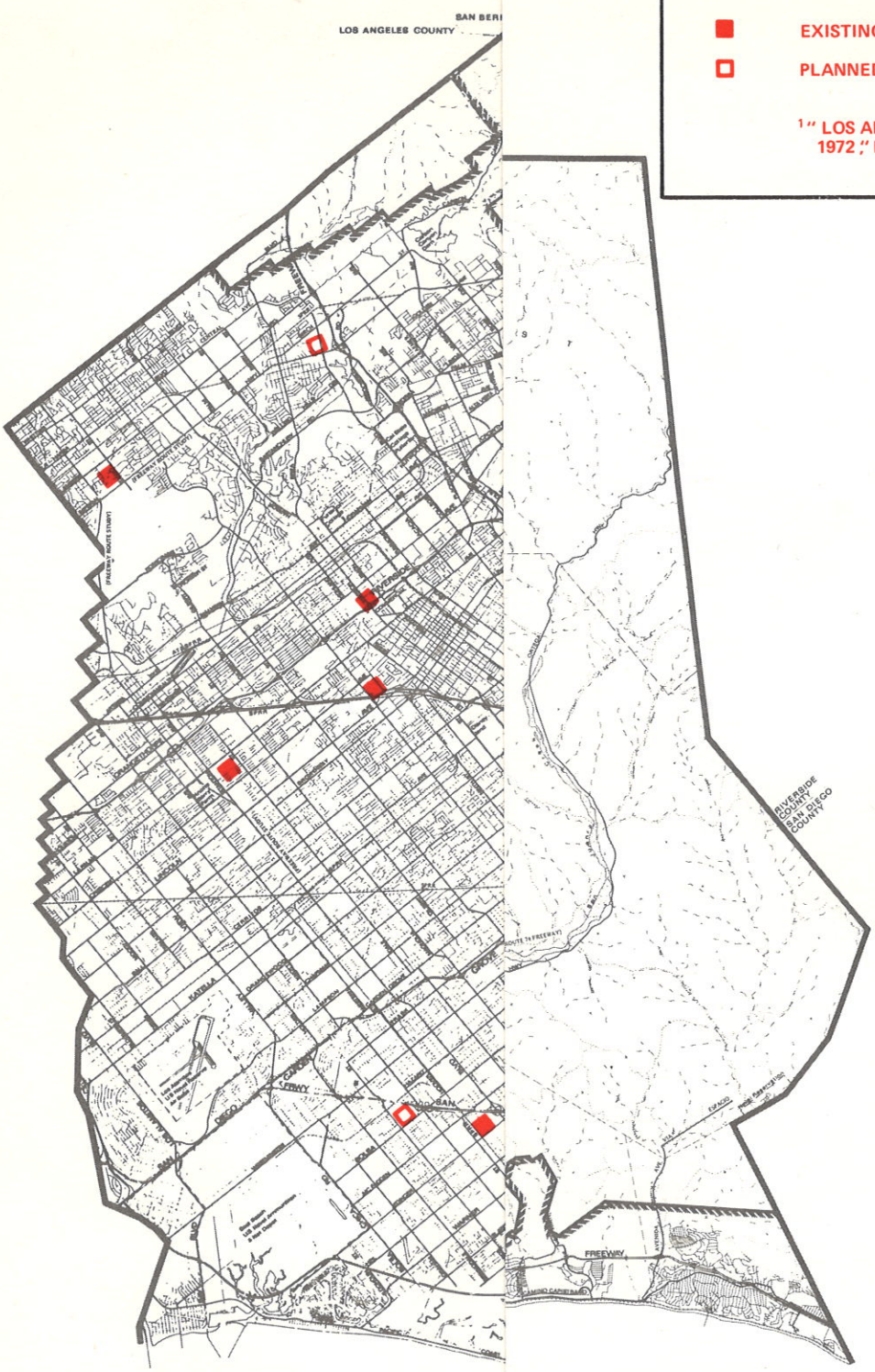
Educational Institutions

Approximately 100,000 students are enrolled in colleges and universities in Orange County and the number grows every year. Exhibit 15 shows the location of the major institutions of higher education and Table 7 lists them. California State University at Long Beach is also shown on the exhibit because of its influence on many Orange County residents. Almost all community colleges and four-year institutions have expressed an interest in bus service for their campuses. There should be careful evaluation (which could not be a part of this study) of the UCI-OCTD experimental service, and possible similar projects at Cypress College and California State University at Fullerton. Because of the short duration of this study, not enough time was available to detail the specific area of influence of each institution but the OCTD staff is now in the process of making such an analysis, working closely with the various institutions. Bus service to these schools should be coordinated whenever possible with the basic transit system so that it will be available for all persons, rather than just college students.

College-Age Areas

As an indication of the location and magnitude of concentrations of college age people, Exhibit 16 presents the location of persons 18-21 years old. That age bracket represents more than nine percent of the population in the areas shown. These are 1970 census data and were recorded by census tract in the same manner as the concentrations of elderly persons. In all of Orange County, approximately 90,000 persons or 6½ percent of the population are within this age group. Table 8 lists the census tracts with more than nine percent in this age group. The 41 census tracts listed account for almost 25 percent of the persons 18 to 21 years old.

[2] Los Angeles Times Marketing Research Department, "Los Angeles Shopping Centers, 1971-1972."



LEGEND

- EXISTING REGIONAL SHOPPING CENTER[1]
- PLANNED REGIONAL SHOPPING CENTER

[1] " LOS ANGELES SHOPPING CENTER, 1971-1972 ," L.A. TIMES MARKETING RESEARCH

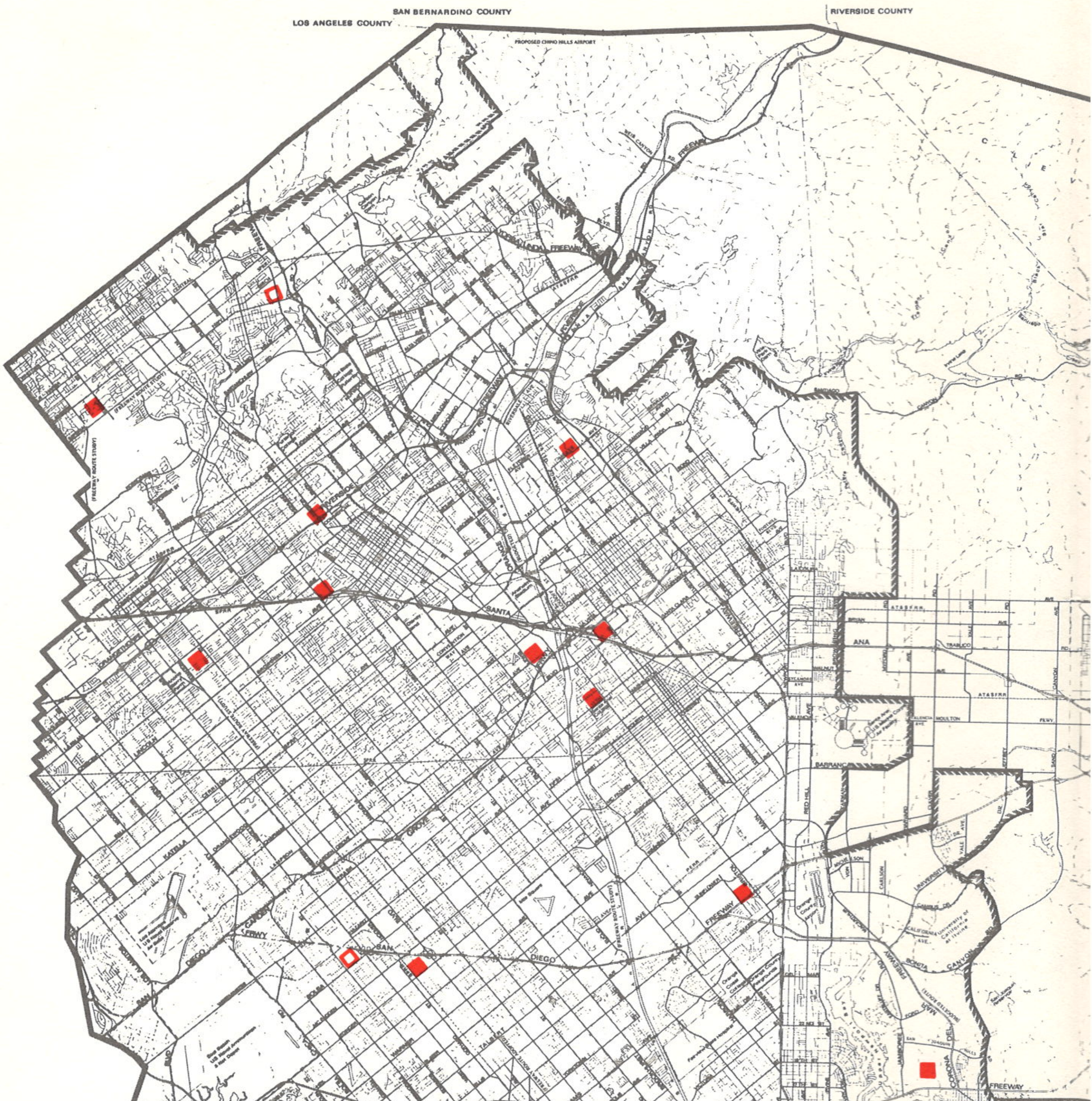
P A N

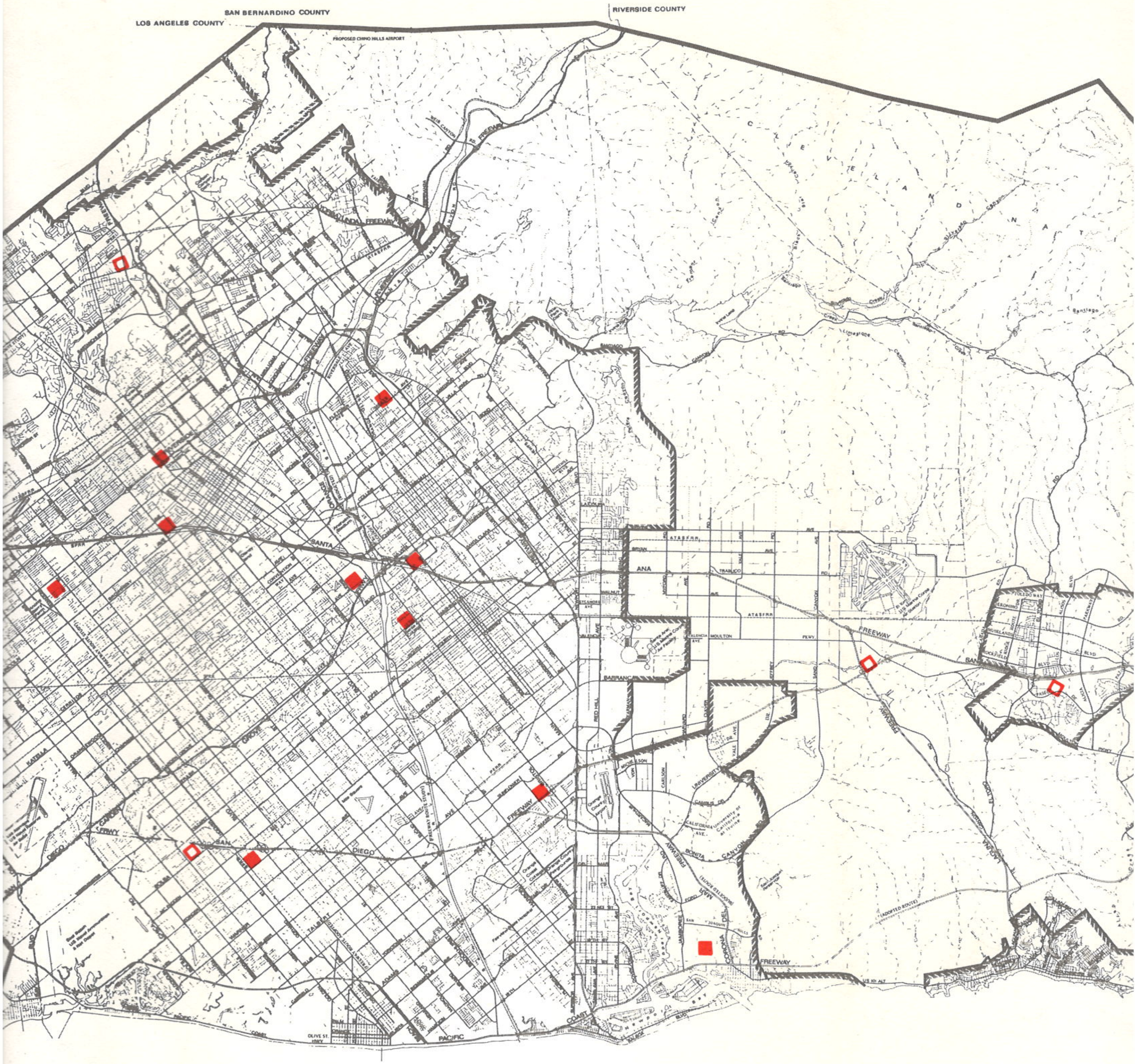
EXHIBIT 13

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

REGIONAL SHOPPING CENTERS

A JOINT VENTURE vtm / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
SANTA
ANA
FREEWAY
SAN
DIEGO
BARRANCA
COAST
PACIFIC
P A C I F I C



SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
FREEWAY
SANTA
ANA
PACIFIC
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PACIFIC
COAST
SAN
DIEGO
FREEWAY
GROVE

P A C I F I C O

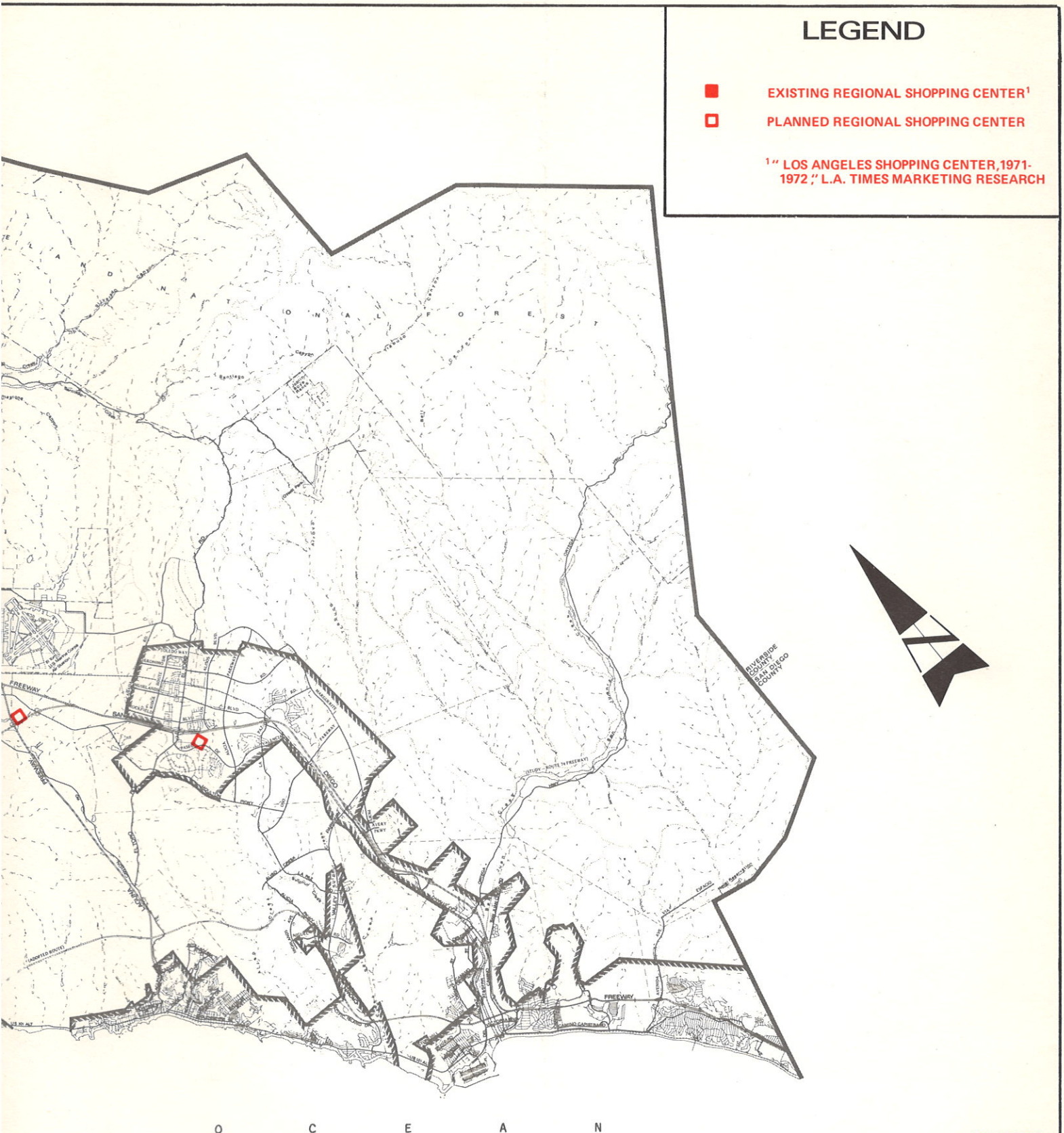


EXHIBIT 13

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

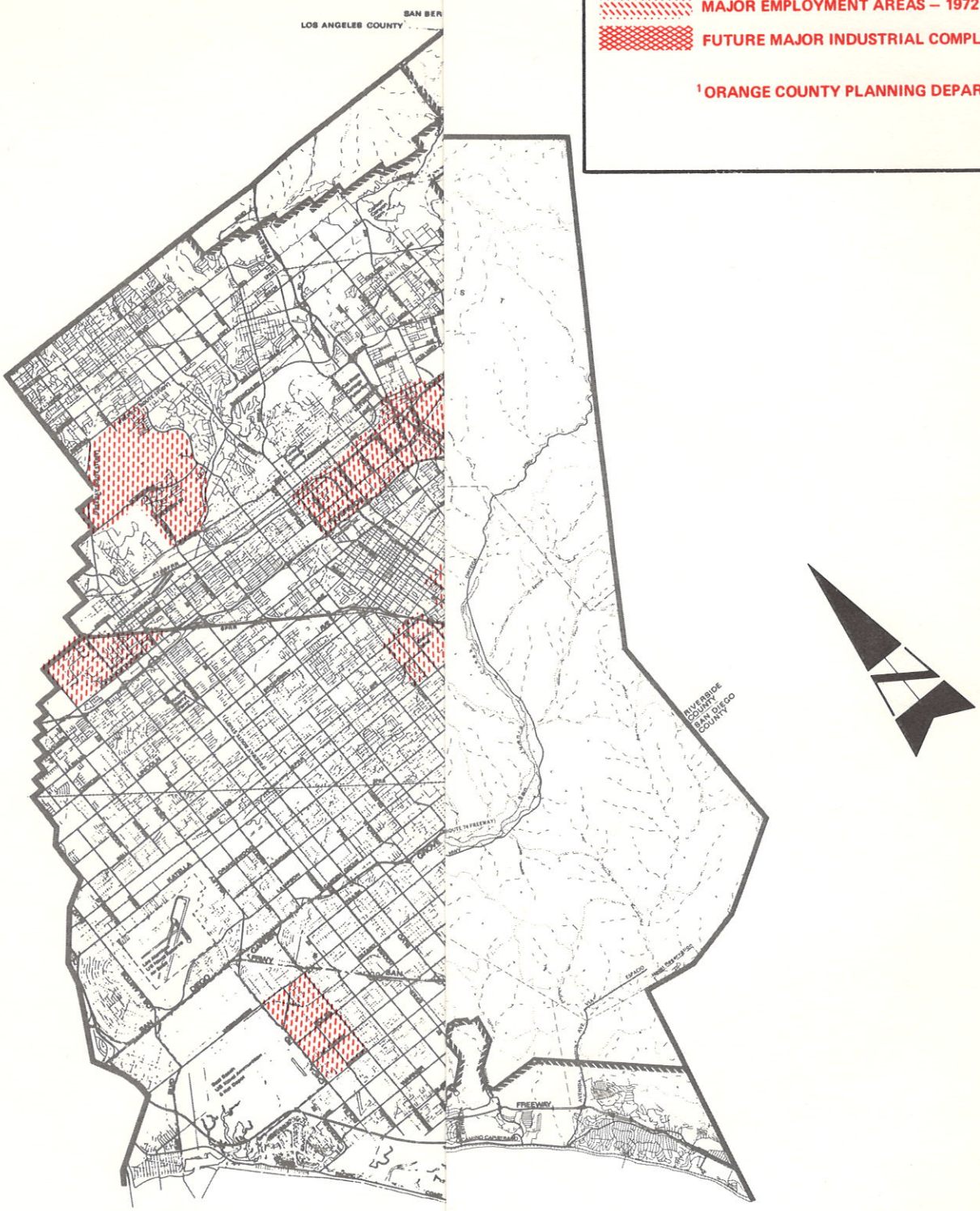
REGIONAL SHOPPING CENTERS

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA

TABLE 6

REGIONAL SHOPPING CENTERS

1. Anaheim Center, Euclid Avenue and Santa Ana Freeway, Anaheim
2. Buena Park Shopping Center, La Palma and Dale Avenues, Buena Park
3. The City Shopping Centre, Chapman Avenue and Santa Ana Freeway, Orange
4. Fashion Island, Newport Center, Newport Beach
5. Honer Plaza Shopping Center, 17th and Bristol Streets, Santa Ana
6. Huntington Center, Edinger Avenue and Beach Boulevard, Huntington Beach
7. La Habra Fashion Square, Imperial Highway and Beach Boulevard, La Habra
8. The Mall of Orange, Tustin Avenue and Meats Avenue, Orange
9. Orangefair Mall, Harbor Boulevard and Orangethorpe Avenue, Fullerton
10. Santa Ana Fashion Square, Main Street at Santa Ana Freeway, Santa Ana
11. South Coast Plaza, Bristol Street at San Diego Freeway, Costa Mesa



LEGEND

MAJOR EMPLOYMENT AREAS – 1972[1]

FUTURE MAJOR INDUSTRIAL COMPLEXES

[1] ORANGE COUNTY PLANNING DEPARTMENT

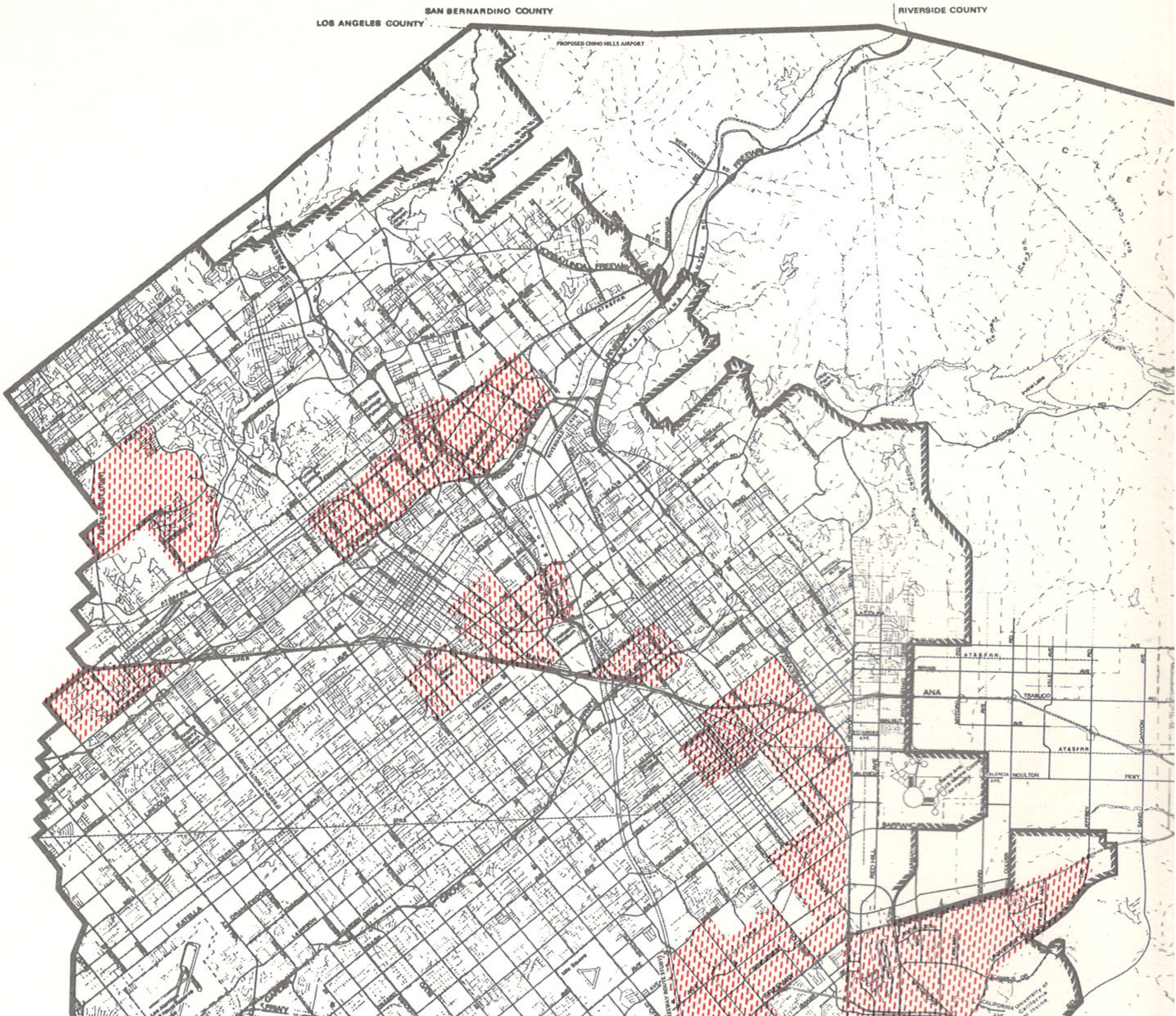
P A N

EXHIBIT 14

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

MAJOR EMPLOYMENT AREAS

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA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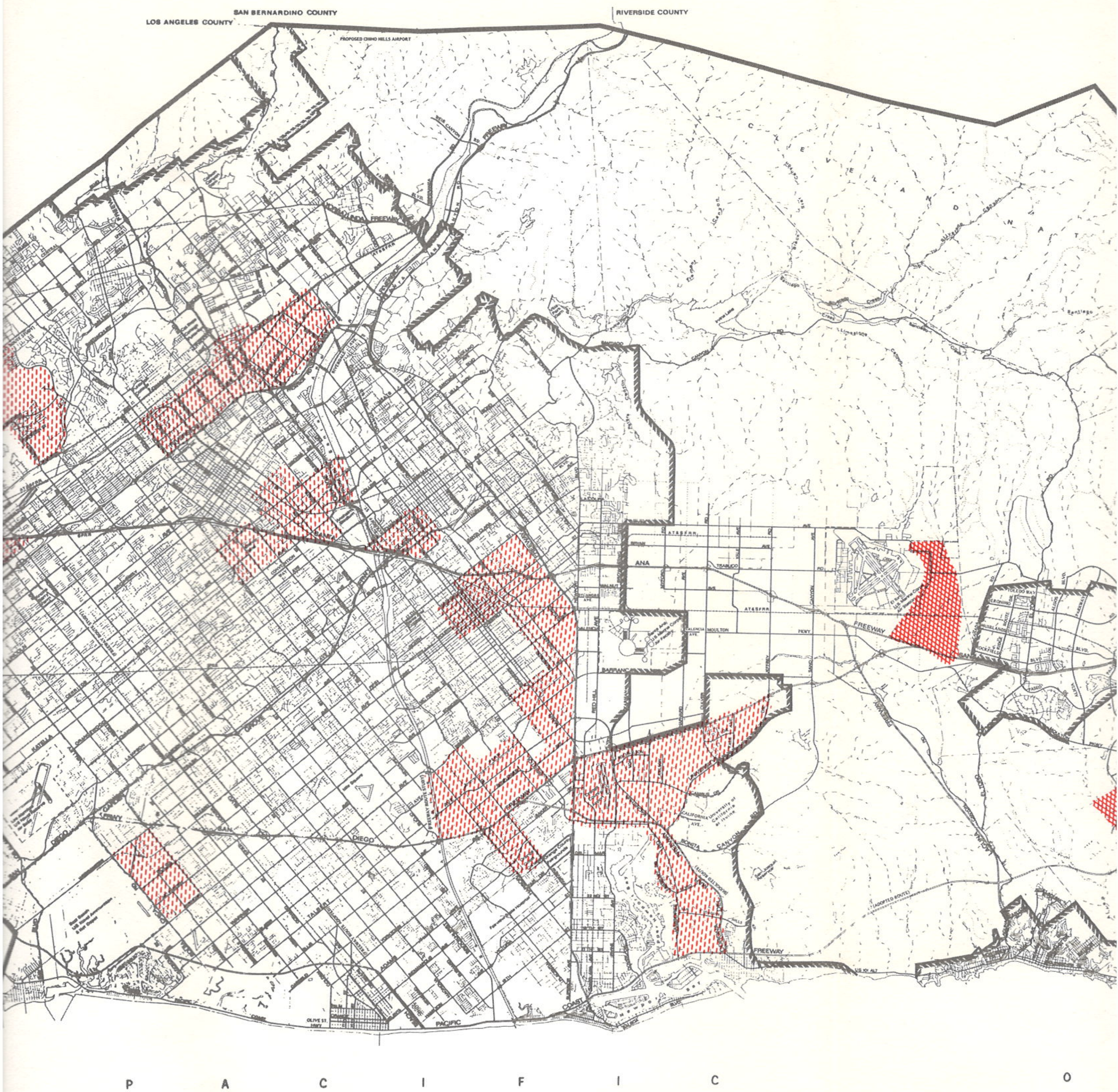
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
FREEWAY
PACIFIC
P A C I F I C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RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
FREEWAY
DIEGO
PACIFIC
BONITA CANYON
P A C I F I C O

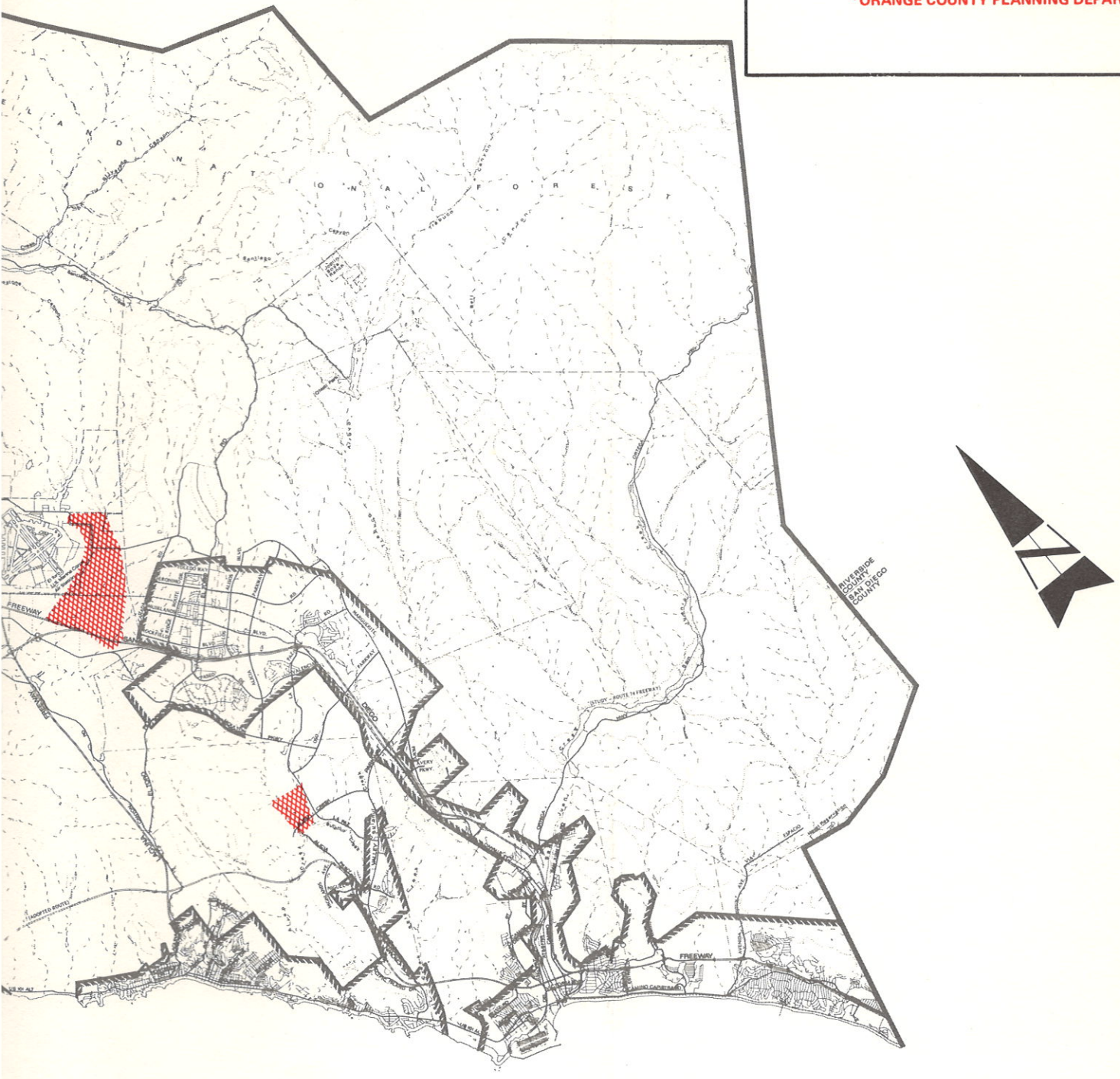


EXHIBIT 14

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

MAJOR EMPLOYMENT AREAS

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA

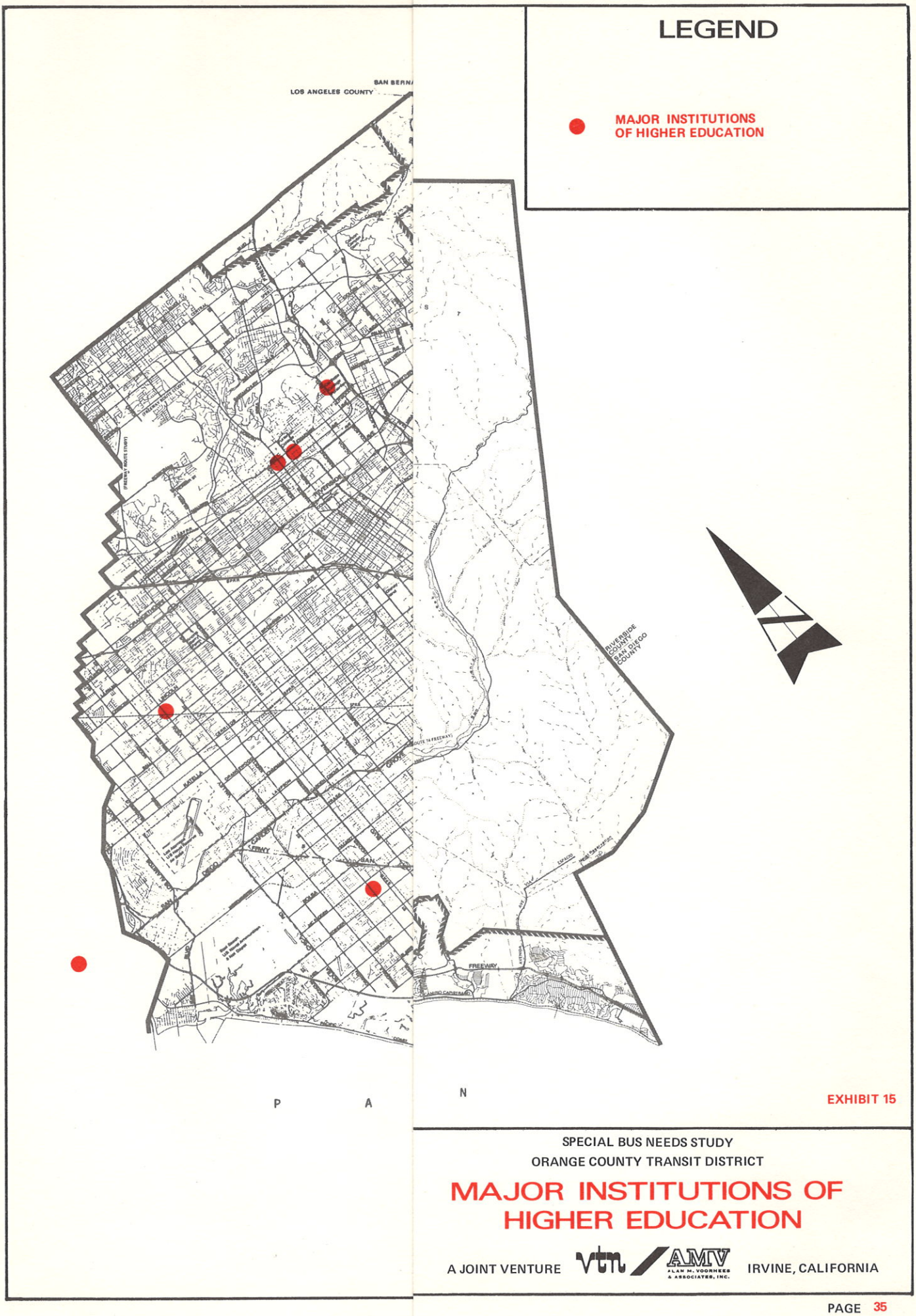
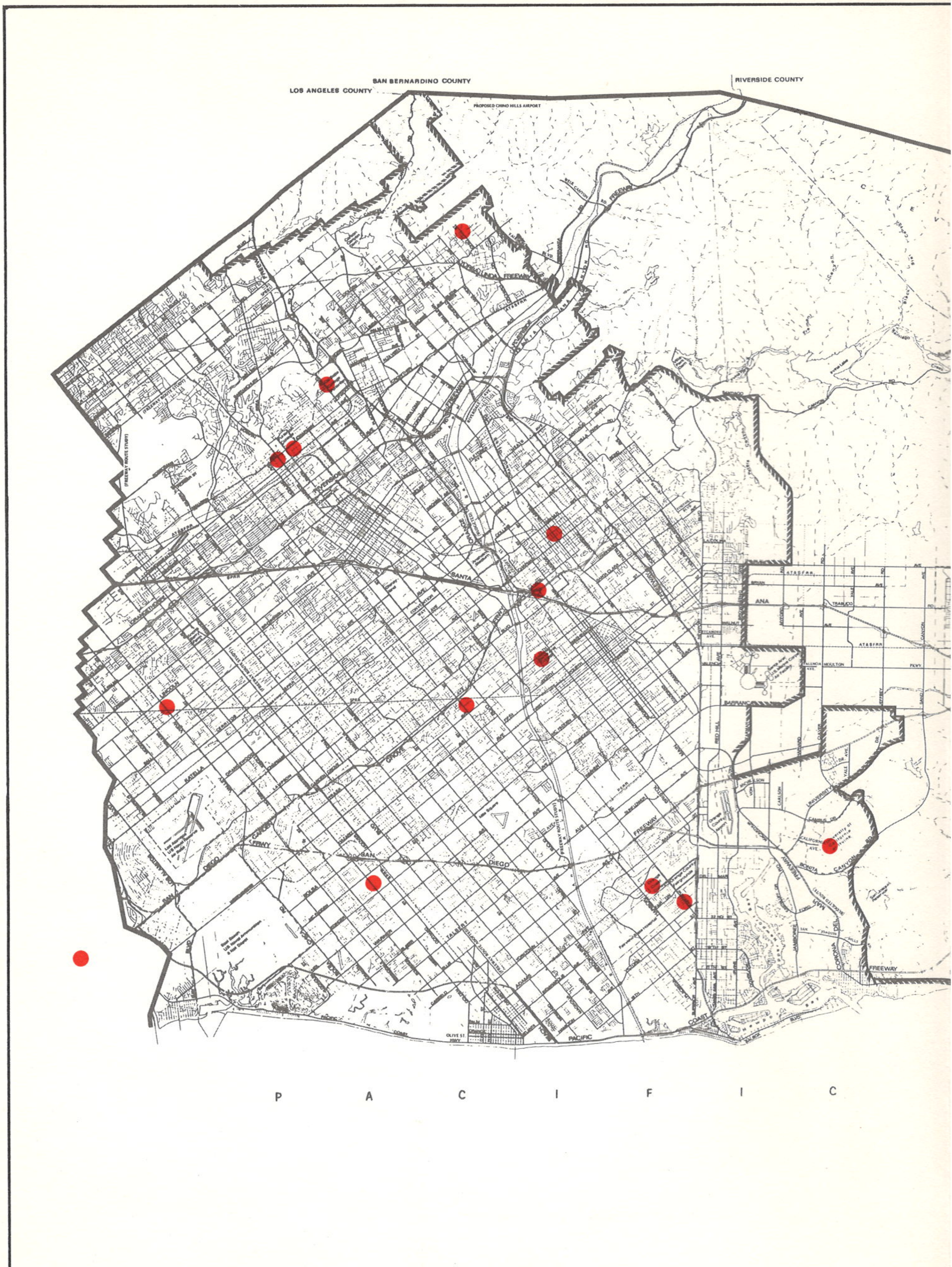


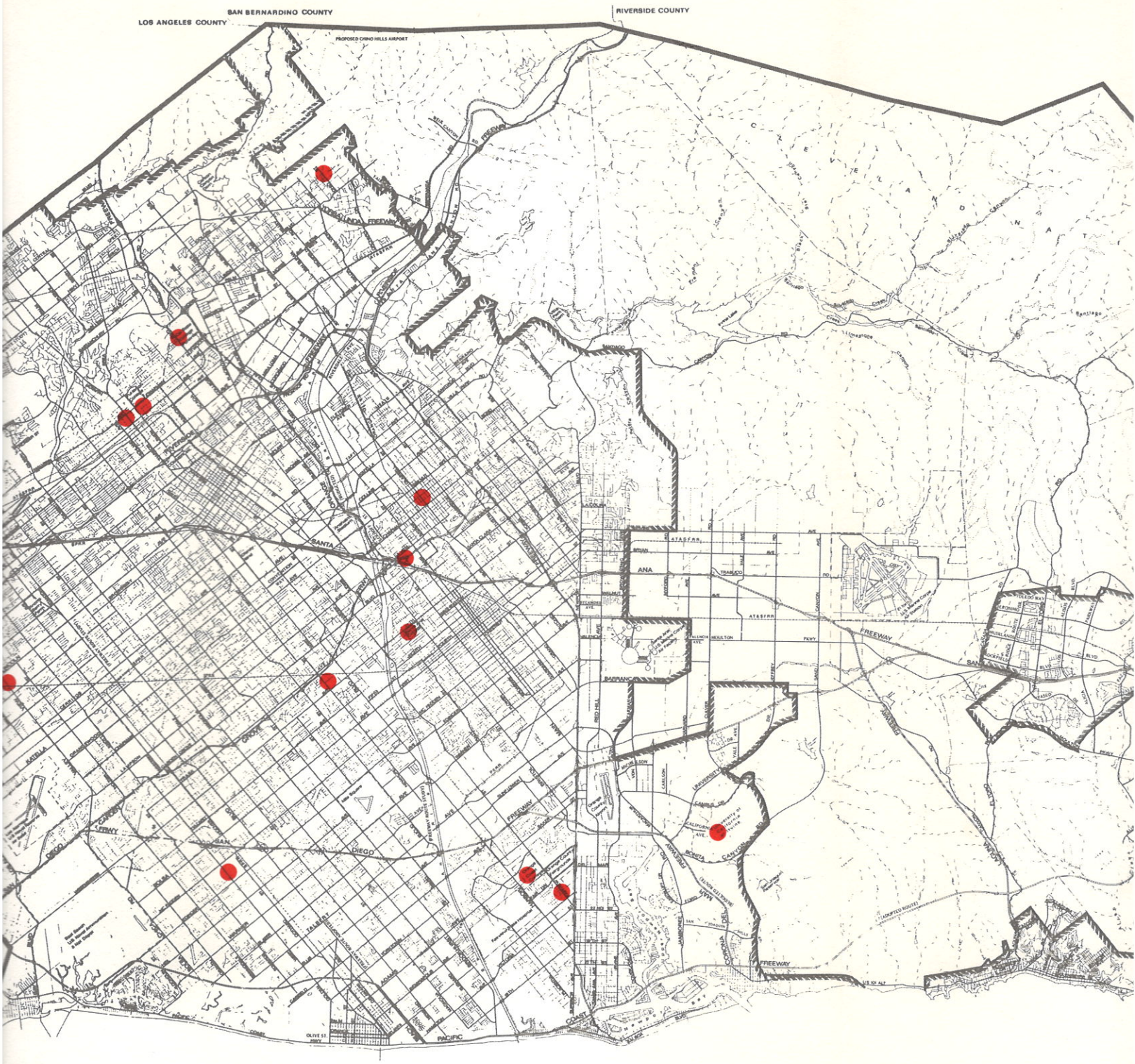
EXHIBIT 15

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

MAJOR INSTITUTIONS OF HIGHER EDUCATION

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
FREEWAY
SANTA
ANA
AT&SF RR
SAN
DIEGO
FRWY
FREEWAY
PACIFIC
COAST
OLIVE ST.
HWY
P A C I F I C


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
SANTA ANA
FREEWAY
P A C I F I C O

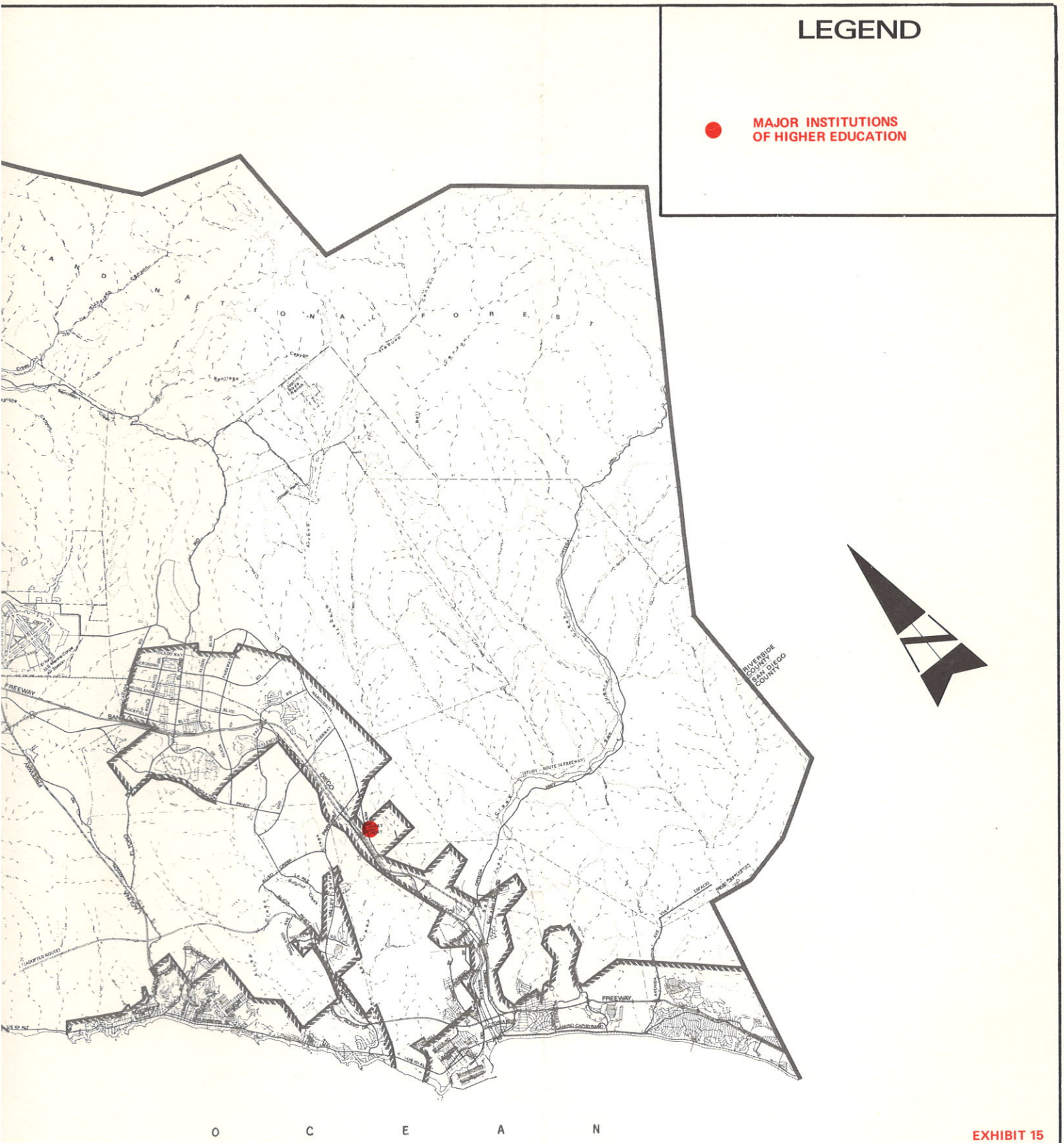


EXHIBIT 15

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

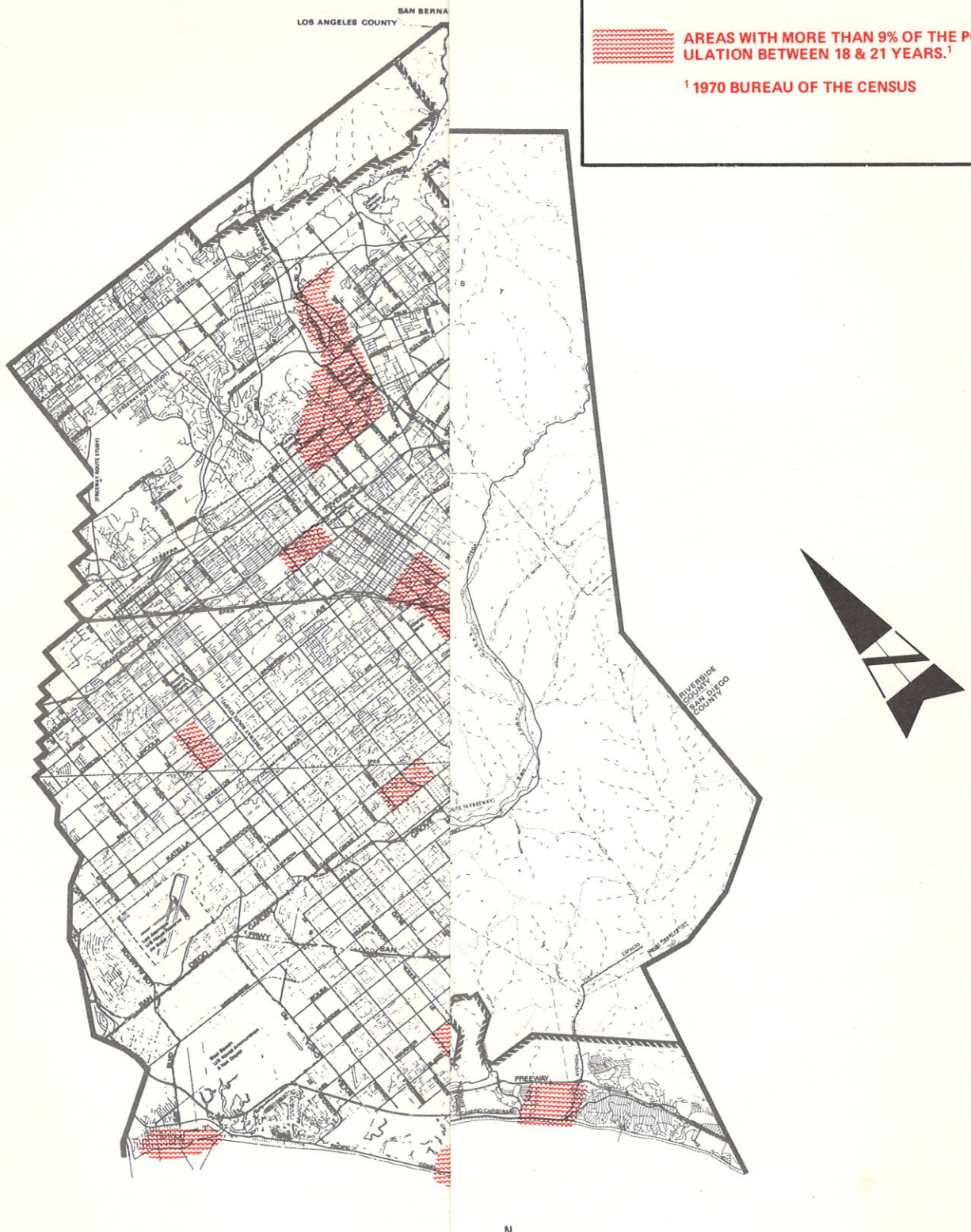
MAJOR INSTITUTIONS OF HIGHER EDUCATION

A JOINT VENTURE vtm / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA

TABLE 7

MAJOR INSTITUTIONS OF HIGHER EDUCATION

1. NOC Jr. College Adult Division, Yorba Linda Boulevard and Fairmont, Yorba Linda
2. California State University—Fullerton, 800 North State College Boulevard, Fullerton
3. Fullerton Junior College, 321 East Fullerton, Fullerton
4. North Orange County Community College, 1000 North Lemon Street, Fullerton
5. Cypress College, 9200 Valley View Street, Cypress
6. Chapman College, 333 North Glassell, Orange
7. West Coast University, 550 South Main, Orange
8. Santa Ana College, 17th Street at Bristol, Santa Ana
9. Pepperdine University, 12345 Westminster, Santa Ana
10. Golden West Community College, 15744 Golden West Street, Huntington Beach
11. Orange Coast Community College, 2701 Fairview Road, Costa Mesa
12. Southern California College, 2525 Newport, Costa Mesa
13. University of California, Irvine, Campus Drive, Irvine
14. Saddleback Community College, 28000 Marguerite Parkway, Mission Viejo



LEGEND

AREAS WITH MORE THAN 9% OF THE POPULATION BETWEEN 18 & 21 YEARS.[1]

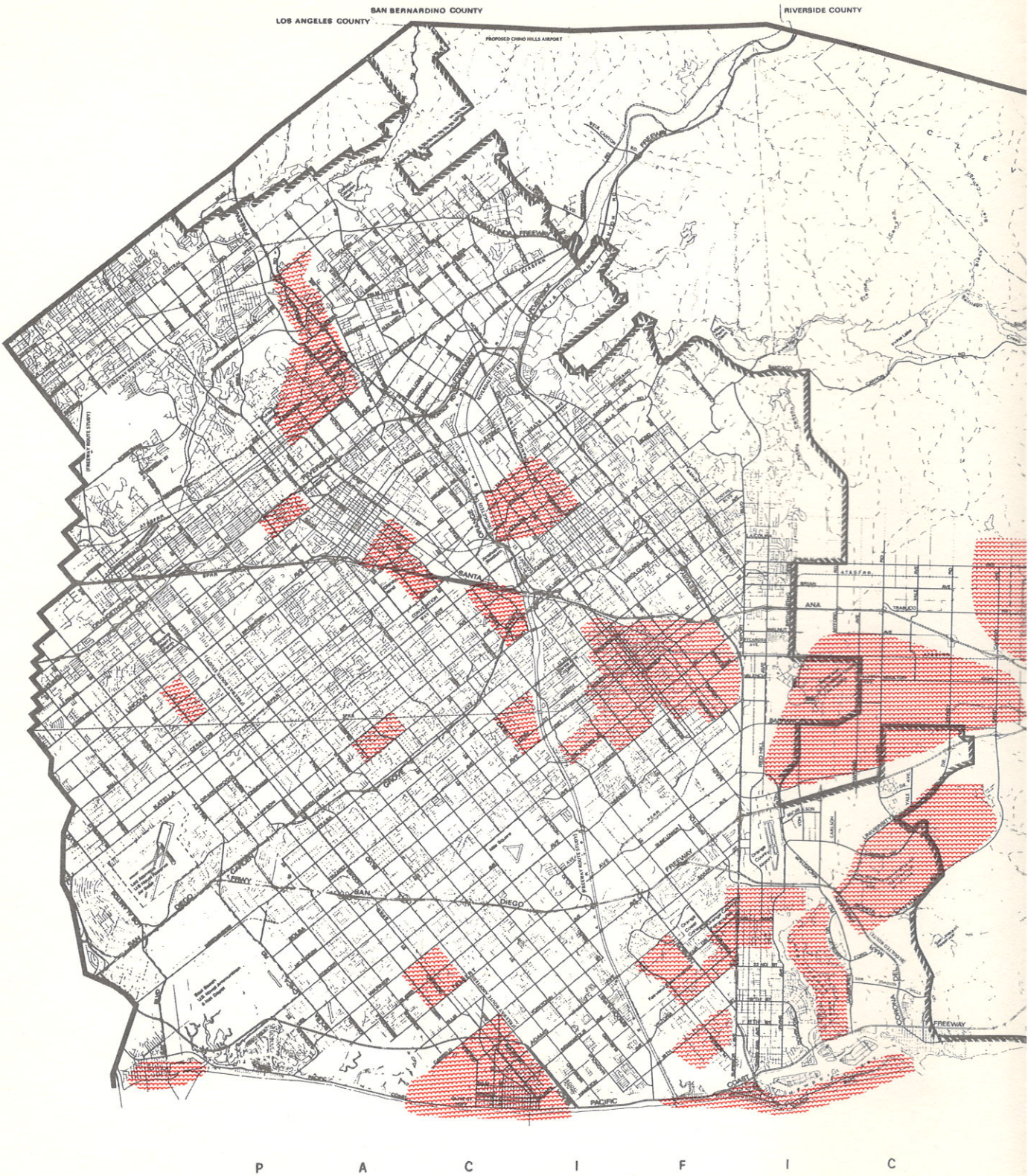
[1] 1970 BUREAU OF THE CENSUS

EXHIBIT 16

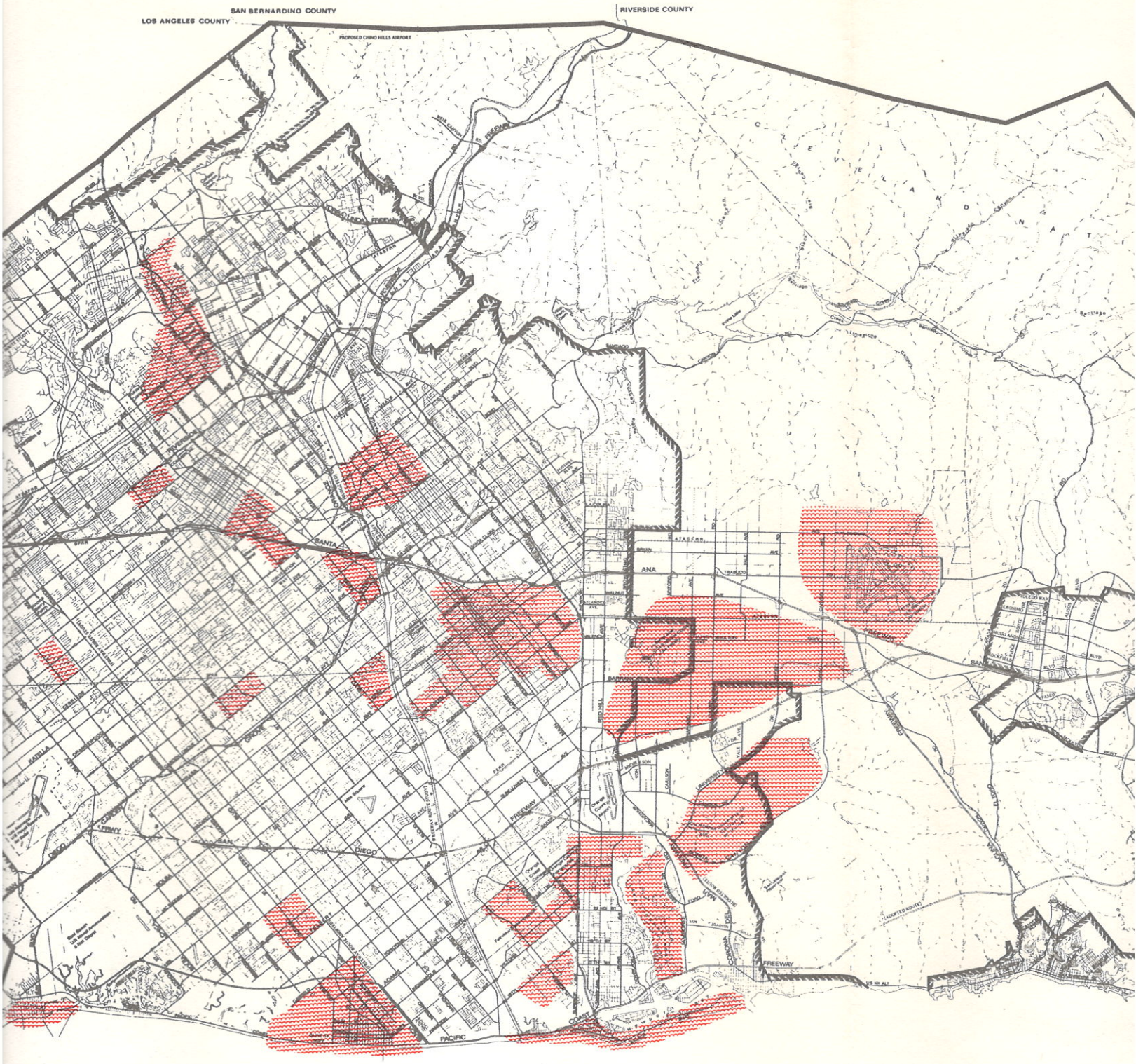
SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

18-21 YEARS OLD AREAS

A JOINT VENTURE VTN / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
(FREEWAY ROUTE STUDY)
SANTA ANA
ANA
SAN DIEGO
FREEWAY
PACIFIC
COAST
FREEWAY

P A C I F I C


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
SANTA ANA
FREEWAY
PACIFIC

P A C I F I C O

LEGEND

AREAS WITH MORE THAN 9% OF THE POPULATION BETWEEN 18 & 21 YEARS.[1]

[1] 1970 BUREAU OF THE CENSUS

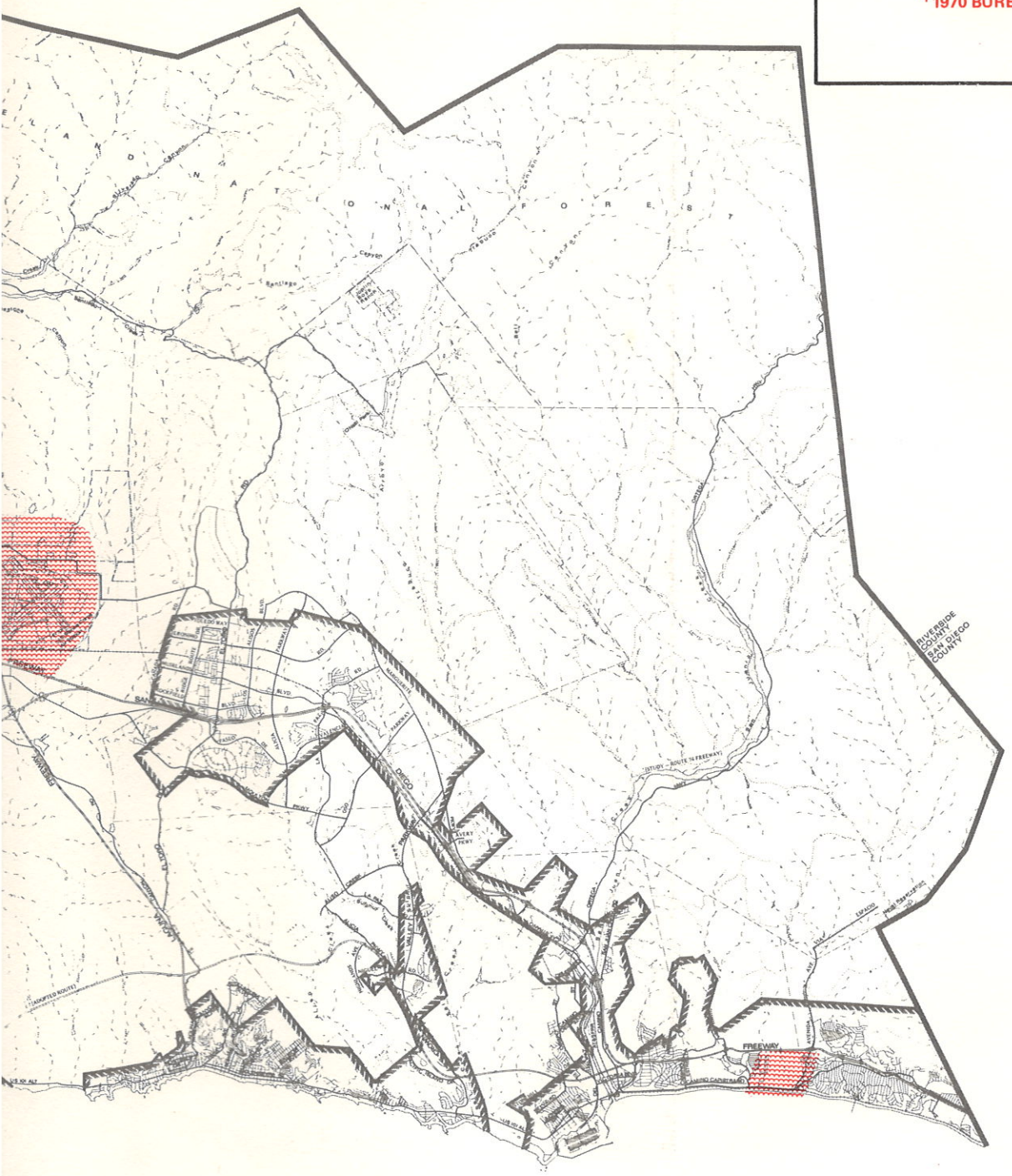


EXHIBIT 16

0 1 2 3 4 5
MILES

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

18-21 YEARS OLD AREAS

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA

TABLE 8

CENSUS TRACTS WITH GREATER THAN NINE PERCENT OF THE POPULATION 18 – 21 YEARS OLD

Census Tract	Percent 18 – 21	Census Tract	Percent 18 – 21
114.02	10.5	748.04	9.8
115.01	21.9	750.01	9.1
115.02	10.6	750.02	13.9
117.01	9.4	761.02	9.4
421.02	14.0	762.04	13.3
524.01	36.0	762.05	14.6
525	12.3	866.01	10.1
626.02	36.1	869.01	11.3
628	9.8	871.01	10.6
630.02	9.9	874.02	9.3
631.01	13.8	874.03	9.8
631.02	11.8	875.01	10.9
635	10.6	887.01	11.1
636.02	9.6	891.03	10.9
638.04	11.3	993.01	9.0
639.06	10.0	993.02	12.6
744.01	9.8	993.03	11.1
744.02	9.4	994.02	10.4
745.01	16.9	995.02	49.6
745.02	10.6	995.05	9.0
747.02	9.6		

Based on the inventory data and dicussions, the following items summarize the major areas of transit service that are in need of improvement.

1. Existing bus routes require reorientation and/or extensions to better serve those needing public transit. Many routes are historic in nature and little has been done to experiment with new service areas.

2. Additional routes are needed in virtually every area of the County to provide mobility for individuals who do not have a car available, cannot drive, or prefer the bus. These routes should provide for movement within each community and for movement between communities and major activity centers.

3. There should be provision for joint fare, transfer, and schedule coordination between different operations. The current situation does not allow transfers between different operations.

4. There is a demand for increased frequency of service during the off-peak hours. In addition more late evening, weekend, and peak season service is needed.

5. There is necessity for upgrading of all equipment to the latest in vehicle design and environmental controls.

6. There must be a major marketing and promotion program which includes as incentive for riding, not just the routes and service, but the equipment, bus stops and shelters, economic advantage, carefree riding, and other transit amenities.

CHAPTER V

PROJECTIONS OF FUTURE BUS NEEDS

The projections of future bus needs to 1980 was, of necessity, based on the evaluation of existing needs, and the extent to which they might grow or change in the next eight years. Such growth and change, as it relates to public transportation, manifests itself in four principal areas of concern: Transportation Corridors, Social Factors, General Growth Patterns, and Intra/Inter-Community Relationships. Each of these is discussed below.

A. Transportation Corridors

From the exhibits presented in the preceding chapter, a number of major activity corridors are apparent in Orange County, irrespective of the already established freeway corridors which are a subject of more detailed analysis by the Transit District. The major corridor is the five-mile wide area between Harbor Boulevard and the Newport Freeway. This corridor extends from the northern county border at La Habra and Brea to the Pacific Coast Highway (approximately 24 miles). This corridor contains a majority of the activity centers (shopping centers, poverty areas, colleges, the elderly, public facilities, etc.). Development of major trunk routes in this corridor and intersecting this corridor should be a high priority item for the District. Two other corridors should be further delineated by the District staff in the near future. These are (1) north-south corridor in the area between Valley View-Bolsa Chica and Beach Boulevard, and (2) the east-west corridor in the area between Katella Avenue and Westminster Avenue.

B. Social Factors

Orange County has had rapid growth over the past twenty years and serious transportation deficiencies have resulted. The purpose of transportation planning is to design systems that allow for the efficient transport of people and goods. Perhaps no single factor affects the form and life style of cities as much as transportation. And yet, in many places we have been planning transportation as though its only purpose was to carry vehicles between two points. If we are to begin reshaping our cities and save them from self-destruction, we must begin to look at transportation as more than a means of travel. It should be viewed within the total environmental planning framework as a critical factor in determining life style and land use. The District's objectives take full cognizance of the total importance of the transportation element. Up to now at least, planning in Orange County has been oriented almost exclusively to the County's perpetual dependence on the automobile. Such dependence has resulted in some significant consequences:

1. Since the transportation system is almost exclusively dependent on the private motor vehicle and since this form of transportation is a low-capacity system, the system begins breaking down during certain portions of the day (peak periods) when the expressed travel desires of a large number of people come together with sustained frequency in key travel corridors.

2. Since the system is relatively expensive and requires certain operational skills, it does not serve the desires of all of the poople. Generally, these people are those who need transportation to find employment (lower income) or to otherwise improve their life styles (youth, aged, infirm, etc.).

3. Even among those who are served, the cost of service has become a burden as the one-car family becomes the two-car family, and ultimately will have to become the three- and four-car family in order to provide the needed level of service to all members of the family.

4. Regionally, the private motor vehicle has been identified as the major source of air pollution.

The implementation of an alternative means of transportation is essential for the development of Orange County. The dependence on the automobile cannot be tolerated in the future. The proposed bus system will place virtually every resident within reasonable walking distance of a bus line and provide access to all of Orange County and the Los Angeles Regional area. With the future addition of higher capacity and faster corridor links, social, economic, and environmental goals will be attained. The bus system will give mobility to the transit dependent population, e.g. the old, the young, handicapped, non-drivers, and drivers not wishing to use their cars.

Along with the mobility provided will come choice in terms of jobs and living opportunities. There will be improved accessibility to and within various land use concentrations – residential, governmental, industrial, commercial, and recreational.

An efficient bus system will strengthen existing neighborhoods and social patterns as well as assisting in structuring developing areas to permit a desirable level of social interaction.

C. General Growth Patterns

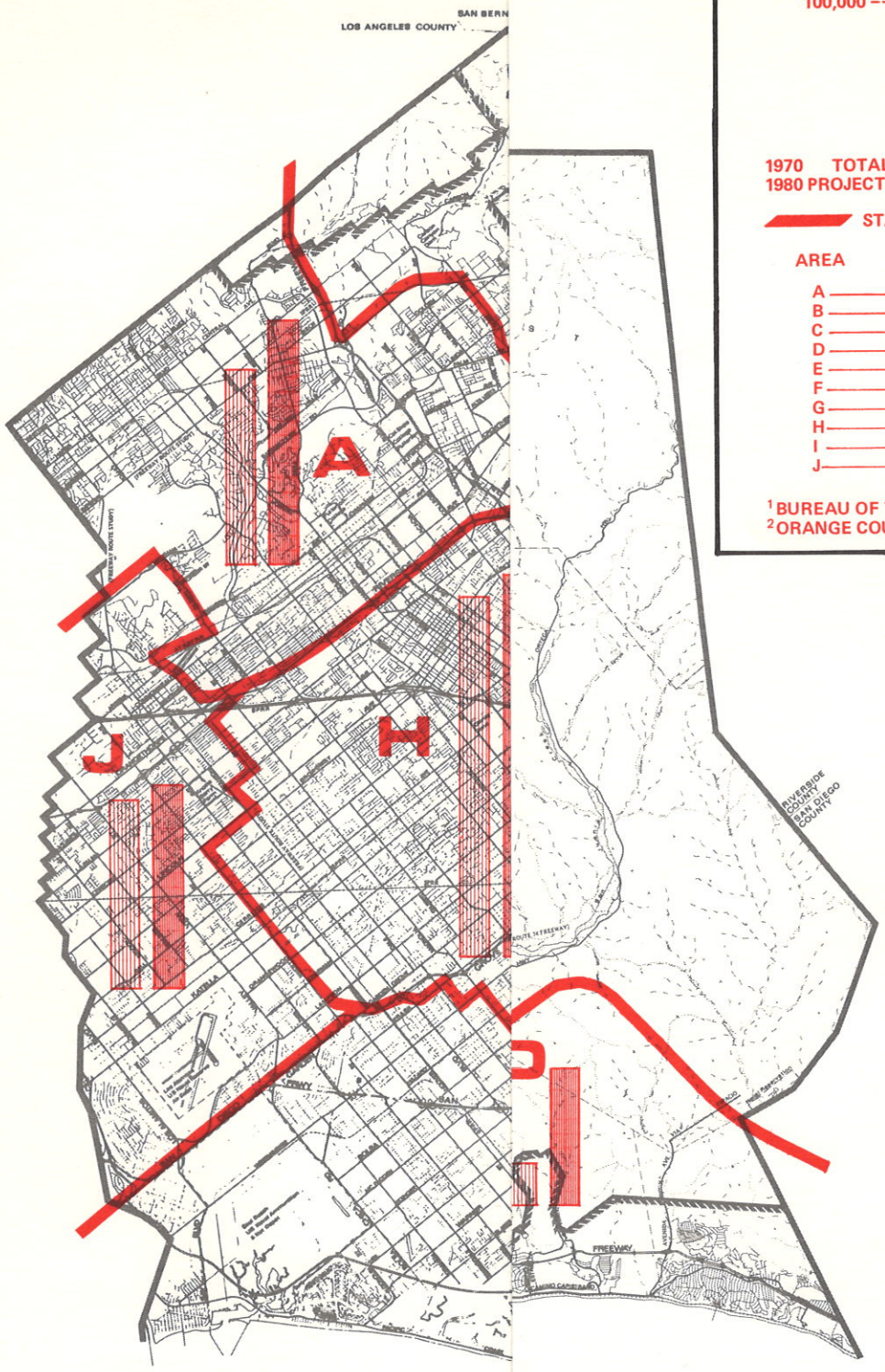
The 1970 Federal Census[3] confirmed that Orange County, during the decade of the Sixties, was the fastest growing County in the State and one of the fastest growing metropolitan areas in the Nation. In 1960, the population was 703,000 and by 1970 it had more than doubled to a population of 1,420,386. Recent estimates by the State of California place the population today at 1,565,100. For comparison, the 1950 population was 216,000. At present, there are 26 incorporated cities in Orange County accounting for almost 90% of the population. The estimated population for 1980 is 1,920,000 (see Exhibit 17). The projections are based on control totals released by the Southern California Association of Governments and allocated to the ten statistical planning areas in the County. The County has currently undertaken a Growth Policy Study as have many other communities in the County. Therefore, the validity of any forecasts should be questioned in later regional studies. The 1980 projection assumed the current growth pattern with two-thirds of the increase expected to be in the now developing southern portion of the County. The residential growth expected is low-medium density development with major regional shopping centers and increased employment in the Irvine-El Toro areas. This type of growth will require close coordination between the Transit District, Planning Agencies, and land developers to provide transit service at the time of development, so that the travel modes and habits of the residents may be influenced.

Although this study is to project needs (and services to meet them) to 1980, the major emphasis is placed on the immediate situation, through 1976. Because of the above-mentioned inadequacies in population forecasts, land use planning, and comprehensive transportation planning the estimate of needs between 1976 and 1980 should be the subject of periodic re-evaluation.

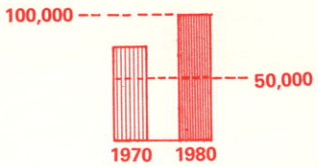
D. Intra- and Inter-Community Relationships

From the previous analyses and conceptual service demands, two types of transit service are needed in Orange County and generally in any metropolitan area. The two types are defined as (1) intra-area and (2) inter-area service.

3 "1970 Census, Special Tabulations," Volume 1, Orange County Planning Department, May 31, 1971.



LEGEND



1970 TOTAL POPULATION[1] = 1,420,386
1980 PROJECTED POPULATION[2] = 1,921,297

STATISTICAL PLANNING AREAS[2]

AREA	1970 POP.	1980 POP.
A	170,787	214,132
B	34.390	69,060
C	18,306	65,209
D	38,834	116,864
E	21,529	97,848
F	161,253	261,871
G	266,279	306,216
H	307,729	328,470
I	240,377	285,433
J	160,903	176,194

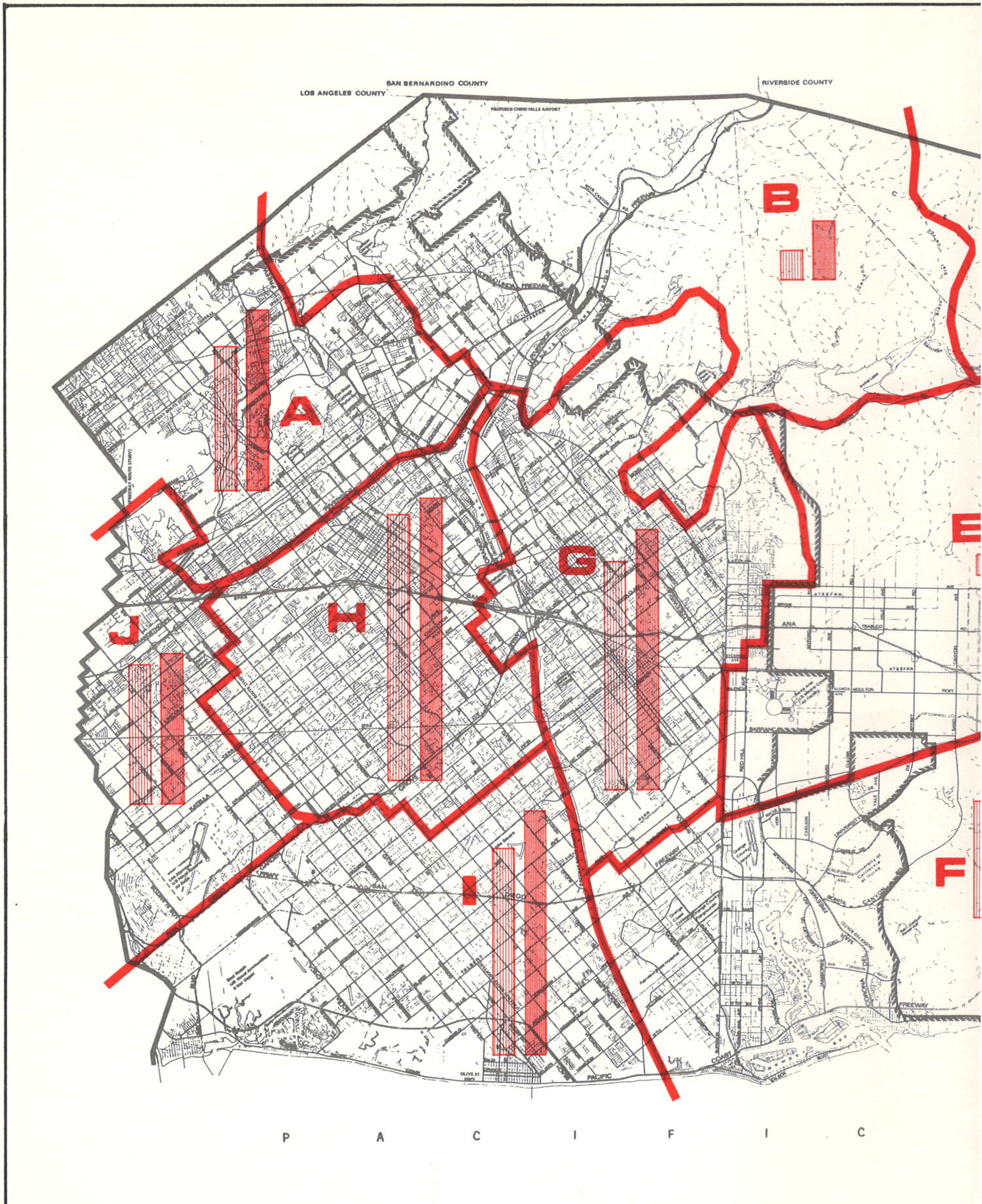
[1] BUREAU OF THE CENSUS
[2] ORANGE COUNTY PLANNING DEPARTMENT

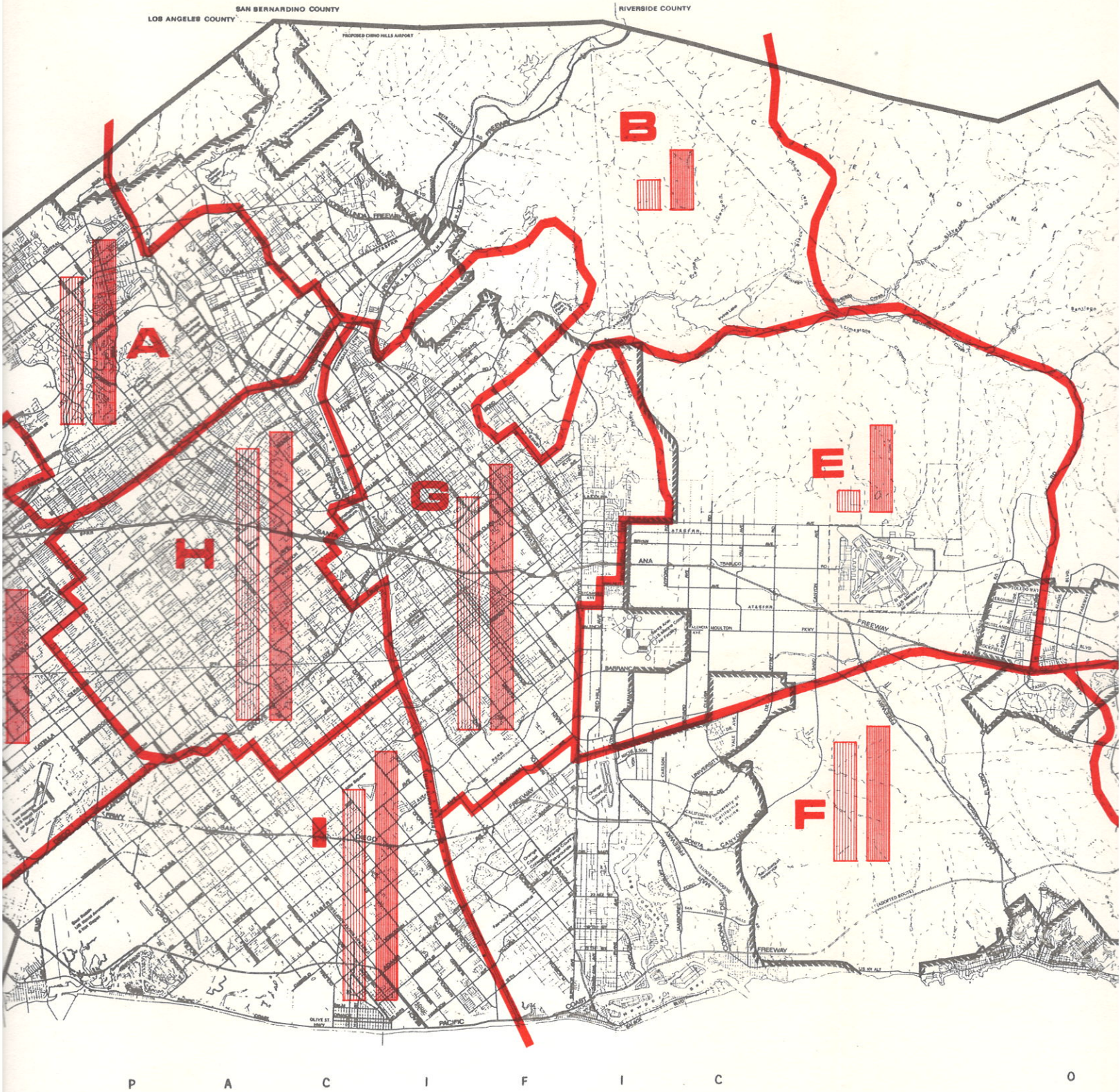
EXHIBIT 17

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

1970 AND 1980 POPULATION

A JOINT VENTURE VTN / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
A
B
E
F
G
H
I
J
FREEWAY
PACIFIC
P A C I F I C


SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
RIVERSIDE COUNTY
PROPOSED CHINO HILLS AIRPORT
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PACIFIC

P A C I F I C O

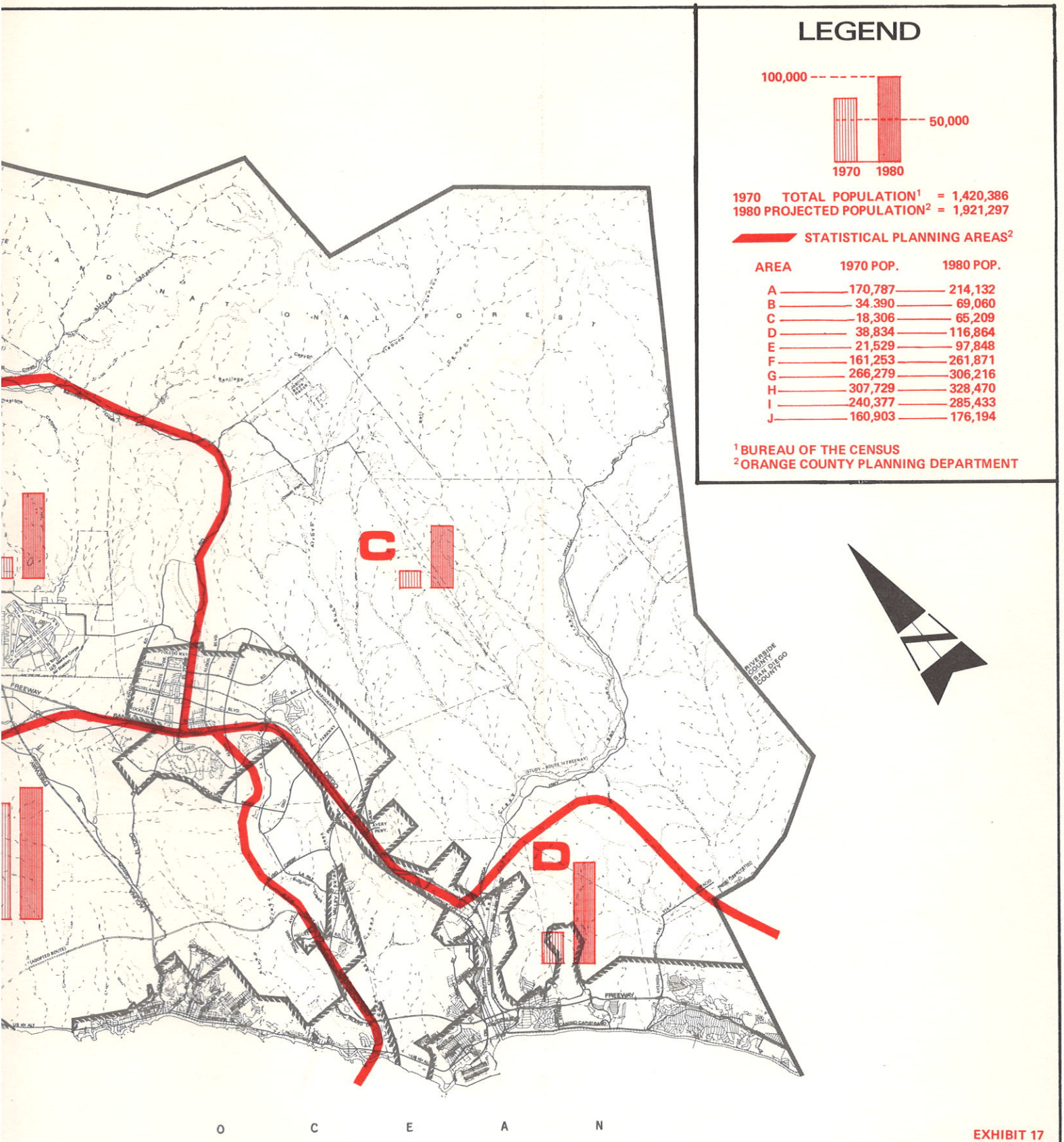


EXHIBIT 17

SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT

1970 AND 1980 POPULATION

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA

The local or intra-area systems like Santa Ana and Laguna Beach should be expanded to all communities and activity centers in Orange County. The proposed Santa Ana system is well designed and should be the model for this service concept. The Santa Ana service will be on a basic 30-minute frequency with a 25-cent fare.

The inter-area service is needed to connect activity centers and to allow more freedom of movement for the transit-dependent and mode-choice riders. The institution of full transfer privilege and a common fare for any length ride would be innovative, but we feel, essential, at least at the outset. Basically, a person should not be penalized or restricted in his mobility by a high fare. It is a well known fact that as fares increase for a specific trip length, ridership will decrease. It should be understood that the free transfer and single fare plan can be implemented (and tested) on the OCTD System, but perhaps not on the other systems with which OCTD may connect. Since such systems (SCRTD and Long Beach Public Transportation) have existing fare zone plans it is possible that agreements reached with those systems may require the rider to pay a transfer and/or zone fee.

Chapter VI will detail the procedure leading to the selection of a level of service and the recommended routes to satisfy the existing and near future transit demands. Subsequent chapters will discuss the financing requirements, organization/management alternatives, and the development plan.

CHAPTER VI

LEVEL OF SERVICE

A basic purpose of Phases I and II of the study was to determine alternative levels of potential transit service, and utilizing a technically objective evaluation process, select for recommendation that level which not only gives the citizens of Orange County a desirable and efficient transportation system, but is practical and attainable.

A. Basic Service Elements

At the outset, it was necessary to establish certain service criteria which were deemed necessary and desirable in any kind of transit system. As an example, it is an established fact that in the transit industry that those who benefit most from public transportation, and incidentally, contribute most to its financial support via the fare box, fall within the low to middle income economic range. It would be wrong therefore to plan and implement a system which had as its primary purpose, service for middle to upper income commuters. Such is of course a desirable goal, but it should not be the primary one. As another example, there are transit systems operating in various metropolitan areas of the country where it is not possible to transfer from one system to another. To the consultant, it is inconceivable that such a plan could truly be considered county-wide, coordinated, or integrated. Accordingly, county-wide transfer potential has been made a primary basic for all systems.

Following is a listing of common elements of service alternatives which should form a part of any coordinated transit operation in Orange County:

1. The selected alternatives must be capable of being phased into an integrated Mass Transit System operated by the Orange County Transit District.

2. Maximum social benefits shall be derived, including service for the poor, the unemployed, the underprivileged, the handicapped, the aged, the young, minorities, students, and other groups requiring public transportation.

3. Special supplemental service will be available for church affairs, shopping events, football games, industrial plants, etc. (Above is service on regular routes – it is not charter service).

4. Image is important. Service enhancement, leading to increased patronage, must be a primary goal. A strong transit marketing program is essential.

5. Service experimentation and demonstration programs will be undertaken.

6. The basic service goal should be a 25 cent fare, county-wide transfer potential, and 30 minute service, or less. Basic service on weekends and holidays may be at a reduced level.

Concerning basic fares and service frequency, the standard of a 25 cent fare and a 30 minute bus frequency is based on numerous previous transit studies in various parts of the country, as well as on the results of attitudinal surveys conducted within Orange County. While it can be argued that a good transit ride is worth more than 25 cents to some people, the fact remains that the average potential transit user feels that at a quarter a pleasant and efficient bus ride on new equipment is a bargain that he will take advantage of if given a chance. This will be especially true in Orange County if the innovative recommendation is followed that one 25 cent fare will be good anywhere on the system, regardless of the length of the trip. It must be remembered however, that the free transfer privilege, and single zone fare, may not apply to other connecting systems, in which case the rider may be charged a transfer or zone fee.

It must be understood that the matter of fares is a basic policy issue which deserves frequent review by the District. There are strong social, financial, competitive, and operational aspects to fare-setting.

In this study there will not be an in-depth analysis of fare structures other than 25 cents. But there are of course numerous alternatives, including fares lower than 25 cents, perhaps with zone increment charges. The decision on what fare to charge will affect existing ridership, ability to attract new riders, budgets, and community benefits. In a profit-making venture, fare setting can be based on established profit producing formulae. They are the very formulas which have brought about the demise of private transit operations. Essentially, people are not willing to pay the true value of a bus ride. And a private operator cannot offer a bus ride below cost.

But in Orange County we will not have a profit making venture. In fact, substantial operating subsidies will be necessary. In that light it will be logical and appropriate for the District to experiment with fares, carefully documenting the results of fare variations in terms of financial impact and ridership. If, for example, a 5% increase in operating subsidy results in a 10% patronage increase, a major goal will have been met. Clearly, however, there must be funds to meet the cost of such experimentation. The happy medium lies somewhere between a full bus and a full fare box.

On bus frequency, attitudinal surveys have revealed that the thought of waiting longer than a half hour for a regular bus would discourage the average potential patron from utilizing the bus system. Accordingly, 30 minute frequency was considered to be the absolute minimum.

B. Alternative Service Levels

In analyzing and selecting the service alternative to be the goal for Orange County, it became apparent that when the elements of service were combined with the elements of organization, management and implementation, the number of alternatives was virtually endless. Accordingly, the service level (what to do) was separated from the implementation method (how to do it). Once the "what" is determined, a later evaluation process for the best means of implementation will determine the "how".

Thus, in terms of service only, numerous social, financial, managerial, and environmental factors were considered, each constituting its share of measuring the effectiveness of a potential transit service. From the early service level possibilities which numbered more than 12, the list was successively reduced to eight, and finally four. Any of the four, it is felt, constitute a suitable level of service goal. A description of each follows, building from Level 1 which is a minimum level, to Level 4, which is a maximum level.

In examining these levels, it is crucial that the reviewer bear in mind that they constitute goals for service attainment over a period of time. None can be accomplished overnight, and as a matter of fact, in order to implement a higher level, it would likely be necessary to pass through the lower levels in a step-up process.

C. Service Alternatives

Minimum Service Level (Level 1) – Present Route Structure with Minor Modifications Including Some New Service

This service level would maintain the present route structure for the existing public and private transit operations in Orange County, along with minor route modificiations, extensions, and new service provided in practically all communities not presently served. The proposed routes would operate at basic service (30 minute weekday service, county-wide transfer potential, and reduced weekend and holiday service). The expanded service, transfer potential, and coordination of schedules are the prime elements of this alternative.

Level 2

This alternative would evaluate all the existing routes and propose major route modifications to provide coordinated and unified intra-community service. New service would be provided in practically all communities not presently served. There would be no commitment to retain any existing service if removal of such service would generally enhance and improve the total system. The proposed intra-community routes would operate at basic service (30 minute weekday service, county-wide transfer potential and reduced weekend and holiday service). The intra-community major route modifications, expanded service, transfer potential, and coordination of schedules are the prime elements of this alternative.

Level 3

This alternative would include all elements of Level 2 (major modification of existing routes, basic service for intra-community routes, transfer potential and schedule coordination), and in addition provide inter-community service on a schedule justified by potential usage. This alternative would provide not only intra-community service, but would also link various communities and major centers.

Maximum Service Level (Level 4) – Intra- and Inter-Community Service

This alternative would include all elements of Level 2 (major modification of existing routes, basic service for intra-community routes, transfer potential, and schedule coordination), and in addition provide inter-community service on a basic schedule (30 minute weekday service and reduced weekend and holiday service). This alternative would provide the maximum level of service for both area coverage and transfer potential.

D. Service Benefit Matrix

One of the prime study requisites was an objective evaluation of service alternatives. The Consultant felt, based on numerous previous transit studies, that such a process was mandatory, primarily to insure that broad bias of a technical or administrative nature had not been introduced into the study. A service benefit matrix was developed in which 17 factors of service benefit were separately grouped and rated. Each of the factors was given a weighted value of either 5 or 10 points depending upon its judged importance, and placed into one of the following categories: Economic Benefits; Social Benefits; Environmental Benefits; and Management/Implementation Benefits. Clearly, an efficient public transportation system must satisfy basic requirements in each of these categories. In several open discussion sessions, each factor was rated by the consultant team as to the extent to which it provided minimum to maximum benefits – the better the benefits, the higher the rating. Thus, as an example, under the factor of Transportation Corridors in the category of Environmental Benefits, Level 1 received only 2 out of 10 possible points, while Level 4 received 8 points. This is because the environmental enhancement in service corridors obtainable from the high service in Level 4 was judged to be far superior to the low service in Level 1. Primarily, this results from the ability to attract more people into transit from private automobiles, with proportionate reduction of "auto blight" (smog, noise, congestion, etc.) Additionally, the enhancement of corridor transit can develop travel habits which could ultimately be served by mass transit, with its further environmental and social attributes.

While the goal of the Service Benefit Matrix was ". . . an objective evaluation of service alternatives," the Consultant realizes that any evaluation procedure which utilizes weighted values and subjective review of elements is a candidate for challenge. The matrix was utilized therefore, not as a firm basis for decision, but as a general guide to which other judgement factors could be applied. As a guide, it was "tested" at several meetings with technical and citizens groups. Input from these groups served to alter the original ratings in many instances. The consultant feels, accordingly, that the matrix represents a fair cross-section of technical and civic opinion, and that its guidance in making recommendations to the Board of the Orange County Transit District is a sound one.

The service benefit matrix with its ratings is shown in Exhibit 18. A discussion of the four categories and the factors within them follows:

Economic Benefits – Out of a possible 30 points, the rated values ranged from 23 points for Level 1 to 18 points for Level 4. While this is not a great spread, it does indicate that the economics of Levels 1 and 2 have considerably less impact than those of 3 or 4. This is understandable when it is considered that Levels 1 and 2 are relatively simple systems with lower capital outlay and operating costs than Levels 3 or 4. Of course, the real key to total economic impact is the matter of passenger revenues. In simple dollars, Level 4, providing the highest service, would also bring the greatest amount of passenger revenue. However, it is virtually assured that during the initial one to two year period, such revenues cannot begin to offset the greatly higher capital and operating costs. For that reason, when total economics are considered, the higher ratings for the lower levels seem quite appropriate.

Social Benefits – Here, out of the total of 45 points, there was a considerable point spread between the lowest and highest level. This is understandable when it is considered that generally, minimum service provides minimum social benefits and maximum service provides maximum social benefits. As an example, under Level 1 there is no way to provide needed service to a number of high activity centers, industrial plants, hospitals, churches, recreation centers, etc. The Social Benefit rating for Levels 3 and 4 are very close of course, since basically there is the same area coverage, the difference consisting solely of the frequency of inter-area service.

Environmental Benefits – In rating the factors under this category, the primary benefit was considered to be the general enhancement of the environment which would result from removing passenger vehicles from the roadway by placing their occupants in transit buses. In terms of reducing air pollution, traffic congestion, and easing the load in transportation corridors, such benefits must be considered as major pluses. On the negative side, however, are such factors as the noise of bus engines and the visual impact (buses and bus stops are really not pretty). Additionally, it is known that buses and bus stops are not necessarily popular in residential and commercial areas. They can be disruptive and litter producing to the point where a frequently expressed attitude is "I want the bus, but not on my street," or "I want the bus, but I don't want it stopping in front of my door." Clearly, the environmental benefits of a good public transportation system are not all positive.

Management-Implementation Benefits – Out of a total of 25 points the range here was from 13 points for Level 1 to 20 points for Level 4. Note that in this category the factor of regional compatibility not only has a heavy weighted value, but picks up a substantial number of points for Levels 3 and 4. While regional compatibility was felt most properly placed in this particular category, it should be understood that it might also be included as a major factor under environmental benefits and social benefits.

One citizen-participation group (The Mass Transit Sub-Committee of the Orange County Chamber of Commerce) expressed extremely strong feelings concerning the needs for a total regionally integrated service (not just in Orange County, but in the entire metropolitan area). In general, the total points in the management-implementation category suggests that a coordinated and complete county-wide system is in total, easier to manage and implement than one which is collective of bits and pieces of transit service.

E. Selection

Although an earlier submission of the Service Benefit Matrix arrived at point totals for the various levels, it was decided as a result of meetings with citizen policy and technical groups that such totals were not objective and meaningful. Rather, it is suggested that the reader analyze the factors and ratings for the four categories and attempt to arrive at separate decisions for each, primarily asking the question, "How do the levels satisfy the requirements of this particular category?"

SERVICE BENEFIT MATRIX
EXHIBIT 18

Alternative Systems		Evaluation Criteria																			
		Economic Benefits					Social Benefits								Environmental Benefits			Management Implementation Benefits				
Level of Service, Routes, Frequencies, Schedules Area Coverage, Transit Concepts		Capital Costs	Operating Costs	Revenues	Grant Potential	TOTAL	Patronage Attraction	Innovative Value	Unemployment Areas	Low-Income Areas	Aged or Disadvantaged Areas	Activity Centers*	Recreation Areas	TOTAL	Environmental Impact	Transportation Corridors	TOTAL	Management Design	Regional Compatibility	Equipment Complexity	Adaptation to Existing Systems	TOTAL
		Weighted Value																			
		5	10	10	5	30	10	10	5	5	5	5	5	45	10	10	20	5	10	5	5	25
	Level 1	5	10	4	4	23	3	2	2	4	4	1	1	17	8	2	10	2	2	4	5	13
	Level 2	5	10	6	4	25	3	4	3	4	4	3	1	22	8	2	10	3	3	4	4	14
	Level 3	2	4	8	5	19	6	8	4	5	5	4	4	36	9	7	16	4	7	3	3	17
	Level 4	1	2	10	5	18	8	8	5	5	5	4	4	39	10	8	18	5	9	3	3	20

*Social Services, Employment Offices, Health Centers, Shopping Centers, Schools

In that light, there was agreement among the Consultant and the various advisory groups that Levels 3 and 4 clearly offered substantial advantage over Levels 1 and 2. In attempting to evaluate between Levels 3 and 4 then, a major question that kept arising was, "Can we afford it?" The answer to that question is covered in Chapter VIII of this report. Basically, however, when it is considered that Level 4 will require substantially more buses, more drivers, more facilities, more capital outlay costs, and more operating costs, it would appear that economically it may be out of reach. Level 3, however, which states that inter-community service will be supplied on a "schedule justified by potential usage" would appear to be attainable both physically and economically. Level 3 was the recommended choice of the Consultant and most of the various advisory groups.

The Board of Directors of the Transit District considered all the alternatives, and then selected Level of Service 3 as the one to receive more detailed study, and ultimately, implementation. Level 3 was considered to be that level which best struck the needed balance between the economic, social, environmental, and management/operations elements.

F. Route and Area Service Recommendations

The detailing of proposed service entailed laying out proposed inter-area routes along with the frequency requirements, number of buses, and annual bus miles operated for each route. The exhibit enclosed in the back cover in this report shows the recommended inter-community route corridors with 30- and 60-minute frequency. The 30-minute service is concentrated in the corridors of greatest need and potential as explained in Chapter V. Table 9 describes the corridors, gives route mileage, and lists them in approximate order of priority for implementation.

The corridors are assigned Route Numbers which have been designed so that *generally* the north-south routes have even numbers and the east-west routes have odd numbers. It must be remembered that these are service *corridors*, and that the *specific streets* for the route will not necessarily be the ones shown on the plan. In Chapter IX – The Development Plan, the detailed street routing of six new inter-area routes have been described. These are rated the highest priority and should be implemented in the first two years. Beyond the first two years, such detailed street routing was not prepared for each corridor, because operating experience and growth patterns may well dictate a change of priorities. The staff of the OCTD agrees with this principle, and will be prepared to undertake priority reassessment and detailed street routing after the first two years.

Table 10 presents the calculations for estimating the total bus fleet requirements and annual bus-miles operating on inter-area service. This was needed to estimate capital requirements and operating costs. Approximately 4,800,000 annual bus-miles and 70 buses were estimated to meet this need to 1980. In arriving at the total of 70 buses, it should be recognized that such a figure appears adequate for the system as a whole. In Table 10 it may be seen that the number of buses needed for certain routes was a "borderline" situation. In that case, the lesser number of buses was generally chosen. It is true that if one were operating only that bus route, the higher number of buses would be needed. In fact however, many routes will be in operation and through a network of route and schedule combinations, the minor bus shortage on a few specific routes will be more than made up by surpluses on the others.

The requirements for intra-area bus service was based on the service to be implemented by the City of Santa Ana as discussed previously. Also the delineation of seven Transit Service Areas (TSA) for possible contract management administration was developed (see back cover insert map for boundaries, and Table 11). A relationship of the population, area, and street miles were used to approximate the annual bus-miles and equipment requirements for the intra-community service using Santa Ana as a base (see Table 12). Approximately 4,800,000 annual bus-miles and 98 buses were estimated to meet this need. Table 13 lists the number of 3.2 mile routes by Transit Service Area. From the socio-economic characteristics, the need for intra-area service is greatest in the Central, West Central and North Central Transit Service Areas.

TABLE 9

PROPOSED ORANGE COUNTY INTER-COMMUNITY BUS ROUTE CORRIDORS

Priority	Route	Description
1	6	Harbor Boulevard Trunk Line: La Habra Boulevard to Balboa Boulevard (Newport Beach) 22.6 miles.
2	15	Adams Street from 17th Street to Fairview, south on Fairview to Fair Drive, east on Fair to Newport, north on Newport to Palisades, east on Bristol to UCI at University and Campus 11.0 miles.
3	2	Beach Boulevard Trunk Line: La Habra Boulevard to Pacific Coast Highway 20.5 miles.
4	8	Imperial Highway from Euclid to State College Boulevard, then south to Chapman, east on Chapman to Main, south on Main to MacArthur, south on MacArthur to Pacific Coast Highway (Corona del Mar) then to Fashion Island 26.1 miles.
5	9	Katella Avenue from L.A. County line to Tustin, east on Villa Park Road to Orange Park Boulevard (Villa Park) 17.5 miles
5	9a	Spur to Rossmoor Leisure World and Seal Beach via Los Alamitos Boulevard and Bay Boulevard 4.0 miles.
6	23	Westminster Avenue (17th Avenue) from Rossmoor Leisure World to Holt Street, south on Holt to Fourth 16.1 miles.
7	102	Balboa Boulevard to Pacific Coast Highway, south on Pacific Coast to Laguna Beach 11.5 miles.
8	11	4th and 5th from Holt to Harbor, south on Harbor to Bolsa, west on Bolsa to Goldenwest, north on Goldenwest to Westminster 12.5 miles.
8	11a	Spur to McDonnell/Douglas plant on Bolsa 2.0 miles.
9	26	San Diego Freeway from El Toro Road to First Street (Santa Ana), west on First Street to Main, north on Main to Fourth (Santa Ana) 13.4 miles.
10	28	Kalua (Tustin) from Newport Avenue to Red Hill, south on Red Hill to Barranca, east on Barranca to Culver, south on Culver to Campus (UCI), on Campus to University, west on University to MacArthur, south on MacArthur to San Joaquin Hills, west on San Joaquin Hills to Fashion Island 13.5 miles.
11	18	Manchester Avenue from Chapman to Memory Lane, east on Memory Lane to Bristol, south on Bristol to Jamboree, south on Jamboree to San Joaquin, east on San Joaquin to Fashion Island 13.1 miles.

TABLE 9 (continued)

Priority	Route	Description
11	18a	Spur on Newport Boulevard from Palisades to Harbor (Costa Mesa) 2.4 miles.
11	18b	Spur on Baker Street from Bristol to Fairview, south on Fairview to Fair Drive (Costa Mesa) 2.1 miles.
12	21	San Diego Freeway (7th Avenue) from L.A. County Line to Los Alamitos, north on Los Alamitos to Katella, east on Katella to Valley View, south on Valley View to Orangewood, east on Orangewood to Western, south on Western to Chapman, east on Chapman to Brookhurst, south on Brookhurst to Garden Grove, east on Garden Grove to Manchester, north on Manchester to Chapman 17.4 miles.
13	24	Valley View (Bolsa Chica) from Artesia to Warner, west on Warner to Pacific Coast Highway (Huntington Harbour) 12.6 miles.
14	3	Artesia Avenue and Santa Ana Freeway (Deer Park), east to Indiana, south on Indiana to Commonwealth, east on Commonwealth to Harbor, north on Harbor to Chapman, east on Chapman to Glassell, south on Glassell to La Veta, west on La Veta to Main, south on Main to 4th (Santa Ana) 17.5 miles.
15	19	Chapman Avenue from Harbor to Newport (El Modena) 7.5 miles.
16	7	Denni Street from La Palma to Lincoln, east on Lincoln to Tustin 13.0 miles.
17	13	Edinger Avenue from Sunset Beach to Main, north on Main to 5th (Santa Ana) 13.1 miles.
18	101	Pacific Coast Highway from Seal Beach to Balboa Boulevard (Newport Beach) 15.5 miles.
19	20	El Toro Road from Rockfield to Laguna Canyon, south on Laguna Canyon to Laguna Beach 7.4 miles.
20	17	San Diego Freeway from Orange County Airport to El Toro Road, east on El Toro to Rockfield, south on Rockfield to Los Alisos, east on Los Alisos to Muirlands, south on Muirlands to La Paz, east on La Paz to Marguerite, south on Marguerite to Crown Valley (Spur to Saddleback College), on Crown Valley to Pacific Coast Highway 24.8 miles.
21	16	Brookhurst Street from Commonwealth to Pacific Coast Highway (Costa Mesa) 16.1 miles.
22	5	Orangethorpe Avenue from Harbor to Kellogg (Yorba Linda) 7.6 miles.
23	4	Euclid Avenue from Whittier Boulevard to Slater Avenue, then west to Beach Boulevard, then south to 17th Street in Huntington Beach 23.1 miles.
24	1	Yorba Linda Boulevard from State College to Fairmont (Yorba Linda) 5.8 miles.

TABLE 9 (Continued)

Priority	Route	Description
25	14	Tustin Avenue from Yorba Linda to Chapman (Orange) 6.9 miles.
26	25	La Palma from Denni to Anaheim, south on Anaheim to Lincoln 8.5 miles.
27	12	Birch Street from State College to Kraemer, south on Kraemer to Yorba Linda, east on Yorba Linda to Bradford, south on Bradford to Orangethorpe (Placentia) 5.2 miles.
28	22	El Camino Real (San Clemente) to Doheny Park Road (Pacific Coast Highway), north on Doheny Park Road (Camino Capistrano) to Junipero Serra, Junipero Serra to San Diego Freeway, north on San Diego Freeway to Avery (Mission Viejo) 11.4 miles.
29	103	Pacific Coast Highway from Laguna Beach to Doheny Park Road (Capistrano Beach) 8.2 miles.
30	10	Brea Boulevard from Central to Harbor, south on Harbor to Commonwealth (Fullerton) 4.3 miles.

TOTAL ROUTE MILES = 415.8

TABLE 10

ESTIMATE OF INTER-COMMUNITY ANNUAL BUS-MILES

Route Number	Basic Weekday Frequency Minutes	Round Trip Length Miles	Round Trip Time Min.[1]	Buses Required	Weekday Trips[2]	Bus-Miles Weekdays	Annual Bus-Miles			
							Weekdays	Saturdays[3]	Sundays[4]	Total
1	60	11.6	35	1	13	151	39,300	5,100	3,600	48,000
2	30	41.0	123	4	25	1,025	266,500	34,600	24,500	325,600
3	30	35.0	105	4	25	875	227,500	29,600	20,900	278,000
4	60	46.2	139	3	13	601	156,300	20,300	14,400	191,000
5	60	15.2	46	1	13	198	51,500	6,700	4,700	62,900
6	30	45.2	136	5	25	1,130	293,800	38,200	27,000	359,000
7	60	26.0	78	1	13	169	43,900	5,700	4,000	53,600
8,8a	30	55.4	167	6	25	1,385	360,100	46,800	33,100	440,000
9,9a	60	43.0	129	2	13	559	145,300	18,900	13,400	177,600
10	60	8.6	26	1	13	112	29,100	3,800	2,700	35,600
11,11a	30(11a-Peak)	29.0	87	3	25	649	168,700	21,100	15,000	204,800
12	60	10.4	31	1	13	135	35,100	4,600	3,200	42,900
13	60	26.2	79	2	13	341	88,700	11,500	8,200	108,400
14	60	13.8	41	1	13	179	46,500	6,000	4,300	56,800
15	30	22.0	66	2	25	550	143,000	18,600	13,100	174,700
16	60	32.2	97	2	13	419	108,900	14,200	10,000	133,100
17	60	49.6	150	3	13	645	167,800	21,800	15,400	205,000
18,18a,18b	30	35.2	106	4	25	880	228,800	29,700	21,000	279,500
19	30	15.0	45	2	25	375	97,500	12,700	9,000	119,200
20	60	14.8	45	1	13	192	49,900	6,500	4,600	61,000
21	30	34.8	104	4	25	870	226,200	29,400	20,800	276,400
22	60	22.8	69	1	13	296	77,000	10,000	7,100	94,100
23	30	32.2	97	3	25	710	184,600	24,000	17,000	225,600
24	30	25.2	75	3	25	630	163,800	21,300	15,000	200,100
25	60	17.0	51	1	13	221	57,500	7,500	5,300	70,300
26	60	26.8	81	2	13	348	90,500	11,800	8,300	110,600
28	30	27.0	81	3	25	675	175,500	22,800	16,100	214,400
101	60	31.0	93	2	13	403	104,800	13,600	9,600	128,000
102	60	23.0	69	1	13	299	77,700	10,100	7,100	94,900
103	60	16.4	49	1	13	213	55,400	7,200	5,100	67,700
TOTALS		831.6		70		15,235	3,961,200	514,100	363,500	4,838,800

NOTES: 1 – Average Speed of 20 miles per hour, assumed.

2 – Weekday Trips based on 12 hours of operation

3 – Saturday service based on 65 percent of weekday service.

4 – Sunday service based on 45 percent of weekday service.

Ave. annual miles per bus = $\frac{4,838,000}{70}$ = 69,100

TABLE 11

TRANSIT SERVICE AREAS

Transit Service Area	Cities/Unincorporated Places and 1970 Population
North Central	Brea, Fullerton, La Habra, Placentia, Yorba Linda. 179,427.
West Central	Anaheim, Buena Park, Cypress, Garden Grove, La Palma, Los Alamitos, Stanton. 422,877.
Central	Orange, Santa Ana, Santa Ana Air Facility, Tustin, Tustin-Foothills, Villa Park. 286,580.
Saddleback Valley	El Toro, El Toro Station, Laguna Hills, Mission Viejo. 41,233.
North Beaches	Fountain Valley, Huntington Beach, Rossmoor, Seal Beach, Westminster. 245,014.
South Central	Costa Mesa, Irvine, Newport Beach. 142,532.
South Beaches	Capistrano Beach, Dana Point, Laguna Beach, Laguna Niguel, San Clemente, San Juan Capistrano, South Laguna. 51,498.

TABLE 12

ESTIMATE OF INTRA-COMMUNITY SERVICE REQUIREMENTS

City/Place	1970 Population	1970 Area Sq. Miles	1970 Miles of Streets[2]	Projected Need (Based on Santa Ana)[1] – Number of 3.2 mile (30 min. freq.) Bus Routes based on: Population	Area Sq. Miles	Miles of Streets	Ave. No. of Routes	Assume
Anaheim	166,701	33.1	426	9.6	11.0	9.4	10.0	10
Brea	18,447	8.9	71	1.1	3.0	1.6	1.9	2
Buena Park	63,646	9.8	146	3.7	3.3	3.2	3.4	3
Costa Mesa	72,660	14.7	179	4.2	4.9	4.0	4.4	4
Cypress	31,026	6.3	72	1.8	2.1	1.6	1.8	2
Fountain Valley	31,826	9.6	78	1.8	3.2	1.7	2.2	2
Fullerton	85,826	22.1	251	4.9	7.4	5.5	5.9	6
Garden Grove	122,524	16.5	278	7.0	5.5	6.1	6.2	6
Huntington Beach	115,960	26.1	292	6.7	8.7	6.4	7.3	7
Irvine	20,450	30.3	–	1.2	10.1	–	5.7	3
Laguna Beach	14,550	3.6	71	.8	1.2	1.6	1.2	1
La Habra	41,350	6.3	101	2.4	2.1	2.2	2.2	2
La Palma	9,687	1.6	35	.6	.5	.8	.6	1
Los Alamitos	11,346	4.1	27	.7	1.4	.6	.9	1
Newport Beach	49,422	14.3	184	2.8	4.8	4.1	3.9	4
Orange	77,374	16.0	209	4.4	5.3	4.6	4.8	5
Placentia	21,948	5.0	73	1.3	1.7	1.6	1.5	2
San Clemente	17,063	8.2	92	1.0	2.7	2.0	1.9	2
San Juan Capistrano	3,781	12.5	28	.2	4.2	.6	1.7	2
Santa Ana	156,601	27.0	407	9.0	9.0	9.0	9.0	9
Seal Beach	24,441	9.8	45	1.4	3.3	1.0	1.9	2
Stanton	17,947	3.0	46	1.0	1.0	1.0	1.0	1
Tustin	21,178	3.4	48	1.2	1.1	1.0	1.1	1
Villa Park	2,723	2.8	18	.2	.9	.4	.5	1
Westminster	59,865	10.7	153	3.4	3.6	3.4	3.5	4
Yorba Linda	11,856	5.5	63	.7	1.8	1.4	1.3	1
Capistrano Beach	4,149	2.8	–	.2	.9	–	.6	1
Dana Point	4,745	6.5	–	.3	3.2	–	1.7	1
El Toro	8,654	6.5	–	.5	3.2	–	1.8	1
El Toro Station	6,970	9.1	–	.4	3.0	–	1.7	1
Laguna Hills	13,676	6.8	–	.8	3.3	–	2.0	2
Laguna Niguel	4,644	8.2	–	.3	2.7	–	1.5	1
Mission Viejo	11,933	6.5	–	.7	3.2	–	2.0	2
Rossmoor	12,922	1.7	–	.7	.6	–	.6	1
Santa Ana Air Facility	2,106	2.8	–	.1	.9	–	.5	1
South Laguna	2,566	4.3	–	.1	1.4	–	.7	1
Tustin-Foothills	26,598	11.1	–	1.5	3.7	–	2.6	2
							TOTAL	98

[1]NOTE: SANTA ANA TRANSIT STUDY, Alan M. Voorhees & Associates, April, 1971.
8 routes, equivalent to 9-3.2 mile routes
Population – 156,600/9 = 17,400 persons/bus route
Area – 27.0/9 = 3.0 sq. mi./bus route
Mileage – 407/9 = 45.3 street miles/bus route

[2]Excludes freeways
98/9 x 444,000 = 4,800,000 annual bus miles
98 X 3.2
Route Miles = 313.6
Buses = 98 + 10 = 108

TABLE 13

INTRA-COMMUNITY SERVICE REQUIREMENTS BY TRANSIT SERVICE AREAS

North Central

Brea	2[1]
Fullerton	6
La Habra	2
Placentia	2
Yorba Linda	1
	13

West Central

Anaheim	10
Buena Park	3
Cypress	2
Garden Grove	6
La Palma	1
Los Alamitos	1
Stanton	1
	24

Central

Orange	5
Santa Ana	9
Santa Ana Air Fac.	1
Tustin	1
Tustin-Foothills	2
Villa Park	1
	19

Saddleback Valley

El Toro	1
El Toro Station	1
Laguna Hills	2
Mission Viejo	2
	6

North Beaches

Fountain Valley	2
Huntington Beach	7
Rossmoor	1
Seal Beach	2
Westminster	4
	16

South Beaches

Capistrano Beach	1
Dana Point	1
Laguna Beach	1
Laguna Niguel	1
San Clemente	2
San Juan Capistrano	2
South Laguna	1
	9

South Central

Costa Mesa	4
Irvine	3
Newport Beach	4
	11

[1] Number of Equivalent 3.2 miles Bus Routes

TOTAL: 98-3.2 mile routes

The implementation of the above inter- and intra-area services would virtually make public transit available to everyone in Orange County. The total bus fleet would number 187 and operate almost ten million bus miles per year. The program is ambitious and will not be completed overnight. The following chapters will explain the phased implementation and financial programs.

G. Environmental Considerations

Considerable concern has been exhibited over the impact of the proposed bus system on air quality and the environment in general. The scope of this study did not envision a comprehensive environmental impact analysis, since UMTA's guidelines[4] state that the most likely impact of a proposed bus system would be on air quality.

It is proposed that the buses purchased by the Transit District be of diesel power with latest environmental improvement packages. The extent of air contamination caused by the proposed 187 bus fleet can be estimated in a manner which does not attempt to deal with relative air quality of a diesel engine versus a gasoline engine. The 172 in-service diesel buses are estimated to travel 9,600,000 miles per year or an average of 55,000 annual miles per bus. Full consumption for standard diesel transit buses average 4.5 miles per gallon. At 55,000 miles per year and 4.5 miles per gallon, each bus uses 12,200 gallons of fuel per year. Average annual mileage for an automobile is estimated at 12,000 miles. Assuming a fuel consumption of one gallon per 15 miles, then each automobile consumes 800 gallons of gasoline annually. On the basis of annual fuel consumption each bus is equivalent to 15 automobiles. The 172 buses for Orange County would be equivalent to only (172 x 15) 2,580 automobiles.

Consultation with the County Road Department indicates that there are approximately 5,000,000 person trips made daily in Orange County, and that the number of automobiles registered in Orange County is approximately 750,000. It is assumed that approximately 100,000 person trips are presently made in trucks and buses. This would yield a ratio of about 6.5 daily person trips per passenger car.

Considering the projected 60,000 daily transit trips on the Orange County system, it would take 9,200 automobiles to maintain the same transporting capability which would be performed by the proposed bus system. This is calculated by dividing 60,000 by the rate of 6.5 person trips per passenger car.

To summarize, the Transit District's fleet affects the air in an amount equivalent to 2,580 automobiles, but will carry passengers equivalent to 9,200 automobiles. This does not even consider the cleaner burning characteristics of the diesel bus engines.

In terms of total impact of bus exhaust relative to all exhaust emissions, the 2,580 equivalent automobiles represented by the 172 buses constitute about 4/10 of one percent of the 750,000 registered automobiles. This means that the bus fleet is contributing less than 4/10 of one percent of the air pollution caused by automobiles while transporting 1.2 percent of all daily passenger trips. Clearly, the diesel bus, maintained to proper standards, contributes less to air pollution than the private gasoline powered automobile. The more people moving by bus, the cleaner the air.

On the matter of diesel versus gasoline power, tests by General Motors Corporation have shown that diesel exhausts contain about one-fifth as much carbon monoxide and one-third as much hydrocarbon emission as a comparable gasoline engine. In a recent report by engineers of the Chevron Research Company[5] it was

[4] Capital Grants for Urban Mass Transportation, "Information for Applicants," pp. 11-14, DOT–UMTA, June, 1972.

[5] "A Brief Review of Fuel Effects on Vehicle Emissions," R. K. Stone and R. L. Courtney, Chevron Research Company. A paper presented at the meeting of the Western Section, Institute of Traffic Engineers, Portland, Oregon. July, 1972.

stated that, "the diesel engine is a negligible source of hydrocarbons, carbon monoxide, and oxides of nitrogen, even in urban areas, because of its combustion characteristics, and the relatively small number of diesel-powered vehicles. Nonetheless, it is a controllable source of air pollutants; and both Federal and state exhaust standards have been established."

"Many states, including Oregon, are adopting 'opacity limits' on diesel vehicle exhaust. The black smoke is, for the most part, simple carbon soot. It presents an annoyance but does not enter into smog reactions or present a recognized health hazard. The usual cause of excessive black smoke is overenrichment due to an improperly adjusted injection system. However, some manufacturers have modified their injector system designs considerably to preclude this possibility. The use of 'turbochargers' also reduces smoke emissions and feeds back the heat of the normally wasted exhaust into the engine by powering the engine's air compressor. Within practical limits, diesel fuel specifications have only minor effects on exhaust smoke.

There are no exhaust odor limits being enforced for diesel engines at this time. This is primarily because the technology does not exist for odor control, although it is under intensive research. There are no health-related adverse effects of diesel exhaust odor. However, it is most objectionable to the public; and it must be reduced to acceptable levels."

It is encouraging that such contamination as is produced by diesel engines is being studied by manufacturers and improvements are being made. Various fuel additives are already available which improve the smoke (soot) emission level, as well as the exhaust odor. Additionally, the federal government, through the Department of Transportation (DOT), the Department of Health, Education and Welfare (HEW), and the Department of Urban Development (HUD), is investing millions of dollars in air pollution research. The Consultant feels confident that such research will reap major rewards in the next few years.

Meanwhile, it is recommended that the OCTD maintain high standards for maintenance of buses and purchase only "Number One Fuel" or fuel with equivalent performance characteristics. It is further recommended that reliable anti-pollution devices be utilized by the OCTD as they are developed and approved for use by the appropriate federal regulations agencies.

There are other environmental considerations which, although not logically the subject of detailed study in this report, must be constantly at the fore as transit implementation takes place by the OCTD. The fact of the matter is, beyond air pollution considerations, buses do make noise, are not necessarily visually pleasing, can create disruption and litter, and can create other adverse social impacts. The recommendations made in this report, both general and detailed, are based on such knowledge as is currently available to the Consultant and the transit industry. As each new route or service is studied in detail, there should be a careful review of numerous environmental elements, in light of the then current information base. Following are some of these elements: Bus size and design, engine size and type of fuel, neighborhood and street character, community acceptance and support, fare structure, bus stop locations (they are not popular with property owners), traffic conditions (existing and predicted), safety for bus patrons, pedestrians, cyclists, children at play, motorists, bus operation practices, and employee courtesy.

CHAPTER VII

ORGANIZATION/MANAGEMENT

Having selected the most desirable Level of Service Plan, as described in the preceding chapter, the "what" part of a short-range transit implementation program has been determined. The question now becomes, "how" do we go about it?

In most urban areas where there has been a public acquisition or takeover of existing transit facilities and operations, there was some form of substantial transit operation in force. Such an operation then became the base or nucleus of the new public operation. Frequently, the organizational and management changes necessary were minor in scope. In the case of Orange County however, there is no major transit operation, but rather a series of fragmented and disassociated private systems, none of which can truly form the nucleus of a new public operation. The form of organization and management therefore is a critical element which requires careful consideration of alternate possibilities.

A. Alternatives

As in the case of the Service Level determination, serious deliberations were held with the Orange County Transit District staff, and with various public and civic groups in order to establish those elements of an organization/management system which should be common to any alternative. These "givens" are listed as follows:

1. Maximum advantage will be taken of federal and state funding opportunities.

2. No public or private properties will be acquired without proper compensation. Condemnation will be used only if negotiation fails.

3. Experimentation and demonstration programs aimed at service enhancement and patronage increase must be undertaken. If subsidy or M&O operations are practiced, such experimentation will be by contract. If District operation is practiced the experimentation will be directly by the District.

4. The District, will set the "level of service" (routes, schedules, fares, special services, etc.).

5. All operations will be clearly identified with the Orange County Transit District. All equipment shall be owned by the District, and the District itself will be the monitoring agency for maintenance and public/operational relationships.

6. Image is important. Service enchancement, leading to increased patronage, must be a primary goal.

Of the above basic elements, the most significant from an organization/management standpoint is item (5) which states "All operations will be clearly identified with the Orange County Transit District. The District itself will be the monitoring agency for public/operational relationships." It seems clear that the most effective way of making all operations clearly identifiable with the Orange County Transit District and of making the District as the monitoring agency would be for the District itself to own and operate its transit system. That is, the District should have its own staff, rolling stock, administrative and maintenance facilities, bus drivers, mechanics, accounting department, supervisorial force, etc. The benefits to such an organization are obvious, not just in terms of operational efficiency, but in the area of economics and financing as they relate to state and federal grants, taxing benefits, preparation of budgets, control of

expenditures and revenues, etc. However, while the advantages of a single centralized public operation would appear to be clear, it is equally clear that such organization and management is not consistent with immediate implementation of public transit. The question then becomes "what is the best interim method of organization and management as we build, over a period of years, to a fully controlled and operated OCTD system? In order to answer that question, five different organization/management alternatives were formulated and considered:

1. District Ownership and Operation with Interim Subsidy to Other Operators – In order to meet the equipment requirements of the selected service alternative, an early application would be filed for state and/or federal assistance to purchase the needed bus fleet, and to construct an administrative and maintenance facility, including the purchase of the needed land. During the approval and bus delivery period, the District would acquire the operating rights of existing public and private systems, and perhaps a few items of their usable equipment, all aimed at a closing date, X months hence.

   During the interim, the District might provide cash subsidies to some operations in order to keep them from total abandonment. However, none of the interim service would be considered as the Orange County Transit System. Also during the interim, the District would hire a work force, aimed at starting on future date X.

   In those locations where interim service were desired, and is not presently being provided, a call for bids would be issued by the District for subsidized service by a private operator with his own equipment.

   Upon bus delivery, service owned and operated by the District would begin in a grand manner on Date X; – new buses on a new system with a new image. If the new maintenance facility were not completed on Date X, maintenance would be by contract.

2. District Ownership and Operation with Interim Lease and Lease Back to Contract Operators – An early application would be filed for state and/or federal assistance to purchase the needed bus fleet, and to construct an administrative and maintenance facility, including the purchase of the needed land. For interim service, the District would immediately acquire the operating rights of all public and private services, and perhaps lease or buy some of their usable equipment. Additional equipment would be leased as necessary from other public or private agencies and leased-back to contract Management and Operations (M&O) firms. The contract M&O firms would be asked to bid competitively for the operation of equipment leased to them by the District. Service areas would be developed so that an operator might seek to operate in one or more, maybe in all, of the Service Areas. It would be an "Orange County Transit System," with buses required to be painted and identified by the M&O contractor.

   After some time, when future Date Y could be set, lease, lease-back, and M&O contracts would be terminated and full District-owned and -operated service begun.

3. District Ownership and Operation, with Interim Subsidy to a Public Operating Agency – An early application would be filed for state and/or federal assistance to purchase the needed bus fleet, and to construct an administrative and maintenance facility, including the purchase of the needed land. Interim service would be provided by an existing public transportation agency, (such as SCRTD). The public agency would be offered a direct subsidy to operate all take-over and new service with its own equipment. The operating rights of existing public and private services would have been acquired, but not any of their equipment or facilities. The subsidized service would cease on Date Y, as in Plan 2, above.

4. District Ownership With Continued Private Operations by Contract – In this plan, the District would immediately acquire the operating rights of all public and private services, and perhaps lease or buy some of their usable equipment. Additional equipment would be leased as necessary from other public or private agencies and leased-back to contract Management and Operations (M&O) firms. The contract M&O firms would be asked to bid competitively for the operation of equipment leased to them by the District. Service areas would be developed so that an operator might seek to operate in one or more, maybe in all, of the Service Areas. It would be an "Orange County Transit System," with buses required to be painted and identified by the M&O contractor. Subsequently the District would replace the leased equipment with its own equipment and lease it to M&O contractors in a similar fashion.

   The above would be the permanent form of organization/management.

5. District Ownership With M&O Contract to a Single Private Operator – In this plan, the District would immediately acquire the operating rights of all public and private services, and perhaps lease or buy some of their usable equipment. Additional equipment would be leased as necessary from other public or private agencies and leased-back to a single county-wide contract Management and Operations (M&O) firm. The firm would be asked to bid competitively for the operation of equipment leased to it by the District. It would be an "Orange County Transit System," with buses required to be painted and identified by the M&O contractor. Subsequently the District would replace the leased equipment with its own equipment and lease it to the operating firm in a similar fashion.

   The above would be the permanent form of organization/management.

B. Evaluation

Rather than to attempt an evaluation matrix as was done for the Level Of Service as discussed in Chapter VI, the evaluation of Organization/Management alternatives consisted primarily of a weighting of the advantages and disadvantages of the various alternatives, utilizing valuable input from the staff of the Orange County Transit District, as well as from the Transportation Council of the Orange County Chamber of Commerce. A discussion of the advantages/disadvantages of various alternatives follows:

1. District Ownership And Operation With Interim Subsidy To Other Operators – Several strong disadvantages were felt to be inherent in this alternative. First, it was felt that it was virtually impossible to set a firm and positive date to begin full and complete district operation at some period X months hence. There are too many complex steps to be taken for which the time requirements simply cannot be pre-determined. Among these are the acquisition of the operating rights of public and private systems, the procedure of filing and receiving approval of federal grants, the preparation of bus and f..cility specifications, the calling for bids and purchase of equipment, the legal obstacles in the areas of labor rights and agreements, the availability and transfer of local funds, the revenue sources beyond the current tax year, etc., etc. All of the above contain so many variables and intangibles as to make it virtually impossible to aim at a future date, unless of course, such date were set three or four years hence. That however, would defeat the entire thrust of the "immediate action" program.

   Second, it was felt to be a disadvantage in this alternative that cash subsidies might be made to some private operations, since such a procedure would involve a need for careful auditing of private books, operation and maintenance procedures, administration, wages, fuel costs, etc. Further, it would not create the desired public image of immediate action by the Orange County Transit District.

2. District Ownership And Operation With Interim Lease And Lease-back To Contract Operators – This alternative overcomes many of the disadvantages expressed for Alternative 1 by not attempting to set a date certain when full District owned and operated service would begin, but rather, to build toward such a date by initially implementing service with Management and Operations (M&O) contracts. The alternative has the clear advantage that in either owning or leasing its own equipment, and then leasing it back to private M&O firms, there would be the image of immediate service action by the Orange County Transit District. The buses would be painted and identified as belonging to the District.

   One disadvantage to this alternative is the fact that no short-range steps were being taken to actually begin a District owned and operated service. The implementation of such District operated service is still aimed at a future date Y which would call for a massive turnover from M&O operation to full District operation, all at one time. The preparation for, and execution of such a step seems cumbersome and unnecessary.

3. District Ownership And Operation With Interim Subsidy To A Public Operating Agency – This alternative has most of the advantages of Alternative 2, plus the interesting concept of dealing with existing public transportation agencies rather than with private ones. The Southern California Rapid Transit District (SCRTD) or Long Beach Public Transportation Company for example could theoretically undertake the required service immediately with surplus equipment on hand. Most likely, they would be satisfied with a "break even" subsidy, rather than having to make a profit such as a private firm. Upon investigation however, several contrary factors became apparent. One is that such public agencies simply do not have equipment available; – at least not of the modern and efficient type felt necessary to create the right kind of public image for the Orange County Transit District. Thus, if the selected public agency had to lease or buy new (or newer) equipment than it had available, there would be no advantage over the acquisition of the same equipment directly by the Orange County Transit District. Further, in the case of SCRTD, it might be requested to provide OCTD subsidized service in an area or corridor which would be directly competitive with service they were already providing themselves. Ultimately of course, such service conflicts will be resolved by the two agencies as they experience a phased coordination to meet regional transportation needs. Initially however, they may very well be real and existent.

   Further, it was determined that such public agencies as might be able to provide the required interim service currently pay the highest wages of all transit operators in the region. Localized private operations in Orange County, due primarily to the fact that they have not been heavily unionized, enjoy lower labor rates, the savings of which can be passed on to the Orange County Transit District, for awhile at least. Additionally, the requirements of Section 13c of the Urban Mass Transportation Act must receive careful consideration. Section 13c states in effect that the labor provisions and privileges enjoyed by a person or group may in no way be worsened as a result of actions taken under the Mass Transportation Act. Thus a labor situation or contract to which the OCTD becomes a party is likely to become a future standard for the full District operation. As the District moves into its implementation process, it must constantly bear 13c in mind, and study the later serious consequences of any labor action which may be expeditious at present. It seems likely that if subsidized service were provided by a public agency paying high labor rates, the personnel enjoying such high labor rates would have strong claims that such rates must be continued at anytime in the future that a full District operated service might be implemented.

4. District Ownership With Continued Private Operations By Contract – Essentially, this plan offers the interim process from Plan 2, but on a permanent basis. It would have all the advantages of Alternative 2, but would not build to what has previously been expressed as a desirable goal, namely that of ultimately having a fully District owned and operated system.

   There are advantages to this plan. The District would never require a large maintenance or administrative facility, it would not require a large work force subject to union labor and contract negotiations, and it would stimulate private enterprise in the area of transit operation. However, the administrative and organizational tasks would be monumental in the sense that many different contractual operations would have to be fully integrated and coordinated. There would have to be arrangements for the loan or interuse of equipment by different contractors. The call for bids and evaluation and award of numerous contracts would be a constant administrative chore and challenge. Perhaps, worst of all in the eyes of the public it might still be considered a fragmented and disorganized system.

5. District Ownership With M&O Contract To A Single Private Operator – This plan contains practically all of the advantages from the interim process in Plan 2, maintaining them on a permanent basis, but awarding the entire County-wide operation to a single private M&O firm. An inherent disadvantage in this kind of an alternative is that a number of small private operations would be wiped out, all at one time. Additionally, it was observed that no single private operator in Orange County, at the present time, would have the needed capabilities for such an undertaking. This plan offsets many of the disadvantages in Plan 4 of course in that it would be far easier for the District to deal with and administer a single M&O contractor than it would with perhaps six or seven.

C. Selection

In weighing the various advantages and disadvantages expressed in the discussion above, it appeared that the best method of organization and management involved a combination of the better elements of several plans.

First, it seems clear that the best immediate method of implementing transit by the Orange County Transit District is through an M&O contractual process with local private operators. The operators could use their own equipment, charging the District at a bus-mile rate which would cover both the capital cost and maintenance and operation cost of such equipment. If the District acquired either by lease or purchase, its own equipment and leased such equipment to the M&O contractor a bus-mile rate could be charged, which covers only the operation and maintenance, and not the capital cost of the equipment.

Second, the above plan, while unquestionably the best for providing most of the service in the first few years, should not be considered suitable as the permanent plan. There should be a gradual building toward full ownership and operation by the Orange County Transit District. In that regard, even in the first year, a small operation should be implemented somewhere in the County which does not involve an M&O contract, but is operated directly by the District. Obviously, since the District will not have maintenance facilities in the first year, the maintenance of such District-operated equipment would require a contract with a private bus or truck maintenance firm.

Third, since there should be a gradual building toward a full District operation so that at the end of four or five years, private M&O operations would be phased out, the District must begin planning immediately for the construction of an administrative and maintenance facility. Such a structure should be capable of handling at least the projected bus fleet which under this plan, comes to 187 buses by the year 1976.

Fourth, the District must immediately launch a marketing and image-building program in which there is a clear identification of the buses and routes with the Orange County Transit District. Gradually the District should acquire more and more of its own rolling stock, replacing that being leased, or owned by private M&O contractors, so that ultimately there is a standardization of the bus fleet with high quality equipment.

Finally, the District must be prepared that as its own operation grows in size, it will be subject to increased labor demands and ultimately unionization. This is in keeping with the experience of other similar public acquisitions and operations throughout the country, and simply recognizes that sound labor practices are, and will be required. As the total OCTD transit system grows, it is likely that labor pressures will be felt, regardless of whether there is an all-District operation or contractual operation by an M&O firm or firms. Such an eventuality is not to be feared, but effectively planned for in an administrative and budgetary sense.

CHAPTER VIII

FINANCING

This chapter discusses in detail the capital requirements and operational support needed to implement the level of service selected in Chapter VI. These items are given by year starting with the 1972-73 fiscal year and ending in 1980. Also included is a section on financing sources which discusses the pertinent federal, state and local funding possibilities.

A. Capital Requirements

A program of capital improvements has been developed to implement the recommended 187 bus fleet over the next five years. Additionally, capital requirements have been estimated to 1980. The program includes items such as buses, passenger amenities, administrative/maintenance facility, communication systems, bus replacement fund, and miscellaneous items, such as service vehicles and automobiles. Table 14 lists the total eight-year program along with the estimated local share based on the current capital grant (1/3 local – 2/3 federal) funding formula. It is recommended that the District take full advantage of all federal financial sources.

The buses purchased should be in the 35- to 45-passenger capacity range. As more experience is gained by the District from actual passenger loading, smaller or larger buses may become appropriate in certain corridors or neighborhoods. All buses should be air-conditioned, of the latest design, capable of freeway usage (part of fleet only) and employing the most advanced measures to reduce polluting exhaust emissions.

It will be necessary for the District staff to be constantly aware of improvements and options available to the bus fleet. With great frequency, Environmental Protection Kits are coming on the market, which have the potential of cleaning exhaust emissions to the point where they will meet the most rigid State and Federal Standards.

While diesel-fueled buses (utilizing Number One fuel or equivalent) are being recommended over those powered by gasoline, propane, or liquified natural gas, it is conceivable that technological advancement may well shift the advantage away from Diesel in the future.

As to size and power of the buses, the options again must be studied, and if proper, exercised. An argument for buying all standard large (51 passenger) buses is that the labor cost, which is the largest part of bus operation costs, is the same, large bus or small bus. But smaller buses are cheaper to buy and operate, they are more maneuverable, and most importantly, they may be all that is needed.

Much controversy exists among bus operators as to V-8 versus V-6 engines. A V-8 may be needed for freeway speeds, or to climb hills. But numerous routes (particularly in Orange County) may not involve the freeway, and may be on extremely flat terrain. Some of each kind should be purchased and experimented with. Experience, even over a few years time, will dictate future selections.

Because of the new bus system being developed by the District, a modern maintenance/administration facility should be designed and constructed as soon as possible. The District staff should inspect the modern facilities either built or under construction in the Southern California area (Long Beach, Santa Monica, San Diego). During the first year the District should select a site, retain an engineer-architect for design plans, and begin construction as soon as possible.

TABLE 14

ORANGE COUNTY TRANSIT DISTRICT
SPECIAL BUS NEEDS STUDY

CAPITAL IMPROVEMENT PROGRAM

Fiscal Year	1972-73 Year 1	1973-74 Year 2	1974-75 Year 3	1975-76 Year 4	1976-77 Year 5	1977-78 Year 6	1978-79 Year 7	1979-80 Year 8	Total
Number of New Buses	25	63	44	45	10	—	—	—	187
Cost of New Buses[1]	$1,050	$2,687	$2,046	$2,183	$ 510	—	—	—	$ 8,476
Bus Replacement Fund[2]	105	374	579	797	848	$ 848	$ 848	$ 848	5,247
Passenger Amenities[3]	36	38	41	54	—	—	—	—	169
Administration/ Maintenance Facility[4]	—	1,550	1,000	15	15	15	15	15	2,625
Communication System	60	64	66	68	15	—	—	—	273
Miscellaneous[5]	125	471	373	311	139	86	86	86	1,677
Totals	$1,376	$5,184	$4,105	$3,428	$1,527	$ 949	$ 949	$ 949	$18,467
Local Share	$ 907	$1,728	$1,368	$1,143	$ 509	$ 316	$ 316	$ 316	$ 6,603
Federal Share	$ 469	$3,456	$2,737	$2,285	$1,018	$ 633	$ 633	$ 633	$11,864

(Figures in $1,000's)

Notes: [1] A 45-passenger bus was assumed to cost $42,000 in the first year and increase in cost 5 percent annually. Five buses of the second-year program are small transit coaches for demand-activated system estimated at $27,000 each.

[2] Ten percent of bus capital costs, cumulative.

[3] These include: (1) bus stop signs and schedule holders; (2) bus stop benches; and (3) bus shelters.

[4] These estimates include land, design fees, construction, and equipment.

[5] Includes service vehicles and contingencies, 10 percent of total capital costs.

B. Operational Support Requirements

A projection of operating data and the related costs and revenues has been made (exclusive of capital requirements) for the assumed service improvement program. Results showing the required operational support (subsidy) are presented in Table 15. Table 16 shows the summary of operating costs, revenues, and capital requirements.

C. Passenger Projections

Because of the lack of adequate transit service in Orange County, the use of historic ridership trends on which to base patronage estimates was very limited. From the Consultant's experience and discussion with operators in the area, the following assumptions were made for the estimate of patronage for new service to be introduced:

First year of operation	–	1.0 revenue passenger/bus-mile
Second year of operation	–	1.3 revenue passenger/bus-mile
Third year of operation	–	1.7 revenue passenger/bus-mile
Fourth year of operation	–	2.0 revenue passenger/bus-mile
Fifth year of operation and thereafter	–	2.0 revenue passenger/bus-mile

The 2.0 revenue passengers per bus-mile is based on areas similar to Orange County and is assumed to be a realistic and attainable value. Because of the existing service in Santa Ana, the projections used there were 1.5 revenue passengers for the first year, 1.7 for the second year, 1.9 for the third year, and 2.0 for the fourth year. These projections are also based on a 25 cent fare, free transfer privilege and no zone fares.

D. Operating Costs

Bus-mile costs were used to estimate the total system operating costs. Seventy cents per bus-mile was used for the first year and increased by four percent per year every year thereafter. The bus-mile cost used was based on comparable fleets in the area (notably Long Beach Public Transportation Company) and assumed union scale wages.

The following lists the items included in operating costs along with the percent devoted to that item:

Account	Percent of Operating Cost
Maintenance	13%
Transportation, drivers wages mainly	67%
Promotion	3%
Insurance and Safety	6%
Administration	6%
Taxes and Licenses	5%
Total	100%

TABLE 15

ORANGE COUNTY TRANSIT DISTRICT
SPECIAL BUS NEEDS STUDY

IMPLEMENTATION STAGING AND OPERATIONAL SUPPORT REQUIREMENTS

Year and Type of Service Implementation	YEAR 1			YEAR 2			YEAR 3			YEAR 4			YEAR 5			YEAR 6			YEAR 7			YEAR 8		
	Annual Bus-Miles 1,000's (1)	Support cents/mile (2)	Support $1,000's (3)	Annual Bus-Miles 1,000's (1)	Support cents/mile (2)	Support $1,000's (3)	Annual Bus-Miles 1,000's (1)	Support cents/mile (2)	Support $1,000's (3)	Annual Bus-Miles 1,000's (1)	Support cents/mile (2)	Support $1,000's (3)	Annual Bus-Miles 1,000's (1)	Support cents/mile (2)	Support $1,000's (3)	Annual Bus-Miles 1,000's (1)	Support cents/mile (2)	Support $1,000's (3)	Annual Bus-Miles 1,000's (1)	Support cents/mile (2)	Support $1,000's (3)	Annual Bus-Miles 1,000's (1)	Support cents/mile (2)	Support $1,000's (3)
Year 1																								
Santa Ana Service	450	33	$150	450	31	$135	450	29	$128	450	29	$128	450	32	$144	450	35	$158	450	38	$171	450	42	$189
South Coast Service	500	45	225	500	40	200	500	34	170	500	29	145	500	32	160	500	35	175	500	38	190	500	42	210
New Inter-Community	570	45	255	570	40	225	570	34	196	570	29	166	570	32	183	570	35	200	570	38	217	570	42	240
New Intra-Community	600	45	270	600	40	240	600	34	204	600	29	174	600	32	192	600	35	210	600	38	227	600	42	251
Dial-A-Bus Experiment	–	–	100	–		100	–	–	100	–	–	100	–	–	100	–	–	100	–	–	100	–	–	100
Year 2																								
New Inter-Community				1,145	48	550	1,145	43	492	1,145	37	424	1,145	32	366	1,145	35	401	1,145	38	435	1,145	42	480
New Intra-Community				1,145	48	550	1,145	43	493	1,145	37	424	1,145	32	367	1,145	35	401	1,145	38	435	1,145	42	480
Year 3																								
New Inter-Community							1,190	51	609	1,190	46	548	1,190	40	478	1,190	35	417	1,190	38	453	1,190	42	500
New Intra-Community							1,190	51	608	1,190	46	547	1,190	40	477	1,190	35	418	1,190	38	453	1,190	42	500
Year 4																								
New Inter-Community										1,250	54	672	1,250	49	610	1,250	43	538	1,250	38	475	1,250	42	525
New Intra-Community										1,250	54	672	1,250	49	610	1,250	43	539	1,250	38	475	1,250	42	525
Year 5																								
New Inter-Community													165	57	94	165	52	86	165	46	76	165	42	69
New Intra-Community													145	57	83	145	52	75	145	46	67	145	42	61
TOTAL	2,120	–	$1,000	4,410	–	$2,000	6,790	–	$3,000	9,290	–	$4,000	9,600	–	$3,864	9,600	–	$3,718	9,600	–	$3,773	9,600	–	$4,130

TABLE 16

ORANGE COUNTY TRANSIT DISTRICT
SPECIAL BUS NEEDS STUDY

SUMMARY OF FINANCIAL PROGRAM[1]

	Operating and Maintenance Fund[2]				Capital Fund			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Local Funds Required
Year	Expenditures	Revenues	Dial-A-Bus	Operational Support	Total Capital	Local Share	Federal Share	(4) + (6)
1	$ 1,488	$ 588	$100	$ 1,000	$ 1,376	$ 907	$ 469	$ 1,907
2	3,212	1,312	100	2,000	5,184	1,728	3,456	3,728
3	5,164	2,264	100	3,000	4,105	1,368	2,737	4,368
4	7,333	3,433	100	4,000	3,428	1,143	2,285	5,143
5	7,872	4,108	100	3,864	1,527	509	1,018	4,373
6	8,150	4,532	100	3,718	949	316	633	4,034
7	8,448	4,775	100	3,773	949	316	633	4,089
8	8,830	4,800	100	4,130	949	316	633	4,446
Total	$50,497	$25,812	$800	$25,485	$18,467	$6,603	$11,864	$32,088

1 Figures in $1,000

2 Column (4) = Column (1) – Column (2) + Column (3)

For determining the amount of operational support required for a particular service, the operating cost per bus-mile was used, less the number of revenue passengers per mile times twenty-five cents. For example for new service implemented in the first year the operating support would be 45 cents per mile (.70 – .25 = $.45). That same service in the second year of operation would require an operational support of 40 cents per mile [(.70 X 1.04) – (1.3 X .25) = .73 – .33 = $.40]. In Santa Ana, the required operational support would be 33 cents per mile [.70 – (1.5 X .25) = (.70 – .37) = $.33]. The annual operational support of one million dollars in the first year to four million dollars in the fourth year was based on discussions with the Transit District staff as to the probable amount of funds available for that purpose. These figures were assumed to be realistic and attainable by the District.

This fiscal program allows the total service to be fully operational within five years.

E. Financial Resources

The resources available to the District at the present time would be in the form of their own tax levy of five cents per $100 of assessed evaluation, State funds through the newly enacted Senate Bill 325, Federal programs, and contributions from communities in Orange County.

Summarized below are the pertinent items related to the State and Federal sources of funds.

State Funds – The SB 325 or Mills-Alquist-Deddeh Act, usually referred to as the Mills Bill, was passed on November 4, 1971. This legislation will take affect on July 1, 1972. This bill removes gasoline from the sales tax exemption list and alters the state-county sales tax split. This will create a source of local public transportation revenue expected to reach $138 million per year. The state-imposed sales tax (on all items except groceries) was reduced from 4% to 3-3/4% while the county imposed sales tax on the same items was raised from 1% to 1-1/4%. The added 1/4% at the county level ($138 million) is restricted in transportation uses in the county in which it was collected. Orange County's share is estimated at approximately $10 million per year. The only eligible Orange County applicants for these monies are the Transit District and the City of Laguna Beach. The Southern California Association of Governments (SCAG) is the regional agency to which claims are filed for these funds, even though the funds are deposited with the County government. The final Rules and Regulations are now being formalized by the State Department of Business and Transportation. The Act generally requires that 75% of the funds granted to an applicant must be used for capital expenditures. In addition, the expenditure of funds granted may in no year exceed 50% of the amount required to meet operating, maintenance, capital cost and debt service requirements after the deduction of Federal grants received. The District should be fully cognizant of the funds available under this Act and the provisions of the Rules and Regulations.

Federal Programs – The major federal programs for financial assistance to public transportation are available through the Urban Mass Transportation Administration (UMTA) of the Department of Transportation (DOT). The major programs of interest to the District at the present time are the Capital Grant Program, Technical Assistance Program, and Research, Development, and Demonstration (RD&D) Program. UMTA publishes an "Information for Applicant" booklet which describes in detail the procedures and requirements for possible assistance under these programs. Since 1964, Federal involvement in public transportation has been increasing and the Urban Mass Transportation Act of 1970 markedly increases the funding available for public transportation. The Capital Grant program provides up to two-thirds of that part of the cost of the project which UMTA determines cannot reasonably be financed from revenues. Eligible projects include the acquisition, construction, or improvement of facilities and equipment for use in urban mass transportation service in urban areas and in coordinating such service with highway or other transportation in urban areas. Repairs, maintenance, and other operating costs, and ordinary governmental or non-project operating expenses are not eligible as part of project costs.

The term "facilities and equipment" includes land (but not public highways), buses and other rolling stock, and other real or personal property. The term "urban mass transportation service" means the provision of general or special transportation service to the public (but not school buses, charter, or sightseeing service) on a regular and continuing basis in the urban area described in the application. *"General service"* means service available to any member of the public on a completely equal basis. "Special service" is service offering greater benefits to one or more groups of people so as to meet the special transportation needs of such groups. Project equipment and facilities may be used for incidental charter or sightseeing service only when not needed for mass transportation service operations.[6] At the present time, the District does not have charter operating rights. The capital improvement program recommended earlier in this chapter has assumed all items are eligible for funds under this section of the Mass Transportation Act.

The Technical Studies grant program is funded through the regional agency, SCAG, and the District is already taking advantage of these funds for the Alternative Transit Corridor Studies, which provide two-thirds of the study costs.

The objective of the R, D and D program is to devise, develop, demonstrate and evaluate new transportation technologies, systems and services which would cause improvements in the accessibility, quality of service, economic performance and environmental impact of public transportation. The demonstrations under this program must have national significance. UMTA is currently funding such projects as the "People Mover" project in Morgantown, West Virginia, Transpo PRT Testing and Evaluation, Long Beach Public Transportation Marketing Program and many others. The trend of UMTA in the last few years has been toward new technology demonstrations and possibly the District could be in a position to propose a PRT demonstration as is being considered in the District's Plan-for-Planning. UMTA participation for this program does not have a statutory formula, but most grants are federally assisted between 66% and 90% of net project costs.

The application procedures for any of these Federal grants are complex. A thorough understanding of the procedures is required for prompt approvals.

6 Capital Grants for Urban Mass Transportation, "Information for Applicants," DOT-UMTA, June, 1972

CHAPTER IX

THE DEVELOPMENT PLAN

The development plan for the Orange County Transit District to 1980 is in effect an operations guideline which combines the elements of need projects, level of service, organization and management, and financing, into a workable program that will build an efficient public transit system over the next eight years. It is emphasized that such a plan is a guide rather than a detailed action plan to be rigidly followed. Possible growth pattern and attitudenal changes in the County will require frequent reappraisals of the plan so that it will remain geared to the transportation needs of the day.

A. Phased Implementation Program

A phased implementation program has been developed and consists of the following elements. (From the "Recommended Organization/Implementation Plan," presented to the OCTD Board of Directors on May 1, 1972):

In the first year, the District should take full advantage of viable existing transit operations by enhancing and supporting them. Accordingly, the Santa Ana Transit System (in its upgraded service level being planned by the City of Santa Ana) should be assumed by the OCTD, and operation begun through a management and operation (M&O) contract with a private transit operator. Initially, the OCTD should lease buses from the selected M&O contractor. As soon as possible, the OCTD should order and purchase new buses, and lease them to the M&O contractor to replace those used for initial service.

In a similar fashion, utilizing M&O contractors, the OCTD should assume and upgrade the operation known as South Coast Lines, in the Central, South Central, and South Beaches Transit Service Areas, and also introduce 600,000 annual bus-miles of new Intra-Area service, probably in the West Central Service Area. The three M&O contract services would total 1,550,000 annual bus-miles.

Also in the first year, innovative transit service in the form of on-call transit (such as Dial-a-bus) should be initiated as a demonstration project in the North Central Transit Service Area in either Fullerton or La Habra, in close cooperation with the local governing body, and an M&O contractor. While the consultant is not prepared to make a positive recommendation, La Habra would seem to offer greater demonstration potential because of the following: a) It is a reasonable self-contained community, b) It has several major traffic generators in the form of industrial areas and regional shopping centers, c) It has a low-income segment with special transit needs, d) Its City government has demonstrated a strong interest in public transportation, e) A radio frequency suitable for base to vehicle communication is available.

Finally in the first year, 570,000 annual bus-miles of new Inter-Area service should be initiated and the recommended routes are the Harbor Boulevard (Route 6) and Adams Avenue (Route 15) routes. These routes have been described on the following pages. Unlike the aforementioned first year M&O contracts, this service should constitute the first element of operational transit directly by the OCTD, utilizing its own equipment and staff. This service should be implemented as soon as nine new buses can be ordered and delivered. The interim period, estimated at six to nine months, will be advantageous because a bus manager and other required personnel can be hired by the OCTD during that time.

Under the above plan, there will have been introduced, 1,050,000 annual bus-miles of intra-area service and 1,070,000 annual bus-miles of inter-area service, as well as the Dial-a-bus concept.

In succeeding years, additional intra and inter-area services should be added in approximately equal bus-mile proportion, until 4,800,000 annual bus-miles have been reached in each. This should occur early in the fifth year of operation. The fleet by then will have reached 187 buses, and good basic service will have been provided to virtually every area of the County.

As additional service is instituted during the second through fifth years, there should be a gradual phasing out of M&O contract operations, in favor of full operation directly by the OCTD. During the first year, a suitable site for an administrative and maintenance facility should be located, and it should be designed and constructed during the 2nd and 3rd years. Thus, by the end of the fifth year, full regionally coordinated transit service, operated and controlled by the District, will have been achieved.

The diagram (Exhibit 19) on the following page indicates the general Development Plan for the first year. A summary of the Eight Year Program, including the costs thereof, is shown on Page 75. The Orange County Transit District Board has adopted the program, subject of course to annual reappraisal and budgetary control.

For purpose of inter-area service implementation during the first two years, the Consultant has detailed six routes as the highest priority items. Beyond the second year, routes have not been detailed, since priorities may change in line with changing development patterns and needs. The detailed routes are as follows:

FIRST YEAR RECOMMENDATIONS

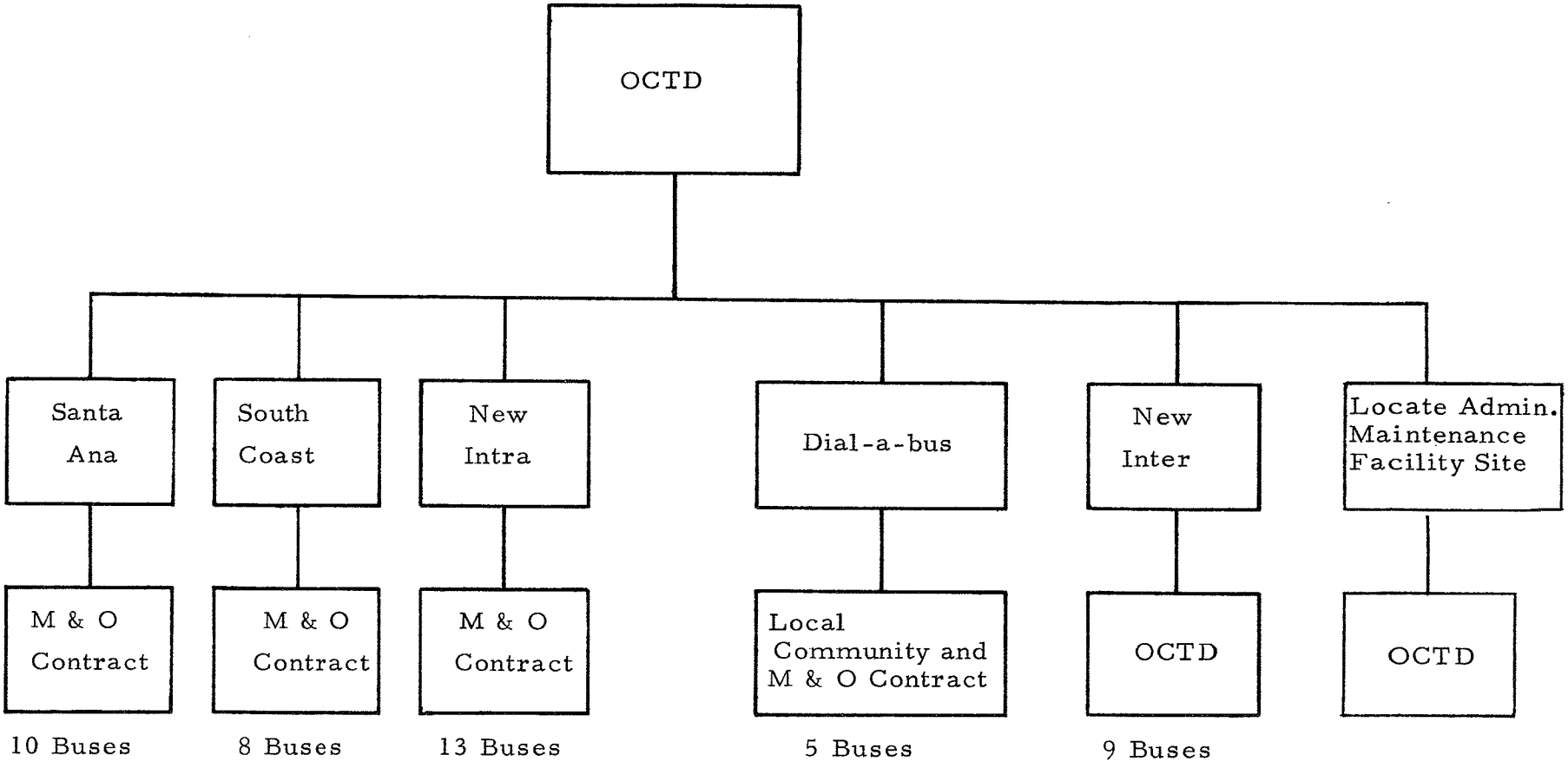
Harbor Boulevard — Route 6. There is currently no continuous, regularly scheduled north-south service for Orange County residents provided by any public or private operator. Harbor Boulevard is one of the heaviest traveled major arterials in Orange County, and the introduction of regularly scheduled transit service is recommended. The vehicular traffic flow on Harbor varies from 20,000 to 50,000 vehicles per day. This route would connect La Habra with Newport Beach. Major attractors along the route include Disneyland, Orangefair Mall, downtown commercial areas, Fullerton Junior College, the beach recreational areas, hospitals, and other public facilities. This route would increase the mobility of elderly persons living in the areas adjacent to this route. Transfer capabilities with other District service, especially the proposed Adams Avenue (Route 15) route, would be available and give access to Huntington Beach downtown and recreational areas, Orange Coast College, Orange County Fairgrounds and Airport, and the University of California at Irvine. The service frequency recommended is 30 minutes on weekdays with reduced service on the weekends, except during the summer months, if response is satisfactory. The estimated annual bus-miles is 360,000.

Adams Avenue — Route 15. Presently, Huntington Beach lacks regularly scheduled bus service to other parts of Orange County. The proposed route would connect the Huntington Beach downtown area with Costa Mesa business district, Orange Coast College, Orange County Fairgrounds and Airport, and U.C.I. The concentration of young and old persons along the route as well as major apartment development would make this area a very good candidate for transit service. The average daily traffic on Adams Avenue varies from 6,000 to 25,000. Thirty-minute service is recommended. This route would have transfer capabilities with the Harbor Boulevard route and the South Coast service to provide access to many parts of the County including Fashion Island, Laguna Beach, Santa Ana, and South Coast Plaza. The estimated annual bus-miles is 175,000.

EXHIBIT 19

ORANGE COUNTY TRANSIT DISTRICT

FIRST YEAR DEVELOPMENT



TOTAL - 45 Buses

ORANGE COUNTY TRANSIT DISTRICT

Eight Year Transit Development Program Costs

	(1) Bus-Miles Operated	(2) No. Buses	(3) Capital Outlay Cost (In $1,000's)	(4) Operational Support Cost (In $1,000's)	(5) Total Cost (In $1,000's)
Year One	2,120,000	25	907	1,000	$ 1,907
Year Two	4,410,000	88	1,728	2,000	3,728
Year Three	6,790,000	132	1,368	3,000	4,368
Year Four	9,290,000	177	1,143	4,000	5,143
Year Five	9,600,000	187	509	3,864	4,373
(Year Six	9,600,000	187	316	3,718	4,034
(6) (Year Seven	9,600,000	187	316	3,773	4,089
(Year Eight	9,600,000	187	316	4,130	4,446

Explanatory Notes:

Column (1): Cumulative total of bus-miles operated, exclusive of Dial-a-Bus or other demonstration/ innovation services.

Column (2): Cumulative total of buses in operation, including Dial-a-Bus.

Column (3): Annual Capital Outlay Costs (Non-cumulative) for purchase of buses, administrative and maintenance facilities, bus replacement fund, communications system, passenger amenities, and other miscellaneous items. Amount represents the local share only, and assumes the balance to be supplied through federal grants.

Column (4): Annual Operational Support (Non-cumulative) required for operation of existing and new service. This represents the difference between operating costs and revenues.

Column (5): The Total Annual Cost (Non-cumulative) to the Transit District which is the sum of Columns (3) and (4).

Item (6): Bus-miles operated and number of buses are assumed to remain constant in Years Five through Eight, although route and service level adjustments may take place. Constant capital outlay cost in years Six through Eight reflect the bus replacement fund, and miscellaneous expenditures.

SECOND YEAR RECOMMENDATIONS

Beach Boulevard – Route 2. At the present time only sporatic service during the summer months is provided by the Pink Bus Lines along this route. This service cannot be considered effective for the expected usage in this corridor. Beach Boulevard is a state highway (39) and one of the heaviest traveled major arterials in the County, carrying from 30,000 to 40,000 vehicles per day along most of its length in Orange County. It is a heavily used recreation route from La Habra to Huntington Beach. Major attractors along this route include La Habra Fashion Square, Buena Park Shopping Center, City Halls of La Habra, Buena Park, Stanton, Westminster and Huntington Beach, Knott's Berry Farm, Japanese Deer Park, and the coastal recreation areas. Transfer capabilities with other district operations crossing this route will, of course, enlarge the actual service area of this route. Thirty minute weekday frequency is recommended and the estimated annual bus-miles is 325,000. The route length is approximately 21 miles.

State College Boulevard–Main Street–MacArthur – Route 8. This route, as described in the text, would use Imperial, State College, Chapman, Main (Santa Ana), and MacArthur thoroughfares to provide transit from La Habra–Brea to Fashion Island and Newport Center in Newport Beach. This route could also be implemented by modifying and expanding the South Coast operation which the District will have assumed in the first year. This route would serve the communities of La Habra, Brea, Fullerton, Anaheim, Orange, Santa Ana, Irvine and Newport Beach. Major attractions include Santa Ana Fashion Square, Fashion Island in Newport Beach, Orange County Airport, major employment complexes in Fullerton, Anaheim, Santa Ana, Irvine and Newport Beach, California State University at Fullerton, U.C.I., Anaheim Stadium, County Hospital and other public facilities. This route will also serve the elderly persons in Brea, and Santa Ana, along with the college age people adjacent to the two universities. Thirty minute weekday frequency is recommended, route length is approximately 28 miles, and the estimated annual bus-miles is 440,000.

Katella Avenue–Villa Park Road – Route 9. This route would be a major east-west line connecting Seal Beach–Cypress–Los Alamitos with the east part of the County (Anaheim, Orange, Villa Park). Major service points along this route include Rossmoor Leisure World, Los Alamitos Naval Air Station, Los Alamitos Race Course, Disneyland, Anaheim Convention Center, and Anaheim Stadium. Sixty minute weekday frequency is recommended initially and the estimated annual bus-miles is 178,000.

Westminster Avenue (17th Avenue) – Route 23). This route would provide east–west service to the communities of Seal Beach, Westminster, Garden Grove, Santa Ana, and Tustin. Public facilities, including Santa Ana College and strip commercial development, with adjacent residential areas characterize this route. The intersecting District routes will provide additional mobility for the individuals along this corridor. Thirty minute frequency is recommended and the estimated annual bus-miles is 226,000.

B. A Public Information Program

We must emphasize the need for a strong public information program on a continuing basis. During the course of our study our contacts with the public often prompted remarks such as, "What South Coast Bus Line? I've never heard of it and today I find that it runs within two blocks of my home." Clearly, there can be no hope for broad public patronage unless the available transportation system is well publicized. Following are twelve detailed suggestions as to how public information and promotion programs might be conducted. The list by no means is all-inclusive. Promotional imagination can produce other productive ideas.

1. Television and radio spot commercial messages, especially when new service is being introduced, or for the special promotions which follow.

2. Promotional advertising in selected local newspapers and magazines. Ads should be eye-catching and clever (San Diego uses one which reads "Keep in shape, – run for a bus.")

3. *Free* bus service for the first week after new service is instituted. There should be a great amount of advance publicity.

4. Free bus service for senior citizens on certain specified days and times.

5. Display board advertising (in good taste, and without violating esthetic standards.)

6. Cooperative "free-bus shopping days" in which merchants offer tokens or pay the fares in some other way.

7. Free bus service for a substantial period while a new residential area is building (to establish "bus travel havits.")

8. Roving "bus hostesses" serving coffee and punch at random times on random routes.

9. Special "bus courtesy days" – (You ride free if our bus driver fails to smile and say "Good Morning.")

10. A summer "Beach Special." Kids and teenagers, with or without surfboards, get a round trip for 40 cents. (Establishes "youth awareness" of the transit system.)

11. A "Transit Fun Day at Disneyland" (or other attraction). Each bus fare includes a ticket good for 50 cents discount on admission to Disneyland.

12. Contests from time to time (Guess the hour and day our new buses will be delivered. Name the buses in our fleet. ((National Airlines says "Fly Samantha to New Orleans.")) Help design a color scheme for our bus fleet. Be our one-millionth rider!.)

C. Monitoring Plan Guidelines

The success of the transit operation must be measured more in terms of how many people are riding than in the cost/revenue balance. It must be considered that every passenger on a bus represents a person-trip which otherwise would most likely have been made in a private automobile. Even if there weren't the other prime factors of community enhancement, reduction of air and noise pollution, economic savings to individuals and the community, etc., etc., the mere fact that automobile congestion is being alleviated would be reason enough to justify major effort and expenditure.

Thus, the results of providing public transportation must be constantly monitored and measured. This can best be done through a program which has the following basic elements:

1. Frequent *passenger* and *revenue* counts for *each* bus on each route.

2. Frequent "on-board" counts to accurately determine *where* passengers get on and get off.

3. Occasional on-board surveys (interviews) to obtain passenger attitudes as to service, efficiency, courtesy, etc.

4. Frequent "load factor" checks at key points on the system (the load-factor is the ratio of passengers to bus capacity.)

5. Secret "evaluators," who ride buses as ordinary passengers and report their findings as to driver courtesy, bus conditions, meeting of schedules, etc. Evaluators must be changed frequently, since they become known to drivers.

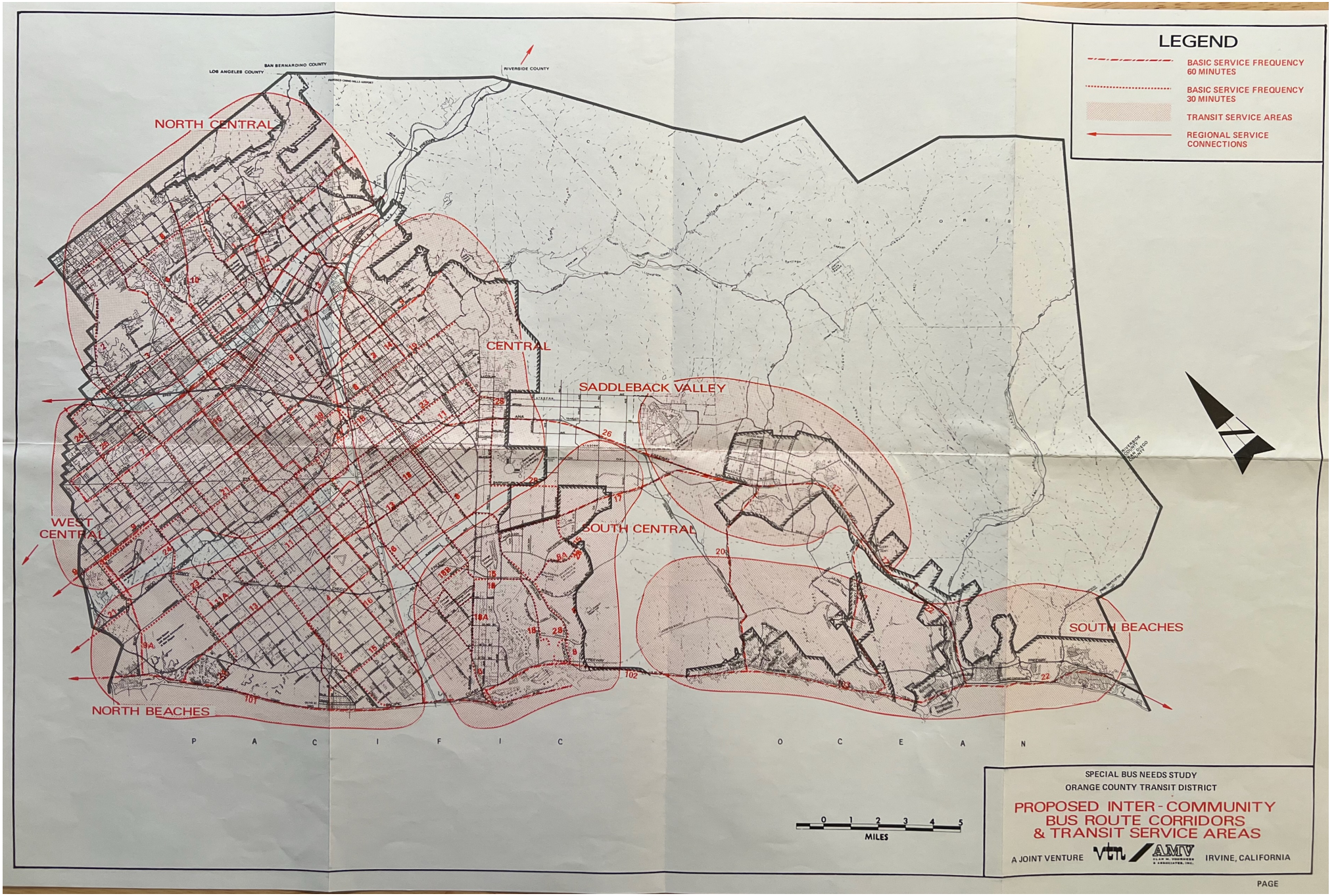
6. Constant "revenue passenger per mile" reviews in order to determine route performance, need to increase or decrease service, need to increase promotional efforts, etc.

7. Close observation of any trial services to determine actual patronage, growth patterns, and long-range potential.

8. "Before and after" studies of traffic conditions on routes where bus service is instituted. City and County Traffic Engineers should assist in this procedure.

9. Equipment maintenance cost records by bus and route. Such costs may vary substantially according to roadway conditions, passenger character, vandalism, stop and go driving, etc. Results could justify special equipment requirements on certain routes (such as heavy-duty shock absorbers, vandal-proof seats, extra hand rails, etc.).

10. Safety records by bus, route, and driver.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SPECIAL BUS NEEDS STUDY
ORANGE COUNTY TRANSIT DISTRICT
PROPOSED INTER-COMMUNITY BUS ROUTE CORRIDORS & TRANSIT SERVICE AREAS
A JOINT VENTURE
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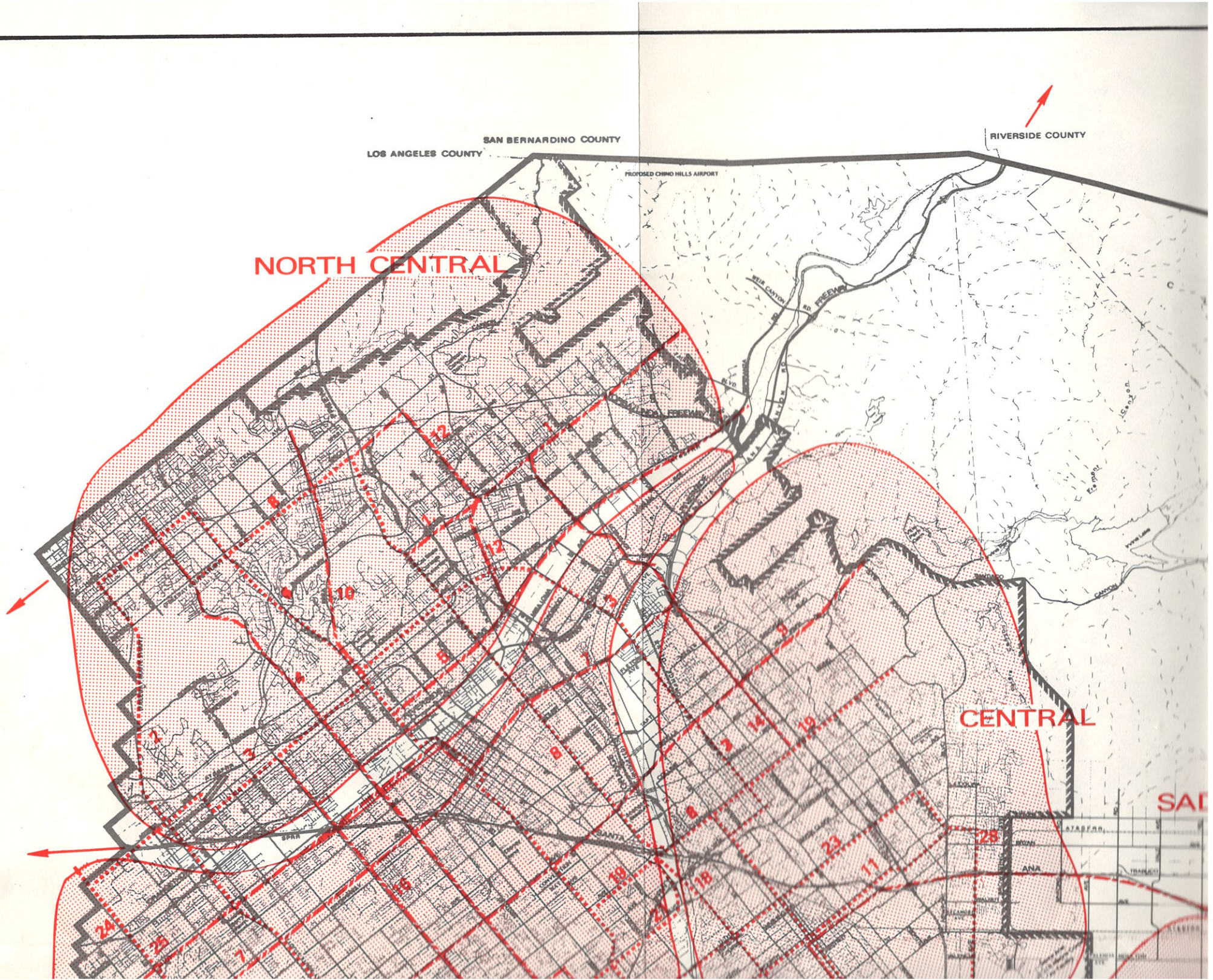
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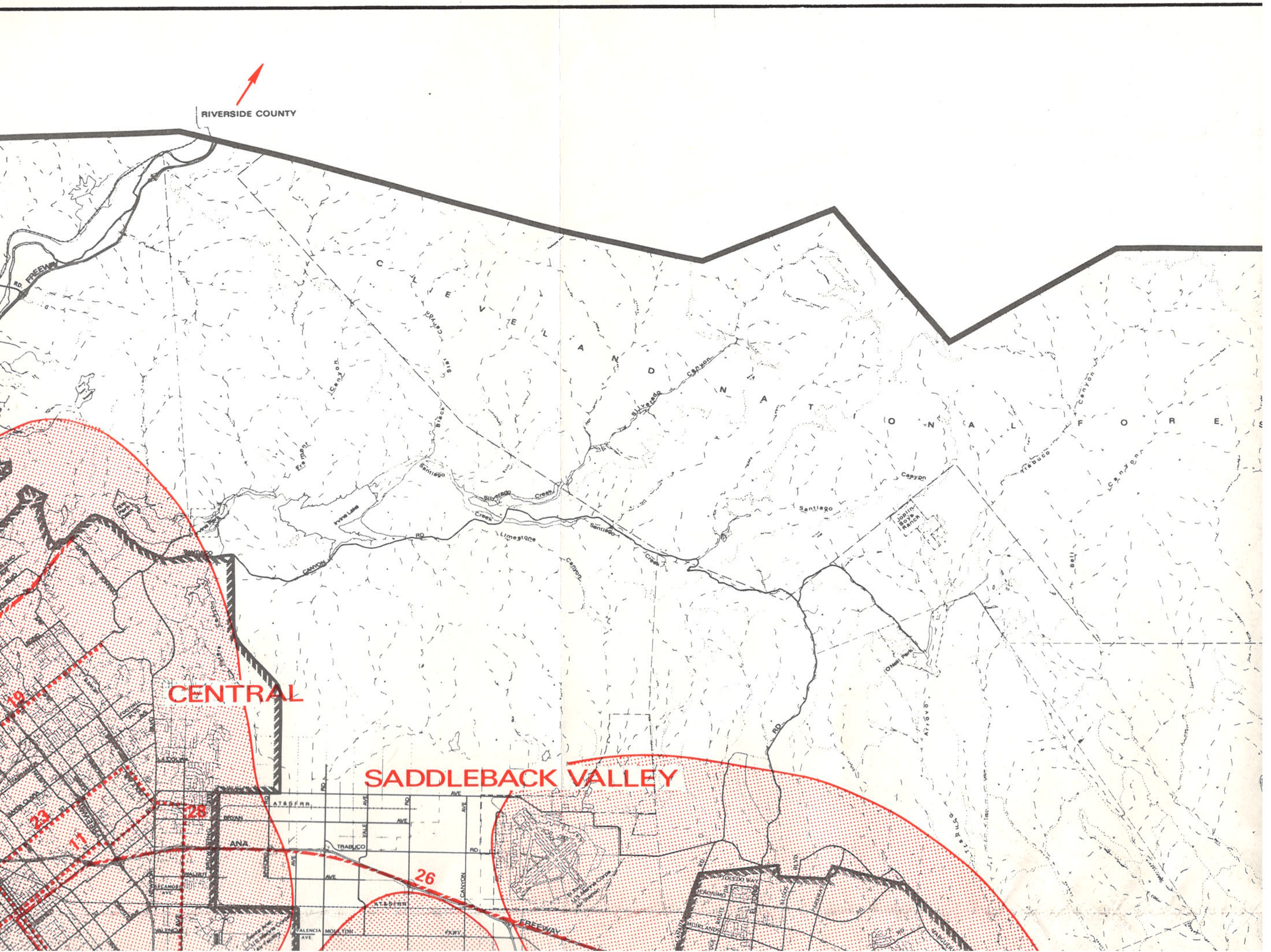

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Santiago Creek
Silverado Creek
Silverado Canyon
Black Star Canyon
Fremont Canyon
Irvine Lake
Limestone Canyon
Santiago Canyon
Trabuco Canyon
Bell Canyon
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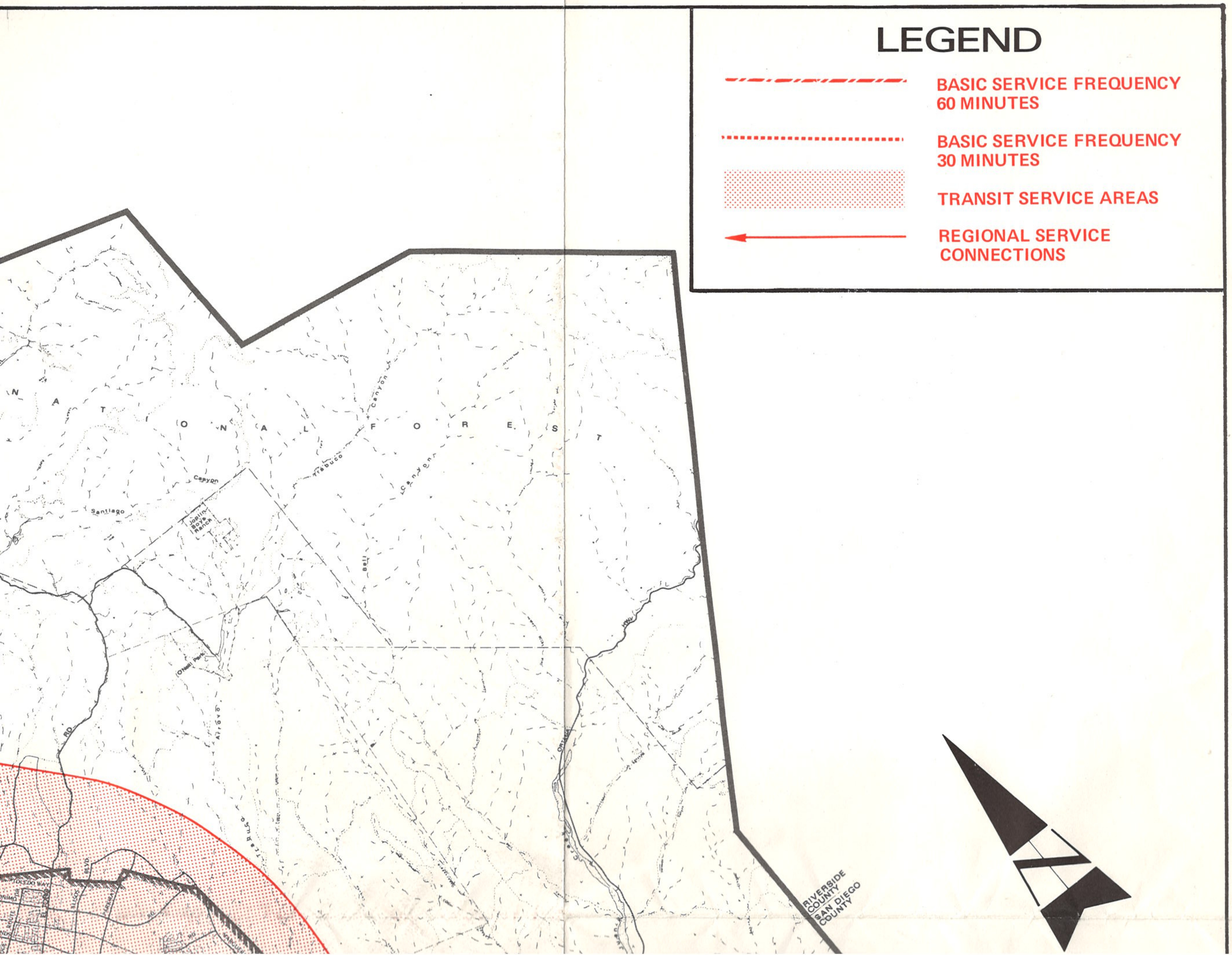
O'Neill Park
TRABUCO
AT&SFRR
VALENCIA AVE
MOULTON
TOLEDO WAY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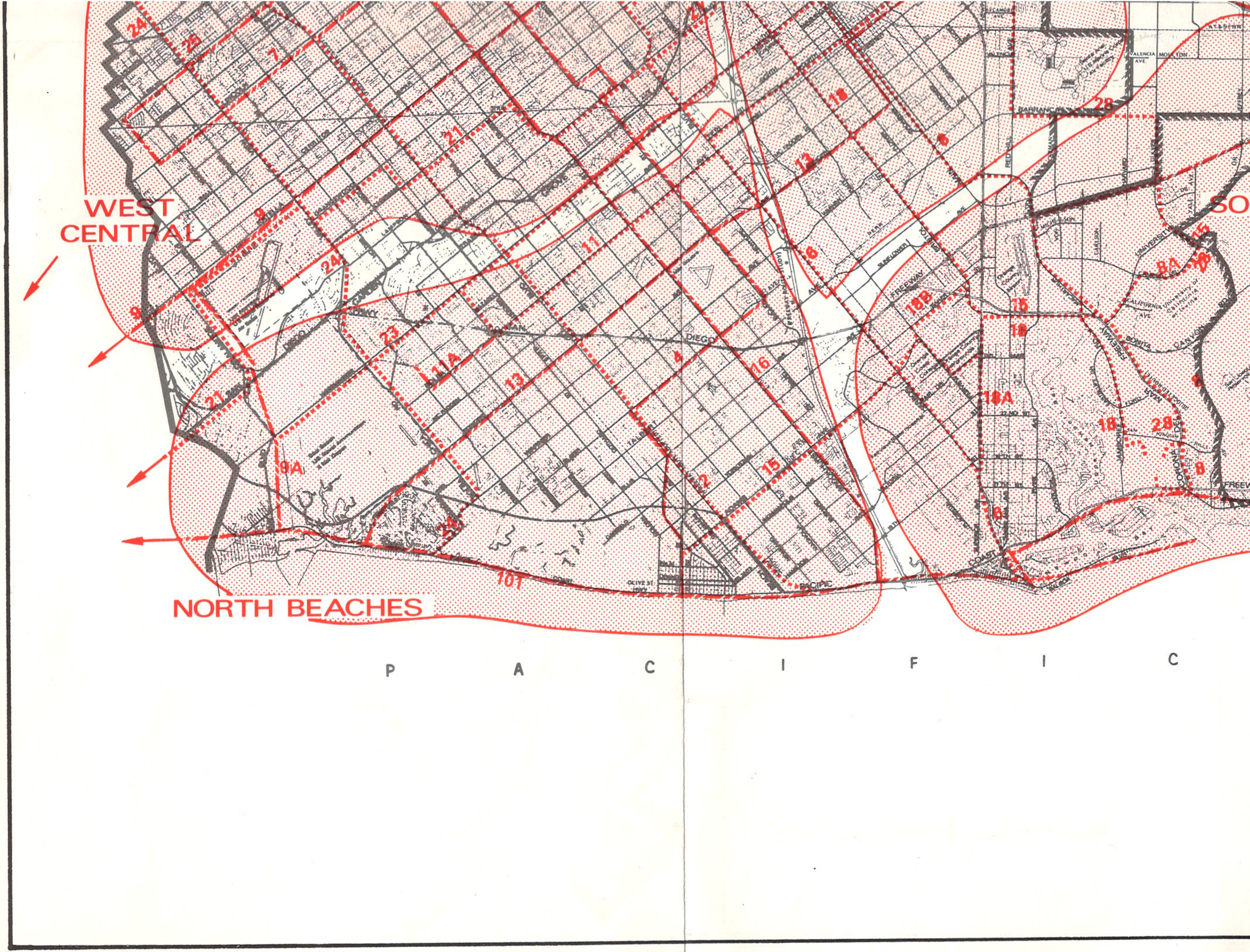
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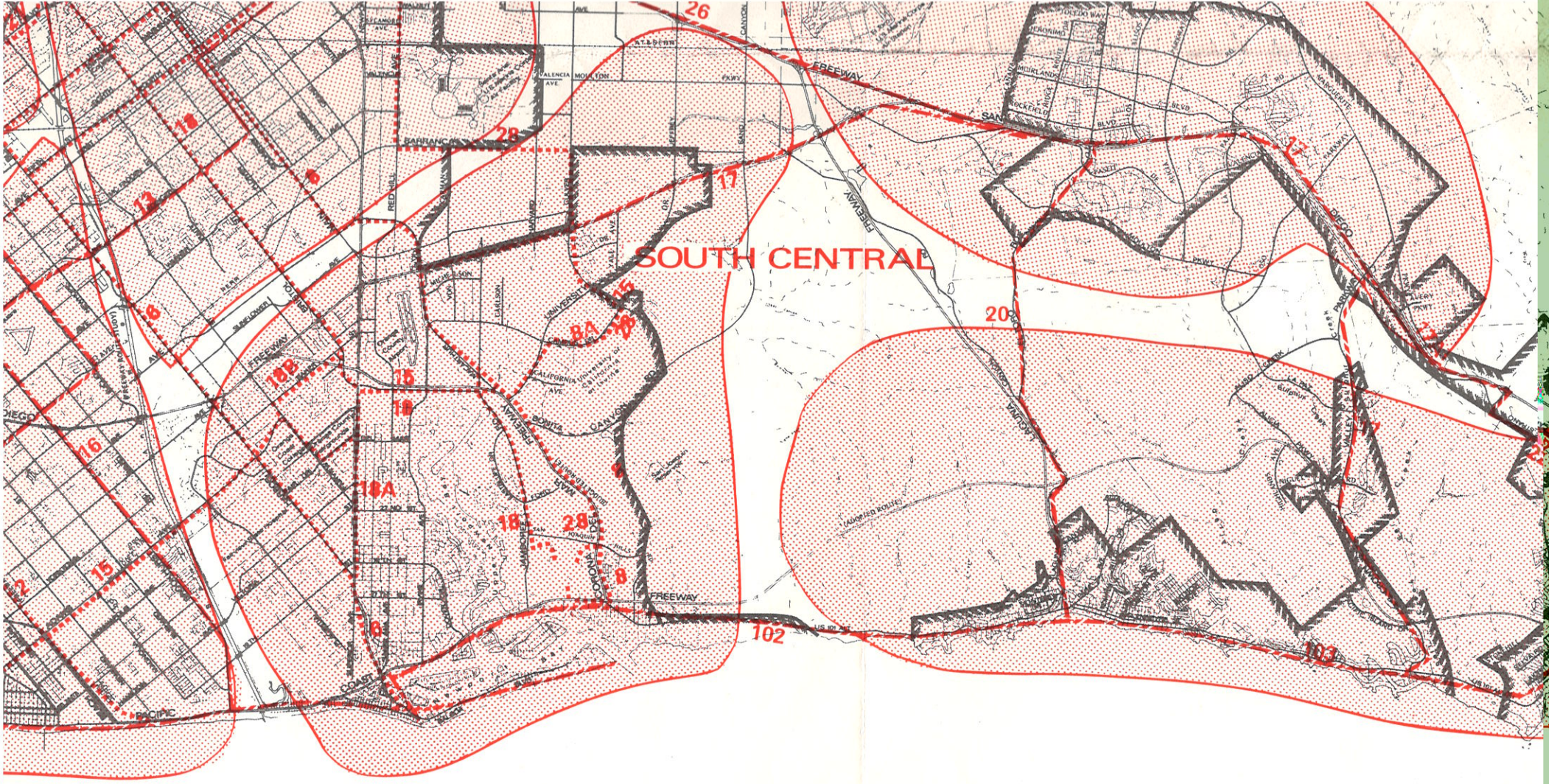
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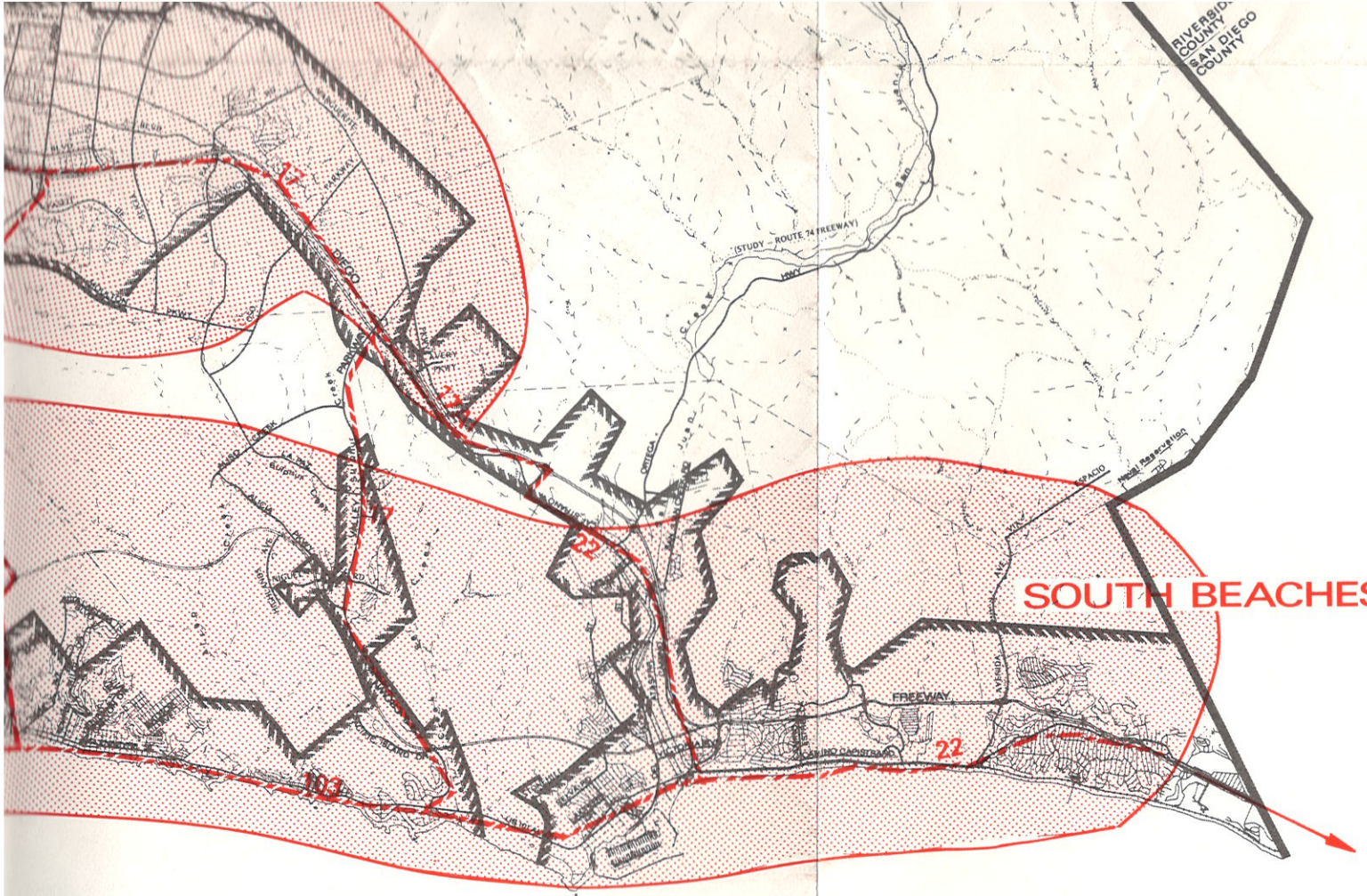

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MILES

SPECIAL BUS NEEDS STUDY

ORANGE COUNTY TRANSIT DISTRICT

PROPOSED INTER-COMMUNITY BUS ROUTE CORRIDORS & TRANSIT SERVICE AREAS

A JOINT VENTURE vtn / AMV ALAN M. VOORHEES & ASSOCIATES, INC. IRVINE, CALIFORNIA