HOV SYSTEM PLANNING STUDY

for the

SACRAMENTO METROPOLITAN AREA

INTERIM REPORT

EXECUTIVE SUMMARY

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Submitted To

Sacramento Area Council of Governments

By

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1.0 EXECUTIVE SUMMARY

This report covers the first phase of a two-phase study designed to develop specific recommendations for High Occupancy Vehicle (HOV) facilities in the Sacramento Metropolitan area that will maximize mobility in the light of projected future growth. Phase I of the study has entailed the collection of current traffic data, the identification of candidate HOV projects, the development of preliminary screening guidelines, and the projection of ridesharing demand on the candidate facilities for the current year and for the planning year 2010.

1.1 BACKGROUND

Sacramento freeways have become increasingly more congested in recent years, and several freeway widening projects have been proposed to relieve this congestion. To ensure that future freeway networks operate as efficiently as possible, a system planning study has been undertaken to explore the possibility of increasing vehicle occupancy rates through the use of HOV lanes. This study reflects Federal Highway Administration (FHWA) policy that HOV lanes shall "...be an essential alternative for evaluation in the project development process when considering an additional lane by restriping and/or reconstruction or widening on freeways with three or more lanes in one direction." The FHWA has further decreed that route-specific region-wide HOV system plans shall be developed as part of the regional transportation plan in all metropolitan areas.

In keeping with the FHWA directive, the California Transportation Commission (CTC) has passed Resolution G-87-8 stating that the long- and short-term feasibility and benefits of HOV lane operations must be examined when any new freeway facility or capacity addition is planned in a metropolitan area. The resolution also calls for region-wide planning for systems of bus and carpool lanes. This report represents the first step in that planning in the Sacramento Metropolitan Area.

1.2 DATA COLLECTION

During Phase I, the SYSTAN team assembled existing land use and transportation data from participating agencies and developed independent observations of vehicle volumes, occupancies, and speeds at prospective HOV locations. During the morning peak, occupancy

counts show that between 11% and 21% of the drivers on various Sacramento Area freeways currently carpool. Speed runs show major slowdowns lasting longer than an hour along the length of Business 80 and on Route 99 near Mack Road. Other areas of congestion include I-80 between Interstate 5 and Greenback Lane, and Route 50 east of Watt Avenue. Weekday transit ridership in the area during 1988 averaged 53,622 passengers during 1988, including 14,750 passengers on the light rail system.

1.3 CANDIDATE HOV PROJECTS

Candidate roadways for Phase II evaluation were identified by studying the current State Transportation Improvement Program (STIP), examining points of congestion in the existing network, projecting congestion in the year 2010 under a "do nothing" alternative, reviewing SACOG's Metro Study, and meeting with the technical advisory committee. This process led to the identification of the network elements mapped in Exhibit 1.1 as candidate HOV projects. These projects have been classified in five categories:

Category 1: HOV Lanes programmed in State TIP

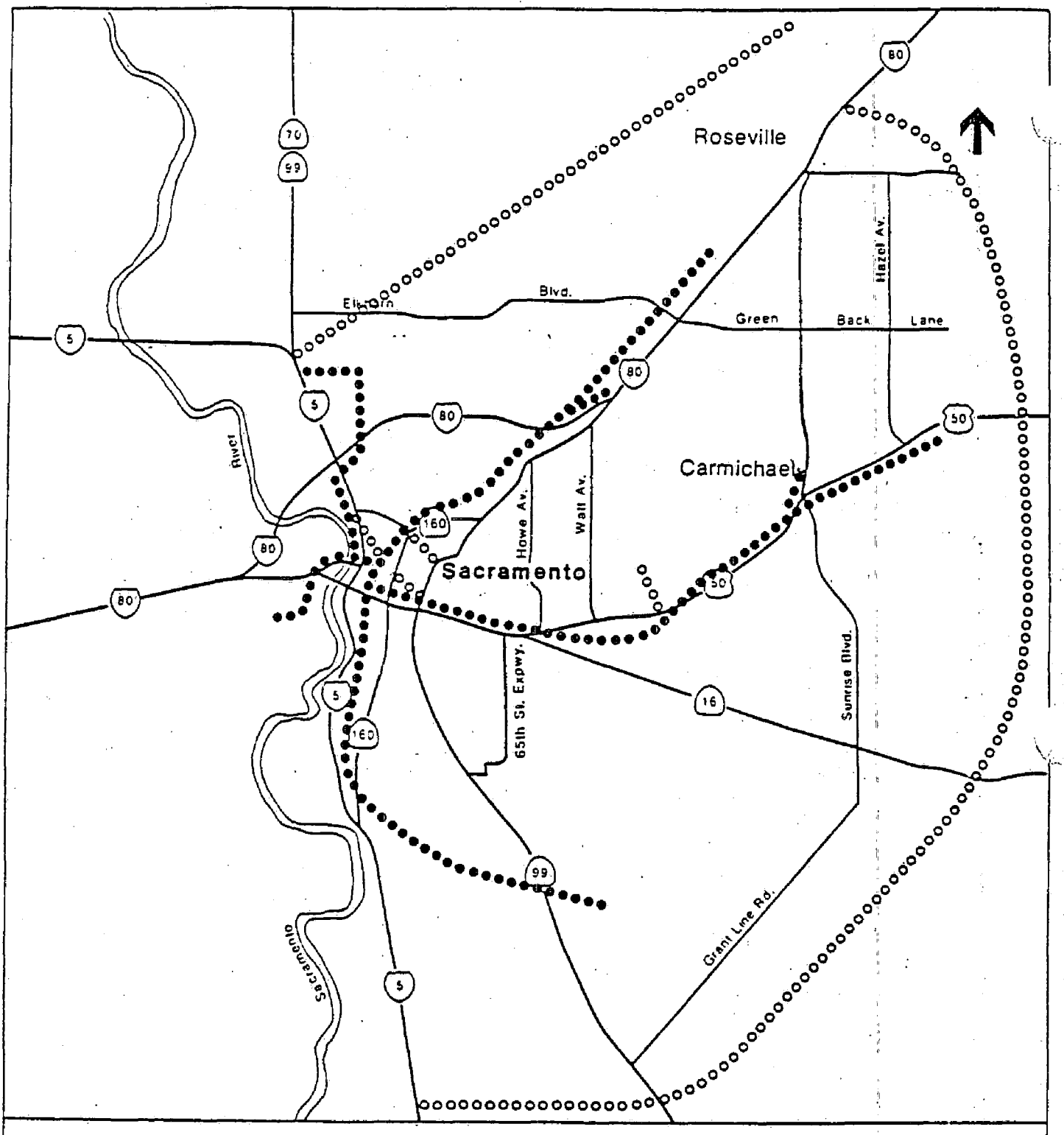
- State Route 99 between Mack Road and Martin Luther King Jr. Way

Category 2: RTP calls for widening with HOV consideration

- State Route 99 between Mack and Elk Grove
- Business 80 between E Street and State Route 160
- I-80 between I-5 and Business 80
- Route 50 between Sunrise Boulevard and the Sacramento/El Dorado County Line
- I-80 through the City of Davis, over the Yolo Causeway to the Route 50 junction to West Sacramento
- I-80 between the Business 80 Interchange and Rocklin Road

Category 3: Severe congestion forecast for 2010, but no project currently in RTP

- I-5 between I-80 and Freeport Boulevard
- I-5 between I-80 and the Sacramento Airport
- Route 50 between State Route 99 and Sunrise Boulevard
- Business 80 between State Route 160 and I-80
- Howe Avenue from State Route 50 to Business 80
- Route 50 from Jefferson Boulevard in West Sacramento to Route 99
- State Route 99 from Elk Grove Boulevard to Route 148 (South of Elk Grove)
- State Route 99 from Martin Luther King Jr. Way to Route 50
- Business 80 from Route 50 to E Street



●●●●● Light Rail Lines

○○○○○ New facilities in the road network on which HOV lanes were considered

EXHIBIT 1-2

EXPANDED ROAD AND RAIL NETWORKS

Category 4: RTP calls for widening but doesn't mention HOV lanes

- Sunrise Boulevard from I-80 to Route 50
- Watt Avenue from I-80 to Route 50
- Greenback Lane from I-80 to Hazel Ave.
- Richards Boulevard from I-5 to State Route 160

Category 5: New Projects and New Facilities

- Fly-over ramp from I-5 near Richards Boulevard to Downtown
- Fly-over ramp from State Route 99 and Route 50 to Downtown
- Route 65/148 from I-5 to State Route 99 to State Route 16 to Route 50 to I-80
- Route 102 from I-5 to State Route 65 to State Route 49 to I-80
- Richards Boulevard Extension from State Route 160 to Route 51
- New river crossing from Fair Oaks Boulevard/Arden Way Intersection to Bradshaw Road

The above projects include the future road and transit network recommended in SACOG's Metro Study, as well as some additions. In addition to these individual projects, future extensions of the regional light-rail transit network were identified (See Exhibit 1.2), and ramp meter bypass lanes were included as candidate HOV projects wherever ramp metering has been scheduled or congestion is likely to warrant future metering.

1.4 SCREENING PROCEDURES

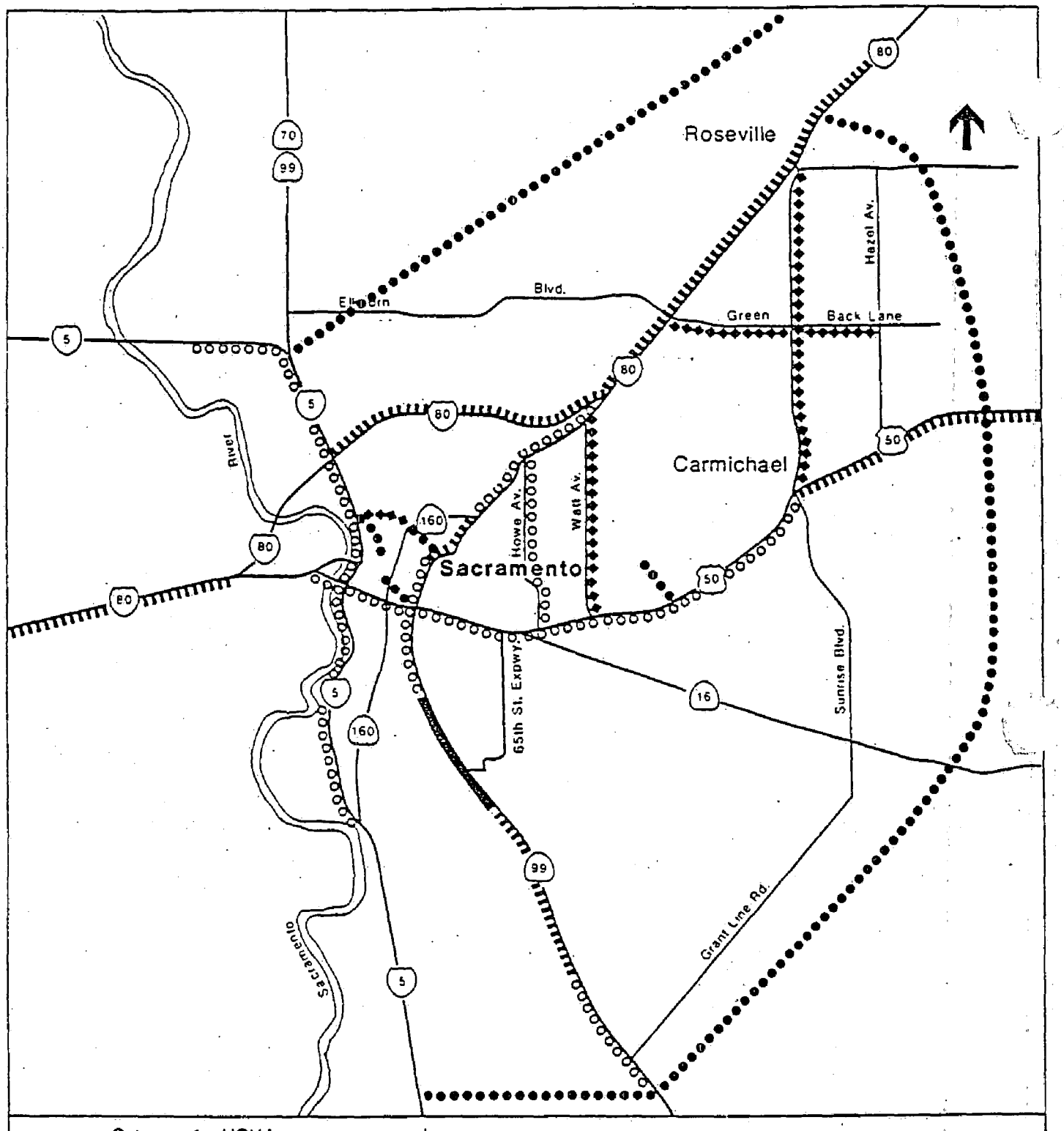
A set of quantitative guidelines were prepared to aid in setting priorities and developing preliminary assessments of candidate HOV projects. These guidelines are listed below.

1.4.1 Screening Guidelines

Existing Configuration. HOV lanes are a possibility when lane additions are contemplated on freeway segments having three or more lanes in one direction. The HOV project now under construction on Route 99, if successful, could redefine this guideline, since part of the project is now only two lanes in each direction. In general, HOV lanes should not be created by taking lanes away from existing mixed-flow traffic.

Existing Congestion. Potentially successful HOV projects should have either:

- 1600 vehicles per hour per freeway lane during the peak period; or



Category 1. HOV Lanes programmed in State TIP

Category 2. RTP calls for widening with HOV consideration

Category 3. Severe 2010 congestion; no project currently in RTP

Category 4. RTP calls for widening but doesn't mention HOV

Category 5. New proposals

EXHIBIT 1.1

ROUTE SEGMENTS UNDER CONSIDERATION FOR HOV LANES

- 1800 vehicles per hour per freeway lane during the peak hour; or
- Travel speeds under 30 mph for 30 minutes.

Potential Time Savings. Potentially successful projects should offer carpoolers a savings of at least 5 minutes during the most congested period.

Throughput. Commuter lanes should carry at least half as many vehicles per hour as adjacent mixed-flow lanes to avoid appearing underutilized. This will also ensure that the number of persons using the HOV lane exceeds the number in a mixed-flow lane.

Design Constraints. Commuter lanes should have no physical constraints limiting lane width or the availability of enforcement areas. Minimum lane widths of 12 feet should be available for freeway HOV lanes.

Support Facilities. HOV lane implementation should be considered in conjunction with such system support facilities as park-and-ride lots, special HOV parking centers, adequate transit service, carpool matching programs, vanpool programs, and effective collection and distribution service.

Enforcement Concerns. Adequate enforcement should be available and integrated into the design of the project, so that no more than 10 percent of the vehicles in the lane are illegal. At a minimum, enforcement pockets must be built adjacent to HOV lanes to provide physical protection for officers and adequate acceleration/deceleration room for apprehended violators.

Transit Operations. Time savings of three to five minutes per route are typically needed before transit systems can realize operating cost savings. Time savings of over five minutes are needed before mode choice is likely to be affected. Even if the absolute time savings available from bus priority treatments is relatively small, service reliability should increase significantly. All express routes in the vicinity of HOV lanes should be rerouted to take advantage of the lanes.

System Development. HOV lanes should be established as part of a system-wide network of priority lanes. This will ensure the widest possible benefits to HOV

users. A system-wide approach need not preclude the implementation of HOV lanes as bottleneck bypasses to give HOVs unobstructed flow and provide a head-of-the-queue advantage over mixed flow traffic.

1.4.2 Current Status of Candidates

Candidate projects meeting or exceeding each of the above guidelines for the base year (1985) were:

- State Route 99 between Mack Road and Martin Luther King Jr. Way; and
- I-80 North of Business 80.

Failure to meet a specific guideline does not necessarily disqualify a candidate project from consideration. In addition to State Route 99 and I-80, other projects may be expected to meet the guidelines as time progresses and traffic congestion grows in the Sacramento area. Several existing roadways (Business 80, Sunrise Boulevard) had sufficient congestion and throughput to warrant an HOV lane under current conditions, but a preliminary engineering inspection revealed physical barriers to HOV lane construction. All surface streets in the list of candidate projects had a number of physical drawbacks, including many abutting structures, closely spaced intersections, and a high incidence of signalized intersections. These constraints do not necessarily mean that it would be impossible to construct an HOV lane along the indicated routes. However, construction will almost certainly be more costly than on alternative routes, and HOV lane operations may be impaired.

1.5 DEMAND ESTIMATION

Two complementing approaches were used to estimate usage of the candidate HOV projects.

(1) A quick-response analysis using existing data and empirical formulas to focus on carpool formation on individual projects during the base year 1985.

(2) A network-wide exploration of the impacts of candidate projects on mode share, vehicle miles of travel, traffic delays, and other key measures of effectiveness.

1.5.1 Quick-Response Analysis

The success or failure of an HOV lane rests upon its ability to induce additional ridesharing. If an HOV lane merely shuffles vehicles so that current carpoolers are given a faster ride, it will not have served its purpose. On the basis of the quick-response analysis, three of the candidate HOV lanes appear to have the potential for inducing additional carpooling if implemented under today's congestion conditions. These are State Route 99 (between Mack and Martin Luther King Jr. Way), Business 80, and Sunrise Boulevard. (The preliminary screening noted several physical barriers which would have to be overcome to introduce HOV lanes on both Business 80 and Sunrise Boulevard.) As time passes and congestion increases, other candidate HOV lanes may be able to provide enough time savings to induce additional carpooling.

1.5.2 Network Modeling

To investigate the future demand for HOV lanes, and to document the network-wide impacts of the candidate HOV lanes, the DKS demand model was used to explore traffic conditions in the base year and the planning year 2010. The results of the modeling effort are summarized below.

Current Year Prospects. During the 1985 base year, the two travel routes which showed a significant increase in carpooling when 2+ HOV lanes were introduced were the routes from Elk Grove to downtown via Route 99 and from Roseville to downtown via Business 80. These were the same two routes which showed promising results in the preliminary screening and the quick-response analysis. On most other routes, current congestion levels do not provide enough of a time advantage to induce carpooling.

Planning Year Congestion. By the planning year 2010, the number of home-work person trips in the network increases from 903 thousand to 1.5 million, and so much congestion exists that most 2+ carpool lanes are filled and provide little time advantage for carpoolers. Even so, the 2+ alternative results in higher auto occupancy levels and lower delays and vehicle trips than any of the other 2010 alternatives.

While the number of person trips increases by roughly 70% between the base year and 2010, the number of person hours of delay encountered in the commute increases by a factor of roughly 2.5 in the expanded 2010 network. Average vehicle delays can be expected to increase

from around 5 minutes per trip at present to 7.6 minutes (6.4 minutes per person) in 2010. (Delays average 8.2 minutes if carpool lanes are not installed.) If the new facilities recommended in the SACOG Metro Study (i.e. Route 65/148 and Route 102 to Auburn) are not constructed, vehicle delays in excess of 10 minutes per trip can be expected by 2010. Even with these additions and the proposed HOV lanes, the resultant congestion suggests that additional road and transit improvements will be necessary to handle the demand projected for the expected 2010 land use distribution.

Transit Impacts. For a given transit network, transit mode share is not affected significantly by either the existence of HOV lanes or the definition of HOV eligibility. As would be expected, however, the extent of the transit network greatly influences transit ridership. The transit network defined in the Metro Study, with north and south extensions of the light rail system claims an estimated 3.1% of the home-work trips in the Sacramento area (3.3% when used in conjunction with 3+ HOV lanes), well above the 2.2% attracted by the base year network.

Ramp Meter Bypass Lanes. On a systemwide basis, installation of ramp meter bypass lanes on 50% of all metered ramps generates fewer carpools than mainline HOV lanes. On the average, each two-minute delay at the ramp increased the number of systemwide carpools by roughly 1%. This change is not larger because ramp meter bypass lanes at 50% of the metered on-ramps provide a time advantage to a relatively small number of the vehicles in the system. Even so, the number of single occupant vehicles decreases systemwide, and from 10,000 to 18,000 new carpools are added to the system as ramp meter delays increase. Although ramp meter bypass lanes do not generate the same modal shift as mainline HOV lanes, they are much cheaper to install, safer, and easier to enforce. Accordingly, the possibility of introducing bypass lanes along Sacramento's freeways will be carried forward in Phase II of the investigation.

1.6 FUTURE DIRECTIONS

This interim report covers Phase I of the current investigation of HOV lanes in the Sacramento metropolitan area. In Phase II, a planning-level feasibility study will be undertaken for each project, traffic-engineering impacts will be evaluated, system continuity will be addressed, the effect of HOV lanes on transit ridership will be assessed, enforcement requirements will be coordinated, costs will be estimated, and projects will be evaluated for the purpose of

recommending time-phased priorities. A final report will be prepared and presented to oversight committees and to the public.

The final report will reflect the requirements of the California and Federal Clean Air Acts, and will evaluate the contribution alternative HOV systems will make toward meeting such clean air requirements as the 1.5 person-per-vehicle peak-hour occupancy rate targeted for 1999.

Depending on the results of this study, a third phase may also be necessary. This third phase would be needed to examine the potential for HOV lanes on additional surface roads and new roads serving new growth areas.

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December 27, 1989

Transportation & Community Development Committee
City of Sacramento

Honorable Committee Members:

The Sacramento Area Council of Governments (SACOG) has contracted with SYSTAN Inc. to develop a High Occupancy Vehicle System Planning Study for the Sacramento region. The goal of the study is to approve a list of projects that can be advanced into the Regional Transportation Plan or Regional Transportation Improvement Program, as appropriate.

In December, an Interim Report was prepared and approved by the SACOG Board of Directors. The report lists projects which are currently under consideration for HOV facilities and discusses the guidelines that will be used to further evaluate the projects as the study continues. Potential HOV projects are currently being evaluated, and a final list is anticipated to be ready in April. An Executive Summary of this report is enclosed for your review.

Councilwoman Lynn Robie, your representative on the SACOG Board of Directors, has asked that we present this information to you as soon as practical. Your staff has indicated that January 9, 1990 would be the earliest opportunity for this presentation. Mr. Doug Reed and Mr. Ken Hough of my staff will be at your meeting to make a presentation and answer your questions.

Sincerely,

MICHAEL HOFFACKER
Executive Director

MH:DR:bb
Enclosure

Transmittal to Committee:

David R. Martinez
Deputy City Manager