STANISLAUS COUNTY
REGIONAL EXPRESSWAY STUDY

Task Group 1 and 2 - Summary Final Report
Study Context, Criteria and Assumptions
Expressway Needs, Opportunities and Constraints

Task Group 3 - Draft Final Report
Recommended Ultimate Expressway System

Task Group 4 - Draft Report
System Design Concepts and Implementation Options

Prepared for
Stanislaus Area Association of Governments

June 14, 1990
89-345

Fehr & Peers Associates
Transportation Consultants

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SAAG REGIONAL EXPRESSWAY STUDY
TASK GROUP 3 REPORT

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I. INTRODUCTION

Stanislaus County's population and employment are expected to double within the next twenty years. Traffic conditions, which are already approaching critical levels in some parts of the region, will become considerably worse unless roadway improvements keep pace with this growth. Recent studies have shown that significant capacity increases will be needed along State Routes 132, 108 and 99 and along other primary travel corridors. These studies suggest that one way to substantially expand the area's street and highway capacity would be to develop a regional expressway system.

Expressways provide considerable capacity and safety advantages over normal arterials, and they generally require less land and are less expensive to build than full freeways. They have higher design standards, greater access restrictions and greater freedom from cross traffic than arterials streets, but they do not meet freeway design standards. Expressways are designed to remove longer-distance "through" traffic from urban arterials, freeing them to carry shorter-distance trips.

The Stanislaus Area Association of Governments (SAAG) has selected Fehr & Peers Associates to help identify potential locations for expressways within the region. The goals of this Regional Expressway Study are as follows:

- To establish the need for an expressway system
- To determine the preferred location and phasing
- To define the preferred expressway design concept
- To assess environmental and General Plan issues associated with the expressway plan
- To define the financing and institutional arrangements needed to implement the plan
- To gain consensus among the various state and local agencies and jurisdictions affected by the expressway plan

The desired product of the study is information to be used in preparing an amendment to the SAAG Regional Transportation Plan (RTP). Subsequent to this study, additional studies may be conducted to: identify and protect right-of-way; establish fees or other funding mechanisms; prepare plans, specifications, designs and cost estimates; produce environmental documentation. These subsequent studies will be intended to lead directly to funding, engineering and construction of the expressway system.

The present study is composed of five task groups:

1. Establish Study Context, Assumptions and Evaluation Criteria.
2. Determine Need for an Expressway System and Key Constraints and Opportunities.
3. Identify the Preferred Ultimate Expressway System Concept.
4. Refine the System Concept and Prepare Implementation Strategy.
5. Select Expressway System and Implementation Plan.

This report summarizes the final results of Task Group 1 (Study Context, Assumptions and Evaluation Criteria), and Task Group 2 (Expressway Needs, Opportunities and Constraints). Complete information on these two tasks was presented in our December 12, 1989 report on Tasks Groups 1 and 2.

This report also reviews and refines information originally presented in our March 9 report on Task Group 3, the Preferred Ultimate Expressway System. It also presents preliminary findings and recommendations on Task Group 4. This includes system design concepts, phasing costs, funding, implementation options, and performance policies.

II. NEED FOR AN EXPRESSWAY SYSTEM

A. Regional Development Forecasts

The planning horizon for this study is twenty years, consistent with the horizon for the Regional Transportation Plan (RTP). SAAG and its member jurisdictions have projected year 2010 population and employment levels for the Stanislaus region. These projections are listed in Table 1.

The region's 1990 population is about 363,000, and its employment is about 141,000. There are presently about 39 jobs in the County for every 100 residents, which translates to less than 90 jobs in the County for every 100 employed residents. Significant numbers of the region's residents commute to work at locations outside of the area, such as the San Francisco Bay Area.

The most recent projections for 2010 suggest that the area's population will exceed 700,000 and its employment will reach about 300,000. These represent an approximate doubling of both population and employment. The region's job/housing balance will improve slightly from 39 jobs for every 100 residents to 43. As a consequence, traffic levels within the region are expected to grow considerably. Out-commuting is also predicted to grow substantially, but at a lower rate than intra-county travel.

SAAG has allocated the projected population and employment to planning zones within each City and the unincorporated areas of the County. The distribution is in accordance with current General Plans. Several cities are in the process of updating their General Plans. However, as approved by the Study Advisory committees and SAAG Policy Board, the Regional Expressway Study will be based on adopted plans, and SAAG's current 2010 land use forecasts.

Alternative land use forecasts have also been analyzed. One series of sensitivity tests evaluated the County's remote development concept. This concept holds the regional population and employment forecasts constant at about 700,000 people and about 300,000 jobs, but it shifts

Table 1

REGIONAL POPULATION AND EMPLOYMENT PROJECTIONS

City (General Plan Area)	Population		Employment	
	1990	2010	1990	2010
Ceres	28,600	61,700	10,100	25,600
Hughson	3,000	7,800	1,900	4,100
Modesto	191,100	379,500	83,900	173,200
Newman	4,700	13,500	1,400	5,400
Oakdale	12,800	22,000	5,800	10,200
Patterson	8,800	19,100	1,500	6,200
Riverbank	9,500	19,700	3,500	8,000
Turlock	46,000	96,300	19,200	42,700
Waterford	3,400	6,400	1,000	2,400
Other	55,400	74,700	13,200	21,800
County Total	363,300	700,700	141,500	299,600

Jobs/Resident: 0.39 in 1990
0.43 in 2010

the development pattern. It places greater emphasis on development in western portions of the county, such as the Mapes Ranch and Lakeborough areas, and it reduces the levels of new development in the existing cities and eastern County areas.

Other sensitivity tests were performed in the Modesto Area. This testing used Modesto's citywide traffic model, which contains the detailed land use information that the City is using in its current circulation planning, Capital Facilities Financing Plan, and Urban Village studies. These land uses differ somewhat from the balanced regional forecasts which were adopted as the primary basis for the expressway study.

Stanislaus County and its cities may actually develop in a pattern which differs from any of those considered in this study. Potential changes in the currently anticipated development scenarios include:

- Major new growth areas could emerge in western parts of the county in addition to Lakeborough and Mapes Ranch.
- A new regional airport could be sited in the western part of the county.
- Improved transit service could affect the need for expressways.

If such circumstances do arise, the findings and recommendations of this regional expressway study should be reviewed and updated accordingly.

B. Expected Levels of Traffic Congestion

1. Regional Travel Growth

Stanislaus County's population and employment are projected to double within the next twenty years, doubling the amount of traffic generated within the County. Neighboring County's are also expecting to experience considerable growth, so that the amount of travel passing through Stanislaus County will also increase substantially. Congestion at existing traffic constraint points will worsen considerably, and new congestion points will arise.

2. Planned Non-Expressway Improvements

The Stanislaus Regional Expressway System is intended to supplement already planned improvements to the area's street and freeways systems. It will ease traffic flow through areas that would otherwise remain capacity-deficient even after all reasonably foreseeable improvements have been made to existing circulation networks.

Such "baseline" improvements include facilities that are already programmed within the short-term State and regional Transportation Improvements Programs (STIP and TIP), and those which are high-priority components of longer-range programs, including the SAAG Regional Transportation Plan (RTP) and the Caltrans Route Development Plan (RDP). Baseline improvements also include roadway projects specified in the General Plans or Capital Facilities Plans of the Stanislaus cities and the County.

Not all of these facilities would necessarily be in place by 2010. However, for purposes of this study it was assumed that these improvements would be in place before expressways would be developed in parallel corridors.

The baseline improvements are described fully in our December 1989 Task Group 1 and 2 report. They include one expressway that is a high-ranking regional priority in both Stanislaus and San Joaquin Counties, and which the consultant team was instructed to assume to be a "given" for the year 2010. That is the east/west expressway on Route 120 from Route 99 near Manteca east through southeastern San Joaquin County and northern Stanislaus County. It includes the following segments: Escalon Route 120 Bypass, Oakdale 120 Bypass, Lancaster Expressway, Valley Home Expressway. The following are also included in the baseline projects list:

- Spot interchange improvements along Route 99 and completion of Keyes Fwy.
- Route 108, widening from Route 219 to west Oakdale.
- Route 132, Empire railroad grade separation and widening from Empire to Waterford.

- o Fifty-two roadway widening projects identified in the County's proposed Capital Improvements Plan, including widening many County roads to four-lanes
- o Modesto arterial widenings; consistent with the City's recently adopted Capital Improvements Program, as well as: Richland-Tioga bridge, Faith Home Road bridge, Lincoln-Lakewood bridge.
- o Ceres area, widening major arterials to up to five lanes as needed.
- o Turlock area, widening major arterials to at least four lanes and six if needed.
- o Oakdale area, an east/west local bypass for Route 108, South Yosemite improvements (four lanes), and J Street extension.
- o Riverbank area, widening arterials to four lanes as necessary.
- o Hughson area, widening arterials to four lanes as necessary.
- o Waterford area, widening arterials to four lanes as necessary.
- o Patterson area, southerly bypass of Las Palmas, Sperry four-lane arterial.
- o Newman area, widening Moyer, Merced, Orestimba, Stuhr Road, Fink Road to four lanes if necessary.
- o In San Joaquin County, the following freeway widenings: Route 120 to six lanes from I-5 to Route 99, Route 132 upgrade to four-lane expressway from Stanislaus County to I-580, Route 205 to eight lanes from Alameda County to I-5, I-5 to ten lanes from I-205 to Route 120, Route 99 to six lanes from Ripon to north of Route 120.

3. Projected Traffic Congestion - Need for an Expressway System

The planned improvements identified above will not provide sufficient capacity to off-set expected traffic growth. Under this "non-expressway" scenario, less than three-fourths of all travel in Stanislaus and San Joaquin counties will be accommodated at acceptable levels of traffic efficiency (Level of Service A, B, or C). About 26% of all travel in the two counties will occur at congestion levels which are considered unacceptable (Levels of Service D, E or F). About half of this (about 12% of all travel in the two counties), will occur under extreme congestion (Level of Service F). This 12% represents the degree by which the projected traffic

volume will exceed the planned roadway capacity. It suggests that the region's street and freeway system will be capable of carrying less than 90% of the travel demand generated in the region in year 2010.

The purpose of this study is to define an expressway system which best meets the goals of the Stanislaus region. These goals were ascertained earlier in this study through a survey of members of the Expressway Study Advisory Committee, the SAAG Technical Advisory Committee, SAAG Citizens Committees, and the SAAG Policy Board. The most important expressway evaluation criteria were found to be: (1) traffic safety, (2) air quality, (3) traffic capacity and level of service, (4) regional economic impacts, and (5) mobility. In view of these goals, the expected high levels of congestion in the year 2010 are unacceptable. They will have adverse effects on travel safety and service level, air quality, mobility and the regional economy.

To meet its goals, the Stanislaus region will need to identify roadway capacity improvements by developing new routes and/or by increasing the capacity and operating efficiency of existing and planned routes.

C. How Expressways Can Reduce Congestion

1. What An Expressway Is

Caltrans defines an "expressway" as follows:

> An arterial highway with at least partial control of access, which may or may not be divided or have grade separations at intersections.[1]

Within this definition, a wide range of facility types may be considered expressways. Access control may be as minimal as restricting left-turn movements at driveways and collector streets,

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1 Caltrans, Highway Design Manual, 1986.

or it may involve the complete elimination of all driveway and collector street connections. Intersections with major arterials may be signalized, or they may be grade-separated interchanges. Although the design characteristics of expressways vary, the functional distinction between an expressway and an arterial street is well understood. "Expressways are facilities that provide for through-traffic movement with limited direct access to abutting property. Expressways serve a similar function to that of highways - the fast and safe movement of people in an urban setting."[2] The principal functional differences between an expressway and a major arterial street are safety, capacity and travel speed. Statewide, expressway accident rates per vehicle mile are about half the rates found on arterials. Expressways also offer capacities and travel speeds that are 20% to 50% higher per lane than arterials.

Stanislaus County presently has three expressways: Briggsmore Avenue in Modesto, Golden State Boulevard just north and south of Turlock, and Route 99 near Keyes. These facilities illustrate some of the principal features of expressways:

- Signals spaced infrequently (Briggsmore and Golden State north), or no signals at all (Route 99 and Golden State south).
- Infrequent driveways with right-turn-only access (Briggsmore), or no driveways at all (Route 99).
- Wide medians to store left-turns to and from stop-sign controlled side streets (Route 99, Golden State), or no side-street left-turns (sections of Briggsmore).

A four-lane expressway generally requires about 110 feet of right-of-way. Cross-section standards vary, but Figure 1 shows a typical configuration, including:

median - 22 feet
traffic lanes - 48 feet
shoulders, buffers - 40 feet

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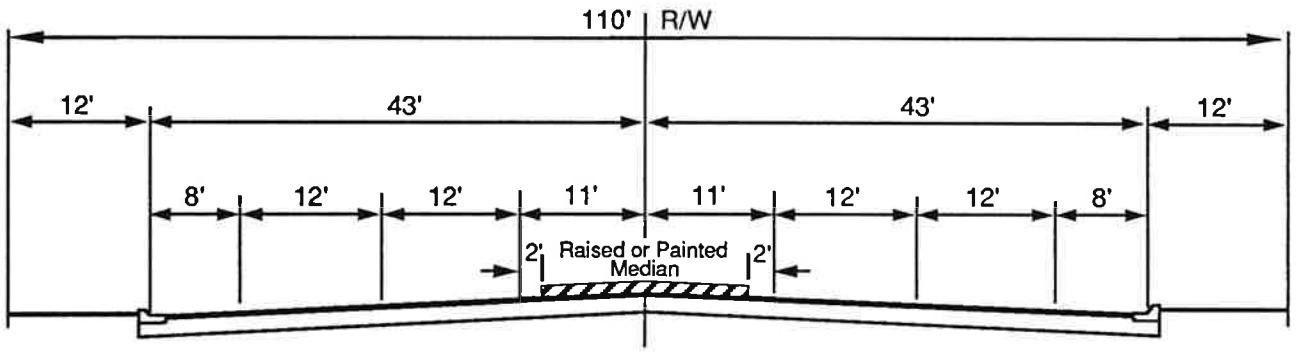
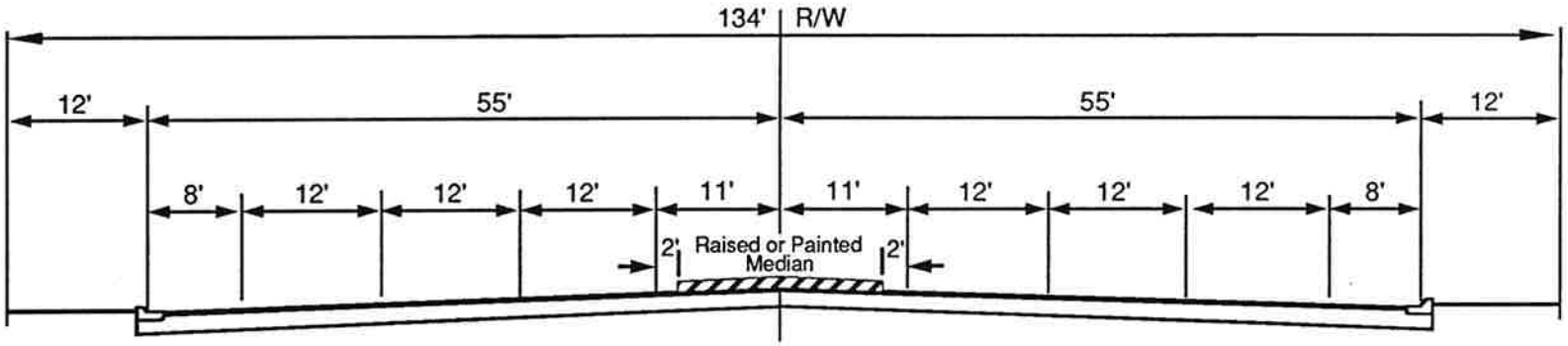
2 Stanislaus County General Plan, 1987.

Figure 1
Typical Expressway Cross Section



4 Lane Expressway



6 Lane Expressway

A six-lane expressway requires an additional 24 feet for traffic lanes, and require a total right-of-way of 134 feet.

For high-design expressways, additional right-of-way is required at major cross-streets for turn-lane channelization or interchanges. At-grade intersections require about 134 feet of right-of-way for four-lane expressways and about 158 feet for six-lane expressways. Grade-separated interchanges can require up to 200 feet of right-of-way within about 1,000 feet in each direction from the cross street. Such interchanges also significantly restrict access to parcels within 1,000 feet of the cross street.

2. Capacity Benefits of Different Classes of Expressway

For planning purposes, the variety of different expressway design concepts can be considered as three generic classes. Table 2 presents the principal features of each class. Figures 2 and 3 illustrate the three concepts.

Class A is the highest-level design. It prohibits access to/from driveways and minor streets and has full interchanges at major cross streets. It is similar to a full freeway, but its interchanges and design-speeds are reduced from Caltrans and FHWA freeway standards. A Class A expressway has a mainline design speed of 50 to 55 miles per hour and interchange ramp speeds of 25 to 30 mph, compared with a full freeway with 70 mph design speeds and 35 to 40 mph ramps.

Class B expressways have restricted access from driveways and minor side streets, but they do not have interchanges. Major cross street intersections are signalized with multiple turn lanes. The expressway receives 65% to 75% of the traffic signal "green time", and therefore 65% to 75% of the intersection capacity. Consequently, Class B expressways have 30% to 50% more capacity than major arterials with the same number of lanes.

Class C expressways have minor access restrictions, but allow left-turns to/from occasional collector streets. Major intersections are signalized, with 55% to 65% of the green time. Class C expressways are similar to major arterial streets, but their access controls and preferential

Table 2

EXPRESSWAY DESIGN CLASSES

Access Control[1]	Class A	Class B	Class C
Driveways	None	None	Right-Turn-Only
Collector Streets	None	Right-turn-only	Left-Turn Staging in Median
Major Streets	Interchange	Signalized	Signalized
Speed	50-55	45-50	40-45

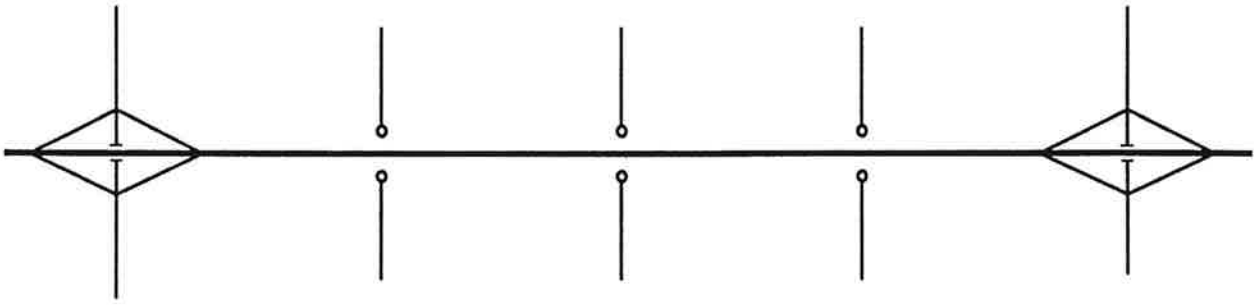
	Class A		Class B		Class C	
	4-lane	6-lane	4-lane	6-lane	4-lane	6-lane
Capacity (ADT)						
Capacity - Maximum	60,000	90,000	50,000	75,000	45,000	65,000
Capacity - @ LOS C/D	48,000	72,000	40,000	60,000	36,000	52,000
Right-of-Way						
Mid-Block[2]	110'	134'	110'	134'	110'	134'
Intersections	175'	200'	134'	158'	134'	158'

1 See Figures on following pages

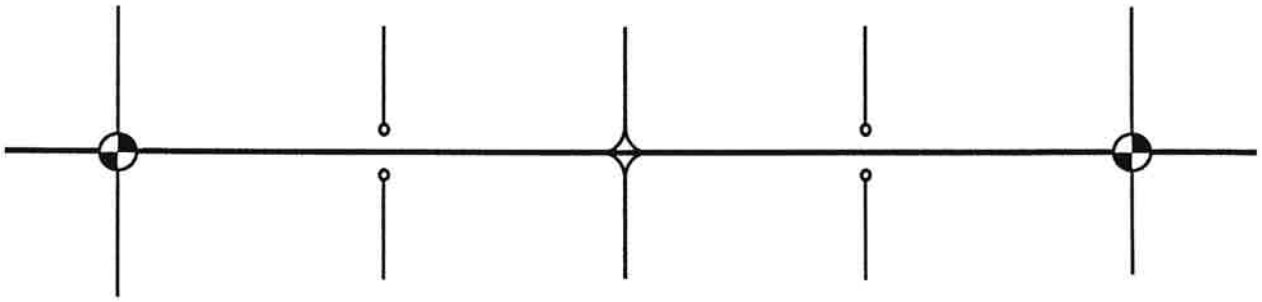
2 If built to Caltrans standards, additional right-of-way would be required

Figure 2
Expressway Design Classes

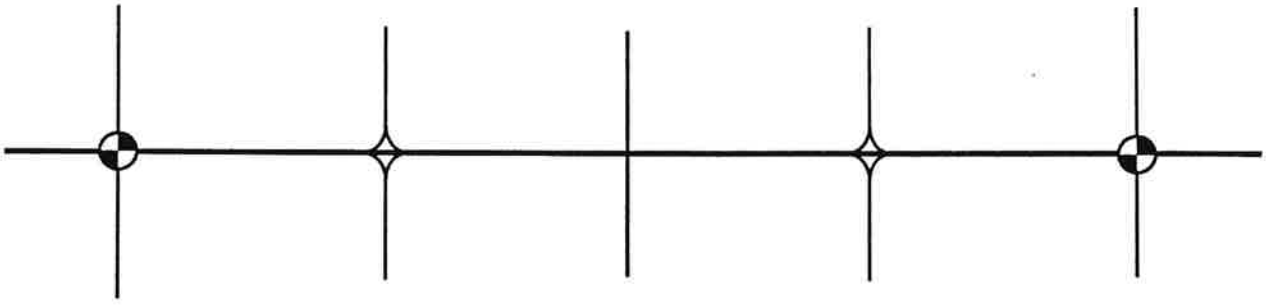
Class A



Class B

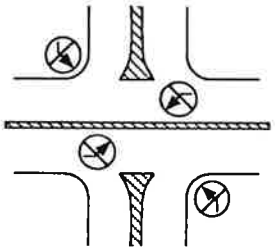
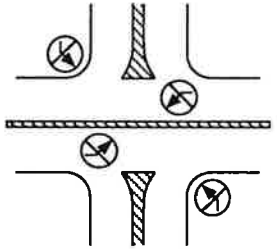
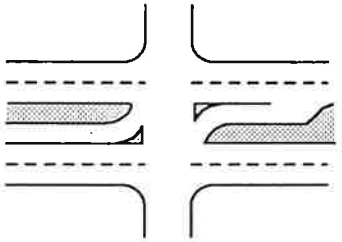
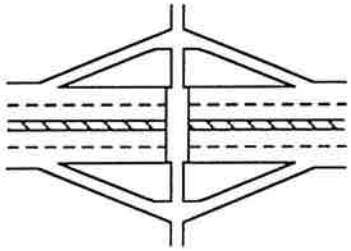
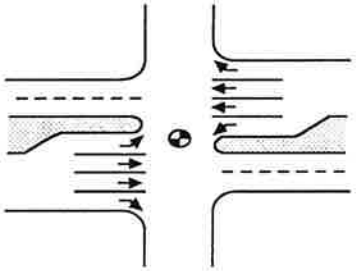
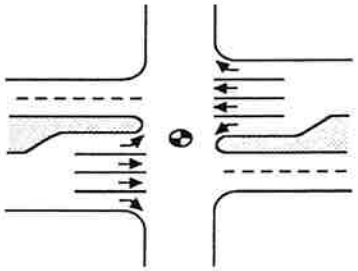


Class C



This diagram illustrates levels of side-street and driveway access permitted on a one-mile section of typical Class A, Class B and Class C expressways, see next figure for greater detail on individual types of access.

Figure 3
Expressway Access Management

Type of Access Point	Minimum Spacing along Expressway (if permitted at all)	Typical Design of Access Point		
		Class A Expressway	Class B Expressway	ClassC Expressway
Driveway	>300ft.	(Not Permitted)	(Not Permitted)	
Collector	1/4-1/2 mi.	(Not Permitted)		
Arterial	1 mi.			

treatment at intersections give them about 20% more capacity than an arterial with the same number of lanes.

Any of the three generic expressway types can be constructed as either four-lane and six-lane facilities. A regional expressway can include a mix of expressway classes and four-lane and six-lane widths.

III. CANDIDATE EXPRESSWAYS

Earlier phases of this study identified 26 candidate corridors for consideration as components of a regional expressway system. The candidate identification process included the following steps:

1. Review of current SAAG Regional Transportation Plan (RTP), Caltrans STIP, RDP and Route Concept Reports, and adopted local county and city circulation plans.

2. Review of recent SAAG corridor studies.

3. Discussions with the Regional Expressway Study Advisory Committee, SAAG Technical and Citizens committees and the SAAG Policy Board.

4. Preliminary 2010 traffic demand analysis for the combined Stanislaus and San Joaquin region .

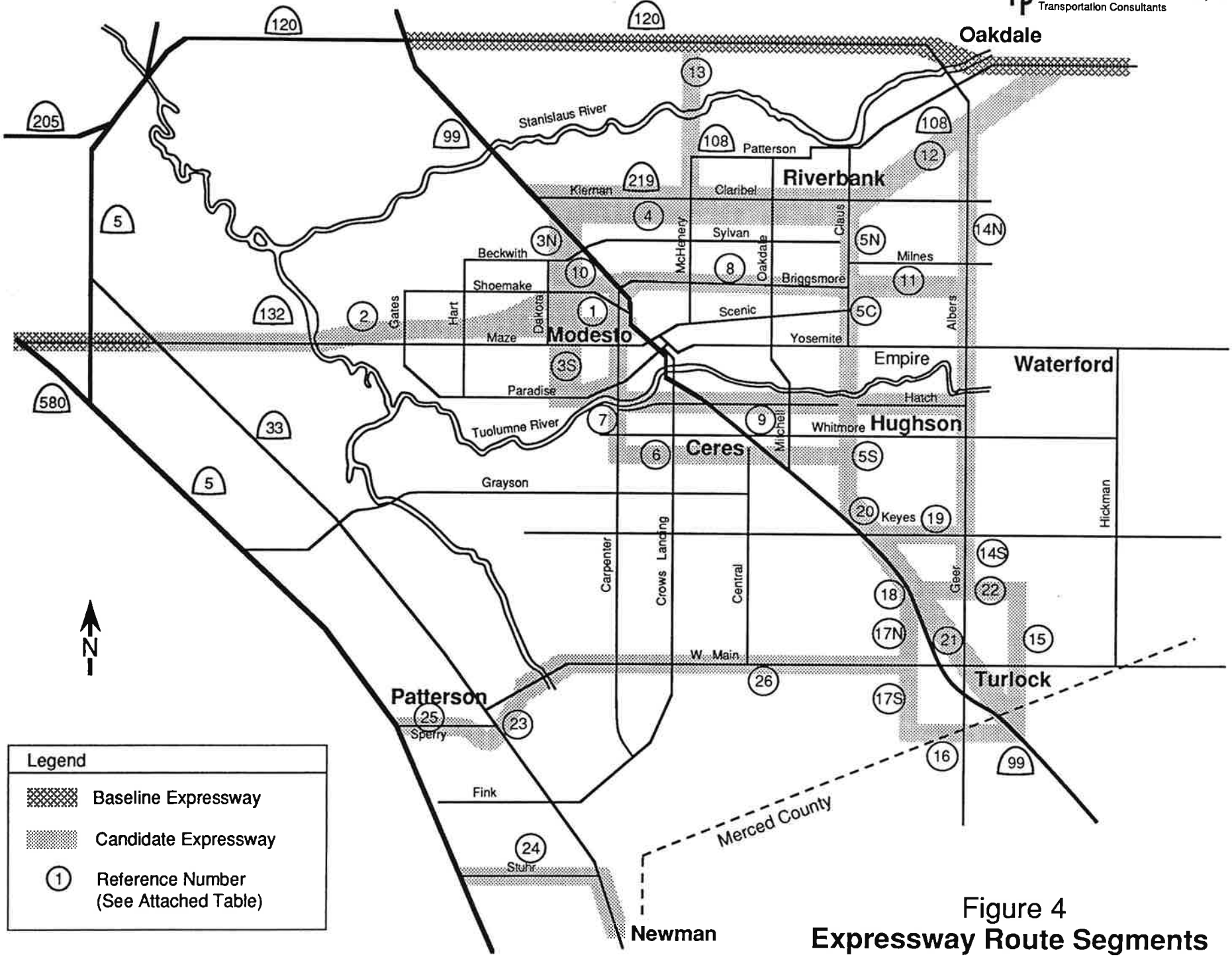
5. Further discussions with the study committee, SAAG committees and SAAG Board, (resulting in approximately 20 corridors).

6. Discussions with Planning and Public Works officials of several jurisdictions for clarification of local issues.

7. Refinement of corridors by the consultant, including extending certain corridors for system continuity purposes and segmenting certain corridors for ease of analysis and data presentation.

8. Election by the SAAG Policy Board to add east/west expressway capacity in the south western portion of the county; along the West Main and Sperry Road corridors.

The resulting set of 26 candidate corridors is shown in Figure 4. Several of the corridors have been divided into segments for system prioritization and phasing analysis. The corridor routes and segments are identified by name and limits in Table 3.



Legend

- Baseline Expressway
- Candidate Expressway
- (1) Reference Number (See Attached Table)

Figure 4
Expressway Route Segments

Table 3

CANDIDATE EXPRESSWAYS

Map Ref.	Route	Limits
1.	Route 132 (Stage 1)[1]	Route 99 to Dakota or Nebraska
2.	Route 132 (Stage 2)[1]	Dakota or Nebraska to San Joaquin Co.
3N.	Dakota Corridor (North)[2]	Route 99 to Kansas Route 132
3S.	Dakota Corridor (South)[2]	Route 132 to Paradise Road/Carpenter
4.	Kiernan Corridor[3]	Dakota Corridor[2] to Claus
5S.	Faith Home	Route 99 to Hatch
5C.	Claus/Garner	Hatch to Briggsmore
5N.	Claus	Briggsmore to Claribel or Pelandale
6.	Service Road	Faith Home to Carpenter
7S.	Carpenter (South)	Service to Hatch
7C.	Carpenter (Central)	Hatch to Route 132
7N.	Carpenter (North)	Route 132 to Route 99
8.	Briggsmore Avenue	Route 99 to Claus
9W.	Hatch Road (West)	Carpenter to Faith Home
9E.	Hatch Road (Eastt)	Faith Home to Geer/Albers
10.	Briggsmore Extension West[4]	Route 99 to Dakota Corridor
11.	Briggsmore Extension East[5]	Claus to Albers
12.	Oakdale/Riverbank Bypass	Claus/Claribel to Bypass 120/108
13.	McHenry Avenue	Kiernan Corridor to Escalon Bypass
14.	Geer/Albers Road	Turlock (Zeering) to Oakdale/Riverbank Bypass
15.	Waring/Verduga Corridor	Zeering to Route 99
16.	Harding Avenue	Route 99 to Washington Road
17.	Washington Road	Harding to Taylor Road
18.	Taylor Road Interchange	Washington to Golden State
19.	Keyes Road	Route 99 to Geer Road
20.	Golden Gate Extension	Keyes to Faith Home
21.	Golden State Boulevard	Keyes through Turlock
22.	Taylor or Zeering Road	Golden State to Waring
23.	Patterson Bypass	San Joaquin River to Sperry Road
24.	Stuhr Corridor	Route 33 at Oristimba to Stuhr/I-5
25.	Sperry Road	Patterson Bypass to I-5
26.	West Main	Washington San Joaquin River (Poplar Ave.)

[1]On existing Caltrans freeway right-of-way just south of Kansas Avenue

[2]Dakota Avenue or Morse/Nebraska

[3]Pelandale or Kiernan

[4]New freeway overcrossing (without ramps), from Briggsmore near Sisk Road to shoemake Avenue near Brink Avenue. Expressway on Shoemake or MID Lateral No. 3 to Nebraska or Dakota.

[5]Along MID Lateral No. 3

IV. EVALUATION OF ALTERNATIVES

A. Goals of the Expressway System

This study attempts to build a consensus among the SAAG member jurisdictions on the region's preferred ultimate expressway system. One of the first steps in the study was to achieve concurrence on the goals, objectives and evaluation criteria to be applied in formulating the expressway system. The process has included a survey of members of the SAAG Policy Board, SAAG Technical Advisory Committee and SAAG Citizens Committee, and the Regional Expressway Study Advisory Committee. It also included written reports, and presentations and discussions with each committee. The SAAG Board and committees have selected three transportation objectives and four environmental constraints to be applied in developing a regional expressway system. Each is listed below and is followed by an explanation of the criteria we used to evaluate the performance of each prospective expressway relative to the stated objective or constraint.

1. Transportation Objectives

- Traffic Safety. Expressways and freeways are considerably safer than arterial streets. Therefore, an expressway system that draws a high percentage of travel from local arterial and collector streets and onto expressways and freeways is capable of improving travel safety within the region. To best meet the safety criterion, the expressway system should emphasize Class A, and secondarily, Class B facilities over Class C expressways.

- Traffic Capacity and Mobility. The expressway system should relieve major existing and future traffic bottlenecks by providing additional traffic capacity directly through them, or close enough to them to serve as a reasonable alternative travel route. It should reduce the amount of travel that occurs under unacceptable congestion (Levels of Service D and E) and extreme congestion (Level of Service F). It should improve overall travel times within the region by reducing traffic delays.

- Air Quality Impacts. The preferred expressway system will solve traffic congestion problems which lead to high-emission stop-and-go travel and to people travelling greater distances to avoid congestion points. The desired system will provide direct links between major trip origins and destinations to minimize expressway travel distances. It will provide enough capacity to relieve congestion but not enough to provide make travel free-flowing enough

to encourage unnecessary travel. The expressway system should not provide enough surplus capacity to become growth inducing, nor should it be placed in areas beyond those where growth is already anticipated.

2. Environmental Constraints

- o Minimize Impacts on Prime Agricultural Land. Developing an expressway through prime agricultural land could be detrimental to the Stanislaus region's agricultural base and could be growth-inducing, encouraging urbanization of agricultural areas. Expressway development through prime agricultural lands outside of existing city spheres of influence should be minimized.

- o Minimize Number of River Crossings. The Stanislaus region's principal wild life and natural vegetation areas are located along the flood zones of the Stanislaus, San Joaquin and Tuolumne rivers. Constructing new expressway bridges or enlarging existing bridges could be disruptive to these resources. Therefore, river crossings should be minimized.

- o Minimize Impact on Land Use. Development of expressways in several of the candidate corridors would impact existing land uses (houses and businesses) along the proposed alignments. Although the evaluation survey conducted as part of this study found that land acquisition and local disruption were less important goals than providing mobility, impacts on existing or approved land uses should be minimized.

- o Minimize Growth Inducement. Placing expressways outside of the spheres of influence of existing cities could be growth inducing, adversely affecting air quality and agricultural preservation.

B. Evaluation Criteria

Table 4 identifies the three transportation-related objectives and defines the measure of effectiveness used to assess the performance of each candidate expressway corridor with respect to each objective.

The first two transportation objectives, safety and capacity/mobility are measured on a corridor-by-corridor basis. Safety is measured as the number of vehicle-miles carried on the expressway, and therefore diverted from less-safe arterial and collector facilities, or over-crowded freeway sections. Capacity and mobility are measured in terms of the amount of traffic carried through the highest-use segment of the expressway.

Table 4

MEASURES OF EFFECTIVENESS FOR EVALUATION OF TRANSPORTATION OBJECTIVES

Objective	Measure of Effectiveness	Range of MOE For Given "Effect" Rating				
		Greatest Positive Effect	Significant Positive Effect	Positive Effect	Minor Positive Effect	Negligible Positive Effect
Safety	Vehicle miles on Expressway (per mile of Expressway)	more than 20,000	15,000 20,000	10,000 to 15,000	5,000 to 10,000	less than 5,000
Capacity/ Mobility	Number of vehicles carried at maximum point	more than 60,000	40,000 to 60,000	20,000 to 40,000	10,000 to 20,000	less than 10,000
Air Quality	Reduction in congested travel (% reduction in regional vehicle miles of travel at LOS F, by sub-system priority group containing given corridor)	more than 10%	7%-10%	3-6%	1%-2%	less than 1%

Air quality effects are measured for different groups or sub-systems of expressway corridors. They are measured as the percentage reduction the sub-system produces in over-congested travel in the Stanislaus/San Joaquin bi-county region. For example, if a sub-system reduces regional congestion by greater than 10%, each corridor within the sub-system is given a rating of "greatest positive effect".

Table 5 presents the environmental constraints and measures used to assess the extent to which each corridor affects them. Taken as a group, the environmental constraints tend to favor corridors which traverse undeveloped areas within existing city spheres of influence and which are away from prime agricultural land and rivers.

C. Evaluation of Alternatives

Table 6 presents the results of the transportation evaluation. The corridors which achieved the highest performance ratings for effects on traffic safety, congestion relief, and air quality are:

- Briggsmore, Route 99 to Claus
- Claus/Faith Home, Kiernan to Route 99
- Golden State Boulevard, Keyes to central Turlock
- The Golden State/Taylor/99 interchange area
- Route 132, Route 99 to Nebraska/Dakota
- Carpenter, Route 99 to Hatch
- Hatch, Crows Landing to Mitchell

Expressways in these corridors offer an ability to relieve congestion both within the corridors, and within heavily congested parallel corridors. For example, Claus/Faith Home provides benefit to the Mitchell/ El Vista/ Oakdale corridor, Briggsmore and Hatch provide relief for crosstown routes through central Modesto such as Route 132, and Golden State provides relief for Geer Road in Turlock.

Table 5

MEASURES OF EFFECTIVENESS FOR EVALUATION OF ENVIRONMENTAL CONSTRAINTS

Constraint	Measure of Effect	Range of MOE For Given "Effect" Rating				
		Negligible Negative Effect	Minor Negative Effect	Negative Effect	Strong Negative Effect	Greatest Negative Effect
Existing Land Use	Approximate portion of Corridor surrounded by sensitive existing uses. (Residential, small business)	None	25%	50%	75%	100%
Growth Inducement	Inside or outside city sphere/ Area currently developed?	Inside/ yes	Inside/ no	Edge/ partial	outside/ parital	outside/ no
Agricultural Lands	Approximate portion of corridor that traverses prime Ag land.	None	25%	50%	75%	100%
River Crossings	Number of rivers crossed	None	X	X	X	One

Table 6
TRANSPORTATION EVALUATION MATRIX

Map Ref.	Route	Safety	Capacity/ Mobility	Air Quality	Composite
1.	Route 132	◔	◔	○	◔
2.	Route 132 West	◑	◑	◔	◑
3.	Dakota Corridor	●	●	◑	●
4.	Kiernan Corridor	◔	◔	◔	◔
5.	Claus/Faith Home	○	○	○	○
6.	Service Road	●	◑	◑	◑
7.	Carpenter Road	◔	◔	○	◔
8.	Briggsmore Avenue	○	○	○	○
9.	Hatch Road	◑	◑	○	◔
10.	Briggsmore Extension West	●	●	◑	●
11.	Briggsmore Extension East	●	●	●	●
12.	Oakdale/Riverbank Bypass	◔	◔	◔	◔
13.	McHenry Avenue	◔	◔	◔	◔
14.	Geer/Albers Road	●	●	●	●
15.	Waring/Verduga Corridor	●	●	●	●
16.	Harding/Clausen Corridor	●	●	●	●
17.	Washington Road	●	●	●	●
18.	Taylor Road	◑	◑	◔	◑
19.	Keyes Road	●	●	●	●
20.	Golden Gate Extension	◔	◔	◔	◔
21.	Golden State Boulevard	◔	○	○	○
22.	Zeering Road	●	●	◔	◔
23.	Patterson Bypass	●	●	●	●
24.	Stuhr Corridor	●	●	●	●
25.	Sperry Road	●	●	●	●
26.	West Main	◔	◔	◔	◔

Legend

- ○ Greatest positive effect
- ◔ Significant positive effect
- ◑ Positive effect
- ● Minor positive effect
- ● Negligible positive effect

Corridors which provided almost as well as the top group include Kiernan Avenue (Route 99 to Claus), and Route 132 from Nebraska west to the San Joaquin County line and McHenry Avenue from the Kiernan corridor to the Escalon bypass in San Joaquin County.

Corridors which provide very little transportation benefit include:

- The southern portion of the Dakota corridor, from Route 132 to Service Road
- Washington and the Harding corridors bypassing west and south Turlock
- The Keyes corridor from Route 99 to Geer Albers Road
- Fink and/or Stuhr from Newman to I-5

None would not carry enough traffic in 2010 to produce strong benefits to traffic safety, capacity, mobility, nor air quality. However, these corridors may provide some benefit as rural truck routes through the year 2010, and as expressways beyond 2010. Therefore, protection of right-of-way and access controls may be warranted even on these low-use corridors.

Table 7 gives the results of the environmental constraints evaluation. The corridors with the least environmental impact are the region's two existing expressways, Briggsmore Avenue and Golden State Boulevard. Others with relatively minor environmental effect are the portion of the Route 132 Kansas expressway between Route 99 and Nebraska, Hatch Road, Golden State extension (Keyes bypass), Zeering Road, the Patterson bypass, and Fink or Stuhr Roads.

Corridors with the greatest environmental constraints are:

- Route 132 from Nebraska west (due to potential growth inducement, impact on prime ag land, and the impacts associated with crossing the San Joaquin River)
- Carpenter Road (due to impacts on existing land uses and the need to widen the existing Tuolumne River crossing)

Table 7
ENVIRONMENTAL/LAND USE EVALUATION MATRIX

Map Ref.	Route	Existing Land Use	Growth Inducement	Ag. Land	River Crossings	Composite
1.	Route 132	◔	◔	◔	○	◔
2.	Route 132 West	○	●	◕	●	◕
3.	Dakota Corridor	◔	●	●	○	◑
4.	Kiernan Corridor	◔	◔	◕	○	◑
5N.	Claus	◑	◑	◑	●	◑
5S.	Faith Home	◔	◑	◑	●	◑
6.	Service Road	◔	◔	●	○	◑
7.	Carpenter Road	◕	◔	◑	●	◕
8.	Briggsmore Avenue	◑	○	○	○	○
9.	Hatch Road	◑	◔	◑	○	◔
10.	Briggsmore Extension West	◑	◑	●	○	◑
11.	Briggsmore Extension East	◔	◕	◕	○	◑
12.	Oakdale/Riverbank Bypass	◔	●	◑	○	◑
13.	McHenry Avenue	◔	◕	●	●	◕
14.	Geer/Albers Road	◔	◔	◑	●	◕
15.	Waring/Verduga Corridor	◔	●	●	○	◑
16.	Harding/Clausen Corridor	◔	●	●	○	◑
17.	Washington Road	◔	●	●	○	◑
18.	Taylor Road	◔	◑	◑	○	◔
19.	Keyes Road	◔	●	◕	○	◑
20.	Golden Gate Extension	◔	◑	◔	○	◔
21.	Golden State Boulevard	◔	○	○	○	○
22.	Zeering Road	◔	◔	◕	○	◔
23.	Patterson Bypass	◔	●	○	○	◔
24.	Stuhr Corridor	◔	◑	○	○	◔
25.	Sperry Road	○	●	●	○	◑
26.	West Main	◔	●	●	●	◕

Legend

- ○ Negligible negative effect
- ◔ Minor negative effect
- ◑ Negative effect
- ◕ Strong negative effect
- ● Greatest negative effect

- o McHenry Avenue (growth inducement, ag lands, river crossings)
- o Geer Albers (growth inducement, river crossing)
- o West Main (growth inducement, ag lands, river crossings)

The Dakota corridor, as defined in the "candidate corridors" section of this report also performed poorly with respect to environmental constraints (growth inducement, agricultural land, river crossing). However, due to the extremely low use the southern portion of this corridor would receive, we redefined the corridor to exclude the new Tuolumne River crossing. The redefined corridor agrees more closely with the adopted City of Modesto concept, which involves linking the corridor to Carpenter just north of the river and crossing the river on a widened Carpenter Road bridge. As shown in Table 7, the redefined Dakota corridor has an overall negative environmental rating, but not a strong negative rating.

In terms of overall performance with respect to both transportation and environmental criteria, the following corridors received the best ratings:

Ref.	Corridor
8.	Briggsmore Avenue
21.	Golden State Boulevard
1.	Route 132
5.	Claus/Faith Home
9W.	Hatch Road (West)
20.	Golden State Extension
4.	Kiernan Corridor
7.	Carpenter Road
6.	Service Road
12.	Oakdale/Riverbank Bypass
13.	McHenry Avenue

The following chapter will integrate these corridors into two high-priority regional expressway systems, and will identify lower priority expansions to the basic systems.

V. RECOMMENDED ULTIMATE EXPRESSWAY SYSTEM

We recommend that SAAG and its member jurisdictions implement a regional expressway system over the next twenty years and beyond in order to help offset the anticipated growth in the region's traffic congestion. The system should include those individual expressways which are determined to be most cost/effective in reducing traffic congestion and improving travel safety and which have the least adverse impact on the environment and existing and planned land uses.

This chapter describes a desirable "ultimate" (2010) expressway system for the region. The desirable system is not necessarily a fundable system. Funding availability will be an important factor in determining the extent of the system which can actually be implemented by 2010. These issues will be examined in later chapters of this report.

Figure 5 illustrates the desirable 2010 regional expressway system. It shows locations at which expressways will or may be warranted by the year 2010. It also shows facilities which do not appear to be warranted until beyond 2010, but which could support the urban-area expressways.

Figure 6 and Table 8 identify the desired 2010 design concept for each expressway, including the recommended design class and number of lanes. The table also identifies the priority that we recommend be assigned to developing an expressway in each corridor. The priority ratings are described more fully below.

A. Principal Features of the Plan

1. Inner and Outer Urban Loops for Major Cities

A two-tiered approach to circulation planning is needed in order to serve the projected growth in the Modesto, Ceres and Turlock areas. This approach calls for an "inner loop" expressway to serve existing traffic and in-fill development, and an "outer loop" to serve growth on the fringes of the existing urban area, urban-area expansion, and "through" traffic.

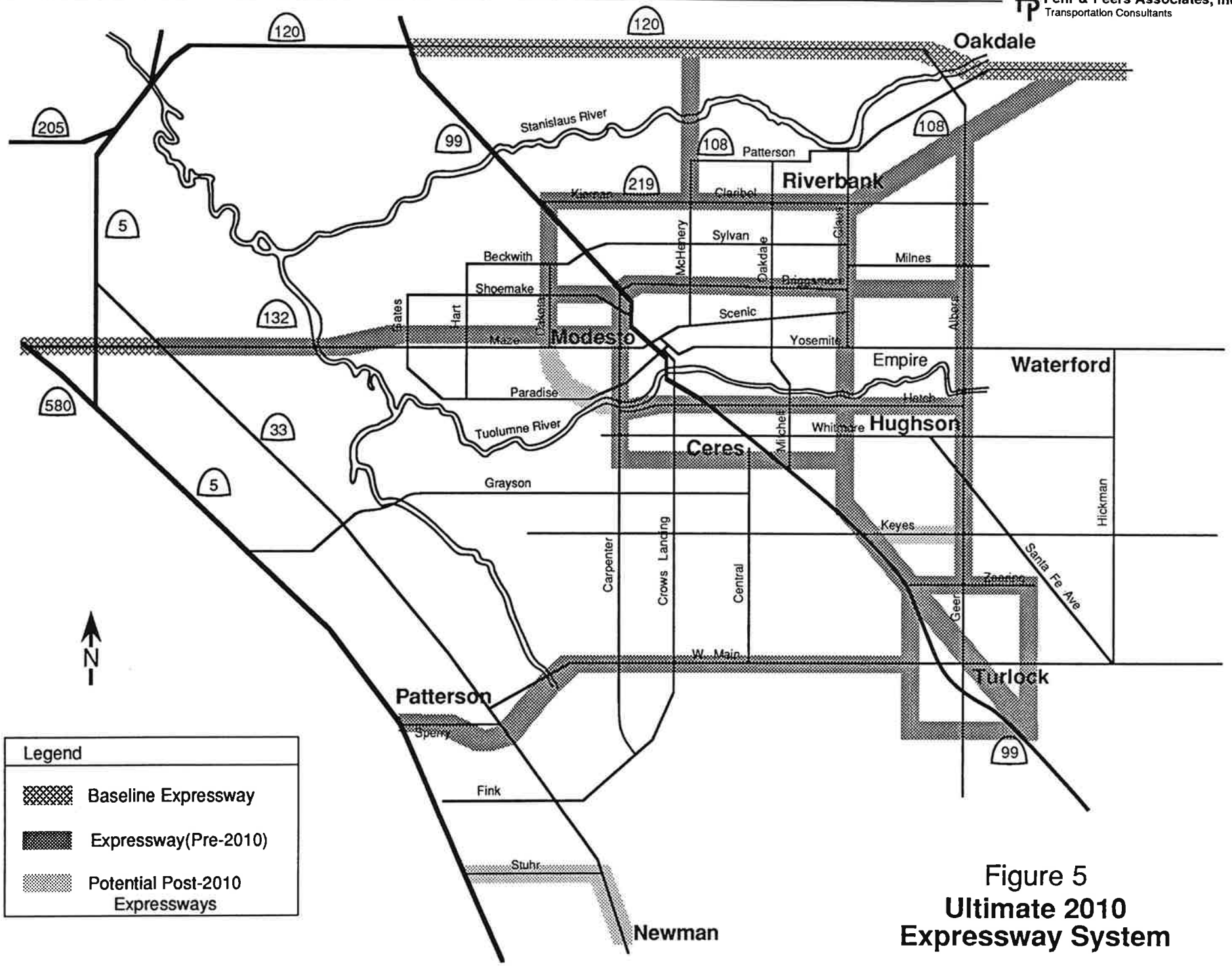


Figure 5
Ultimate 2010 Expressway System

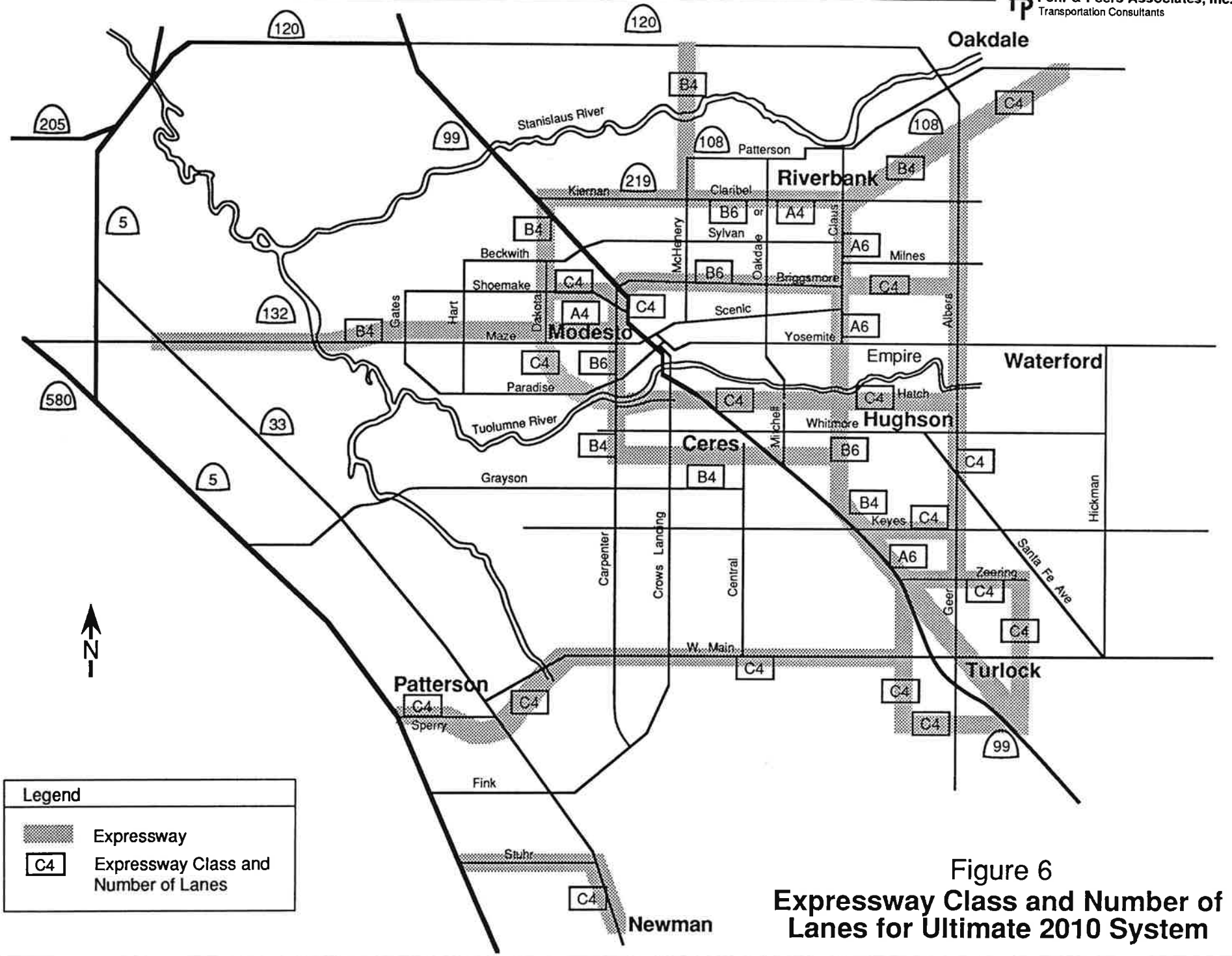


Figure 6
Expressway Class and Number of Lanes for Ultimate 2010 System

Table 8

PRIORITY AND RECOMMENDED CLASS AND SIZE FOR COMPONENTS OF ULTIMATE EXPRESSWAY SYSTEM

Map Ref.	Route (Segment)	Length (Miles)	Priority Group[1]	2010 Class	2010 Lanes
1	Route 132 (Stage 1)	1.8	1	A	4
2	Route 132 (Stage 2)	14.0	2	B	4
3N	Dakota (North)*	5.1	3	B	4
3S	Dakota (South)*	4.3	5	C	4
4	Kiernan/Claribel*	8.2	2	B	6
5S	Faith Home	4.2	1	B	6
5C	Claus/Garner	4.0	1	A	6
5N	Claus (North)	1.5	1	A	6
6	Service Road	6.4	3	B	4
7S	Carpenter (South)	2.0	2	B	4
7C	Carpenter (Central)	2.6	1b	B	6
7N	Carpenter (North)	1.1	1b	C	4
8	Briggsmore Avenue	6.3	1	B	6
9W	Hatch (West)	6.3	1b	C	4
9E	Hatch (East)	4.4	4	C	4
10	Briggsmore (West)*	2.8	3	C	4
11	Briggsmore (East)	4.2	4	C	4
12	Modesto/Riverbank/ Oakdale	10.1	3	B	4
13	McHenry	5.0	3	B	4
14	Geer/Albers	15.9	4	C	4
15	Waring/Verduga	4.5	4	C	4
16	Harding	4.2	3	C	4
17	Washington	4.7	3	C	4
18	Taylor I/C	0.3	1	B	4
19	Keyes Road	3.8	5	C	4
20	Golden State (North)	2.0	2	B	4
21	Golden State	7.0	1	A	6
22	Zeering	4.0	3	C	4
23	Patterson Bypass	5.3	3	C	4
24	Route 33/Stuhr	5.7	5	C	4
25	Sperry Road	1.3	3	C	4
26	West Main	9.5	3	C	4

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1 Priority groups indicate relative importance of expressway (on a scale of 1 through 5) to relieving traffic congestion and meeting other regional expressway goals. Priority 1b indicates facilities on which expressway upgrades are of high importance, but on which land use constraints may inhibit and/or delay ability to implement expressway.

(Table 8 continued)

Map Ref.	Route (Segment)	Length (Miles)	Priority Group	2010 Class	2010 Lanes
* Modesto Loop Segment Alternatives					
3N	Morse	4.3	3	B	6
3S	Nebraska	3.4	5	C	4
4	Pelandale	8.2	2	B	6
10	Briggsmore West	1.3	3	C	4

In the Modesto/Ceres area, the inner loop would consist of Class C or B expressways on: Briggsmore, Carpenter, Hatch and Claus. The outer loop would consist of Class B or A expressways on Kiernan (or Pelandale), Dakota (or Nebraska) and Service Road. Initially the eastern leg of the outer loop would coincide with the eastern leg of the inner loop along Claus/Faith Home. However, in about 2010 or beyond the eastern leg of the outer loop may need to be moved to Albers Road.

In the Turlock area, most inner area east/west and north/south circulation and freeway access can occur via Golden State Boulevard. The outer loop would consist of Zeering, Waring/Verduga, Washington and Harding.

2. Bypasses for Smaller Cities

We also recommend bypass expressways for the county's mid-size cities (Riverbank, Oakdale and Patterson)by the year 2010. From a regional perspective, bypasses do not appear to be justified around the smaller cities until beyond 2010.

a. Riverbank and Oakdale

Caltrans already plans a northerly bypass of Oakdale and Riverbank on Route 120. This expressway, which includes the Oakdale Bypass, the Valley Home Expressway and the Escalon Bypass, is assumed to be in place for purposes of our study. We recommend additional bypasses around the east, south and west sides of the Oakdale/Riverbank area, creating an expressway loop for the area. In addition to the Route 120 bypass on the north, the loop would consist of McHenry Avenue on the west, the Kiernan corridor of the Modesto outer loop on the south, and the Modesto/Riverbank/Oakdale bypass on the south and east.
By 2010, McHenry Avenue will become an a heavily used inter-county connection and a link between two key east/west expressways: the Escalon Bypass and the north leg of the Modesto loop in the Kiernan corridor. McHenry achieves a relatively low rating on environmental issues, mainly because of its impacts on growth inducement on agricultural lands and because

it involves widening a river crossing. However, additional inter-county traffic capacity will be needed by 2010, and we recommend that it be provided along McHenry.

The southerly bypass of Riverbank and Oakdale is included in the County's current capital improvements plan. Based on requirements estimated in an earlier study, the facility is planned as a six-lane, Class A facility. However, the latest forecasts indicate that the Escalon Bypass will be an effective carrier of east/west travel from Oakdale and Riverbank, including Bay Area commuters. Therefore, the southerly Oakdale/Riverbank bypass requires only a Class B, four-lane expressway for the year 2010.

b. Hughson

Under the recommended ultimate regional expressway plan (Figure 5), Hughson would have a bypass loop consisting of expressways and/or rural truck routes along Hatch, Faith Home, Keyes and Geer Road.

c. Waterford

The expected levels of growth in and near Waterford will not generate enough demand to warrant a new expressway in the area by 2010.

d. Patterson

The City of Patterson would benefit from a bypass of Las Palmas and the downtown area. The current Patterson and County General Plans do not generate enough land use and traffic in the area to warrant an extremely high-capacity expressway. The maximum facility that might be needed on the Patterson Bypass by 2010 is a four-lane Class C expressway. Projected 2010 traffic demands do not warrant an expressway bypass around the north side of Patterson. The southerly bypass would be sufficient for general traffic, although it may not fully resolve problems associated with truck traffic to/from Route 33 north using the Las Palmas/Route 33 intersection.

To test the sensitivity of these conclusions to the land use assumptions adopted for this study, we evaluated a scenario that allows for higher levels of development in remote areas in western Stanislaus County. The analysis assumed that about 25,000 people and between 10,000 and 15,000 jobs would locate just west of Patterson in the Lakeborough area by 2010. It assumed that similar numbers of population would locate at Mapes Ranch, north of Patterson. The sensitivity analysis found the Patterson would not require more than a Class C bypass expressway by 2010, even with high levels of remote development in the area.

e. Newman

Under its current General Plan and SAAG's growth projections, automobile traffic growth in and around Newman can be handled with planned upgrades to the arterial streets in the area. From a regional perspective, new expressways would not be warranted to handle growth in automobile traffic. However, truck traffic in and around Newman needs to be managed. We recommend that, in addition to the regional expressway system that this study will identify, that SAAG and its member jurisdictions consider establishing a system of rural truck routes to carry agricultural and other large trucks safely and efficiently around and between the region's smaller cities.

3. Prioritization to Match Expressway System to Funding Resource

Available funding will limit the extent of the expressway system that can be implemented by 2010. In order to accommodate a number of different funding scenarios, we have developed an incremental approach to implementing the ultimate expressway system. There are five increments, each of which is prioritized relative to the others. For example, expressways included in the Priority 1 group should be given a competitive edge in fund allocation decisions over those in Priority groups 2, 3, 4 and 5. The Priority 1 system addresses existing safety and capacity problems in the Stanislaus region. Priority 2 facilities respond to existing safety concerns and capacity needs likely to materialize within the next five years, including the effects of development in the Salida area, Modesto Urban Village 1, and development in north

Turlock. Priorities 3, 4 and 5 respond, respectively, to needs anticipated in the next 5 to 10 years, 15 to 20 years, and beyond 20 years.

B. Prioritized Expressway System

Our analysis indicates that the 26 candidate expressway corridors (consisting of 32 route segments) can be ranked on the basis of priority by placing them into five different priority groups. Each priority group provides a different level of performance relative to the goals of the expressway system. The "Priority 1" group contains those expressways which provide the greatest amounts of traffic relief with the least amount of environmental impact. "Priority 2" expressways are those which are not as effective as the Priority 1 group, but which are more effective than those in priority groups 3,4 and 5. Expressways in the Priority 2 group would only be implemented if and when the expressways in Priority 1 are implemented. The priority rankings presented below represent the relative importance of installing expressways in the individual corridors. They give a general indication of the appropriate order in which expressways should be implemented (Priority 1 first, Priority 2 second, etc.), but they do not specifically define the an implementation phasing program. A later section in this chapter describes a phasing plan for the regional expressways. A later chapter identifies how many of the priority groups the region can reasonably expect to fund by 2010.

1. Priority 1 Expressways

Ten of the candidate expressway segments warrant our highest, "Priority 1", recommendation. These expressways should be installed or upgraded as soon as possible. They are facilities which offer the greatest traffic congestion relief and produce the least adverse impact on environmental concerns such as air quality, agricultural lands, growth inducement and river ecology. In almost all cases, these facilities resolve existing or imminent congestion problems in the region. They are illustrated in Figure 7.

Seven or eight of the Priority 1 corridors pose relatively minor implementation constraints. We recommend that these be considered "Priority 1A". They are recommended to become full Class A or Class B expressways by year 2010.

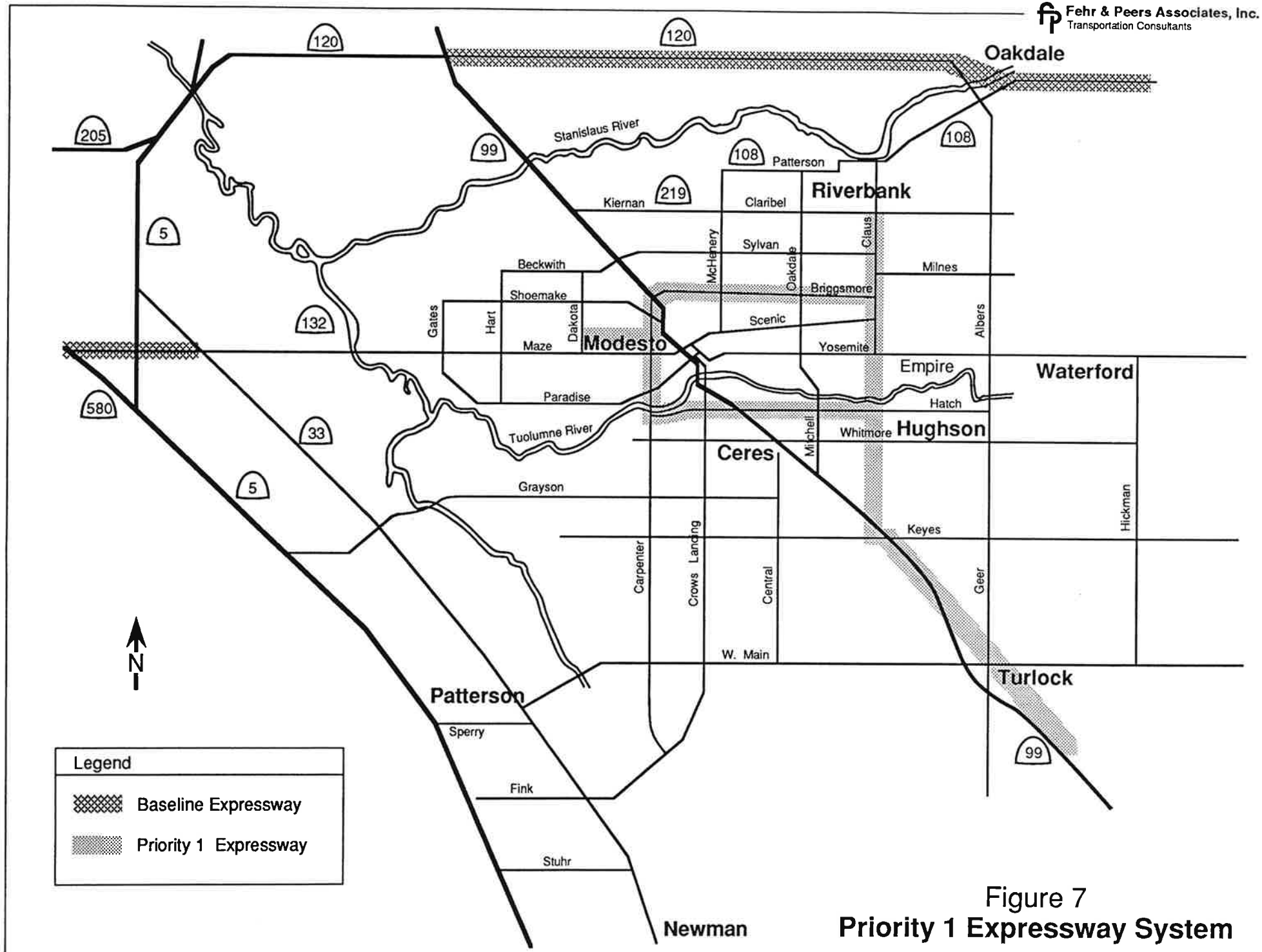

Figure 7
Priority 1 Expressway System

Installing two or three of the Priority 1 expressways would substantially disrupt existing property access and would be incompatible with some of the planned abutting land uses. We recommend that these be considered "Priority 1B". They are recommended to become no better than Class C expressways. We anticipate that even upgrading to Class C standards will be gradual and that the facilities may not become continuous expressways until beyond 2010.

a. Priority 1A

In seven of the ten cases and along most of an eighth, the recommended expressways are consistent with local plans (such as General Plan circulation elements, local capital improvements plans, Stanislaus Regional Transportation Plan and/or Caltrans Route Development Plan), and are relatively compatible with abutting land uses. These corridors are ranked as Priority 1A. They are:

PRIORITY 1A EXPRESSWAYS

Ref.	Name	From/To	Class*	Lanes
8.	Briggsmore	Route 99 to Claus	B	6
5N.	Claus	Claribel to Briggsmore	A	6
5C.	Claus/Garner	Briggsmore to Hatch	A	6
5S.	Faith Home	Hatch to Route 99/Keyes	B	6
1.	Route 132	Route 99 to Dakota Corridor	A	4
21.	Golden State Blvd.	Keyes to central Turlock (Geer)	A	6
18.	Taylor Interchange	Golden State to Route 99	B	4
7C.	Carpenter	Paradise to Hatch	B	6

* Indicated expressway class is the goal for the entire facility, and is presently available or feasible along all or most of the facility, although some short segments of a lower class may continue to exist for the foreseeable future.

Each of these facilities is projected to carry at least 40,000 vehicles a day (ADT), and in some cases over 70,000. None of these facilities is at a location which could be significantly mitigated by placing a parallel facility through a nearby, less built-up area.

Furthermore, each corridor provides relief for parallel heavy traffic routes on which capacity improvements would be difficult. Briggsmore provides relief for cross-town routes further south, such as Route 132 through central Modesto, and Sylvan/Standiford to the north. Claus/Faith Home provides relief for the Mitchell/El Vista/Oakdale Road Corridor through Ceres and Modesto. The Route 132 expressway on the new (Kansas) alignment would help relieve Maze Boulevard, the Briggsmore/Carpenter interchange and sections of Route 99. Golden State Boulevard and the Taylor/99 interchange are bypass/reliever routes for Geer Road and for West Main from Route 99 to downtown Turlock.

b. Priority 1B

Three of the proposed Priority 1 expressways pose significant implementation constraints along at least parts of their lengths. The constrained corridors are Carpenter Road from the Briggsmore/99 interchange to Hatch Road, Hatch Road from Carpenter east through Ceres, and the section of Golden State Boulevard through central Turlock. We recommend that local goals be established to gradually upgrade these facilities to Class C expressways wherever possible.

We recognize that such upgrades would involve retro-fitting existing arterials through areas with well established property access. Local public works representatives do not consider true expressway conversions to be feasible within the foreseeable future. Abutting undeveloped lands are zoned for commercial uses, which will require reasonable access. However, substantially more capacity will be needed by 2010 on each of these facilities than they will be capable of providing as full-access arterials. This will be true even if a full system of expressway bypasses is established to route new traffic away from these congested corridors. The decision concerning each of the Priority 1B corridors can be simply stated: make these facilities more efficient through expressway-type access management, or be prepared to experience considerable congestion by the year 2010.

The committees guiding this Regional Expressway Study (the multi-jurisdictional Study Advisory Committee, and the SAAG Technical Advisory Committee, Citizens Advisory Committee, and Policy Board) established a set of goals for the regional expressway system.