



California Legislature

Joint Legislative Audit Committee

GOVERNMENT CODE SECTION 10500 et al

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RICHARD ROBINSON
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June 14, 1979

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The Honorable Speaker of the Assembly
the Honorable President pro Tempore of the Senate
The Honorable Members of the Senate and the
Assembly of the Legislature of California

Members of the Legislature:

Your Joint Legislative Audit Committee respectfully submits the
audit report of Arthur Young and Company on alternatives for
expending highway funds more expeditiously.

Arthur Young and Company indicates that Caltrans will probably be
unable to fully deliver the State Transportation Improvement
Plan, and that potential for accelerating new facilities is
limited. In addition, they found that it is feasible to contract
with both the private sector and local government for certain
project development work.

This report merits close legislative scrutiny in light of the
billions of dollars which will flow through Caltrans in the
upcoming years, especially considering the impact of inflation on
idle funds.

Respectfully submitted,

RICHARD ROBINSON
Assemblyman, 72nd District
Chairman, Joint Legislative
Audit Committee

ARTHUR YOUNG & COMPANY

555 CAPITOL MALL
SACRAMENTO, CALIFORNIA 95814

June 8, 1979

Mr. Thomas W. Hayes
Acting Auditor General
Joint Legislative Audit Committee
925 L Street, Suite 750
Sacramento, California 95814

Dear Mr. Hayes:

Submitted herewith is Arthur Young and Company's final report on the Study to Assess Alternatives for Expending Highway Funds More Expeditiously. The report is presented in three major sections as follows:

- . Summary
- . Introduction
- . Study Results

We have attempted to address all issues objectively, and the findings and conclusions represent our best judgement, based on information obtained during the limited time available. We have attempted to provide specific findings and conclusions whenever reasonable; however, many of the issues addressed were extremely complex, and clear "answers" were not discernible in all instances. In these instances, we have attempted to define opposing points of view and the strengths and weaknesses of each.

We have reviewed CALTRANS' response to our report and, for the most part, find the disagreements largely to be matters of individual perspective regarding future capabilities. As there is little or no hard evidence to support either point of view in these matters, no specific counter-responses are offered. Our conclusions, however, remain unchanged.

In reviewing the CALTRANS comments regarding technical content of our report, several were found to be justified, and the report was modified accordingly. Others are either subject

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to argument or appeared to result from a misunderstanding of our findings, and no changes were made to the report. Our specific responses to each CALTRANS comment are as follows:

Item No. 1: County Minimums (Page 13)

We recognize that the California Transportation Commission has recommended dropping county minimum requirements effective June 30, 1979; however, it is our understanding the legislature may override this recommendation if desired. Our report addresses current constraint conditions; therefore, the text remains as originally written. The outcome of the county minimum recommendation should not impact our findings regarding other matters.

Item No. 2: Personnel Planning Systems (Page 31)

In response to CALTRANS objection to our finding that there is "considerable overlap of tasks performed . . ." in existing personnel forecasting systems, we have substituted "some" for "considerable". While we believe overlap exists, it is not considered a major factor affecting our analysis. To the extent that it exists, it would tend to support CALTRANS contention of sufficient personnel by providing a hidden reserve.

Item No. 3: Highway Engineering Technicians (Page 37)

Our incorrect usage of the word "classification" has been deleted in describing the combination of target positions.

Item No. 4: Exhibit XI (Page 39)

The position numbers for associate engineer and assistant engineer have been changed in accordance with CALTRANS comments.

Item No. 5: Project Mix and Flexibility

Our discussion of constraints refers to the capability to award contracts within the scheduled fiscal year. It remains our understanding that advertising for the current year must be ceased approximately six weeks prior to conclusion of the fiscal year. In our interviews with CALTRANS personnel, we were told specifically that this requirement imposed a real constraint. If, in fact, it is merely an artificial constraint, consideration of impact should be diminished accordingly.

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Item No. 6: Historical Experience (Page 49)

We agree that our comparison of funds expended versus planned expenditures was incorrect due to the oversight of including right-of-way monies only in the planned expenditure amount. Statements pertaining to this comparison have been deleted.

Item No. 7: Excess Funds Available in Early STIP Years
(Page 57)

CALTRANS suggests that our statement regarding current law requirements for initiation of construction on interstate projects by 1986 is inaccurate, stating, "Present interpretation is that the 1986 date for initiation of construction applies only to the federally designated interstate gaps . . ." Upon further inquiry, we were told by local FHWA representatives that this interpretation is that of CALTRANS; FHWA has not adopted this interpretation. Our statement remains unchanged.

In closing, we wish to express our sincere appreciation for having been afforded the opportunity to assist on this challenging and complex engagement, and we wish to thank the members of the Joint Legislative Audit Committee and the representatives of CALTRANS for the assistance and cooperation provided throughout the study. Should there be any questions regarding the contents of our report, or should you desire additional information, please call Mr. Joseph F. Hill or Mr. Robert C. Baynes at (916) 443-6756.

Very truly yours,

Arthur Young & Company

California Legislature
Joint Legislative Audit Committee
Office of the Auditor General

**Report on the Study
to Assess Alternatives
for Expending
Highway Funds
More Expeditiously**

June 8, 1979

ARTHUR YOUNG

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I. SUMMARY

I. SUMMARY

In response to a request from the Legislative Audit Committee, Office of the Auditor General, we have reviewed certain CALTRANS operations to determine if available highway funds can be spent more expeditiously than planned in the 1979 State Transportation Improvement Plan (STIP).

More specifically, there were four primary objectives of the project. The objectives and our findings are described in the following paragraphs.

1. ASSESS THE CAPABILITY OF CALTRANS TO DELIVER THE 1979 STIP

Based upon our analysis of available information, it is our opinion that CALTRANS probably will be unable to deliver the five-year STIP as planned. Our principal reasons are stated below.

(1) Personnel Requirements

While the basic approach CALTRANS used to determine total personnel needs is essentially reasonable, and the acquisition of identified position targets appears probable (with minor exceptions), we question the expected productivity levels, given the employee mix. CALTRANS is relying heavily on the use of new Junior Civil Engineers (approximately four times the number used in recent years). The expectation of full "journeyman" level productivity from these relatively inexperienced employees seems optimistic. It would seem more reasonable to expect reduced overall productivity due to increased supervision requirements during the initial year.

(2) External Constraints

A major impediment to delivering the STIP as planned, appears to be the extensive number of external constraints which are seemingly beyond CALTRANS' control. They include:

- . Increasingly complex and encompassing environmental clearance requirements
- . Litigation
- . Relocation assistance on major projects
- . State and Federal expenditure constraints.

All of these factors combine to make it increasingly difficult to deliver a plan as developed.

(3) Flexibility

In view of all external constraints, and the optimistic scheduling of projects, the probability of individual project slippage appears evident. It does not appear that the current plan has provided sufficient resources to assure reasonable flexibility. Current resource requirements are based upon needs to produce only the projects contained in the STIP, and according to the proposed schedule. They do not appear, therefore, to establish the capability for advanced project development or for the development of backup projects.

(4) Historical Experience

Historically, CALTRANS has neither delivered all projects in the year planned nor obligated the amount of funds planned in any given year. There were, of course, reasons for these slippages, however, the fact remains that the work planned was not accomplished in total.

2. ASSESS THE POTENTIAL FOR ACCELERATING CONSTRUCTION OF NEW FACILITIES

Assuming that current priorities reflect actual needs, it is our conclusion that the potential for significant acceleration of new facilities projects essentially is limited to the projects which may be supported by discretionary interstate funding unless other future funding is increased accordingly. Without regard for specific priorities selected by CALTRANS, we find the current modest approach generally responsible under present conditions. We support the need to develop additional flexibility, either in the form of additional "backup" projects or advanced development of STIP projects, to insure against potential losses due to project casualties or delays; however, early funding of additional projects for construction does not appear merited with current funding limitations.

Assuming additional funding would become available, and new facility projects are needed, four potential approaches to acceleration are offered:

- (1) Revising the Current Project Mix to Obtain a Greater Advantage of Economy of Scale
- (2) Use of Outside Resources to Accelerate Interstate Construction
- (3) Split Financing of State Funded Projects to Obtain Earlier Start Dates
- (4) Revision of Current Funding and Budgetary Process Constraints to Provide Increased Flexibility

3. ASSESS THE FEASIBILITY AND ADVISABILITY OF CALTRANS CONTRACTING WITH THE PRIVATE SECTOR

We found that, technically, it is feasible to use the private sector for highway project development work. Other states have done so for years and indicated that they experienced

no major problems. Although consultant costs were thought to be higher, no specific evidence was available to support that conclusion.

CALTRANS may face legal obstacles to contracting due to previous case law interpretations of Article VII (formerly Article XXIV) of the State Constitution. Case law has in the past supported the civil service system constraints of Article VII, which essentially says that work performed by the State shall be done by employees of the State. However, there are indications that broader legal interpretations of Article VII are being made (CSEA V. SPENCER WILLIAMS) and that the State Personnel Board is taking a more pragmatic approach to assessing individual requests for contract services.

Although a specific constitutional amendment would eliminate all constraints, it appears that under current conditions, CALTRANS could legitimately negotiate contracts for highway development work with the private sector.

Regarding the advisability of CALTRANS contracting with the private sector, we believe that it would be advantageous to the State if such a policy was adopted. We essentially concur with the findings of the Little Hoover Commission in 1965 which stated in part:

" . . . the Division of Highways--should avoid the recruitment of additional staff for peak loads . . ."

" . . . it is suggested that consideration be given to the adoption of a state-wide policy which would outline the conditions under which it would be to the State's best interest to provide for engineering services by contract."

Primary advantages to contracting with the private sector include the following:

- Establishes a relatively constant level of CALTRANS staffing with peak loads absorbed by consultants
- Precludes inefficient use of CALTRANS personnel during low productivity or funding periods
- Provides a process for expeditious expenditure of unanticipated funds:
 - Precludes schedule stretch-outs
 - Precludes emergency-type hiring and training of personnel to supplement CALTRANS staff
 - Minimizes loss of the value of money through inflation.

4. DETERMINE WHETHER LOCAL GOVERNMENT CAN PERFORM FUNCTIONS WHICH COULD EXPEDITE THE STATE HIGHWAY PROGRAM

Although local jurisdictions interface with CALTRANS during project development and construction phases, their ability to influence a project schedule is extremely limited. They are, however, willing to take responsibility for implementing moderate size projects through contracting with CALTRANS. Based on our discussions with several jurisdictions it appears reasonable to assume that county road departments can perform all functions associated with environmental clearance, basic and detail design, right of way acquisition and construction management. Cultivating such resources would provide CALTRANS the capability for handling peak loads and preclude project deferments and associated inflation losses.

II. INTRODUCTION

II. INTRODUCTION

The Joint Legislative Audit Committee, Office of the Auditor General, in order to respond to informational requests from the California State Legislature has requested consultant services to provide certain data concerning activities associated with the State Highway Account. Arthur Young & Company having been selected to perform the study, has reviewed relevant CALTRANS functions and submits this report with resultant findings and conclusions.

1. STUDY BACKGROUND

Prior to 1974, California operated an ambitious and growing highway construction program. By the early 1970's, however, inflation rates had begun to reduce available purchasing power. It became increasingly apparent that a more modest approach was necessary. In 1973-74, the situation was exacerbated by the imposition of the Arab oil embargo, and an economic crisis resulted. As fuel tax revenues decreased, it was apparent that current program expenditure levels exceeded anticipated funding. In response, CALTRANS declared a moratorium on advertising of construction, and a major reduction in the existing work force took place. Planned projects were either dropped or deferred and a general slowdown in highway construction occurred.

In recent years, however, with the lifting of the embargo, and increased consumption of gasoline, revenues have exceeded previous expectations. This, coupled with the aforementioned construction slowdown, has resulted in a growing accumulation of unobligated funds in the State Highway Account. This accumulation has been a major concern to members of the legislature who believe the combination of failure to expend available funds expeditiously and current inflationary trends are eroding the State's capability to provide needed facilities.

2. PROJECT OBJECTIVES AND SCOPE

The overall goal of the study was to determine how (or if) available highway funds could be spent more expeditiously than shown in the current 1979 STIP. Although the RFP contained specific items to be considered during this evaluation, initial meetings with representatives of the Joint Legislative Audit Committee and an ad hoc study review committee clarified the study requirements, from which the following specific project objectives were identified.

- (1) Determine whether CALTRANS can, in fact, accomplish all actions contained in the 1979 STIP (Including the March Supplement).
- (2) Identify alternatives by which CALTRANS can accelerate the 1979 STIP.
- (3) Assess the feasibility and advisability of CALTRANS contracting with the private sector for certain project development functions.
 - . Evaluate other state's private sector contracting programs
 - . Identify project development functions most appropriate for contracting
 - . Determine the extent to which the private sector will be able to absorb CALTRANS work
 - . Assess legal constraints to private sector contracting
 - . Assess management problems associated with private sector consulting.
- (4) Determine whether local government can perform functions which could expedite the State Highway Program.

Due to the short time frame available to complete the study, and the complexity of the highway program, it was agreed

that our review should be limited in scope. Specifically, the agreements reached were as follows:

- (1) The study was to be restricted to "new" facilities (HE-type projects); however, some understanding of the other two major program areas, HA-Rehabilitation and HB-Operational Improvements, would be necessary.
- (2) The 1979 STIP dated December 15, 1978, revised February 15, 1979; and supplemented March 20, 1979 would be the document on which we would base our analysis. The scope limitation was necessary because the STIP had not been officially approved by the California Transportation Commission and the potential for change was high considering the differences between the STIP and the regional TIPs.
- (3) Revenue and expenditure forecasts as developed by CALTRANS would be considered accurate, as sufficient time for an extensive evaluation of methodology was not available.
- (4) Review of the project development process would be limited to activities occurring subsequent to the identification of needs and the adoption of routes. Essentially the "process", for purposes of this study, starts with the establishment of a Project Development Team and continues through construction including basic design, environmental clearance, right-of-way acquisition, detailed design, and construction.
- (5) Legal research was excluded as a part of our review of the steps necessary to utilize private sector and local government capabilities.

III. STUDY RESULTS

III. STUDY RESULTS

In this section, we discuss the information obtained, the analysis that took place, and the findings and conclusions we developed. The study results are presented in the following sub-sections:

- A. Our Understanding of the Funding Sources, Planned Expenditures and Financial Constraints Associated with the 1979 STIP
- B. Analysis of CALTRANS Potential for Completing the 1979 STIP
- C. Analysis of Potential for Accelerating the Construction of New Facilities (HE) Projects
- D. Use of the Private Sector on Highway Projects.
- E. Survey of Private Engineering Firms.
- F. Survey of Local Governments and Regional Transportation Commissions

A. OUR UNDERSTANDING OF THE FUNDING SOURCES,
PLANNED EXPENDITURES AND FINANCIAL
CONSTRAINTS ASSOCIATED WITH THE
1979 STIP

1. THE STATE HIGHWAY ACCOUNT (SHA)

For purposes of this study, our evaluation of the STIP was restricted to those elements dealing with the State Highway Account. Within the SHA, it was further restricted to capital outlay and capital outlay support functions.

The State Highway Account is that portion of the State Transportation Fund from which monies are used for street and highway purposes. Exhibit I, following this page, is a schematic showing the flow of funds through the SHA. Following is a brief description of the sources of revenue and a listing of the primary users of funds held in the SHA.

• State Revenue Sources

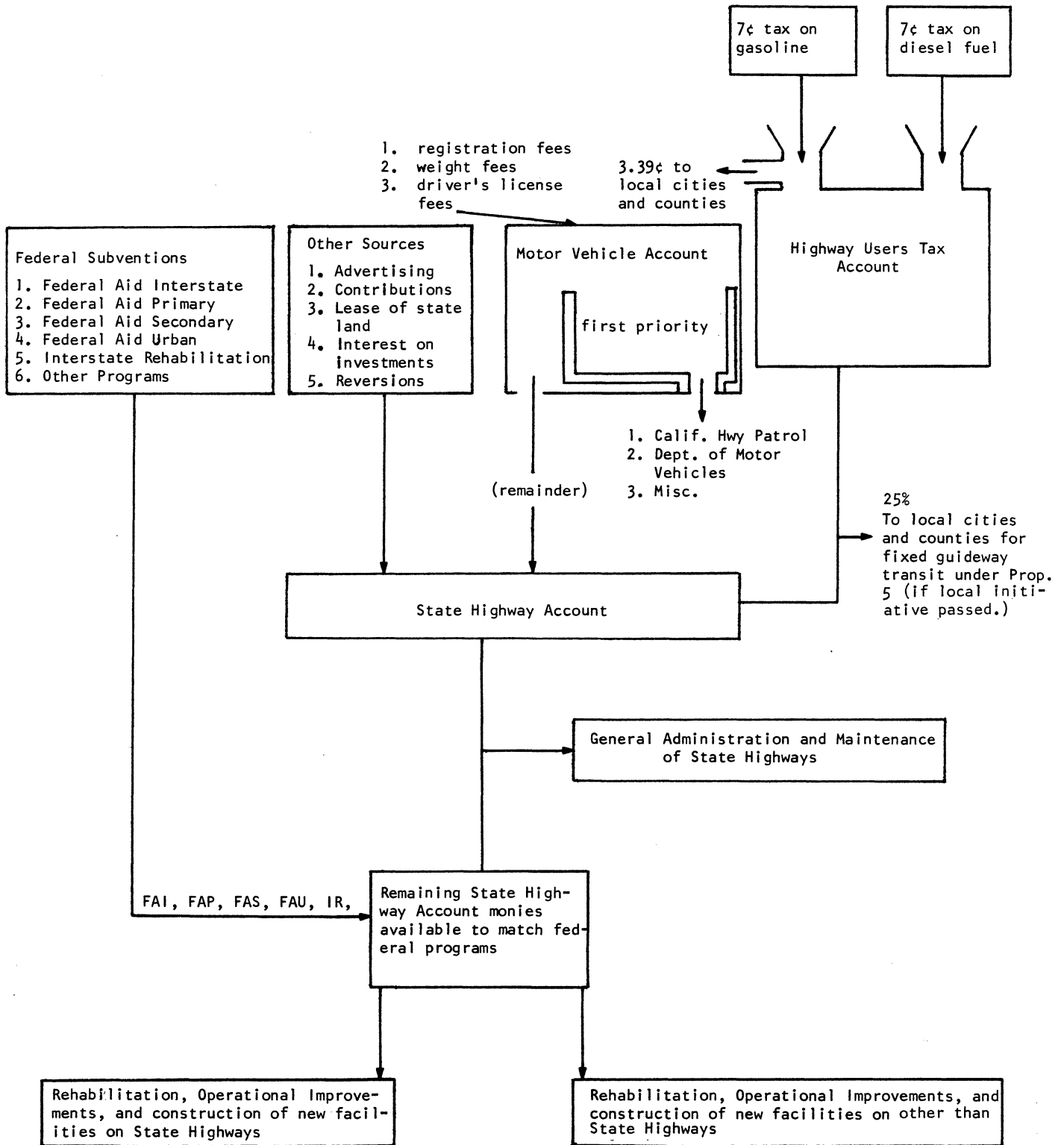
Revenue comes primarily from the 7 cent tax on gasoline and diesel fuel (through the Highway Users Tax Account) and from registration, weight and driver's license fees, through the Motor Vehicle Account. Other revenue sources include leasing of state land, interest on investments, reversions on construction contracts, etc.

• Federal Revenue Sources

Under the 1978 Surface Transportation Act, California will receive funds from about fourteen federal aid categories, the major ones being:

- Federal Aid Interstate--Funds are used to construct roads that connect the principal metropolitan areas, cities, and industrial centers
- Federal Aid Interstate Rehabilitation--Funds are used to resurface, restore and rehabilitate those

FLOW OF REVENUES THROUGH THE STATE HIGHWAY ACCOUNT ^{1/}



^{1/} Source: Sacramento Area Regional Planning Commission

lanes on the Interstate system which have been in use for more than five years

- Federal Aid Primary--Funds are used to develop an adequate system of connected main roads important to interstate, statewide and regional travel, consisting of rural arterial routes and their extensions into or through urban areas
- Federal Aid Secondary--Funds are used to assist State and local rural governments in the improvement of major rural collector routes
- Federal Aid Urban--Funds are used to improve service to the major centers of activity within urbanized areas and in such other urban areas as the Department may designate
- Other categories include:
 - .. Metropolitan Planning
 - .. Railway/Highway Crossings
 - .. Economic Growth Centers
 - .. Bridge Replacement
 - .. Pavement Markings
 - .. Forest Highways
 - .. Safer Off-System
 - .. Highway Planning and Research
 - .. Hazard Elimination
- . Major SHA expenditures categories
- . Administration of the State Highway Program
- . General Maintenance of the State Highway System
- . Operations
- . Program Development
- . Local Assistance
- . Operational Improvements
- . Transportation Planning and Research
- . Rehabilitation
- . New Facilities

2. FEDERAL AND STATE EXPENDITURE CONSTRAINTS

There are a variety of constraints that relate to the expenditure of funds passing through the State Highway Account. Those most applicable to this project are:

(1) State Expenditure Constraints

Current legislation requires that State Highway Account funds, after setting aside those amounts required for local assistance and administration and maintenance, be distributed according to three geographic factors. They are:

- North/South Split

The North/South split requires that on an annual basis 60 percent of all capital funds be spent in the southern 13 counties of the State and the remaining 40 percent be spent in the north. The percentage is roughly proportional to the split in population.

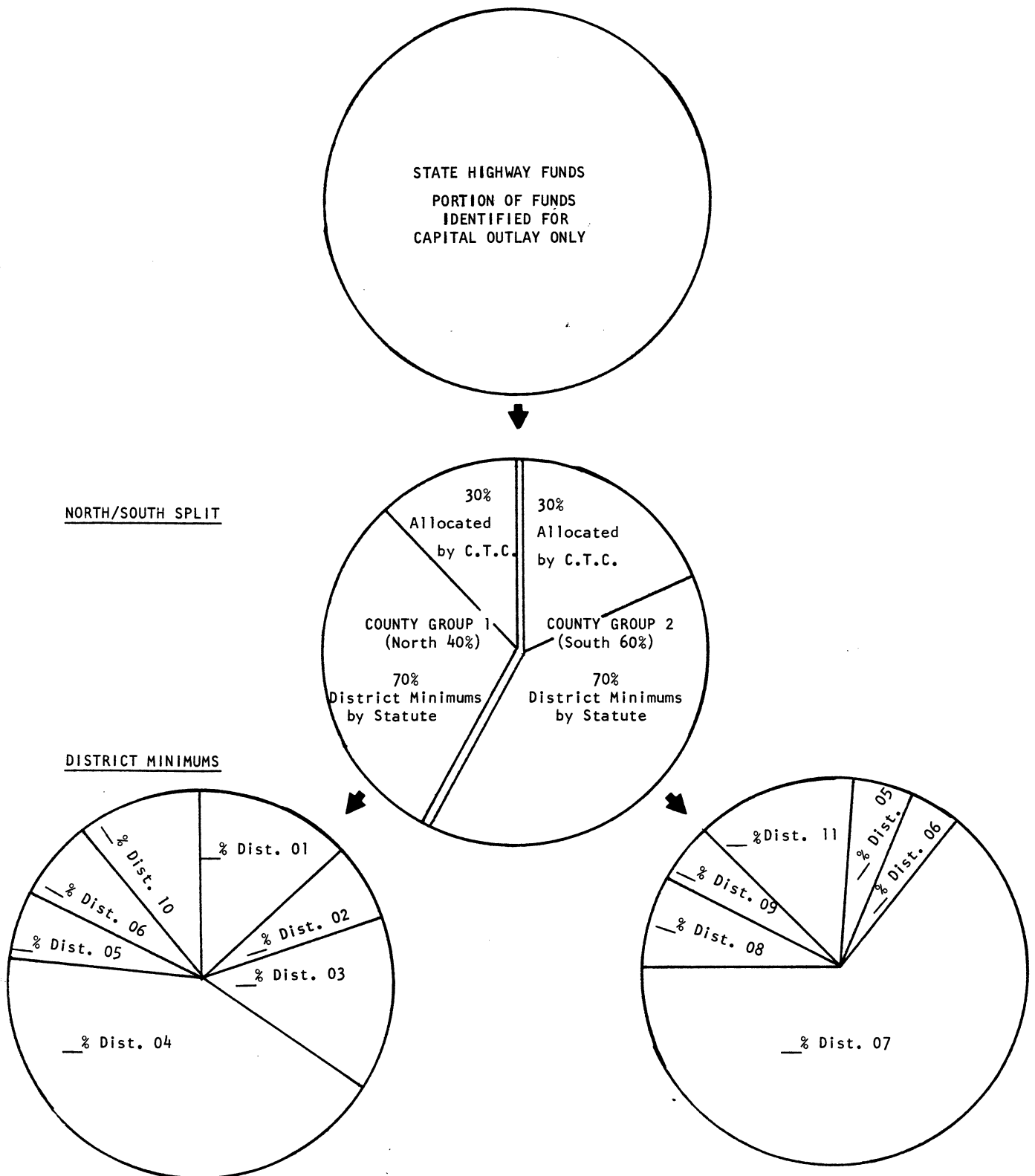
- County Minimums

The County Minimum criteria state that each county receive at least \$4 million in non-interstate capital funds during each four-year planning period. Alpine and Sierra counties are exceptions; each receiving \$3 million in the four-year period.

- District Minimum

Under section 188.8 of the Streets and Highways Code it is stated that each of the eleven CALTRANS Districts are to receive construction funds according to need during the four-year planning periods. Seventy percent of capital outlay expenditures are programmed under this constraint. The remaining 30 percent can be programmed at the discretion of the California Transportation Commission (CTC). However, the programming of these funds must also stay within the respective North/South allocation percentage. Exhibit II, following this page, graphically portrays the north/south and District minimum funds distribution.

ALLOCATION OF CAPITAL OUTLAY FUNDS
FROM THE STATE HIGHWAY ACCOUNT



NOTE: District Percentages are based on Four Year Needs Study

. Additional State Constraints

Funds from the State Highway Account used for capital outlay purposes are budgeted in the STIP by three basic program elements: HA Rehabilitation, HB Operational Improvements, and HE New Facilities. In addition to the geographic constraints noted above the legislature has set a limit on the amount of funds that can be moved between these elements once the budget is approved. With the concurrence of the California Transportation Commission, the Department can reduce any element of its program by no more than 10 percent of its original budgeted amount. Increases in any given element are limited only by the amount of dollars made available through the limited budget reductions in other elements.

What appears to be another major constraint resulted from implementation of AB 402. Under this bill the STIP (and, therefore, the authorization for obligating funds) is to be approved on or before July 1 of each year. Basically, this means that the Department cannot advertise for construction work or obligate right of way funds until that date.

(2) Federal Expenditure Constraints

The recent Federal Surface Transportation Act of 1978 funded federal highway programs for the next four federal fiscal years. The effect on California was manifested through an increase in federal dollars and a reduction in the State's matching requirement. The following list summarizes the constraints placed on these federal funds:

- . The 1978 Act funds only the next four federal fiscal years (1979-1982). The amount of Federal aid beyond 1982 is unknown
- . Funds are apportioned by highway categories and must be spent accordingly, with two exceptions:
 - A one-time annual movement of up to 50% of unobligated funds can be effected between consoli-

dated primary and rural secondary apportionments, or between consolidated primary and urban system apportionments.

- . There is a matching requirement for federal funding which varies by category. For the 1978 Act this matching requirement ranges between 8-1/2 and 12 percent.
- . Interstate funds can only be used for interstate projects
- . A minimum of 10 percent of all interstate funding must be used for rehabilitation
- . There is a fixed number of miles of interstate in California and all of the miles are programmed for certain projects. The only way to increase existing interstate mileage would involve acquiring unused mileage given up by other states.
- . It is possible to transfer existing interstate mileage within California as long as it would be transferred to another approved interstate route
- . All non-interstate funds are available for obligation for three years at which time unobligated funds lapse. Interstate funds are available for obligation one year in advance of regular apportionment plus two subsequent years, or for two years if they are not used in advance.
- . Federal funds are received on a reimbursement basis with State funds required for initial outlay.

3. PLANNED REVENUES AND EXPENDITURES--THE 1979 STATE TRANSPORTATION IMPROVEMENT PLAN (STIP)

The revenues and expenditures contained in the December, 1978 STIP (updated in February, 1979) were based on the "Funds Estimate" adopted by the California Transportation Commission in November, 1978. This Funds Estimate was developed by CALTRANS and includes ". . . all State and Federal funds reasonably expected to be available to the commission for allocation for

transportation purposes during the five year period . . ."^{1/}
Because of the short time available to conduct this study, we did not evaluate the methodology used to develop the Funds Estimate, nor did we validate any of the inflation factors used in the forecasts.

In March, 1979, subsequent to the publication of the December/February STIP, a supplement was prepared specifically to account for additional revenue provided by the 1978 Surface Transportation Act (\$270 million) and an unanticipated transfer of \$100 million from the Motor Vehicle Account. The STIP we evaluated included the March supplement.

Exhibit III, following this page, shows the revenues estimated to be available during the STIP period. State resources include revenues from the Highway User Tax Account, transfers from the Motor Vehicle Account, Miscellaneous State Resources (investment revenues, sale of land, etc.), and construction contract reversions. Unobligated State carryover funds going into the first year of the STIP are identified at \$229 million.

Federal Aid resources are also identified by several major categories. These major categories include Interstate, Interstate Rehabilitation and Primary. All other federal aid categories are lumped together in a category called Other Federal Aid. Early year Interstate commitments are shown in brackets in the column preceding 1979-1980 revenues along with some unobligated federal aid carryover. Reversions from federal projects are also shown.

Total estimated State resources for the five year period are \$3.103 billion while Federal resources are estimated to be \$2.986 billion, for a total of \$6.089 billion. Federal resources include all early year interstate funds.

^{1/} Source: CALTRANS 1979 STIP

ESTIMATED REVENUES (MARCH STIP)
(\$ MILLIONS)

STATE HIGHWAY ACCOUNT

<u>State Resources</u>	<u>Carry Over</u>	<u>79-80</u>	<u>80-81</u>	<u>81-82</u>	<u>82-83</u>	<u>83-84</u>	<u>FAI Early Year</u>	<u>Available</u>
Highway User Tax Account		487	487	485	482	476	-	2,417
Motor Vehicle Account		100	0	0	0	0	-	100
Misc. State Resources		75	82	65	59	51	-	332
Reversions		5	5	5	5	5	-	25
Total State Resources	229	667	574	555	546	532	-	3,103 ^{2/}
<u>Federal Aid Resources</u>								
Interstate (FAI)	(85) ^{1/}	217	234	234	213	242	238	1,293
Interstate Rehabilitation	(3) ^{1/}	15	15	24	24	24	24	123
Primary (FAP)	-	101	107	88	88	88	-	472
Other Federal-Aid (FAU, FAS)	25	218	220	183	183	184	-	1,013
Reversions	-	15	15	15	15	15	10	85
Total Federal-Aid	(63) ^{1/}	566	591	544	523	553	272	2,986
Total Revenues	166	1,233	1,165	1,099	1,069	1,085	272	6,089 ^{2/}

^{1/} Following year's apportionment already committed.

^{2/} Includes 229 carryover.

Exhibit IV, following this page, identifies the planned program element expenditures by non-capital outlay, capital outlay support and capital outlay. Exhibit V, following Exhibit IV, identifies total expenditures for the STIP by program element. The respective portions of capital outlay support for HA, HB and HE are included in each of those elements.

Exhibit VI, following Exhibit V, identifies the rate at which the Department will be spending State cash during the STIP period. Total resources available for programming include new revenues of \$2.874 billion and \$229 million of unobligated carryover for a total of \$3.103 billion. Of this amount there is \$2.128 billion allocated for non-capital activities and \$337 million allocated for capital outlay support. The remaining \$638 million is allocated for capital outlay expenditures.

During the five-year period, \$199 million of the amount available for capital outlay is required for matching on federal projects, \$209 million is to be spent on federal aid type projects over the required match (mostly for primary and safety projects), and \$230 million is to be spent on State only projects.

The result of this expenditure plan is that during the five-year period all available state funds are programmed to be spent including prior year unobligated funds. The \$229 million of cash (carryover) available in the first year of the STIP, increases to \$320 million by the end of the 1979/1980 year. However, it is reduced each subsequent year by the amount that annual planned spending exceeds new annual revenues. At the end of the five-year period it is planned that all carryover funds will have been obligated.

4. FEDERAL DISCRETIONARY FUNDING FOR INTERSTATE COMPLETION

The recent Federal Surface Transportation Act of 1978, which funds federal highway programs for the next four years,

NON-CAPITAL OUTLAY EXPENDITURES AND
CAPITAL OUTLAY EXPENDITURES (\$ MILLIONS)

STATE HIGHWAY ACCOUNT

	Carry Over	79-80	80-81	81-82	82-83	83-84	FAI Early Year	Available For 5 Year Program
Total Resources	166	1,233	1,165	1,099	1,069	1,085	272	6,089
Transfer to TP&R	-	13	14	16	16	17	-	76
HB - Operational Improvements	-	4	5	6	6	6	-	27
HC - Local Assistance	-	204	221	210	200	200	-	1,035
HD - Program Development	-	15	16	17	18	19	-	85
HF - Administration	-	57	61	64	68	71	-	321
HK - Operations	-	20	21	23	24	25	-	113
HM - Maintenance	-	217	232	251	268	286	-	1,254
Subtotal - Non-C/O	-	530	570	587	600	624	-	2,911
C/O Support		144	145	157	140	119	-	705
Subtotal C/O Support & Non-C/O		674	715	744	740	743	-	3,616
HA - Capital Outlay		100.582	105.574	113.473	112.455	99.082	-	531.166
HB - Capital Outlay		105.111	107.747	128.031	147.864	133.554	-	622.307
HE - Capital Outlay		293.554	256.137	285.322	224.023	214.197	-	1,273.233
Subtotal - C/O		499.247	469.458	526.826	484.342	446.833	-	2,426.706
Total Expenditures		1173.247	1184.458	1270.826	1224.342	1189.833		6,042.706 <u>1/</u>

EXHIBIT IV

1/ Does not include \$40 Million in fixed guideway or \$7 Million in bike lane funds yet to be programmed.

STATE HIGHWAY ACCOUNT
EXPENDITURES BY ELEMENT

	(MILLIONS OF DOLLARS)					Five Year Total
	79-80	80-81	81-82	82-83	83-84	
HA - Rehabilitation <u>1/</u>	130	139	147	149	130	695
HB - Operational Improvements <u>1/</u>	161	169	186	212	192	920
HC - Local Assistance	204	221	210	200	200	1,035
HD - Program Development	15	16	17	18	19	85
HE - New Facilities <u>1/</u>	357	313	358	271	251	1,550
HF - Administration	57	61	64	68	71	321
HK - Operations	20	21	23	24	25	113
HM - Maintenance	217	232	251	268	286	1,254
Transportation Planning & Research	13	14	16	16	17	76
Total Expenditures	1,174	1,186	1,272	1,226	1,191	6,049 <u>2/</u>

1/ Expenditures include program element's proportion of capital outlay support.

2/ Does not include \$40 Million in fixed guideway yet to be programmed.

SUMMARY OF STATE FUNDS USAGE AND EARLY YEAR SPENDING
OF INTERSTATE FEDERAL RESOURCES
(MILLIONS OF DOLLARS)

		<u>79-80</u>	<u>80-81</u>	<u>81-82</u>	<u>82-83</u>	<u>83-84</u>	<u>TOTAL</u>
<u>State Funds Usage</u>							
New Resources		662	569	550	541	527	2,849
Reversions		5	5	5	5	5	25
Carryover	229						229
Total Resources	229	667	574	555	546	532	3,103
State Funds for Non-Capital Outlay <u>1/</u>		(371)	(403)	(434)	(448)	(472)	(2,128)
State Funds for Capital Outlay Support		(68)	(69)	(82)	(69)	(49)	(337)
Available for Capital Outlay		228	102	39	29	11	638
State Funds Required for Federal Funds Match		40	39	40	41	39	199
State Funds Used for Federal Aid Category Projects Over Match		49	17	82	40	21	209
State Funds for State Only Projects <u>2/</u>		48	58	36	46	42	230
State Funds Capital Outlay Requirements		137	114	158	127	102	638
Increase (Decrease) in State Cash for the Year		91	(12)	(119)	(98)	(91)	
Net Cash Carryover at Year End	229	320	308	189	91	0	

1/ Includes Proposition 5

2/ Includes \$13 for non-interstate right-of-way acquisition, \$35 for local FAU matching and \$10-15 for state funds required on federal projects over matching requirements.

included a provision designed to accelerate the interstate program. The provision makes lapsed interstate funds available to all eligible states on a first come, first served basis. Although the funds can be applied only to Interstate projects, they may be used for right of way engineering and preliminary design as well as capital outlay for right of way acquisition and construction.

There are three criteria associated with a state becoming eligible for discretionary funds. First, all current year and early year^{1/} interstate apportionments must be obligated before the end of the current Federal fiscal year. Second, construction projects for which discretionary funds are being sought must be ready for advertising, and third, construction must begin 90 days after obligation. Non-construction activities such as environmental clearance and preliminary design of interstate projects are also eligible for discretionary funds. However, they must be obligated within 12 months after funds are available for expenditure.

According to Federal sources, during the current Federal fiscal year, approximately \$1.4 billion of discretionary interstate money has been made available. Approximately \$710 million has already been applied for and received by fifteen states. Florida and West Virginia have received the largest amounts to date, obtaining about \$134 million and \$95 million respectively.

This first year's discretionary fund was large because it consisted of several years of lapsed monies. Next year's available discretionary funds are expected to total about \$600 million.

^{1/} Next subsequent funding year, e.g., 1980/81 apportionment funds are "early year" funds for 1979/80

Exhibit VII, following this page, depicts the rate at which regular and early year interstate funds are being spent according to the March 1979 STIP. As can be seen from the exhibit, available early year funds are not entirely obligated until the last year of the STIP. Recent information received from CALTRANS indicates that in the 1980 STIP, the rate of spending of early year interstate is such that it will be fully obligated by June, 1982.

ANNUAL INTERSTATE SPENDING AND
USAGE OF EARLY YEAR FUNDS
(MILLIONS OF DOLLARS)

<u>Annual Increase in</u>					
<u>Early Year</u>	<u>79-80</u>	<u>80-81</u>	<u>81-82</u>	<u>82-83</u>	<u>83-84</u>
<u>Interstate</u>					
<u>Spending</u>	\$ 121	\$ 33	\$ 47	\$ 46	\$ 25
<u>Cumulative Amount by</u>					
<u>Which Early Year</u>					
<u>Spending Increases</u>	121	154	201	247	272
<u>Annual Interstate Spending</u>					
<u>Including Early Year</u>					
<u>Usage</u>					
Annual Interstate & Rehabilitation Apportionment	232	249	258	237	266
Reduction for Prior Year Usage of Early Year Funds	(88)	(121)	(154)	(201)	(247)
Current Year Apportionment Remaining	144	128	104	36	19
Usage of Next Years Funds in Current Year (Early Year Spending)	121	154	201	247	272
Net Annual Spending for Interstate and Interstate Rehabilitation	\$ 265	\$ 282	\$ 305	\$ 283	\$ 291
1/	\$1,514 less \$88 of early year spending in 78-79 leaves \$1,426 to be spent during the stip period.				\$1,426

B. ANALYSIS OF CALTRANS' POTENTIAL FOR DELIVERING
THE 1979 STIP

This section describes our analysis and conclusions regarding the capability of CALTRANS to meet the project objectives defined in the 1979 State Transportation Improvement Program. In conducting this analysis, our efforts focused on their capability to deliver specific, or like, highway projects. While fund expenditures were considered, meeting total fund obligation targets alone was not considered successful STIP delivery. This distinction was made to allow for "apparent" successful delivery which might result from prior year carryover, unanticipated expenses, inflation, or year-end expenditures in unplanned minor projects, e.g., resurfacing.

Our analysis focused on four factors considered key to successful completion of the STIP. These were:

- . Personnel Resource Requirements
- . Personnel Augmentation Capability
- . Project Mix and Flexibility
- . Process Controls.

In addition, our analysis included a review of available historical information regarding past success or failure. Our analysis and findings regarding each of these factors are presented in the succeeding subsections.

1. PERSONNEL RESOURCE REQUIREMENTS

The purpose of this analysis was to determine whether sufficient resources had been planned to assure reasonable probability of completing the STIP objectives. The scope of the analysis was limited to a review of the process used and the personnel forecasting systems applied.

(1) Process

Several steps were involved in determining CALTRANS staffing requirements for the capital outlay portion of the 1979 STIP. The process was initiated at the district level, where each district identified staffing requirements for alternative projects capable of being delivered during the STIP period. Personnel requirements were developed on a project-specific basis, using various CALTRANS forecasting systems (these are discussed subsequently). The list of alternative projects and attendant resource requirements were then forwarded to Headquarters personnel, who viewed the material in terms of 1979-80 needs only; making adjustments as necessary. We were informed that adjustments at this level did not result in an overall decrease in personnel forecasts.

Following the initial review, projects were prioritized and low priority jobs culled out of the proposed list. Staffing requirements for the remaining jobs were then totaled to determine overall requirements. Subsequent to this process, additional funds were received, and additional projects were added to the proposed STIP via the March, 1979 supplement. Staffing requirements for the added projects were identified by Headquarters personnel, using the same forecasting systems mentioned previously. The project list and resource requirements were then submitted to the Budget Review Committee. At the time of submittal, the defined personnel requirements for capital outlay support for each program element were as follows:

. Rehabilitation	879.3	Person Years
. Operational Improvements	1,823.9	" "
. New Facilities	<u>1,535.5</u>	" "
TOTAL	4,238.7	" "

In the Budget Review Committee meeting, personnel requirements were reviewed, and revisions made at the program element level. Individual projects were not evaluated and no projects were deleted. Following these revisions, the approved staffing level became:

. Rehabilitation	871.3	(2.9%)
. Operational Improvements	1,704.3	(6.5%)
. New Facilities	<u>1,547.4</u>	<u>+1%</u>
. TOTAL	4,123	(3.2%)

Total approved staffing allocations were then provided to the districts, and the districts were directed to make the adjustments by classification in the manner which would best support their specific projects.

Based on our understanding of the approach described, the overall process appears reasonable with respect to the projects that were included for work in 1979-80. Because the review process was not extended to subsequent years, we are unable to comment regarding whether the approved level is appropriate for later years. Nor can we be certain that the mix of personnel is appropriate, as reductions were made by program element rather than classification. The total allocation, however, appears reasonably within the totals developed from the forecasting systems. Although we concluded that the process is reasonable, we do have two concerns regarding the approach.

- . We were informed by personnel who conducted the reviews and adjustments that staffing requirements were based solely on work requirements for projects contained within the STIP. We question whether this approach will provide needed flexibility
- . Staffing standards were not adjusted for new personnel. All 350 persons were expected to be available and fully productive by July 1, 1979.

(2) Review of Personnel Planning Systems Used

The systems we reviewed that are related to projecting personnel requirements included:

- . Design Management System (DMS)
- . Construction Engineering Management System (CEMS)
- . Right of Way System.

These systems relate to the majority of project development and capital outlay support personnel.

Our reviews were made with the objective of evaluating the overall reasonableness and logic of the systems. We did not attempt to validate the standards, norms or planning values included in these systems. Nor did we evaluate the productivity or efficiency levels of CALTRANS personnel or the efficiency levels inherent in the personnel systems.

- . Design Management System (DMS)

The Design Management System, originally developed as a tool for budgeting, planning, scheduling and performance monitoring, has evolved into a system used primarily for budgeting and scheduling. The performance monitoring features of DMS have not been maintained, primarily because of staffing restrictions in the DMS organization.

Planning values have been developed, based on engineered standards and historical cost accounting data. These planning values are updated annually, and are used in the annual budget preparation cycle by the district. The Headquarters' DMS staff reviews the budget requests for reasonableness, and recommends adjustments where they feel it is appropriate.

The Design Management System appears to be a reasonable and logical approach to projecting personnel requirements. Requirements are estimated on a project-by-project basis, using planning values developed by Headquarters for use in each district, and budgets are subject to review by the DMS group in Sacramento.

- Construction Engineering Management System (CEMS)

The CEMS group in Sacramento has accumulated a data base of over 2,000 construction projects. Using this historical data, formulas have been developed which project the personnel requirements for construction on a project-by-project basis. The district can use these formulas in preparing their budget requests, which are reviewed by the CEMS group in Sacramento. Reports are prepared which show actual cost, and productivity indexes can be determined for different program elements from these reports.

While it is not clear that all districts rely specifically on the CEMS staffing formulas in preparing their budget requests, we believe the process of budget review, historical cost accumulation and reporting makes the system reliable enough to be considered reasonable in its projections of construction personnel requirements.

- Right of Way System

Right of Way has a system for monitoring productivity by district, which is based on completed units of work. Statewide standards and district norms are developed, using historical data. Since project-related work is only 40-60% of Right of Way's work load, their budget process is based on projecting outputs for the activities which have standards, and using the standards to project personnel needs. The 1979-80 district budget requests were reviewed by Right of Way in Headquarters before being submitted to financial affairs.

We did not review the activity lists, output definitions or standards for the Right of Way System. We were also told that the 1980-81 Right of Way budgets will not be reviewed by Right of Way in Sacramento, due to staffing problems. Because of these limitations and our own time constraints, we have less ability to judge the reasonableness of the Right of Way System in projecting personnel needs. The description provided us is that of a reasonable system. We are unable to determine, however, whether the system operates to project staffing needs reasonably.

All systems include provisions for application of adjustment factors, for special conditions, or to provide a means for a local manager to exercise some judgement about

individual projects. Use of these adjustments is monitored by the central functional unit in Sacramento (for Design), but not for other functions (Construction, Right of Way). We have been told that use of judgement factors is limited, and that they have little overall impact on projected personnel requirements. We were unable to determine, due to time constraints, whether these statements are accurate. Our previous experience with the Design Management System was that the adjustments usually cancelled out when aggregated to the district level.

In general, our reviews of the functional staffing systems showed the following characteristics:

- . A central function group in Sacramento has responsibility for development of district norms and standards
- . Standards, planning values or norms have been based primarily on historical data, and are periodically reviewed and updated
- . Cost accumulation and reporting systems are in place which permit periodic evaluation of the standards, norms and planning values used in the systems
- . Staffing requirements are developed, to the extent practical, on a project-by-project basis, or on the basis of projected outputs (e.g., number of parcels to be acquired)
- . District personnel budget requests have been subject to review by the central functional units in Headquarters before submittal to Financial Affairs
- . The Budget Review Committee makes a final review of person-year budget requests at the program level (HA, HB, HE, etc.). Any adjustment made to a program in total person years approved is transmitted back to the districts for adjustment of their budgets
- . The personnel planning systems and the budget development process do not identify personnel requirements by classification. There is some 1/ overlap of tasks performed by different classifications, and it is virtually impossible to project accurate requirements down to the classification level.

1/ Arthur Young's experience with the Design Management System indicates that there is overlap of task responsibility. The term "some" may be more appropriate than "considerable".

These characteristics lead us to conclude that the systems for projecting functional personnel needs can be considered as reasonable, and the projections developed through these systems as sufficiently accurate that they can be used for purposes of this study in evaluating the ability of CALTRANS to deliver the 1979-80 STIP.

It should be noted that we believe each of the systems we reviewed could be refined and improved, to provide more accurate projections of personnel needs, and better management reporting of productivity. However, our objective in this study was only to determine whether the staffing needs, as projected on a state-wide basis, are sufficiently reliable to base conclusions and recommendations for our study. We do not think the person-year projections developed through these systems are unreasonable, and we do not have a basis for projecting different staffing needs from those developed through the functional systems. However, because there is limited use of engineered work standards in the systems we reviewed, we believe there may be opportunities for productivity improvement through development of standards for more of the project development functions.

2. ANALYSIS OF THE PERSONNEL AUGMENTATION PROGRAM

As the result of applying the staffing development process previously described, CALTRANS identified the need for 700 additional personnel to support capital outlay project functions for the 1979 STIP. This number was subsequently changed to 820, apparently for two reasons:

- . Establishing a target above actual need, and planning a recruiting program accordingly, would enhance the prospects of obtaining the number actually needed
- . Personnel obtained above the actual need would serve as a hedge on anticipated attrition.

To expedite the acquisition of these additional positions, CALTRANS developed and implemented a personnel augmentation program. The program addressed two sources of personnel; 520 new hires and 300 internal transfers, both to be accomplished within the current CALTRANS personnel ceiling. The new hires are to fill currently authorized but vacant positions. The in-house transfers will be accomplished by re-classifying non-project related positions to project-related positions. This is to be accomplished by eliminating currently authorized (and occupied) non-project positions through the centralization of certain District functions at Headquarters.

Our analysis of the program involved an examination of the targets set for critical engineering classes and progress to date in order to assess whether achievement of the program objectives appears likely. It should be noted that some problems were encountered with respect to obtaining necessary information. First, consistent information was not available regarding district targets by classification; while district targets were defined specifically for some classifications, some were defined only in the aggregate. In addition, the numbers from various sources, provided by CALTRANS, did not agree in all cases. Several discrepancies, therefore, may be noted in the exhibits included in this section. The data presented, however, are the best we were able to obtain during our review.

(1) Hiring Targets and Current Success

Exhibit VIII, following this page, presents the overall position requirements identified for each district and the number of positions currently filled. As indicated, the number of vacancies as of April 1, 1979, the approximate start of the program, was 798. As of May 15, this number had been reduced to 741, with districts 4, 7, and 11

OVERALL TARGETS FOR ALL PROJECT-RELATED
POSITIONS, BY DISTRICT^{1/}

<u>District</u>	<u>Authorized Project- Related Positions</u>	<u>Filled Positions 4/1/79</u>	<u>Vacancies As of 4/1/79</u>	<u>Filled Positions As of 5/15/79</u>	<u>Vacancies As of 5/15/79</u>
1	176	150	26	153	23
2	163	140	23	142	21
3	340	301	39	301	39
4	954	844	110	845	109
5	159	158	1	161	2
6	175	161	14	164	11
7	1,340	1,004	336	1,024	316
8	330	301	29	309	21
9	95	91	4	93	2
10	252	226	26	226	26
11	520	414	106	410	110
Head- quarters	<u>1,103</u>	<u>1,019</u>	<u>84</u>	<u>1,042</u>	<u>61</u>
	5,607	4,809	798 ^{2/}	4,870	741 ^{2/}

^{1/} Source: Financial Affairs, CALTRANS

^{2/} Includes non-project related positions to be transferred/restructured/reclassified into project-related positions; best information to date as it relates to the recent published figure of 820.

accounting for over 70 percent of remaining vacancies. Available information regarding specific classifications is provided in the succeeding paragraphs.

. Junior Civil Engineer

Of the remaining 741 positions, those considered most critical to program success are positions requiring skilled engineering personnel, most notably, the Junior Civil Engineer (JCE) classification. Exhibit IX following this page, identifies the JCE targets for each district, and commitments obtained to date. As of May 1, 1979 62 percent of the total Department target had been reached; by May 18, the number had increased to 74 percent. In District 7, however, where there is significant competition for engineering skills, only 48 percent of the goal had been reached. This is the only remaining area where a large number of JCE commitments are still required.

CALTRANS fully expects to achieve the JCE target by mid June or early July. This projection appears reasonable, as approximately 190 applications were still awaiting processing and a number of responses to offers were still outstanding at the time of our latest inquiry.

. Associate and Assistant Engineers

There are no precise targets for Associate and Assistant Engineers. The majority of these positions will be filled internally through promotions and transfers from non-project areas.

As of May 1, 1979, authorized positions for Associate Engineers totalled 789. As of the same date there were 763 people "on board", leaving 26 vacancies. The estimated potential for acquiring re-hires via the re-employment list is 25. There are also 362 people on a statewide eligibility list. This should be sufficient to provide the necessary number of Associate Engineers required.

As of May 1, 1979, the number of positions authorized for the Assistant Engineer classification totaled 1,829; filled positions numbered 1,760, leaving 69 vacancies. There is no re-employment list for this

JUNIOR CIVIL ENGINEER NEW HIRE TARGETS BY DISTRICT
AND COMMITMENTS AS OF MAY 18, 1979^{1/}

<u>District</u>	<u>Initial Targets As of 3/23/79</u>	<u>Commitments As of 5/1/79</u>	<u>Vacancies As of 5/1/79</u>	<u>Commitments As of 5/18/79</u>	<u>Vacancies As of 5/18/79</u>
1	5	1	4	4	1
2	3	0	3	0	3
3	10	1	9	4	6
4	30	29	1	34 ^{2/}	(4)
5	3	4 ^{2/}	(1)	5 ^{2/}	(2)
6	3	1	2	2	1
7	100	37	63	52	48
8	20	10	10	13	7
9	4	1	3	3	1
10	12	8	4	8	4
11	20	22 ^{2/}	(2)	16	4
Head- quarters	<u>90</u>	<u>72</u>	<u>18</u>	<u>81</u>	<u>9</u>
	300	186 ^{3/}	114	222 ^{4/}	78

^{1/} Source: Personnel, CALTRANS

^{2/} Temporarily overcommitted, this indicates first choice of applicant.

^{3/} % completed toward goal as of 5/1/79 is $186/300 = 62\%$

^{4/} % completed toward goal as of 5/18/79 is $222/300 = 74\%$

classification; however, there are 143 people on the statewide eligibility list.

The potential for meeting the program objective for this classification appears less promising than for Associate engineers; however, it is still considered a reasonable possibility, either from the current eligibility list or from transfers of personnel in non-project functions.

- Junior Engineering Technicians (JET)

Exhibit X, following this page, is a listing of the JET hiring target and their potential availability (via re-employment listing) by district. As can be seen from the chart, most of the districts requiring more than several positions have an identified potential supply that should be sufficient to achieve their needs. Also, as in the Associate and Assistant Classifications, there apparently are other JET's that can be transferred from non-project positions.

- Highway Engineering Technician

The target for this position has recently been combined with that for JET classification. Originally, the number of vacancies identified totaled 248, as of May 1, 1979; however, the combined target is now 200 positions (mix is unknown). A statewide test has been administered to 194 applicants; however, results will not be known until August.

- Transfers from Non-Project Related Areas

Under the augmentation plan, it is expected that about 300 existing personnel will be transferred from non-project functions to project related activities. Of the 300 people, 25 currently occupy positions that will not require restructuring or reclassification. Twenty-three of the people in these positions have already agreed to transfer to the project areas.

The remaining 275 people may be reclassified based on project needs. Exhibit XI, following Exhibit X, is CALTRAN's estimate of the positions subject to restructuring or reclassification. Of the 275 people targeted for these positions only 80 (or 29 percent) had commitments to transfer as of May 22, 1979.

JUNIOR ENGINEERING TECHNICIAN (JET)
TARGET AND RECRUITMENT COMPARISONS
AS OF MAY 1, 1979^{1/}

<u>District</u>	<u>1979 Hiring Target</u>	<u>Candidates on District New Hire Eligibility List</u>
1	9	71
2	-	-
3	-	-
4	25	- <u>2/</u>
5	8	23
6	2	-
7	8	250 ^{3/}
8	14	52
9	6	23
10	4	-
11	<u>18</u>	<u>45</u>
	94	464

^{1/} Source: Personnel; CALTRANS

^{2/} Testing is underway, development of a list is anticipated in early June.

^{3/} Re-employment List

DEPARTMENTAL ESTIMATE OF CURRENT NON PROJECT
POSITIONS THAT ARE SUBJECT TO RESTRUCTURING AND
RECLASSIFICATION IF NECESSARY^{1/}

<u>District</u>	<u>Supervising Engineer</u>	<u>Senior Engineer</u>	<u>Associate Engineer</u>	<u>Assistant Engineer</u>	<u>HET/ JET</u>	<u>TARGET TOTALS</u>
1	-	-	1	4	1	6
2	-	-	1	3	-	4
3	-	-	6	12	7	25
4	1	2	8	26	8	45
5	-	-	3	5	1	9
6	-	-	2	7	6	15
7	-	2	17	23	8	50
8	-	-	2	7	6	15
9	-	-	2	3	1	6
10	-	-	3	6	6	15
11	-	1	3	14	7	25
Head- ^{3/} quarters	<u>4</u>	<u>5</u>	<u>15^{2/}</u>	<u>24^{2/}</u>	<u>12</u>	<u>60</u>
TOTALS	5	10	72	125	63	275

^{1/} Source: Personnel, CALTRANS

^{2/} Original information received from CALTRANS incorrect; modified based on CALTRANS' comments to this report.

^{3/} Changed per CALTRANS' comments to this report.

(2) Assessment of Augmentation Program

One of the difficulties in assessing the augmentation program is the lack of known personnel requirements by class and by district, and the changes that have occurred to the identified targets during the study period. In areas where targets have been set we looked at the progress made toward achieving these targets, either on a statewide basis, or by district. In situations where actual targets were unknown, our analysis is based on the availability of people from various pools such as re-employment lists and new hire eligibility lists. Our assessment of the augmentation program is as follows:

• Junior Civil Engineers (JCE)

To date, commitments for new hires are at 74 percent of the initial goal of 300. Based on this progress, the Department should reach its goal by July 1. On a district basis, the only major problem to meeting the targeted goal is District 7 with 48 more JCE's required. This represents 48% of the initial goal of 100 in that district with only one month left to recruit. Although District 7 may not reach its intended goal of 100 JCE's, the short fall should be minimal and have no significant impact on the overall program.

• Associate and Assistant Engineers

The overall statewide pool of available Associate and Assistant Engineers looks sufficient to meet department requirements, provided candidates are willing to relocate. The fact that many of these jobs will be filled through promotions may provide the incentive necessary to mitigate this potential constraint.

• Highway Engineering Technician (HET)

The existing re-employment list will meet some of the department's needs. The remainder should be obtained through new hires; however, the eligibility list based on the recent testing of 194 persons will not be available until sometime in August. This appears to be one classification which will not meet its goal by July 1, 1979.

. Junior Engineering Technicians (JET)

We have examined JET hiring targets and the available supply by district. Other than the need for an eligibility list in District 4 (which should be published by June) the pool of available resources looks sufficient to meet requirements.

Summary

Based on hiring activities to date and the available pool of resources (i.e., re-employment and new-hire eligibility lists) it is reasonable to assume that CALTRANS will acquire personnel planned to be acquired from outside the Department. There are, however, two areas that should be monitored closely; the JCE requirements of District 7, and the apparent delay that is occurring in the acquisition of Highway Engineering Technicians. The Department should act more aggressively in these two recruiting areas.

Regarding the success of the internal transfer program, we see no reason why the required shift from non-project related functions to project related functions cannot be accomplished by July 1. This assumes that the Department, if necessary, can restructure/reclassify positions as it sees fit and place personnel accordingly.

(3) Attrition Considerations

Exhibit XII, following this page, shows Department-wide attrition rates for all engineering classifications. They are relatively consistent with the exception of 1975 which reflects the major layoff that impacted the entire department.

ATTRITION RATES FOR ALL ENGINEERING CLASSES 1/
1970-1978

CLASSES	1970			1971			1972			1973		
	AVG. POB	SEP.	(%) RATE	AVG. POB	SEP.	(%) RATE	AVG. POB	SEP.	(%) RATE	AVG. POB	SEP.	(%) RATE
SENIOR ENGINEER	600	9	1.5	590	39	6.6	580	25	4.3	572	21	3.7
ASSOCIATE ENGINEER	1550	15	1.0	1449	55	3.8	1277	51	4.0	1285	45	3.5
ASSISTANT ENGINEER	3610	115	3.2	3525	161	4.6	3037	288	9.5	2866	179	6.2
JUNIOR CIVIL ENGINEER (JCE)	37	32	86.5	35	19	54.3	31	13	41.9	54	14	25.9
HIGHWAY ENGINEERING TECH. (HET)	1760	37	2.1	1690	59	3.5	1534	114	7.4	1450	86	5.9
JUNIOR ENGINEERING TECH. (JET)	570	92	16.1	575	78	13.6	520	74	14.2	557	56	10.1

CLASSES	1974			1975 2/			1976			1977			1978 3/		
	AVG. POB	SEP.	(%) RATE	AVG. POB	SEP.	(%) RATE	AVG. POB	SEP.	(%) RATE	AVG. POB	SEP.	(%) RATE	AVG. POB	SEP.	(%) RATE
SENIOR ENGINEER	577	31	5.4	566	42	7.4	536	15	2.8	476	8	1.7	476	8	3.4
ASSOCIATE ENGINEER	1330	51	3.8	1284	119	9.3	1170	52	4.4	1021	46	4.5	1092	20	3.7
ASSISTANT ENGINEER	2742	216	7.9	2688	425	15.8	2292	95	4.1	1893	109	5.8	1945	28	2.9
JUNIOR CIVIL ENGINEER (JCE)	23	9	39.1	26	15	57.7	11	1	9.1	4	1	25.0	77	1	2.6
HIGHWAY ENGINEERING TECH. (HET)	1355	76	5.6	1314	279	21.2	1046	70	6.7	774	32	4.1	830	12	2.9
JUNIOR ENGINEERING TECH. (JET)	377	74	19.6	257	102	39.7	146	10	6.8	89	6	6.7	83	4	9.6

1/ Source: Personnel, CALTRANS
 2/ Attrition rates reflect major layoff
 3/ Reflects first 6 months of 1978

It is our understanding that the Department has an ongoing program to compensate for this turnover. If this is true, then attrition does not become a factor in our analysis of the manpower augmentation program. The normal attrition-related recruitment program should service the existing Department work force as well as the turnover to be experienced by those departments affected by the augmentation program.

We would comment, however, on two engineering classifications; Junior Civil Engineers and Junior Engineering Technicians. Both are high on the recruiting list and both have historically high turnover rates. If these two positions are key to delivering the 1979 STIP, then it may be appropriate for the Department to maintain an aggressive, continuing recruitment effort to assure a level of employment consistent with STIP requirements.

Exhibit XIII, following this page, shows attrition rates by District; however, it reflects the total of all engineering classes, as rates by specific classes, by District, were not available. District rates were reviewed to determine if any given District historically has had higher than normal attrition rates, and if so, how this might impact the recruiting program and the ongoing attrition replacement program. As can be seen, with the exception of District 9 in the years 1970, 1971 and 1972, there does not appear to be any significant variations. We cannot, however, tell whether there have been major variations in specific engineering classes.

Based on the above, it is our opinion that, assuming there is an ongoing recruitment program to offset annual attrition, no additional action need take place concerning turnover.

ATTRITION RATES BY DISTRICT FOR THE ENGINEERING CLASSIFICATION

1970-1978

DIST	1970		1971		1972		1973		1974		1975		1976		1977		1978	
	POB	SEP RATE	POB	SEP RATE	POB	SEP RATE	POB	SEP RATE	POB	SEP RATE	POB	SEP RATE	POB	SEP RATE	POB	SEP RATE	POB	SEP RATE
1.	261	9 3.4	245	7 2.9	203	11 5.4	185	9 4.9	173	6 3.5	160	24 15.0	130	6 4.6	139	9 6.5	137	2 1.4
2.	280	8 2.9	265	9 3.4	249	15 6.0	209	8 3.8	203	7 3.4	195	8 4.1	153	6 3.9	164	7 4.3	148	2 1.4
3.	564	12 2.1	534	18 3.4	390	20 5.1	458	23 5.0	425	32 7.5	394	55 14.0	307	21 6.8	298	10 3.4	290	4 1.4
4.	1553	75 4.8	1466	94 6.4	1312	93 7.1	1306	82 6.3	1164	105 9.0	1103	182 16.5	831	59 7.1	833	37 4.4	909	8 1.0
5.	275	11 4.0	266	10 3.8	251	12 4.8	243	11 4.5	231	16 6.9	220	32 14.5	165	3 1.8	165	6 3.6	144	3 5.0
6.	343	2 .6	329	15 4.6	297	23 7.7	245	11 4.5	232	8 3.4	220	16 7.3	171	2 1.2	168	4 2.4	164	2 2.9
7.	2204	101 4.6	2105	118 5.6	1963	134 6.8	1787	126 7.0	1662	116 7.0	1590	313 19.7	1144	83 7.3	1012	46 4.5	1091	21 2.1
8.	531	17 3.2	487	30 6.2	453	44 9.7	438	29 6.6	389	36 9.3	356	82 23.0	257	9 3.5	255	9 3.5	267	6 4.5
9.	125	9 7.2	112	15 13.4	94	15 16.0	87	5 5.7	83	8 9.3	105	34 32.4	66	4 6.1	77	3 3.9	86	3 3.5
10.	419	11 2.7	398	18 4.5	368	22 6.0	330	11 3.3	311	15 4.8	299	33 11.0	232	6 2.6	242	11 4.5	215	3 3.3
11.	659	24 3.6	642	33 5.1	600	47 7.8	582	37 6.4	559	26 4.7	527	92 17.5	394	27 6.9	359	26 7.2	398	10 6.0

3. PROJECT MIX AND FLEXIBILITY

The current mix of projects in the 1979 STIP would appear to present excellent potential for delivering a high percentage of planned projects. To explain, approximately 90 percent of the STIP projects are in the maintenance/rehabilitation and operational improvements program elements. Over eighty percent of these involve projects of less than \$1 million, and over half are less than \$500 thousand. As such, most have relatively short lead times and are less likely to suffer major delays due to process controls, e.g., extended environmental clearance problems, etc. In this respect, there should be a significant level of flexibility available, i.e., the capability to move projects forward as delays do occur.

On the other hand, the relatively small number of major projects and lack of "back up" capability for these would appear to present a high risk of slippage with major projects. Most projects have been scheduled with minimum, optimistic lead times, and a number are currently under process constraints which are outside the control of CALTRANS, e.g., Century Freeway, which accounts for approximately 25 percent of planned capital outlay expenditures. This optimistic scheduling approach suggests that some slippage is likely to occur. Without a reasonable level of backup capability, it appears likely that specific major project expenditures may not occur as planned.

Most of the CALTRANS personnel we interviewed agreed that additional flexibility would be desirable; however, most also expressed a preference for developing flexibility in the form of advanced readiness of STIP projects rather than additional projects outside the STIP. This approach would provide for a percentage of projects (e.g., 15 to 20 percent) to be completed six months ahead of the planned advertising date, allowing the Department to move one forward in the event of unforeseen delays

to another. The advantage of this approach is that it would provide flexibility without affecting STIP priorities (i.e., the elimination of a priority project replaced by a "backup" project.

CALTRANS representatives have stated they are unable to provide this level of flexibility with current resources. They estimate that achieving it would require approximately 175 person years initially, with a reduced level required thereafter to maintain it.

Another factor which may impact slippage is the reduced time available for obligating construction funds under the revised budget review and approval process mandated by AB 402. Under this bill the STIP (and, therefore, the authorization for obligating funds) is to be approved on or before July 1 of each year. Basically, this means that the Department cannot advertise for construction work or obligate right of any funds until that date. If any delay occurs in the July 1 date, the authority to release funds comes too late in the year to permit effective advertising. In addition, advertising must stop about 6 weeks from the end of the fiscal year if funds are to be obligated in the planned time-frame. Considering any delay at the beginning of the budget period, the advertising time in any given fiscal year could be no more than 9-10 months. This compares to 16-17 months under the prior project planning and budget process.

4. EXTERNAL CONSTRAINTS

The major impediment to completion of the STIP as planned, appears to be the extensive number of external constraints which are beyond CALTRANS control. These include:

- . Environmental clearance requirements, which are increasing and may impact a project at any stage prior to completion
- . Historical preservation requirements, also increasing
- . Litigation
- . Relocation assistance problems
- . Federal funding constraints (specific use restrictions)
- . State funding constraints (annual north/south allocations, and county/district minimum requirements)
- . Extended budget and review process
- . Document review requirements.

All of these factors combine to make it increasingly difficult to deliver a plan precisely as developed, especially major construction projects, where several factors may be involved. Faced with these potential constraints, the need for project flexibility seems imperative if projects are to be completed in a cost-effective manner.

5. HISTORICAL EXPERIENCE

Several problems were encountered in our efforts to review CALTRANS historical performance in delivering previous Transportation Improvements plans. The first was in identifying a comparable performance period from which to draw inferences regarding future performance. Unfortunately (for comparison purposes), the Department's operations have changed significantly in recent years, e.g., moving from a growing program operating on a cash flow basis and using split financing to a diminishing program with modest targets and the extreme of an advertising

moratorium. In recent years, a number of exogenous factors have impacted operations, e.g., the Arab oil embargo, Proposition 13, administrative cutbacks, the hiring freeze, etc. This year AB 402 brought about a new approach to development and approval of the STIP and a reduced budget period for obligation and construction activities. All of these factors tend to make any specific inference questionable with respect to future operations. As a general observation, however, the trend of changes, coupled with other increasing external constraints, suggest that delivery of the STIP is becoming more difficult rather than easier.

Our second problem related to obtaining complete and accurate information regarding past performance. CALTRANS does not maintain summary information on a project basis. The Department does maintain information regarding dollars expended versus planned expenditures; however, the expenditure data does not distinguish currently budgeted dollars from previously budgeted dollars (carryover monies). Further, there is some question regarding the reliability of the data available. For example, summary information regarding actual expenditures vs. planned expenditures for 1976-77, and 1977-78, was obtained from three sources in Financial Affairs; each contained different data.

The figures considered most reliable provided the following information for the 1977-78 year (the only complete year without split financing):

. Budgeted Projects Awarded	\$141.9 million
. Added Projects Awarded	157.6 million
. Minor Projects Awarded	40.0 million
- Total Awarded	339.5 million

. Major Projects Not Awarded	52.7 million
. Minor Projects Not Awarded	<u>17.4 million</u>
- Total Not Awarded	70.1 million

These figures suggest that total awards equalled about 83 percent of planned expenditures; however, the added projects included \$27.7 million in projects carried forward from the previous year. If we assume that all were awarded, expenditures for 1977-78 projects would appear to equal approximately 80 percent of plan.

Our final effort to identify historical performance consisted of a sample review of projects planned to establish a general pattern of success or slippage. Projects listed in the 1976-77 TIP for two districts, District 1, and District 4, were traced through subsequent years to their disposition. The review was not intended to establish statistically reliable data, and the limited value of our results should be recognized.

In District 4, we reviewed 112 projects. Of these, 58 (52.7 percent) were either dropped or experienced slippage beyond the budget year. Five (4 percent) were advanced and 49 (44 percent) were completed as scheduled.

Forty-four projects were reviewed in District 1. Of these, 15 (34 percent) slipped or were dropped. Four (9 percent) advanced, and 25 (57 percent) were completed on schedule.

6. CONCLUSIONS REGARDING CALTRANS ABILITY TO COMPLETE THE STIP

Based on our analysis of available information, it is our opinion that CALTRANS probably will be unable to deliver the five-year STIP as planned. While planned dollar expenditures may occur, it most likely will be due to prior year carryover,

unanticipated levels of inflation, or increased expenditures on minor projects. We doubt that all projects (or substituted similar projects) currently identified will have funds obligated as scheduled. The optimistic lead times used in the schedule coupled with the potential for delay due to external constraints, are the major factors influencing this conclusion. Obviously, we cannot state with certainty that the plan will not be achieved. Nor do we believe that CALTRANS planning approach should necessarily be considered deficient. It does, however, appear very optimistic.

The principal factors influencing our conclusions, in addition to historical experience and external factors, relate to personnel requirements and to flexibility requirements, both being interrelated.

(1) Personnel Requirements

While the basic approach used to determine total needs was essentially reasonable, and the acquisition of identified position targets appears probable (with minor exceptions), we question the expected productivity levels, given the employee mix. CALTRANS is relying heavily on the use of new Junior Civil Engineers (approximately four times the number used in recent years). The expectation of full "journeyman" level productivity from these relatively unexperienced employees seems optimistic. It would seem more reasonable to expect reduced overall productivity due to increased supervision requirements during the initial year.

(2) Flexibility

In view of all external constraints, and the optimistic scheduling of projects, the probability of individual project slippage appears evident. It does not appear that

the current plan has provided sufficient resources to assure reasonable flexibility. Current resource requirements are based on needs to produce only the projects contained in the STIP, and according to the proposed schedule. They do not appear, therefore, to establish the capability for advanced project development or for the development of backup projects.

C. ANALYSIS OF POTENTIAL FOR ACCELERATING CONSTRUCTION
OF NEW FACILITIES PROJECTS

This subsection presents our analysis and findings regarding the capability to expedite construction of new facility highway projects. It contains four principal subsections, as follows:

- . Factors Supporting Acceleration
- . Constraints to Acceleration
- . Conclusions
- . Potential Approaches to Acceleration.

In conducting our analysis, the concept used was that of completing needed construction projects within a shorter time period than is currently planned in the 1979 STIP. The concept of "needed projects" necessarily expands the scope of the analysis to include projects which may be outside the current STIP as well as those currently identified for planned construction. At the same time, the concept of need requires consideration of more than just the capability to accelerate; it imposes the requirement to consider whether acceleration is reasonable and justified.

Exhibit XIV, following this page presents the major factors which we believe support acceleration and the constraints which restrict it or suggest that acceleration is inadvisable . Quite frankly, we believe that strong arguments exist both for and against acceleration. The key issues affecting determination of the most appropriate action appear to revolve around differing views regarding:

- . Actual construction needs and priorities
- . The most reasonable use of a large cash balance in the State Highway Account.

FACTORS IMPACTING ACCELERATION OF 1979/80 STIP

FACTORS ENCOURAGING ACCELERATION	POTENTIAL APPROACHES TO ACCELERATION	CONSTRAINTS TO ACCELERATION
<p>1. Excess Funds Available in Early STIP Years</p> <ul style="list-style-type: none"> • Carry over funds -- - Carry over - 229 million - Federal carry over - 25 million - DMV transfer - 100 million • Additional Funding Potential - Advanced release of Inter-state discretionary funds - Additional funds anticipated from future DMV transfers <p>2. Existing Needs and Inflationary Construction Costs</p> <ul style="list-style-type: none"> • Opportunity costs of delays • Inflationary construction costs, diminishing funding <p>3. Availability of Unfunded Projects</p>	<p>1. Compression of Existing Project Schedules</p> <p>2. Inclusion of Additional Projects in the STIP</p> <p>3. Increased Flexibility to Protect Against Unforeseen Delays</p> <p>4. Increased State Funding of Projects</p> <p>5. Increased CALTRANS Staffing</p> <ul style="list-style-type: none"> • Project development • Construction management <p>6. Use of Resources Outside CALTRANS</p> <ul style="list-style-type: none"> • Consultants • Cities and counties <p>7. Change Existing Project Mix</p> <ul style="list-style-type: none"> • Increased emphasis on larger projects 	<p>1. Perceptions Regarding Stated Versus Actual Needs</p> <ul style="list-style-type: none"> • Actual needs considered less than level identified in needs inventory <p>2. Funding Limitations</p> <ul style="list-style-type: none"> • Limited funds available for entire STIP period, future years--need to match federal funds • North/South funding requirements, county/district minimums • Reduced period for obligation of funds • Rehabilitation/maintenance needs inventory <p>3. Low Priority of Available Projects Outside the STIP</p> <p>4. Process Requirements of Projects Within the STIP</p> <p>5. Desire to Maintain a Consistent Programming Level</p> <ul style="list-style-type: none"> • Avoid "boom or bust" cycles in industry • Stable staffing levels in CALTRANS <p>6. Potential Problems Related to Use of Outside Resources</p> <ul style="list-style-type: none"> • Legal constraints • Quality of work performed • Cost • Time required for implementation (develop control procedures)

The subsections which follow attempt to examine both perspectives separately and in an objective manner. Subsequent discussions present our conclusions and potential approaches toward acceleration.

1. FACTORS SUPPORTING ACCELERATION

Aside from a perceived need for the construction of new highway facilities, there are two major factors supporting acceleration of the construction program:

- . Apparent availability of excess funds during early years of the STIP period
- . Additional costs associated with delayed construction

The merits of each are described in the following discussions. A third subsection describes the results of our analysis of projects potentially available for acceleration.

(1) Excess Funds Available in Early STIP Years

The key factor supporting potential capability for expediting construction of new facilities is the current availability of more state and federal funds than are required to support planned expenditures during the initial years of the 1979 STIP. The amount of additional funds available during each year and planned expenditures are provided in Table 1 below.

TABLE 1
STATE RESOURCES AND PLANNED EXPENDITURES
(MILLIONS)

<u>RESOURCES</u>	79-80	80-81	81-82	82-83	83-34	5 Yr. Total
New Resources	662	569	550	541	527	2,849
Reversions	5	5	5	5	5	+25
Carryover	229	320	308	189	91	+229
Total Resources	896	894	863	735	623	3,103
<u>EXPENDITURES</u>						
Fixed Expenditures	439	472	516	517	521	2,465
Federal Match	40	39	40	41	39	199
Over Committed						
Primary & Safety Project	49	17	82	40	21	209
State Only	48	58	36	46	42	230
Total Expenditures	576	586	674	644	623	3,103
<u>EXCESS FUNDS</u>	320	308	189	91	-0-	-0-
<u>EXCESS LESS FUTURE MATCH REQUIREMENTS</u>	161	188	109	52	-0-	-0-

As the table indicates, a balance of approximately \$320 million in state funds is anticipated following first-year expenditures; however, the plan provides for expenditure of all funds over the course of the STIP. In reviewing the planned revenues and expenditures, and calculating gains and losses from interest vs. inflation, first year expenditures could be increased by approximately \$100 1/ million in over-committed primary and safety

1/ Assumes approximately \$60 million of excess funds required for future FAU match, state portion of future federal projects without full federal participation. Projection does not include potential receipt of additional \$100 million from Motor Vehicle Account transfer in 1980-81.

projects plus state only projects without jeopardizing planned federal match requirements. Actual savings from this approach would depend on the amount by which inflation rates exceeded return on investments.

Our review of available interstate funds and planned expenditures indicates that unobligated "early year" interstate funds will be available during each of the five years. Table 2, below, reflects the approximate amounts to be available. The Department is currently developing an accelerated interstate program for the 1980 STIP aimed at consuming all early year funds by June, 1982.

TABLE 2
AVAILABLE INTERSTATE FUNDS VERSUS PLANNED EXPENDITURES
(MILLIONS OF DOLLARS)

	79-80	80-81	81-82	82-83	83-84
Available Funds	393	258	237	266	272
Planned Expenditures	265	282	305	283	291
Net Difference	128	(24)	(68)	(17)	(19)
Remaining Early Year Funds Available	\$128	\$104	\$36	\$19	\$0

In addition to funds available through normal allocation, there exists the opportunity to obtain additional federal funding for completion of interstate projects, provided: (1) apportionments for the current and subsequent year have been obligated, (2) additional funds can be obligated within one year, and (3) construction begins within 90 days following obligation. These discretionary funds are comprised of lapsed interstate apportionments from other states, and are available on a "first-come" basis to states meeting the previous criteria. It is

estimated that \$600 million of these funds will be available during 1979/80, with approximately \$1 billion already having been claimed by other states. While obtaining a share of these funds will not increase the state's total apportionment, early acquisition should increase the value of these funds in view of current inflationary trends.

A related factor supporting acceleration of interstate construction is the potential loss of future funds. Current law requires that environmental clearance be completed on all interstate projects by 1983, and all construction be initiated by 1986.

The current availability of funds, coupled with the potential availability of discretionary interstate funds clearly suggests that acceleration of construction projects is feasible provided:

- . New facilities projects are actually needed
- . Accelerated construction will avoid unnecessary costs
- . Accelerated construction of new facilities will not impact the overall highway program adversely
- . There are projects within the STIP period which are capable of being advanced from planned advertising dates
- . There are additional projects outside the STIP which are sufficiently developed to allow advertising during the STIP period
- . Allocation requirements (e.g., North/South and county/district minimums) can be satisfied or ignored
- . Current priorities are maintained or revised.

(2) Cost of Delayed Construction

Two principal cost factors are associated with delayed highway construction: (1) opportunity costs, and (2) inflation. Although analysis of opportunity costs is clearly outside the scope of this study, these cost factors should play a major role in determining the need for additional facilities. Such costs include: (1) cost of delayed travel, (2) cost of goods delivered, (3) impact on economic growth in areas affected, (4) safety costs, etc. On balance, there are also offsetting costs associated with construction which should be considered, e.g., impact on environment, energy conservation, etc.

Based on the CALTRANS Estimate of Existing Highway Construction, April 1977, the current "now" needs estimate totals approximately 6.6 billion dollars, excluding normal maintenance and predictable future rehabilitation requirements.

Of the total inventory identified, systems improvements (major improvements and new facilities) comprise over 4.5 billion dollars (about 68 percent). New facility needs alone represent approximately 56 percent of the total.

CALTRANS estimates that construction costs will escalate at a rate of 10 percent in the next year, 9 percent in the following year, and 8 percent annually during the remainder of the STIP period. While these estimates appear conservative in view of trends in construction costs, petroleum products, etc., the estimated inflation levels will have a substantial impact on the ability of CALTRANS to reduce current project inventories.

Exhibit XV, following this page, illustrates the impact on current inventory of an 8 percent inflation rate over a ten year period, under the planned funding approach. As the exhibit indicates, the total cost to complete remaining "now" needs at the end of the STIP period will be approximately equal to current cost estimates. The cost to complete remaining new facilities will be slightly higher than current estimates, and new facility requirements will comprise approximately 57.5 percent of the total. Assuming continued funding at the 83/84 level, purchasing capability to construct new facilities will be reduced approximately 40 percent from current levels. By 1989/90, the inventory will exceed current costs and purchasing power will be approximately one-half current capability.

Given these conditions, and recognizing the substantial cost of new facilities, two points appear obvious:

- . Needed new facilities should be constructed at the earliest date possible
- . New facilities projects which are delayed face an increasing probability of never being constructed at all as they are forced to compete for diminishing funds with increasing rehabilitation needs.

Not immediately obvious are the savings which could result from increased emphasis on major projects. Since inflation has a greater impact on larger dollar amounts, and large projects can be developed at less cost (addressed in more detail in our discussion of resources), a shift in current project emphasis could produce substantial savings in the longer-term, assuming major projects were considered necessary. For example, four-\$10 million dollar projects can be developed for approximately the same project development costs as 20-\$1 million dollar projects. The savings in inflationary costs from this approach is readily apparent, as illustrated below in Table 3.

COMPARISON OF HIGHWAY CONSTRUCTION
NEEDS VS. PLANNED EXPENDITURES

	NEED VERSUS SCHEDULED EXPENDITURES 1/										NEED VS. CONTINUED PROGRAM AT 83/84 LEVEL				
	78/79	79/80	80/81	81/82	82/83	83/84	84/85	86/87	88/89	89/90					
COST	6.619	6.619	6.610	6.632	6.593	6.597	6.642	6.697	6.744	6.801					
STIP EXPENDITURES	.518	.499	.469	.527	.484	.447	.447	.447	.447	.447			.447		
REMAINING NEEDS	6.129	6.120	6.141	6.105	6.109	6.150	6.195	6.244	6.297	6.354			6.354		
ESCALATED COSTS	6.619	6.610	6.632	6.593	6.597	6.642	6.691	6.744	6.801	6.862			6.862		

NEW FACILITIES NEEDS VS. PLANNED EXPENDITURES

	NEW FACILITIES NEEDS VS. PLANNED EXPENDITURES										NEED VS. CONTINUED PROGRAM AT 83/84 LEVEL				
	78/79	79/80	80/81	81/82	82/83	83/84	84/85	86/87	88/89	89/90					
COST	3.693	3.709	3.689	3.710	3.700	3.768	3.823	3.883	3.945	4.014					
STIP EXPENDITURES	.258	.293	.254	.284	.211	.228	.228	.228	.228	.228			.228		
REMAINING NEEDS	3.435	3.416	3.433	3.426	3.489	3.540	3.595	3.655	3.717	3.786			3.786		
ESCALATED COSTS	3.709	3.689	3.710	3.700	3.768	3.823	3.883	3.945	4.014	4.080			4.080		

1/ Needs costs projected at 8 percent annual inflation

TABLE 3
SAVINGS IN INFLATIONARY COSTS

Project Cost (Millions)	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>
\$20	21.6	23.32	25.19	27.2	29.4
\$40	43.2	46.6	50.4	54.4	58.8

Assuming a fixed level of expenditures, the same approach could be used to protect against slippage of major projects without requiring additional resources. For example, the two additional major projects could be used as a backup to scheduled projects.

(3) Projects Available for Acceleration

Assuming that savings resulting from early construction of new facilities would justify acceleration, the major problem remaining is the identification of needed projects which are subject to acceleration. In this regard, our review of major HE-1 projects contained in the STIP, the review of periodic status reports on these projects, and our discussions with CALTRANS project development personnel have convinced us that potential for acceleration of major projects currently in the STIP through schedule compression is very limited. Current schedules are based primarily on process controls (e.g., environmental clearances, court actions, right of way lead time, etc.) which are essentially beyond the Department's control. While some projects are subject to labor intensive effort, these appear to be few. In fact, as stated previously, the current STIP schedule appears optimistic already.

It appears, therefore, that any significant acceleration must necessarily result from projects not currently in the STIP. Short term acceleration will require the addition of projects already substantially completed with respect to project development activities. Acceleration in the longer

term, i.e., outside the current STIP period, could be accomplished with the addition of projects totally new; however, construction of those projects within the 1979 STIP appears unlikely in view of normal lead time requirements for major project development activities.

Our attempts to identify available projects outside the STIP consisted of a review of all projects contained in Districts' Status of Projects Reports (March, 1979), the review of past reports of available projects (previously provided to the Legislature by CALTRANS), and a review of potential candidate projects with representatives from the Divisions of Project Development, Highways, and Finance. These efforts resulted in the identification of 56 projects which appear to be sufficiently developed to achieve obligation of funds within the current STIP period. These are presented in Exhibit XVI, following this page. Most are Primary fund projects and are considered low priority by CALTRANS or constrained by the lack of required agreements with local agencies.

2. CONSTRAINTS TO ACCELERATION

The previous discussions have addressed the major factors supporting accelerated construction of new facility highway projects. In this subsection we present our understanding of factors which restrict the capability to expedite construction. These constraints may be separated into two principal categories: (1) needs vs. funding constraints, and (2) the desire to maintain a stable program during the STIP period.

(1) Needs vs. Funding Constraints

Review of the existing needs inventory and both current and future funding expectations demonstrates that

POTENTIAL PROJECTS WHICH COULD BE
BE CONSTRUCTED DURING THE STIP PERIOD

DISTRICT	PROJECT	CONSTRUCTION VALUE (MILLIONS OF DOLLARS)	
		INTERSTATE	PRIMARY
1	Humboldt 36	.	\$ 1.1
2	Shasta I-5	\$ 7.0	
	Shasta I-5	9.3	
3	Yolo 80	16.4	
	Sac 16		2.4
	Nevada 20		25.7
4	ALA 500	1.0	
	SM 380	10.9	
	SM 380	5.0	
	SCL 280	3.0	
	SCL 280	19.0	
	HOFFMAN 181	11.5	
	CC 80	2.0	
	SCL 17		1.0
	SCL 152		4.9
	SCL 101		7.6
	SM 92/101		23.0
	SON 116		4.1
	SON 101		12.8
	SCL 101		6.1
	ALA 17		1.5
	SCR 129		1.0
	SM 101		1.6
	SF 480		8.9
	SON 116		1.0
5	SB 166		2.4
6	FR 99		2.0
	MAD 99		3.6
7	LA 7	5.0	
	ORA 5	5.0	
8	SBD-15E	2.9	
	RIV 194		3.5
	SBD 194		10.0
	SBD 194		3.6
	SBD 138		5.6
	RIV 194		4.1
	RIV 194		9.0
	SBD 138		11.9

		CONSTRUCTION VALUE (MILLIONS OF DOLLARS)	
DISTRICT	PROJECT	INTERSTATE	PRIMARY
9	SBD-15E	\$ 1.5	\$ 7.0
10	Merced 99		6.0
	SJ 4		13.7
	Riverside 086		13.4
	Riverside 086		14.7
11	IMP 086		11.9
	IMP 086		9.7
	SD 015		28.7
	SD 015		3.3
	SD 094		9.7
	RIV 086		5.3
	RIV 086		2.4
	RIV 086		1.1
	RIV 086		3.0
	IMP 086		5.1
	IMP 086		2.7
	SD 08-SD 163		9.4
TOTAL		<u>\$100.6</u>	<u>\$305.5</u>

the current inventory of "now" needs (costs to alleviate deficiencies) far exceeds present and future funding capabilities. It follows, therefore, that expenditures toward resolving deficiencies should be made on a priority basis, i.e., providing the maximum benefit to the overall system with available dollars during a given time period.

In this regard, CALTRANS has attempted to achieve optimum cost-effectiveness through establishing a "modest" approach toward expenditure of funds. Project priorities are established by weighing the cost and benefits of a specific project (e.g., an optimum facility) against benefits to the overall system which would derive from alternative uses of the funds, i.e., a "spreading of the wealth". As the result of this approach, CALTRANS has adopted the position that maintenance (investment protection) and operational improvements are generally more cost effective than construction of new facilities.

Further, CALTRANS contends that, aside from the major construction projects contained in the current STIP, the state highway system is substantially complete, and the actual need for new major facilities is relatively limited. Real maintenance and rehabilitation needs, on the other hand, are increasing.

In reference to the 1977 Needs Study which reflects new facility needs as comprising the majority of deficiencies, the Department points out: (1) the survey does not establish priority of need; (2) the principle purpose of the survey was simply to establish funding guidelines for districts, and (3) many of the deficiencies identified are not, in fact, true needs.

Given this background, CALTRANS contends the current STIP represents the most cost-effective use of funds under current conditions, which include:

- . Limited funding
- . Constraints on the use of funds, e.g., north/south allocations, and federal funding restrictions
- . Process controls restricting acceleration of priority projects (i.e., projects currently in the STIP, and needed projects outside the STIP which are dependent on uncontrollable delays)

To expand, the projects contained in the STIP represent those which CALTRANS considers to be top priority, given current constraints. All available funds are currently planned for expenditure. In fact, absent additional revenues, continuation of the 1983-84 STIP program level would exceed anticipated revenues by approximately \$109 million. This negative balance could be delayed by one year if an additional \$100 million is received from the Motor Vehicle Account in 1980-81; however, like amounts will be required in 1985-86, and thereafter to sustain the 84-85 program level.

While some projects outside the STIP are sufficiently developed to allow accelerated construction, the addition of these projects would require that current projects be dropped, or delayed beyond the STIP period, due to funding limitations. Additionally, the unlimited use of state funds to advance project construction would jeopardize the State's ability to match future federal funds, which currently support as much as 92 percent of construction costs for eligible projects. While some STIP projects supported by federal Primary Funds are technically amenable to acceleration, advancement is constrained by annual federal apportionments. Again, advancement would require replacing or supplementing federal funds with state funds only. The net effect of this action would be the replacement

of currently planned state funded projects which would not be eligible for subsequent federal funding. In addition to these constraints, any acceleration of projects would be required by law to maintain the 60/40 north-south expenditure allocation balance on an annual basis.

The most reasonable potential for acceleration of construction without adversely impacting current priorities appears to be in the interstate construction program, where advanced "early year" funding is available, along with the potential for obtaining discretionary funds. CALTRANS' position with respect to this program remains that of planning only those projects for which funding may be reasonably anticipated. Again, it is anticipated that available funds will be insufficient to meet identified needs (approximately \$3 billion outside the STIP) within the established time frame (construction by 1986). The amount of Federal funding required beyond the STIP period to complete construction within the established time frame would be approximately \$1 billion dollars a year. CALTRANS' administration believes this level of funding is not likely to be available.

CALTRANS is, therefore, proceeding on a priority basis, attempting to develop only projects which may be funded. The Department estimates that future funding will continue at approximately the same level as is being received today, and is planning accordingly.

Available interstate discretionary funds are expected to reach \$600 million to \$1 billion dollars, and the Department is planning to apply for \$300 million of these funds. To become eligible for discretionary funds as planned, heavy reliance is placed on meeting planned advertising dates of specific projects: (1) Century

Freeway I-105 (court injunction); (2) Auburn I-80 (environmental control); (3) Riverside I-15 (environmental control); and Hoffman I-180. Other interstate projects (outside the STIP) are sufficiently developed to allow construction; however, they are not currently being planned as replacements due to a perceived low priority and overall funding limitations.

(2) Desire to Maintain a Consistent Programming Level

CALTRANS' desire to provide a stable, consistent construction program, and its desire to retain total responsibility for project development functions within the Department, are also constraints to acceleration. The reasons offered in support of program stability are:

- . Minimizing staffing problems by providing consistent work load levels
- . Orderly development of projects
- . Obtaining more dependable and responsive construction bids and performance by avoiding "boom-and-bust" cycles

Support for this approach appears to be widespread throughout the Department. Aside from the surface merits of the arguments offered, a large measure of this support appears (based on our interviews with Department personnel) to result from:

- . A recognition that the highway program is diminishing
- . A desire to avoid the traumatic impact of severe work force reductions experienced previously.

Both concerns appear to be legitimate considerations.

In response to an alternative approach of using outside resources (e.g., cities, counties, or private engineering consultants) to perform project development functions during peak, or "boom" periods, the Department offers four principal arguments in opposition. These are:

- . The use of outside resources would result in a reduction of work quality
- . Project development costs would increase due to higher salaries demanded by private engineers, profit and tax requirements of private firms, and increased requirements for supervision by CALTRANS
- . A high potential for legal action by state employees if the Department attempts to contract with the private sector for project development
- . Potential loss of key CALTRANS personnel to private sector firms if a new demand is created.

In addition, it should be recognized that any approach to acceleration through use of consultants will, of necessity, require some lead time to develop required control procedures prior to implementation. A minimum time of one year would seem optimistic, regardless of potential legal problems.

3. FINDINGS AND CONCLUSIONS

This subsection presents the findings and conclusions resulting from our analysis of factors supporting and constraining accelerated construction of new facilities. Briefly, our findings can be summarized as follows:

- . Acceleration of new facilities construction is technically feasible
- . Acceleration of projects within the STIP has only limited potential due to process controls and funding constraints

- . Significant acceleration will require the addition of projects not currently in the STIP, i.e., projects already substantially developed, or projects started earlier than currently planned to obtain future savings
- . Assuming current priorities are appropriate, acceleration of projects, other than interstate, does not appear advisable unless funding is increased accordingly.

Three discussions are presented in the pages which follow; the first addresses our general conclusions regarding acceleration, the second discusses cost comparisons related to the use of consultants, and the third addresses the issues we consider key to determining the advisability of acceleration, i.e., needs and funding requirements.

(1) General Conclusions Regarding Acceleration

Where needs demand new facilities, early construction obviously will result in reduced building costs if inflationary trends continue as expected. Actual savings to the State, however, will depend on funding sources used for construction. Advanced construction of state funded projects will result in overall savings to the extent that inflation rates exceed income derived from interest on funds. If state funds are expended to the extent that future matching of federal funds is not possible, overall costs to the State will actually increase as federal funds are lost. However, the State is currently capable of expending about \$100 million without jeopardizing federal funds. This may be increased if an additional \$100 million is received from DMV transfers in 1980-81.

The wisdom of accelerating projects eligible for federal Primary funds (these appear to represent the majority of current outstanding needs), is dependent upon

whether opportunity costs of delayed construction (waiting for available primary funds) offset additional costs of constructing projects with state funds only. The acceleration of interstate projects clearly provides the greatest potential for direct savings due to advanced funding capability and the fact that unobligated federal funds are not protected against inflation. While we are in agreement with the administration's policy of limiting project development to reasonable funding expectations, we question whether alternative risks (project development cost vs. potential loss of funds) have received sufficient consideration. Currently, the Department's interstate program relies heavily on several major projects controlled by outside sources. If approval for construction is received in the near future, it would appear that an accelerated interstate program could be implemented with little difficulty. If, on the other hand, clearance is not received on one or more major projects (e.g., Century Freeway), the availability of alternative strategies would seem appropriate to avoid extensive losses due to inflation.

(2) Cost of Using Consultants for Preliminary Designs

CALTRANS' argument against accelerated construction in order to protect program stability appears, in our minds, to be weak, at least from an economic perspective. We agree it is desirable to maintain a stable work load and we are generally supportive of the desire to avoid mass hiring and subsequent massive cutbacks. However, we question whether avoiding use of consultants is desirable, provided the benefits which can result from acceleration. Our principal concern is with arguments regarding increased costs resulting from use of outside resources (other issues regarding quality of work, legal constraints, etc. are addressed later in this section.

The principal concern in comparing the cost of using consultants to that of conducting work "in house" should not be whether project development costs are more or less, but whether the overall project costs are more or less. The principal cost factors considered should be the elapsed time required to complete the project, estimated construction costs, and the impact of inflation on those costs.

To illustrate, the experience of six states in using consultants for preliminary engineering of highway facilities resulted in average costs ranging from 7.2 percent to 10.1 percent of construction costs.^{1/} During the same time CALTRANS estimated its own development costs to be 8 percent of construction. Assuming that similar relationships exist today, and taking the highest consultant cost, 10 percent (26 percent above that of CALTRANS), the following comparison is made.

Project development costs by CALTRANS for a \$10 million dollar facility should approximate \$800,000; consultant costs would be about \$1,010,000, a difference of \$210,000. Clearly, if both could be accomplished during the same period CALTRANS would be the logical choice. If, however, the project were allowed to slip in lieu of using consultants, the result would be as illustrated below.

TABLE 4
CONSULTANT COSTS VS. ESCALATION

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>
Net Cost Increase Due to 8% Inflation	\$800,000	\$1,166,400	\$1,259,712	\$1,360,489
Additional Cost of Consultant	\$210,000	\$ 210,000	\$ 210,000	\$ 210,000
Net Loss	\$590,000	\$ 956,400	\$1,049,712	\$1,151,489

^{1/} Economy and Efficiency in the Use of Engineering Talent,
Volume I, Page 51; California Committee for Engineering
Efficiency, 1964

It is apparent that slippage of even one year results in substantial overall loss. This will be true as long as the net increase in the cost of a consultant is less than the inflation rate applied against the total cost of the project.

(3) Needs and Funding Requirements

The scope of our study did not include assessment of actual highway construction needs; we are not therefore, in a position to comment specifically on whether the current needs inventory or administration priorities are appropriate. In this regard, we are able to offer only our general observations pertaining to major issues involved.

Regardless of the purpose of the 1977 needs survey, the definition of need provided in the report and the extensive description of process of needs determination (pages 3-3, 3-4 and Appendix C) make it difficult to accept assertions that identified needs do not reflect actual problems requiring amelioration. The key issue, in our minds, is the appropriate determination of priorities for expenditure of limited funds.

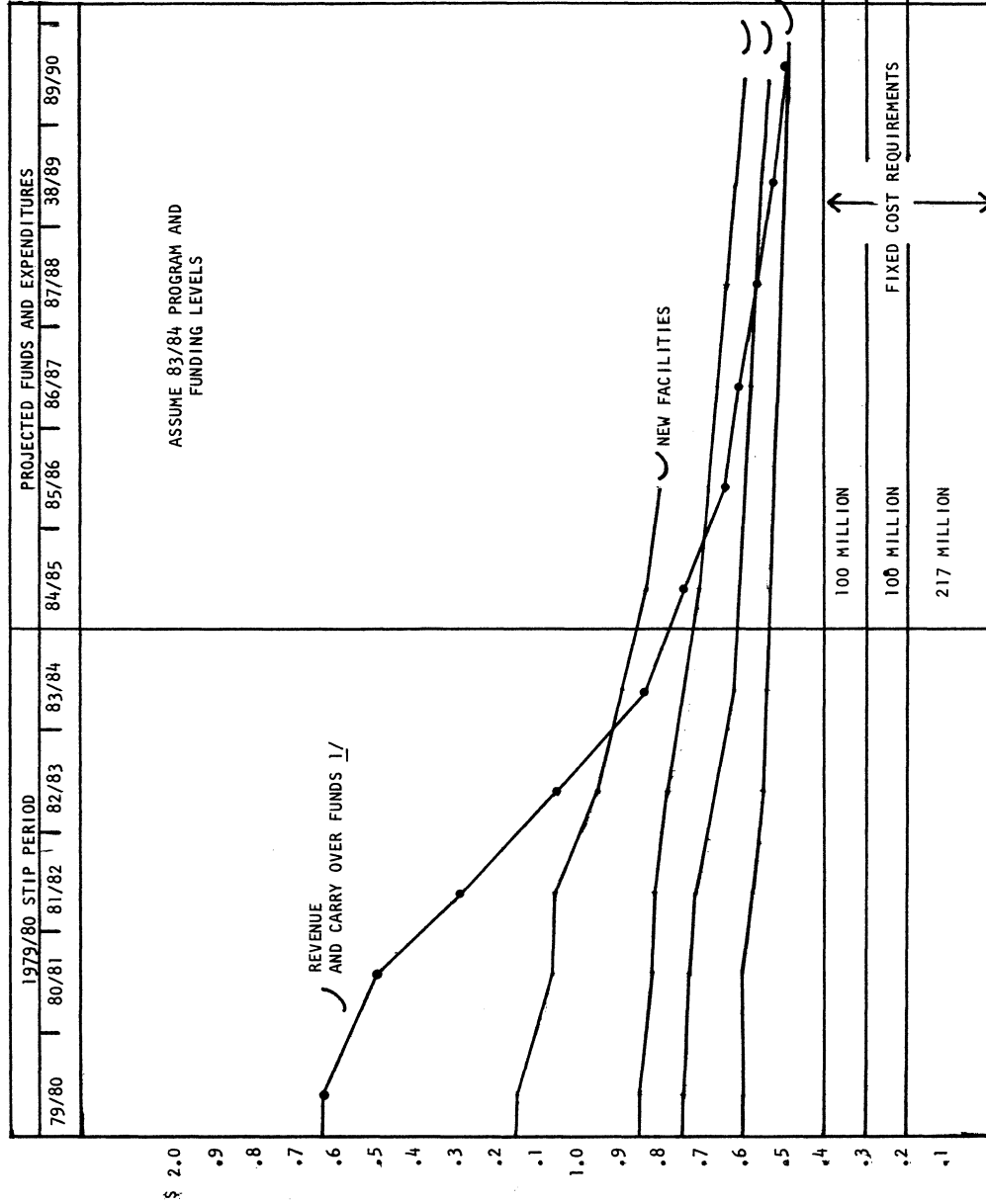
We are supportive of CALTRANS' position that project development should be on a priority basis and limited to funding levels which can be reasonably anticipated during the planning and construction period (possible exceptions being "backup" priority projects to replace potential project casualties, e.g., 15 percent of planned expenditures). In this regard, it should be recognized that absent additional fundings, attempts to accelerate construction by adding projects not currently in the STIP should be considered a replacement of current priorities.

We also support the current "modest" approach toward expenditure of funds, i.e., completion of projects providing the greatest overall benefit to the system; however, without implying that current priorities are incorrect, we have some difficulty accepting the general statement that maintenance and rehabilitation are more cost effective than construction of new facilities. While we would agree that costs of maintaining an adequate facility are less than replacement costs if the facility is allowed to deteriorate, and that maintenance and rehabilitation costs are less than new facility construction costs (allowing greater opportunity to spread the wealth), it does not necessarily follow that maintenance and rehabilitation are always the most cost effective solutions in specific instances. It would seem reasonable that the need for a specific new facility (and resulting system benefits) in one area might well outweigh the needs and benefits resulting from maintenance, rehabilitation, or operational improvements to another facility.

The critical issues to determining an appropriate mix of highway expenditures are: the desired level of maintenance and rehabilitation service to be provided, and the quantification of current and future costs required to maintain acceptable service levels. CALTRANS currently is developing data bases to support the latter; however, the former does not appear to be adequately defined.

If current maintenance and rehabilitation efforts are considered close to minimum acceptable levels, and if it can be assumed that future maintenance and rehabilitation requirements will either remain constant or increase due to an expanded system or freeway deterioration, the current approach may well be the only responsible position available, given projected funding. To illustrate, Exhibit XVII, following this page, presents an analysis of future needs

CALTRANS FUNDING VERSUS OPERATING REQUIREMENTS
 PRESENT VALUE ANALYSIS BASED ON ANNUAL INFLATION RATE OF EIGHT PERCENT



1/ Does not include additional 100 million DMW Transfer Projected for 1980/31 five year STIP. Inclusion will delay program deterioration approximately one year.

CUMULATIVE COST AT PRESENT VALUE (BILLIONS)

and current funding projections. Expenditure requirements are estimated at present value while purchasing power is assumed to diminish by eight percent annually. Assuming that certain requirements will remain relatively constant (e.g., maintenance, rehabilitation, administrative costs, etc.), it is readily apparent the current level of operation will begin to deteriorate by 1983/84 (additional transfer of \$100 million from Motor Vehicle Account funds in 1980/81 should defer program deterioration approximately one year). Since the trend reflects planned expenditures in new facilities and operational improvements, the deterioration obviously will occur in those program categories reflected as fixed costs, e.g., maintenance or rehabilitation. Should inflation occur at a rate greater than 8 percent, or rehabilitation needs increase significantly, the impact will be exacerbated. Given these projections, which we believe are conservative, the wisdom of constructing new facilities appears highly questionable unless future funding is increased.

(4) Conclusions

Assuming that current priorities reflect actual needs, it is our conclusion that potential for significant acceleration of new facilities projects is essentially limited to those projects which may be supported by discretionary interstate funding unless future funding is increased accordingly. Without regard for specific priorities selected by CALTRANS, we find the current modest approach generally responsible under current conditions. We support the need to develop additional flexibility, either in the form of additional "backup" projects or advanced development of STIP projects, to insure against potential losses due to project casualties or delays; however, early funding of additional projects for construction does not appear merited with current funding limitations.

We recognize that our assumption of appropriate prioritization is a matter of considerable dispute, and one which is likely to continue under the current planning approach. We offer, therefore, the observation that perhaps the process should be revised. For example, we question that the current approach of examining a five-year plan annually provides appropriate perspective or overall program direction. It appears that some merit would result from redefining a master plan, based upon current conditions, for completion and maintenance of the state system, including major new facility and operational requirements, standards for maintenance service levels, and projected costs associated with various program elements. We recognize that long-term cost projections are difficult; however, the revised approach could include provisions for periodic plan review and revisions. Our principal point is that logical progression toward completion of system requirements should be enhanced by identification of the key components, an agreed upon scheduling sequence, and recognized funding requirements within planned timeframes, e.g., five-year increments. Within such a planning structure, it would appear that the legislature could assume a stronger position with respect to policy determination and program guidance, e.g.:

- . Expenditure levels by program element
- . Service level objectives to be achieved
- . Funding adjustments to meet objectives within specific time periods.

CALTRANS should benefit from this approach in that it would be provided with specific direction, targets to be achieved, and assured of necessary funds to fulfill its responsibilities.

4. POTENTIAL APPROACHES TO ACCELERATION

This subsection presents four alternative approaches toward expediting the construction of new highway facilities. While each is discussed separately, some combination of the four may provide the most reasonable approach. The alternatives presented are:

- . Revising the current project mix
- . Use of outside resources to accelerate the interstate program
- . Split financing of state funded projects
- . Revision of current funding and budgetary process constraints.

We emphasize that the discussions are not intended as recommended actions, but merely alternative approaches. Implementation will require either a change in current priorities or adjustments in planned funding levels. Any decision regarding acceleration should include careful consideration of the key factors discussed previously, i.e.,:

- . Actual Need--The relative need for new facilities and major system improvements versus maintenance/rehabilitation and operational improvements to existing facilities. There appears to be little justification for changing the project mix for the sake of productivity where such changes do not support actual needs.
- . Funding Capability--There is also little justification for increasing the amount of dollars to be obligated beyond the level capable of being supported by available funding.

(1) Revising the Current Project Mix

Our analysis of the current STIP indicates that acceleration could be accomplished by altering the current

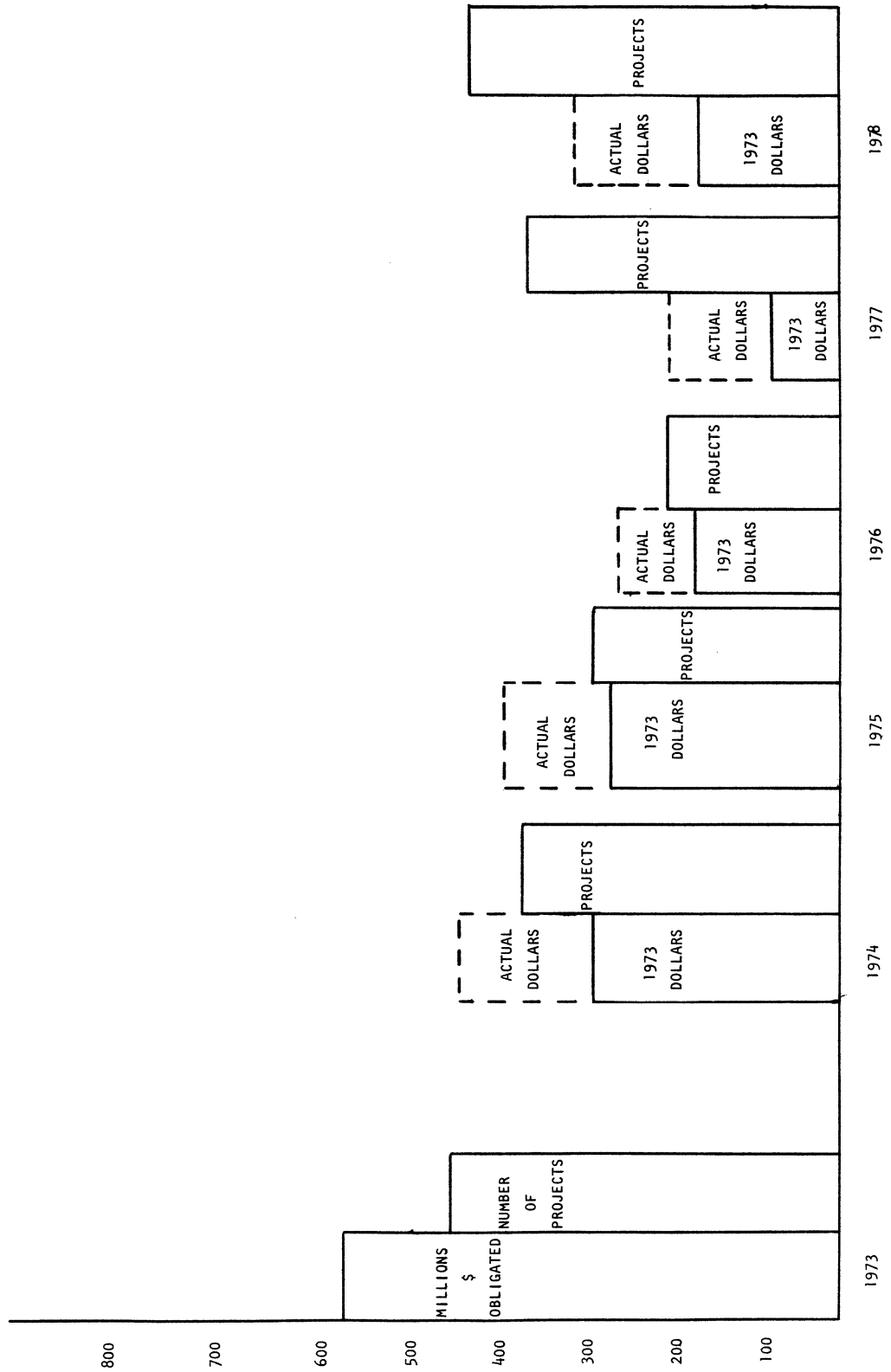
project mix to increase the size of projects included, revising existing priorities. Recent trends toward reducing the size of individual projects (reflected in Exhibit XVIII, following this page) although perhaps justified due to reduced needs, diminishing funds, and changing priorities, have impacted potential productivity significantly.

Approximately 90 percent of the projects contained in the current STIP are in the maintenance/rehabilitation and operational improvements program elements. These projects account for approximately one-half of planned expenditures and consume 65 percent of project development and construction engineering personnel. Over half of the projects are equal to, or less than, \$500,000 in size, and over 80 percent do not exceed \$1 million.

The average size of projects in the new facilities program element (HE-1) is about \$8 million, with 75 percent being over \$1 million, and about 35 percent over \$5 million. Review of total resources in each program suggests that productivity potential (dollars obligated for construction) for the new facilities element is approximately twice that of the other two. This difference is due primarily to economy of scale and is typical of engineering and architectural functions.

The potential impact of revising the current mix can be illustrated by comparing the potential productivity of two projects, one having a construction cost of \$10 million, the other a cost of \$1 million. Assuming both are divided facility-new alignment projects, and using the staffing values contained in CALTRANS Design Management System (DMS) and the Construction Engineering Management System (CEMS), the person year (PY) requirements for each would approximate the following:

COMPARISON OF AVERAGE PROJECTS UNDERWAY VS DOLLARS OBLIGATED
(1973 DOLLARS - MILLIONS)



	<u>\$10 million</u>	<u>\$1 million</u>
. Project Development PY's	17	7
. Construction Management PY's	<u>9.5</u>	<u>1.5</u>
TOTAL PY'S	26.5	8.5

Based on these figures, the average annual productivity (dollars constructed) per person year would approximate \$377,000 for personnel assigned to a \$10 million dollar project, versus approximately \$118,000 a year for personnel assigned to a \$1 million dollar project. Using the same approach, the average productivity of persons assigned to a \$500,000 project would approximate \$68,500.

To illustrate further, a transfer of 100 persons (2.5 percent of capital outlay personnel, or 4 percent of the HA/HB program element personnel) should impact productivity as follows:

- . Transfer from Projects of \$1 Million to \$10 Million--
Increased potential productivity of \$25,900,000 and potential savings in inflation of \$2 million dollars (8 percent)
- . Transfer from Projects of \$500,000 to \$10 Million--
Potential productivity increased by \$30,800,000 and potential savings of \$2.5 million
- . Transfer from \$500,000 to \$1 Million Projects--
Increased productivity of \$5 million and potential savings of \$400 thousand.

Should the transfers be to projects of higher costs, the difference in potential productivity would be even larger.

The obvious disadvantage of this approach is the requirement to defer projects currently considered high priority. Another is that, unless substantially developed

projects are substituted for deferred projects, acceleration would not be accomplished immediately because of long lead times associated with major projects (an alternative approach to avoid this occurrence is presented in our discussion regarding the use of outside resources).

With respect to project deferment, we are not in a position to determine those projects which might be amenable to delay. A comparison of the STIP expenditures and the 1977 needs survey, however, might serve to identify potential areas for plan revision. For example, Exhibit XIX, following this page, presents a comparison of percentage of needs identified by program element versus the percentage of planned STIP expenditures. While the comparison does not consider project priorities, it does suggest the potential for reallocating approximately \$274 million dollars to major system improvement elements, based on proportional needs.

Revision of the current mix could provide the capability to use transferred personnel in several ways, including:

- . Increasing the total dollars currently planned for obligation, e.g., acceleration of interstate projects
- . Developing sufficient flexibility to protect against slippage of major projects, e.g., advanced completion or concurrent development of "back up" projects to replace project casualties
- . A combination of these approaches.

(2) Use of Outside Resources to Accelerate Interstate Construction

Assuming that potential legal problems involving the use of outside resources (e.g., consultants, cities, and

ANALYSIS OF NEEDS VERSUS STIP EXPENDITURES

	<u>Program Element</u>	<u>Percentage of Need (1977 Survey)</u>	<u>Percentage of STIP Expenditures</u>	<u>Amount Above/Below Proportional Need (\$000)</u>
HA 1	Maintenance Land, Build	.5%	1.1%	13,418
HA 21	Bridge Reconstruction	2.4%	4.8%	Not included in totals
HA 22/23	Reconstruction & Restoration	4.7%	7.3%	58,144
HA 25	Plant Restoration	0.5%	0.7%	4,473
HA 26	Roadside Rests	.03%	0.1%	15,654
HA 3	Resurfacing	1.1%	4.0%	64,852
HA 4	Protective Betterment	.6%	2.5%	42,489
HB 1	Safety Improvements	6.0%	5.7%	6,709
HB 311/312	Noise Attenuation	5.7%	5.3%	8,945
HB 32	Highway Planting	1.1%	2.6%	33,545
HB 33	Roadside Rests	0.7%	1.4%	15,654
HB 34	Roadside Enhancements	.2%	.5%	6,709
HB 42/43/44	Operational Improvements	20.2%	10%	(228,103)
HE 3	Bicycle Facilities	.4%	.5%	6,709
HE 1	New Construction	55.6%	53.5%	(46,962)
	Miscellaneous	.1%	-	

counties) can be averted, it appears that use of these resources presents excellent potential for accelerating the interstate program. Two significant benefits could result from adopting this approach:

- . Advanced construction, avoiding the impact of inflation
- . Assured commitment of early year funds, leaving the Department eligible to apply for discretionary monies.

It is our understanding, based on our conversations with representatives of the Federal Highway Administration, that funds used to contract for project development functions are considered obligated funds. This interpretation should provide the capability to assure obligation of early year funds simply by contracting for the design of future projects as well as obligation through construction contracts. This would appear to enhance current capabilities significantly.

A possible approach, which appears to us to have some merit would be the use of outside resources to change the current project mix for CALTRANS personnel without deferring existing projects. For example, the current STIP schedule provides for expenditure of approximately \$170 million of interstate funds in the HA (other than IR funds) and HB program elements after 1980-81. Most are small projects (i.e., less than \$1 million), and, presumably, relatively low risk. Contracting for project development of these would appear to provide three distinct benefits:

- . Obligation of funds required for project development
- . Release of CALTRANS personnel to work on larger interstate projects

- . Advanced construction (where reasonable) in both program areas.

While the approach appears plausible, some caution probably should be exercised in moving toward its adoption. For example, ceasing current project development efforts in order to contract for them later would represent a significant gamble, as substantial losses could result from an adverse finding in future litigation.

(3) Split Financing of State Funded Projects

This approach toward financing of state projects provides the capability to start more projects at an earlier date as only the funds to be expended during a budget year are considered obligated. Under current practices, the entire cost of a project is obligated at the time of advertising (for the majority of projects), thereby establishing a sequential development and obligation system.

While financing ultimately would result in earlier construction, current funding limitations restrict this approach. Adopting this approach would require increased future funding to assure that all projects started would be constructed.

(4) Revision of Current Funding and Budgetary Process Constraints

Based on our review, we believe the current funding constraints and constraints imposed by the budget review process should be recognized as significant constraints on CALTRANS ability both to meet the STIP as planned, and to accelerate construction.

Specifically, the requirement to assure a 60/40 percent north-south allocation of funding annually appears to present an unnecessary restriction of flexibility. It is not our intent to question the allocations; however, it would seem that a system providing required allocations over an extended period of time (e.g., five years) would serve all concerned better, particularly with respect to reallocation in accordance with statewide needs when extended delays to specific projects are experienced.

Our second concern relates to the current budget planning process, which requires a complete review by the Commission of the CALTRANS STIP and alternative proposals from regional planning agencies. This appears to be an unnecessary level of process on an annual basis. The approach imposes a significant administrative planning burden on CALTRANS, and necessarily extends the annual review/approval process, thereby limiting time available for obligation and construction activities. Perhaps the major weakness of the current process is the apparent constraint on the administration's ability and commensurate responsibility, to develop a plan capable of being delivered, i.e., to schedule delivery dates and determine appropriate resource requirements without being certain of the specific projects to be included.

Again, it would seem the intent of current process could be served better if the term of the process were extended and removed from the annual budget review process. A preferable approach, in our opinion, would be development of a master plan for a specific time period (e.g., ten years), using a process similar to that planned for the current year. The Department could then develop the annual plan in accordance with agreed upon priorities, and the review process conducted on the same basis. Revisions to the plan could be made periodically (e.g., five-year increments), repeating the regional input process.

D. USE OF THE PRIVATE SECTOR ON HIGHWAY PROJECTS

One of the objectives of this project is to determine the feasibility and advisability of contracting with the private sector to perform State highway project development functions now accomplished exclusively by CALTRANS.

For purposes of this study, project development excludes the actual construction component, as CALTRANS always contracts for this activity. Basically, the question is whether private firms can effectively and efficiently perform highway development functions such as the following:

- . Prepare environmental impact reports and negative declarations
- . Prepare basic design elements such as strip maps, preliminary geometric studies, horizontal and vertical alignment designs, contour grading plans, etc.
- . Prepare detailed design plans for highways and structures (PS&E)
- . Conduct land surveying, photogrammetry and other topography functions
- . Conduct soils and materials testing
- . Prepare right of way maps, develop relocation assistance programs, appraise and acquire right of way parcels
- . Perform construction management and inspection activities.

(1) Use of the Private Sector by CALTRANS

Historically, California in general has not contracted with the private sector for performing any of the above project development functions. There have been exceptions whereby individuals with expertise in specialized areas

such as archeology, environmental planning, or water and air quality, have been hired as consultants to perform short term, specific tasks. Basically, however, major sub-contracts with private firms have not been let. The primary reason for the reluctance to contract major highway projects appears to be historically entrenched in Article VII (formerly Article XXIV) of the State Constitution and the related Civil Service Act. The basic philosophy of these laws is that work to be performed by the State shall be done by employees of the State. The primary purpose of Article VII and the Civil Service Act, was to eliminate the political spoils system by establishing a merit system of employment; protected from periodic dissolution and destruction.

Periodically, since 1934, this implied legal constraint against contracting for services has been questioned. As early as 1946 an attempt was made to amend Article XXIV to exempt from civil service seasonal, part time and contractual employment.^{1/} It apparently died in Committee. In 1956 SCA-6 became Proposition 10 on the November ballot and would have amended Article XXIV as follows:

"Nothing in this article shall prevent the Legislature from enacting legislation to authorize the employment of private architects and engineers on a contract basis for the performance of work which the obtainable staff of a state agency is unable to perform within the time the public interest requires such work to be done."^{1/}

SCA-6 was defeated. In addition to legislative concern, the public sector, particularly the consulting engineering industry, was suggesting that more work should be contracted out for the sake of economy and efficiency.

^{1/} From the report by the California Committee for Engineering Efficiency representing California Council of Civil Engineers and Land Surveyors and Consulting Engineers Association of California.

In 1963 the California Committee for Engineering Efficiency suggested to the Commission on California State Government Organization and Economy (Little Hoover Commission) that the State could save money by contracting for certain professional services. There was an implication that engineering costs in relation to construction costs were higher in the California State Highway Department (now CALTRANS) than they would be in the private sector.

The Little Hoover Commission gathered evidence from both sides and issued a report (April 7, 1965) from which the following is excerpted:

- . We are convinced that (Division of Highways) engineering costs, although high, are reasonable . . .
- . No evidence was presented or discovered which would lead us to believe that greater use of private engineers would result in significantly reduced time for design and construction
- . Analysis of the material placed before us . . . leads to the observation that no significant saving in cost would result if normal preliminary engineering work were to be performed by consultants by contract rather than by Division engineers. Evidence is to the contrary--it is reasonable to expect that total costs might even be greater.
- . In the Commission's judgment, however, the Division of Highways, as well as other State agencies should avoid the recruitment of additional staff for peak loads or for the performance of unusual or other design activity requiring specialized talent not ordinarily found on the regular professional staff of the State agency.
- . It is suggested that consideration be given to the adoption of a state-wide policy which would outline the conditions under which it would be to the State's best interest to provide for engineering services by contract. Such a policy statement, preferably worked out in cooperation and in good faith with representatives of the private engineering organizations, would spell out the conditions under which consultants would

be employed. Assurance would need to be provided, however, that adequate state engineering staff would be maintained to satisfy normal work requirements and thus assure that there would be no adverse effect on program, control or quality of work.

- . It is our belief that the adoption of reasonable policies for guidance in the use of engineering consultants by contract would result in the use of such consultants for a significant amount of design work. Accurate cost data as well as information on new or different techniques would thus be available on a continuing basis for comparison and control purposes. On the other hand, the Commission does not recommend that extensive use be made of consultants for construction engineering work. The State must retain basic and immediate responsibility for quality control, checking and processing payments to contractors, maintaining permanent records, obtaining reimbursement and for the performance of other services which in our belief cannot properly be delegated to a third party.

Article VII and the Civil Service Act have also been tested in court with most decisions upholding the State's contention that work must be done by civil servants employed by the State as full time personnel (e.g., STATE COMPENSATION INSURANCE FUND V. RAY L. RILEY; STOCKBURGER V. RILEY; STATE COMPENSATION INSURANCE FUND V. BURUM). On the other hand decisions upholding sub-contracting are also in evidence; CALIFORNIA STATE EMPLOYEES ASSOCIATION V. SPENCER WILLIAMS, ATTORNEY GENERAL'S OPINION NO. 54-135, November 16, 1954. Although there appear to be constitutional constraints to unrestricted contracting, some of the above court decisions have also included statements such as:

" . . . Civil Service coverage restricts but does not prohibit the performance of government work by independent contractors."

" . . . Both the STATE COMPENSATION INSURANCE FUND decisions left room for contract services which cannot be adequately or competently or satisfactorily performed by civil service personnel."

In today's environment, the State Personnel Board is continually asked to approve State agencies' requests for contracting for personal services. Discussions with a representative of the Board indicates that there is no problem with "contracting" if the service is to be provided by a consultant; for duties that have no established class in civil service and is hired for a specialized project on a short term, temporary basis not to exceed nine months over a one year time span.

The State can also contract with local governments without violating Article VII or the Civil Service Act. However, when major contracting efforts are requested then more analysis has to be conducted to assure that a violation of civil service does not take place. Recently the State Personnel Board requested information concerning personal service contracts from the Department of Justice. In its reply on November 7, 1978, the Department summarized applicable case law (some of which were mentioned above) then concluded that although the ". . . Constitution does not present an absolute bar to 'contracting out' for personal services . . . determinations as to the propriety of such contracts require a case-by-case analysis."

The Department then provided a list of probative questions which the Board now uses to determine the validity of requested contract services in terms of the State Constitution. The questions presented were:

1. Are the services contracted for exempted from the civil service mandate by section 4, article VII or any other provision of the California Constitution?
2. Can the services contracted for be performed by persons selected pursuant to the civil service system? In answering this question, the following considerations may be pertinent:

- a. Are the services of such an urgent, temporary, or occasional nature that the delay incumbent in their implementation under the civil service provisions would frustrate their very purpose?
 - b. Are the services of such a highly specialized or technical nature that expert knowledge, experience, or ability which cannot be acquired through the civil service system is appropriate?
 - c. Are the services presently being adequately provided by civil servants or have they been so provided in the past?
 - d. Are the services adjunctive or incidental to a contract for the purpose or lease of real or personal property?
 - e. Can legislative goals and purposes, as distinguished from particular tasks when examined in a vacuum, be accomplished through the utilization of persons selected pursuant to the civil service system?
 - f. Would performance of the function by contract compromise or threaten the confidentiality of sensitive public records or projects?
 - g. Will approval of the contract otherwise result in an abuse or displacement of the civil service system?
3. Alternatively, is the contract within the class legitimized by the Williams case, that is:
- a. Is the contract explicitly authorized by the Legislature; and
 - b. Does the contract relate to a new function not previously performed by an existing State agency?

Recognizing the wide band of logic applied by the courts when considering cases involving contractual services, the Department of Justice ends the memo on a cautious note:

"You will note that there is considerable latitude in the various criteria utilized by the Courts in either sanctioning or disapproving personal service contracts. Because the third criteria established by Williams is so very broad, a seemingly boundless principle for the approval of new legislatively-authorized functions, the Board should attempt whenever possible to stay within the earlier criteria mentioned in paragraphs 1 and 2 above."

The essence of the above is that the legality of contracting-out services is still a questionable issue and one which probably will not be fully and specifically defined until so designated within a Constitutional amendment. Pending a Constitutional amendment, the only apparent recourse is to justify such services within one of the above considerations. For example, in 2c. above, the question contains the word "adequate". Could adequate mean timely? If so, projects would be scheduled in a time frame of need rather than in accordance with CALTRANS staffing availability, and all effort beyond CALTRANS capacity could legitimately go to the private sector.

Or, could "adequate" mean availability of experienced people? If so, when additional funds become available on a one-time basis and there is a desire to expend those funds expeditiously, then contracting could be an acceptable alternative to CALTRANS' recruiting and training new personnel to handle a peak load.

Today CALTRANS utilizes the services of consultants, primarily individuals with special expertise, however, there is evidence that some firms are also performing transportation-related work. Although we did not research files for confirmation, information obtained from CALTRANS indicates that engineers and other professionals have been employed to supply special expertise not available within CALTRANS, or to assure maximum objectivity for

special projects. Some examples of work contracted for include:

- . Accident investigation and court testimony
- . Property appraisals
- . Employee training
- . Archeological and environmental investigations
- . Site geology
- . Slope stability
- . Dewatering measures
- . Construction litigation
- . Watershed protection
- . Freeway corridor studies
- . EDP studies
- . Program management and funding
- . Mass transit and ridesharing programs
- . Affirmative action activities.

There was also an indication that the usage of consultants has been effective, will probably continue, and most likely grow.

(2) Use of the Private Sector by Other States

It is a well-known fact that other states contract for various highway project development and construction services. To obtain specific information about the extent of such use, we visited three states and interviewed representatives of their departments which correspond to CALTRANS. The states were Florida, Illinois and Texas. A brief summary of our findings is presented in the following paragraphs.

. Legislative Authority

Each state can legally contract for services and none have any Constitutional constraints

- Florida

Chapter 287.055, Florida Statutes is the Consultant Competitive Negotiation Act:

" . . . relating to and establishing policies and procedures for contracting professional services by the state . . . ; defining professional services; establishing competitive selection procedures and competitive negotiations for firms or individuals . . ."

Also:

"WHEREAS, the legislature of Florida declares it to be in the best interest of the public health, safety and welfare and of good fiscal management to seek the most qualified and competent individuals and firms . . . and

WHEREAS, the legislature of Florida desires to promote competition among firms interested in providing professional services to the state . . ."

- Illinois

The Illinois Revised Statutes (1957) provide for the use of consultants. They must be pre-qualified but bidding is not required for professional services. In the Illinois Department of Transportation Order 1-4, Change 3, May 7, 1978:

"Architect Engineer consultant firms may be hired to supplement and complement Architect-Engineer capabilities within the Department. These A-E consultant firms will be hired only when in-house capability is not available to accomplish architectural or engineering projects within required time limits."

- Texas

The following is contained in the General Appropriations Bill for 1979-80:

"In order to insure that the Department of Highways and Public Transportation maintains the lowest practicable staffing levels, that the public receives the optimum service possible, and that the principle of allowing the free enterprise system to provide necessary services to the public is pursued to the fullest extent (as provided for in legislative policy expressed in H.C.R. No. 138, Sixty-second Legislature), it is the further intent of the Legislature that engineers in private practice shall be utilized to perform design services for both highways and bridges on a continuing, regular basis and especially whenever there is a probability that Department personnel alone will not be able to complete projects on schedule, and that no additional personnel will be added unless absolutely necessary."

. Extent of Use of Consultants

Generally, the use of consultants is extremely heavy in Florida and Illinois while Texas has only recently started using contract services. In all three states the emphasis on consultants seems to stem from a desire by the legislative body to retain a certain minimum staff level. This level is deliberately calculated to be somewhat below that required by a work load based on anticipated revenues. This assures that the State will have an opportunity to assure maximum productive capacity of its personnel while contracting the balance of work to consultants.

- Florida

Florida currently uses the private sector to perform preliminary engineering in about 40% of their highway projects. In the Governor's 1979-81 Biennial Budget one of the Governor's ten goals is to increase the utilization of private business to perform state services. Part of his recommendation related to this goal is:

- .. In the Department of Transportation delete 98 preliminary engineering positions to obtain a ratio of 60% of preliminary engineering services secured through the private sector and 40% provided by agency staff
- .. One hundred and fifty routine maintenance positions are to be deleted and that specific types of maintenance activities such as preparation of turn lanes or mowing be contracted statewide
- .. Conduct a pilot project for a district in which all maintenance activities will be contracted in lieu of continuing 213 maintenance positions.

Florida's Department of Transportation estimates that for the 1979-80 and 1980-81 budget periods that the consultant cash flow (fees) will approach \$45,000,000 in each fiscal year.

- Illinois

In Illinois consultants are used extensively for Interstate, supplementary freeways, and other systems. The Interstate is almost complete and, according to those we interviewed, consultants have performed about 98 percent of work involved with project development and construction. On the other types of highways consultants have been involved in about 26 percent of the activity.

In terms of consultant cash flow (fees) the amounts have been as follows:

1975	-	\$25.45 million
1976	-	8.34 million
1977	-	10.13 million
1978	-	11.67 million
1979	-	9.00 million (est)

The lesser fees over the last few years appears to reflect the fact that in Illinois most of the Interstate system is complete.

- Texas

Texas has only been using engineering consultants to any significant degree within the last two years. Currently they have about twenty PS&E projects under contract. These projects are all highways and do not include structures. Structure

work is accomplished centrally at the Department of Highways in Austin, Texas. The use of consultants is gradually increasing (about \$1.5 million in fees in 1977-78; no figures available for 1978-79) primarily because of a stated policy of the Administration and the legislature that there is to be a ceiling on the Department's staffing levels. As funds become available and projects are scheduled, work that cannot be accomplished within the scheduled time frame will be contracted to the private sector.

All three states utilize consultants for the variety of tasks that are associated with a highway project development and construction program. Exhibit XX, following this page shows a page from each state's pre-qualification procedures that is required to be submitted by consultants to become eligible for state work. Consultants are asked to indicate those areas in which they have expertise. These forms reflect the broad range of functions which are contracted to the private sector.

• Selection Procedures

All three states have formal, documented contractor selection procedures which are essentially similar in the steps taken. Although there are some minor variations among the three processes, the steps involved are:

- Contractors are Prequalified

All contractors interested in doing state highway work are required to complete a detailed qualification application package. Information required includes firm information, past experience, current projects, personnel summary, project specialization, and other informational forms related to occupational specialties. In two states these prequalification statements are maintained in manual files while in the other the information is entered into a computerized data base.

- Jobs Advertised

In two states projects to be contracted are advertised in State publications which are mailed directly to prequalified contractors. Contractors are only required to respond with a letter indicating an interest in a specific project or projects.

CONTRACTOR SPECIALIZATION CATEGORIES

PROCEDURES

State of Florida Department of Transportation

No.: 146-002

Page 11

FIGURE 4

DRM 146-28
37

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
AREA-CLASS CHECK SHEET

<p>TRANSPORTATION PLANNING</p> <p><input type="checkbox"/> 1.01 Statewide Systems Planning</p> <p><input type="checkbox"/> 1.02 Urban Area and Regional Transportation Planning</p> <p><input type="checkbox"/> 1.03 Aviation Systems Planning</p> <p><input type="checkbox"/> 1.04 Waterways and Ports Planning</p> <p><input type="checkbox"/> 1.05 Mass and Rapid Transit Planning</p> <p><input type="checkbox"/> 1.06 Alternate Systems and Corridor Location Planning</p> <p><input type="checkbox"/> 1.07 Environmental Studies</p> <p><input type="checkbox"/> 1.08 Attitude, Opinion and Community Value Studies</p> <p><input type="checkbox"/> 1.09 Airport Master Planning</p>	<p>TOPOGRAPHY CON'T.</p> <p><input type="checkbox"/> 5.03 Geodetic Surveying</p> <p><input type="checkbox"/> 5.04 Aerial Photography</p> <p><input type="checkbox"/> 5.05 Aerial Photogrammetry</p> <p><input type="checkbox"/> 5.06 Remote Sensing</p> <p><input type="checkbox"/> 5.07 Cartography</p>
<p>MASS TRANSIT OPERATIONS</p> <p><input type="checkbox"/> 2.01 Mass Transit Program (Systems) Management</p> <p><input type="checkbox"/> 2.02 Mass Transit Feasibility and Technical Studies</p> <p><input type="checkbox"/> 2.03 Mass Transit Vehicle and Propulsion System</p> <p><input type="checkbox"/> 2.04 Mass Transit Controls, Communications and Information Systems</p> <p><input type="checkbox"/> 2.05 Mass Transit Architectural Engineering</p> <p><input type="checkbox"/> 2.06 Mass Transit Unique Structures</p> <p><input type="checkbox"/> 2.07 Mass Transit Electrical and Mechanical Systems</p> <p><input type="checkbox"/> 2.08 Mass Transit Harbor and Docks</p> <p><input type="checkbox"/> 2.09 Mass Transit Operations Management and Support Services</p> <p><input type="checkbox"/> 2.10 Mass Transit Airport Design</p>	<p>SOILS, FOUNDATION, AND MATERIAL TESTING</p> <p><input type="checkbox"/> 6.01 Soil Exploration</p> <p><input type="checkbox"/> 6.02 Materials Testing</p> <p><input type="checkbox"/> 6.03 Foundation Studies</p> <p><input type="checkbox"/> 6.04 Hydraulic and Hydrologic Studies</p> <p><input type="checkbox"/> 6.05 Performance Observation</p>
<p>HIGHWAY DESIGN - ROADWAY</p> <p><input type="checkbox"/> 3.01 Two-Lane or Multi-Lane Rural, Generally Free Access Highways Design</p> <p><input type="checkbox"/> 3.02 Two-Lane or Multi-Lane, with Curb and Gutter, Generally Free Access Highways Design Including Storm Sewers</p> <p><input type="checkbox"/> 3.03 Multi-Lane Rural, Limited Access Expressway Type Highway Design</p> <p><input type="checkbox"/> 3.04 Design of Urban Expressway and Urban Interstate</p> <p><input type="checkbox"/> 3.05 Traffic Operations Studies</p> <p><input type="checkbox"/> 3.06 Traffic Operations Design</p> <p><input type="checkbox"/> 3.07 Landscape Architecture</p> <p><input type="checkbox"/> 3.08 Traffic Control Systems Analysis, Design and Implementation</p> <p><input type="checkbox"/> 3.09 Specialized Design</p>	<p>REAL PROPERTY</p> <p><input type="checkbox"/> 7.01 Fee Appraising</p> <p><input type="checkbox"/> 7.02 Appraisal Support</p> <p><input type="checkbox"/> 7.03 Right of Way Map Preparation</p> <p><input type="checkbox"/> 7.04 Legal Description Preparation</p> <p><input type="checkbox"/> 7.05 Right of Way Document Preparation</p>
<p>HIGHWAY DESIGN - BRIDGE</p> <p><input type="checkbox"/> 4.01 Minor Bridges Design (pile bent, pedestal, pier or comparable foundation)</p> <p><input type="checkbox"/> 4.02 Major Bridges Design</p> <p><input type="checkbox"/> 4.03 Movable Span Bridges Design</p>	<p>ELECTRONIC DATA PROCESSING</p> <p><input type="checkbox"/> 8.01 Engineering Programming</p> <p><input type="checkbox"/> 8.02 Commercial Programming</p> <p><input type="checkbox"/> 8.03 Computer Systems Program Integration</p>
<p>TOPOGRAPHY</p> <p><input type="checkbox"/> 5.01 Land Surveying</p> <p><input type="checkbox"/> 5.02 Engineering Surveying</p>	<p>GENERAL MANAGEMENT</p> <p><input type="checkbox"/> 9.01 Management Systems, Methods and Studies</p> <p><input type="checkbox"/> 9.02 Financial Management</p> <p><input type="checkbox"/> 9.03 Public Affairs</p>

BE SURE TO RETURN THIS CHECK SHEET WITH PROPER CHECK MARKS WITH YOUR APPLICATION.

CONTRACTOR SPECIALIZATION CATEGORIES

EXPERIENCE DATA (continued)

5. Professional Registration (Applies to transportation staff only):	In Illinois	Not in Ill. but In Other States	Net Total Persons
a. Number of Registered Professional Engineers	()	()	_____
b. Number of Registered Land Surveyors *	()	()	_____
c. Number of Registered Structural Engineers *	()	()	_____
d. Number of Registered Architects *	()	()	_____
e. Number of Other Registered Professionals (Designate class * by footnote)	()	()	_____
Net Total persons listed in one or more groups a-b-c-d-e	_____	_____	_____

* Also show in () the number of multi-registered persons who are also listed on line(s) above.
6. Summary of Firm's Transportation Specialization-Enter experience references for only services offered in-house that at least one employee listed under Item 2 had responsible charge of within the last ten years. The experience reference shall be the page number(s) hereof where such work is described.

Design and Contract Plan Services for: <small>3,4,5,6</small>	Page	Other Services:	Page	Page
Freeways		Needs Studies		
Roads & Streets	Orthotropic Girders	Feasibility Study		Soils Borings
Storm Sewers	Cable-stayed Girders	Safety Studies		Soils Analysis
Traffic Signals	Segmental Box Girders	Traffic Studies		Electrical Engr'g.
Area Lighting	Arch/Truss Bridges	Environmental Study		Mechanical Engr'g.
Airports	Stream Crossings	Location Studies		Sanitary Engr'g.
Mass Transit	Canals	Drainage Studies		Architecture
Grade Separations	Dams & Locks	Route Surveys		Landscape Arch.
Major River Brs.	Harbor Facilities	Aerial Photography		Construction Insp'n.
Movable Bridges	Public Buildings	Land Surveys		Condition Insp's/Rating
Railroad Bridges	Pumping Stations	Photogrammetry		
	Tunnels			

ILLINOIS

CONTRACTOR SPECIALIZATION CATEGORIES

<p>Experience Profile Code Numbers for use with questions 10 and 11</p> <p>001 Acoustics; Noise Abatement 002 Aerial Photogrammetry 003 Air Pollution Control 004 Airports; Navalds; Airport Lighting; Aircraft Fueling 005 Airports; Terminals & Hangars; Freight Handling 006 Archeological Investigations 007 Automation; Controls; Instrumentation 008 Bridges 009 Communications Systems; TV; Microwave Computer Facilities; Computer Service 011 Conservation and Resource Management 012 Construction Management 013 Corrosion Control; Cathodic Protection; Electrolysis 014 Cost Estimating 015 Ecological Investigations 016 Electronics 017 Elevators; Escalators; People-Movers 018 Energy Conservation; New Energy Sources 019 Environmental Impact Studies, Assessments or Statements 020 Garages; Vehicle Maintenance Facilities; Parking Decks 021 Graphic Design 022 Harbors; Jetties; Piers; Ship Terminal Facilities 023 Heating; Ventilating; Air Conditioning 024 Highways; Streets; Airfield Paving; Parking Lots 025 Historical Preservation 026 Hydraulics & Pneumatics 027 Industrial Processes; Quality Control 028 Irrigation; Drainage 029 Landscape Architecture</p>	<p>030 Lighting (Exteriors; Streets; Memorials; Athletic Fields, Etc.) 031 Metallurgy 032 Pipelines (Cross-Country- -Liquid & Gas) 033 Planning (Community, Regional, Areawide and State) 034 Planning (Site, Installation, and Project) 035 Railroad; Rapid Transit 036 Recreation Facilities (Parks, Marinas, Etc.) 037 Rivers; Canals; Waterways; Flood Control 038 Safety Engineering; Accident Studies; OSHA Studies 039 Seismic Designs & Studies 040 Socioeconomic Investigations 041 Soils & Geologic Studies; Foundations 042 Solar Energy Utilization 043 Solid Wastes; Incineration; Land Fill 044 Structural Design; Special Structures 045 Surveying; Platting; Mapping; Flood Plain Studies 046 Storm Water Handling & Facilities 047 Testing & Inspection Services 048 Traffic & Transportation Engineering 049 Towers (Self-Supporting & Guyed Systems) 050 Tunnels & Subways 051 Zoning; Land Use Studies</p> <p>101 _____ 102 _____ 103 _____ 104 _____ 105 _____</p>
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OCTOBER 1977

4.

- Contractor Selection

Subsequent to the identification of interested contractors, consultant service units review their qualifications and select a pre-defined number of consultants for further consideration. (In one state the District Office performs this function.) The selected names are forwarded to a Selection Committee that usually selects a minimum of three and establishes a priority ranking. Negotiations are then initiated with the number one ranked firm. It is at this point that funding is first discussed. Usually both the State and the contractor separately estimate project costs with the final dollar amount reached during negotiations.

. Quality of Work

All three states indicated that the quality of consultant work was good. They did add, however, that when a contractor is used for the first time it required close monitoring due to unfamiliarity with procedures, design standards, State requirements, etc. Also, contractors generally meet schedules established, with one state indicating that if a contractor had a problem it many times was due to the State being slow in reviewing and accepting plans, completed work, etc. If quality and adherence to schedule do become a problem with any particular contractor, the two factors become a key evaluation consideration for subsequent work.

. State Supervision Requirements

None of the states had any readily available data related to the number of State personnel required to monitor contractor performance. It apparently varies with the size of the project, the type of project, and the degree of confidence generated by previous performance. One state indicated that consultants needed less guidance on major new facility projects because they are essentially performed using standard, repetitive methodologies. Smaller projects such as those involving rehabilitation are less standard and require more state involvement. In another state, each District has two consultant liaison personnel who apparently do the majority of the project monitoring.

. Cost of Contracting

Each state was specifically asked if they had documented the differences (if any) in project costs

regarding in-house versus outside contracting. In all cases no comparisons had been made, however, all three states were of the opinion that project costs are higher if the work is performed by contractors. None indicated that such costs were significantly higher, nor did it appear that they were a factor in terms of the philosophical concept which established the requirement for using consultants.

(3) Conclusion

The basic question addressed in this subsection is, "Is it feasible and advisable to contract with the private sector for project development functions now accomplished within CALTRANS?"

If "feasible" means "capable of being done technically", then the answer to the first part is--yes. If, however, "feasible" means can it be done legally under the Constitution then the answer becomes more ambiguous. As indicated previously there is no black or white answer to that question. Case law provides support both ways and in itself is inconclusive as to whether any given contract for service will be valid. On the other hand, CALTRANS currently contracts for some of the services connected with highway projects, and although these services are of limited scope, such contracting apparently does not violate Article VII of the Constitution. Considering that CALTRANS currently successfully contracts work and considering the guidelines listed in the Attorney General memo regarding approval of contracts for services, it appears reasonable to assume that various sized contracts could be entered into and still fall within the limitations of Article VII. However, it is cautioned that what may seem reasonable to us may not be considered legal in a court of law.

The other part of the question is, "Is it advisable to contract with the private sector?" We think the answer is embodied within whatever operational philosophy is established by the State Department of Transportation. There are at least two basic approaches:

- . Establish and maintain a cadre of personnel of sufficient size and with the variety of technical disciplines necessary to perform all work associated with transportation projects. This approach would also include the ability to expand as necessary to meet new (temporary or permanent) funding levels or, as an alternative to expansion, modify project schedules to provide more calendar time. In either case, the objective is to refrain from contracting with the private sector.

Advantages:

- Maintains the integrity of the civil service system
- Provides technical capability to perform any facet of transportation planning and implementation (conceivably this could include construction crews and equipment)
- Provides absolute internal control over all phases of any project

Disadvantages:

- Continues the growth of State government
- Does not provide for reduced staff effort during periods of low funding availability (civil service typically finds work for employees in lieu of layoffs, especially if the inactive period is considered temporary)
- Limits the growth of private enterprise by substituting governmental services (in direct opposition to the spirit of Proposition 13)
- Leads to expansion of government services in related fields (since they have expertise, it can be used in other areas of state government)

- . Establish and maintain a cadre of personnel that will remain relatively constant in number and will be funded for a staffing level somewhat below the projected work load. The areas of work to be done by the Department will be defined, with all other functions to be contracted with the private sector. Exhibit XXI, following this page presents this concept schematically.

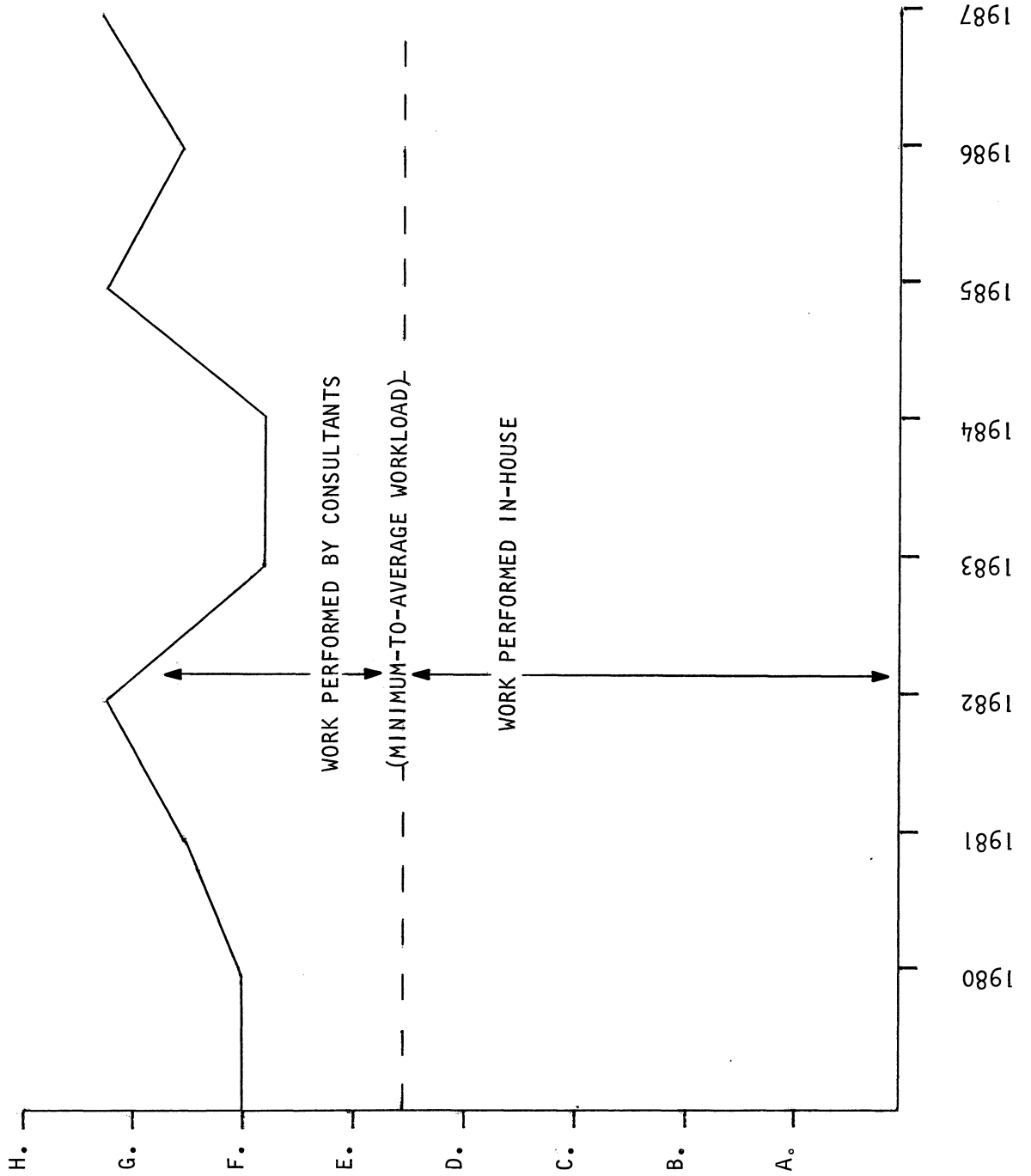
Advantages:

- Maintains the integrity of the civil service system while establishing a consistent and reasonable level of state staffing (minimize government growth)
- Consultants will absorb the peak loads thus allowing CALTRANS to avoid the inefficient use of staff during those periods
- Will allow expenditure of funds expeditiously, when new revenues are obtained (in lieu of CALTRANS either stretching schedules or going through the time-consuming process of hiring and training new employees)
- Consultants can help CALTRANS expand its engineering expertise through experience gained in other states and from private industry projects
- Combining the talents of Department personnel and consultants could result in better solutions to problems
- Serves the public interest by maintaining, through use of consultants, the capability to expend funds on current basis to minimize the loss of the value of the dollar caused by inflation.

Disadvantages:

- May not meet the requirements of Article VII of the Constitution
- Will require some level of continual monitoring of the consultants by the Department to assure proper quality and adherence to schedule
- Will require the establishment and maintenance of a consultant qualification and selection procedure

SCHEMATIC REPRESENTATION
IN-HOUSE VS. CONSULTANT WORKLOAD



DEVELOPMENT EXPENDITURES
FORECASTED PROJECT

- Will provide the environment for allegations of corrupt project awarding practices and/or payoffs for less than adequate design review/construction inspection

We believe that the "advisability" part of the question is a policy issue between CALTRANS and the Legislature. We have provided information from other states which supports the technical feasibility of using consultants, however, such use was based on an overall philosophy embraced by both the Administration and the state legislature; thus our reference to policy.

From a management point of view, we believe there are several factors which argue for the second approach (maintaining a constant state work force). These factors include those listed as advantages, above. Logic suggests that maintaining a constant work force should be less costly than increasing and reducing staff levels. With outside consultants available, flexibility is greatly increased.

While the advisability of using consultants is a policy issue, which relates to the legislature's and the administration's interpretation of appropriate governmental activities, we suggest that the conclusions and recommendations of the Little Hoover Commission, made in 1965, are still appropriate. In order for this approach to be workable, a sufficient level of consulting activity will be needed to keep consultants interested and proficient in doing work for the State. Sporadic and unpredictable levels of activity may make it economically unattractive for contractors to hire, retain, and develop the skills necessary for this work.

One final note regarding use of consultants. If it is decided that contracting is feasible and advisable, it appears that least the following functions related to rehabilitation, operational improvement and new facility projects are appropriate for performance by the private sector.

- . Environmental studies including all the specialist disciplines involved such as archeological, historical, water and air quality, biological, geological, seismic, etc.
- . Basic preliminary design in support of the environmental studies such as strip maps, horizontal and vertical alignment, structural sections, contour grading plans, etc.
- . Detail design of highways, structures, and associated appurtenances
- . Surveying and other topographical analysis
- . Traffic control system design
- . Soils testing
- . Property appraisal
- . Right of way map preparation and supporting documentation
- . Landscaping and maintenance operations

E. SURVEY OF PRIVATE ENGINEERING FIRMS

In order to determine the capability of the private sector to absorb any work that might be forthcoming from CALTRANS, key executives of several major private engineering firms were interviewed. The firms contacted were:

- . The Parsons Corporation (includes Ralph Parsons Company and De Leuw, Cather & Company)
- . Bechtel, Incorporated
- . Daniel, Mann, Mendenhall & Johnson
- . Kaiser Engineers
- . The Spink Corporation.

The interviews were structured to obtain information relating to four primary points; (1) experience in the transportation field, (2) interest in contracting work with CALTRANS, (3) ability to absorb work, and (4) costs of performing contracted work in comparison to CALTRANS costs. Because the results of the interviews were so similar, they are discussed below by topic area rather than by firm. Although there were minor variations in point during the discussions, for the most part a consensus of opinion surfaced on each element and they are represented below. The discussion of each element is deliberately brief as we can see no benefit in reproducing the credentials of each firm presented to us in brochures, annual reports, etc. Also, the responses are probably predictable and there appears to be no need for expanding on a point beyond the basic conclusion. If specific additional information is required, it can be made available upon request.

(1) Experience in the Transportation Field

Although none of the firms had performed much work in California, considerable transportation work has been done in other states and foreign countries. Projects included highways, bridges, airport terminals, mass transit, railroads, etc. Functions performed included design, environmental studies, surveying, mapping, photogrammetry, construction management/inspection, structural engineering, traffic engineering, urban/regional transportation planning, right of way location and land acquisition, engineering geology, soil mechanics, hydrology and hydraulics, etc.

(2) Interest in Performing Work for CALTRANS

As expected, the response was unanimous in that the interest was extremely high. Although some thought that only major projects would be pursued, most were interested in any size project, and any type project for which they had skills.

(3) Ability to Absorb CALTRANS Work

Again, they saw no problem in adding any size project to their schedule. This was to be expected since most of the firms are very large and constantly experiencing start-up and job completions in an ever-changing job mix. Also, in most cases, unless an extremely large project was involved, there was no indication that a significant number of new people would have to be recruited. Firms felt that most new work could be absorbed within existing manpower levels.

(4) Contractor Costs versus CALTRANS Costs

None of the firms had data comparing their project costs with costs of governmental agencies. However, as

expected, they all thought that they could complete projects for the same costs, or less, than CALTRANS, but they admitted there was no documentation to support that conclusion.

The conclusions to be drawn from the interviews are obvious:

- . The private sector is eager to secure work from CALTRANS of any type and any size
- . Larger firms will probably be able to absorb new work without an appreciable increase in staffing requirements (assuming this to be true, there should be a minimum amount of pirating of CALTRANS staff)
- . Considering the experience level of the large firms, the "learning time" required due to unfamiliarity with CALTRANS requirements should be minimal (highway work done in California by consultants is typically performed to CALTRANS standards)
- . The extent of additional costs, if any, that will be associated with consultants is unknown and additional analysis should be done in this area to assure that excessive costs will not be involved.

It is cautioned that a program for using consultants to do major transportation projects on a contracted basis cannot be implemented overnight. To assure a high level of integrity in the program, it should be designed and formalized similar to those in Florida, Illinois and Texas. A pre-qualification process should be developed to preclude the necessity of repetitive evaluations of firms, while a selection procedure must be developed which will assure the absence of any potential for collusion, bribery, kickbacks, etc. Based on observations of other systems, it is estimated that a sound private sector contracting program could take up to a year to develop and implement. Beyond that we would also suggest a go-slow approach or, if you will, the application of the procedures to several small to medium size pilot contracts for de-bugging purposes.

F. SURVEY OF LOCAL GOVERNMENTS AND REGIONAL
TRANSPORTATION COMMISSIONS

The purpose of this survey was to determine if local governments or regional transportation commissions could assist in expediting the State Highway Program. Pursuant to that purpose we interviewed representatives of the following agencies:

- . Los Angeles County Road Department
- . Los Angeles County Transportation Commission
- . San Diego County Road Department
- . Sacramento County Road Department
- . Sacramento Regional Area Planning Commission
- . Butte County Road Department.

Our first objective was to understand the interface these two units had with CALTRANS and the five-year STIP. Part of the interface was explained via AB 402 which placed the regions and local governments in a coordinated planning position with CALTRANS. However, this is primarily a priority-setting function and not directly related to preparing or influencing plans for accelerating the expenditure of funds.

Other interfaces occur when CALTRANS initiates and performs work associated with a highway project. Many times local government and the regional transportation agency participate as members of a Project Development Team. To the extent that they can help to accelerate the decisions involved with that team, such action would expedite the ultimate goal of obligating funds. However, these decision points are relatively few in number in relation to the time required for environmental clearance and Department, public and FHWA approvals. The potential for compressing the overall schedule in this area of activity is extremely limited.

Another interface occurs during the review of CALTRANS' environmental impact reports (EIR) on projects in the local agencies' geographical area of influence. All agencies interviewed indicated that delays in the processing of CALTRANS' EIR's through their offices are rare and they generally make a point of promoting a fast review and approval. The indication was that CALTRANS' EIR's are so detailed and complete that there is normally no delay necessary. Again, the possibility of schedule compression is slight.

During the remainder of a CALTRANS project, interface with the local jurisdiction is generally limited to such actions as street closings due to construction, relocation assistance programs, surface street/expressway connections, etc. These requirements are usually discussed and agreed upon during the initial planning stages and demand only cursory monitoring. Such actions rarely cause project delays.

Discussions with local agencies did identify one possible activity which could help expedite the obligation of funds faster than planned in the STIP. Counties and cities appear to be willing to take on the responsibility of performing most of the work involved in planning and completing a highway project. (Depending on the size of the local agency, it was suggested that such projects be in the 1-10 million dollar construction value range). They suggest that once a given project is identified in the STIP for their area, they contract with CALTRANS to perform functions necessary to obtain the environmental clearance, prepare basic and detailed designs, accomplish right of way functions and monitor construction. Essentially this means that more projects can be scheduled in the STIP and more funds obligated. Basically it provides CALTRANS additional person years without physically adding state staff. (We recognize that CALTRANS would still be required to provide overall management but the staff involved should be relatively insignificant in

size in relation to the number of CALTRANS staff that is normally required to do the entire job.)

Two additional points should be made. First, the State Personnel Board indicated that under Article VII the state can legally contract with local government. Second, representatives of local agencies thought that jurisdictions under 50,000 population might not have the manpower necessary to absorb CALTRANS work.

In summary, it appears reasonable to conclude that small to medium size highway projects could be sub-contracted to local jurisdictions. Their interest in completing local highway projects would guarantee quality work and, in their opinion, the time scheduled by CALTRANS for completion of individual projects would be more than sufficient for their needs.

IV. WRITTEN RESPONSE TO THE REPORT

DEPARTMENT OF TRANSPORTATION

OFFICE OF DIRECTOR

1120 N STREET

SACRAMENTO, CALIFORNIA 95814



June 5, 1979

Mr. Thomas W. Hayes
Acting Auditor General
Joint Legislative Audit Committee
925 L Street, Suite 750
Sacramento, CA 95814

Dear Mr. Hayes:

Thank you for the opportunity to review the draft report entitled "Report on the Study to Assess Alternatives for Expending Highway Funds More Expeditiously."

Our overall observation is that the consultant, Arthur Young and Company has treated the subject objectively and in surprising depth, considering the complexity of the material and the time available for the study. We agree in several instances with the conclusions reached. However, in other very significant areas, we find that we cannot agree.

The study addressed four primary objectives. They were to:

- Assess the capability of Caltrans to deliver the 1979 STIP.
- Assess the potential for accelerating construction of new facilities.
- Assess the feasibility and advisability of Caltrans contracting with the private sector.
- Determine whether local government can perform functions which could expedite the State Highway program.

These primary objectives are used in the discussion below as headings under which are detailed any areas of disagreement with the findings of the report.

THE CAPABILITY OF CALTRANS TO DELIVER THE 1979 STIP

Personnel Requirements: The consultant feels that Caltrans is over optimistic in relying on newly hired Junior Civil engineers to carry their share of the project development workload. Our past experience with JCE's has been excellent. These young engineers enthusiastically attack the work and the learning experiences. Our staff scheduling in the past has utilized a much larger percentage of this class than in recent years. Our younger

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engineers were lost in the Department's reduction of staff a few years ago. We have absolutely no doubt regarding the productivity of these engineers. Project development has sufficient work at the JCE level of capability to use the number we will soon have "on board".

EXTERNAL CONSTRAINTS: It is true, as noted, that there is a growing number of external constraints which tend to impede the delivery of completed projects. Caltrans has recognized this fact and lived with it for a number of years. Our process for estimating staffing needs and our project scheduling fully accounts for this factor. These external constraints would operate on any agency engaged in project development to the same degree that they operate on Caltrans.

FLEXIBILITY: The report points to the need for backup projects to provide program flexibility in the event of significant project slippage. We agree that flexibility within the approved STIP is important to the stability of our program and that we do not have adequate flexibility in this area at the moment. Our current lack of flexibility has resulted from several factors. They include the deliberate decision several years ago to program Route 105 (Century Freeway) without alternative programming, the program disruption caused by the retroactive application of environmental laws to existing projects, and the hiring freeze which was terminated (for Caltrans) last year. However, the increased staffing for project development now being provided (820 people) will bring the total engineering staff to a level sufficient to deliver the STIP projects and begin to provide a measure of flexibility. This important feature of resource budgeting will continue to receive high priority in future budget requests.

HISTORICAL EXPERIENCE: The statement is made that Caltrans had neither delivered all projects in the year planned nor obligated the amount of funds planned in any given year. This statement creates the impression that Caltrans accomplishes much less work than it programs. This is not the case. This conclusion was based upon insufficient information (as noted in the report). We feel it is not reasonable to draw conclusions on the basis of performance for any single year, due to the long-term nature of our work.

We have generally advertised essentially the amount of construction originally programmed and budgeted, although we have not followed precisely the original list of projects. We maintain that the shifting of a few projects in or out of a given budget period because of uncontrollable circumstances should not be viewed as unusual or with undue alarm.

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Prior to legislative budgeting, the time frame for contract awards extended from January 1 preceding the fiscal year through an 18-month period ending June 30 of the fiscal year. Beginning with the 1977-78 fiscal year, this time frame shifted such that projects cannot be awarded until the fiscal year begins; however, it was extended for one full year beyond the fiscal year (and will be further extended for future budgets). This factor needs to be considered with respect to the statement in the report that only about 80% of the 1977-78 program was accomplished in that year. Using the 18-month time frame suggested by the pre-legislative budgeting practice, the Department accomplished 95% of the 1977-78 fiscal year program within the allotted time.

THE POTENTIAL FOR ACCELERATING CONSTRUCTION OF NEW FACILITIES

Four separate strategies for accelerating new facility construction were investigated. Three were discarded as being infeasible in the short term or long term, or because Caltrans' approach is considered correct.

The findings focus on the remaining strategy--use of outside resources to accelerate Interstate construction--as the most feasible of those investigated. We agree that if construction of new facilities is to be accelerated beyond the rate of construction presently proposed, the effort should be applied to Interstate projects. This is the segment of programming which can be accelerated (within reasonable bounds) without a direct detrimental effect on the valid program priorities now being implemented.

Caltrans has considered the advantages of accelerating the Interstate program and has already embarked upon such a course. The consultant finds, "The Department is currently developing an accelerated Interstate program for the 1980 STIP aimed at consuming all early year funds by June, 1982." This program acceleration has resulted from our "first stage" reevaluation of programming capabilities following the hiring freeze mentioned earlier.

As we proceed into the early stages of the 1980 STIP, we will be further reassessing and defining the optimum rate of Interstate facility programming in the light of:

- Eligibility for discretionary (additional) funding.
- The likelihood that FHWA can maintain the funding levels required to meet new target dates.
- The need to reach a balance between the advantages of immediately utilizing windfall financing and the disadvantages of "boom and bust" construction.

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Our continual reevaluation of this element of programming will provide the basis for making needed changes in program and staffing levels. In short, Caltrans is fully prepared to follow the most advantageous course with respect to Interstate construction.

THE FEASIBILITY AND ADVISABILITY OF CALTRANS CONTRACTING WITH THE PRIVATE SECTOR

We agree with the study findings that contracting with the private sector is technically feasible. As noted in the report, Caltrans makes frequent and advantageous use of this avenue for accomplishing work under the more unusual circumstances such as contemplated by constitutional and State Personnel Board guidelines. These circumstances include the need for expertise not available in Caltrans staff, the need for a disinterested third-party objectivity in special studies, etc. This use of the private sector is efficient and advantageous. We fully expect to maintain or increase such use as indicated by circumstances.

The report correctly recites the controlling case law concerning the legality of contracting for services outside the civil service. It should be emphasized, however, that the case of CSEA v. Williams, 7 CalApp.3d 390, permits service contracts in the limited circumstances where the activity is a new activity and the Legislature expressly authorizes the work to be by contract. The test in ordinary circumstances is whether or not the services could be performed "satisfactorily" by an employee selected under civil service (State Comp. Fund v. Riley, 9 Cal., 2d 126) or "adequately and competently" (Borum v. State Comp. Fund, 30 Cal.2d 575).

The application of these tests to project development activity of the Department leads to the conclusion that there are several weaknesses in asserting that service contracts are legal in this case. First of all, the work has been performed by the civil service for over forty years. The limited instances where work is contracted out has to do with the ability of the civil service to do the work at all, not in a certain time frame. Secondly, the Department has been publicly stating for at least four years that workload leveling is desirable and can be accomplished by long-term programming, not contracting out peak loads.

It is our opinion that the adequacy test relates to the ability to do the work qualitatively on a continuing basis. Contracts are permissible only in an intermittent and unpredictable need; for example, some archeological work which requires rather detailed regional knowledge.

If the Department does not have the engineering personnel to perform project development work at the rate it deems appropriate,

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it is required to employ further personnel under the Civil Service System.

In CSEA v Williams, the court stated at page 399:

"... It [The constitutional policy of civil service] does not prohibit legislative experimentation in new forms to fit new functions. It compels expansion of civil service with expansions of state agency structure but does not force expansions of state agency structure to match extensions of state function..." Emphasis added.

The report indicates that other states contract extensively with the private sector without major problems. It was thought that costs are higher, but there is no specific evidence to support this conclusion. Caltrans has found much more persuasive evidence regarding this issue.

Administrative costs of several millions of dollars per year are reported by other states due to added staff needed to select consultants, review their work and perform the necessary administrative functions. For example, the State of Washington found that for 29 bridges completed by consultants, between 1 and 6 person-months of State engineering staff and about 2/3 person-month of administrative staff was required for each bridge.

The State of Hawaii utilizes a "Technical Design Services Section" consisting of 6 staff engineers to negotiate and administer consultant contracts for peak workloads. In addition, review of design work and increased audit capability is required.

The State of Maryland Department of Transportation maintains four technical bureaus for administering about 250 consultant contracts. The annual cost is over \$2 million.

Over and above the cost of administering the contracts must be added the additional cost of engineering by consultants. Wages are higher and a profit must be earned. For example, Caltrans estimates the in-house design engineering cost for bridge construction on Route 105 at 3.5%. The consultants fee range based on American Society of Civil Engineers guidelines is 4.7% to 5.7%. Using an average of 5.2%, we find that bridge engineering for the \$350 million in Route 105 structures would cost \$6 million more if done by consultants.

An important factor in considering the advisability of contracting with the private sector would be the long lead time involved. The consultant estimates one year would be required to "gear up" for

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the process. This means an actual time lag of two to three years minimum before any benefits in the form of completed work could be expected.

The consultant makes a major point of the staffing and programming difficulties Caltrans is assumed to experience because of large variations in workload. It is proposed that the private sector be assigned the peak workloads, thus relieving Caltrans of the costly necessity to first increase and later decrease staff or, alternatively, to "stretch-out" the program. This would be accomplished by holding Caltrans' work force below the projected workload level and assigning all additional work to consultants.

To this, we must repond that, in general, Caltrans has not experienced these assumed difficulties. The program has been basically stable. Fluctuations have been small in comparison with the size of the overall program and have been further minimized with routine adjustments of work force and (more rarely) minor scheduling changes.

A major exception, of course, was the project advertising moratorium and staff reduction of about 4 years ago. Since that time, and over a period of many years, the Department has produced all, or essentially all of its program on schedule. This was accomplished with the reduced work force (diminished by the hiring freeze in 1978) despite a continuing high-level of program and steadily increasing highway maintenance inventory and needs.

Incidentally, a technicality regarding the production of the annual highway program should be called out at this point. Caltrans is constrained by law from obligating more funds for construction than the Legislature has approved in the budget. Since it is virtually impossible to obligate the exact amount, the full amount of the approved budget cannot be spent.

ABILITY OF LOCAL GOVERNMENTS TO HELP EXPEDITE THE HIGHWAY PROGRAM

The Department does not agree with the rather optimistic projection presented by the consultant regarding the potential of local agencies doing Caltrans' projects. There could be some limited local development of selected conventional highway projects although that would depend on local circumstances at the time. Our contacts with those local agencies identified in the report do not confirm the conclusion that this source of help would either be generally available or dependable. One of these agencies listed in the report is presently using consultants to perform their own workload.

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Twenty local agencies statewide have been prequalified to handle right-of-way for Federal-aid projects; however since Prop. 13, most of these agencies have referred requests from other locals back to Caltrans for assistance. Based on our own knowledge of local agencies' performance in the Federal-Aid Urban (FAU) program, the probability of a dependable source of additional project-development support is extremely limited.

IN SUMMARY

The Department is pleased to note that the consultant agrees with a number of elements affecting our current programming and budgeting practices, including:

- The basic approach used by Caltrans to determine total personnel needs is essentially reasonable.
- The current modest approach in programming is considered generally responsible under present conditions.
- Based on activities to date and available resources, it is reasonable to assume Caltrans will be able to acquire the needed personnel from outside the Department.
- External constraints make it difficult to deliver a plan precisely as developed.
- Caltrans' position that project development should be on a priority basis and limited to funding levels which can be reasonably anticipated is supported.

Caltrans is confident that it can deliver the 1979 STIP and that our newly hired Junior Civil Engineers can be counted upon to work productively in this effort.

With the staff increase now being implemented, Caltrans' position with respect to program flexibility will be considerably improved and will be further improved in succeeding budget cycles.

Caltrans is developing an accelerated Interstate construction program and will continue to reevaluate the optimum rate of acceleration in the light of the pertinent factors.

The Department's interpretation of case law and the constitution is at variance with that of the consultant. We believe reasonable

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interpretation will continue current practices regarding contracting for the services of engineering consultants.

With respect to the additional costs due to contracting with the private sector, Caltrans apparently has more positive data and a clearer conviction, pointing to the conclusion that doing the work in-house is considerably more economical.

Regarding the economics of accomplishing peak workloads in-house versus contracting with the private sector, it appears that it may be somewhat a question of "whose ox is being gored". Staffing up and staffing reductions will be a factor without regard to who is doing the work. The organization best equipped to handle the problem with a minimum of disruption will be the one with the greatest depth of overall program. This clearly points to the advisability of doing all the work with State forces.

Caltrans does not share the consultant's optimism regarding the ability of local governments to carry part of the load of delivering the highway program. Proposition 13 has made it necessary for most of these agencies to cease doing work for others and, at least in one case, to turn to consultants themselves.

Our review indicates several instances of technical and statistical nature where our records do not agree with the consultant's figures. These inconsistencies are included as general information in the attachment to this letter.

Sincerely,



for Adriana Gianturco
Director of Transportation

Attachment

COMMENTS

TECHNICAL CONTENT

The following comments concern the technical contents of the report and should be brought to the attention of the consultant:

1) County Minimums (page 13)

It should be pointed out that the current county minimum requirement that at least \$4,000,000 in noninterstate capital funds be expended during each four-year planning period will be dropped effective June 30, 1979 through California Transportation Commission action.

2) Review of Personnel Planning Systems Used (page 31)

The last item on the page concerns personnel planning systems and the budget development process. The statement is made, "There is considerable overlap of tasks performed by different classifications." It appears that this conclusion is drawn from information provided by the several information management systems. While no attempt is made in the information systems to equate staffing needs (PYs) to Civil Service Classifications, it is incorrect to say that considerable overlap of tasks occurs.

3) Highway Engineering Technician (page 37)

The statement made concerning the combination of the HET and JET classifications is incorrect. There has been no combination of these classifications. In several reports the targets for recruitment were combined which probably led to the misunderstanding that there was a combination of classifications.

4) Exhibit XI (page 39)

Please note that the associate engineer and assistant engineer numbers for headquarters should be reversed. Also, note that the headquarters category includes more than just those divisions reporting to the Chief Engineer as indicated on the chart.

5) Project Mix and Flexibility (page 46)

The statement is made that, "Advertising must stop about six weeks from the end of the fiscal year if funds are to be obligated in the planned time-frame." There is no specific

requirement that advertising must stop prior to the end of the fiscal year. Implementation of legislative budgeting and appropriations of funds extends project awards beyond the end of the fiscal year. Projects are considered to be encumbered or awarded for a specific budget fiscal year even if it is outside the technical fiscal year designation.

6) Historical Experience (page 49)

A comparison of expenditures in 1977-78 is made to "1977-78 TIP identified in the 1979-80 STIP summary (\$508 million)" to arrive at an approximate 61% of planned expenditures. This comparison is incorrect since the information in the STIP summary includes both expenditures for Construction and for Right-of-Way while the base figures for 1977-78 expenditures are only for construction projects.

7) Excess Funds Available in Early STIP Years (page 57)

The statement is made that "Current law requires that Environmental agreements be completed on all interstate projects by 1983 and all construction be initiated by 1986." Present interpretation is that the 1986 date for initiation of construction applies only to the federally designated interstate gaps. We are currently planning to continue construction on other segments of the system after 1986.

Office of the Auditor General

cc: Members of the Legislature
Office of the Governor
Office of the Lieutenant Governor
Secretary of State
State Controller
State Treasurer
Legislative Analyst
Director of Finance
Assembly Office of Research
Senate Office of Research
Assembly Majority/Minority Consultants
Senate Majority/Minority Consultants
California State Department Heads
Capitol Press Corps