

REPORT BY THE
AUDITOR GENERAL
OF CALIFORNIA

**THE DEPARTMENT OF TRANSPORTATION'S
REPLACEMENT OF THE TOWN CREEK BRIDGE:
RESPONSE TO QUESTIONS
POSED BY THE LEGISLATURE**

REPORT BY THE
OFFICE OF THE AUDITOR GENERAL
TO THE
JOINT LEGISLATIVE AUDIT COMMITTEE

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REPLACEMENT OF THE TOWN CREEK BRIDGE:
RESPONSE TO QUESTIONS POSED BY THE LEGISLATURE

MARCH 1982



California Legislature

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March 30, 1982

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

Members of the Legislature:

The Joint Legislative Audit Committee respectfully submits the Auditor General's report on the Department of Transportation's decisions relating to the replacement of the Town Creek Bridge in Mendocino County.

This report was prepared by the Office of the Auditor General in response to specific questions posed by Assemblywoman LaFollette and other members of the Legislature. These questions pertained to whether the CALTRANS director made an engineering decision on the width of the bridge, the role of federal and state bridge width standards, the applicability of the Professional Engineers Act, as well as cost and safety implications of the decision.

The Auditor General has concluded that the CALTRANS director made a management decision on the width of the bridge by choosing between two engineering alternatives.

In doing so, the CALTRANS director ignored over 200 years of mainline engineering design experience to adopt a bridge design that was considered unsafe for that location by both district and headquarters project engineers.

Even though the federal government has refused to fund a 32-foot bridge at this location, the department continues to pursue this design width knowing that state-only funds would

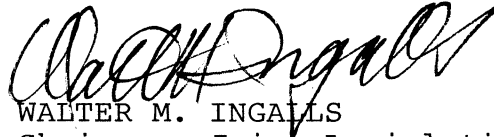
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have to be used for its construction. It seems to be grossly inconsistent with the state's current fiscal condition to be using state funds when federal funds are available.

It should be noted that the state is now borrowing \$1.8 billion from all of its funds, including \$128 million from the Highway Account to pay its bills and meet its payrolls.

I regret that I have to report to my colleagues and to the public that these are the types of questionable management decisions that we are getting from that department.

Respectfully submitted,



WALTER M. INGALLS
Chairman, Joint Legislative
Audit Committee

WMI:smh

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SUMMARY

The Department of Transportation is responsible for constructing the State's transportation facilities. Part of this responsibility includes replacing or repairing substandard bridges. This report addresses specific questions posed by the Legislature regarding the replacement of a 20-foot wide bridge and its 6-foot wide walkway with either a 32-foot wide bridge or a 40-foot wide bridge across Town Creek in Mendocino County. The entire project involves construction of two replacement bridges, one over Town Creek and one over Grist Creek. The department identified these two bridges as needing replacement because of structural deficiencies. The bridge over Grist Creek will be replaced by a 32-foot wide structure. The Director of Transportation decided to replace the second bridge and its 6-foot wide walkway with a single 32-foot wide structure.

We were asked to determine if the Director of Transportation's decision to build a 32-foot wide bridge over Town Creek violated either the Federal Highway Administration's standards or the Department of Transportation's standards for bridge width. The 32-foot wide bridge proposed as a replacement for the existing Town Creek Bridge does not meet

federal standards, which require a 40-foot wide bridge at this location. The 32-foot wide bridge does meet the department's standards, however, and the department applied to the Federal Highway Administration for federal funding under an exception to the federal standards. The Federal Highway Administration reviewed the proposal for the 32-foot wide replacement bridge and did not grant the exception. Among its reasons for disapproving the proposed 32-foot wide bridge, the Federal Highway Administration stated that the bridge was close to an urban area and was used by many pedestrians, bicycles, and equestrians, as well as by a large number of logging vehicles. The Federal Highway Administration expressed concern about the safety implications of the incompatible mix of motorized and nonmotorized traffic on the bridge. The department has appealed the Federal Highway Administration's decision.

Although the department may eventually build the bridge solely with state funds, department officials believe that the State will not lose any federal funds for the bridge replacement program. The department's position is based on the assumptions that there will be sufficient state funds to match available federal money and that the department will have enough projects available that will qualify for federal funding. Officials of the California Transportation Commission also believe that, based on data provided by the department, the State will not lose federal funds.

The Legislature asked that we determine if the Director of Transportation made a decision that only a professional engineer would be qualified to make. In our judgment, the Director of Transportation made a management decision by selecting one of two bridge-width options in deciding to replace the existing bridge with a 32-foot wide bridge. Both options, one for a 32-foot wide bridge and the other for a 40-foot wide bridge, were developed by licensed civil engineers employed by the department. The proposal for a 40-foot wide bridge was a fully developed project report, while the proposal for a 32-foot wide bridge was an analysis prepared outside of the department's normal project development process.

We were asked by the Legislature to determine if the decision by the Director of Transportation to build a 32-foot wide bridge at Town Creek will cost the State additional funds. The narrower bridge may save the State approximately \$70,000. Of this amount, \$29,000 can be attributed to building a narrower structure. The remaining \$41,000 results from a decline in the construction price index and from interest earned in the Surplus Money Investment Fund. However, similar savings from a decline in the cost of construction and from interest earned in the Surplus Money Investment Fund would also occur if a 40-foot wide bridge were constructed. In addition, if the State decides to build a 32-foot wide bridge solely with

state funds, the Surplus Money Investment Fund could lose approximately \$3,500 in interest per month until all federal funds are exhausted for the year.

The Legislature asked us to determine whether department engineers would violate the Professional Engineers Act concerning design safety or compromise their professional integrity if they were involved in building the 32-foot wide structure. The act establishes certification requirements for engineers who wish to practice in the State, but it does not specify particular design standards. However, if the department's engineers were found to be negligent or incompetent in designing the 32-foot wide bridge, the State Board of Registration for Professional Engineers could reprove them, privately or publicly, or suspend or revoke their engineering certificates. We could not determine if the engineers would compromise their professional integrity by building a 32-foot wide bridge because of the subjective nature of professional integrity.

Finally, we were asked by the Legislature to address motorist safety as it relates to bridge width. Available data show that wide bridges are safer than narrow bridges. However, if either the 40-foot wide bridge or the 32-foot wide bridge were constructed, pedestrian and bicycle traffic would be

combined with cars and trucks on the same bridge. The existing 20-foot wide bridge has a separate 6-foot wide walkway for pedestrians and bicyclists.

Because the decision process surrounding the replacement of the Town Creek Bridge was a complex one, we have provided a chronology of events in Appendix D with the names of the individuals involved. In Appendix E we have provided resumes of key personnel in the Department of Transportation.

INTRODUCTION

In response to a request by the Joint Legislative Audit Committee, we have reviewed the circumstances surrounding the replacement of the Town Creek Bridge located in Mendocino County near the town of Covelo. This review was conducted under the authority vested in the Auditor General by Sections 10527 through 10528 of the Government Code.

We were asked to respond to questions regarding the Federal Highway Administration's standards and the California Department of Transportation's standards for bridge width. We were also asked to review the basis for the decision made by the Director of Transportation to build a 32-foot wide bridge, the potential costs resulting from the decision, the applicability of the Professional Engineers Act to the decision, and the effects that the decision may have on motorists' safety.

Background

One of the responsibilities of the Department of Transportation is to construct the State's transportation facilities. The responsibility includes replacing and repairing substandard bridges. To fulfill this responsibility,

the department is organized into four functional areas: Planning and Programming, Project Development and Construction, Maintenance and Operations, and Administration and Finance. These functional areas are administered by deputy directors who provide direction and support to the 11 district offices in the State. (Appendix A provides an organization chart of the Department of Transportation.)

The decision we were asked to examine concerns the replacement of a bridge on Highway 162 in Mendocino County. There are 12 bridges along Highway 162, some constructed in the 1920s. These bridges range in width from 20 feet to 30 feet. Two of the bridges, the Town Creek Bridge and the Grist Creek Bridge, were built in 1923 and both are 20 feet wide. The Town Creek Bridge has a 6-foot wide pedestrian walkway to accommodate nonmotorized traffic. These two bridges are located within one-half mile of each other near the town of Covelo. The department identified these bridges as needing replacement because they were being overloaded and there are cracks in the supporting girders. The department is treating the replacement of both bridges as a single construction project.

Project Development and Construction had recommended that the Grist Creek Bridge be replaced by a 32-foot wide structure and that the Town Creek Bridge be replaced by a

40-foot wide structure. The Director of Transportation decided that it would be more appropriate to have a 32-foot wide bridge at Town Creek. Our study concerns this decision. (See Appendix B for diagrams of the Town Creek Bridge.)

Scope and Methodology

Our review was designed to answer specific questions asked by the Legislature. To answer these questions, we interviewed Department of Transportation officials connected with the project, other department officials involved with bridge replacement programs, and officials of the Federal Highway Administration. We also examined the project files as well as other documentation connected with the project. Finally, we reviewed the Professional Engineers Act, available studies on bridge traffic safety, and the state and federal design standards used by the department.

As well as responding to the questions, we also provide additional information requested by the Legislature concerning the educational background, engineering licenses, and employment history of selected employees of the California Department of Transportation.

STUDY RESULTS

I

REVIEW OF THE BRIDGE WIDTH STANDARDS

The Legislature asked us to determine if the Director of Transportation's decision violated either the Federal Highway Administration's standards or the Department of Transportation's standards for bridge width. If the replacement bridge at Town Creek were 32 feet wide, it would not meet Federal Highway Administration standards. Such a bridge does, however, meet the minimum standards established by the Department of Transportation. In some instances, the Federal Highway Administration may grant an exception to these standards and approve federal funding for a structure that does not meet federal standards. This was the case with the Grist Creek Bridge when the Federal Highway Administration granted an exception and approved a 32-foot wide replacement bridge. In the case of the Town Creek Bridge, however, the Federal Highway Administration did not grant an exception for the proposed 32-foot wide replacement bridge. Although this disapproval may result in the department's using state funds to build the bridge, the department has indicated that the State will not lose available federal funds for the repair or replacement of

other bridges. The department assumes that there will be sufficient state funds available to match federal allocations in the future and that there will be sufficient projects developed to use the available federal funds. According to officials of the California Transportation Commission, based on information provided by the department, the State will not lose federal funds for bridge repair or replacement.

Federal Bridge Width Standards

The Federal Government makes funds available for the repair and replacement of bridges. When states apply for these funds, the Federal Highway Administration must approve a project proposal before it will release the funds for the project. When considering a project for funding, the Federal Highway Administration evaluates the proposed project according to federal design standards established by the American Association of State Highway and Transportation Officials. Although project proposals are evaluated against these standards, the Federal Highway Administration may grant exceptions to them if an agency provides sufficient justification.

Federal design standards require the replacement bridge over Town Creek to be 40 feet wide. On January 15, 1981, the Federal Highway Administration approved federal

funding for a 40-foot wide replacement bridge at Town Creek. After this approval was granted, the department adopted an alternate proposal to replace the existing Town Creek Bridge with one that is 32 feet wide. The 32-foot wide bridge did not meet federal standards, so the department applied to the Federal Highway Administration for an exception. If an exception to the federal standards had been granted, the department would have been able to receive federal funds for replacing the Town Creek Bridge with a 32-foot wide structure.

Applying for exceptions from Federal Highway Administration standards is not an unusual process. During 1981, the department requested funding from the Federal Highway Administration for 40 replacement bridges. Of these 40 bridge proposals, 15 were for bridges whose widths were narrower than those prescribed by federal standards. Of these 15 bridges, 11 were granted exceptions and 4 were denied.

In February 1982, the Federal Highway Administration denied an exception on the 32-foot wide Town Creek Bridge. In its letter to the department, the Federal Highway Administration stated that its analysis showed that the bridge is "within the urban complex" and that "the proximity of the bridge to stores and other business establishments [means that] pedestrian, bicycle, and equestrian crossings are prevalent."

Further, the analysis showed that traffic in the area has "a high seasonal factor," that trucks account for approximately 10 percent of the average daily traffic, and that there is a "preponderance of logging vehicles." The letter also states that the existing structure could be widened "with relative ease" and that "a new structure can be expected to serve for a minimum of 40 to 50 years." Based upon its analysis and "in consideration of the safety implications of the rather incompatible mix of autos, trucks, recreation vehicles, and nonmotorized traffic using the facility," the Federal Highway Administration stated that it could not approve federal funds for a 32-foot wide bridge over Town Creek.

Presently, the department is appealing the Federal Highway Administration's decision not to fund the bridge at the proposed 32-foot width. Although the department may not have federal funds available for the Town Creek Bridge, department officials point out that the department will still receive its share of the federal funds available for the repair and replacement of other bridges in California. According to these officials, there are sufficient state funds to finance bridge projects and a sufficient number of bridge replacement projects being developed that will be eligible for federal reimbursement. (See Appendix C for an expanded discussion of the status of federal funds for bridge repair and replacement.)

California Bridge Width Standards

The proposed 32-foot wide replacement bridge at Town Creek does meet the minimum design standards established by the Department of Transportation. For replacement bridges constructed on existing two-way, two-lane roads that do not have sidewalks, the minimum width is 32 feet. This 32-foot wide minimum includes a 24-foot wide roadbed and 4-foot wide shoulders on both sides of the roadbed. However, actual bridge widths can vary from this standard depending on several factors that may affect the width of the shoulders. These factors include the relationship between safety and the volume and nature of traffic, the width of the adjacent sections of roadway, the effects of the structure on the environment, the structure's cost, the needs of nonmotorized traffic, the potential interference with the flow of traffic, and special shoulder uses. In the following section of the report, we discuss the manner in which these factors affected the decisions on the Town Creek Bridge replacement project.

The department recognizes that conflicts may exist when federal nationwide standards for bridges do not satisfy conditions that exist in California. The state Highway Design Manual provides that when federal and state standards differ, the state standards shall prevail.

II

EXPLANATION OF THE BRIDGE WIDTH DESIGN DECISION*

The Legislature asked us to determine if the Director of Transportation made a decision that only a professional engineer would be qualified to make. In our judgment, the Director of Transportation made a management decision in selecting which of two proposals to implement. One proposal, the project report prepared by Project Development and Construction, recommended replacing the existing 20-foot bridge and its 6-foot walkway with a bridge that would be 40 feet wide. The other proposal, an analysis prepared by Planning and Programming, recommended replacement with a 32-foot wide bridge. Both proposals were developed by licensed civil engineers employed by the department. However, the proposal to build a 32-foot wide bridge was not coordinated with Project Development and Construction, which would normally be involved in developing such projects.

* Because this decision process was a complex one, we provide in Appendix D a chronology of events with the names of the individuals involved. In Appendix E we provide the resumes of key department personnel.

Development of the Proposal
for a 40-foot Wide Bridge

The project involving the Town Creek and Grist Creek bridges was developed according to normal departmental procedures until it was to be presented to the California Transportation Commission for funding. The department identified two bridges in Mendocino County as being structurally deficient and scheduled them for replacement during the 1980-81 and 1981-82 fiscal years. The Eureka district office recommended that the Grist Creek Bridge be replaced with a 32-foot structure and the Town Creek Bridge be replaced with a 40-foot structure. Although the district staff considered proposing a 32-foot wide structure with 4-foot shoulders for Town Creek, they decided instead to propose a 40-foot wide bridge that would include 8-foot shoulders.

As mentioned in the previous section of this report, there are several factors that must be considered when designing shoulder widths. In proposing 8-foot wide shoulders for the Town Creek Bridge, the Eureka district office took into account the expanding commercial development, the needs of nonmotorized traffic, the need to provide continuity to the adjacent roadway, and the existence of graded parking areas 8 to 10 feet wide adjacent to the bridge.

The department's standards specify that a shoulder width of at least 4 feet wide is warranted on almost all highways and on roadways adjacent to populated areas. The Eureka office indicated that 8-foot wide shoulders would be necessary because of the significant pedestrian and bicycle traffic and because the Town Creek Bridge is in an expanding business district. The department's standards also state that it is generally desirable to maintain a uniform shoulder width along a highway. In developing the proposal, the Eureka office indicated that the existing shoulders on the roadway leading to the Town Creek Bridge are about 10 feet wide and that they are used for parking. According to the department's standards, the existence of significant roadside parking usually indicates the need for a shoulder width of at least 8 feet so that vehicles that are turning or being parked will not interfere with the flow of traffic on the roadway.

The completed project proposal recommending a 40-foot wide bridge over Town Creek and a 32-foot wide bridge over Grist Creek was sent to the department headquarters for review in December 1979. Project Development and Construction approved the project report in February 1980, and by February 1981, the Federal Highway Administration had approved both bridges for funding. The Federal Highway Administration granted an exception to the federal standards and agreed to

fund a 32-foot wide bridge at Grist Creek provided that the project included provisions for future expansion of the bridge. By August 1981, the project was ready for presentation before the California Transportation Commission. From this point, the development of the project did not follow the department's normal project development process.

Development of the Proposal for a 32-foot Wide Bridge

Under normal circumstances, Project Development and Construction prepares a project proposal and Planning and Programming reviews the proposal and presents it to the California Transportation Commission for evaluation. If the commission approves the proposal, it then obligates state funds for the project. However, in July 1981, the director requested that Planning and Programming staff and Project Development and Construction staff review all proposed projects to ensure that they are cost-effective. Thus, instead of preparing the Town Creek and Grist Creek bridge proposal for the California Transportation Commission, Planning and Programming, in addition to its usual review of whether a project is feasible and whether it fits into the existing highway system, began to review the Town Creek project for cost-effectiveness. Because this was the first time that Planning and Programming had seen the proposed project, Planning and Programming asked Project

Development and Construction to review the recommendations in the project report concerning the Town Creek and Grist Creek bridges. Project Development and Construction is the unit responsible for developing standards and for the preliminary engineering, design, specifications, estimates, and structural engineering of all projects. Project Development and Construction recommended that the construction of two bridges be advertised as soon as possible and that they be constructed at the widths of 32 feet for Grist Creek and 40 feet for Town Creek.

Planning and Programming staff were not comfortable with the decision to build a 40-foot wide bridge at Town Creek because they could not understand the need for different bridge widths at Grist Creek and Town Creek. As a result, the Deputy Director of Planning and Programming asked civil engineers in Planning and Programming as well as the Chief of the Office of Bicycle Facilities to reexamine the project. They examined the data used in the original project report. Based partly on new traffic counts and a new analysis of nonmotorized traffic in the Town Creek area, they suggested that a 32-foot wide bridge would be adequate at Town Creek. They said that a 32-foot wide bridge would be a vast improvement over the existing bridge, and that it would be more compatible than a 40-foot wide bridge with the existing facilities and traffic volumes on Route 162 in and around Covelo. However, in developing this alternate

proposal for a 32-foot wide bridge, Planning and Programming staff did not consult with the engineers in Project Development and Construction even though the latter are responsible for developing project alternatives.

Director's Decision on
the Width of the Bridge
and Subsequent Events

In October 1981, two options were presented to the Director of Transportation for resolution. According to department officials, decisions of this type normally would be made before the recommendations are submitted to the director for approval. The director stated that this was the first time that she was aware of the proposed project. She examined both alternatives and recommended that a 32-foot wide bridge be constructed at Town Creek. She said that this structure would be more appropriate because it would cost less to build and because it would preserve the continuity of the roadway.

When the director decided on a 32-foot wide replacement bridge for Town Creek, she directed both the Deputy Director for Project Development and Construction and the Deputy Director for Planning and Programming to implement her decision. The Deputy Director for Planning and Programming delegated the matter to his Chief of the Division of Transportation Planning. The Chief of the Division of

Transportation Planning prepared a memorandum addressed to the Eureka district office stating that the director decided to build a 32-foot wide bridge at Town Creek. The memorandum directed the Eureka office to prepare a supplemental project report proposing a 32-foot wide replacement bridge. Normally, direction for supplemental project reports would originate with Project Development and Construction, not Planning and Programming.

After discovering that Planning and Programming had directed the Eureka district office to prepare a supplemental project report recommending a 32-foot wide replacement bridge, the Deputy Director for Project Development and Construction asked the director about the appropriateness of the Chief of the Division of Transportation Planning's memorandum and asked that it be rescinded. He also asked the director to reconsider her decision and recommend building a 40-foot wide bridge. A disagreement developed between the director and the Deputy Director for Project Development and Construction over the appropriate width of the replacement bridge over Town Creek. Ultimately, this disagreement contributed to the deputy director's resigning his position.

After the deputy director resigned, the Eureka office forwarded a supplemental project report recommending a 32-foot wide replacement bridge to the Office of Planning and Design

within Project Development and Construction. The Chief of the Office of Planning and Design did not approve the supplemental report because he did not agree with the recommended 32-foot width and because the project report did not have the required signature of a registered civil engineer. The supplemental project report was not signed because project development staff in the district did not believe that a 32-foot wide bridge was safe for the Town Creek location.

When the supplemental report was disapproved, the new Deputy Director for Project Development and Construction withdrew the authority for approving the Town Creek project from the Chief of the Office of Planning and Design. The new Deputy Director for Project Development and Construction then approved the supplemental report proposing a 32-foot wide bridge and directed the Sacramento Project Design Branch to prepare plans for a 32-foot wide bridge. The plans were prepared; however, they also failed to have the appropriate signature of a registered civil engineer because the Chief of the Sacramento Project Design Branch did not believe that a 32-foot wide bridge was appropriate at Town Creek.

The unsigned plans were then sent to the Eureka district office. Normally, registered civil engineers in project development prepare and approve plans at the district office. In the case of the Town Creek project, the Eureka

district Deputy Director for Maintenance and Operations, who is a registered civil engineer, signed the plans. (A detailed chronology of the development of both options can be found in Appendix D.)

III

REVIEW OF THE COSTS RELATED TO THE BRIDGE DECISION

The Legislature asked us to determine if the decision by the Director of Transportation to build a 32-foot wide bridge at Town Creek will cost the State additional funds. Based on the most recent data available, the current proposal for constructing a bridge 32 feet wide may cost the State approximately \$29,000 less than constructing a bridge 40 feet wide. Furthermore, no matter which version of the bridge is built, the six-month delay will enable the State to earn \$10,000 in interest income on unspent state funds deposited in the Surplus Money Investment Fund, and the State will save between \$31,000 and \$32,500 due to a recent decline in the construction price index. However, if the 32-foot wide bridge is constructed solely with state funds rather than with 80 percent federal funds as originally proposed, there would be an additional state investment of approximately \$345,000. By committing these state funds, the State would forgo about \$3,500 per month in interest until federal funds for all bridge replacements were exhausted for the year.

Estimated Decrease in
Costs Attributable to
Building a Narrower Bridge

Although the department estimated that constructing a 32-foot wide structure at Town Creek would save \$60,000, we found that the savings in construction costs for this narrower structure would be approximately \$29,000. In May 1981, the department estimated that the original project replacing the Grist Creek and Town Creek bridges would cost \$793,000. The Town Creek structure at 40 feet wide would cost approximately \$470,000, and the Grist Creek structure at 32 feet wide would cost approximately \$323,000.

When the director decided, in October 1981, that a project comprising two 32-foot wide structures rather than one 40-foot structure and one 32-foot wide structure was more appropriate for Town Creek and Grist Creek, the department estimated that the project would cost \$756,000. This would represent a savings of \$37,000 because the smaller structure at Town Creek would require less material. However, the design plans and engineering specifications for the 40-foot wide structure had to be reworked to accommodate a 32-foot wide structure before the project could be put out to bid. These new plans and specifications cost the department an estimated \$8,000. Thus, the net decrease in cost attributable to building a narrower structure would be \$29,000.

Estimated Decrease in
Cost Resulting From a
Decline in the Price Index

In addition to the reduction in construction costs attributable to the narrower structure at Town Creek, the State may realize other savings because the general cost of construction contracts decreased while the project was delayed. The original project consisting of a 40-foot wide structure at Town Creek and a 32-foot wide structure at Grist Creek was to be presented to the California Transportation Commission for funding in June 1981. If the project had been funded at that time, it would have gone out to bid in July or August of 1981, and the contractor's bid would have been accepted in September 1981. The current project proposing two 32-foot wide structures was not included on the January 1982 agenda of the California Transportation Commission. If the project had been on the February agenda and if it had been approved, the earliest date that the project could have been funded, advertised, and contracted is March 1982.

This six-month delay between September 1981 and March 1982 may save the State additional funds regardless of which bridge width is adopted. Over the past five years, the Price Index for Selected Highway Construction Items has increased

steadily on an annual basis.* From 1976 through 1980, the index increased from 85.9 to 154.1. The index was 187.7 by the end of the second quarter of 1981. However, by the end of the third quarter of 1981, the index had dropped 8.25 percent to 172.2. At the end of the fourth quarter of 1981, the index was 180.0. The net result of these fluctuations is that the index fell 7.7 points or 4.1 percent between June 30, 1981, and December 31, 1981. Assuming that this decrease in the general index will affect the Town Creek and Grist Creek project, the original cost of the project may have decreased by \$31,000, as shown in the following table.

TABLE 1

DEPARTMENT OF TRANSPORTATION
 ESTIMATED DECREASE IN THE COST OF THE PROJECT
 RESULTING FROM A DECLINE IN THE PRICE INDEX
JUNE 30, 1981, TO DECEMBER 31, 1981

	32-foot Wide Bridge <u>Option</u>	40-foot Wide Bridge <u>Option</u>
Estimated cost of the project, May 1981	\$756,000 ^a	\$793,000 ^a
Percentage decrease in the Price Index from June 1981 to December 1981	X <u>.041</u>	X <u>.041</u>
Estimated decrease in project costs due to decrease in the Price Index	<u>\$ 31,000</u>	<u>\$ 32,500</u>

^a These cost estimates were provided by the department in January 1982.

* The Price Index for Selected Highway Construction Items represents the bid prices of such items as portland cement concrete, aggregate base, and roadway excavation. As the bid prices for the various items change, so does the index.

Both the \$31,000 and the \$32,500 decreases in costs are only estimates. The price index may change between December 1981 and the date on which the project is contracted. In addition, the contractor's final bid price may differ from the estimated cost of the project.

Interest Income Accrued

A third element that may reduce the cost of constructing the Town Creek and Grist Creek project is the interest income that has accrued to the State during the six-month delay. The project was originally scheduled to be contracted in September 1981 at a cost of \$793,000; 80 percent of this cost was to be reimbursed by the Federal Government. If this had occurred, the State would have had to pay a total of \$158,600 to construct the two bridges. Because of the various concerns surrounding the project, the project has been delayed six months, and the \$158,600 has not been spent.

According to department officials, any money not needed for contract commitments is held in the Surplus Money Investment Fund. During 1981, the Surplus Money Investment Fund earned an average annual rate of approximately 12.2 percent on its investments. Using this assumption, the \$158,600 earned almost \$10,000 in interest income during the six-month period, and the estimated interest income may

continue to increase as the construction funds continue to be held in the Surplus Money Investment Fund. However, future interest may be lost if the State decides to build the 32-foot wide bridge solely with state funds. The loss of interest income would occur because the loss of 80 percent federal funding would mean that the State would have to pay an additional \$345,000 to build the 32-foot wide bridge. This additional investment of state funds would cause the Surplus Money Investment Fund to lose about \$3,500 in interest per month until the federal matching funds for all bridge projects are exhausted for the year.

Summary of Estimated Savings

According to the most recent data, there will be a six-month delay in construction because of concerns over the project and the director's decision to construct two 32-foot wide structures. As a result, the State may save a total of approximately \$70,000: \$29,000 because it will cost less to build a narrower bridge at Town Creek, \$31,000 because the price index has decreased, and \$10,000 because of interest income accrued in the Surplus Money Investment Fund. However, increases in construction costs may reduce or eliminate these savings. Furthermore, if the State ultimately builds the 32-foot wide bridge solely with state funds, the State could lose \$3,500 per month in interest income until the State's federal allocation of funds is exhausted.

IV

REVIEW OF THE PROFESSIONAL ENGINEERS ACT AND PROFESSIONAL INTEGRITY

We were asked to determine if Department of Transportation engineers would violate the Professional Engineers Act concerning design safety or compromise their professional integrity by building a bridge at Town Creek that is 32 feet wide. The Professional Engineers Act provides for the registration of persons who practice civil engineering, but it does not specify particular design standards. If the department's engineers were found to be negligent or incompetent in designing a 32-foot wide bridge, the State Board of Registration for Professional Engineers could reprove them, privately or publicly, or suspend or revoke their engineering certificates. We could not determine if the engineers would compromise their professional integrity by building the 32-foot wide bridge because of the subjective nature of professional integrity.

Legal Requirements of the Professional Engineers Act

The Professional Engineers Act (Section 6700 et seq. of the California Business and Professions Code) seeks to protect the public by ensuring that only qualified engineers

are licensed to practice engineering in the State. More specifically, Section 6730 of the act states as follows:

In order to safeguard life, health, property and public welfare, any person, either in a public or private capacity, except as in this chapter specifically excepted, who practices, or offers to practice, civil engineering, electrical engineering or mechanical engineering, in any of its branches in this state, shall submit evidence that he is qualified to practice, and shall be registered accordingly as a civil engineer, electrical engineer or mechanical engineer by the board.

The Professional Engineers Act defines the practice of civil engineering as including the "preparation and/or submission of designs, plans and specifications and engineering reports." Neither the act nor related regulations, however, specify particular design standards to be applied in any given situation. Rather, such engineering decisions are left to the sound discretion of engineers registered under the act. Should an engineer abuse this discretion, the act provides for disciplinary proceedings by which the State Board of Registration for Professional Engineers could reprove them, privately or publicly, or suspend or revoke an engineer's certificate if it finds an engineer guilty of "negligence or incompetency in his practice."

Compromise of Professional
Engineering Integrity

In our opinion, professional integrity is a subjective matter that rests with individuals as they carry out the duties and responsibilities of their profession. Consequently, we are unable to provide an answer to this question because of the subjective nature of professional integrity.

EXAMINATION OF SAFETY IN
RELATION TO BRIDGE WIDTH

We were specifically asked by the Legislature to address motorist safety as it relates to bridge width. However, nonmotorist safety, that is the safety of pedestrians and bicyclists, must also be considered when designing a bridge.

The department proposes that pedestrians and bicyclists use the same bridge as cars and trucks regardless of which bridge is ultimately constructed. The existing 20-foot wide bridge provides a separate 6-foot wide walkway for pedestrian and bicycle traffic. As pointed out on pages 6-7, pages 10-11, and page 16 of this report, engineers in the Eureka district office, engineers in Project Development and Construction, and officials of the Federal Highway Administration were concerned that a 32-foot wide bridge would not meet the safety needs of nonmotorized traffic. The Federal Highway Administration emphasized nonmotorist safety when it concluded that it could not agree to fund a 32-foot wide bridge partly because of the incompatible mix of autos, trucks, recreation vehicles, and nonmotorized traffic on the bridge. However, as discussed on page 13 of this report, engineers in

Planning and Programming and the Chief of the Office of Bicycle Facilities did not agree that a 40-foot wide bridge was necessary at Town Creek because they believed that a 32-foot wide bridge would meet the needs of nonmotorized traffic.

Regarding the specific issue of motorist safety, we were asked to determine whether motorist safety would be compromised if the Department of Transportation built a 32-foot wide bridge rather than a 40-foot wide bridge at Town Creek. Department design standards generally recognize that wide roadways are safer for motorists than narrow roadways. An article published by the Transportation Research Board states that a bridge is more hazardous to motorists than a roadway. In addition, statistics on Arizona's accident rates presented in the article show that accident rates for wide bridges are lower than those for narrow bridges. Table 2 shows the relationship between the width of a bridge and the rate of accidents occurring. Based on the data, fewer accidents occur on 40-foot wide bridges than on 32-foot wide bridges.

TABLE 2

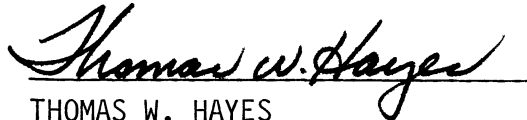
ACCIDENT RATE AS A FUNCTION OF BRIDGE WIDTH

<u>Bridge Width (In Feet)</u>	<u>Accident Rate per Million Vehicle Miles</u>
30	1.18
32	1.00
36	.83
40	.71
44	.69

Source: "Strategy for Selection of Bridges for Safety Improvement," Facility Design and Operational Effects, Transportation Research Record 757, November - December 1980.

We reviewed several other bridge width studies supplied to us by federal and state agencies. Most of these studies address a number of design and traffic characteristics that affect bridge safety. The studies indicate that a primary safety concern is the degree to which a roadway narrows as it approaches a bridge. The studies also indicate that the potential for accidents appears to be higher at bridge sites where the roadway shoulders narrow more rapidly during the approach to the bridge. Furthermore, the studies confirm that bridges are more dangerous than highways and that the narrower the bridge the greater the potential for accidents.

Respectfully submitted,



THOMAS W. HAYES
Auditor General

Date: March 29, 1982

Staff: Thomas A. Britting, Audit Manager
Walter M. Reno
John B. Schmidt

DEPARTMENT OF TRANSPORTATION

OFFICE OF DIRECTOR

1120 N STREET

SACRAMENTO, CALIFORNIA 95814

916-445-2200



March 25, 1982

Mr. Thomas Hayes
Auditor General
600 J Street, Suite 300
Sacramento, California 95814

Dear Mr. Hayes:

We offer the following over-all comments on the draft report titled "The Department of Transportation's Replacement of the Town Creek Bridge: Response to Questions Posed by the Legislature," which you have prepared under the direction of the Joint Legislative Audit Committee, chaired by Assemblyman Walter Ingalls. These comments, as well as more detailed comments which we will submit to you tomorrow, constitute our written response to the report.

1. We agree with the major conclusion contained in the report: that the Director of Transportation made a management, and not an engineering, decision in selecting a 32-foot width option for the replacement of Town Creek Bridge.
2. Unfortunately, this conclusion is buried in a document which, as a whole, is biased and non-objective both in tone and in content. Some of the more striking examples of this bias and non-objectivity are:

--The report does not mention the most salient fact regarding the Town Creek Bridge; namely, that in the 15 years for which records have been kept, there has not been a single accident reported on the existing bridge, which is 20 feet in width.

--The report does not accurately portray the character of the geographic area or of the highway on which the bridge is located. The report gives the impression the bridge is in an expanding urban area, while the fact is the bridge is in a rural area, near a settlement which is too small to be characterized as urban and which is furthermore declining in population.

NOTE: The Auditor General has responded to the agency's comments on page 57.

No mention is made of the fact that the highway on which the bridge is located is in no place over its 34-mile length more than 32 feet in width and in most places narrower than 32 feet, that traffic volumes are low, and that there are no plans to widen or otherwise change the character of the highway either in the immediate vicinity of the bridge or elsewhere.

--The report ignores the perfect record of safety on the 20-foot bridge in question in concluding that a 20-foot wide bridge is less safe than a 32-foot wide bridge, which is less safe than a 40-foot wide bridge. In reaching this conclusion, the report cites and extrapolates data from a single study in Arizona on width and safety noted secondhand and very briefly in a Transportation Research Board paper. The paper cited actually says that several factors are related to traffic safety on bridges and it does not contain a statistical analysis to determine the relative significance of width, among other factors, to safety. The conclusion of the paper (not mentioned in your report) is that, to be cost-effective, bridge safety improvements should be concentrated on bridges with (a) adverse accident experience (not the case at Town Creek) and (b) high traffic volumes (also not the case at Town Creek). Furthermore, there have been at least 35 other studies in the general area of bridge traffic safety, none mentioned in your report. These studies reach varying conclusions regarding the importance of width in contributing to accidents. One study in West Virginia, for example, concludes (based on a statistical analysis) that there is no strong relationship between width and safety.*

--There is only brief mention in the body of the report of the Department's reasons for selecting a 32-foot bridge width; conversely, prominent attention is given to the arguments made by others against a 32-foot wide bridge. Moreover, the arguments against a 32-foot wide bridge are presented as fact, although these arguments are unsubstantiated by any numerical or other real evidence as to their correctness or reasonableness.

3. We question the propriety or necessity to the subject being audited of including detailed biographical data on named individuals in the report. Moreover, the treatment of different individuals is inconsistent and biased.

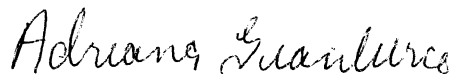
* The department reviewed a draft of our report. In this final version of the report, we have changed the text when we believed such a change was warranted. Consequently, some of the agency comments refer to text that has been changed.

Mr. Thomas Hayes
Page 3
March 25, 1982

4. We arrive at a total savings of \$83,000, not \$70,000, for the 32-foot project as compared to the 40-foot project if we include the same three cost elements as the report does but utilize the latest and final figure for savings in material and construction (which is not \$29,000 but \$42,000, according to the Final "bluesheet" Engineer's Estimate). Further on the matter of cost, we withhold comment on the curious letter we received from you on the next-to-the-last day of our five-day review period. We find it hard to understand how your review of the written document was being conducted simultaneously with ours, particularly since three weeks elapsed between the time we were informed by your staff that the report was complete and the time we finally received a written copy.

In closing, we note that the report as it is now written is not the same report as was read to several of us, in major portions, by your professional audit staff prior to and on the occasion of a formal "exit interview" on February 26, 1982. In our opinion, a major re-working of the document we have reviewed would be required to bring your report up to the "Standards for Audit of Governmental Organizations, Programs, Activities and Functions." *

Sincerely,



ADRIANA GIANTURCO
Director of Transportation

*Subsequent to the publication of this report, representatives of the Department of Transportation and the Office of the Auditor General met to discuss this issue. The department agreed that the published report fully complied with the "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions."

CALIFORNIA DEPARTMENT OF TRANSPORTATION

RESPONSE TO

"THE DEPARTMENT OF TRANSPORTATION'S REPLACEMENT OF THE TOWN
CREEK BRIDGE: RESPONSE TO QUESTIONS POSED BY THE LEGISLATURE"

AUDITOR GENERAL SUMMARY

Errors of Fact

1. The draft report summary indicates that "Among its reasons for disapproving the proposed 32-foot wide bridge, the Federal Highway Administration stated that the bridge was close to an urban area...." (underlining added). The precise language used by the Federal Highway Administration (FHWA) in its letter to Caltrans dated February 12, 1982 indicates that the Town Creek structure "is within the 'urban' complex." However, the term "urban complex" has never been used as a standard for determining bridge width. Furthermore, Covelo, with a population of 1,448 that has declined over the past 20 years, does not meet any recognized definition of an urban area.
2. The summary of the draft report indicates that of the approximately \$70,000 the State may save by constructing a 32-foot wide bridge at Town Creek, "\$29,000 can be attributed to building a narrower structure. The remaining \$41,000 results from" other factors. In fact, the actual Final Engineer's Estimate for a 32-foot wide bridge shows that approximately \$42,000 will be saved in material and construction when compared to the most recent construction cost estimate for a 40-foot wide bridge at Town Creek. Using the assumptions indicated in the draft report, it is possible that the State may save as much as an additional \$41,000, resulting from a decline in the Construction Price Index and the interest earned in the Surplus Money Investment Fund. Total savings, therefore, may be as great as \$83,000. However, the actual bid will determine the real construction savings to be realized by constructing a 32-foot wide bridge. According to our estimates, the savings will total no less than the \$42,000 indicated above.

Errors of Omission

1. The draft summary does not include the specific questions posed by the Legislature regarding the Town Creek Bridge. These questions, coupled with concise, objective answers determined by your independent auditors, would present a true and more balanced summary than that contained in the draft report.*
2. The summary fails, as does the main body of the report itself, to indicate that the safety record of the existing 20-foot wide Town Creek Bridge has been perfect -- that in fact, no accidents have been recorded at the bridge. In the interest of maintaining objectivity, this actual experience should have been considered as auditors reached the conclusion -- based on a single research report -- that "wide bridges are safer than narrow bridges," as the draft report summary indicates. (See pages 8-9 of the response for an expanded explanation.)
3. In dealing with the issue of using federal funds for the State's bridge replacement program, the summary of the draft report fails, as does the main body of the report itself, to include a conclusion reached by the auditors regarding the loss of such funds. Instead, the summary merely indicates that "Department officials believe" and that "Officials of the California Transportation Commission also believe that the State will not lose federal funds." If your auditors also reached the same conclusion after analyzing pertinent data, then the summary should so state. If there is no evidence that was provided to your auditors indicating that the State will, in fact, lose federal funds as a result of constructing a 32-foot bridge at Town Creek, then the summary should indicate so.
4. The draft report summary indicates that the "Proposal for a 32-foot wide bridge was an analysis prepared outside of the Department's normal project development process." While this statement itself is not incorrect, the summary nevertheless fails to include a required explanation that the scope of other projects has been modified -- for numerous reasons -- after a project review process has been completed. Furthermore, in some of these cases, the scope of projects has been modified as a result of reviews conducted by the Planning and Programming side of the Department.

* Text changed to reflect this comment.

5. The draft summary includes in detail the reasons given by the Federal Highway Administration for disapproving the proposed bridge, but it fails to include the Department's reasons for proposing the 32-foot wide bridge in the first place. Appendix D of the draft report is the only location which displays this crucial information in any detail. (See page 5 for an expanded explanation.)
6. The summary fails, as does the report itself, to include a conclusion concerning whether or not engineers would violate the Professional Engineers Act by implementing the decision to build a bridge at Town Creek that is 32 feet wide. If the auditors determined that an engineer would not violate the Act, then the summary should so state.

Indication of Bias

The draft report contains numerous examples of language which unnecessarily generates doubt and needlessly arouses suspicion concerning the Department's decision to construct a 32-foot wide bridge at Town Creek. One example of such language found in the summary is the section concerning the use of federal funds for the State's bridge replacement program. The summary indicates that "Officials of the California Transportation Commission also believe that the State will not lose federal funds" if the Town Creek Bridge is built solely with State funds. The summary further states, "However, their conclusion is based on data provided by the Department." This comment is not relevant, is not objective and can be construed most easily as a gratuitous editorial remark designed to impugn the adequacy, quality and/or truthfulness of the Department's data.*

AUDITOR GENERAL INTRODUCTION

Error of Fact

In the Scope and Methodology section, the introduction of the draft report indicates that a single study ("the available study on bridge traffic safety") was reviewed by auditors. In fact, more than 35 studies exist on bridge traffic safety. These studies reach various conclusions regarding the relationship of bridge width and accidents. In addition, the draft report misinterprets the conclusion of the single study reviewed. (See page 9 for more information.)**

* Text changed to reflect this comment.

** Information added to text to reflect these studies.

Error of Omission

Of the 12 bridges on Route 162, five are 20 feet wide. The draft report introduction implies that only two, the Town Creek Bridge and the Grist Creek Bridge, are 20 feet wide.

AUDITOR GENERAL STUDY RESULTS, SECTION I: REVIEW OF BRIDGE WIDTH STANDARDS

Error of Fact

Chapter 1 of the draft report indicates that "The State Highway Design Manual provides that when federal and State standards differ, and when the Department believes that the federal standards are not applicable, the State standards shall prevail" (underlining added). In fact, the Manual does not include the language underlined above. Section 7-001.3 of the Caltrans Highway Design Manual states simply that: "When standards differ, the instructions in this manual (State Design Manual) shall govern." *

In simple terms, State standards prevail when federal and State standards differ. The auditors preparing the draft report have erroneously included a completely new criterion, believing "that the federal standards are not applicable," for determining when State standards shall take precedence over federal standards.

Error of Omission

1. The draft report includes a lengthy description of FHWA's reasons for denying the Department's proposal for a 32-foot bridge. However, there is only cursory mention in the report of the Department's reasons for proposing a 32-foot bridge. It is unfortunate that the auditors' findings have not been presented objectively and do not include sufficient information to provide a proper perspective on this issue. The reasons for the Department's decision to construct a 32-foot bridge include:

* Text changed to reflect this comment.

- there have been no reported accidents at the existing bridge, which is 20 feet wide;
- the width is consistent with State standards for vehicular and nonvehicular traffic (such as pedestrians and bicycles);
- substantial savings will result;
- no proposed widening of Route 162 is foreseen and, therefore, the Department projects no need for a bridge wider than 32 feet.

It should also be mentioned, that the initial reason the Town Creek Bridge was identified for replacement was because of structural inadequacy -- not because of width or safety problems.

The attached letter to Mr. R.G.S. Young of the FHWA explains in more detail why the Department believes a 32-foot wide bridge at Town Creek is appropriate. FHWA has not yet replied to the Department's letter, which asks the Regional FHWA Office to approve an exception request for a 32-foot wide bridge at Town Creek.

AUDITOR GENERAL STUDY RESULTS: SECTION II, EXPLANATION OF BRIDGE WIDTH DECISION

Errors of Fact

1. A statement on Page 9 of the draft report indicates that the proposal to develop a 32-foot wide bridge was not coordinated with Project Development. Again on Page 14, the report states that, "...Planning and Programming staff did not consult with the engineers in Project Development and Construction...." These statements are incorrect. There was coordination between the two units up to the point where it was obvious there was a difference in professional opinion. Subsequent development of information to enable a decision by the Director was done independently by each unit.
2. The draft report indicates on Page 11 that by February 1981, the FHWA had approved both bridges for funding. This is incorrect. FHWA approved the eligibility of the project in February but actual funding approval doesn't occur until review and approval of Plans, Specifications and Estimates, which in the case of the Town Creek Bridge is currently being reviewed by FHWA's Regional Office in San Francisco, with final decision pending.

3. The statement on Page 12 indicating that proposals for projects are submitted to the CTC for evaluation is incorrect. Projects are submitted to the CTC for the purpose of securing approval for the allocation of funds.
4. The draft report indicates incorrectly that the Director started reviews for appropriateness of alternatives and cost-effectiveness in 1981. In fact, these reviews were started as early as 1979. The Deputy Director for Planning and Programming asked his staff to carry out reviews specifically of bridge projects around March 1981.
5. The statement on Page 13 that "Planning and Programming staff were uncomfortable with decisions..." is not an accurate statement of fact. The staff appropriately questioned the information submitted and determined that the current facts did not support a conclusion that a 40-foot wide bridge should be built.

Errors of Omission

1. On Page 10, the report states that, "...the Eureka District Office took into account the expanding commercial development, the needs of motorized traffic, the need to provide continuity to the adjacent roadway and the existence of graded parking areas 8 to 10 feet wide adjacent to the bridge." These comments, presented as facts, continue on Page 11 with an additional comment about the significant pedestrian and bicycle traffic. The report is misleading in this regard because it fails to explain that the information was later found to be outdated, inaccurate and/or unsubstantiated.

The 1980 average daily traffic (ADT) for autos at Town Creek Bridge is estimated at 1,640 vehicles. Recent pedestrian and bicycle counts indicate approximately 20 crossings per day. This low number of crossings results from the fact that all students living south of the Town Creek Bridge are now bussed by the Round Valley School District. This information was not included in the report.

As indicated earlier, the population of Covelo is 1,448 and declining. The character of Covelo and the entire Round Valley is rural.

2. Page 14 of your report discusses the Director's decision but omits the list of reasons upon which the decision was based. These reasons have been stated on Page 5.

Indication of Bias

In discussing the events that took place following the Director's decision, the draft report indicates that the District and Headquarters' Design staffs refused to sign the project report and plans. The reason cited is that they felt it would be unsafe. Your report fails to state that the engineers who did sign felt equally as strong that a 32-foot wide bridge will be a safe bridge.

AUDITOR GENERAL STUDY RESULTS: SECTION III, REVIEW OF THE COSTS TO THE BRIDGE DECISION

Error of Fact

This chapter of the draft report indicates that "Based on the most recent data available, the current proposal for constructing a bridge 32 feet wide may cost the State approximately \$70,000 less than constructing a bridge 40 feet wide." The draft report attributes \$29,000 in savings to building a 32-foot wide bridge as compared to a 40-foot wide bridge, and \$41,000 to a decline in the Construction Price Index and to interest earned on unspent State funds.

In fact, the State may save as much as \$83,000 by constructing a 32-foot wide bridge. The most recent available data which compares the cost of constructing a 32-foot wide bridge with the cost of constructing a 40-foot wide bridge at Town Creek indicates that, strictly in terms of material and construction, a 32-foot wide bridge will save the State approximately \$42,000. Adding the extra \$41,000 attributable to a decline in the Construction Price Index and to interest (using the same assumption and data given in the draft report), totals \$83,000.

The auditors who investigated this issue compared a May 1981 estimate of the cost of constructing two bridges, a 40-foot wide bridge at Town Creek and a 32-foot wide bridge at Grist Creek, with a January 1982 estimate for constructing a 32-foot wide bridge at both Town Creek and Grist Creek. However, a more accurate estimate which is based on the best data available to the auditors, compares the December 19, 1981 estimate for a 40-foot wide bridge at Town Creek with the Final Engineer's Estimate, dated January 11, 1982, for the 32-foot wide bridge at Town Creek:

40-foot estimate (12/19/81)	\$ 401,000
32-foot estimate (1/11/82)	351,000
	<hr/>
Difference	\$ 50,000
Redesign Cost	8,000
	<hr/>
Net Construction Saving	\$ 42,000

The draft report correctly indicates that "the Town Creek design plans and engineering specifications for the 40-foot wide structure had to be reworked to accommodate a 32-foot wide structure before the project could be put out to bid." This process cost the Department approximately \$8,000.

Using the same highway Construction Price Index figures and Surplus Money Investment Fund (SMIF) data indicated in the draft report, it is possible to project an additional savings to the State of approximately \$41,000.

Thus, the total savings to the State may be as much as \$83,000. Continued decreases in construction costs may result in even greater savings to the State.

Indication of Bias

The last sentence of the draft report's third chapter, "However, increases in construction costs may reduce or eliminate these savings," is another editorial example indicative of a lack of impartial judgement. The comment is not neutral; it does not point out that further decreases in costs may increase savings to the State.

AUDITOR GENERAL STUDY RESULTS, SECTION IV: REVIEW OF THE PROFESSIONAL ENGINEERS ACT AND PROFESSIONAL INTEGRITY

Errors of Omission and Bias

The authors of the draft report do not clearly answer the question posed by the Legislature regarding whether or not engineers who participated in the design of a 32-foot wide bridge at Town Creek would violate the Professional Engineers Act. If the auditors concluded that an engineer would not violate the Act, then the report should state so.

The draft report correctly indicates that "If the Department's engineers were found to be negligent or incompetent in designing a 32-foot wide bridge, the State Board of Registration for Professional Engineers could revoke their engineering certificates." However, in yet another example of bias by omission, the report fails to indicate that the Board could just as properly revoke engineering certificates of engineers found to be negligent or incompetent in designing a 40-foot bridge.

AUDITOR GENERAL STUDY RESULTS, SECTION V: EXAMINATION OF SAFETY IN RELATION TO BRIDGE WIDTH

Errors of Omission and Interpretation

1. In treating the issue of safety and the Town Creek Bridge, the draft report relies upon a solitary study to conclude that "Fewer accidents occur on 40-foot wide bridges than on 32-foot wide bridges." While this conclusion may or may not be accurate in the abstract, it does not address the specific -- the actual record of safety on the existing 20-foot wide Town Creek Bridge. Simply stated, there have been no recorded accidents at the existing Town Creek Bridge, and there is no specific evidence in this case to suggest that a 20-foot wide or the proposed 32-foot wide bridge will be unsafe. It is unfortunate that the authors ignored this very important, basic fact when drafting the report.

2. The draft report fails to mention that the reason the Town Creek Bridge was initially identified as a candidate for replacement was not because of its width or accident record. It was structural factors which made the bridge eligible for replacement.
3. In regard to safety, it is significant that the single Transportation Research Board (TRB) study cited in the draft report clearly indicates that a uniform design standard for bridge widths is not the most effective strategy for improving bridge traffic safety. On the contrary, the study concludes that a "uniform risk approach is the only strategy that is both effective and affordable."
4. Additionally, as the chart included in the draft report indicates, the TRB document does show that an Arizona study found an inverse relationship between the number of accidents and the width of bridges. However, the study also points out two other major contributors to bridge-related accidents: (1) narrow bridges on roadways which have been widened and, (2) obsolete bridge and approach guardrails. The Arizona finding does not indicate the relative importance of these factors in causing accidents.

In the case of Town Creek Bridge, the existing bridge is 20 feet wide, the approaching pavement is 22 feet wide, and the approach guardrails provide a good transition to the bridge. The 32-foot wide bridge will be 10 feet wider than the existing pavement and will have up-to-date guardrails.

5. The authors of the draft report apparently interpolated the specific numbers included as Table 2 in the draft report from a graph cited in the TRB study relating to bridge widths, but specific accident rates are not indicated for specific bridge widths. If a chart is included in your final report, the report should indicate that your auditors took the liberty of interpolating data from the actual study to produce the chart.
6. At least 35 other studies related to highway safety and bridges or roadway width could have been reviewed by the auditors. Some of these studies cite variables other than bridge width as factors affecting accident rates. Typically included are factors such as traffic volume, volume of cross traffic, period of construction, degree of roadway curvature, bridge and approach guardrails, width of approach pavement, and vehicle speed.*

At least one study readily available in the Caltrans Library, the "Bridge Shoulder Width Study" completed in 1976 for the West Virginia Department of Transportation, indicates that no strong relationship exists between bridge shoulder width

* Information added to text to reflect these studies.

and accidents. This study is substantially more comprehensive in scope than the TRB study cited in your draft report.

Given that the body of analytical evidence available to the auditors does not present a single, uniform judgement concerning bridge width and safety, it is not appropriate to determine -- based on insufficient evidence -- that a 32-foot wide bridge at Town Creek is less safe than a 40-foot wide bridge.

APPENDIX E

It is unclear precisely what relevance the biographical information on various individuals has to the specific questions the Auditor General was asked to investigate. Furthermore, the personal descriptions are biased as they relate to formal education, licensing, and sex of the individual involved. For example, one individual who has an engineering license but apparently no college degree is gratuitously described under the "Formal Education Background" heading as "self-taught." Individuals without licenses, on the other hand, receive a flat "none" description under the "Engineering License" heading. The sketches of some of the males covered include "military service" as an explanation for how the individual was occupied during a certain period. For one of the female individuals, a period of child rearing, on the other hand, is characterized simply as "no employment."*

NOTE: ATTACHED IS A COPY OF THE LETTER, DATED DECEMBER 8, 1981, SENT TO THE CHAIRMEN OF THE ASSEMBLY AND SENATE TRANSPORTATION COMMITTEES. THE LETTER INCLUDES ADDITIONAL INFORMATION ABOUT THE TOWN CREEK PROJECT.

ALSO ATTACHED ARE PERTINENT PHOTO COPIES FROM THE BOOKLET ENTITLED "STANDARDS FOR AUDIT OF GOVERNMENTAL ORGANIZATIONS, PROGRAMS, ACTIVITIES, AND FUNCTIONS."

* Text changed to reflect this comment.

DEPARTMENT OF TRANSPORTATION

OFFICE OF DIRECTOR

1120 N STREET

SACRAMENTO, CALIFORNIA 95814

(916) 445-8090



March 10, 1982

Mr. R. G. S. Young
Regional Administration
Region Nine
Federal Highway Administration
Two Embarcadero Center, Suite 530
San Francisco, CA 94111

Dear Mr. Young:

01-Men-162-28.7 Town Creek Bridge
#10-94 01201-194461

I have received the attached letter from the California Division of the Federal Highway Administration (FHWA) denying a January 20, 1982 Caltrans request for exemption to AASHTO width standards for replacing an existing bridge. The bridge is on State Route 162 near Covelo in Mendocino County.

I have subsequently discussed this issue with the Division Administrator, Mr. Bruce Cannon, and requested he reconsider the Division's decision. Mr. Cannon appears firm in denying the exception request. Therefore, I am requesting that your office consider this issue and approve the exception request.

Proposal

Caltrans is proposing to replace an existing 20-foot wide by 123-foot long bridge with a 32-foot wide bridge of the same length. The new bridge will consist of two 12-foot lanes with two 4-foot shoulders. The design of the structure is such that it can be easily widened should that ever become necessary.

The FHWA Division Office is insisting on a 40-foot wide replacement bridge.

The estimated net savings in cost between the 32-foot wide bridge and a 40-foot wide bridge is \$50,000. This represents a 12½ percent saving of the total cost of the project.

Mr. R. G. S. Young
Page 2
March 10, 1982

Background

Route 162 is a winding 34-mile stretch of two-lane highway which begins at Route 101 and ends just north of the community of Covelo. The width of the roadway varies from 20 feet to 28 feet, averaging 24 feet. There are 12 existing bridges on the route ranging in width from 20 feet to 30 feet, with seven of the bridges less than 24 feet wide.

We are proposing to replace three of the existing narrow bridges with 23-foot wide bridges. To date, FHWA has approved the 32-foot width on one of the proposed replacements. We have no plans to widen or otherwise change the character of Route 162.

The existing Town Creek Bridge, constructed in 1923, is 20 feet wide. There is a 6-foot wide wooden pedestrian walkway, constructed in December 1978, on one side of the bridge. The walkway was installed as a part of an agreement with the community of Covelo which eliminated diagonal parking on Route 162, and was not the result of a pedestrian/bicycle study. The pavement approaching the bridge on either side is 22 feet wide, consisting of two paved 11-foot lanes. The posted speed limit at the bridge is 25 mph.

The 1980 average daily traffic (ADT) at Town Creek Bridge is estimated at 1,640 vehicles. During the past 15 years there have been no reported accidents on the bridge. From 1978 to 1980, there were two non-injury accidents on the highway near the bridge, neither of which was related to bridge width.

Recent pedestrian and bicycle counts indicate approximately 20 crossings per day. This low number of crossings results from the fact that all students living south of the Town Creek Bridge are now bussed by the Round Valley School District. This bussing program has been carried out for a number of years and is not related in any way to the Town Creek or Grist Creek bridges.

FHWA Division Comments and Caltrans' Response

In rejecting our request for an exception to the 40-foot AASHTO standard for the Town Creek Bridge, the FHWA Division Office gave six reasons. We do not believe any of these reasons are valid, and we will comment on each of them below.

The structure is within the "urban complex."

We are unclear as to the meaning of this term "urban complex." Covelo does not meet any recognized definitions of urban areas. The character of Covelo and the entire Round Valley is rural.

Mr. R. G. S. Young
Page 3
March 10, 1982

According to the census, the population of the unincorporated community of Covelo is declining. The 1960 population was 1,540. The 1980 population is 1,448. The 1980 population of the entire Covelo-Round Valley area is 2,143.

While the approaches are currently paved 22 feet in width, the cross section already exists such that further widening could be accomplished with relative ease.

The State has no plans to widen the road. There is no need for widening.

The proposed bridge could be widened easily if the need ever develops.

A new structure can be expected to serve for a minimum of 40 to 50 years.

This is true. A two-lane road and a 32-foot wide bridge are expected to be fully adequate for that time frame.

The truck traffic on this roadway has been estimated at 10 percent of the ADT with a preponderance of logging vehicles.

Much of the truck traffic is generated by the Louisiana Pacific Lumber Mill in Round Valley. Based on the truck traffic generated by the Mill, it's likely the percentage of trucks, especially logging trucks, is considerably lower than previously estimated, perhaps as much as 50 percent lower. In any event, 5-10 percent truck traffic is nothing unusual on routes in this part of the State, and many of the routes have bridges under 40 feet approved by FHWA.

From count data we find the traffic to have a high seasonal factor.

The estimated 1980 ADT at the bridge is 1,640. The estimated peak month ADT is 2,700. Both of these figures are well below the 5,000 ADT figure used in California as one of the criteria requiring a 40-foot wide bridge.

Due to the proximity of the bridge to stores and other business establishments we understand pedestrian, bicycle, and equestrian crossings are prevalent.

The meaning of this statement is unclear. There are some pedestrian and bicycle crossings on the bridge. However, recent Caltrans counts indicate only about 20 crossings per day as result of the

Mr. R. G. S. Young
March 10, 1982
Page 4

bussing program by the school district. This number of crossings can't be characterized as "prevalent" (or "frequent", which we assume is what's meant here). In any event, 4-foot wide shoulders should be entirely adequate to handle this light non-motorized traffic.

Summary

The proposed 32-foot wide bridge is adequate for the location and consistent with State standards. I might point out that our proposal, which will result in a 12½ percent cost savings compared to a 40-foot wide bridge, is also consistent with the President's direction to cut waste in government. As you know, the U.S. House Public Works and Transportation Committee, chaired by the Vice President, is currently looking at ways to reduce costs for highway projects. Considering the superficial analysis and comments by your Division Office, I don't believe FHWA should deny approval of this project. There is no reason to spend additional public funds for a wider bridge.

As far as safety is concerned, our proposal for a 32-foot wide bridge is entirely appropriate. Since there have been no accidents on the 20-foot wide bridge for fifteen years, there is no reason to conclude that a 32-foot wide bridge is less safe. If FHWA believes wider bridges lead to less safe conditions, then perhaps we should replace the existing structure with one of a similar width. However, that obviously is not a realistic proposal; the 32-foot wide bridge is.

In closing, I would like to point out that this case is not an isolated instance of excessive federal design standards being imposed on California. I am sending you, under separate cover, a copy of a letter I am sending to Drew Lewis describing the more general situation, including but not limited to the Town Creek case.

At this time, I look forward to your speedy consideration of our request for approval of a 32-foot width for the Town Creek Bridge.

Sincerely,

Adriana Gianturco

ADRIANA GIANTURCO
Director of Transportation

Attachment

DEPARTMENT OF TRANSPORTATION

OFFICE OF DIRECTOR

1120 N STREET

SACRAMENTO, CALIFORNIA 95814

(916) 445-2201



December 8, 1981

Hon. Bruce Young, Chairman
Assembly Transportation Committee

Hon. John F. Foran, Chairman
Senate Transportation Committee

Dear Assemblyman Young and Senator Foran:

There has been some interest expressed lately in a project to replace and widen the existing Town Creek Bridge on State Route 162 near the Town of Covelo in Mendocino County. Unfortunately, reported statements regarding the project have contained serious misrepresentations of fact and false allegations about engineering standards and public safety. I would like to present in this letter the basic facts surrounding the Town Creek Bridge replacement and widening project, which I believe will allay the concerns that have been raised.

Caltrans' plans to replace and widen the Town Creek Bridge are in conformance with Department engineering and safety-related standards. The issue is not one of violating standards. The issue is gold-plating projects -- spending taxpayers money to build projects that are bigger, more elaborate, and more costly than required to meet safety and engineering standards designed to protect motorists' safety.

Bridge Description

The existing Town Creek Bridge is located on State Route 162, 28 miles northeast of Highway 101 near the Town of Covelo, population 1,500, in Mendocino County. The posted speed limit at the bridge is 25 MPH. Route 162 comes to an end approximately 5.5 miles north of the Town Creek Bridge, where it becomes an unpaved U.S. Forest Service access road, varying from one to two lanes in width.

The existing bridge, constructed in 1923, carries the highway over a small creek which flows part of the year. The bridge is 20 feet wide. There is a six-foot-wide wooden pedestrian walkway on one side of the bridge. The roadway approaching the bridge from either side has a paved width of 22 feet, consisting of two 11-foot lanes. There is an unpaved, graveled shoulder about eight feet wide on each side of the roadway.

There have been no traffic counts taken at the bridge. Traffic counts taken two miles south of the bridge on Route 162 indicate the average daily traffic (ADT), or the number of vehicles using the roadway at this point is 700. Traffic counts taken .5 mile north of the bridge indicate the ADT is 1,350. One can assume that the ADT at the bridge is somewhere between these two traffic counts. There is also some pedestrian and bicycle traffic on the bridge, estimated at 70 to 100 crossings per day.

During the past 15 years, there have been no accidents on the bridge. In the past three years (1978-1980), there have been two non-injury accidents on Route 162 near the bridge, neither of which was related to the width of the bridge.

The bridge replacement and widening project is intended to provide a new bridge with a width of 32 feet, which is 12 feet wider than the current structure. There are no plans to widen Route 162 itself, now or in the foreseeable future.

A diagram is attached which shows the existing and planned structures.

Purpose of Project

The Town Creek Bridge is being replaced to correct structural deficiencies, which were discovered during a regularly scheduled inspection. It was structural factors, not inadequate geometrics, e.g., width, or safety problems that resulted in the decision to replace the bridge.

Engineering and Safety Standards

There are two sets of engineering and safety standards relevant to this and other Caltrans highway projects: State standards and federal standards.

A. State Standards

State engineering and safety standards for highway projects are contained in the California Department of Transportation Highway Design Manual. The portion of that Design Manual dealing with bridge width is Section 7-211.1. Paragraph (1) of that section provides:

"State Highways - The clear width (the space between bridge rails) of all bridges, including grade separation structures, shall equal the full width of the traveled way and paved shoulders on the approaches..."

Application of this standard to Town Creek Bridge would result in a 22-foot bridge. However, paragraph (1) (d) of the same section of the Design Manual provides that:

"Bridges to be constructed as replacements on existing two-lane, two-way roads shall not be less than 32 feet wide..."

Application of this standard to Town Creek Bridge requires that a 32-foot bridge be constructed.

With regard to provisions for bicycle and pedestrian traffic, Section 7-307.2 of the Design Manual states that:

"...a shoulder width of at least four feet is warranted on practically any highway in or near a populated place..."

A 32-foot bridge at Town Creek provides for two 12-foot lanes and two 4-foot shoulders. The planned 32-foot bridge, therefore, meets the standard for bicycle and pedestrian traffic.

B. Federal Standards

The federal standards on bridge widths, developed by the American Association of State Highway and Transportation Officials (AASHTO) in 1969 and adopted by the Federal Highway Administration, differ from State standards in that they include consideration of traveled way and the entire shoulder, whether or not it is paved. Federal standards would require a minimum bridge width of 36 to 40 feet at Town Creek. However, Caltrans' Highway Design Manual, Section 7-001.3 states that:

"AASHTO policies represent nationwide standards which do not always satisfy California conditions. When standards differ, the instructions in this manual (State Design Manual) shall govern."

The Federal Highway Administration recognizes that their own bridge width standards are not always appropriate and provide that states may request exceptions to federal standards. For example, Caltrans requested and received such an exception for replacement of the Grist Creek Bridge, which is 0.4 mile south of the Town Creek Bridge, also on State Route 162. The speed limit at this bridge is 55 miles per hour. The bridge will be constructed using federal funds at a width of 32 feet, in accordance with State design standards.

There are many other bridges in California which have been designed for construction at a width of 32 feet or less.

Finally, you should be aware that there is great concern at the national level and among State transportation officials across the nation over excessive federal highway design standards. In response to these concerns, the U.S. House Public Works and Transportation Committee is currently holding hearings on the need to modify federal standards that result in projects being over-designed at the public's expense.

To conclude, I believe we should not spend taxpayers money to build facilities that are wider, bigger, more elaborate than our own standards require, unless there is some clear-cut justification in doing so. The cost of constructing Town Creek Bridge at 32 feet is \$70,000 less than the cost of constructing a 40-foot bridge at this location. If you apply this cost saving to the other 20 bridge replacement projects planned for construction at 32 feet instead of 40 feet, the estimated savings are \$1.5 million.

Within Caltrans, engineering staff were not unanimous as to the appropriate width of the Town Creek Bridge, opinions having varied from reinforcing the existing bridge at its current width (20 feet), to replacement at 32 feet, to replacement at 40 feet. To date, there has been no documented justification provided to me for exceeding State design standards as they relate to this project.

I will reiterate the project planned at Town Creek Bridge will provide a facility that is 12 feet wider than the existing structure and 10 feet wider than the approach road on either side. I assure you that the safety of the motoring public was a key factor in determining the appropriate project at Town Creek Bridge.

Page 5
December 8, 1981

If I can provide you with additional information on this matter,
please do not hesitate to let me know.

Sincerely,

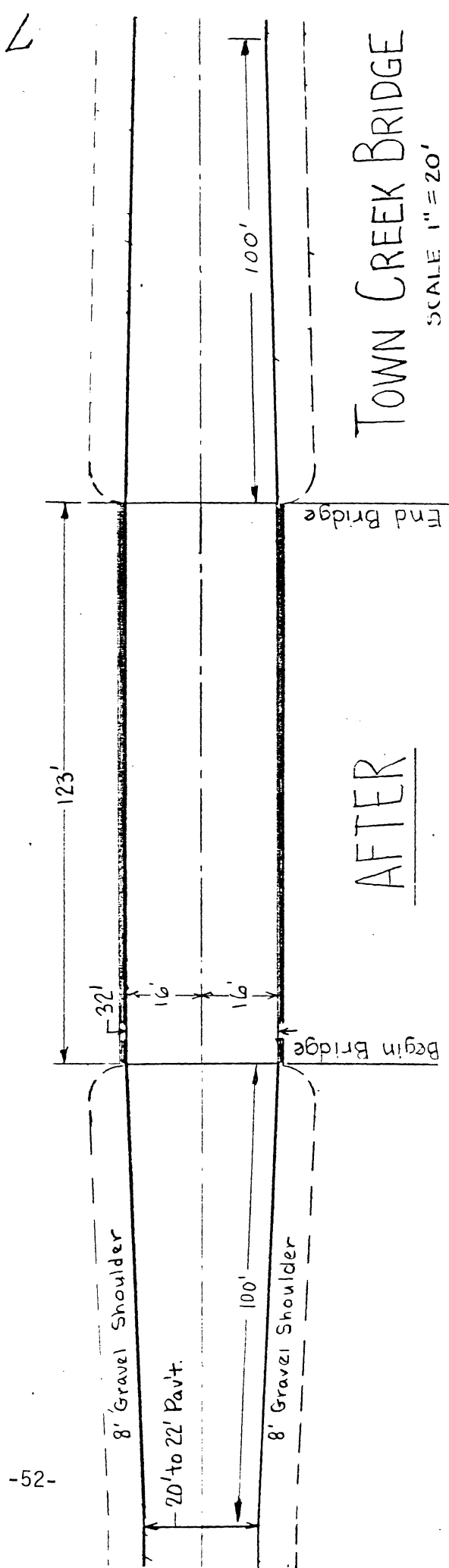
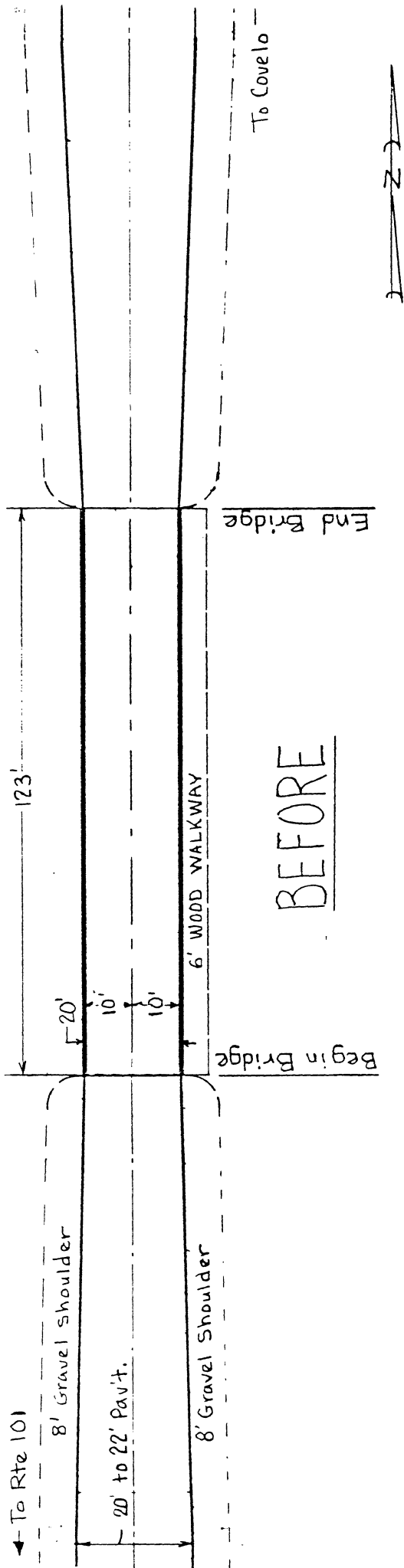
Adriana Gianturco

ADRIANA GIANTURCO
Director of Transportation

cc: Hon. David Roberti
President Pro-Tem
California State Senate

Hon. Willie Brown
Speaker of the Assembly

Attachment



Standards For Audit Of Governmental Organizations, Programs, Activities, And Functions

BY THE
COMPTROLLER
GENERAL
OF THE
UNITED STATES



1981 Revision

forth. Where such weaknesses are found, the auditor's work should stimulate corrective modifications and improve the applications. Also, the auditor must be mindful, when conducting tests, that there are no guarantees that the application systems will continue to operate in accordance with the latest approved specifications. Therefore, adequacy of controls over program changes, program documentation, and operating procedures is most important.

Although auditing for fraud is not the primary objective of audits, the auditor must be alert to the possibility of fraud or other irregularities in computer systems (see discussion of fraud, abuse, and illegal acts in standard G).

F. Evidence

The sixth examination and evaluation standard for government economy and efficiency audits and program results audits is:

- **Sufficient, competent, and relevant evidence is to be obtained to afford a reasonable basis for the auditors' judgments and conclusions regarding the organization, program, activity, or function under audit.**

47 A written record of the auditors' work shall be retained in the form of working papers.

Evidence may be categorized as (1) physical, (2) testimonial, (3) documentary, and (4) analytical.

Physical Evidence

Physical evidence is obtained by direct inspection or observation of (1) activities of people, (2) property, or (3) events. It may be in the form of memorandums summarizing the matters inspected or observed, photographs, charts, maps, or actual samples.

Testimonial Evidence

Testimonial evidence is obtained from others through statements received in response to inquiries or through interviews. The statements critical to the audit should be corroborated when possible by checks of the records and physical tests.

Documentary Evidence

Documentary evidence consists of letters, contracts, accounting records, invoices, and so forth.

Analytical Evidence

Analytical evidence includes computations, comparisons, reasoning, and separation of information into components.

Regardless of the type, the evidence should meet the basic tests of sufficiency, competence, and relevance. The working papers should reflect the details of the evidence and disclose how it was obtained.

Sufficiency

Sufficiency is the presence of enough factual, adequate, and convincing evidence to lead a prudent person to the same conclusion as the auditors. Determining the sufficiency of evidence requires judgment. When appropriate, statistical methods may be used to establish sufficiency.

Elaborate support of insignificant points is not needed. For significant matters, however, sufficient evidence is needed to back up the conclusion.

Competence

To be competent, evidence should be reliable and the best obtainable through the use of reasonable audit methods. In evaluating the competence of evidence, the auditors should carefully consider whether there is any reason to doubt its validity or completeness. If there is, the auditors should obtain additional evidence.

The following presumptions are useful in judging the competence of evidence; however, these presumptions are not to be considered sufficient in themselves to determine competence:

1. Evidence obtained from an independent source is more reliable than that secured from the audited organization.
2. Evidence developed under a good system of internal control is more reliable than that obtained where such control is weak or unsatisfactory.
3. Evidence obtained through physical examination, observation, computation, and inspection is more reliable than evidence obtained indirectly.
4. Original documents are more reliable than copies.

example, "indications of illegal acts"—however, see third paragraph on page 52) and the requirement that makes the omission necessary. The auditors should obtain assurance that a valid requirement for the omission exists. If a separate report was issued on omitted information, it should be indicated in the report.

E. Report Presentation

All reports shall:

1. Present factual data accurately and fairly. Include only information, findings, and conclusions that are adequately supported by sufficient evidence in the auditors' working papers to demonstrate or prove the bases for the matters reported and their correctness and reasonableness.¹
2. Present findings and conclusions in a convincing manner.
3. Be objective.
4. Be written in language as clear and simple as the subject matter permits.
5. Be concise but, at the same time, clear enough to be understood by users.
6. Present factual data completely to fully inform the users.
7. Place primary emphasis on improvement rather than on criticism of the past; critical comments should be presented in a balanced perspective considering any unusual difficulties or circumstances faced by the operating officials concerned.

Accuracy and Adequacy of Support

The need for accuracy is based on the need to be fair and impartial in reporting and to assure readers that what is reported is reliable. One inaccuracy in a report can cast doubt on the validity of an entire report and can divert attention from the substance of the report.

Conclusions should be clearly identified and all facts, findings, and conclusions should be supported by sufficient objective evidence. Except as necessary to make

¹ Well-developed findings have the following common attributes that provide the framework for an expanded scope audit report: (1) statement of condition (what is), (2) criteria (what should be), (3) effect (difference between what is and what should be), and (4) cause (why it happened).

convincing presentations, detailed supporting data need not be included. In most cases, a single example of a deficiency is not sufficient to support a broad conclusion or a related recommendation. All that it supports is that there was a deviation, an error, or a weakness.

Convincingness

Findings must be presented in a convincing manner and conclusions and recommendations must follow logically from the facts presented. The information in reports must be sufficient to persuade the readers of the importance of the findings, the reasonableness of the conclusions, and the desirability of their accepting the recommendations. Reports designed in this manner can do much to focus the attention of responsible officials on the matters in reports which warrant attention and to stimulate corrective actions.

Objectivity

Findings should be presented objectively and should include sufficient information on the subject to give readers a proper perspective. The audit report should be fair and not misleading and should place primary emphasis on matters needing attention. The auditor should guard against the tendency to exaggerate or emphasize deficient performance noted.

The information needed to provide proper report balance and perspective should include:

1. Why the audit was made.
2. The size and nature of the activities or programs audited.
3. Correct and fair descriptions of findings. To avoid misinterpretations, the sample of items tested and the methods of selecting the items should be given.

Clarity and Simplicity

Reports must be as clear and simple as is practicable. The auditor should not assume that readers have detailed technical knowledge of the subject. If technical terms and unfamiliar abbreviations must be used, they should be clearly defined. Flowery expressions and stilted language must be avoided.

Proper organization of material and precision in stating facts, analyzing the

and drawing conclusions are essential to clarity. Visual aids (such as pictures, charts, graphs, maps) should be used when possible.

Conciseness

The reports should be no longer than necessary. Too much detail detracts from a report, may even conceal the real message, and may confuse or discourage readers.

Although there is room for considerable judgment in determining the content of reports, those that are complete, but still concise, are likely to receive attention.

Completeness

Although reports should be concise, they should also be complete. Reports should contain sufficient information about findings, conclusions, and recommendations to promote adequate understanding of the matters reported and to provide convincing, but fair, presentations in proper perspective. Sufficient background information should also be included.

Readers should not be expected to possess all the facts that the auditor has, and therefore reports should not be written on the basis that the bare recital of facts makes the conclusions inescapable. Conclusions should be specified, rather than left to be inferred by readers.

Constructiveness of Tone

The tone of reports should encourage favorable reaction to findings and recommendations. Titles, captions, and the text of reports should be stated constructively. Although findings should be presented in clear, forthright terms, the auditors should keep in mind that their objective is to obtain favorable reaction and that this can best be done by avoiding language that unnecessarily generates defensiveness and opposition. Although criticism of past performance is often necessary, the report should emphasize needed improvements rather than criticism.

AUDITOR GENERAL'S COMMENTS ON
THE DEPARTMENT OF TRANSPORTATION'S RESPONSE

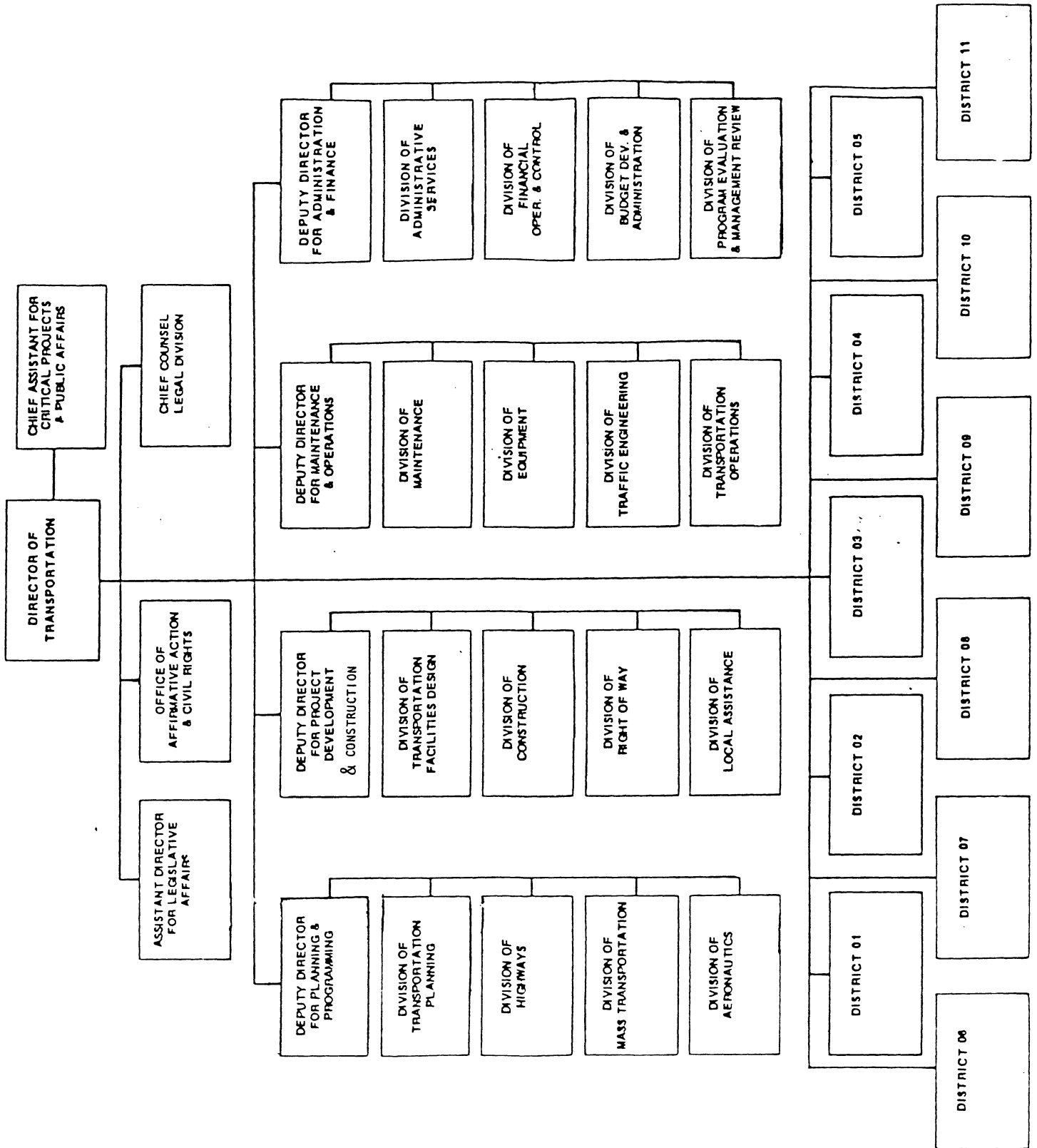
Normally, we do not comment on agency responses to our audit reports. However, we are commenting in this instance to provide clarity and perspective in view of the Department of Transportation's exceptions to our report. The department makes continuous reference throughout its response to bias, errors of omission, and errors of fact. Our report is thoroughly researched, fully documented, and totally objective. Furthermore, the department's assertion that the report does not meet the auditing standards contained in "Standards for Audit of Governmental Organizations, Program, Activities, and Functions" is incorrect. This audit was conducted independently under the direction of the Auditor General and meets all applicable auditing standards established by the Comptroller General of the United States.

We find it necessary to address specifically three fundamental issues raised by the department. First, the department indicates that the State will save \$42,000 in material and construction costs by building a 32-foot wide bridge instead of a 40-foot wide bridge at Town Creek. Based on data supplied to us by the department in January 1982, we calculated the material and construction cost savings to be \$29,000. Furthermore, the data provided to us were the same data that were available to the Director of Transportation in October 1981 when she made her decision to build the 32-foot wide bridge.

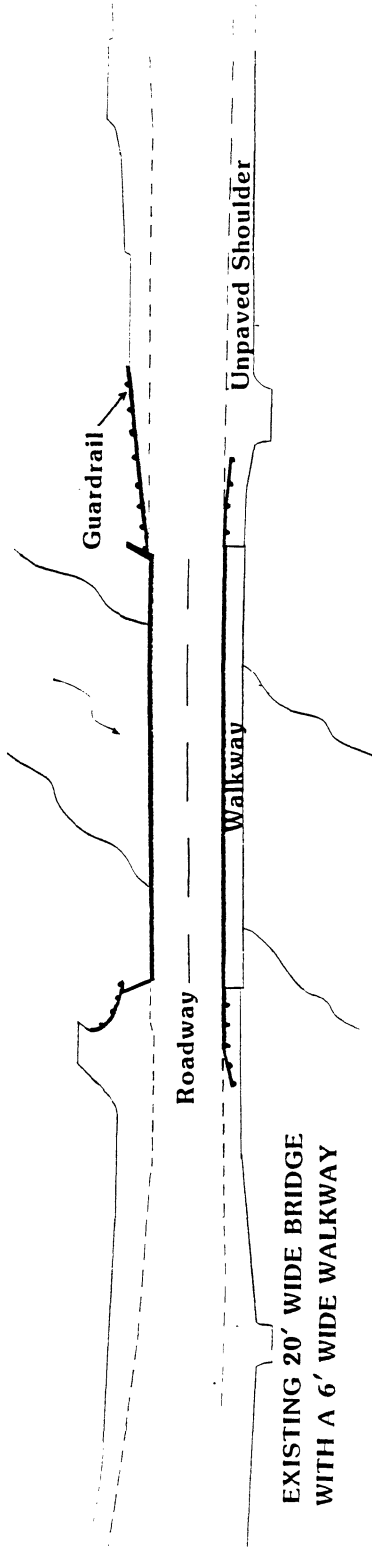
Second, the department criticizes the report for making only cursory mention of the reasons for deciding to build the 32-foot wide bridge. On pages 13, 14, D-4, and D-5, our report fully discusses the department's reasons for building the 32-foot wide bridge.

And finally, the department takes issue with our report for not mentioning that there have been no reported accidents on the existing 20-foot wide bridge during the past 15 years. However, once the 20-foot wide bridge is replaced by a larger structure, statistics pertaining to the accident history of the 20-foot wide bridge will no longer be relevant.

ORGANIZATION CHART OF THE
DEPARTMENT OF TRANSPORTATION



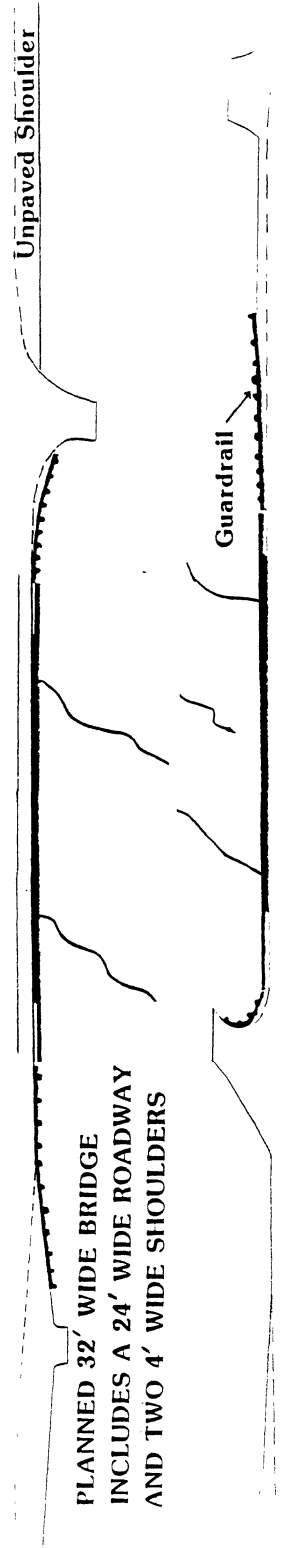
BRIDGE DIAGRAMS



EXISTING 20' WIDE BRIDGE
WITH A 6' WIDE WALKWAY



PLANNED 32' WIDE BRIDGE
INCLUDES A 24' WIDE ROADWAY
AND TWO 4' WIDE SHOULDERS



PLANNED 40' WIDE BRIDGE
INCLUDES A 24' WIDE ROADWAY
AND TWO 8' WIDE SHOULDERS

EXPANDED DISCUSSION OF FEDERAL FUNDS
FOR BRIDGE REPLACEMENT AND REPAIR

According to Department of Transportation officials, the State will not lose any federal funds for bridge replacement and repair even though the department may build the Town Creek Bridge solely with state funds. The department's position is based on estimates that there will be enough state funds to match federal funds and that the State will develop a sufficient number of other projects that will be eligible for federal funds for bridge replacement and repair.

Projected State Funds
Will Be Adequate

The Federal Highway Administration's Bridge Replacement and Rehabilitation Program has received federal subsidies since 1972. Federal money from the Special Bridge Replacement Fund is allocated annually to the 50 states, the District of Columbia, and Puerto Rico based upon a formula developed by the Federal Highway Administration. The states can only use the allocations for four years: the year of allocation and the three succeeding federal fiscal years. California's share of these funds is allocated to both the State Government and the local agencies. The Department of Transportation administers the State's portion of the allocation.

In the proposed 1982 State Transportation Improvement Program, the department estimates that it will receive \$57.1 million in federal allocations over the next five federal fiscal years. An additional \$12.1 million in federal allocations from previous years is also available to the department. Thus, the department estimates that it will be eligible for \$69.2 million in total federal allocations between fiscal years 1982-83 and 1986-87.

Although the Federal Government will reimburse the State for as much as 80 percent of the costs of a project, department officials state that each project usually has some expenditures that the Federal Government will not reimburse. As a result, department officials assume that the State will ultimately have to pay approximately 23 percent of the construction costs of any given project.

In the proposed 1982 State Transportation Improvement Program, the department estimates that it will have \$24.8 million in state funds available during the next five fiscal years. This total is based upon recent projections for

contract reversions and funds from the State Highway Account. Therefore, if the federal allocations are forthcoming as estimated and the state funds are received as projected, the department will need only \$15.9 million of the estimated \$24.8 million in state funds to match the available \$69.2 million in federal funds.

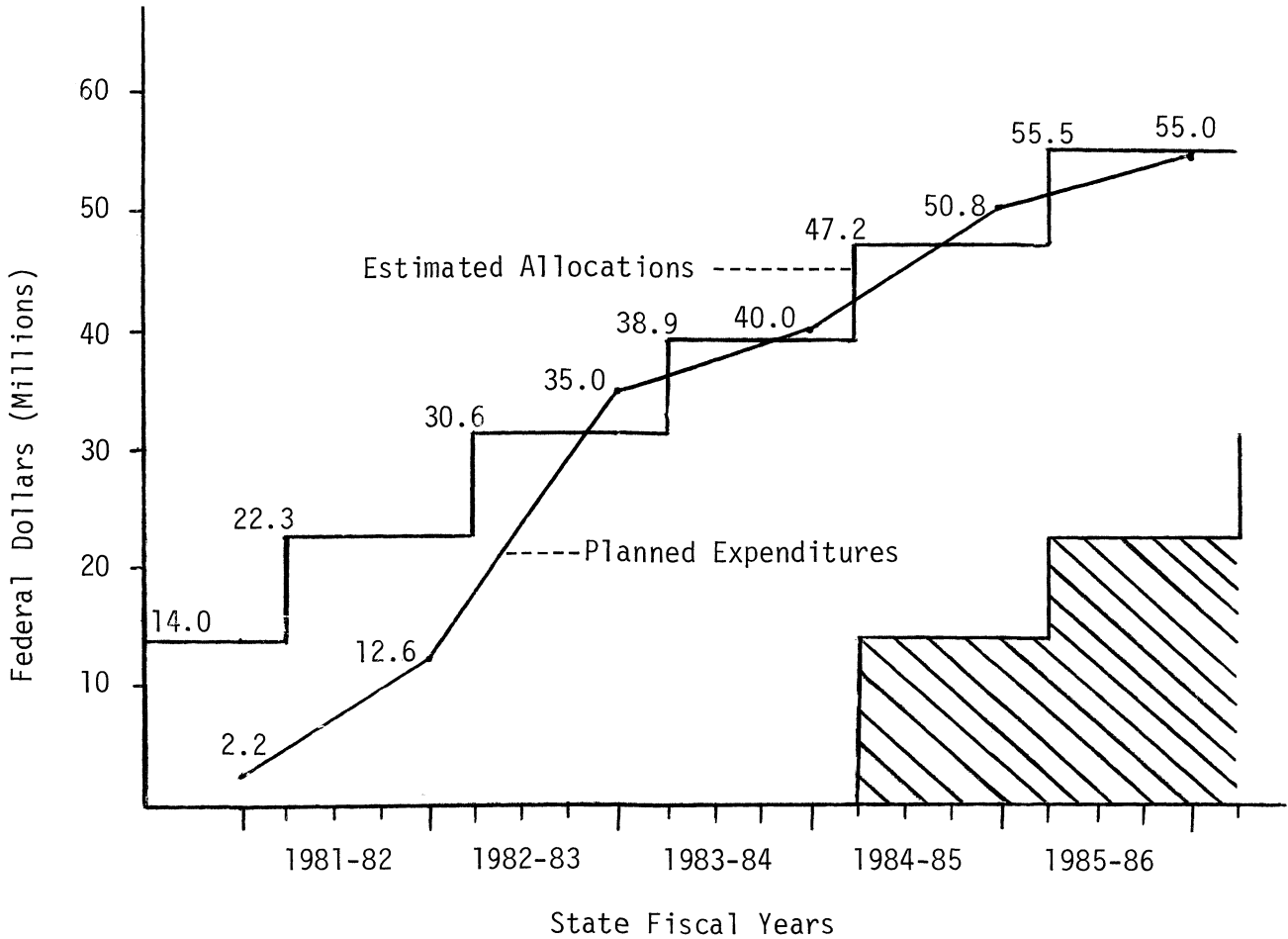
Estimated Number of Projects
Will Use Available Funds

The department reports the projects that it plans to develop during the next five years in the State Transportation Improvement Program. In the program, projects are scheduled to begin construction during various fiscal years. If there are problems in the development of a project and it cannot be ready for construction in the designated timeframe, the department can replace it with another project currently in the program. In addition, the department can begin project development before the project is placed in the program. These types of projects are called "shelf projects" and can also serve to replace projects that are delayed or suspended.

As shown in Chart 1 on the following page, the department estimated in the 1981 State Transportation Improvement Program that it would be eligible to receive \$55.5 million in federal allocations over the next five fiscal years. Of this amount, the department planned to spend \$55 million during the same period. This is shown by the planned expenditure line on the chart.

CHART 1

DEPARTMENT OF TRANSPORTATION
ESTIMATED ALLOCATIONS AND PLANNED EXPENDITURES
FISCAL YEARS 1981-82 THROUGH 1985-86



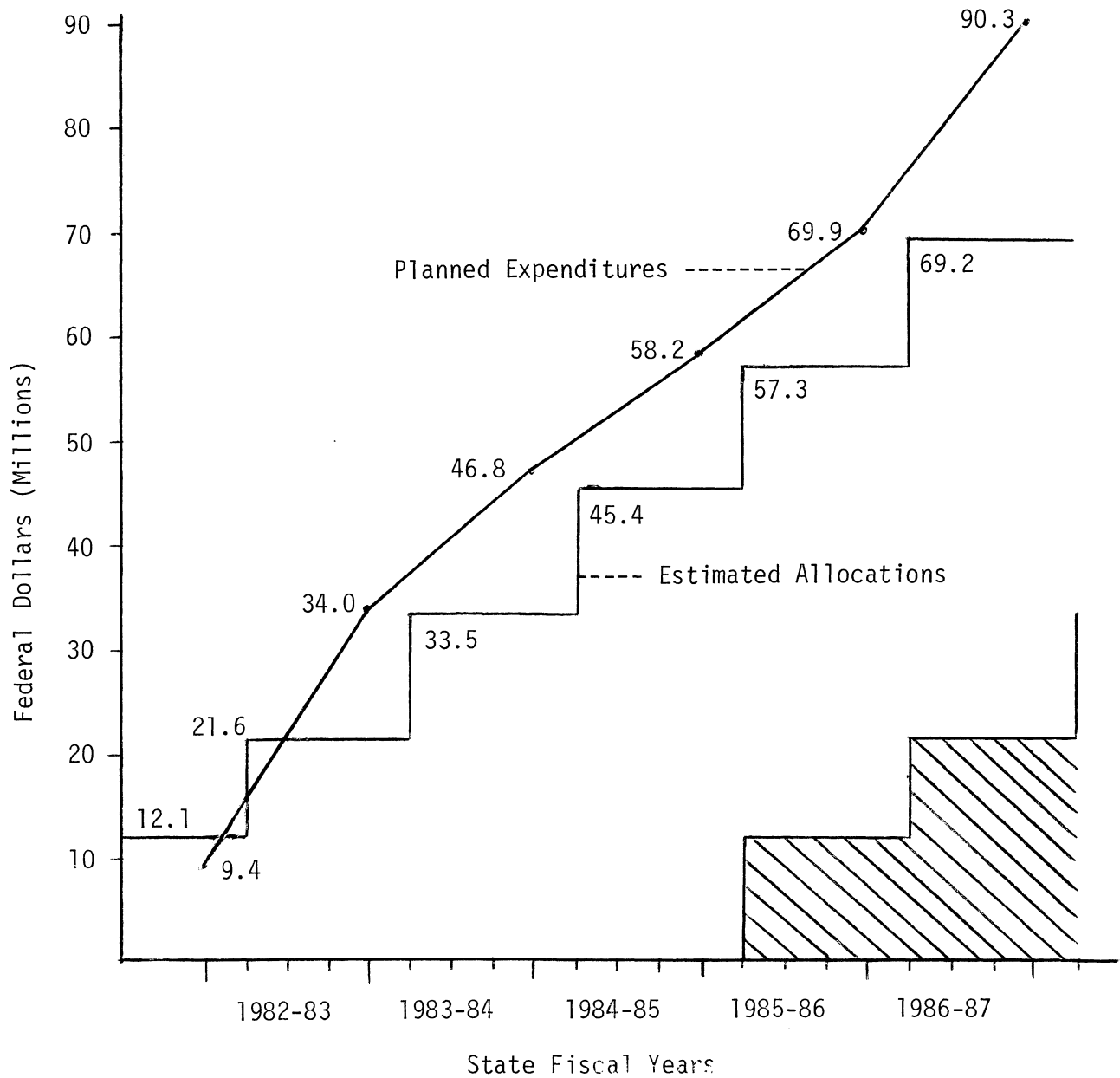
The shaded portion in the lower right-hand corner represents the amount of the federal allocations that could lapse at the end of each federal fiscal year. If the department's expenditure line drops into the shaded portion during a given fiscal year, the department would forgo that amount of federal allocation above the expenditure line and within the shaded portion.

In an attempt to ensure the full use of federal funds, the Director of Transportation, in September 1981, authorized the development of shelf projects for the Bridge Replacement and Rehabilitation Program. As a result, the department is developing approximately 20 additional projects that could be used to maintain the full use of federal funds if federal allocations increase.

In its proposed 1982 State Transportation Improvement Program, the department estimates it will be eligible for \$69.2 million in federal allocations during the next five federal fiscal years. Chart 2 below shows this new estimate of federal allocations.

CHART 2

DEPARTMENT OF TRANSPORTATION
ESTIMATED ALLOCATIONS AND PLANNED EXPENDITURES
FISCAL YEARS 1982-83 THROUGH 1986-87



As the chart shows, the new program anticipates spending \$90.3 million, which is more than the estimated available federal funds. However, the department realizes that all projects may not meet development schedules. Thus, the department is attempting to ensure full use of the available federal funds by developing more projects than it has the money to build. Consequently, if the federal allocations and state revenues are available and the projects are developed, the department will use all of its federal allocations.

CHRONOLOGY OF EVENTS
TOWN CREEK BRIDGE REPLACEMENT PROJECT

- May 1978 The Town Creek Bridge was identified as eligible for replacement because it is being overloaded and there are cracks in the supporting girders.
- December 1978 A 6-foot wide wooden pedestrian walkway was added to the existing 20-foot wide Town Creek Bridge.
- December 1978 The department recommended replacement of the bridge. The bridge was tentatively scheduled for replacement during the 1981-82 fiscal year.
- September 1979 A project development team in the Eureka district office recommended replacing the Town Creek Bridge with a 40-foot wide structure and replacing the Grist Creek Bridge with a 32-foot wide structure. A 32-foot wide structure for Town Creek was discussed. The team asked that district management determine which width would be most appropriate at Town Creek.
- October 1979 The District Director at the Eureka Office (Vostrez) and district Deputy Director for Planning (Brown) determined that a 40-foot replacement bridge at Town Creek was appropriate because of expanding commercial development. Further, the Grist Creek Bridge would be designed at 32-feet wide with provisions for future expansion.
- December 1979 The District Director of the Eureka Office (Vostrez) and district Deputy Director for Planning (Brown) formally approved the Grist Creek Bridge and Town Creek Bridge replacement project. The project report was actually signed by the Eureka District Director (Vostrez) and by the current Chief of Planning/Public Transportation who signed for the district Deputy Director for Planning (Brown).

January 1980	The project was reviewed by staff at department headquarters. The Division of Traffic Engineering questioned the difference in speed limits in relation to the different widths of the Town Creek Bridge. The issue was resolved when it was pointed out that the 40-foot width was justified primarily because of the existence of pedestrian and bicycle traffic on the Town Creek Bridge.
February 1980	The proposal for building a 32-foot wide bridge at Grist Creek was forwarded to the Federal Highway Administration for approval of an exception to the federal standards requiring a 40-foot wide replacement bridge at Grist Creek.
March 1980	The Federal Highway Administration granted an exception to federal bridge width standards and approved the 32-foot wide Grist Creek Bridge as eligible for federal funds. This approval was contingent on the department's designing the bridge in such a way that it could be expanded in the future.
February 1980	The Chief of the Office of Planning and Design (Green) at the department headquarters approved the replacement of the Town Creek Bridge at 40 feet wide and the Grist Creek Bridge at 32 feet wide.
April 1980 - May 1981	The Eureka district office prepared the engineering plans, specifications, and cost estimates for the Grist Creek Bridge and the Town Creek Bridge.
January 1981	The Federal Highway Administration approved federal funding for the 40-foot wide Town Creek Bridge.
May 29, 1981	The Eureka district office forwarded the project plans, specifications, and cost estimates to departmental headquarters.

June 1981 Planning and Programming received the project proposal so that it could develop a funding proposal to be presented before the California Transportation Commission.

July 1981 The Director of Transportation (Gianturco) asked the Deputy Director for Project Development and Construction (Russell) and the Deputy Director for Planning and Programming (Herbold) to review bridge projects for cost-effectiveness.

July 1981 The Deputy Director for Planning and Programming (Herbold) asked the Deputy Director for Project Development and Construction (Russell) to review personally the proposed replacement widths of both bridges.

July 31, 1981 A draft policy and procedure memorandum was circulated by the Division of Highways (Planning and Programming) which addressed department policy concerning geometric standards for two-lane, two-way bridges. The proposed policy required the concurrence of the Deputy Director for Planning and Programming (Herbold) and the Deputy Director for Project Development and Construction (Russell) on any proposed widening of bridges that are now less than 32 feet wide. The draft memorandum was later withdrawn because some of the department staff maintained that decisions concerning the width of bridges were the responsibility of the designing engineers, not a matter that should be determined by a management committee.

August 14, 1981 The Deputy Director for Project Development and Construction (Russell) responded to an inquiry from the Deputy Director of Planning and Programming (Herbold) concerning the delegated responsibility of Project Development and Construction to determine bridge widths. Project Development and Construction maintained that it was the duty of an engineer to determine the appropriate width of a bridge.

August 19, 1981 The Deputy Director for Planning and Programming (Herbold) replied that the proposed policy and procedure memorandum of July 31, 1981, on bridge widths had been prepared at the request of the Director of Transportation (Gianturco) and that she would resolve the issue.

August 28, 1981 The Deputy Director for Project Development and Construction (Russell) wrote a memorandum to the Deputy Director for Planning and Programming (Herbold) indicating that he had reviewed the project and recommended that the department proceed with a 40-foot wide bridge at Town Creek and a 32-foot wide bridge at Grist Creek.

September 1981 The Deputy Director for Planning and Programming (Herbold) disagreed with the conclusions of the Deputy Director for Project Development and Construction (Russell) and directed his staff to reexamine the project.

October 1981 A fact sheet on the 32-foot wide bridge option and the project report on the 40-foot wide bridge option were presented to the Director of Transportation (Gianturco). These documents formed the basis of her decision to build a 32-foot wide bridge at Town Creek.

October 1981 The Director of Transportation (Gianturco) directed the Deputy Director for Planning and Programming (Herbold) and the Deputy Director for Project Development and Construction (Russell) to implement her decision to build a 32-foot wide bridge over Town Creek.

October 26, 1981 The Chief of the Division of Transportation Planning (Barkley) sent a memorandum to the director of the Eureka district office. The memorandum stated that the Director of Transportation (Gianturco) determined that a 32-foot wide structure was appropriate at Town Creek for the following reasons:

- The Average Daily Traffic at Town Creek Bridge in 1980 was approximately 700, a low figure.
- It is consistent with 32-foot width proposed for Grist Creek Bridge (0.4 mi. west).
- It is consistent with the existing paved roadway width of 22 feet.
- The posted speed limit at Town Creek Bridge is 25 mph.
- There is no proposed widening of Route 162 in the foreseeable future.
- Building a 32-foot wide structure instead of a 40-foot wide structure would mean a cost reduction of about 12 percent.

The Chief of the Division of Transportation Planning (Barkley) directed the Eureka district office to prepare a supplemental project report proposing that a 32-foot wide bridge be developed.

November 2, 1981

The Deputy Director for Project Development and Construction (Russell) resigned his position citing his reluctance to carry out the director's decisions regarding the replacement of the Town Creek Bridge with a 32-foot wide structure and the replacement of an edge stripe along a several-mile segment of Highway 44 in Shasta County.

November 18, 1981

The District Director at the Eureka Office (Vostrez) complied with the direction from the Chief of the Division of Transportation Planning (Barkley) and recommended a 32-foot wide replacement bridge. However, the district director reiterated that the 1600 ADT (Average Daily Traffic) count was still valid for this project.

- November 23, 1981 The Chief of the Office of Planning and Design within Project Development and Construction (Kassel) sent a memorandum to the Chief of the Division of Transportation Planning (Barkley) expressing his disapproval of a 32-foot wide bridge at Town Creek because the district's supplemental report was not signed by a registered civil engineer. The memorandum reiterated the need for a 40-foot wide bridge.
- December 8, 1981 The new Deputy Director for Project Development and Construction (West) withdrew approval authority from the Chief of the Office of Planning and Design (Kassel) for the Town Creek project.
- December 8, 1981 The Deputy Director for Project Development and Construction (West) advised the Eureka district office that headquarters would prepare plans, specifications, and estimates for a 32-foot wide replacement bridge over Town Creek. This constituted approval of the supplemental project report. The responsibility for developing the plans, specifications, and cost estimates was shifted to the Sacramento Project Design Branch.
- January 1982 The Chief of the Sacramento Project Design Branch (Jackson) refused to sign the 32-foot wide bridge plans because he did not believe this bridge width was appropriate. The plans were then sent to the district.
- January 20, 1982 The department asked the Federal Highway Administration for an exception to the federal standards so that a 32-foot wide replacement bridge at Town Creek could qualify for federal funds.
- February 12, 1982 The Federal Highway Administration disapproved the 32-foot wide proposal for Town Creek.

February 1982

The plans for a 32-foot wide bridge at Town Creek were sent from the district office to department headquarters. The plans were signed by the district's Deputy Director for Maintenance and Operations (Sweet) because the district's Deputy Director for Planning (Brown) refused to sign the Town Creek Bridge plans. The plans were then forwarded to headquarters.

March 1982

The project is being prepared for presentation before the California Transportation Commission for funding approval.

EDUCATIONAL BACKGROUND, TYPES OF
ENGINEERING LICENSES, AND EMPLOYMENT HISTORY OF
SELECTED CALIFORNIA DEPARTMENT OF TRANSPORTATION EMPLOYEES

HEADQUARTERS STAFF

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Gianturco, Adriana	Bachelor of Arts in History, Magna cum laude, Phi Beta Kappa, Master of Arts in Economics	None	1966-1968: City planner for a consultant firm in Cambridge, Massachusetts 1968-1973: Director of a planning and evaluation department for a community action agency in Boston, Massachusetts 1973-1975: Director of Planning, Office of State Planning and Management, Commonwealth of Massachusetts 1975-1976: Assistant Secretary for the Business and Transportation Agency of the State of California 1976 to present: Director of Transportation

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Herbold, Ronald L.	Bachelor of Arts in Public Administration	None	<p>1960-1962: Crimes Analyst, Department of Justice</p> <p>1962-1963: Military Leave</p> <p>1963-1969: Investigator, Department of Motor Vehicles</p> <p>1969-1972: Management Analyst, Department of Transportation</p> <p>1972-1973: Assistant to Director for Planning, Department of Motor Vehicles</p> <p>1973-1975: Executive Assistant to Chief Deputy Director and to Director of Transportation</p> <p>1975-1977: CEA I, Chief, Office of Capital Budgets</p> <p>1977-1979: CEA III, Assistant Director of Financial Affairs</p> <p>1979-1980: CEA IV, Deputy Director of Financial Affairs</p> <p>1980 to present: CEA IV, Deputy Director for Planning and Programming</p>

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Russell, Gerald	Bachelor of Science in Civil Engineering	Registered Civil Engineer	1949-1950: Junior Civil Engineer 1950-1952: Military Service 1952-1953: Junior Civil Engineer 1953-1955: Assistant Highway Engineer, Project Engineer 1955-1961: Associate Highway Engineer, Project Engineer 1961-1963: Senior Highway Engineer, Route Planning 1963-1967: Supervising Highway Engineer, Assistant District Engineer for Traffic 1967-1969: Principal Highway Engineer, Division of Highways, Traffic Engineer 1969-1970: Principal Highway Engineer, Legislative Liaison 1970-1972: Principal Highway Engineer, Director's Office 1972-1979: CEA I, Assistant State Highway Engineer 1979-1980: CEA III 1980-1981: CEA IV, Deputy Director Project Development and Construction 1981 to present: Chief Office of Transportation Laboratory

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
West, John	Bachelor of Science in Civil Engineering, Masters in Business Administration, Doctoral Candidate, Organizational Behavior	Registered Civil Engineer, Registered Traffic Engineer	1959-1962: Junior Civil Engineer 1962-1965: Assistant Highway Engineer, Traffic Department 1965-1968: Associate Highway Engineer, Materials Office Engineer 1968-1972: Senior Highway Engineer, District Freeway Operations Engineer 1972-1977: Supervising Highway Engineer 1977-1979: CEA II 1979-1980: CEA III, Chief, Division of Aeronautics 1980-1981: CEA IV, District Director, District 4 1981-1982: CEA IV, Deputy Director for Project Development and Construction 1982 to present: CEA IV, Deputy Director for Planning and Programming

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Barkley, Ann	Bachelor of Science in Social Studies	None	<p>1965-1970: Elementary school teacher</p> <p>1970-1974: Child Rearing</p> <p>1974-1978: Member of the Advisory Board of the Tahoe Regional Planning Agency</p> <p>1976: Appointed by the Governor to the State Transportation Board</p> <p>1977: Elected Chairman of the State Transportation Board</p> <p>1978: Assistant to the Deputy Director for Planning and Programming as an exempt employee</p> <p>1978 to present: Chief of the Division of Transportation Planning as an exempt employee</p>

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Peddy, Jack	Bachelor of Science in Civil Engineering	Registered Civil Engineer	<p>1946-1948: Structural Engineer, North American Aviation, Inc.</p> <p>1948-1950: Junior Civil Engineer</p> <p>1950: Assistant Highway Engineer</p> <p>1950-1952: Military Service</p> <p>1952-1954: Assistant Highway Engineer, Project Design Engineer</p> <p>1954-1957: Associate Highway Engineer, Project Design Engineer, Resident Engineer</p> <p>1957-1961: Senior Highway Engineer, District Design Engineer</p> <p>1961-1964: Supervising Highway Engineer, Assistant Program Budgets Engineer</p> <p>1964-1967: Principal Highway Engineer, Project Control Engineer, Programs and Budgets Engineer</p> <p>1967-1971: Assistant State Highway Engineer, Programs Management Engineer</p> <p>1971-1974: Deputy State Highway Engineer</p> <p>1974-1975: Deputy State Transportation Engineer</p> <p>1975-1979: CEA IV, District Director, District 8</p> <p>1979-1981: CEA III, District Director, District 8</p>

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Peddy, Jack (Continued)		1981:	CEA III, Chief, Division of Transportation Facilities
		1982 to present:	Administrator, Environmental Public Works Agency, County of San Bernardino

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Green, William R.	Bachelor of Science in Civil Engineering	Registered Civil Engineer	1949-1951: Junior Highway Engineer in the department 1951-1954: Resident Engineer as an Assistant Highway Engineer 1954-1960: Resident Engineer as an Associate Highway Engineer 1960-1963: Assistant Program and Budget Engineer as a Senior Highway Engineer 1963-1969: Supervising Highway Engineer, Chief of Planning and Design 1969 to present: Principal Transportation Engineer

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Kassel, Jack	Bachelor of Science in Civil Engineering	Registered Civil Engineer, Registered Traffic Engineer	1956-1958: Assistant Highway Engineer 1958-1960: Associate Highway Engineer, Project Design Engineer 1960-1963: District Traffic Engineer 1963-1969: Assistant Traffic Engineer 1969-1972: Computer Systems Engineer 1972-1975: Chief, Office of Local Assistance, Chief, Transportation Analysis Branch 1975-1977: Chief, Office of State Planning 1977-1978: Acting Chief, Division of Transportation Planning 1978-1980: Principal Transportation Engineer; Chief, Office of Equipment
			1980 to present: Chief, Office of Planning and Design

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Jackson, Fred	Bachelor of Science in Civil Engineering	Registered Civil Engineer	1944-1946: Joined Department of Transportation, served at Bishop in surveys and construction 1946-1950: Junior Engineer, working in surveys, District 8 1950: Chief of Surveying Section 1950-1965: Advanced Planning Engineer in Freeway Design, District 8 1965-1973: Design Engineer, District 8 1973-1975: Selected as District Construction Engineer, District 8 1975-1979: Supervising Engineer, moved to Sacramento in Planning and Design 1979 to present: Chief, Sacramento Project Design Branch

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Hagen, Garland	Bachelor of Science in Civil Engineering	Registered Civil Engineer	1961-1963: Junior Engineer, Department of Transportation 1963-1968: Assistant Engineer, Highway Project Design 1968-1972: Associate Engineer, District Environmental Studies Branch 1972-1979: Senior Engineer and Planner, Regional Planning Activities 1979 to present: Chief, Regional Planning and Modal Coordination Branch

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Rodgers, Richard	Bachelor of Science in Civil Engineering	None	<p data-bbox="240 327 272 959">1966-1971: Project Engineer, District 1</p> <p data-bbox="297 222 362 959">1971-1972: District Environmental Coordinator, District 1</p> <p data-bbox="391 117 456 959">1972-1973: Statewide Environmental Design Coordinator, Department of Transportation</p> <p data-bbox="485 96 550 959">1973-1976: Chief, Nonmotorized Section, Department of Transportation</p> <p data-bbox="579 222 612 959">1976-1982: Chief, Office of Bicycle Facilities</p> <p data-bbox="647 96 742 959">1982 to present: Deputy District Director for Planning and Public Transportation, District 3</p>

DISTRICT STAFF

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Vostrez, John	Bachelor of Science in Civil Engineering, Master of Science in City Planning and Traffic Engineering	Registered Traffic Engineer	1958-1960: Junior Civil Engineer, Design and Construction, District 4 1960-1961: Assistant Highway Engineer, Traffic Department 1961-1963: Directed Operations Research Program at Department of Transportation 1963-1964: Graduate School, Yale University 1964-1966: Assistant Highway Engineer, Traffic Department, District 11 1966-1972: Associate/Senior Transportation Planner 1973-1979: Director, Tahoe Regional Planning Agency 1979 to present: CEA II, District Director, District 1

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Brown, Delbert	None; Self-taught engineer	Registered Civil Engineer	<p>1956-1963: Early experience at the Department of Transportation with engineering duties</p> <p>1963-1964: Assistant Highway Engineer in Project Design</p> <p>1964-1968: Associate Highway Engineer in the areas of Project Design and City and County Project Engineering</p> <p>1968-1974: Senior Highway Engineer in the areas of District Traffic Engineering and Transportation Planning</p> <p>1974-1978: Supervising Engineer in Transportation Studies</p> <p>1978-1979: Acting District Director under a Career Executive Appointment</p> <p>1979 to present: Supervising Transportation Engineer of Design, Construction and Engineering services in the Eureka District Office, currently a district Deputy Director</p>

<u>Name</u>	<u>Formal Educational Background</u>	<u>Engineering License</u>	<u>Employment History</u>
Sweet, Ray	Bachelor of Science in Civil Engineering, Master of Science in Civil Engineering	Registered Civil Engineer	1951-1952: Assistant Highway Engineer, District 5 1952-1954: Military Leave 1954-1956: Associate Highway Engineer, Design Engineer 1956-1960: Senior Highway Engineer, Design Engineer 1960-1962: Senior Highway Engineer, Special Project Engineer 1962-1965: Assistant District Engineer 1965-1969: Supervising Highway Engineer 1969 to present: Supervising Transportation Engineer, Deputy District Director for Maintenance and Operations

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