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## **Evaluating the Effectiveness of the State of California, Department of Transportation's Change Control Policy**

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Evaluating the Effectiveness of the State of California,  
Department of Transportation's Change Control Policy

By James R. Anderson

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## Table of Contents

Agency History .....	3
Introduction.....	6
Literature Review.....	8
Methodology .....	10
Findings.....	15
Conclusion and Areas for Further Research .....	29
References.....	31
Appendixes .....	33
Appendix A (List of contacted State DOTs).....	34
Appendix B (Structured Phone Interview Questionnaire).....	35

## Agency History

In 1895, the first state agencies were created for the purpose of constructing roadways. The Bureau of Highways was formed to study the laws, physical features, economic, and legal status of highways; and the Tahoe Wagon Road Commissioner was appointed to examine the possibilities of constructing a road to Lake Tahoe.

In 1897, three Commissioners headed the Department of Highways. The agency was reduced to one in 1898, and assumed the functions of the Bureau of Highways. In 1907, both the functions of the Department of Highways and the Lake Tahoe Wagon Road Commissioner were absorbed into the Department of Engineering. All highway work was handled by a subdivision of the Engineering Department called the Highway Department.

The Advisory Board of the Department of Engineering was expanded to include three new members in 1911. These members were vested with direct control over the Highway Department. In August 1911, the Advisory Board designated these members the California Highway Commission (CHC).

The newly created CHC appointed a Highway Engineer in October 1911 to serve as the chief executive of the Highway Department and created seven highway districts, each with a district office headed by a division engineer (hereinafter referred to as district engineers). The district engineers were responsible for the construction and maintenance of highways within their respective district. The Highway Department consisted of five major organizational units at that time: legal, disbursing, accounting, and headquarters engineering.

In 1915, the Department of Engineering was reorganized and assigned the new name of Bureau of Highways. The CHC continued to serve as the executive body and the core organizational programs remained unchanged. In 1921, the Bureau of Highways was

reassigned the Division of Highways and along with the CHC was placed under the newly created Department of Public Works. The director of the Department served as both the State Highway Engineer and as Chief Executive of the CHC.

In 1923, highway activities were removed from the Department of Public Works and placed under the CHC, which became a totally independent entity. The Department of Public Works succeeded to the power and duties of the Commission, although the CHC was recreated with more limited powers including: the routing of highways, the funding of projects, the abandonment of routes, the inclusion of roads within the State highway system, and the condemnation of property.

The CHC reorganized the Division of Highways in 1923. The Disbursing Department was terminated. Moreover, six new Departments were added and they include: Bridges, Construction, Maintenance, Equipment, Prison Road Camps, and Surveys and Plans. Even though the Division was placed under the control of the Department of Public Works in 1927, its organization remained essentially unchanged until 1947, with the following exceptions: in 1928 the Testing and Research Laboratory was removed from the Construction Department and renamed the Materials and Research Department; in the same year the Department of Prison Road Camps was placed under the Construction Department; in 1933, the City and Cooperative Project Department was created; and in 1938, the Department of Traffic and Safety was formed.

Originally, the CHC created seven-highway district to oversee highway construction and maintenance activities. In January 1924, increased construction demands made it necessary for the addition of four additional districts, three were added immediately bringing the total to ten districts. In 1935, an eleventh district was added.

In 1947, increased highway funding necessitated the revamping of the Division of Highways. In August of that year, the Departments of Construction, Maintenance, Equipment, and Research were made functions of a new Department of Operations. Traffic and Surveys and Plans (renamed Design) were placed under the newly created Department of Planning. An administrative Department was established encompassing the Office Engineer, County and Cooperative Projects (created in 1945), City and Cooperative Projects, Highway Stores (in 1951 the name changed to Service and Supply), and the Federal Secondary Engineer (created June 1, 1945). Furthermore, the Department of Rights of Way was formed to handle right of way functions first centralized in 1941, and an Assistant state highway engineer was made responsible for personnel matters and the pre-qualification of contractors (Anonymous, year unknown, pg. 2).

The following additional changes were made to the 1947 organization before the elimination of the Division of Highways in 1973: in 1948, the Advanced Planning Department was established under the Department of Planning; the Department of Public Relations and Personnel was formed in 1951; and 1962 brought the creation of the Office of Urban Planning under the Department of Planning, and the renaming of the Accounting Department of Fiscal Management (Anonymous, year unknown, pg. 2).

In 1973, the Department of Transportation assumed the functions of the Division of Highways, and the California Highway Commission ceased to exist as of July 1, 1978.

## Introduction

Policy evaluation is learning about the consequences of public policy and to accomplish that, the impact of a policy and its effects on real-world conditions must be analyzed. The impact of a policy includes 1) Its impact on the target situation or group, 2) Its impact on situations or groups other than the target (spillover effects), 3) Its impact on future as well as immediate conditions, 4) Direct costs, in terms of resources devoted to the program, and 5) Indirect costs, including loss of opportunities to do other things. All the benefits and costs, both immediate and future, must be measured in both symbolic and tangible effects (Dye, 2000, pg. 312).

In past years, the Department of Transportation's (Department or Caltrans) emphasis has been on the technical quality and adequacy of its transportation products, and not necessarily on timely delivery of projects. At the end of every fiscal year, the Department promises the California Transportation Commission (CTC), the political body responsible for setting long range transportation policies, programming, and allocating funds for the construction of highway, passenger rail and transit improvement throughout California, that a certain number of projects will be delivered by the end of the fiscal year. The decisive moment occurs at the end of the fiscal year when progress and tangible results are evaluated, with the measurement being the Ready-to-list (RTL) date for all the projects identified in the department's report to the CTC. Far too often, the department has failed in meeting its time commitments to deliver these projects.

Recent changes in transportation legislation, particularly Senate Bill 45 and Proposition 35, have given more control to local government and public enterprises (Metropolitan Transportation Organization (MPO) and Regional Transportation Planning

Agency (RTPA)) with regards to which transportation projects receive funding and who develops the contract documents (project plans, specifications, and cost estimate). The Department's Chief Engineer, Mr. Brent Felker states that, "We have an opportunity to provide mobility across the State through enhanced transportation funding. However, we must improve our processes to facilitate project delivery." In an effort to capitalize on this opportunity, the Department implemented a Change Control Policy (policy) in July 2000, with the goal of improving project delivery by reducing the number of scope changes after a project has acquired environmental clearance. The policy is to be applied to all Capital Projects (greater than \$750,000 in capital cost) administered by the Department.

This is a major commitment by the Department as this policy requires a significant investment of man hours (up to 35% increase of resources up front) in advancing key work activities in the project development process. The objective is to pinpoint information related to survey, foundation, environmental impacts, etc. to limit increases to the scope of work and related cost of projects. If the policy is not achieving the desired results, the Department may need to investigate other alternatives to improving project delivery.

This research will focus on evaluating the effectiveness of this policy for Rehabilitation projects that are greater than or equal to \$1,000,000 (capital cost) in District 3. The rich question is twofold:

1. Whether on-time project delivery has improved with the use of this policy when compared to similar projects delivered in prior fiscal years?
2. Which type of transportation projects, if any, are appropriate for this policy?



On-time project delivery is defined as deliverance of the project anytime within the scheduled programmed fiscal year. This research will attempt to answer these questions and provide additional benefits to the Department by:

- Collecting data that, once analyzed, will illustrate whether implementation of this policy is a prudent use of departmental resources;
- Recognizing patterns and trends in the delivery of Rehabilitation Projects;
- Providing a reference point to consider external validity of the research results to the Department's other districts and core programs (projects); and
- Increasing the department's fiscal awareness.

This research will also add value by documenting lessons learned and identifying future areas of exploration. The region for this research is District 03, which consists of the following 11 counties: Butte, Colusa, El Dorado, Glenn, Nevada, Placer, Sacramento, Sierra, Sutter, Yolo, Yuba, and Sacramento. Satellite offices are located in the Sacramento area, but the main office is located in Marysville, California.

### Literature Review

The focus of this research study is the evaluation of the effectiveness of the policy and its impact on the department's ability to delivery Rehabilitation Projects. The literature review attempts to illustrate how approaches to developing policies to improve project delivery have been implemented and changed over time throughout the country, and considers the implementing agency's criterion for measuring the successes of the policy.

The literature review was examined in four areas:

1. Policies other State Department of Transportation (DOT) Agencies have in place to control or limit scope and cost creep for Rehabilitation projects.
2. The model of such policies and how they are implemented and maintained.
3. Types of techniques used in evaluating such policies and program measures.
4. Written reports that consider the cost versus benefits from the perspective of how the delivery of the program would progress without the policy.

Twelve DOTs were contacted to ascertain if their agency utilized a policy similar to Caltrans' policy to control or limit project changes (see Appendix A for list).

Representatives from all of the agencies indicated that they had no such policy in place. In fact, they incorporated no other policies during the project development process to limit or reduce changes. The general theme of the representatives was that their agency's policy is to comply with the various federal and state legal requirements, and that additional bureaucracy was not necessary to facilitate project delivery because they are not required to comply with California Environmental Quality Act (CEQA) mandates. CEQA was adopted in 1970 and its basic purposes are to inform governmental decision makers and the public about the potential significant environmental effects of proposed activities, and to identify ways that environmental damage can be avoided or significantly reduced. It should be pointed out that CEQA requirements are generally more stringent than those of the National Environmental Policy Act (NEPA).

While all states in the United States (U.S.) have to comply with the requirements in NEPA for their transportation projects to be eligible for federal funding, other state environmental laws generally are not as strict as those identified in NEPA. This is very important and provides the critical distinction between Caltrans and other state DOTs with

respect to difficulties in delivering projects. Caltrans has a very difficult time receiving environmental clearance for its transportation projects from the various resource or regulatory agencies due to CEQA requirements. Because of these facts, representatives from other DOTs caution that Caltrans is playing by a different set of rules. Policies and procedures implemented by other DOTs may not be applicable to Caltrans and vice versa.

## Methodology

### Overview of the Methodology

The methodology for this research began by searching the California Transportation Improvement Program System (CTIPS). CTIPS is a project database that is used to develop and manage the various State and Federal programming documents as required by federal and state law. Caltrans uses CTIPS to streamline the programming process, eliminate redundant entry errors, and to foster communication with representatives from MPOs, RTPAs, and the districts. During this research study, CTIPS was used to determine the number of Rehabilitation projects that met the research criteria and the person responsible for managing the project.

A structured phone interview questionnaire (see Appendix B) was developed to obtain project delivery information. The focus of the questionnaire was centered on whether or not projects developed using the policy were delivered on-time as scheduled, and, if not, the reason(s) for the delay. The questionnaire also inquired as to whether or not the sponsors' needs were met, and the impact the policy had on the soft side of project delivery (i.e. teamwork, communication, conflict resolution,). Using data from CTIPS and the questionnaire, a research design was formulated using both qualitative and quantitative

methods. The policy evaluation techniques included before versus after comparisons to compare the Department's delivery of Rehabilitation projects, and projected trend line versus post policy comparisons.

#### Limitations of the Research

This research study is limited to Rehabilitation Projects that are located in District 03, and are greater than or equal to \$1,000,000 in construction cost, and may not be applicable to projects in other districts. Projects that are split from these projects (referred to as subprojects) will not be considered. Likewise, separate projects that are combined for any reason (projects are commonly combined for construction purposes) will be evaluated in their original programmed state as individual projects.

The programming process allows amendments to be executed prior to the beginning of the fiscal year in which the project is scheduled for delivery. Amendments can be performed for just about any reason (including adding projects to the program), and essentially change a project's scope, schedule, and/or cost. This research effort will not include Rehabilitation projects that were programmed by execution of an amendment.

Since the focus of this study is on design scope modifications resulting in project delivery delays or failures, project delays coming by way of environmental, right-of-way, and funding issues/concerns will not be considered a part of this research effort. Data collected that reflect this will not be accepted for inquiry or analysis. Similarly, projects that have been deprogrammed for any reason (most commonly to fund cost increases on other projects within the program) are ineligible for this research paper.

### Characteristics of the Research Sample

This research study considers Rehabilitation projects programmed in the 1998/99 and 1999/2000 fiscal years prior to implementation of the policy, and projects programmed in the 2000/01 and 2001/02 fiscal years post implementation. A fiscal year in California is defined as the beginning of July to the end of June of the following year. For example: Fiscal year 1998/99 spanned from July 1998 to June 1999. This boundary condition sets the sample for the study. The research sample can be classified as follows:

- Scope of work generally includes placing asphalt concrete overlay, shoulder widening to bring the highway facility up to current federal standards, drainage improvements, and traffic signing, lighting, and striping enhancements;
- Projects are funded from the State Highway Operation and Protection Program (SHOPP);
- Projects are managed by engineers with one to three years of experience with the Department; and
- Capital cost of projects range from \$1,000,000 to \$16,650,000.

### Data Collection

By accessing CTIPS, a search was done for projects that met the research criterion in the appropriate fiscal years. Project specific identifiers were noted and used to request scoping documents from District 03. Scoping documents are used to define a project's scope of work, delivery schedule, and capital cost. Over a three week period, the District Program Advisor for the SHOPP collected all the scoping documents and transmitted them to Sacramento for the researcher's review and reference. The scoping documents were

reviewed to ensure consistency in scope of work and that they were qualified for this research study. After four weeks, the documents were returned to the district.

Once the sample of Rehabilitation projects were identified for the research, a review of approved programming amendments (changes) by the CTC was done to verify whether the projects were delivered on-time, and to see if any changes were made to the projects' baseline delivery schedule. After a project is programmed, its scope, schedule, and cost are set for delivery within a particular fiscal year. The programming process allows for unknowns and uncertainties during the development of a project and allows the responsible agency (either Caltrans, local agencies, MPOs, or RTPAs ) to change the programmed commitment by executing an amendment. The key is that a project can not be amended after the beginning of the fiscal year it is programmed for delivery. This step is very important as it is possible to deliver a project on-time after executing an amendment to change its scope of work or to reschedule delivery into the next or another fiscal year.

Using the structured questionnaire (see Appendix B) to guide the interview, phone calls were made to the 12 project managers in District 3. The project managers' name and phone numbers were obtained from CTIPS. The database is maintained by staff in Headquarters, and is updated whenever programming changes occur.

The interview began by informing them that approximately 30 minutes of their time would be needed to discuss the Department's Change Control Policy (policy) and the impact it had on the delivery of their Rehabilitation projects. The purpose of the interview was explained, and the goal of using their input to evaluate and assess the policy was communicated. The interviewees were given a few minutes to get the relevant information available so that it would be readily accessible. They were assured that the information they

provided would remain confidential, and that the Department was not the sponsor of this survey. The parameters were explained in terms of the number of questions and how common threads would be gleaned from their responses. After each interviewee answered the questions, their response was restated to ensure that the content and accuracy remained the same. Notes were taken during the interview in a college rule notebook. The notes were later transcribed into a word processor.

#### Summary of Research Process

The structured interview questionnaire consisted of eight open-ended questions designed to gain insight into understanding the impact of the policy. Each participant was asked the following questions:

1. Tell me about your experience using the Change Control Policy (policy) to deliver Rehabilitation projects.
2. Were your Rehabilitation projects delivered on-time? If not, please describe any delays that were encountered.
3. Are there significant differences between managing a Rehabilitation project prior to and post 2000/2001 Fiscal Year? Please explain.
4. Did locking in the project's scope of work, much earlier in the process, take away too much flexibility so that the needs of the sponsors went unmet?
5. Did implementing the policy improve working relations with regulatory or resource agencies? If so, please explain.
6. How did the policy affect the construction cost of the projects in terms of the quality of the end project (i.e. more or less changes during construction)?

7. Were project development support resources expended efficiently and effectively or did a considerable amount of rework arise for the project development team?
8. Anything I should know about your projects that would distinguish them from regular Rehabilitation projects?

At the end of the interviews, time was allowed for additional comments and inquiry as to how the data would be interpreted. Immediately following the interviews, the participants' responses were organized in such a way to identify consistent and common themes.

Data collected from CTIPS will be evaluated using quantitative methods. The number of projects delivered on-time will be measured using an Ordinal scale and basic statistical computations will be made to analyze the information. Projects that have had design scope changes will be known by the fact that an amendment was processed. The investigation will include determining whether pattern or trends currently exist, and examining/assessing relationships between the reduced number of design scope changes and whether this translates to improved on-time project delivery.

### Findings

This section of the paper releases the findings of the data collected from CTIPS and from the structured interviews with the project managers. The collected data will be used with policy evaluation tools to assess the impact the policy had on the department's project delivery record. Since the focus of this research study is to evaluate the effectiveness of the policy, before versus after, and project line versus post policy comparisons will be done to assist with the evaluation.



The data collected from CTIPS for the 1998/1999 through 2001/2002 Fiscal Years (FY) is summarized in Table 1, page 13. In the 1998/1999 FY, the Department programmed a total of 14 Rehabilitation projects and delivered 13 of them (93%) on time as originally scheduled. In the 1999/2000 FY, 21 projects were programmed and 17 of them (81%) were delivered on time. In the 2000/2001 FY, 25 projects were programmed and 16 of them (64%) were delivered as scheduled. Likewise, in the 2001/2002 FY, 16 projects were programmed and 8 of them (50%) were delivered on time. An analysis of the data will be discussed later in this report.

	Fiscal Year (FY)	No. of Projects	Num. of Amendments	Num. of Projects Delivered on-time	Projects Delivered On-time (%)
Prior to Policy	1998/1999	14	1	13	93
	1999/2000	21	4	17	81
Post Policy	2000/2001	25	9	16	64
	2001/2002	16	8	8	50

Table 1 – Data Collected from CTIPS

The data from the structured interview is shown below.

Question 1: Tell me about your experience using the policy to deliver Rehabilitation projects.

Participant	Response Category		
	Positive	Negative	Neutral
1			X
2		X	

3			X
4		X	
5		X	
6	X		
7		X	
8		X	
9			X
10		X	
11	X		
12		X	

Table 2 – Participants' Response to Question Num. 1

As shown in Table 2, seven of the 12 participants (58%) reported difficulty using the policy to minimize design scope changes. The general feeling was that Headquarters provided very little guidance in directing the district on how to effectively implement the policy. As a result, project managers and project teams were being creative in implementing the policy, and many work packages or activities were inappropriately advanced and this resulted in a tremendous amount of rework. Overall the participants seemed to believe that the policy had merit, but that management should spend more time developing the methods of implementation to provide consistency in its application.

Three of the 12 participants (25%) reported feelings of indifference towards the policy. They contend that the policy neither had a profound impact on the projects nor caused the team any anxiety in implementing the policy. The general feeling was it is too

soon to effectively evaluate the policy because District 3 and Headquarters are still silently hammering out implementation details.

The remaining two participants (17%) reported that the policy was effective in minimizing design scope changes on their projects. There was a great deal of latitude afforded in implementing the policy and this provided considerable flexibility to the project team in advancing work activities as deemed necessary. The participants generally had no issues or concerns with the policy.

Question 2: Were your Rehabilitation projects delivered on-time? If not, please describe any delays that were encountered.

Participant	Response Category	
	Yes	No
1	X	
2		X
3		X
4		X
5		X
6	X	
7		X
8		X
9		X
10		X
11	X	
12		X

Table 3 – Participants' Response to Question Num. 2

As illustrated in Table 3, three of the 12 participants (25%) reported successful delivery of their Rehabilitation projects using the policy. However, nine project managers (75%) did not deliver their projects as originally programmed. The reasons were primarily related to funding and conflicting priorities between the Program Managers in the district and Headquarters. For projects that had incorrectly advanced work activities, the rework did not cause delivery delays, but did cause morale problems with staff. Project managers have reported that staffs have been seeking assignments on Minor projects (less than \$750,000 in capital cost) because they are exempt from the policy.

Question 3: Are there significant differences between managing a Rehabilitation project prior to and post 2000/2001 Fiscal Year? Please explain.

Participant	Response Category	
	Yes	No
1	X	
2	X	
3		X
4		X
5		X
6	X	
7		X
8	X	
9		X

10	X	
11		X
12		X

Table 4- Participants' Response to Question Num. 3

The responses to Question 3 are fairly divided. Seven project managers (58%) believe there is no difference between managing Rehabilitation projects prior to implementing the policy and thereafter. They contend that these projects are relatively simple to design, environmentally they are categorically exempt/excluded, typically small amounts of right-of-way may be needed, and involve very little public interaction. The only difference under the policy is the work activities are advanced to nail down the scope of work prior to environmental clearance. Five project managers (42%) feel there is a significant difference managing the project after implementing the policy. They emphasized the fact that identifying which activities to advance made it more difficult to manage because more effort was required up front in planning the project.

Question 4: Did locking in the project scope of work, much earlier in the process, take away too much flexibility so that the needs of the sponsors went unmet?

Participant	Response Category		
	Yes	No	Not Applicable
1		X	
2	X		
3	X		
4	X		

5	X		
6		X	
7	X		
8			X
9	X		
10	X		
11		X	
12	X		

Table 5- Participants' Response to Question Num. 4

The participants responded surprisingly to Question 4. Eight project managers (67%) feel the policy did eliminate much of the flexibility in delivering these projects. They indicated that Program Managers in the district and Headquarters had to make decisions with regards to conflicting priorities much sooner than they wanted, and that this was one of the policy's strengths. Three project managers (25%) believed that the policy resulted in the department delivering projects that did not fulfill their stated purpose and need. They stated the newly accelerated schedules for their projects, due to the policy, did not provide adequate time for building consensus among program managers. One project manager (8%) maintained that Rehabilitation projects are so straight forward and their needs are usually well defined that locking down the scope of work did very little other than to facilitate decision making. This project manager felt that this question was not suitable for these types of projects.

Question 5: Did implementing the policy improve working relations with regulatory or resource agencies? If so, please explain.

Participant	Response Category	
	Yes	No
1		X
2		X
3		X
4		X
5		X
6		X
7		X
8		X
9		X
10		X
11		X
12		X

Table 6- Participants' Response to Question Num. 5

As shown in Table 6, the project managers share the same opinion regarding Question 5. All participants agreed that the policy did not improve relations with regulatory or resource agencies. The primary reason was that nearly all Rehabilitation projects are categorically exempt from CEQA and categorically excluded from NEPA requirements. This means these projects generally do not have a significant effect on the environment.

According to several participants, the existing environmental process enables the Department to fast track environmental approval for not only Rehabilitation projects but Capital Maintenance projects as well.

Question 6: How did the policy affect the construction cost of the projects in terms of the quality of the end product (i.e. more or less changes during construction)?

Participant	Response Category	
	Impact	No Impact
1		X
2		X
3	X	
4		X
5		X
6		X
7		X
8	X	
9		X
10		X
11		X
12		X

Table 7- Participants' Response to Question Num. 6

Eighty three percent of the project managers agreed that the policy did not have an affect on the quality of the end product. However, 70% of those project managers believe the



policy had immediate impacts on construction staff responsible for overseeing the contractor's work and administering the project while in construction. For example, in District 3 construction activities are normally suspended during the winter months due to weather conditions. Construction staff would then assist other functional units in the department where additional resources are needed to meet their workload demands. By advancing work activities, the policy contributed to depleting construction resources prematurely as staff was needed to inspect contractor's operations. Two project managers (17%) felt the policy did affect the quality of the product because work was advanced leading to an increased amount of design errors and change orders during construction.

Question 7: Were project development support resources expended efficiently and effectively or did considerable amounts of rework occur for the project team?

Participant	Response Category	
	Yes	No
1		X
2		X
3		X
4		X
5		X
6		X
7		X
8		X
9		X
10		X

11		X
12		X

Table 8- Participants' Response to Question Num. 7

The participants were in agreement with their response to Question 7. All project managers agreed that the policy did not result in effective use of departmental resources, but for two separate and distinct reasons. First, project managers questioned what the policy gained the department in terms of benefits to society. Rehabilitation projects are not capacity enhancing projects or widening projects to accommodate additional lanes of travel so by delivering it four months sooner does not provide value to the traveling public. Second, they contend that by having staff advance work on Rehabilitation projects the department is indirectly slipping work on other projects. Thus, impeding project delivery. Three project managers suggested another study to look at the policy's impact to the State Transportation Improvement Program's (STIP) projects. These projects are generally of capacity increasing nature and include regional and commuter rail as well as and mass transit projects.

Question 8: Anything I should know about your project that would distinguish them from a regular Rehabilitation projects?

The project managers reported no unique features that would distinguish their projects from typical Rehabilitation projects. This ensured consistency in the reporting of their responses.

#### Analysis of the Data

Programming data obtained from CTIPS shows that prior to implementing the policy; the Department delivered a combined 86% of its Rehabilitation projects for the 1998/1999

and 1999/2000 FY. Similarly, post policy implementation reveals that a combined 59% of its projects were successfully delivered for the 2000/2001 and 2001/2002 FY. The data demonstrates a 27% decrease in the department's delivery rate.

While this decline in performance is disturbing, there is a plausible explanation and it can be attributed to the personnel recruitment and retention issues facing Caltrans. District 03 has lost approximately 25 % of its experienced senior level engineers (with more than seven years of experience with the department) over the last two years. According to an article in Contra Costa Times, the mass exodus began when local agencies, including the Contra Costa Transportation Authority, lured Caltrans' engineers onto their payrolls because of Caltrans' anemic salaries. Couple this with the fact that 56% of Caltrans' workforce generally has less than three years of experience and it is very difficult to accurately assess the impact the policy has had on the department's ability to timely deliver projects.

The data obtained from the structured interviews demonstrate that there are differing opinions on the applicability of the policy for Rehabilitation projects. The project managers' views are widespread, but there are some commonalities:

- Implementation of the policy did not result in improved working relationships with resource and regulatory agencies;
- Rehabilitation projects are relatively simple to design, and the current environmental approval process facilitates project delivery;
- The policy resulted in accelerating work packages and the need to expedite decision-making;
- Execution of the policy for Rehabilitation projects does not appear to be an effective use of departmental resources; and

- The policy did not have a significant impact on the quality of the construction documents (Project plans, Specifications, and Estimate).

The data also pointed out another critical point that even with implementation of the policy, on time project delivery did not improve. The primary reasons were related to internal issues or struggles with conflicting priorities between the district and Headquarter Program Managers.

#### Before versus After Comparisons

Dye contends that one of the most common policy evaluation techniques is the before-and-after study, which essentially compares results at two separate times. One before the policy was implemented and the other some time thereafter. He further purports that the key is to measure what actually happened to what would have happen if the policy had never been implemented.

The data shows that project delivery declined significantly, by 27%, after the policy was implemented. Dye makes a very powerful point that often times it is very difficult to know whether the observed changes came about as a result of the policy or as a result of other changes that were occurring within the organization at the same time. Such is the case in evaluating the department's policy. An organization's ability to deliver its workload is directly proportional to the caliber of its staff. Since the presence of a control variable (experienced of employees) was not considered in this research study, it would be inappropriate to make before versus after comparisons at this time. Recommendations will be made in the Conclusions and Areas of Further Research section of this report on how to limit the influence of the control variable on future research endeavors.

### Projected Trend Line versus Postprogram Comparison

According to Dye, a better estimate of determining what would have happened without the policy can be made by projecting past policy trends into the postpolicy time period. This sets the framework to determine what actually happened with regards to project delivery after the policy was implemented. The results of this analysis are shown in Table 8.

Fiscal Year (FY)	Projected % of Projects Delivered On Time	Postpolicy % of Projects Delivered On Time
2000/2001	69	64
2001/2002	57	50

Table 8 – Projected Trend Line versus Postpolicy Comparisons

The analysis indicates that department would have delivered 69% of its projects on time in the 2000/2001 FY when compared to the actual delivery percentage of 64%. In the 2001/2002 FY, the department would have delivered 57% of its project as scheduled; whereas the actual delivery percentage was 50%. This method of policy evaluation shows that the policy did not improve on time project delivery for Rehabilitation projects. In fact, for the 2000/2001 and 2001/2002 FYs, the department's delivery percentage actually decreased 5% and 7%, respectively. Another way of interpreting the results could be if the department did not undergo high turnover in staffs, then there would have been a 5% increase in project delivery for the 2000/2001 FY and a 7% increase in project delivery for the 2001/2002 FY.

### Conclusions and Areas for Further Research

If California is to continue setting the standard and providing leadership for the transportation industry, the Department must develop a plan to improve its project delivery efforts. Part of the plan must include evaluating policies so that leaders and managers can ascertain whether or not the goals and objectives of the organization are being met.

This research project began with the question: Has the Department's Change Control Policy (policy) improve on time delivery for Rehabilitation projects that are greater than or equal to \$1,000,000 in capital cost? The qualitative data shows that the policy did not improve on time project delivery. The main reason was the inability of the program managers to reach agreement on which projects would be delivered and when they would be delivered. Another reason appears to be related to the applicability of the policy as it may be better suited for State Transportation Improvement Program (STIP) projects. More regulatory and resource agencies are involved in the development of STIP projects as well as public involvement. In addition, STIP projects are highly visible and political such that advancing work to expedite the delivery would look favorably in the eyes of Caltrans constituents.

Two consistent and very powerful themes emerged from the research methodology: First, the project managers believed the policy was not an effective use of departmental resources. Second, they purport that the policy did not make a significant difference in the transportation community. Nothing can be contributed to this research study from the quantitative data as it is inconclusive. The data may have been skewed as the Department was experiencing high levels of staff turnover during the fiscal years under investigation.

Two suggestions are offered for future research exploration. The first involves revisiting the research question but to focus on STIP projects rather than Rehabilitation projects. Not only will this assist in setting transportation policy, but will have greater societal impacts as the traveling public will directly benefit from receiving transportation improvements one year or six months earlier by advancing work packages. Lastly, the research study should be performed in a district or region with limited staff turnover. This will isolate the variables and limit the impacts of extenuating circumstances that are occurring in the agency at the time the research is conducted. District 1 (located in Eureka), 2 (located in Redding), and 11 (located in San Diego) are excellent candidates as they endure very little movement of staff.

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## Appendix

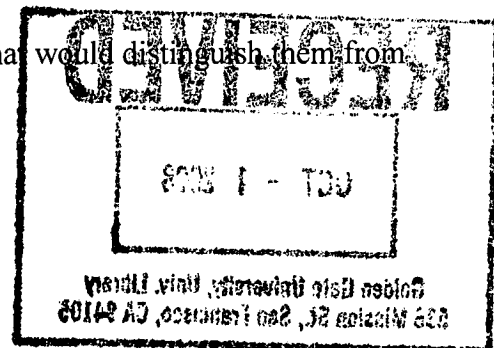
### List of Contacted State Department of Transportations

1. Texas Department of Transportation (Contacted February 2003)
2. Nevada Department of Transportation (Contacted February 2003)
3. Utah Department of Transportation (Contacted February 2003)
4. Washington State Department of Transportation (Contacted February 2003)
5. Minnesota Department of Transportation (Contacted February 2003)
6. West Virginia Department of Transportation (Contacted February 2003)
7. North Carolina Department of Transportation (Contacted February 2003)
8. Georgia Department of Transportation (Contacted February 2003)
9. Colorado Department of Transportation (Contacted February 2003)
10. Arizona Department of Transportation (Contacted February 2003)
11. Illinois Department of Transportation (Contacted February 2003)
12. Oregon Department of Transportation (Contacted February 2003)

## Structured Phone Interview Questionnaire

(Project Managers Interviewed the Week of February 17-21, 2003)

1. Tell me about your experience using the Change Control Policy (policy) to deliver Rehabilitation projects.
2. Were your Rehabilitation projects delivered on-time? If not, please describe any delays that were encountered.
3. Are there significant differences between managing a Rehabilitation project prior to and post 2000/2001 Fiscal Year? Please explain.
4. Did locking in the project's scope of work, much earlier in the process, take away too much flexibility so that the needs of the sponsors went unmet?
5. Did implementing the policy improve working relations with regulatory or resource agencies? If so, please explain.
6. How did the policy affect the construction cost of the projects in terms of the quality of the end project (i.e. more or less changes during construction)?
7. Were project development support resources expended efficiently and effectively or did a considerable amount of rework arise for the project development team?
8. Anything I should know about your projects that would distinguish them from regular Rehabilitation projects?



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