

**ATTACHMENT 48 – ANSWERS TO STANDARD SET OF QUESTIONS BY THE  
CALIFORNIA DOT (CALTRANS)**

(15 pages)

## California DOT (Caltrans)

May 1, 2008

Italics represent the responses by the California DOT (Caltrans).

**1. What was your procedure in reviewing consultant engineering bridge plans in the early 1960's? What is your procedure in reviewing consultant engineering bridge plans today?**

### **State-Owned Bridges**

#### ***1960's***

*There was no formal procedure in reviewing consultant engineering bridge plans in the early 1960's as in-house staff designed nearly all state bridges. When consultant designed bridges were reviewed, the typical practice was to undertake a rigorous analysis of the design, independent design calculations, and a comprehensive check of the contract plans. This was performed under the direction of experienced bridge design engineers. This practice extended into the mid-1980's when an office was established to review projects of this nature.*

#### ***Current Practice***

*Since the mid-1980's an office dedicated to the review of consultant engineered bridge plans has been in place. In the mid-1990's the office was split, with one office handling Caltrans sponsored projects the other office handling external agency sponsored projects.*

*Currently there is a comprehensive process for developing consultant-prepared bridge projects. These offices are involved from the planning, through preliminary design and final design stages, and completion of construction.*

*These offices, with functional support from groups with specialized expertise, review the planning documents, preliminary and final design plans, design calculations, foundation reports, hydraulic reports, project construction specifications, and other items. The reports are reviewed against the plans and calculations to determine if the information was used correctly. The design, independent check and other pertinent items are also reviewed against design specifications, Department policies, and design guidance materials.*

#### ***Additional Information:***

*Items reviewed: See Information & Procedures Guide section 1-7 entitled "Deliverables."*

*<http://www.dot.ca.gov/hq/esc/osfp/project-development/information-and-procedures-guide/manual-sections/1-07.pdf>*

*Information publicly available via Department's internet website:*

*<http://www.dot.ca.gov/hq/esc/osfp/>*

### **Local Agency Owned Bridges:**

*Local Agencies own approximately 1/2 of the 25,000 publicly traveled bridges in California. It is unknown how Local Agencies review consultant designed bridge plans in the 1960's or today. Federal aid bridge projects are required to meet Caltrans standards. Considerable information related to the design of bridges is available from Caltrans.*

*At some point, Caltrans became very involved with development of locally owned federal aid bridge projects. It is believed this involvement was a result of the enactment of the Special Bridge Replacement Program in the 1970's. In the mid-1990's Caltrans relinquished this responsibility to the local agencies.*

**2. How do you ensure the QA/QC process of a consultant engineering firm is adequate? In the early 1960's and today? What procedures are in-place to ensure that the consultant does not submit an inadequate design?**

### **State-Owned Bridges**

#### ***1960's***

*The adequacy of consultant QC/QA process is unknown, nor are the procedures to ensure against the submittal of an inadequate design.*

*As previously stated, when the occasional consultant-designed bridge plans were submitted, the typical practice was to undertake a rigorous analysis of the design and a comprehensive check of the calculations and plans. This was performed under the direction of experienced bridge design engineers.*

#### ***Current Practice***

*The basis for a formal QC/QA process was developed for consultant-designed State bridges in the 1980's and formally presented in manual form around 1990. This manual titled "Information & Procedures Guide" was completely revised and expanded in 2002 to incorporate all aspects of bridge design from project inception to construction completion. Consulting engineering firms develop internal procedures and project specific QC/QA plans. The QC/QA plans are a required submittal and are reviewed in addition to the previously described reviews.*

### **Local Agency Owned Bridges:**

*It is unknown how Local Agencies ensure the adequacy of their bridge designs. Local agencies are required to self-certify that their federal aid bridge projects meet Caltrans standards.*

**3. What does Caltrans consider a red-flag item when reviewing consultant engineering bridge plans? What follow-up action is taken to address the red-flag item? Describe the level of detail Caltrans uses in reviewing consultant engineering bridge plans?**

**State-Owned Bridges**

*A list of items from the minor to the major is returned to the design consultant. All items, both minor and major, are addressed or corrected before plan approval is recommended. Approval includes the Caltrans reviewer signing each bridge plan sheet to signify that the plans appear to be structurally adequate and meet minimum Caltrans standards.*

*As previously described, there is a comprehensive process for developing consultant-prepared bridge projects. These offices are involved from the planning, through preliminary design and final design stages.*

*These offices, with functional support from groups with specialized expertise, review the planning documents, preliminary and final design plans, design calculations, foundation reports, hydraulic reports, project construction specifications, and other items. The reports are reviewed against the plans and calculations to determine if the information was used correctly. All pertinent items are also reviewed against design specifications, Department policies, and design guidance materials.*

**Local Agency Owned Bridges:**

*It is unknown how many owners of local agency bridges handle red flag items.*

**4. Does Caltrans review consultant engineering bridge plans concurrently with the FHWA Division Office? Does Caltrans review the consultant plans with the expectation that FHWA will be performing a similar type of review?**

**State-Owned Bridges**

*Caltrans always does a thorough review for state highway bridges with no expectation that FHWA will be performing a similar type of review.*

**Local Agency Owned Bridges:**

*Caltrans is not required to review local agency owned bridge plans. FHWA may selectively review these projects, typically as a part of a process review.*

**5. What are the qualifications of Caltrans personnel who conduct the review of consultant engineering bridge plans?**

*The lead reviewer is always a Senior Bridge Engineer who is a licensed Professional Engineer and has a minimum of two years of experience in designing bridges for the State. These engineers are assigned projects within a geographical region (typically Caltrans, regions, Districts or portions thereof) and have independent quality assurance responsibilities from the projects inception to construction closeout. Thus they develop an extensive working knowledge of the projects. These Liaison Engineers are responsible for coordinating the responses from the various functional reviews and have final responsibility to judge the acceptability of the design project.*

*Staff working under the direction of the Liaison Engineer, or under the functional leads, normally perform the detailed reviews. Basic qualifications for the Staff Engineers are an engineering degree from an accredited college and must have extensive California bridge design experience.*

*The current experience level of Senior and Staff Oversight engineers far exceed these minimum requirements. Many of the Staff Oversight engineers have their professional engineering license.*

**6. What is the percentage of bridge design work that is done in-house versus the percentage that is done by consultant engineering firms?**

*The following percentages represent a 10-year timeframe for bridges built on the state highway system. As the Department does not specifically track this statistic the figures are an approximation. These percentages are based on costs obtained from bid openings or from Engineer's Estimates.*

- *~50% by in-house engineers*
- *~25% by consultants hired by Caltrans*
- *~25% by consultants hired by cities, counties, regional transportation authorities and developers.*

**7. Describe the structure of Caltrans? Is the bridge office centrally organized? How many district bridge offices are located in the state? Are consultant engineering bridge plans reviewed at the central office or district bridge office?**

*The main Caltrans bridge design office is located in Sacramento with two smaller regional design groups in Los Angeles County and in Oakland. The state is divided into 12 district offices. The majority of the consultant designed bridge plans are reviewed in the main office in Sacramento.*



## 1-7 Deliverables

Summarized in this section are general deliverable requirements and information for documents to be submitted for projects with bridges or other transportation-related structures.

Registered Professional Engineer registration seals and signatures required on deliverables shall be in accordance with the requirements of the State of California Business and Professions Code and Caltrans policy as stated elsewhere in this Guide.

All submitted documents shall be neat and legible. Paper plans must be stapled outside of the left border and other documents must be bound. Loose-leaf type binders may be used. Project identifications are to be clearly shown on each document and electronic media as stated in this section and elsewhere in this guide. The contents of all documents should be indexed, and all pages numbered.

Attachment 1-7.1 Deliverable Distribution List indicates the required documents and the number of copies that are submitted to OSFP by the Consultant for the various phases of the project.

### Deliverable Distribution List

The Deliverable Distribution List is used for project development from inception to PS&E Completion. It is intended for use by Districts, sponsoring agencies, and consultants to convey the deliverable requirements for each element of the project for which OSFP provides oversight. Following is a description of the information each column in the list contains.

#### **Section Reference**

Provides a convenient cross-reference to the pertinent sections elsewhere in this manual.

#### **Deliverable Review Duration**

Provides the review duration OSFP requires to review the different deliverables for typical projects. The durations take into account the time needed for OSFP to coordinate reviews through the various functional units within the Division of Engineering Services. Sponsoring agencies and their consultants must include the appropriate review duration into the project schedules. The Liaison Engineer should be consulted early in the project to assist with schedule development to ensure that all necessary reviews are properly considered. This particularly applies to projects that contain non-typical elements.

During the development of the project, the schedule should be reviewed with the Liaison Engineer to ensure that the elements of the project can be reviewed as originally planned.



### **Minimum Total Copies**

Provides the number of copies of documents required. Before making any copies of the deliverable documents, the consultant should always confer with Liaison Engineer to determine the exact requirements.

The Liaison Engineer will determine the need for additional document copies which may be required for projects with non-typical features, such as pumping plants, movable bridges, vehicular tunnels, steel structures and railroads. Additional copies may also be required for those projects which require extraordinary distribution to Districts, the Federal Highway Administration, DES Technical Committees or individual Technical Specialists.

Unless otherwise approved by the Liaison Engineer, the deliverables shall conform to the numbers indicated.

### **Copies per Structure (S) or Project (P)**

Indicates whether the number of copies is on a per structure (S) basis or on a per project (P) basis.

In certain cases, the designation (S/P) is used. If there are a large number of structures on a project the deliverables should be on a per structure basis. If there are a small number of structures on the project, deliverables can be based on a per project basis with the approval of the Liaison Engineer

### **Remaining Columns**

Provides the details regarding the involvement of other units that participate in project reviews. These columns are primarily for use by OSFP.

In addition to design reviews performed by OSFP, other offices within the Division of Engineering Services provide reviews in specialized areas. Listed below, in the same order as shown on the list to provide clarity, are the functional areas that most often perform reviews:

- Office of Geotechnical Services
- Structure Hydraulics
- Structure Design
- Structure Construction
- Structures Maintenance
- Earthquake Engineering
- Structures Specifications
- Bridge Architecture & Aesthetics



# OSFP Information and Procedures Guide



## 1-7 Deliverables

March 2004

- Various Technical Specialists or Committees, such as, Bridge Barriers, Retaining Walls, Signs, Underground Structures, Concrete, Structural Steel, etc.
- Structures Estimating

The Liaison Engineer will determine the involvement of the specific units and will distribute the documents as necessary. Consultants shall only submit deliverables to the Liaison Engineer and not directly to the units shown.

### Attachments

1. 1-7.1 Deliverable Distribution List

Deliverable Distribution List (Project Development)	Section Reference	Review Duration (Weeks)	Minimum Total Copies	Copies per Structure (S) or Project (P)	OSFP			OGS	HYD	Others								
					Liaison Engineer	OSFP FILE	OSFP Str Reviewer	OSFP Detailing	Foundations	Hydraulics	DSD	DSC	DSM&I	EQ Engineering	Specifications	Aesthetics	Specialists	Estimating
<b>Project Study Report/Project Report</b>																		
<i>(PSR/PR, WBS 150, 160, 180)</i>																		
<b>PROJECT STUDY REPORTS (PDS) (WBS 150)</b>																		
1. Advanced Planning Study	3-2	4	6	S	1	1			1 <sup>1</sup>	1 <sup>1</sup>			1				1 <sup>1</sup>	
2. Preliminary Foundation Report	2-3		2	S	1				1 <sup>1</sup>									
3. Preliminary Hydraulics Report	2-4		2	S	1					1 <sup>1</sup>								
4. Structure Advanced Planning Study Checklist	3-2		6	S	1	1			1 <sup>1</sup>	1 <sup>1</sup>			1					1 <sup>1</sup>
5. Design Memo	3-2		6	S	1	1			1 <sup>1</sup>	1 <sup>1</sup>			1					1 <sup>1</sup>
6. Cost Estimate	3-2		2	S	1													1 <sup>1</sup>
7. Draft PSR			1	P	1													
Final Approved PSR (after APS Approval)		NR	2	P	1	1												
<b>PROJECT REPORTS (WBS 160)</b>																		
Items 1 through 6 above <sup>1</sup>		4	See items 1 through 6 above for copy requirements.															
Draft Project Report w/ Structures Planning Studies <sup>1</sup>			1	P	1													
Final Signed Project Report (after APS Approval)			NR	2	P	1	1											

General: Unless otherwise noted, all plans are to be reduced paper size (279x432 mm, 11”x17”).

<sup>1</sup> At the discretion of the Liaison Engineer

Deliverable Distribution List (Project Development)	Section Reference	Review Duration (Weeks)	Minimum Total Copies	Copies per Structure (S) or Project (P)	OSFP			OGS	HYD	Others								
					Liaison Engineer	OSFP FILE	OSFP Str Reviewer	OSFP Detailing	Foundations	Hydraulics	DSD	DSC	DSM&I	EQ Engineering	Specifications	Aesthetics	Specialists	Estimating
<b>Design Phase</b>																		
<b>PRELIMINARY DESIGN (WBS 210,215)</b>																		
<b>Pre-Type Selection</b>																		
Draft Bridge Site Data Submittal (to District) <sup>3</sup>	4-1	4	2	S													2	
Foundation Boring Plan	2-3	4	2	S/P	1			1										
Draft Final Hydraulics Report <sup>4</sup>	2-4	4	2	S	1				1									
<b>Type Selection</b>																		
Type Selection Report	4-2	4	14	S	1	1	1	1	1	1	1	1	1	1	1		2	
Approved Bridge Site Data Submittal w/attachments	4-1		1	S	1													
General Plan (electronic .DGN file)	2-2		1	S				1										
Draft Foundation Plan	4-2		2	S		1	1											
Final Hydraulics Report	2-4		2	S	1					1								
Preliminary Foundation Report	2-3		4	S	1	1			1	1								
<b>Post-Type Selection</b>																		
Type Selection Review Meeting Summary	4-2	NR	2	P	2													
Updated General Plan Estimate	4-2	NR	2	S	1												1	
Updated General Plans <sup>1</sup>	4-2	NR	40	S	1	1	1	1	See GP Distribution List, Memo to Designers									

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<sup>1</sup> At the discretion of the Liaison Engineer

<sup>3</sup> Contact District Project Manager to determine necessary number of copies.

<sup>4</sup> Submit minimum of 4 weeks prior to Type Selection Submittal

Deliverable Distribution List (Project Development)	Section Reference	Review Duration (Weeks)	Minimum Total Copies	Copies per Structure (S) or Project (P)	OSFP			OGS	HYD	Others								
					Liaison Engineer	OSFP FILE	OSFP Str Reviewer	Foundations	Hydraulics	DSD	DSC	DSM&I	EQ Engineering	Specifications	Aesthetics	Specialists	Estimating	District
<b>65% UNCHECKED DETAILS (WBS 240)</b>																		
Unchecked Structure Plans (paper)	4-3	3	6	S	1		1	1			1						1	
Unchecked Structure Plans (electronic)	4-3		1	S				1										
Draft Road Plans	4-3		4	P	1		1	1				1						
Draft, Final Foundation Report	4-3	6	4	S	1	1			2									

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Deliverable Distribution List (Project Development)	Section Reference	Review Duration (Weeks)	Minimum Total Copies	Copies per Structure (S) or Project (P)	OSFP			OGS	HYD	Others										
					Liaison Engineer	OSFP FILE	OSFP Str Reviewer	OSFP Detailing	Foundations	Hydraulics	DSD	DSC	DSM&I	EQ Engineering	Specifications	Aesthetics	Specialists	Estimating	District	
<b>INITIAL PS&amp;E (WBS 240)</b>																				
Structure Plans	2-2	6	13	S	1	1	1	1	2			2	1		1			1 <sup>2,5</sup>	2	
Structure Plans (electronic file)	2-2		1	S				1												
Design Calculations	4-5		1	S			1													
Check Calculations	4-5		1	S			1													
<b>Structure Special Provisions</b>																				
Structure Special Provisions	4-6		6	P			1		1				2			1			1 <sup>2,5</sup>	
Special Provisions (electronic file)	4-6		1	P												1				
Memo to Specification Engineer/Estimator	4-6		3	P	1											1			1 <sup>2,5</sup>	
<b>Cost Estimate</b>																				
Cost Estimate	4-7		2	S			1												1 <sup>2,5</sup>	
Quantity Calculations & Summary Sheets <sup>2</sup>	4-7		2	S			1												1 <sup>2,5</sup>	
Working Day Schedule <sup>2</sup>	4-7		2	P			1												1 <sup>2,5</sup>	
<b>Final Reports</b>																				
Final Hydraulics Report <sup>1</sup>	2-4		4	S			1		1							2				
Final Foundation Report	2-3		5	S			1		2							2				
<b>Road Plans</b>																				
Road Plans (paper)	4-8		3	P			1		1				1							
Road Special Provisions (electronic)	4-8	5	P			1		1				1			1			1 <sup>2,5</sup>		
Consultant Quality Control Statement	1-6	1	P			1														

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<sup>1</sup> At the discretion of the Liaison Engineer  
<sup>2</sup> Submit only for projects advertised by Caltrans.  
<sup>5</sup> Liaison Engineer: Route submittal thru Specifications for state advertised projects.

Deliverable Distribution List (Project Development)	Section Reference	Review Duration (Weeks)	Minimum Total Copies	Copies per Structure (S) or Project (P)	OSFP			OGS	HYD	Others								
					Liaison Engineer	OSFP FILE	OSFP Str Reviewer	OSFP Detailing	Foundations	Hydraulics	DSD	DSC	DSM&I	EQ Engineering	Specifications	Aesthetics	Specialists	Estimating
<b>INTERMEDIATE PS&amp;E (WBS 240)</b>																		
Resubmit all items in Initial PS&E <sup>1</sup>		4	Same as Initial PS&E Submittal, Contact Liaison Engineer															
<b>FINAL PS&amp;E <sup>7</sup> (WBS 240 thru 250))</b>																		
Final Structure Plans	2-2	4	6	S	1		1	1							2 <sup>6</sup>		1 <sup>2</sup>	
Signed Structure Plans (electronic file)	2-2		1	S				1										
Plans (paper, full size reproducible)	2-2		1	S	1													
Road Plans (paper) & Road Special Provisions (electronic)	4-8		1	S		1												
Resident Engineers Pending File	4-9		2	S								1 <sup>2</sup>		1 <sup>2</sup>				
1:50 Deck Contour Plot (full scale reproducible)	4-9		1	P								1 <sup>2</sup>						
1:50 Deck Contour Plot (full scale print)	4-9	2	P								2 <sup>2</sup>							

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<sup>1</sup> At the discretion of the Liaison Engineer

<sup>2</sup> Submit only for projects advertised by Caltrans

<sup>6</sup> Submit 1 copy for non-state advertised projects

<sup>7</sup> Assumes that all documents not shown were reviewed and determined to be final in previous PS&E reviews.

Deliverable Distribution List (Post PS&E Approval and Construction)	Section Reference	Review Duration (Weeks)	Minimum Total Copies	Copies per Structure (S) or Project (P)	OSFP			OGS	HYD	Others						
					Liaison Engineer	OSFP FILE	OSFP Str Reviewer	Foundations	Hydraulics	DSD	DSC	DSM&I	EQ Engineering	Specifications	Aesthetics	Specialists
<b>CONTRACT ADVERTISEMENT (WBS 265)</b>																
As-Advertised Plans <sup>2</sup>	4-12	--	10	P	1	2		1			3	1	1	1		
As-Advertised Special Provisions <sup>2</sup>	4-12	--	10	P	1	2		1			3	1	1	1		
<b>ADDENDA (WBS 265)</b>																
Plan Details																
Plan Details (full size) <sup>2</sup>																
Plan Details (electronic) <sup>1</sup>																
Design Calculations																
Check Calculations																
Quantities <sup>1</sup>																
Check Quantities <sup>1</sup>	4-13				Copies As Required by the Liaison Engineer											
Cost Estimates <sup>1</sup>																
Special Provisions																
Addenda Memorandum <sup>2</sup>																
Addenda <sup>2</sup>																
<b>BIDDER INQUIRIES (WBS 265)</b>																
Documentation of Bidders Inquiries	4-14		6	P	1	1					3		1			

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<sup>1</sup> Submit only for projects advertised by Caltrans

<sup>2</sup> Do not submit for projects advertised by Caltrans



Deliverable Distribution List (Post PS&E Approval and Construction)	Section Reference	Review Duration (Weeks)	Minimum Total Copies	Copies per Structure (S) or Project (P)	OSFP			OGS	HYD	Others						
					Liaison Engineer	OSFP FILE	OSFP Str Reviewer	Foundations	Hydraulics	DSD	DSC	DSM&I	EQ Engineering	Specifications	Aesthetics	Specialists
<b>CONTRACT CHANGE ORDERS (WBS 285) <sup>1</sup></b>																
<b>Initial and Intermediate Submittals</b>																
Structure Plans	5-2	ASAP—Up to weeks depending on the complexity of the change	7	S	1		1	1		1				1 <sup>2</sup>		
Structure Plans (electronic)	5-2		1	S			1									
Special Provisions	5-2		4	P	1						1				1 <sup>2</sup>	
Quantities <sup>2</sup>	5-2		2	S	1										1	
Check Quantities <sup>2</sup>	5-2		2	S	1										1	
Cost Estimates	5-2		2		1										1 <sup>2</sup>	
Structure Design Calculations	5-2		1	S	1											
Structure Independent Check Calculations	5-2		1	S	1											
Foundation Report	5-2		2	S			1		1							
Hydraulics Report	5-2		2	S			1		1							
Other items required			Copies As Required by the Liaison Engineer													
<b>Final Submittal<sup>7</sup></b>																
Structure Plans	5-2		6	S	1	1		1 <sup>2</sup>						2 <sup>6</sup>		1 <sup>2</sup>
Structure Plans (paper, full size reproducible)	5-2		1	S	1											
Structure Detail Sheets (electronic) <sup>2</sup>	5-2	1	S				1									
Other items required		Copies As Required by the Liaison Engineer														
<b>COST REDUCTION INCENTIVE PROSALS (WBS 285) 5-3</b>																
<b>Same as for Contract Change Orders</b>																
<b>AS-BUILTS (WBS 285)</b>																
Final As-Built Plans	5-5		1		1											
Red-Marked As-Built Prints (from field office)	5-5		1		1											

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<sup>1</sup> Required documents all at the discretion of the Liaison Engineer

<sup>2</sup> Submit only for projects advertised by Caltrans

<sup>6</sup> Submit 1 copy for non-state advertised projects

<sup>7</sup> Assumes that all documents not shown were reviewed and determined to be final in previous reviews.