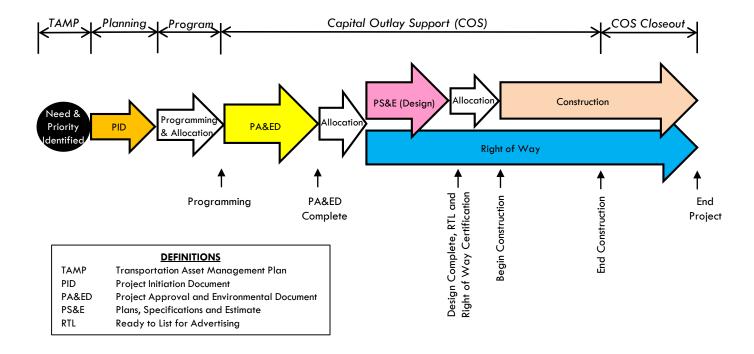


CTC Workshop

Caltrans Project Cost Development Process

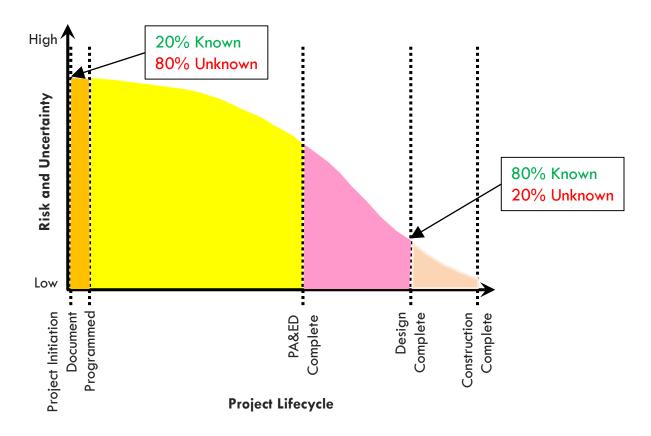
by Mike Keever and Tim Sobelman

Phases of Project Development





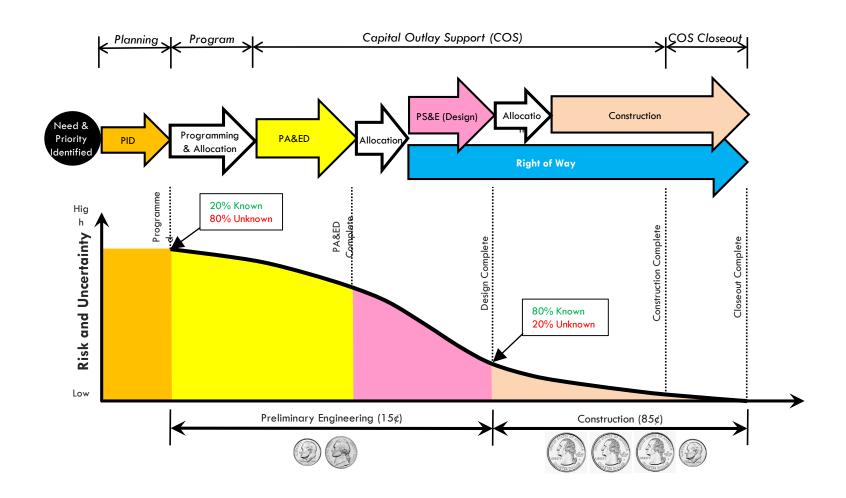
Risk and Uncertainty During Project Phases



Modified version of Project Management Institute, A Guide to the Project Management Body of Knowledge, (PMBOK® Guide) - Fifth Edition, Project Management Institute Inc., 2013 Page 40 Figure 2-9



Phases of Project Development





What is a cost estimate?



Cost Estimate Definition

- Forecasting the expense of building a project
- An approximate prediction of how much money is needed to complete a project
- 3. The art of assigning value combined with the science of making use of techniques to predict the cost of activities and assets.



Risk Register

District - County - Route - Begin Post Mile/End Post Mile Expenditure Authorization (EA) - EFIS ID - Planning Program Number (PPNO), SHOPP ID Tool Number SHOPP Tool Activity Category Month/Year

Project Initiation Report

To

Request Programming in the 20XX SHOPP

On Route	
Between	
And	
APPROVAL RECOMMENDED:	
	(Name), PROJECT MANAGER
APPROVAL RECOMMENDED:	
II I KOVAL KLEOMMENDED.	
	(Name), PLANNING DEPUTY DIRECTOR
APPROVED:	
HIROVED.	
(Name), DISTRICT DIRECT	OR (or delegated authority) DA

May 01, 2018 -Version 1.0

Risk Register / Risk Management Plan for 06-0V110, Stratford Kings River Bridge Replacement

Phase

OPASE

1-PSSE

2-RW Sup

3-Can Sua
Support Centingence

4-Con Cas

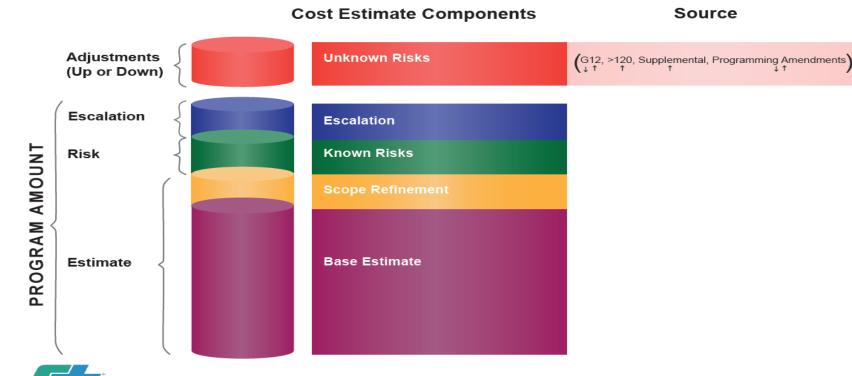
3-RW Cap

Capital Contingency

Total Contingency Project Nichmane: Stratford Kings River Bridge Replacement EA: 08-0/110 Co-Rt, Post Miles: Kings-41-30.8/33.0 Project Manager: FY & Program (SHOPP or STIP): 2018 (SHOPP) Total Costs (Capital & Support): \$32,008k RTL Target: 10/1/2021

Risk Identification				Risk Assessment				Risk Response			Quantifying "Red" (High P & I) Level Risks							
Status	ID#	Туро	Category	Title	Risk Statement	Current status / assumptions	Risk Trigger	Probability (P)	Cost Impact Schedule Impact (I)	Cost Score Schedule Score (PxI)	Strategy	Response Actions	Risk Owner	Updated	Impacted Phase	Calculated Contingency	Support (hours) Capital Cost 5k	Schedule (Day
Active 1 Threst Structure Foundation-work	Foundation work	The ability to conclud pers in the liver is unbrown all this limb and it can result in redesigning the structure for a sincle 300 again, which in compact	piors in the crook with 3 span	1-resigency worldallow cork 2-accuratelysis	4Hgh (51- 79%)	4 - Moderale (\$1900k - \$3196.8 q		Accept	(Ve are planning to set as delegate time and money (supplished) in order to deal with the reducing not the to dip in cose soour analysis power that a bridge.	Structure Designer	3/12/017	1-PSSE 9-p	\$109k 38	0.900 hours VL 1,440 hours P 2,000 hours PERT 1,444 hours 0.96,630k	0.30 VL E0 P.160 PERTAD -0.60			
			Satisf.			PSSEPermiting Prese.	2 3002 E BIJAB	90%	8 - Hgn (3-6 morths)	92		redesign is called for or perhaps the resource agency more dates about or not allowed in the proor c	July		40en Osp	\$5,051k	HL 93 550k P 58,700k PERT 18,417k	+HL 29 P10
Aztive	2n	Threat	Dasgr	l Ign water	water elevation can impact the vertical alignment of the roadway and the bridge. Righting the profile will	tuther study. High water	Structures hydraulic analysis	2-Love (11- 305v)	4 - Moderale (\$1800k - \$3195.84)	ε	Accept	We are planning to set as despine time and money (tupp & pop) in order to deal with the reducing of the	Design Senor	3/42017	D-MAED But	\$6k	O 150 hours ML 210 hours P 360 hours PERT 024 hours O 250 hours	0.20 WL 26 P OI PERT 2
				100	result in a wider foolprint which impacts RMF and Env. This insk will incount the project cost and schools by	elevation vill be available at 60% PASED:		20%	10 - Very High (+0 months)	30		verticle allignment and evaluate wither toolprint.			1-PS&C Sup	\$12k	ML 425 hours P 800 nours PERT 456 hours 0 30 hours	VC 53 P 100 PERT 5
Acre	20	Threat	Deagr	Hydrosita elevation - 19	Same as above			2 Live (11 30%)	4 - Moderato (\$1900k - \$3155.84)	8					2-RM Sub	\$7k	VL 60 hours P 160 rours PDRF 75 hours C 3 hours	%. 4/ F 110 PERT 6
				de satur- 18				90%	16 - Vary High (+6 morths)	99					3 On Sup	\$GK 28	V., 40 hours P 160 hours PERT 54 hours C \$100k	VL 20 F 120 PERT 1
Active	20	Ihrest	Desgr	High water elevation • 19	Same as above			2 Lor (21- 3056)	4 - Moderate (\$1900k - \$3166.04)	8					4-Don Osp	\$84k	ML \$250k P 9800k PERT \$317k O \$16k	ML 3
								20%	16 - Vary High (+6 mortile)	52					9 PW Cac	\$8k 11	NI S40k P B00k PERT S45k	N 4 P:19 PERT
Azive	3 C	pportunit	Consciudion	Construction working period -		We will assume two	Vildrein steson	3-Moderare (31 s0%)	8 - High (\$3200k - \$\$400 g	24	Accept	If the apportunate sek corrests tructor then we will be ease the fundants a PCR	Construction Senior	3/1/2017	3-OzriSu)		VI. P	M.
	_				working day during construction to the adverse y impacted. This will improdip to job obstitution of last; as their as one jet someoute.			40%	15 - Very High (>8 incritio)	**					/-Con Crp		VI. P	H.
Anivo	41	Threat		Tomporary construction essence:	ll adjacent landzwiers do not aight the TCC this still notos. Il o project past and refreshio adversely. We			3-Mederns (31 a0%)	1 - Very Low (neignificant)	3			R/W Strie	37123017	1-PS&F Sup		VI. P	M.
	1			agraement • 28	do not have a roof cause for this threat		<i>y</i>	40%	4 Vodente (1.3 storibe)	*2					2-RW 8up		VL P	HL 9
Astive	40	Threat	Right of Way	Temporary conduction esseners	Same as above										9 RW Cac		VL. P	H.
				egraement - 28														
Ache	doive 5 Threat Littles Utbycomer⊪	If utility owner (POSE is soon in reviding relection three time will report project once and extraction three time times are not only to see a soon to see the user utility company has been at soon to								Design Sen or	31/2017							
					respond to our previous projects.)											
Aztve	6	Threat	Utilizes	Utility relocation	There is a pasebility that the utility company (PGSE) will not bear the cost of the relocation and													
					would ward us to carry it. This will impact cap cost of the project.		j)											
16(15)40	Dia					for-site miligation for the				STATES					1			

Caltrans Project Cost Estimate Components



jeet eest Eetimate eempeneme

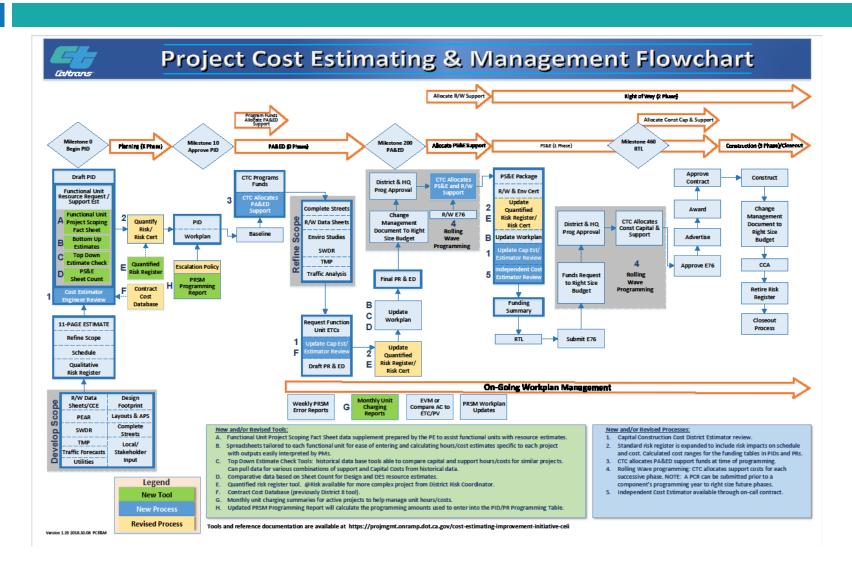
* All components are made up of both support & capital except scope refinement, which is capital only.

Version 2 Rev. 10/30/17



How Caltrans Develops Cost Estimates







Bid Summaries/Raw Data

314.	E OF CALIFORNIA	BID	SUM MARY	PAG	0211 SE 1
BID OPENING DATE CONTRACT NUMBER LOCATION		IN P LOCA	ERN COUNTY AT VARIOUS TIONS	02) CONTRACT CODE 28 CONTRACT	
		METH	ACRYLATE AND JOINT SEALS	FEDERAL AID NONE	
DVBE GOAI PROPOSALS ISSUED 10	S: DISABLED VETERAN	IS BUSINESS ENTE		TOTAL NUMBER OF WORKING DAYS 45	
NUMBER OF BIDDERS 9	ENGINEERS EST	413,889.02	AMOUNT UNDER 136,	512.02 PERCENT UNDER EST 33.01	
BID RANF	BID TOTAL		BIDDER INFORMATION (N.	AME/ADDRESS/LOCATION)	
1	277,277.00	4	TRUESDELL CORPORATION (CALIFORNIA, INC. 1310 W. 23RD STREET TEMPE AZ 85282		AIMED.
2	306,630.30	7	ETIC 2285 MORELLO AVENUE PLEASANT HILLCA 945:		.AIMED
3	308,640.27	5	***************************************	INC. 909 394-4510 SB PREF CL	
			SAN DIMAS CA 91773	PREFERENCE	
4	314,000.04	3	INC.	RUCTION, 818 898-2300 SB PREF CL 00662355 FAX 818 898-2330 BID IS OV PREFERENCE	ER SBP
5	316,300.00	6	AMERICAN CIVIL CONSTRUCT	TORS 707 746-8028 NSB PREF C	AIMED.
6	319,080.57	2	ENGINEERING CONSTRUCTION	949 252- <u>0441</u> NSB PREF CI DN, INC. 00615876 CLE WEST FAX 949 252-0266	AIMED.



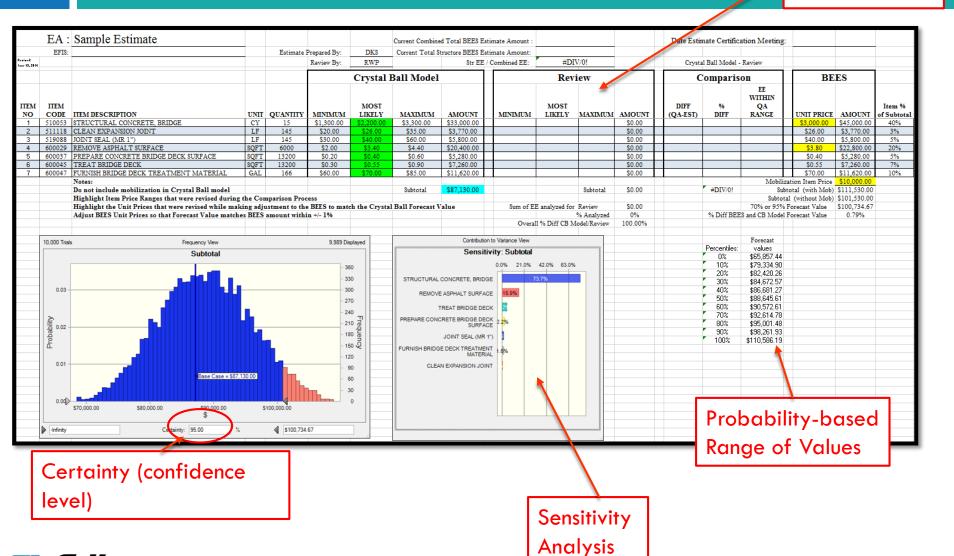
Bid Summaries/Raw Data

	06-0U1804 06-KER-0-0 02/16/17		сои	TRACT	PROP	OSAL OF	LOW BI	DDER	BID211 PAGE 20 02/17/17	
ITEM NO.	ITEM CODE		ITEM	DESCRIPTION			ESTIMATED QUANTITY	BID	AMOUNT	
1 2 3	070030 120090 120100	CONSTR	COMPLIANCE PROCECTION AREA	SIGNS		LS LS LS	LUMP SUM LUMP SUM LUMP SUM	8,500.00	5,000.00 8,500.00	
3 4 5	120100 128652 130100	PORTAB		LE MESSAGE S	SIGN (LS)		LUMP SUM	3,300.00 750.00	25,000.00 3,300.00 750.00	
6	130200 130900	TEMPOR	RARY CONCRETE	E WASHOUT		AM LS	LUMP SUM LUMP SUM	2,500.00	2,500.00 100.00	
8	141103	STRIPE	E (HAZARDOUS		TRAFFIC		3,880	2.00	7,760.00	
	(F) 510053 511118					LF	0.4 233	15,000.00 25.00	6,000.00 5,825.00	
- ITEM	S	ECOND			THIRD	 	FOU	 RTH	FIFTH BID AMOUNT	
 									BID 	
1 i	1,92	5.00	1925.00	1,	,600.00	1600.00	1,800.0	00 1800.00	1,500.00	1500.0
2 3	10,77	5.00	10775.00	10,	000.00	10000.00	10,764.0	00 10764.00	7,400.00	7400.0
3 I									52,153.80 5,000.00	
5	-,						,		500.00	
6									1,000.00	
7	72	0.00	720.00		500.00	500.00	300.0	00 300.001	1,000.00	1000.
8 [2.45	9506.00		2.20	8536.00	1.4	45 5626.001		8148.
9 10	,	0.00	4880.00 5056.10		000.00		21,800.0		15,000.00 20.00	6000. 4660.

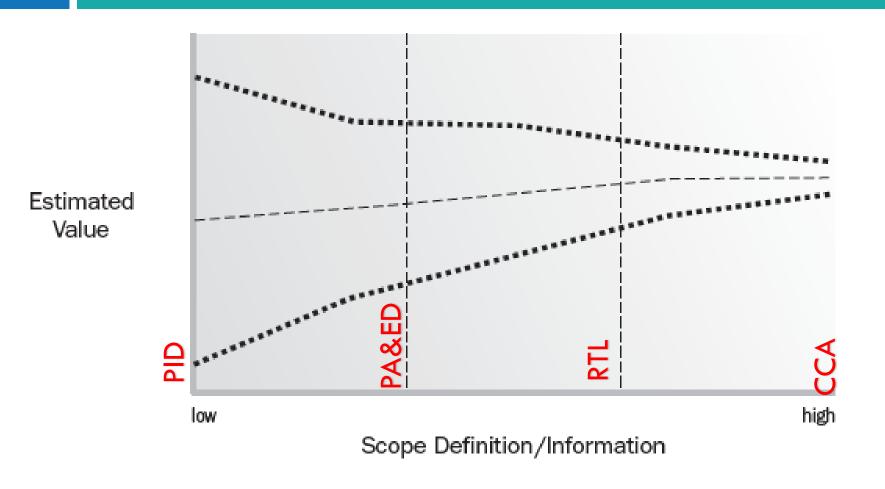


Probabilistic Cost Estimate using Monte Carlo simulation

Independent Review



Cost Estimating Uncertainty





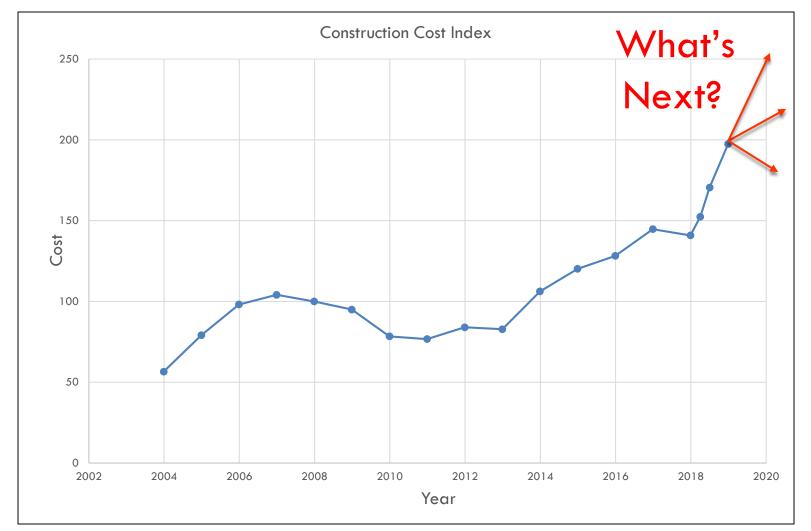
The Challenge of a Dynamic Bidding Environment



Construction Costs can be Volatile and Difficult to Predict

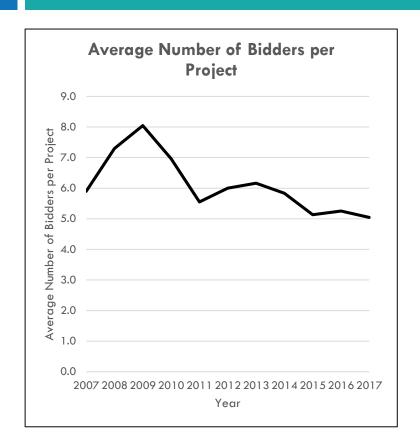


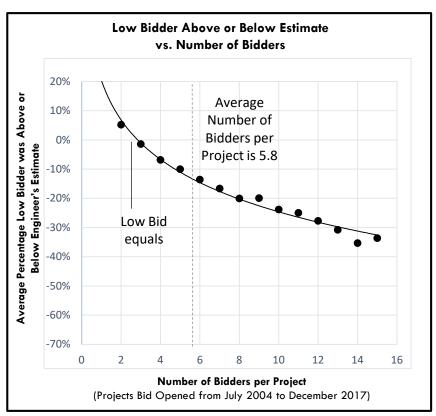






More Bidders Equals Lower Costs







What Can Happen in 6 Months?



\$100 Oil Becomes \$50 Oil

May 10, 2018

CNBC: "Oil prices risk spiking to \$100 next year, Bank of America analysts say."

October 3, 2018

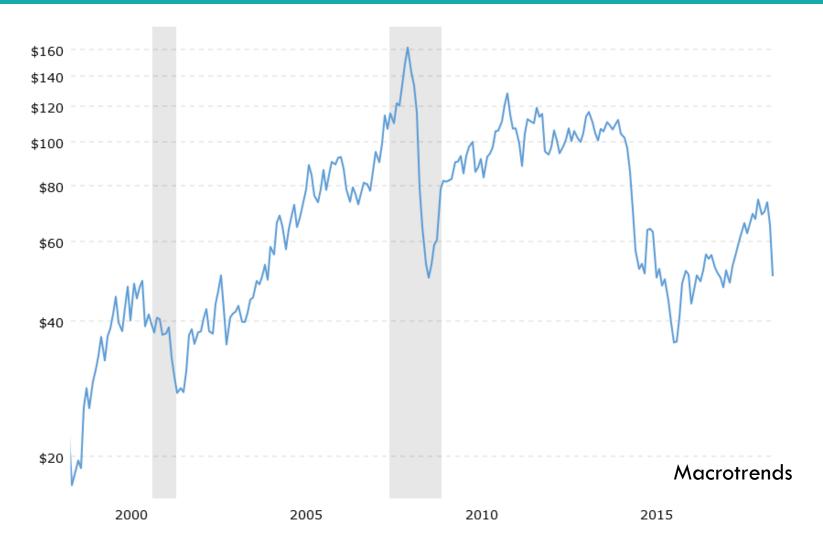
Reuters: "Oil traders have piled into wagers that U.S. crude oil could surge to \$100 a barrel by next year."

November 29, 2018

CNN: "US crude fell below \$50 a barrel Thursday...."



Crude Oil Prices

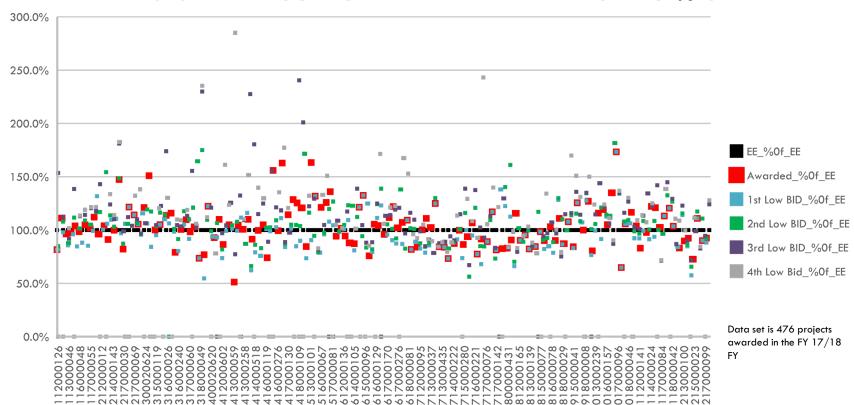




The Results



FY 17/18 BID RESULTS AND AWARDED PRICE AS % OF EE





G-12 Progress Report 5-Year Look

5-Year Authorized Adjustments to Capacity Fiscal Years 2013-14 through 2017-18 (\$ in millions)

Fiscal Years	Prog	Net Change		
riscal rears	SHOPP ¹	STIP ²	INC	Change
2013-14	\$ (133.0)	\$ 13.0	\$	(120.0)
2014-15	\$ (100.4)	\$ (3.7)	\$	(104.1)
2015-16	\$ (148.6)	\$ (52.9)	\$	(201.5)
2016-17	\$ (123.2)	\$ 1.4	\$	(121.8)
2017-18	\$ (162.2)	\$ 12.9	\$	(149.3)
TOTAL	\$ (667.4)	\$ (29.3)	\$	(696.7)

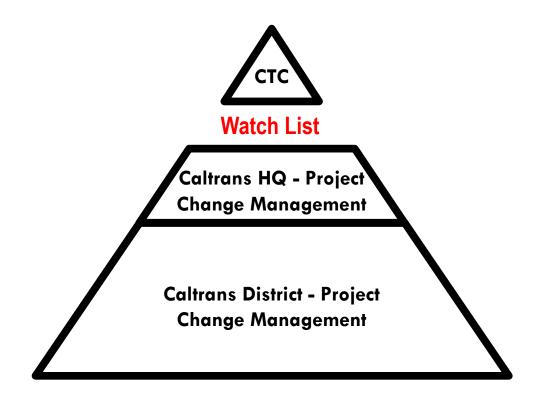
Note: Totals may not add due to rounding

²Includes STIP G-12 and Proposition 1B Bond G-12 (TFA) adjustments.



¹ Includes SHOPP G-12s, Proposition 1B Bond G-12s (SHOPP Augmentation) adjustments & rescissions.

Project Change Management Hierarchy





Caltrans District – Project Change Management

Caltrans Identifies Changes: during all project phases through:

- Studies Environmental, Engineering
- Surveys
- Geotechnical Analysis
- Field Reviews
- Coordination with Local Partners and the public
- Permit Negotiations

Caltrans Manages Changes through:

- Project Development Teams
- District Status Meetings
 - Executive Review
- Task Management
- Qualitative and Quantitative Risk Management





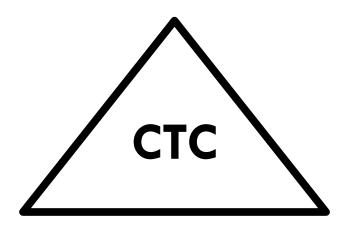
Districts Coordinate with Headquarters to Identify, Evaluate, Manage and Mitigate Change:

- Quarterly Status Meetings
- HQ Functional Coordinators
- HQ Executive Meetings

Considerations

- Amendments- Cost or Schedule
- Split or Combine Projects
- Time Extensions
- Greater than 20% Allocations
- Supplemental Fund Requests

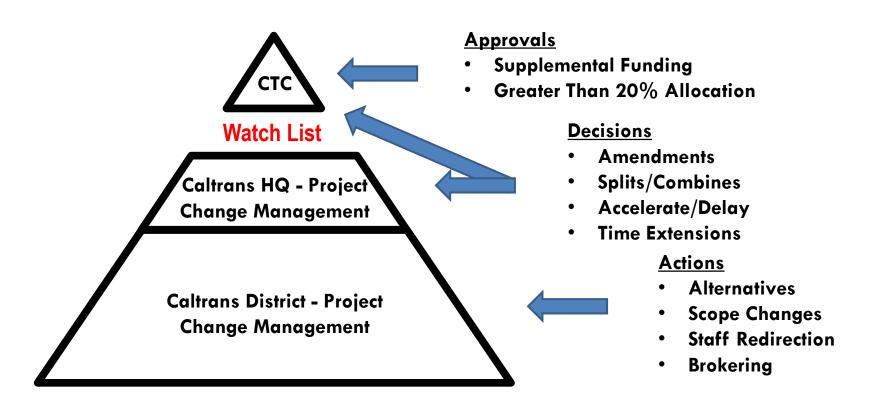




Before project changes (>20 percent or Supplemental allocations) are presented to the Commission for action:

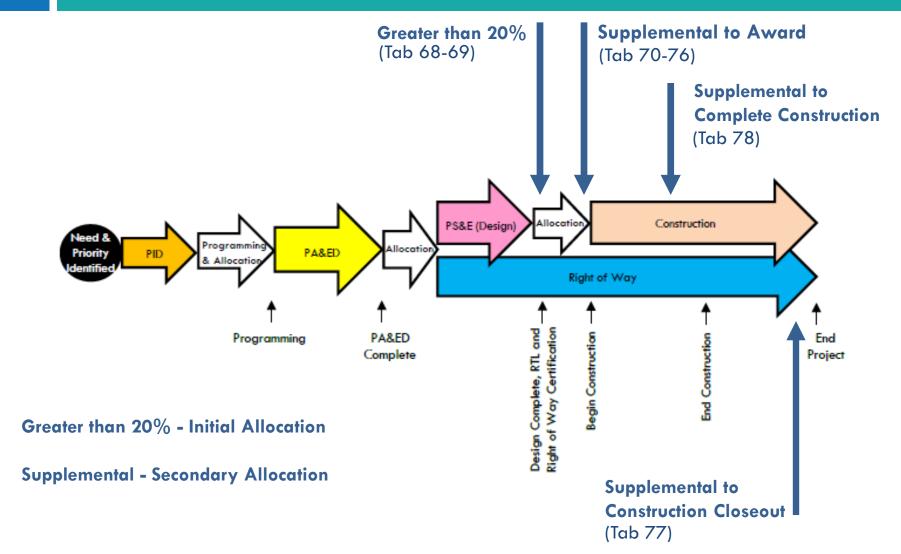
- Caltrans Office of CTC Liaison Coordination
- Pre-meetings with CTC Staff





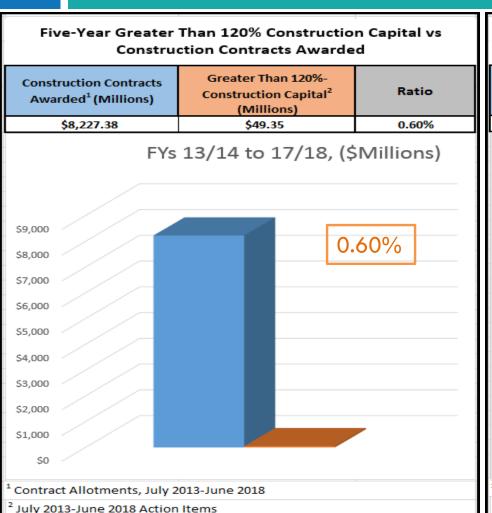


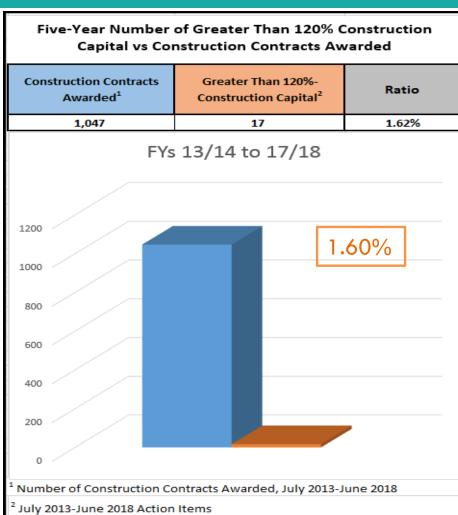
Supplemental and "Greater than 20%" Allocations





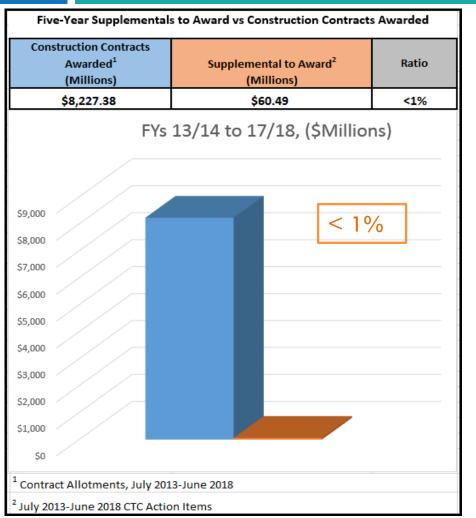
Five-Year Greater Than 120% vs Awarded FYs 13/14 to 17/18

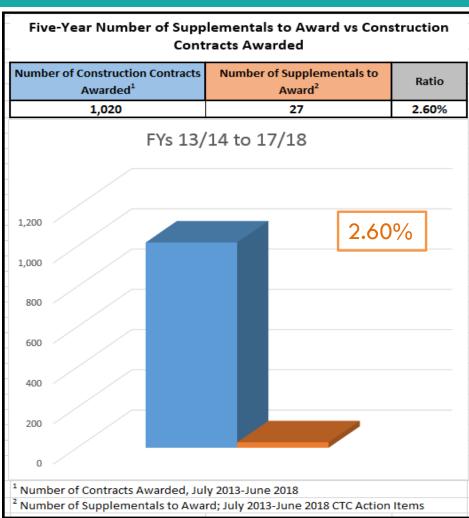






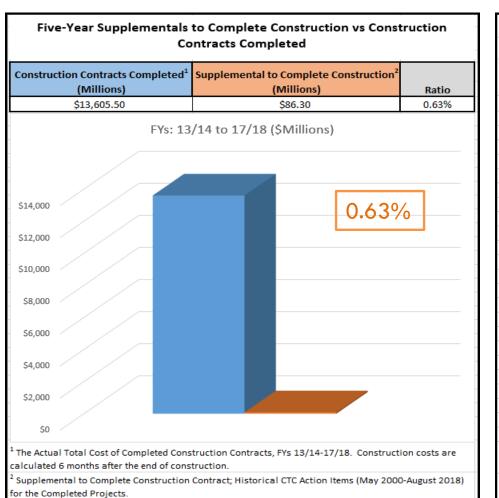
Five-Year Supplementals to Award vs Awarded FYs 13/14 to 17/18

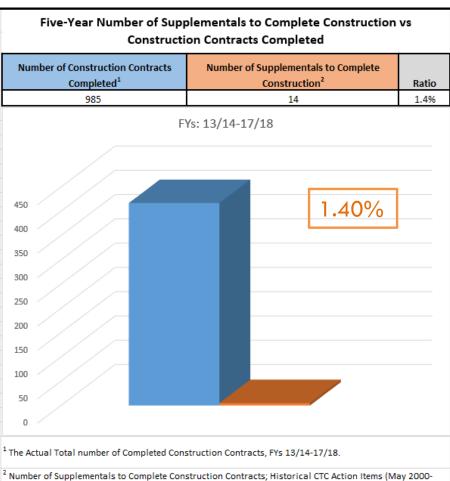






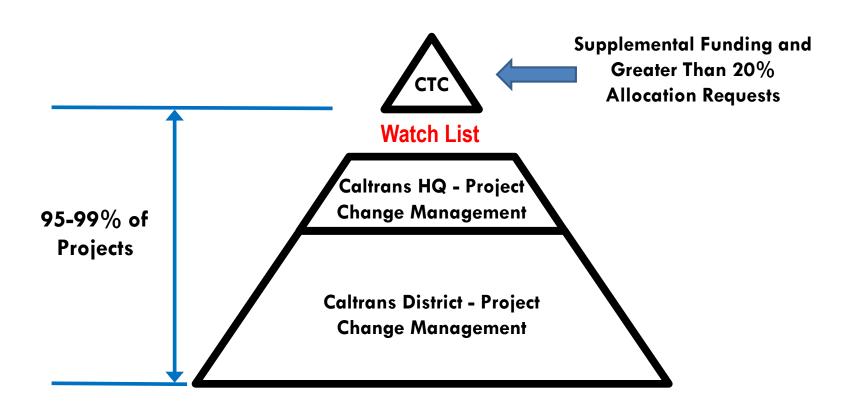
Five-Year Supplementals to Complete Construction vs Construction Contracts Completed-FYs 13/14-17/18





August 2018) for the Completed Projects.







What We are Doing to Improve



Cost Estimating Improvement Initiative

- Improved Estimating Tools
- Identification of Best Practices
- Quantification of Risk
- Training
- Business Intelligence
- Economist

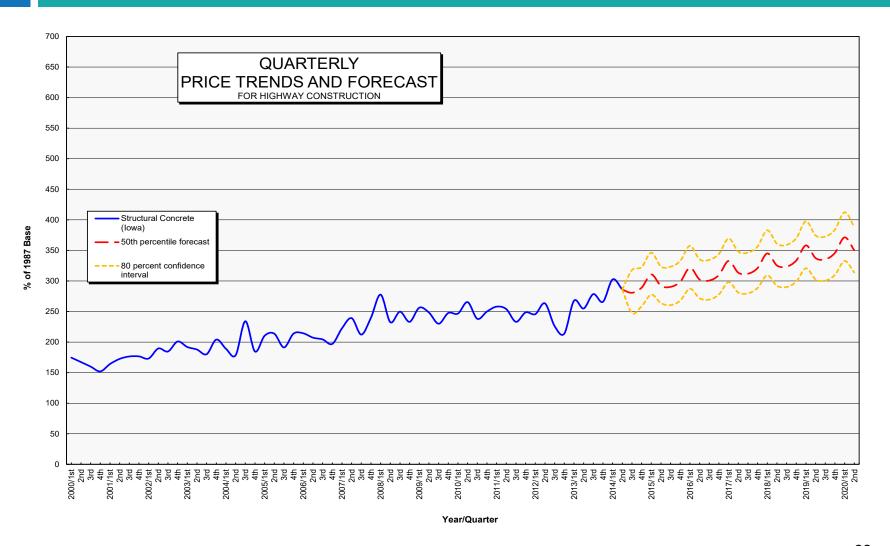


Construction Cost Escalation Study

- Research and assess Caltrans' construction cost escalation practices and existing forecast methodology
- Generate risk-adjusted forecasts for the California Highway Construction Cost index (CHCCI)
- Develop regional factors to account for different price dynamics across the State



Price Trends Forecast





Delivery Results



FY 17-18 4th Quarter Project Delivery Performance Measures

Project Costs at End of Construction¹

Measure	Expended	Budget	Savings	%	Annual Goal (%)	On Target
Costs for 29 Completed STIP Projects	\$1.37 B	\$1.59 B	\$218 M	86%	< 100%	✓
Costs for 388 Completed SHOPP Projects	\$2.11 B	\$2.34 B	\$228 M	90%	< 100%	✓

¹ Construction costs are calculated 6 months after the end of construction



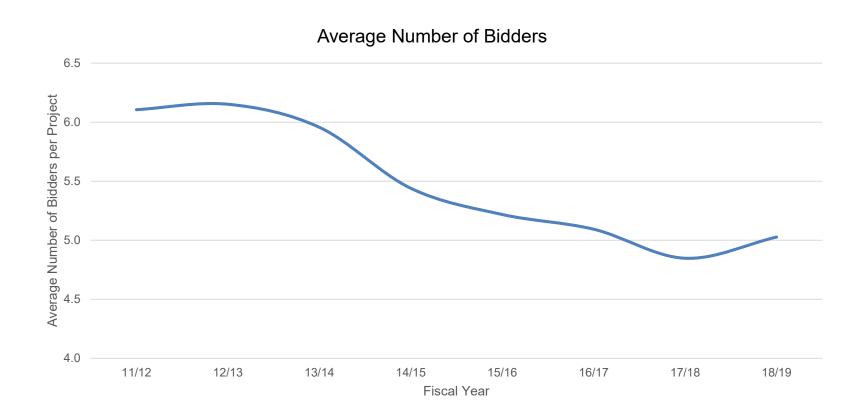
Questions?



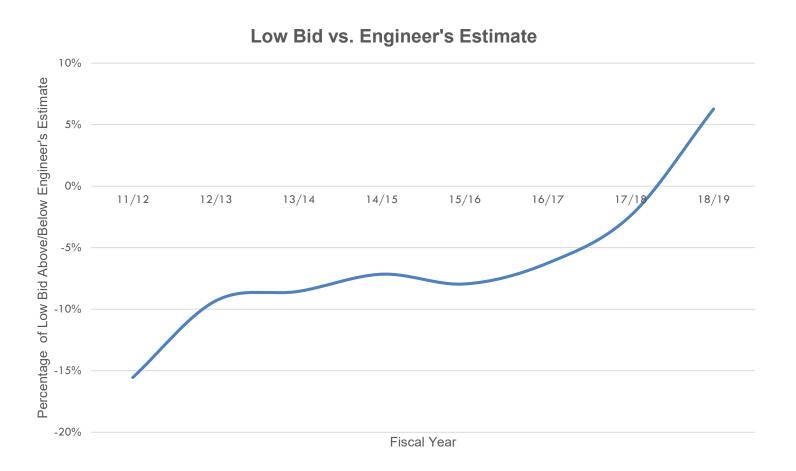


CTC Workshop Bidding Environment

by Rachel Falsetti





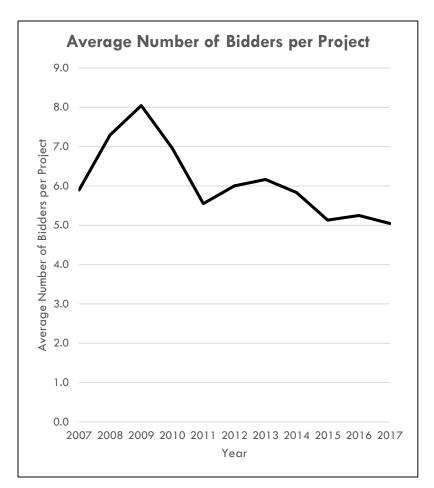


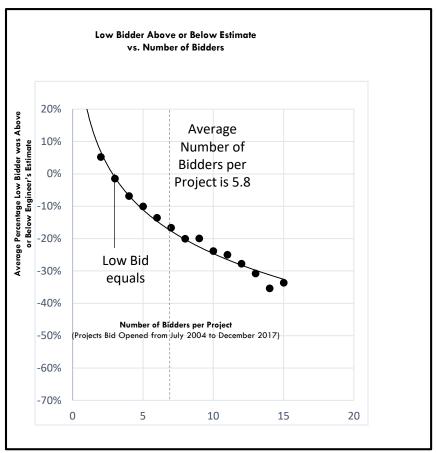






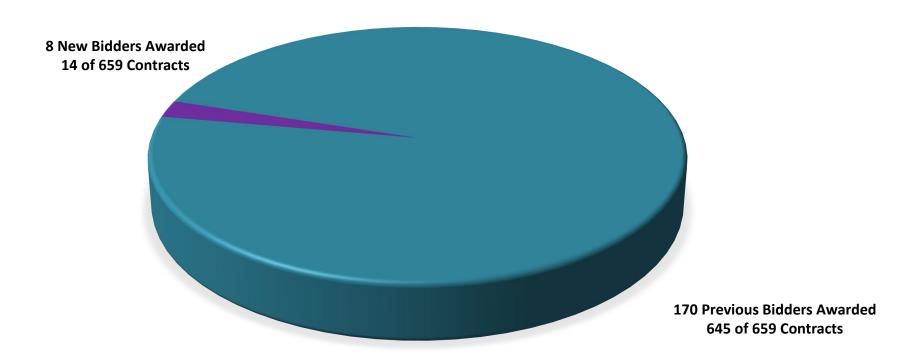
More Bidders Equals Lower Costs







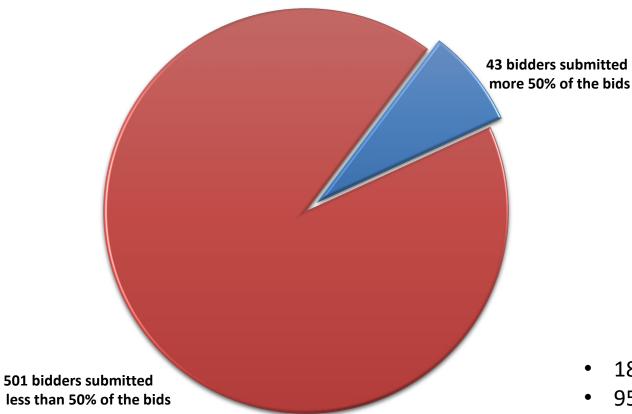
NUMBER OF CONTRACTS AWARDED TO BIDDERS



April 2017 – November 2018







- 1852 Projects advertised
- 9575 bids submitted



Awarded Projects (17/18)

698 Projects Awarded

■89% less than \$10m

■78% less that \$5m

38% less that \$1m



Factors Potentially Influencing Construction Costs

- General inflation
- Market conditions
 - Material shortage
 - Labor costs
- Highway construction spending
- Unforeseen events
- Insufficient bid competition



Questions?





Resource Agency Influence on **Project Delivery**

by Jeff Wiley and Phil Stolarski

Environmental Laws





Agencies and Requirements



Increasing Project Delivery Requirements (Pre- 1940 to Present)





Environmental Documents

SHOPP Projects

- Categorical Exemptions Over 90%
- Initial Studies/Negative Declarations Almost 9%
- Environmental Impact Reports 0.5%

STIP Projects

- Categorical Exemptions 33%
- Initial Studies/Negative Declarations 41%
- Environmental Impact Reports 26%



Environmental Costs

Support

Capital expenses

Right-of-way



Costs Related to Permits

Support

- Studies required by other environmental laws or permit requirements;
- Preparation and approval of the environmental document required by CEQA and NEPA;
- Plan and establishment;
- Application for permits;
- Long-term mitigation monitoring

Capital

- Permit fees;
- Acquisition of property for mitigation banks;
- Construction elements including:
 - Temporary creek diversion measures
 - Fish passage measures
 - Landscaping and irrigation



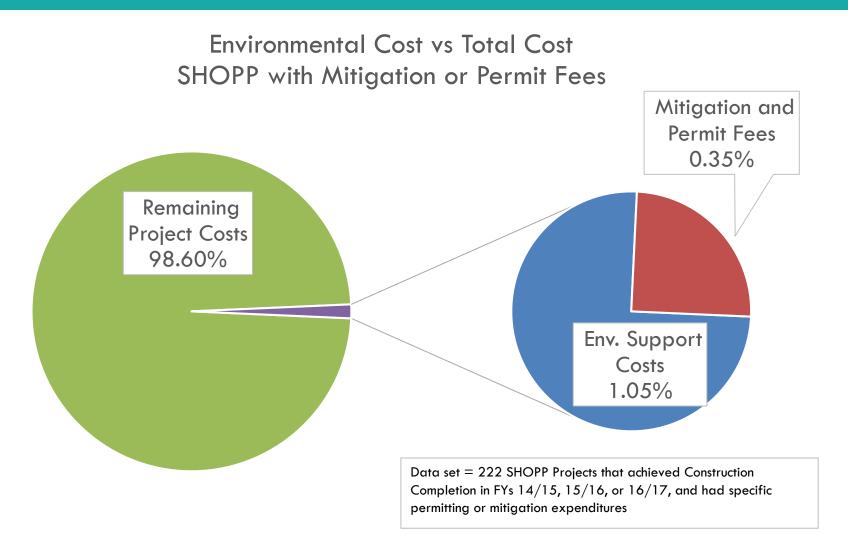
Costs for Project with Permitting Fees

Projects With Mitigation or Permitting Fees that achieved CCA within the									
14/15, 15/16 or 16/17 FY									
				Avg. Mitigation		Max Mitigation and			
				and	Permitting	Permit Cost			
	Number	Avg.	Total Env Cost	Cost		(% of Total Cost)			
SHOPP	222	\$	167,606	\$	41,801	13.38%			
STIP	72	\$	908,442	\$	463,080	9.92%			

Data set = 745 SHOPP and 166 STIP Projects that achieved Construction Completion in FYs 14/15, 15/16, or 16/17



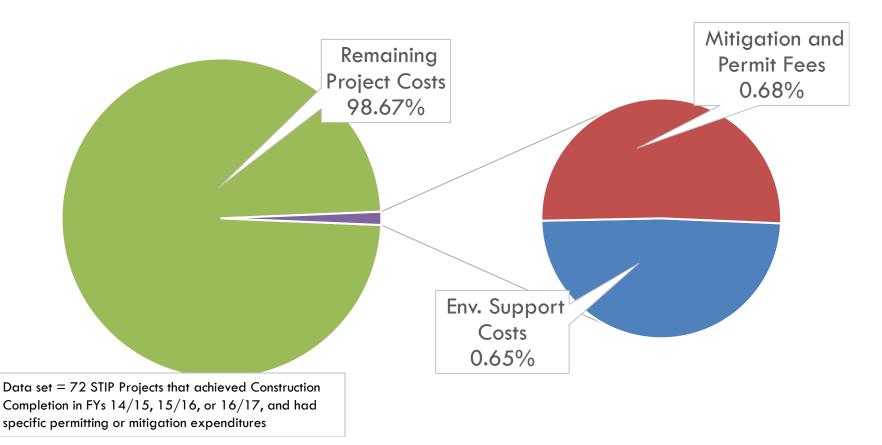
SHOPP: Environmental Cost vs Total Cost





STIP: Environmental vs Total Cost

Environmental Cost vs Total Cost STIP with Mitigation or Permit Fees





Efficiencies

NEPA Assignment

Advance Mitigation Program

AB 1282 – Transportation Permitting Task Force



NEPA Assignment

Reduces reviews

Time-savings for projects

Requires waiver of immunity



Advance Mitigation

Accelerate transportation project delivery



Improve environmental outcomes



Enhance communication with stakeholders



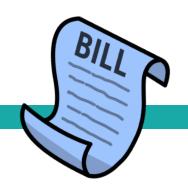
Ensure the
Program
account is
self-sustaining



Advance Mitigation Projects Purchase or Create Mitigation



AB 1282



Establishes the Transportation Permitting Task Force Statutory Goals:

- Early engagement
- Reasonable deadlines
- Greater certainty of permit approval requirements



















Questions?





CTC Workshop

Engaging the Industry

by Janice Salias and Ramon Hopkins

Caltrans' Small Business Program

Small Business (SB)

25% Overall Goal

State-Funded Contracts and Procurements

California Code of Regulations

Disabled Veteran
Business
Enterprise
(DVBE)

3% Overall Goal

State-Funded Contracts and Procurements

California Code of Regulations

Disadvantaged
Business
Enterprise
(DBE)

17.6% Overall Goal

FHWA-Assisted Contracts and Procurements

Code of Federal Regulations



Caltrans' SB, DVBE, and DBE Participation

SB Participation - 25% Goal			DVBE Participation — 3% Goal		DBE Participation Overall Goal		
FY	SB Dollars	%	DVBE Dollars	%	DBE Dollars	% at Commitment	%
14/15	\$349,378,944	28.4%	\$47,149,004	3.83%	\$275,730,549	12.40%	12.5%
15/16	\$519,879,000	46.05%	\$57,190,818	5.07%	\$314,950,430	13.15%	12.5%
16/17	\$408,919,922	28.86%	\$46,800,099	3.30%	\$264,592,759	12.08%	12.5%
17/18	\$509,017,424	28.51%	\$87,857,147	4.92%	\$359,506,554	14.88%	12.5%
18/19 1 st Qtr	\$95,056,771	28.40%	\$11,010,727	3.3%	\$24,980,875 (1 st month of FY)	16.98%	17.6%



OBEO's Training and Outreach to Support Business

- Training, technical assistance, and advocacy services
- Training to help prepare small businesses to compete for Caltrans' contracting and procurement opportunities
 - Certification workshops
 - Prime contractor training
 - Subcontractor training
 - "Doing Business with Caltrans: Getting Started"



OBEO's Training and Outreach Objectives

- Organize and participate in outreach events
- Promote awareness of Caltrans' contracting and procurement opportunities
 - Pre-bid meetings/pre-proposal conferences
 - Business matchmaking events
 - Procurement fair

 Develop comprehensive Senate Bill 1 and Senate Bill 103 outreach plans



District Efforts to Increase Participation

- District Small Business Liaisons (DSBLs)
 - Develop partnerships with local and regional entities
 - Market Caltrans' contracting and procurement opportunities
- One District is testing a Contractor Boot Camp
 - Provide assistance in
 - Certification
 - **Bidding**
 - Marketing/Building Relationships
 - ➤ Contractor Compliance



Industry Involvement

- Statewide Small Business Council
 - Standing committees
 - Ad hoc committees

- DBE Participation Committee
 - Task groups
- Meetings with Industry Organizations

Caltrans internal stakeholders



OBEO Certifies Disadvantaged Business Enterprises (DBE)

Currently no backlog in processing new applications

Increase the pool of certified DBEs

 DBE Certification Workshops to be held throughout the state and specific workshops with small business organizations



OBEO Provides Supportive Services to Disadvantaged Business Enterprises (DBE/SS)

 DBE program is guided by USDOT regulations (49 CFR Part 26)

 The first in the nation pay-for-performance model with established metrics the consultant is expected to achieve



DBE/SS Totals to Date

Program launched in August of 2018:

 130 certified DBEs enrolled into the Business Development Program (BDP)

7 firms have graduated from the BDP

18 bids for contracts have been submitted

2 contracts have been reported as awarded



DBE/SS Program Providers

 Northern Region - Humboldt State University-Sponsored Programs Foundation
 (Districts 1, 2, 3, and 4)

 Central Region - CSU Fresno Foundation (Districts 5, 6, 9, and 10)

Southern Region - MiraCosta Community College
 District (Districts 7, 8, 11, and 12)



On-The-Job Training Supportive Services (OJT/SS)

- Provides training to increase the participation of women, minorities, and other disadvantaged individuals in skilled crafts on federal-aid highway construction contracts
- Current OJT/SS contracts include:
 - > Field Ironworkers Apprenticeship Program
 - Including a nationwide women-only boot camp
 - South Bay Workforce Investment Board Southern
 California Pre-Apprentice training
 - Ladders of Opportunity Pre-Apprenticeship training



National Summer Transportation Institute (NSTI)

 A career awareness initiative designed to introduce disadvantaged secondary school students to all modes of transportation-related careers

Provides academic enhancement activities

 Encourages students to pursue transportation-related courses of study at the college/university level



Increasing Construction Costs

- Changing Market Conditions
- Labor Shortage
- Industry Engagement



Changing Market Conditions

- Increased Demand
 - Local Roads and Private Development
- Market Volatility
 - Tariffs
 - Oil Price Fluctuations
 - Foreign Economies



Completed Initiatives

- 12 Month Look Ahead
- Materials on Hand
- Aggregate Resource Policy Statement
- Increase use of Recycled Material



Completed Initiatives

- Hot Mix Asphalt Formula Approval
- Collaborative Payment Policy
- DBE Certification Process Review
- Newly Certified DBE Reporting
- DBE Supportive Services



Ongoing Initiatives

- Designated Storage Areas
- Automated Technology
- Renewable Diesel Pilot
- Small Business "Bootcamp"



Labor Shortage

- Need for additional labor
- Competition with other States
- Increase Salary



Attracting New Workforce

- Caltrans
 - Hiring Centers
 - Recruitment
- Industry
 - Helmets to Hardhats
 - Community College Outreach
 - Apprentice Programs



Questions?

