

SECTION 7 PREPARING THE PROJECT COST ESTIMATE**7.1 PURPOSE**

This section provides guidance for preparing the project cost estimate.

7.2 BACKGROUND

Prepare the project cost estimate using the Department's best cost forecasting capabilities and BEES. The BEES printout of the project cost estimate is called the engineer's estimate.

Documents pertaining to this section include:

- Basic Engineering Estimating System (BEES) User Guide and Reference Manual
- Certification of Project Cost Estimate, memorandum signed by Robert Pieplow, dated January 5, 2012
- PD-04 Project Contingencies and Supplemental Work, project development directive

The project cost estimate includes:

- Bid item quantities, units of measure, and item costs
- Supplemental work items and costs
- Department-furnished materials costs
- Department expense costs
- Contingencies
- Funding segregation with identification of funding participation levels

The amount of allocated funds should not influence the estimate. Reducing the estimate to be within the allocated amount or within the limit for projects will not reduce bids. Bid overruns can cause serious problems such as delay of award, rejection of bids, and re-advertisement.

Project construction funds (capital outlay) are only for project improvement and not for maintenance.

Construction contracts must not include purchasing supplies or equipment for the Department. State law prohibits using capital outlay funds for such purchases. For example, it is prohibited to require the Contractor to provide a changeable message sign for Department use either during construction or after construction is complete.

7.3 RESPONSIBILITIES

7.3.1 GENERAL

Details on responsibilities for approval of supplemental work and nonstandard contingencies are in the Project Development Directive PD-04 Project Contingencies and Supplemental Work.

FHWA approval is required on federal-aid projects for items not on the FHWA pre-approved supplemental work list.

For Federal aid projects, FHWA approval is required for contingencies (1) greater than 5 percent and (2) when the increase in contingencies is greater than \$200,000.

7.3.2 PROJECT ENGINEER

- Generates the District portion of the project cost estimate.
- Ensures the project cost estimate is complete and accurate including:
 - Complete and accurate bid item quantities for both district and Structures work.
 - Consistency between the plans, specifications, and estimate.
 - Appropriate final pay designations.
- Coordinates with SOE for common bid items.
- Obtains approval for supplemental work when this work totals more than 5 percent of the project cost estimate.
- Ensures accurate funding segregation when applicable.
- Prepares justification for Department-furnished materials and Department expenses.

7.3.3 OTHER FUNCTIONAL DISTRICT ENGINEERS

- The other function district Engineers submit complete and accurate contract quantities for their portion of the project to the Project Engineer.

7.3.4 STRUCTURE OFFICE ENGINEER

- Generates the portion of the project cost estimate for structures work.
- Ensures their portion of the project cost estimate is complete, accurate, and consistent with the plans and specifications.
- Ensures the final pay designation is appropriate for Structures work.
- Coordinates with the District for common bid items and working days.
- Reviews the combined project cost estimate and resolves issues with the District as necessary.

7.3.5 DISTRICT OFFICE ENGINEER

- Verifies the project cost estimate is complete and consistent with the plans and specifications.
- Coordinates with SOE on combined bid items and working days.
- Verifies final pay designation is appropriate.
- Verifies the funding segregation is complete and accurate.

7.3.6 DIVISION ENGINEERING SERVICES, OFFICE ENGINEER

- Assigns one-time item numbers for nonstandard items.
- Locks BEES after project is received in PPM&OE and listed for advertisement.
- Maintains standard bid item codes.

7.3.7 DESIGN ENGINEER OR PROJECT MANAGER

- Ensures the estimate complies with standard contingencies, pre-approved supplemental work items, and standard limits on supplemental work costs.
- Ensures the PE obtains applicable approvals.

7.3.8 DISTRICT PROJECT DELIVERY DEPUTY

When delegated, the District Project Delivery Deputy must certify project cost estimates over \$1,000,000.

7.3.9 DISTRICT DIRECTOR

- Certifies the project cost estimate for all projects.
- Recertifies the project cost estimate for certifications.

7.4 BASIC ENGINEERING ESTIMATING SYSTEM (BEES)

7.4.1 GENERAL

This system:

- Provides data files required for the project information systems and analysis (PISA).
- Provides data needed by the bid opening and progress pay systems.
- Produces segregated estimates according to funding sources.

For each project BEES limits the maximum number of bid items to 350. BEES limits the combined number of supplemental work items and state-furnished items to 50.

For projects that include Structures work, the DOE submits a project cost estimate that is a combination of the estimate from the District and SOE. Structures work may include railroad work, temporary structures, supplemental work, Department-furnished items, and Department expenses. For a given project, BEES permits separate storage of the District from the SOE estimate. The District and SOE must use the same EA and keyword when inputting their portion of the items into BEES. Phase 1 must be used for the EA. If the District and SOE do not use the same EA and keyword, BEES cannot generate a combined estimate. District files are designated with "H" and SOE files are designated with "B". The combined file is designated with "C". Each office is responsible for completing and updating their portion of the estimate. BEES reports may be generated for just the "H" or "B" portions or may be generated for the combined "C". When BEES generates a combined estimate, the quantities for District and structures are integrated. If District and SOE estimates have the same bid item but different unit prices, the District unit price prevails. Before finalizing the estimate, District and SOE estimators should concur on the pricing for items with the same bid item.

The PE reviews all items and ensures that quantities and costs are not duplicated. Duplication may occur for items such as temporary railing or retaining walls. For project with work where a portion of an element (such as a retaining wall) is designed by both the District and Structures, the same bid item should be used. If the Structures portion is designated as final pay, final pay designation should also be used for the District portion. In the rare case where it is appropriate to pay for the same work with different bid items, the plans must clearly show the limits for payment.

If federal or local funding is included, segregate the estimate before submitting the construction contract to PPM&OE under Section 7.11.

PPM&OE locks the estimate in BEES when the Construction Contract Submittal is received by PPM&OE.

7.4.2 ROUNDING QUANTITIES

The project contains two kinds of quantities:

- Actual calculated quantities shown on the plans to help the Contractor and the Engineer complete the project.
- Rounded quantities shown on the bid item list to simplify bidding.

Quantities on plans must be actual calculated quantities and never rounded quantities.

When applicable, round the quantities in BEES and on the bid item list. Round using the total quantities and not partial quantities or subtotals. Typically, quantities should be rounded up. Do not round such that the quantity is changed by more than 25 percent. Do not round structure bid items.

Do not round final pay quantities unless the quantity is more than 5. In this case, round up to the nearest whole number. For example, round 6.3 to 7 do not round 4.3.

For quantities greater than 1,000, round to no more than three significant figures. The significant figures are those figures of a number that begin with the leftmost figure and extend to the last nonzero figure to right. For example:

- 5,050 and 1,620,000 are correctly rounded.
- Round 1,103 to 1,110.
- Round 2,234,541 to 2,240,000.

For quantities less than 1,000, round to no more than two significant figures. For example, round 426 to 430.

Avoid decimal quantities. Consider using a unit of measure that avoids this problem such as using 1,000 lb. and not 0.5 ton. Do not use more than 1 decimal place in a BEES quantity. Currently the programs used for opening bids and accounting during construction accept only 1 decimal place. Any quantity with two or more decimal places must be corrected prior to bid opening, even if an addendum is required.

It is not always possible to eliminate using one decimal place for small quantities. For example, 1.4 lb. of seed for erosion control cannot be rounded up to 2 lb. or down to 1 lb. without changing the quantity by more than 25 percent. For decimal quantities less than 5, round to one decimal place. For quantities of 5 or more, round to the nearest whole number.

7.5 ESTIMATING COSTS

7.5.1 GENERAL

The estimate must be current, and complete at RTL milestone and must be the final project cost estimate that is submitted with the construction contract package.

If the CTC votes on the project funding, the project cost estimate should be reviewed and updated before being listed for the CTC vote. Data entered into the BEES should not be changed after the CTC vote.

If a CTC vote is not required, estimates should be reviewed and updated as necessary before funds are allocated. Data entered into the BEES should not be changed after funds are allocated.

Estimating is not an exact science and analysis should include evaluation of the following issues:

a. COST FLUCTUATION

The project cost estimate must be reviewed and corrected as conditions change and costs fluctuate.

Construction costs may fluctuate due to issues including:

- Material shortages which may develop at unexpected intervals and cause an increase of the material prices.
- Wage increases which typically occur at a somewhat predictable rate.

- Time of the year that the contract is advertised.
- Changing economic conditions and indications.

b. TRAFFIC CONDITIONS

Traffic conditions can have a significant effect on costs. Adjust unit prices to reflect special difficulties, dangers, and expenses caused by traffic. Bidders are inclined to raise their bids for projects with difficult traffic conditions.

c. RESTRICTIVE WORK HOURS OR METHOD OF WORK

Restricting the working hours or the method of work on a project may have a major effect on costs. If the special provisions limit work to nighttime or short shifts, increase unit prices to reflect:

- The cost of premium wages for night work
- Premium payment for partial shifts
- General decreases in productivity and efficiency

Night work for HMA can be especially expensive where small quantities are involved. HMA plants do not usually operate at night. Small quantities and night deliveries increase the unit prices.

d. SMALL QUANTITIES

Small quantities of work and materials will nearly always have higher unit prices than identical work in larger quantities. Equipment and labor must be distributed over a much smaller base. Production is usually inefficient and slow for small quantities and this also increases unit costs.

e. SEPARATED OPERATIONS

Separated operations will generally have higher unit prices. Staged construction, specified order of work, or scattered locations may require portions of the work to be constructed as separate operations. Each operation may require separate equipment and labor. In this case the unit prices should then be based on the smaller operations and not on the total quantities for the project. Consider separated operations when estimating mobilization.

f. HANDWORK AND INEFFICIENT OPERATIONS

Handwork, small, and low production rate operations (even though equipment may be used) have higher unit costs than work adaptable to machine operation, mass production, and high production rates.

g. ACCESSIBILITY

Difficult job site access increases cost.

Work on an existing interchange may require long out-of-direction movements by construction personnel and equipment if the Contractor must observe one-way ramp movements or enter or leave at restricted locations (such as only ramps or interchanges). Hauling materials for earthwork under these conditions can be especially expensive.

Work at the top of retaining walls, on slopes, or where workers must climb slopes to get to the work area is expensive. This is true regardless of whether the operation is handwork or is done by equipment. Work that is easy to do on level ground or a gentle slope may be almost impossible to do on steep slopes.

h. GEOGRAPHIC LOCATION

Geographically remote locations usually result in higher unit prices.

Where applicable, the unit prices should include consideration of the Contractor's costs for the worker's subsistence.

The source of supplies and the distance to the job site from these sources should also be considered.

i. CONSTRUCTION SEASON

The time of the year when the Contract is awarded may affect cost. Contractors are usually more available for work early in the spring and will therefore bid more competitively at that time. Later in the spring or summer, many contractors have on-going contracts to keep them busy and therefore tend to bid higher or not at all.

For contracts awarded near the end of summer or end of the construction season for a given location, it is important to determine if construction can be finished before the construction season ends. If the Contract cannot be finished before the end of the construction season, bidders increase their bids to cover work delays due to bad weather and winter suspension. Even if bidders reasonably expect to finish before winter, they increase their bids to cover costs from delays due to early

rains. This is especially true if construction involves work in or around drainage channels, rivers, rainy areas, and snow areas.

7.5.2 PRICING METHODS

a. GENERAL

There are two methods commonly used for estimating prices. One method uses previous bid prices as a basis for establishing prices. The other method makes a complete analysis of production rates, labor costs, and material costs. One or both methods can be used.

b. PREVIOUS BID PRICES METHOD

Basing estimates on previous bid prices is probably the most widely used and the most practical method. When using this method, consider:

- Using approximately the same size and type of projects that have similar quantities for individual items.
- Using an average price from the 3 lowest bidders, using prices from the 2nd lowest bidder, or using the District 8 costdatabase.
- At a minimum, revising previous bid prices by the projected change in the California Construction Cost Index between the date of the old bid and the anticipated date of the new bid. See Section 8 for typical schedules to calculate the time to the probable new bid opening date.
- Adjusting the reference bid price to reflect conditions of the project, such as type of terrain, geographical location, soil, traffic, and other related factors.
- Not using lump sum bid prices or unit prices for items of work (such as culverts) that include varying amounts of other related work.
- Using comparable months. Seasonal work items vary by the time of year.

To estimate the price of individual items, start with bid prices from similar projects. Pricing tools available on the PPM&OE Internet site include:

- Contract Cost Data. These books are published annually.
- Quarterly California highway construction cost index

- Asphalt price index
- Bid summary results from projects with bid opening (1) within the last six weeks (2) less recent

Item cost databases are available on the PPM&OE Intranet site. These FileMaker Pro databases containing all contract items with quantities and prices used in the past four quarters and the past several years, listed by item code number. District 8 maintains a comparable Intranet site that does not require FileMaker Pro.

The scheduling chart showing average times from submittal of construction contract to award is available on the PPM&OE Intranet site. This can be used to help determine the time of year that bid opening will occur.

c. COMPLETE ANALYSIS METHOD

This method is not usually practical for estimating all bid items. It may be practical for estimating earthwork items where rock or unusual haul is required, or for lump sum items such as signals and lighting. Use the following steps:

1. Compile a materials list.
2. Estimate materials costs using available price lists.
3. Estimate production rates.
4. Determine labor and equipment costs based on production rates.
5. Calculate the subtotal.
6. Add overhead and profit.

It is important to consider subsistence cost and premium pay for overtime on night work. On larger projects with long time limits, determine if the majority of a bid item is paid early or late in the project. To estimate items that cannot be completed early in the project, it may be necessary to forecast wage scales and material cost increases to accurately estimate bid item costs.

7.6 BID ITEMS

7.6.1 GENERAL

Bid items are listed in numerical sequence. Item descriptions must match the item descriptions in the Coded Contract Items Lists shown on the PPM&OE Website.

The Coded Contract Item list is reviewed periodically. Items that are no longer supported by the specifications are deleted and items required by revised and new specifications are added.

7.6.2 TIME-RELATED OVERHEAD

The bid item for TRO compensates the Contractor for overhead expenses such as those for a field and home office. Include this bid item on all projects over \$5 million and with at least 100 working days. The district must obtain approval from the Chief, Division of Construction, or the Chief of Construction's delegate, to not use TRO on a qualifying project. Requests for approval should be sent to: HQ Construction Engineering@DOT <HQ.Construction.Engineering@dot.ca.gov>.

The district calculates the base TRO item by using 10 percent of the sum of all contract bid items excluding Mobilization. Do not include Supplemental Work, Department Furnished Materials and Contingencies. Contract bid items should not be reduced to compensate for the cost of the additional TRO item if the historical data used to estimate the unit costs reflects that reduction.

The TRO base percentage may be adjusted to reflect unique project or district circumstances. The TRO base percentage should be modified by using recent cost data from similar projects with TRO and by taking into consideration project conditions such as project size, duration, location and other conditions that could influence TRO.

7.6.3 MOBILIZATION

The bid item for mobilization compensates the Contractor for preconstruction construction expenses due to preparatory work and assembly of staff.

Include mobilization for contracts with at least 50 working days not including plant establishment days. Mobilization may be included for projects with less than 50 days if the work is primarily structures work. Mobilization is not typically included on contracts that are mostly building work.

BEES automatically calculates the amount for mobilization based on the percentage entered. Enter the percentage into BEES as a decimal such as

0.1 for 10 percent or 0.02 for 2 percent. The percent for mobilization should be based on the evaluation of cost data from recent similar projects and other considerations such as project scope, location, and unique conditions.

7.6.4 NONSTANDARD ITEMS

If the work is not accurately represented by a standard bid item, you may establish a nonstandard bid item. Ensure that payment is covered by the specifications, and if necessary develop an NSSP to cover payment. For use of nonstandard bid items, consult with the owner of the associated specification.

Nonstandard bid items must be consistent in style with standard bid items.

To create a nonstandard bid item in BEES:

- Find a bid item code (1) not already being used for the Contract and (2) with the most similar bid item description and most applicable unit of payment. Use only the units of measure and abbreviations shown in the BEES manual.
- Make the bid item code nonstandard by adding “A” to the end (such as 390104A).
- Do not create a nonstandard bid item for an item that was on the bid item list and now is not on the list. If the item no longer exists in the bid item list then it has been deleted.
- Add nonstandard items to the table in SSP 1-1.01.

Before advertisement, PPM&OE replaces the nonstandard bid item code with a unique, one-time bid item code. These one-time bid item codes are shown in the bid item list in the Bid book. PPM&OE corrects SSP 1-1.01 with the final nonstandard bid item codes.

7.6.5 FINAL PAY DESIGNATION

Bid items may be designated as final pay if the quantity can be independently verified.

Final pay bid quantities must be correct. The Contractor will not receive payment for less than or more than the quantity shown. Do not round the quantities for items designated as final pay, except as described in Section 7.4.1.

Show the final pay designation on the bid item list for both nonstandard and standard bid items.

Do not show the final pay designation on the plans.

Use Table 7-1 to determine which items may be designated as final pay.

Table 7-1
Guidance for Final Pay Designation

Items	Work
Architectural Treatment	Bridges, Walls
Bar Reinforcing Steel	Box Culverts and Wingwalls
Bar Reinforcing Steel (Bridge)	Bridges
Bar Reinforcing Steel (Bridge, Retaining Wall, Soundwall, Tunnel, or Pumping Plant)	Bridge, Retaining Wall, Soundwall, Tunnel, or Pumping Plant
Bridge Deck Drainage System	Bridges
Channel, Stripping or Tunnel Excavation	Channels, Tunnels
Class 1 Concrete (Structure)	Box Culverts and Wingwalls
Communication Conduit (Bridge)	Bridges
Concrete Closure Wall	Bridges
Conduit	Communication
Deck Seal and waterproofing	Bridges
Earth Retaining Structure	Retaining Structures
Erect Precast Concrete	Bridge
Erect Structural Steel Bridge	Bridges
Furnish and Install Sign Structure (Tubular, Truss, Lightweight, etc.)	Overhead Sign Structures
Furnish Structural Steel Bridge	Bridges
Grind Bridge Deck	Bridges
Handrailing	Bridges
Minor Concrete (Minor Structure)	Drainage Inlets and Pipe Headwalls
Miscellaneous Iron and Steel	Frames and Grates
Miscellaneous Metal (Bridge)	Bridges
Miscellaneous Metal (Restrainer)	Bridges
Miscellaneous Metal (Retaining Wall)	Retaining Wall
Miscellaneous Metal (Tie Rod, Restrainer)	Bridges
Pervious Backfill Material	Bridges, Retaining Walls
Pipe (Supply Line)	Irrigation Systems
Place Deck Overlay (Concrete)	Bridges
Place Polyester Concrete Overlay	Bridges
Pumping Plant Metal Work	Pumping Plant
Railings and Concrete Barrier on Structures	Bridges
Rock Slope Protection measured by CY	RSP
Seal Concrete Surface	Bridges

Items	Work
Shotcrete	Bridges, Walls
Sound Wall (Masonry Block)	Walls, Bridges
Sprinkler Control Conduit Bridge	Bridges
Structural Concrete, Approach Slabs (except Type R)	Bridges
Structural Concrete, Bridge	Bridges
Structural Concrete, Bridge Footing	Bridges
Structural Concrete, Deck Overlay	Bridges
Structural Concrete, Pier Column	Bridges
Structural Concrete, Pumping Plant	Pumping Plants
Structural Concrete, Retaining Wall	Retaining Walls
Structural Concrete, Sound Wall	Sound Walls
Structural Concrete, Tunnel	Tunnels
Structural Concrete, Tunnel Footing	Tunnels
Structural Steel	Bridges
Structural Steel (Bridge)	Bridges
Structure Backfill (Bridge)	Bridges
Structure Excavation (Bridge, Tunnel)	Bridges, Tunnels
Timber and Lumber	Bridges, Retaining Walls
Treat Bridge Deck	Bridges

7.7 SUPPLEMENTAL WORK

7.7.1 GENERAL

Supplemental funds are used for either (1) work that may or may not be required to complete the project, or (2) work that is not bid. When approved, supplemental funds may be used for work that is anticipated but cannot be quantified. Supplemental work must be within the scope of the Contract.

Do not use supplemental items to:

- Cover an incomplete design or lack of quantities.
- Add more contingency funds.
- Pay for work that should be paid by maintenance funds. Maintenance work is not eligible for federal funding.
- Pay for work not performed by the Contractor such as the inspection of work by the railroad.

Supplemental work must be identified, justified, and approved. Approval request forms and procedures are provided in project development directive PD-04 Project Contingencies and Supplemental Work. The items for supplemental work are numbered 066XXX. Items pre-approved by FHWA are shown in Table 7-2:

Table 7-2
FHWA Pre-Approved
Supplemental Work Items
(Approved 3/18/19)

Item Code	Supplemental Work Item	Rationale/Comments
066008	Incentive Payment	For Incentive/Disincentive (I/D) guidelines see <i>CCD Guide</i> , Sections 6.4 and 12.4, Discussion of selected standard special provisions and the Brent Felker memorandum dated June 12, 2000, with the subject Delegation of Authority for Use of A+B Bidding and Incentive/Disincentive Provisions. I/Ds must be approved case-by-case for both rationale and cost basis. <u>Excluded from limitation.</u>
066015	Federal Trainee Program	<i>Federally funded projects with at least 100 working days.</i> Cost is for training expenses as part of the contractor's equal employment opportunity affirmative action program according to Title 23 Code of Federal Regulations, "Highways." The contractor is to provide on-the-job training to develop full journeymen in the types of trades or job classification involved in the contract.
066016	Just-In-Time Training (JITT)	For SSP 40-1, used for continuously reinforced concrete pavement (CRCP), or if District Construction recommends JITT for concrete pavement, then the Contractor provides JITT and the Department pays for half the cost of the training.
066041	Bird Protection	The Engineer orders the Contractor to construct exclusion devices, take nesting prevention measures, and remove and dispose of partially constructed and unoccupied nests on a regular basis to prevent their occupation, or perform any combination of these.

Item Code	Supplemental Work Item	Rationale/Comments
066070	Maintain Traffic	<p>Cost is to cover the 50 percent State share of flagging and 100 percent of other traffic-handling equipment and devices used in carrying out provisions in Sections 7-1.08 and 7-1.09 and the special provisions ordered by the resident engineer.</p> <p>Exclude from limitation up to \$600 per day for "Maintain Traffic" (include in the limitation estimated costs in excess of \$600 per day) and up to \$1,200 per day if there are advance flagmen. The daily rates are for typical eight-hour shifts and may be increased accordingly if multiple closures or shifts are anticipated and explained in the justification. Include costs over these amounts in the percentage limitations.</p>
066094	Value Analysis	<p><i>Section 4-1.07C applies to non-building-construction contract with a total bid of over \$5 million.</i></p> <p>The \$10,000 is required by SSP for a "Value Analysis" workshop. This is value-analysis effort after the award of the contract. The purpose of the workshop is to identify value-enhancing opportunities and to consider modifications to the plans and specifications that will reduce either the total cost, time of construction, or traffic congestion without impairing the essential functions or characteristics of the project.</p>
066595	Water Pollution Control Maintenance Sharing	<p>Cost is to cover the 50 percent State share for maintaining the temporary water pollution control items identified on the approved water pollution control cost breakdown.</p>
066596	Additional Water Pollution Control	<p>Cost is to cover overruns on bid items in the event of heavier- than-normal rainfall during the life of the project.</p>

Item Code	Supplemental Work Item	Rationale/Comments
066597	Stormwater Sampling and Analysis	<p>These funds compensate the contractor for performing stormwater sampling. These costs can vary widely because of the frequency of storm activity during the life of the project and the sampling frequency required. Samples for the applicable non-visible pollutants and a sufficiently large, uncontaminated background sample are collected during the first two hours of rain event discharge that results in a sufficient discharge for sample collection. Because of the uncertain frequency of testing required, this work is included in supplemental funds.</p>
066610	Partnering	<p><i>Contract over \$1 million, partnering is <u>encouraged</u>. Contract over \$10 million and 100 or more working days, partnering is <u>required</u>.</i></p> <p>The State promotes the formation of a partnering relationship with the contractor to effectively complete the contract to the benefit of both parties. The State pays the cost for providing the "Training in Partnering Concepts" trainer and training site, and the State and contractor pay equally for the "Partnering Workshop" facilitator and workshop site. <u>Excluded from limitation.</u></p>
066670	Payment Adjustments for Price Index Fluctuations	<p><i>Use for projects with paving asphalt items.</i></p> <p>The cost is to compensate the contractor for price fluctuations of the asphalt used in hot mixed asphalt, asphaltic emulsion, and so forth that may occur during performance of the contract. <u>Excluded from limitation.</u></p>

Item Code	Supplemental Work Item	Rationale/Comments																		
066919	Dispute Resolution Board	<p><i>Section 5-1.43E(3) applies to a contract with a total bid of over \$10 million and 100 or more original working days.</i></p> <p>Dispute Resolution Board is to assist in the resolution of disputes or potential claims arising out of the work of the contract. The engineer and contractor establish the board cooperatively upon approval of the contract. The State and the contractor pay the cost equally.</p> <p><u>Excluded from limitation.</u></p>																		
066921	Dispute Resolution Advisor	<p><i>Section 5-1.43E(2) applies to a contract with a total bid from \$3 million to \$10 million and 100 or more original working days.</i></p> <p>Disputes Resolution Advisor assists in the resolution of disputes or potential claims arising from the work of the contract. The engineer and contractor establish the advisor cooperatively upon approval of the contract. The State and the contractor pay the cost equally.</p> <p><u>Excluded from limitation.</u></p>																		
066395	HMA Smoothness Incentive	<p><i>Use for projects placing HMA pavement.</i></p> <p>The cost to compensate the contractor for producing smoother pavement. The Special Provisions require contractors to meet smoothness ranges depending on the existing road conditions and the HMA thickness being placed. To encourage contractors to perform above the required smoothness range, an incentive is paid up to a set maximum.</p> <table border="0" data-bbox="672 1377 1468 1793"> <thead> <tr> <th data-bbox="672 1377 1084 1409">Target MRI (in/mi)</th> <th data-bbox="1101 1377 1468 1409">Supplemental Funds Formula</th> </tr> </thead> <tbody> <tr> <td data-bbox="672 1419 1084 1451">60</td> <td data-bbox="1101 1419 1468 1451">\$9,000 X Pavement Lane Miles</td> </tr> <tr> <td data-bbox="672 1451 1084 1482">75</td> <td data-bbox="1101 1451 1468 1482">\$4,500 X Pavement Lane Miles</td> </tr> <tr> <td colspan="2" data-bbox="672 1493 1468 1524"><u>Percent Improvement</u></td> </tr> <tr> <td data-bbox="672 1524 1084 1577">< than 0.3' HMA Layer Thickness (excluding OGFC)</td> <td data-bbox="1101 1524 1468 1577">\$4,500 X Pavement Lane Miles</td> </tr> <tr> <td data-bbox="672 1587 1084 1640">≥ than 0.3' HMA Layer Thickness (excluding OGFC)</td> <td data-bbox="1101 1587 1468 1640">\$9,000 X Pavement Lane Miles</td> </tr> <tr> <td colspan="2" data-bbox="672 1661 1468 1692"><u>OGFC</u></td> </tr> <tr> <td data-bbox="672 1692 1084 1745">OGFC on existing pavement or cold planed surfaces</td> <td data-bbox="1101 1692 1468 1745">\$4,500 X Pavement Lane Miles</td> </tr> <tr> <td data-bbox="672 1766 1084 1797">On new HMA (No Incentive)</td> <td data-bbox="1101 1766 1468 1797">\$0 X Pavement Lane Miles</td> </tr> </tbody> </table> <p><u>Excluded from limitation.</u></p>	Target MRI (in/mi)	Supplemental Funds Formula	60	\$9,000 X Pavement Lane Miles	75	\$4,500 X Pavement Lane Miles	<u>Percent Improvement</u>		< than 0.3' HMA Layer Thickness (excluding OGFC)	\$4,500 X Pavement Lane Miles	≥ than 0.3' HMA Layer Thickness (excluding OGFC)	\$9,000 X Pavement Lane Miles	<u>OGFC</u>		OGFC on existing pavement or cold planed surfaces	\$4,500 X Pavement Lane Miles	On new HMA (No Incentive)	\$0 X Pavement Lane Miles
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7.7.2 PARTNERING

In order to effectively complete contracts to the benefits of both parties, the Department promotes the formation of "Partnering" relationships. Include supplemental funds in the estimate to cover the Department's required and potential share of the cost. Estimate the cost using Table 7-3 as a guide.

Table 7-3 Partnering

Bid Item Total		Number of working days *		Supplemental funds
Over	To	Over	To	
\$1 million	\$10 million	0	50	\$7,000
\$1 million	\$10 million	50	150	\$12,000
\$1 million	\$10 million	150		\$20,000
\$10 million	\$25 million	0	200	\$20,000
\$10 million	\$25 million	200	300	\$35,000
\$10 million	\$25 million	300		\$50,000
\$25 million		0	400	\$50,000
\$25 million		400	600	\$70,000
\$25 million		600		\$90,000

* Exclude plant establishment days.

7.7.3 DISPUTE RESOLUTION

When applicable include supplemental funds for either a dispute resolution advisor or a dispute resolution board. Do not include funds for both on the same contract.

a. DISPUTE RESOLUTION ADVISOR

If the project bid item total is at least \$3 million and not more than \$10 million, and if the project has 100 or more working days, include the supplemental item for a dispute resolution advisor. The recommended costs \$5,000.

b. DISPUTE RESOLUTION BOARD

If the project cost estimate is over \$10 million, and if the project has 100 or more working days, include the supplemental item for a dispute resolution board. Estimate the cost using the Table 7-4 as a guide.

Table 7-4 Dispute Resolution Board

Total working days	Supplemental funds
100 to 200	\$7,500
201 to 400	\$15,000
401 to 600	\$22,500
601 to 800*	\$30,000*

*Increase supplemental funds by \$7,500 for each additional block of 200 working days in conformance with the pattern shown above

7.7.4 FEDERAL TRAINEE PROGRAM

For federally funded projects with at least 100 working days, include supplemental funds for the federal trainee program. Trainee funds are required for each of the following work categories:

- Earthwork (except for imported borrow)
- Pile driving
- Portland Cement Concrete (except for precast concrete)
- Masonry
- Bar reinforcing and prestressing steel
- Structural steel erection
- Electrical
- Buildings

Use Table 7-5 to calculate the number of trainees for each work category:

Table 7-5 Federal Trainee

Cost for work category	Number of trainees	Cost for work category	Number of trainees
400,000	0		
≥ 400,000	1	16,000,000	15
700,000	2	18,000,000	16
1,000,000	3	20,000,000	17
1,500,000	4	23,000,000	18
2,000,000	5	26,000,000	19
2,500,000	6	29,000,000	20
3,000,000	7	33,000,000	21
4,000,000	8	37,000,000	22
5,000,000	9	41,000,000	23
6,500,000	10	45,000,000	24
8,000,000	11	50,000,000	25
10,000,000	12	> 50,000,000	*
12,000,000	13		
14,000,000	14		

* 25, plus 1 additional trainee for every \$5,000,000 over \$50,000,000

The number of federal trainees for the Contract is the sum from all work categories. Calculate the contract cost using \$800 per trainee.

7.7.5 PAYMENT ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

In order to limit the financial exposure of both the Department and the construction industry to dramatic swings in the crude oil prices, for all projects with HMA pavement, include supplemental funds for payment adjustments for price index fluctuations.

The calculated amount may vary substantially from the actual amount since the change in crude oil prices cannot be predicted with accuracy.

Estimate the cost using the formula:

$$\text{Price Index Fluctuations} = F_s \times Q_t \times I_c$$

Where:

- F_s = Supplemental work allotment factor:
 - Use 0.15 for projects with less than 250 working days
 - Use 0.25 for projects with 250 to 500 working days
 - Use 0.35 for projects with more than 500 working days
- Q_t = Total estimated asphalt quantity contained in materials for pavement structural sections and surface treatments to be placed in the work. Use the formulas in specification section 9-1.07B.
- I_c = California Statewide Crude Oil Price Index. Use the current month's index. Update your estimate as close to advertisement as possible.

Include with your construction contract submittal:

- List of materials containing asphalt and the values used for X (percent asphalt content as specified in specification section 9-1.07B), such as:
 - HMA: $X_a = \underline{\hspace{2cm}}$ %
- Total estimated asphalt quantity (Q_t) used for the supplemental item for price adjustments for price index fluctuations
- California Statewide Crude Oil Price Index month
- California Statewide Crude Oil Price Index

7.8 DEPARTMENT-FURNISHED MATERIALS

Items for Department-furnished materials are numbered 066XXX.

(Subject to Change)

FHWA has pre-approved the following Department-furnished items:

- Laminated wood box posts and metal caps
- Monument disks
- Traffic signal controller assemblies, including wired cabinets and loop detector units
- Changeable message signs and assemblies
- Salvaged material in stock, such as temporary traffic signals and flashing beacons
- Battery backup system (BBS), electronics assembly

If items on the FHWA pre-approved Department-furnished material list are included in a contract, the PE must sign a letter justifying the cost of each item and send it to the Office of Federal Resources. A copy of this letter must be included in the construction contract submittal.

For items not on the FHWA pre-approved list, the PE must generate a PIF. A new PIF is required for each contract.

**Table 7-6 FHWA Approved Department Materials
 Approved as of 12/11/17)**

	FEDERALLY PARTICIPATING DEPARTMENT-FURNISHED MATERIALS	RATIONALE
		There is a history of very long delays by the manufacturers of some products. Procurement of those products, by the department, starts early to meet construction deadlines. All items listed here are obtained by the department, for convenience and cost savings, in competitive bid contracts from qualified vendors.
1	Laminated wood box posts and metal . caps	Avoid project delays due to order delays of not commonly available materials. The department benefits by purchasing in large quantities.
2	Survey Monuments	Statewide uniformity allows replacement with department stock. Volume purchase by State benefits due to typical project small quantities.
3	Traffic signal controller assemblies, including wired cabinets and traffic detector units	Avoid project delays due to fabrication, delivery, testing, operational unit programming, modifications, and retesting requirements. Volume purchase benefits the department due to typical project small quantities. Require statewide uniformity, compatibility, and maintenance factors.
4	Changeable message signs and assemblies	Avoid project delays due to fabrication, delivery, testing, operational unit programming, modifications, and retesting requirements. Require statewide uniformity, compatibility, replacement exchangeability, and maintenance factors. Volume purchase benefits the department due to typical project small quantities.
5	Salvaged (recycled) material. e.g. temporary traffic signals, and flashing beacons	Salvaging and recycling materials are resource conservation efforts. The service of salvaging is Contractor Furnished, but the department has to furnish these "salvaged materials" to the contractors for reuse on projects.
6	Battery Back Up System (BBS) - Electronics Assembly	The electronics portion of the BBS is highly customized and complex. Statewide uniformity and operational compatibility with state systems. The cabinet and batteries of the BBS will be contractor furnished. Volume purchase benefits the department due to typical project small quantities. Require statewide uniformity, compatibility, and maintenance factors.

7.9 DEPARTMENT EXPENSES

Department expenses are directly related to project construction and do not include work done by the Contractor. FHWA has approved the following Department expenses as eligible for federal reimbursement as shown in Table 7- 7.

**Table 7-7 FHWA Approved Department Expenses
 Approved as of 12/11/17)**

	FEDERALLY PARTICIPATING DEPARTMENT-FURNISHED EXPENSES	RATIONALE
1	Railroad Work	Department expenses are directly related to project construction and do not include work done by the Contractor. This is any work done by railroad agency according to 23 CFR 635.205(b).
2	Traffic Management Plan	Required on all capital construction projects on the State highway system to minimize motorist delays. Incorporates traffic mitigation strategies with innovative public and motorist information techniques and tools to plan for and manage the traffic impacts.
3	Construction Zone Enforcement Enhancement Program (COZEEP)	The COZEEP is jointly operated by Caltrans and CHP to increase the safety of motorists and construction workers in State highway project construction zones. COZEEP is used to increase traffic enforcement above normal levels during the various construction stages when lane closures and diversions increase the potential for traffic accidents within the highway construction project zone. (This is inter-agency agreement to improve and enforce traffic safety in construction zone)
4	Electrical Service Connection	Expenses necessary to connect power supply at the service point to the utility company facilities. This is needed for the power company to install meter and service conductors to the service cabinet on the job site. The connection work is done by public utility companies according to 23 CFR 635.205(b). (This is service connection prearranged by Caltrans and done by utility company).
5	Telephone Service Connection	Expenses necessary for telephone company to connect telephone service to the telephone demarcation cabinet or controller cabinet on the project. The telephone demarcation cabinet will be furnished and installed by the contractor. This is connection work done by public utility companies according to 23 CFR 635.205(b) (This is service connection prearranged by Caltrans and done by utility company).

6	Water Services Connection	<p>Expenses necessary for connecting water services to the irrigation systems for planting and maintaining existing plants within the project limits. For convenience, the contractor is allowed to use water from department facilities where available within project limits.</p> <p>The connection work is done by public utility companies according to 23 CFR 635.205(b).</p> <p>(This is service connection prearranged by Caltrans and done by utility company).</p>
7	Annual Fee to State Water Resources Board	<p>Payment for National Pollutant Discharge Elimination System (NPDES) permit annual fees, as a Construction General Permit (CGP). The payment covers the permit for required annual fee for each active construction project based upon its disturbed soil area in excess of 1 acre.</p>
8	Disposal of Wood Waste (Guard Rail)	<p>Treated Wood Waste (TWW) is generated during the removal of treated wood post used with metal beam guard railing. This is considered as hazardous waste by the Department of Toxic Substances Control (DTSC) who creates a Generator Identification Number (GIN) for projects that generate more than 10,000 pounds of TWW per site. the Board of Equalization charges Generator Fee for projects with GIN and this fee will be best handled as Department Furnished Expense.</p>
9	Resident Engineer's office rental and maintenance cost	<p>CURRENTLY NOT FEDERALLY ELIGIBLE - Resident Engineer and staff need to have an office close to the job site for administration of the contract. In this case, the cost of the office would be distributed proportionally among the projects involved according to their estimated use of the office.</p>

A PIF is not required for the FHWA pre-approved Department expense items. However, if these items are included in a contract, the PE must sign a memo justifying the cost of each item and send it to the Office of Federal Resources. A copy of this memo must be included in the construction contract submittal package.

To request Federal participation for items not pre-approved by FHWA, the PE must generate a PIF and obtain approval. A new PIF is required for each contract.

7.10 CONTINGENCIES

Contingency funds are included to compensate the Contractor for work:

- Not covered by the bid items
- Not covered by supplemental work
- Within the scope of the Contract
- Necessary for completion of the Contract
- Ordered by the Engineer

The standard contingency is 5 percent of the project cost estimate and calculation is automated by the BEES program. The contingency percentage in the BEES will be rounded by $\pm 0.1\%$ so that the project total dollar amount is rounded to the nearest thousands.

Document the need and cost for nonstandard contingencies. The maximum contingency is 10 percent.

Requests for use of nonstandard contingencies must be approved by the Chief, Division of Design. Forms and procedures are included in the project development directive PD-04 Project Contingencies and Supplemental Work.

7.11 SEGREGATING THE ESTIMATE

7.11.1 GENERAL

It is the District's responsibility to segregate the BEES. Projects with multiple funding sources, Federal-aid, or Structures items must have a segregated BEES estimate identifying the funding sources and levels of funding. Enter all segregated estimates into the BEES during project design. Because funding segregations are required in the funding summary, estimates must be segregated when the District submits the construction contract to PPM&OE. Incorrectly segregated estimates may delay contract award.

- a. Use the following segregation headings:
 - i. All Federally reimbursed items should go in one segregation.
 - ii. Use the default segregation heading "STATE FUND."
 - iii. All Non-Federally reimbursed items should go in one segregation with segregation heading "FEDERALLY NON-PARTICIPATING."
 - iv. Establish additional segregations for items that are reimbursed through a cooperative agreement (city, county, utility) with segregation heading as labelled in the agreement (CITY OF MODESTO, SAN JOAQUIN COUNTY, PG&E etc.).

7.11.2 FEDERAL AID

Federal-aid contracts must be segregated by:

- a. District work.
- b. Structures work. Separate each structure by component level.
- c. Work paid for by others. When funding is from other sources, the project cost estimate must be segregated and each funding source must be identified. If there is a cooperative agreement on a project, a copy of the agreement must be included with the construction contract submittal and must also be sent to the Office of Federal Resources. Other funding sources may include:
 - i. Cities, counties, or local transportation agencies contributing to construction costs under cooperative agreements.
 - ii. Utility agreement.
 - iii. Right-of-Way contract.
 - iv. Cooperative agreement that requires anyone other than the State to pay for any of the bid items or supplemental work.

- v. Purchase order, or other instrument.
- d. Utility relocation when done by contract item work (by right-of-way, utility, or railroad agreement).
- e. Work done on the same Contract but outside of the federal-aid-project limits.
- f. By Program Element Component (PEC) Code (for example a project may be programmed with both SHOPP and STIP funds)
- g. Resident Engineer's Office will not be federally reimbursed.

7.12 DETERMINING CONTRACTOR'S LICENSE REQUIREMENTS

Contractor license requirements are shown in the notice to bidders. The Contractor's classification must cover the majority of the work.

For all projects, the District determines the applicable contractor license classifications. For informal projects, PPM&OE makes this determination. See the Description of CSLB License Classifications at <http://www.cslb.ca.gov/>.