Central Federal Lands Highway Division

ENGINEER'S ESTIMATE MANUAL

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CHAPTER 1

GENERAL

1.1 INTRODUCTION

The objective of this Manual is to provide a guide to the Central Federal Lands standard procedure for preparation, review, and updating of the engineer's estimate.

The engineer's estimate is a critical part of the project development process since it provides the following:

- Serves as a basis for probable construction cost
- Supports decision-making on project scope
- Serves as a guide to evaluate bidders' proposals

1.2 APPROACHES TO ESTIMATING

Unit prices for the engineer's estimate should reflect the actual cost to the contractor of doing business, including a reasonable profit. There are two common methods to determine this cost: historical costs (bid-based estimating) and actual costs (cost-based estimating). With either method, strive to predict the expected overall low bid, and develop unit prices that will at least equal, or slightly exceed this amount.

Develop unit prices for each defined pay item using either historical bid data that is factored for the project conditions, or cost-based pricing (using costs for equipment, labor, material, overhead, profit and production rates applicable for the project condition).

As a general rule, use historical bid-based estimating for minor items of work (e.g. culverts, cattleguards, and silt fence) and cost-based estimating for major items of work (e.g. roadway excavation, aggregate base, and pavement). In determining the major and minor items of work, generally follow the "80/20 rule": the major cost items are the 20% of the items that contribute 80% of the estimated costs. However, for some projects, such as 3R, ERFO, OMAD, or various unusual projects, some of the minor items could contribute large percentages of the project costs (e.g. traffic control, wall structures, drainage structures, reconditioning).

1.3 STANDARD PRACTICE AND PROCEDURE

Prepare an engineer's estimate for every project at each design milestone. Use a consistent and comprehensive methodology to prepare a quality estimate. Document in the project file the estimate basis, assumptions, calculations, contingencies, and uncertainties. Review the unit prices at each milestone to confirm that the prices fully reflect the project scope and market conditions. Develop the estimate in current-year dollars. Escalate the estimate to the proposed contract award date. Retain the confidentiality of the unit price analysis and construction cost estimate at all times to maintain the integrity of the bidding and procurement process.

1.3.1 Estimate Types Required at Each Milestone

At each level of project development, the estimate has a specific purpose, methodology for development, and expected level of accuracy. The estimate level of accuracy is related to construction cost uncertainty. The contingencies included in the estimate are intended to account for construction cost uncertainties. Some of the typical causes of construction cost uncertainty are lack of scope definition, lack of information inside the roadway prism (e.g. no survey data available yet, technical recommendations not yet complete), and lack of information outside the roadway prism (e.g. ROW, environmental, and inflation concerns). As the project development process advances, more information becomes available, so the expected contingency decreases and expected estimate level of accuracy increases. See Table 1 for a summary.

1.3.1.1 Project Scoping

Develop a construction cost estimate that is based on estimated quantities and unit costs for the major high-cost categories of work and a percentage of total construction costs for minor categories of work. Use cost per mile estimating methods to gauge that the estimated scoping costs are reasonable.

Add contingencies shown in Table 1 based on undefined work items and anticipated additional design elements.

1.3.1.2 Preliminary Design (15 and 30 percent)

Develop cost estimate using cost-based estimating for major items of work and historical bid-based estimating for minor items of work.

Refine the unit costs to reflect current level of design. Verify that the quantities used in the estimate reflect current design.

Add contingencies shown in Table 1 based on undefined work items and anticipated additional design elements.

1.3.1.3 Intermediate Design (50 and 70 percent)

Develop cost estimate using cost-based estimating for major items of work and historical bid-based estimating for minor items of work.

Contact material suppliers to update material costs. Refine the unit costs to reflect current level of design. Verify that the quantities used in the estimate reflect current design.

Add contingencies shown in Table 1 based on undefined work items and anticipated additional design elements.

1.3.1.4 Final Design (95 and 100 percent)

Develop cost estimate using cost-based estimating for major items of work and historical bid-based estimating for minor items of work.

Contact material suppliers to update material costs. Review production, equipment and labor rates to incorporate latest information and trends. Refine the cost-based items to reflect final

design. Verify that the quantities used in the estimate reflect final design and review any significant changes from earlier estimates.

Review and update major cost items to reflect final bid quantities. Eliminate all contingencies and uncertainty factors added to earlier estimates.

Table 1: Cost Estimating Matrix

Project Development Level	Class Description	Purpose of Estimate	Methodology	Approximate Contingency Range *
Project Scoping	Class C	• Set the baseline cost • Verify the Program amount	• Historical-bid based • Cost per mile	25% to 35%
Preliminary Design (15% and 30%)	Class B	• Supports decision-making • Control of project scope and schedule	• Historical-bid based • Cost-based	20% to 30%
Intermediate Design (50%)	Class B	• Supports decision-making • Control of project scope and schedule	• Historical-bid based • Cost-based	10% to 20%
Intermediate Design (70%)	Class A	• Supports decision-making • Control of project scope and schedule	• Historical-bid based • Cost-based	10% to 20%
Final Design (95% and 100%)	Class A	• Obligate construction funds • Evaluate contractor's bids	• Historical-bid based • Cost-based	None

* The contingency is a percentage of the estimated project cost.

1.3.2 Cross-Functional Team (CFT) Roles and Responsibilities

Project Management

- The Project Manager is ultimately responsible for the accuracy and review of the estimate.
- Review estimate and provide comments to the Designer.
- Review escalated cost estimate for conformance to program amount.
- Review major cost items to determine if the appropriate detail is included to justify estimated costs.
- Review CFT input for the appropriate level of detail to reflect the project-specific conditions.
- Provide input, including production rate, labor, and equipment recommendations, for the development of cost-based unit process.

- Review with designer project specific constraints, unusual economic conditions and other cost factors.

Design

- Develop, revise, and update Engineer's Estimates.
- Incorporate cost data provided by CFT members.
- Maintain cost estimate documentation.
- Perform appropriate quality control and quality assurance activities.

Pavements and Materials

- Contact material suppliers to obtain current cost data.
- Provide cost data to the Designer. Include in cost data the specific breakdown of cost data: basic material cost, processing costs, handling costs, haul cost, overhead, profit, bonding, and other fees.
- Review all estimates and provide comments to the Designer.
- Perform appropriate quality control and quality assurance activities.

Construction

- Provide input, including production rate, labor, and equipment recommendations, for the development of cost-based unit process.
- Review all estimates and provide comments to the Designer.
- Discuss with the designer any project-specific constraints, unusual economic conditions and other cost factors.
- Perform appropriate quality control and quality assurance activities.

Technical Services (Bridge, Geotech, Hydraulics, Safety)

- Provide current cost data to the Designer.
- Contact material suppliers to obtain current cost data.
- Review all estimates and provide comments to the Designer.
- Perform appropriate quality control and quality assurance activities.

1.3.3 Software

1.3.3.1 Engineer's Estimate System (EES)

The EES is a Federal Lands developed construction estimating software program that is currently in use at CFL for project development, advertisement, and award. Microsoft Excel is typically used in conjunction with the EES. It is expected that the EES will be phased out over the next few years.

1.3.3.2 Engineer's Estimating, Bidding, Award, and Construction System (EEBACS)

The EEBACS is a Federal Lands developed construction estimating software program scheduled for release in early 2008. There is a separate manual with instructions on how to use the new estimating software currently under development.

1.3.4 Documentation

Documentation is a key element in good estimating practice. The estimate file is a well organized, easy to follow history from the first estimate at scoping through the preparation of the final estimate. Include the following in the estimate documentation:

- Assumptions
- Contingency amount selected and descriptions of the uncertainty in the design
- Quantity and unit price calculations
- Changes from the previous estimate
- Recommendations on unit costs provided by the CFT

CHAPTER 2

METHODS OF ESTIMATING

2.1 HISTORICAL BID-BASED ESTIMATING

Use the historical bid price approach, tempered with engineering judgment, for estimating the minor items of work on a project.

The following are typically considered minor items of work:

- Erosion control
- Guardrail
- Landscaping
- Culverts
- Underdrains
- Drop inlets and catch basins
- Manholes
- Curb and gutter
- Sidewalk
- Riprap
- Fencing and cattleguards
- Traffic control
- Signing
- Striping

Some items that cannot be estimated using the historical bid approach include:

- Lump sum items. Most lump sum items (except mobilization and contractor testing) are very different from one project to another. See Section 2.3.1 for guidance on estimating lump sum items.

- Unique or seldom used items. The lack of available historic data for these items often leads to inaccurate unit prices. See Section 2.3.2 for guidance on estimating unique items.

2.1.1 Sources of Historical Bid-based Estimating Data

Historical bid prices are available in the following locations:

- Recent CFL project bid tabulations are posted at http://www.cflhd.gov/procurement/construction/bid-tabs/.

- *Using EES*: Bid histories for both US Customary and Metric files are posted at http://www.cflhd.gov/design/ee-prog/cfl-ee.cfm. For internal designers, bid histories may be accessed through the following:

    - Click on the 'Browhist English03' or the 'Browhist Metric03' shortcuts that are on the desktops.

    - Click on 'Do UPA' while in the individual estimate item screen.

- *Using EEBACS*: Follow the instructions in the EEBACS Manual for accessing bid histories.

2.1.2 Historical Bid-based Estimating Considerations

Consider the bids received for like items on recent projects (within the past one to three years) built under similar conditions that fairly represent the contractor's cost plus a reasonable profit. Consider the average of the low bids received on previous projects in similar locations, factored for project conditions and cost indices, as a basis for the anticipated minimum overall cost for current projects.

Use the average of the unit prices from the lowest three bidders to verify that the low-bid unit price is reasonable and consistent. Modify the unit prices to fit the conditions on the project, and adjust for increases in the overall cost of construction over time using an inflation index. Inflate the historical unit bid prices from bid date to current year using the following methods:

- For EES: Use the following spreadsheet:
  http://www.cflhd.gov/design/eng-estimate/_documents/construction_inflation.xls

- For EEBACS: Follow the instruction in the EEBACS manual (all inflation to current year is within the EEBACS system).

2.2 COST-BASED ESTIMATING

Use the cost-based approach, tempered with engineering judgment, for estimating the major items of work on a project.

The following are typically considered major items of work:

- Earthwork, including excavation, embankment, borrow, and waste
- Aggregate base
- Asphalt pavement

The major items of work contribute to about 80% of the project cost. The typical items are noted above, but depending on the project, other items may also be significant cost items. Document the basis for estimating these items.

2.2.1 Sources of Cost-based Estimating Data

Sources of information used to develop cost-based unit prices include the following:

- Production Rates. General production rates are provided in the CFL production rate spreadsheet located at:
  L:\Teams\Engineers Estimate\Misc. Historical Data\DRAFT_production_rates.xls.
  This spreadsheet is still in draft form; once the spreadsheet is completed, it will be posted on the CFLHD website.

Adjust the general production rates to fit project-specific requirements. Consult with the Construction Operations Engineer and other members of the CFT as appropriate to verify the selected production rate.

- Equipment. Equipment costs include ownership expenses to cover items such as depreciation, repairs, taxes, fuel, and storage. Equipment costs may be estimated by using historical bid prices or from the latest edition of *Heavy Construction Cost Data* published by RS Means.

- Labor. Obtain estimated labor rates from the current Davis-Bacon prevailing wage rates at http://www.gpo.gov/davisbacon/allstates.html. Add fringes to the Davis-Bacon labor rate. Apply the appropriate payroll burden, overhead, and profit to the current labor rates.

- Material. Contact the suppliers directly to obtain material quotes. The material price should include royalties, crushing costs, and vendor profit. Hauling costs are estimated based on haul distance, truck capacity, load and unload time, driver wage and truck expense.

- Overhead and Profit. Estimate overhead at 10%. Estimate profit at 10%. Profit is applied to all costs, including labor, equipment, materials, and overhead.

2.2.2 Cost-based Estimating Methods

Use the cost-based unit price tab in EEBACS following the instructions in the EEBACS Manual.

As appropriate, use the Cost-based Unit Price Spreadsheet located at http://www.cflhd.gov/design/eng-estimate/_documents/Cost_Based_Unit_Price.xls to develop cost-based unit prices.

2.3 OTHER ESTIMATING CONSIDERATIONS

2.3.1 Estimating Lump Sum Items

For commonly used lump sum items, such as mobilization and contractor testing, refer to Chapter 3. For less commonly used lump sum items, first quantify the work included in the lump sum item. Use historical bid data to come up with costs on the quantified work within the lump sum item and make any necessary project-specific adjustments to determine a lump sum estimated cost.

Limit the use of lump sum pay items. Using lump sum items typically transfers risk to a Contractor, and the Contractor will adjust bid prices upward to account for this risk.

2.3.2 Estimating Unique Items

Occasionally, items of work that have little or no historical data to aid in establishing unit prices are included in a project. For these unique items, look for similar items that may provide some guidance on cost. In addition, gather information from others who may be familiar with the item,

including State Departments of Transportation, other government agencies, or suppliers. Add appropriate overhead and profit to the estimated cost.

2.3.3 Subsidiary Items

Include the costs of any subsidiary items in the estimated cost of the related pay item. Subsidiary items are paid for indirectly; do not assume that because an item of work is subsidiary that it does not cost anything. Clearly note in the plans or SCRs any work that is considered subsidiary to a specific pay item.

2.3.4 General Considerations

Consider the following rules of thumb when making adjustments to unit bid prices:

Project size. Generally, the unit price for larger quantities of a given material will be less than for smaller quantities.

Geographic location. The project's location, whether in an urban or rural setting, should be considered in establishing bid prices. A project in an urban setting is generally faced with confined work spaces, greater volumes of traffic, and limited hours of operation. A project in a rural location generally requires materials, equipment and personnel brought in from elsewhere.

The location of a material source may have a large impact on cost. For a rural project with long material hauls and no commercial asphalt hot plants or concrete batch plants available, unit bid prices most likely would be higher than an urban project where these facilities are readily available.

Traffic conditions. Projects with complex sequences of work and high traffic volumes will have higher prices than uncomplicated projects with low traffic volumes. Short traffic delays (less than 30 minutes per passage through the project) or other project-specific requirements will increase costs.

Timing of Advertisement. When a project is advertised and bid may have a major influence on the bid prices. Contractors typically have a time of year that is busier than others. There is a benefit to advertise the project as soon as possible before the peak season to allow the Contractor to plan and schedule the work. Contractors are usually more readily available for work early in the spring. Later in the spring or during the summer, many contractors have on-going projects that keep them busy, so they tend to bid higher or not at all.

Construction season. The time of year that a project is to be let for contract and the estimated time required for completion may be significant in price selection. Factors, such as if the project will have to be suspended or delayed by inclement weather, will have an effect on bid prices. Compressed or accelerated construction schedules could potentially increase costs. These factors should be considered when establishing the construction schedule for each project.

Projects requiring long periods of construction (a year or longer) will quite likely reflect higher bid prices for items which must be purchased from suppliers. Especially

noteworthy are large quantity items or expensive items which will be constructed during the later stages of the project, since suppliers are usually unwilling to guarantee prices for extended periods of time. Contractors, for protection against any increase in prices, will usually hedge their bid on this type of item, resulting in higher prices than in projects with shorter completion times. Price adjustments or escalation clauses may be necessary to mitigate the effects of construction time. Estimated costs must include the anticipated adjustments during the period of the construction contract.

Accessibility. Accessibility to the work area and the existing terrain are important factors. For example, work that is normally easy to accomplish on level terrain or gentle slopes may be almost impossible on steep slopes. Mountainous terrain and steep grades reduce production rates which lead to increased costs.

Restrictive conditions. Restricting the working hours or method of work on a project can have a great effect on prices. If the specifications limit work to nighttime or short shifts, increase unit prices to reflect:

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

Night work for asphalt concrete can be especially expensive where small quantities are involved because asphalt plants do not usually operate at night and may have to do special runs at a much higher operating cost per unit.

Conditions and limitations imposed by client agencies should be reviewed with the Project Manager for discussion with the client agency. Flexibility in requirements or incentives to complete the operations in a timely manner can impact the estimated costs.

Environmental commitments that restrict construction operations typically increase costs. Examples of environmental restrictions that have increased costs include:

- Seasonal restrictions due to nesting birds,
- Haul restrictions,
- Restrictions on the amount of clearing or disturbance allowed,
- Coordination with archaeologists and cross haul requirements.

Availability of materials. Materials that are readily available, or ones that are commonly used, are generally less expensive. Material shortages or stringent requirements can cause construction delays and increase costs.

Experimental or research items. Projects which include experimental or research items usually receive higher bids.

Specifications. The Special Contract Requirements (SCRs) may dictate materials or procedures more costly to the contractor than the conventional items.

Plan clarity. Plans which are neat, clear, and accurate will usually contribute to lower overall unit bid prices.

Bidder competition. A lack of competition or contractor availability often leads to higher bid prices. Generally, projects that are bid during a period of time when a large number of contractors are available are bid more competitively.

2.4 RULES FOR ROUNDING

An estimate is an approximation of costs; it cannot be an exact calculation. If an estimate is shown calculated to the nearest penny, there is a false impression that the estimate is very precise. Round numbers as described below:

- Table 2 provides guidance for rounding the unit bid prices:

Table 2: Unit Price Rounding

Unit Price Range	Rounding
$ 0.01 - $ 19.99	$ 0.50
$ 20.00 - $ 99.99	$ 1.00
$100.00 - $ 499.99	$10.00
$ 500.00 - $ 999.99	$ 50.00
$ 1,000.00 - $ 2,499.99	$ 100.00
$ 2,500 - $ 9,999.99	$ 500.00
$ 10,000 - $ 49,999.99	$1,000.00
$ 50,000 +	$ 5,000.00

Example: $6.14 rounded to $6.25
$67.26 rounded to $68.00

- For the total estimated cost, round to the nearest appropriate significant digit (generally this is either three or four significant figures). Adjust the mobilization cost to show a rounded total estimated cost.

Example: $1,348,127.58 rounded to $1,350,000
$12,479,697.35 rounded to $12,480,000

2.5 INFLATION

Inflate the historical unit bid prices from bid date to current year using the following methods:

- For EES: Use the following spreadsheet:
http://www.cflhd.gov/design/eng-estimate/_documents/construction_inflation.xls

- For EEBACS: Follow the instruction in the EEBACS manual (all inflation to current year is within the EEBACS system).

2.6 ESCALATION

After estimating the cost in current-year dollars, escalate the total estimated cost to the proposed contract award date. Escalate the total cost only; do not escalate each pay item separately. Use the spreadsheet at:
http://www.cflhd.gov/design/eng-estimate/_documents/CFLHD_EE_Cover_Sheet.xls.

Include this cover sheet with each Engineer's Estimate.

For Shelf projects, escalate the Engineer's Estimate according to the Policy on Managing Shelf Projects and Escalation of Engineer's Estimate at:
http://www.cflhd.gov/Project_Management/Documents/policies/shelf-project-managing-policy.pdf.

CHAPTER 3

PAY ITEMS

3.1 SECTION 151 - MOBILIZATION

Use Table 3 as guidance for estimating mobilization.

Table 3: Estimating Mobilization

Project Type	Size	Percentage of the Construction Estimate
Projects with limited scope, such as OMAD and pavement preservation projects	All	4 – 9%
3R	Smaller (<$5 million)	11%
3R	Larger (>$5 million)	12%
4R	Smaller (<$5 million)	13%
4R	Larger (>$5 million)	14%

Adjust the estimated cost of mobilization so that the total engineer's estimate reflects an appropriate number of significant digits.

3.2 SECTION 154 - CONTRACTOR SAMPLING AND TESTING

Use Table 4 as guidance for estimating contractor testing.

Table 4: Estimating Contractor Testing

Project Type	Size	Percentage of the Construction Estimate
Projects with limited scope, such as OMAD and pavement preservation projects	All	3%
3R	Smaller (<$5 million)	4%
3R	Larger (>$5 million)	4%
4R	Smaller (<$5 million)	3%
4R	Larger (>$5 million)	5%

Stringent requirements or unusual structures or materials will add to the typical testing cost. The items that typically add to the testing costs include Section 301, 401, 402, 552, and 551-565 items.

3.3 SECTION 155 – SCHEDULES FOR CONSTRUCTION CONTRACTS

Estimate construction schedules as 1.5% of the construction estimate.

3.4 SECTION 158 – WATERING FOR DUST CONTROL

Use historical bid prices from projects in the same geographical area and adjust for any project-specific requirements. Consider the haul distance for the water and any royalties or premiums that must be paid by the contractor.

3.5 SECTION 201 – CLEARING AND GRUBBING

Consider the following:

- Vegetation density and size (e.g. dense forest of large trees vs. prairies with few trees).
- Terrain and accessibility (e.g. steeper terrain with inaccessible slopes vs. flat, open areas)
- Timber costs (e.g. any US Forest Service costs for tree removal)

3.6 SECTION 203 – REMOVAL OF STRUCTURES AND OBSTRUCTIONS

If historical bid data is not available for the work proposed, use cost-based estimating methods to determine a unit price. Provide sufficient information about removal items so that they can be properly bid.

3.7 SECTION 204 – EXCAVATION AND EMBANKMENT

To estimate earthwork early in project development (before mapping is available), review similar projects to get an idea on an approximate range of expected earthwork quantities. Collect rough estimates of widening widths and slope heights in the field. Use the field data to calculate rough estimates of earthwork quantities. Compare the calculated earthwork quantities with similar projects to verify that the rough estimate is reasonable.

When mapping becomes available, use cost-based estimating to develop unit prices for earthwork. Use the Cost-based Unit Price Spreadsheet located at http://www.cflhd.gov/design/eng-estimate/_documents/Cost_Based_Unit_Price.xls as a guide for estimating earthwork costs.

Consider the following conditions that may increase the earthwork costs:

- Rocky conditions that require ripping, blasting, or reduction in material size before it can be used as embankment.
- Difficult earthwork that requires pioneering a road for construction access.
- Traffic control restrictions and sequencing of work that require significant demobilization and moving of equipment.
- Subgrade and slope finishing that have slower production rates than bulk production earthwork. Examples of earthwork finishing activities with slower production rates include:

- Using a motor grader to finish subgrade within staking tolerances
- Finishing cut and fill slopes by 'tracking in' material with a dozer

3.8 SECTIONS 255, 257, 258, AND 259 – WALLS

Coordinate with the Geotechnical CFT member to estimate these items.

3.9 SECTIONS 301 AND 308 – AGGREGATE COURSES

Coordinate with the Materials and Pavements CFT member to estimate these items. Use the Cost-based Unit Price Spreadsheet located at http://www.cflhd.gov/design/eng-estimate/_documents/Cost_Based_Unit_Price.xls as a guide for estimating aggregate costs.

3.10 SECTION 303 – ROAD RECONDITIONING

Coordinate with the Materials and Pavements CFT member to estimate these items. Consider the subgrade material; expect higher costs for subgrade with significant areas of unsuitable material. Include equipment and labor costs for grade finishing.

3.11 SECTIONS 401 AND 402 – ASPHALT SURFACING

Coordinate with the Materials and Pavements CFT member to estimate these items. Consider the additional cost of materials and binder not available locally. Review current local price trends for asphalt.

Use the Cost-based Unit Price Spreadsheet located at http://www.cflhd.gov/design/eng-estimate/_documents/Cost_Based_Unit_Price.xls as a guide for estimating paving costs.

3.12 SECTION 552 – STRUCTURAL CONCRETE

Coordinate with the Bridge CFT member to estimate these items. Consider the haul distances for materials and any special forming requirements. Determine if there are any local cement shortages.

3.13 SECTION 553 – PRESTRESSED CONCRETE

Coordinate with the Bridge CFT member to estimate these items. Consider the haul distances for materials. Determine the availability of local girder types.

3.14 SECTION 602 – CULVERTS AND DRAINS

Consider the haul distances for materials (e.g. is reinforced concrete pipe readily available locally?). Consider the difficulty of installation (e.g. is the culvert in a deep fill or is the subgrade material difficult to work in (rock or highly erodible)?).

3.15 SECTION 609 – CURB AND GUTTER

Consider the haul distances for materials. Expect higher costs for curb that requires more difficult installation (i.e. on tight radii, unique shape and size, or hand forming required). Include the additional cost for any concrete coloring.

3.16 SECTION 617 – GUARDRAIL

Consider the subgrade material near the guardrail; expect higher costs if the guardrail will be installed in rocky subgrade.

Consider special connections to structures; expect higher costs if complicated connections are required at box culverts or other structures.

3.17 SECTION 635 – TEMPORARY TRAFFIC CONTROL

Review the assumptions made for the cost-based unit price items and verify that the hours estimated for both flaggers and pilot car match the assumptions. Assure that conditions and requirements included in the SCRs are addressed with adequate temporary traffic control items and quantities. Road closures, nighttime construction, length of construction zone, number of intersections and traffic volume during the construction period are critical elements of consideration for temporary traffic control. Check similar projects for final traffic control costs.

CHAPTER 4

OTHER RESOURCES

4.1 SOURCES OF INFORMATION

- *FHWA Office of Program Administration*
  http://www.fhwa.dot.gov/programadmin/contracts/ta508046.cfm

  This website details the FHWA Guidelines for Preparing Engineer's Estimate, Bid Reviews, and Evaluation.

- *Transportation Estimator's Association (TEA)*
  http://www.tea.cloverleaf.net/

  The TEA website has estimating information and links to other useful sites.

- *American Society of Professional Estimators (ASPE)*
  http://aspenational.com/

  The ASPE serves construction estimators by providing education, fellowship, and opportunity for professional development.

- *Associated General Contractors (AGC) of America*
  http://www.agc.org/page.ww?section=Construction+Economics&name=About+Construction+Economics

  The AGC website provides a number of reports that address historical, present, and future cost trends of highway and other types of construction. Its Construction Inflation Alert bulletin is of particular interest.

- *Washington State Department of Transportation (WSDOT)*
  http://www.wsdot.wa.gov/biz/construction/constructioncosts.cfm

  The WSDOT website provides extensive information on construction cost trends of several States (Washington, California, Colorado, Oregon, South Dakota, and Utah). The site also contains information on the price trends of individual materials (fuel, concrete pavement, concrete structural, crushed surfacing, hot mix asphalt, road excavation, steel reinforcing bar, and structural steel), the status of competition for highway construction projects, and the steps that WSDOT has taken promote competition and mitigate the effects of cost escalation.

- *California Department of Transportation (Caltrans)*
  http://www.dot.ca.gov/hq/esc/oe/costinfo.html

  The Caltrans website has information about highway construction costs in California.

- *Caltrans Labor Surcharge and Equipment Rental Rates*
  http://www.dot.ca.gov/hq/construc/equipmnt.html

  This Caltrans website has current equipment cost data for California.

- *Caterpillar*
  http://www.cat.com

  This website has information about Caterpillar brand construction equipment.

- *John Deere*
  http://www.deere.com

  This website has information about John Deere brand construction equipment.

- *Komatsu*
  http://www.komatsuamerica.com/

  This website has information about Komatsu brand construction equipment.

- *Construction Equipment Ownership and Operating Expense Schedules*
  http://www.usace.army.mil/publications/eng-pamphlets/cecw.htm

  This website has equipment rates published by the U.S. Army Corps of Engineers (USACOE). There are separate volumes for different regions of the United States defined by the USACOE. See the map at http://www.usace.army.mil/publications/eng-pamphlets/ep1110-1-8%28vol1%29/map.pdf to determine which region is appropriate.