Chapter 8

CONSTRUCTION COST ESTIMATES

SCDOT BRIDGE DESIGN MANUAL

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CHAPTER 8

CONSTRUCTION COST ESTIMATES

To adequately define the project scope and budget, cost estimates are required during the various stages of project development. As the project progresses, the estimates are refined to verify that the project is still cost effective, sufficient funds are available for construction, and the Contractor’s bid price is reasonable. This Chapter discusses the various project estimates that are required and who is responsible for their preparation.

8.1 PROGRAMMING ESTIMATES

8.1.1 Bridge Replacement Projects

For bridge replacement projects, cost estimates are generally provided at the following stages of project development:

1. Program Action Request (PAR). The Project Manager is responsible for determining the construction cost estimate at this stage of project development. The cost estimate typically is developed based on the area of the proposed bridge deck (ft²), the type of structure (e.g., steel, concrete), recent similar projects in the geographic area, and engineering judgment. This estimate is completed before the Preliminary Bridge Plans are prepared; however, it should include all project elements from all units including road items, traffic items, etc. Include this cost estimate with the PAR. See Section 5.5 for a description of the PAR.

2. Project Planning Report (PPR). The Project Manager is responsible for updating the cost estimate determined for the PAR at this stage of project development. This estimate is prepared in a similar manner as for the PAR. Include this estimate with the PPR. See Section 5.5 for a description of the PPR.

3. Engineer’s Estimate. The Engineer’s Estimate is a very detailed construction cost estimate developed from final computed quantities and the appropriate unit costs. For information on preparing the Engineer’s Estimate, see Section 8.2.

8.1.2 Other Projects

Through various stages of project development, the Bridge Design Section will be responsible for providing the appropriate Project Manager with a cost estimate of the structural elements included in a road design project.
8.1.3 **Additional Costs**

In addition to the costs developed for the structure and approach roadways, the following will apply:

1. **Preliminary Engineering.** Preliminary engineering costs are generally calculated to be between 10% and 15% of the construction cost estimate. This percentage may be adjusted upwards for projects that require a considerable effort relative to the amount of construction involved, or the percentage could be less for projects that do not require as much time and effort for studies and plan preparation.

2. **Utilities.** The Utilities Office will provide the utilities relocation cost estimate.

3. **Right-of-Way.** The Right of Way Office will provide all right-of-way costs. Right-of-way costs are initially calculated using an estimated acreage and the number of relocations denoted during the scoping review. The estimates should include an appropriate percentage increase to cover personnel services and equipment, appraisals, condemnation settlements, and other miscellaneous costs that are difficult to anticipate during the initial stages of project development.

4. **Traffic Control.** The Traffic Engineering Division will provide a cost estimate for traffic control.

5. **Construction Engineering and Contingencies Costs.** After the construction cost estimate has been determined, 10% to 15% is added for engineering and contingencies costs.

6. **Project Scope Changes.** If the project scope changes or if the project cost significantly increases at any point during the planning or design process, the Project Manager will notify the State Bridge Design Engineer.
8.2 ENGINEER’S ESTIMATE

The Engineer’s Estimate provides the Department with a basis for evaluating the bids for bridge and highway construction and allows the Department to determine if the low bid price is fair and reasonable for the work involved. This Estimate, plus the data used to generate the Estimate, is considered confidential and is not for general distribution. This Section discusses the procedures for developing this cost estimate. Engineer’s Estimates for all Department projects (e.g., bridge projects, road improvements, safety improvements) are forwarded to the Specifications and Estimate Group in the Road Design Section.

8.2.1 Responsibilities

8.2.1.1 Design Units

The following discusses the responsibilities of the various units for the preparation of the Engineer’s Estimate:

1. Bridge Design Section. The Bridge Design Teams are responsible for entering all quantities into the Department’s estimating software package (i.e., Trns•port’s Proposal and Estimates System (PES)). The Bridge Design Teams are responsible for providing the Bridge Cost Estimate Coordinator with a set of plans for the project and any information that may influence the cost of the project (e.g., special commitments, experimental materials, special equipment, expected construction delays). Other Department Sections and Divisions will prepare their own cost estimates (e.g., Utilities, Traffic).

2. Road Design Section. The Road Design Groups are responsible for providing the Specifications and Estimate Group with a complete set of quantities and plans for the road design portion of the project.

3. Utilities Office. The Utilities Office will provide the Specifications and Estimate Group with completed costs and specifications for any utilities work to be included in the contract.

4. Traffic Engineering Division. The various Sections within the Traffic Engineering Division (e.g., Signing, Traffic Signals, Highway Lighting, Pavement Markings) are responsible for supplying the Specifications and Estimate Group with a complete cost estimate for their applicable design work for direct incorporation into the Engineer’s Estimate.

5. Changes. If an estimated quantity or pay item is changed, the Bridge Design Team should immediately notify the Bridge Cost Estimate Coordinator of the change. The Bridge Cost Estimate Coordinator will revise the estimate accordingly.
8.2.1.2 Bridge Cost Estimate Coordinator

The Bridge Cost Estimate Coordinator will develop the Engineer’s Estimate for in-house-designed bridge projects. See Section 8.2 for a description of the computer programs and guidelines for completing an Engineer’s Estimate.

8.2.1.3 Consultants

The Consultant is responsible for preparing the Engineer’s Estimate for Consultant-designed projects. The Project Manager is responsible for reviewing the cost estimate and forwarding it to the Bridge Cost Estimate Coordinator for review.

8.2.2 Computer Programs

Trns•port is AASHTO’s information system for managing transportation programs, beginning with planning and estimating, and continuing through to the development of bidding documents, letting and contract award, and management of construction operations. Trns•port also provides a database of historical costs.

The Department uses two modules from the AASHTO Trns•port software program to track cost estimates. These programs are described below:

1. **PES.** The Trns•port Proposal and Estimates System (PES) is an interactive, online system for managing project information during the pre-letting phase of a construction project. PES permits the flexible definition of a project and its associated funding requirements to track and manage project cost information and set up the bidding proposal prior to the bid letting activity.

   With PES, data can be entered at the project, category, and item level. Grouping of multiple projects is allowed to track all related costs and funding sources. PES supports the preparation of the PS&E for Federal-aid bridge construction projects and allows projects to be combined into proposals for bid letting. The Bridge Design Section is responsible for entering the required data into PES for in-house-designed bridge projects, and the Project Manager is responsible for entering the required data into PES for Consultant-designed projects.

2. **LAS.** The Trns•port Letting and Award System (LAS) provides the capabilities to automate the many tasks that are necessary during the letting and award stages of a transportation construction project. LAS aids in advertising bids, tracking plan and proposal holders, processing bid information, evaluating bids, and making award decisions. It provides online and batch data entry with full edit checking and verification for vendor bids, produces the bid tabulation report, and performs analyses on received bids. LAS also maintains the Planholder’s List, produces mailing lists, and maintains information for invoicing vendors for proposals and plans purchased.
8.2.3 Estimating Guidelines

The estimator should consider the following:

1. Historical Data. The Bridge Cost Estimate Coordinator maintains a database with unit prices on similar projects in similar geographic areas allowing the estimator to compile cost data for like structural elements and construction costs.

2. Unit Costs. Based on the proposed scope for the project, the estimator may revise unit prices based on the following factors:
   - geographic location (e.g., urban/rural, engineering district);
   - similarity to recent bridge projects;
   - inflation (adjustments to past prices to reflect the current year);
   - reliability of recent construction cost data;
   - recent trends in cost of materials, labor, and equipment;
   - anticipated difficulty of construction;
   - project size relative to size of similar projects;
   - proposed project schedule;
   - anticipated construction staging;
   - expected environmental problems (e.g., hazardous wastes, wetlands);
   - use of experimental materials; and
   - engineering judgment.

3. Lump-Sum Items. Desirably, lump-sum items should not be used on a project. However, this is not always practical. In determining the unit price for lump-sum items, the estimator should consider the following:

   a. Components. Most lump-sum items can be divided into individual parts for estimating purposes. Once the elements have been tabulated, the estimator should use engineering judgment to determine the appropriate cost for each component. The following are some example components of a bridge project:
      - Structural Steel. Base the cost of the steel for the structure on the weight of the steel.
      - Drainage System. Calculate the cost of the drainage system by determining the number of drains plus the total length of pipe required for the project.
      - Utility PVC Conduit. Calculate the cost of PVC conduit by the length of the conduit used for the project. When the PVC conduit is provided at the request of a Utility company, the utility is required to reimburse the Department for the cost.
b. Mobilization. Use 5% of the total project cost for mobilization. Mobilization costs consist of preparatory work and operations necessary for the movement of personnel, equipment, supplies, and incidentals to and off the project site; for the establishment and removal of offices, buildings, and other facilities necessary for work on the project; and for all other work or operations that must be performed or costs incurred when beginning or ending work on the project.

c. Traffic Control. Maintaining traffic is a lump-sum item and the estimated cost is provided by the Traffic Engineering Division. Elements that should be considered include traffic volumes, traffic composition, peak times, number of lanes, length of construction, and type of work.

d. Existing Bridge Removal/Disposal. The cost of removing and disposing of an existing bridge is based on the project location, bridge type, bridge length and width, traffic control, type of crossing, historical data, and engineering judgment.

4. Engineering and Contingencies. Use between 10% and 15% of the total project cost for engineering and contingencies.