

**Appendix C:
Cost Estimating Methodologies**

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During the FasTracks 2010 Annual Program Evaluation (APE), the majority of the estimates that were prepared followed the “Bottoms Up Estimating” procedure.

Top Down Estimating Procedure for the RTD-FasTracks Program

1. Top Down or parametric estimates are used on the FasTracks program when the corridor/project is less than 30% complete with design. Top Down estimates utilize standard unit rates developed internally by RTD.
2. A unit rate development team is assembled at the very start of the APE. This team is comprised of staff from all major disciplines i.e. track, civil, stations, bridges, systems, etc.
3. For each discipline, a lead is identified and has responsibility for all unit rates within that discipline.
4. Each discipline lead is given a unit rate template in the FTA Standard Cost Categories for Capital Projects (SCC) format to populate.
5. Bi-monthly status meetings are held to assist in keeping the process on schedule and to resolve issues.
6. RTD’s estimating group publishes material and labor cost and submits them to the discipline leads for their use. This process makes sure all unit rates use consistent pricing.

Markup Guidelines

7. In order to provide consistency to the development of the APE unit rates, the following is a guideline used to markup the APE unit rates. The unit rate needs to include contractor’s profit and home office overhead (15%). The Contractor’s field office overhead and other direct costs (ODCs) is 17% and is accounted for in a separate line item within the estimates under SCC 40.08. Unit rates are developed by one of the following approaches:

Bottom’s up Estimate

If the unit rate is developed from the “bottoms up”, the contractor’s profit and home office overhead of 15% must be added.

Colorado Department of Transportation (CDOT) Estimate

CDOT unit rates include all markups. When using the CDOT unit rates the contractor’s indirect costs of 20% should be removed.

Contractors Quote

A contractor’s quote includes all markups. When using a contractor’s quote the contractor’s indirect costs of 20% should be removed.

Means Estimate

When Means unit rates are considered, the “Total” amount and not the “Total incl O&P” values are used. The 15% for the contractor’s home office overhead is added to the “Total” Means values. The contractor’s field overhead and ODCs are included in the SCC 40.08 line.

Other Estimate

Any alternative method used for unit rate development is evaluated by RTD's FasTracks Chief Capital Cost Estimator before it is used on any FasTracks APE estimates.

8. Once the initial unit rates are developed they are sent out to the project team for review and comment. After the comments are incorporated the unit rates are published and used by the Project Managers (PMs). The PMs populate the project estimate with the approved unit rates.
9. The Engineer of Record design plan quantities shall be used as the official takeoff quantities. The quantities can be generated traditionally by using either dimensions shown on the drawings, or by scaled measurements when necessary. In addition, some linear and area measurements can be made on the electronic copies of the plan sheets in portable document format (PDF) by utilizing on-screen measuring tools.
10. The takeoff quantities are loaded into the individual project cost estimates.
11. The following must be carefully taken into consideration when estimating "big ticket" items:
 - Major items of cost will require "bottoms up" estimating by selecting and possibly modifying the preprogrammed standard crews. In addition, the production rates used will require careful consideration of the uniqueness of the project.
 - Material suppliers are contacted to obtain permanent and expendable material costs.
 - Contact subcontractors to get input and prices for specialty work.
 - Research appropriate websites to obtain general information, especially regarding various expendable materials such as forming supplies, form rentals, sheet piling, shoring, etc. Also, research the capabilities of the various specialty equipment to be used as related to the specific project requirements
12. Using information from the estimate, as well as the FasTracks program schedules, determine the total time required for each phase of the project (i.e., design, construction, commissioning/testing). This duration, usually designated in months, is used in the calculation of the jobsite indirect costs.

Estimating Procedure for the RTD-FasTracks Program (Bottoms Up)

1. "Heavy Bid" by HCSS, Inc. is the standard estimating software that is utilized for producing all RTD-FasTracks program estimates and includes the following capabilities:
 - Preprogrammed material and subcontract costs that are pertinent to the RTD-FasTracks program. These will be updated for each major estimate, especially for those materials and subcontracts that comprise the largest costs (rail, ties, MSE wall panels, MSE wall select backfill, embankment borrow material, concrete, reinforcing steel, structural steel, prestressed concrete bridge girders, etc.).
 - Preprogrammed labor rates for the various classifications (i.e., laborer, carpenters, semi-skilled, bulldozer operator, etc.). The Estimating Group continually monitors the latest Davis-Bacon decisions and updates the labor rates accordingly.
 - Preprogrammed equipment rates for most types of equipment. These rates periodically revised whenever there are any major changes to either the ownership or operating costs with yearly updates to the Rental Rate Blue Book for Construction Equipment.
 - Preprogrammed crew assemblies for the most common heavy/highway/transit/rail types of work.
 - The ability to customize the labor rates, equipment rates, crews, etc. to fulfill job-specific requirements.
 - The ability to modify the labor burden categories (payroll taxes, workman's comp rates, fringe benefits, hours greater than 40 per workweek factor, etc.).
 - Preprogrammed typical heavy/highway/transit/rail pay items that have built-in unit prices.
 - Preprogrammed activities from past estimates, which contain a checklist of indirect costs (supervision, engineering, quality control inspection and testing, survey, field office, equipment maintenance and mechanic, etc.) typically encountered on heavy/highway/ transit/rail types of projects.
2. The FasTracks Standard Production Rates have been developed for most of the work activities that are typically encountered on FasTracks projects. For the majority of the individual work activities, there are "low," "medium," and "high" production rates listed, depending upon jobsite conditions and the quantities of work to be performed.
3. Monitor the anticipated design plan submittal dates as reflected on the FasTracks Master Program Schedule to establish time frames required for producing the major program corridor estimates. In addition, Heavy Bid is used to perform check estimates on contract changes/contract directives or any other estimating services as required. Estimating subconsultants are employed on an as-needed basis when the estimating workload is anticipated to exceed the available resources.
4. Consult with experts in the field (people who have "first-hand" knowledge of field operations) of transit/rail construction to obtain their input related to crew assemblies (labor and equipment), along with typical production rates that the crews are capable of obtaining in various scenarios (tight ROW, limited work areas, large work areas, interfaces with third parties, typical things to "watch out for", etc.). Heavily utilize the information obtained from these sources to adjust the standard preprogrammed crews in Heavy Bid or add custom and/or specialty crews to the database.

5. Study the plans to gain an understanding of the work which comprises the majority of the project cost. Roughly identify the 20% of the project elements which comprise 80% of the project cost. Partition the time allotted to produce the cost estimate between the 20% “big ticket” items, according to the level of effort required. For instance, earthwork, drainage and various structures components will usually require more time than rail installation.
6. Perform the detailed quantity takeoff, particularly for all of the “big ticket” items. The designer’s plan quantities, if provided, should be used as a “rough check” of the takeoff quantities. The quantities can be generated traditionally by using either dimensions shown on the drawings, or by scaled measurements when necessary. In addition, some linear and area measurements can be made on the electronic copies of the plan sheets in portable document format (PDF) by utilizing on-screen measuring tools.
7. Input the takeoff quantities into the individual cost activities set up in the Heavy Bid estimating software.
8. The following must be carefully taken into consideration when estimating “big ticket” items:
 - Major items of cost will require “bottoms up” estimating by selecting and possibly modifying the preprogrammed standard crews. In addition, the production rates used will require careful consideration of the uniqueness of the project.
 - Material suppliers are contacted to obtain permanent and expendable material costs.
 - Contact subcontractors to get input and prices for specialty work.
 - Research appropriate websites to obtain general information, especially regarding various expendable materials such as forming supplies, form rentals, sheet piling, shoring, etc. Also, research the capabilities of the various specialty equipment to be used as related to the specific project requirements
9. Using information from the estimate, as well as the FasTracks program schedules, determine the total time required for each phase of the project (i.e., design, construction, commissioning/testing). This duration, usually designated in months, is used in the calculation of the jobsite indirect costs.
10. Utilizing the indirect activities from past estimates as a template, determine the applicable items comprising the jobsite indirect costs. Base the individual activity costs on the estimated times determined in the above step.
11. Next, use the “Spread” tool in Heavy Bid to spread the markup amounts for the contractor’s home office overhead and profit (usually 15%) to all of the activities of cost. This will generate the “bid prices” for each of the bid items comprising the estimate.
12. When the estimate has been completed in Heavy Bid, usually the estimate will need to be compared to either the Design Engineer’s or the Contractor’s cost estimate. As such, produce a spreadsheet that compares these costs. Usually the designer will already have put his estimate in Excel spreadsheet format, with a separate workbook sheet being used for each of the SCC codes. There should also be a separate summary sheet in the workbook that summarizes the costs by the SCC codes.
13. Estimates generated within the FasTracks Estimating Group are reviewed by a qualified estimator within the group to confirm the estimates are accurate and free of error.

14. The estimates are reviewed with the Corridor Project Manager to confirm all project elements have been included. Appropriate adjustments are made and the estimate is finalized. The estimate is then coded with the Work Breakdown Structure (WBS) cost accounts and an Excel spreadsheet export file generated. The resulting export file can be input into PRISM Project Manager, the FasTracks Cost Control System, for estimate-to-complete calculations and cost control purposes.
15. When the subsequent design submittal are received for review, the previous design submittal estimate is version controlled before any estimate updates are completed as a result of any changes to the design.