

Cost Estimating Tool for Engineering and Design Services

The costs of basic engineering and design services normally performed by an architectural-engineering firm on complex construction projects are eligible for reimbursement. Such services include:

- Preliminary engineering analysis;
- Preliminary design;
- Final design; and
- Construction inspection.

While a final inspection and reconciliation will be used to determine the actual costs for reimbursement of these services, the costs can be estimated during project formulation using a percentage of the construction cost. Percentages are derived from FEMA engineering and design services cost curves. These curves, which were developed for FEMA from data developed by the American Society of Civil Engineers Committee on Professional Practice in 2005, show a correlation between engineering costs and total construction costs. These curves are shown in Figures 3 and 4. To use the curves, estimate construction costs for a project. Find the construction cost on the horizontal axis and, using the appropriate curve for either force account or contract work, read the associated percentage of engineering and design services from the vertical axis. This percentage can be multiplied by the estimated construction cost to determine an appropriate engineering and design cost estimate.

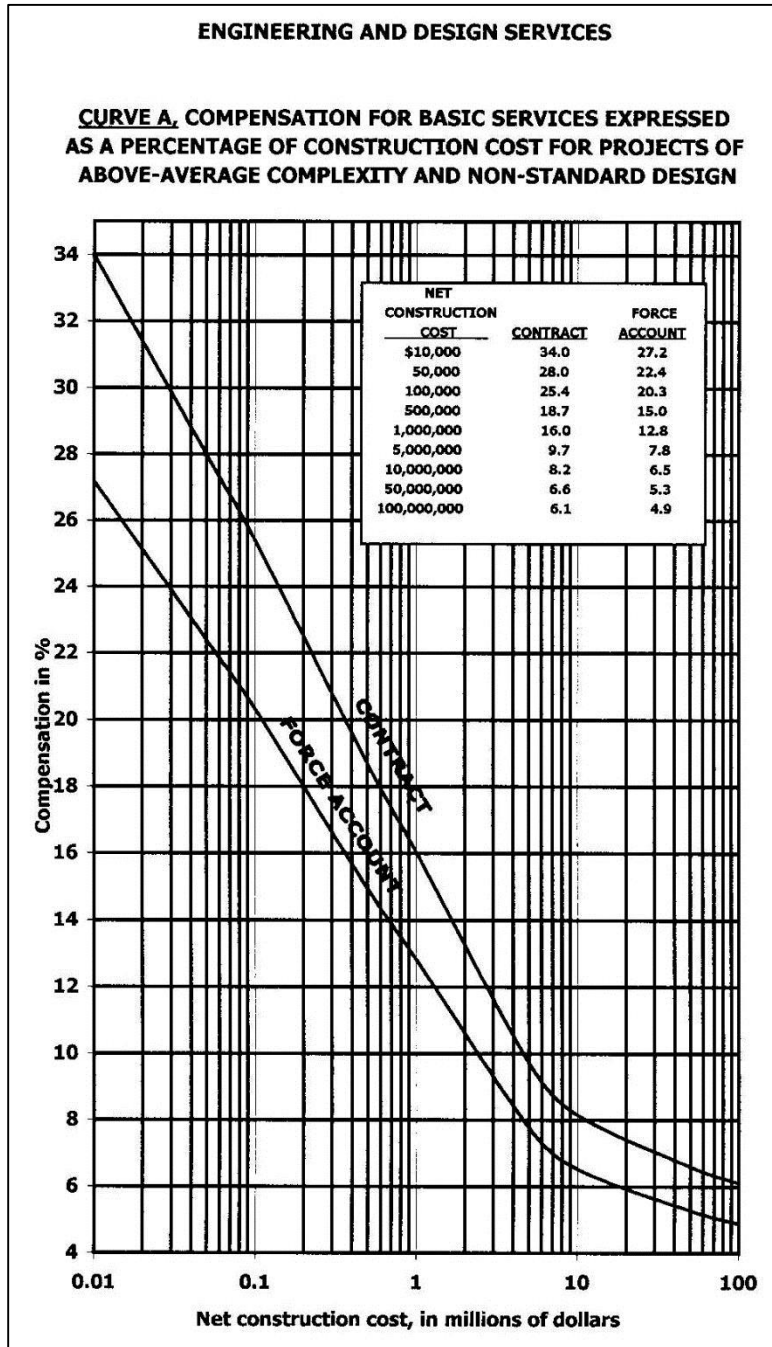
Curve A

Curve A¹ applies to projects of above-average complexity and nonstandard design. Examples of such projects include:

- Airports with extensive terminal facilities;
- Water, wastewater, and industrial waste treatment plants;
- Hospitals, schools, and office buildings;
- Power plants;
- Large dams and complicated small dams;
- Highway and railway tunnels;
- Pumping stations;
- Incinerators; and
- Complicated waterfront and marine terminal facilities.

¹ See **Figure 1** on page 2

Figure 1:
Engineering and Design Services of Above-Average Complexity



NOTE: "Contract" and "Force Account" above mean engineering and design services performed by contract or by an applicant's own employees, respectively.

Curve B

Curve B² applies to projects of average complexity. Examples of such projects include:

- Industrial buildings, warehouses, garages, hangars, and comparable structures;
- Bridges and other structures of conventional design;
- Simple waterfront facilities;
- Roads and streets;
- Conventional levees, floodwalls, and retaining walls;
- Small dams;
- Storm sewers and drains;
- Sanitary sewers;
- Water distribution lines;
- Irrigation works, except pumping plants; and
- Airports, except as classified for Curve A.

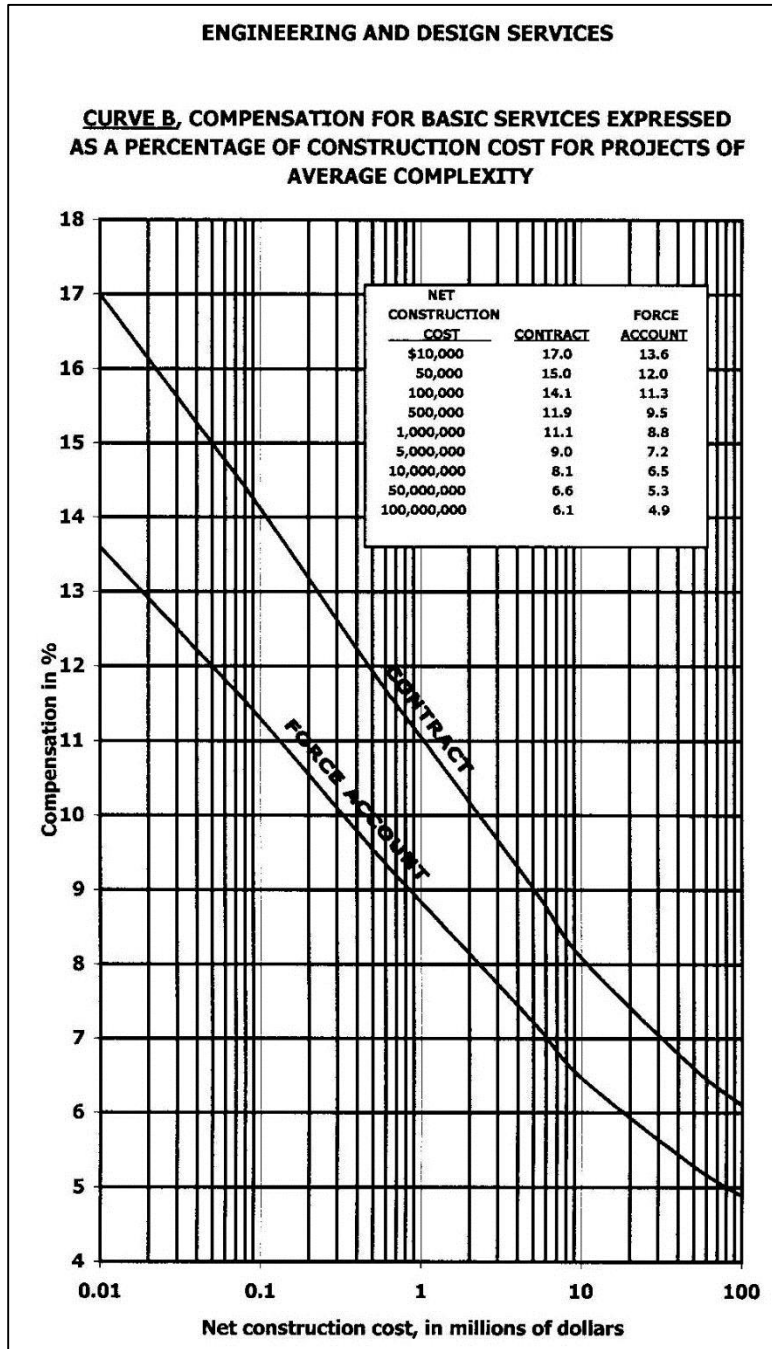
In addition to the basic engineering services, special services may be required for some projects. Such services include engineering surveys, soil investigations, services of a resident engineer, and feasibility studies. Because special services are not required on all projects, they are not included in the percentages on the engineering and design services curves. These services are estimated separately.

If a project requires only basic construction management, a fee not exceeding 3 percent of construction costs may be used for the estimate. Management functions include review of bids, work site inspection visits, checking and approval of material samples, review of shop drawings and change orders, review of contractor's request for payment, and acting as the client's representative. An example of a project requiring only inspection services but no design and engineering would be a building repair project that only included patching and painting damaged interior wall. Another example would be where a contractor is hired to repair local roads back to the pre-disaster condition, using local construction standards.

Estimates for engineering and design services and construction inspection typically are not included in small project estimates or emergency work project estimates except for complex projects or projects where special services are required.

² See **Figure 2** on page 4

**Figure 2:
Engineering and Design Services of Average Complexity**



NOTE: “Contract” and “Force Account” above mean engineering and design services performed by contract or by an applicant’s own employees, respectively.