

Technical Matters

Chapter VIII - General

Introduction

Public Works Department is executing & maintaining all the Govt. buildings works and all Irrigation Projects such as Dams, Canals, Tanks multifarious works such as construction of buildings, roads, bridges, culverts, water harvesting structures, implementation and maintenance of water supply in rural areas. The following chapters visualize the various technical aspects involved in execution of works in this Department, facilitating the systematic implementation of schemes.

Designs and Drawings:

- Drawings in respect of Government buildings works are prepared and approved by Chief Architect, PWD, Chennai for entire PWD.
- Structural Designs for building works are prepared and approved by the Superintending Engineer, Planning and Designs Circle, (Buildings) Chennai.
- The Superintending Engineer, PWD Designs Circle, WRO, Chennai is preparing design and drawings for all irrigation works and the same is approved by the Chief Engineer, PWD, DR&CS, WRO, Chennai.

Specification of works

Specification specifies or describes the nature and the class of the work, materials to be used in the work, workmanship, etc. and is very important for the execution of work. Specifications should be clear and there should not be any ambiguity anywhere. Drawings do not furnish all the details of items of work. For details such as materials, their proportions, qualities, workmanship, etc., specifications are to be referred. The combination of drawings and specifications defines completely the structure.

Standard Data for Preparing Rates

For building works, Standard Data Book published by Public Works Department and for road works road data prepared by Highways Department is followed. For road works to be executed under PMGSY schemes Standard Data Book published by MORD (Ministry of Rural Development) is followed.

Adoption of PWD Schedule of Rates & Highways Approved Rates

The rates of works, materials, labour etc., vary from place to place but to have common method of working out rates, the current Schedule of Rates published by Public Works Department has been used for arriving rates of items of works in building estimates and estimates of related works such as retaining wall, compound wall, etc.

The Competent Authority i.e Superintending Engineer/ Executive Engineer/Assistant Executive Engineer/Assistant Engineer after satisfying himself about the efficacy and economical nature of

the design accords technical sanction to the estimate. Administrative approval and technical sanction are fore runners for invitation of tenders for execution of work.

Delegation of Powers

The powers for according Administrative Sanction and Technical Sanction, Measurement and Check measurement and Tender Inviting, Accepting and Scrutiny of Tenders for various works is published in this book.

Preparation of estimates

In preparing an estimate, the quantities of different items of work are calculated by the simple menstruation method and from these quantities the cost is calculated. The subject of estimating is simple, nothing much to understand, but knowledge of drawing is essential. In preparing an estimate one has to go into details of each item, big or small, nothing can be left or missed.

Accuracy in estimate is very important, if estimate exceeds, it becomes a very difficult problem for engineers to explain, to account for and arrange for the additional money. Inaccuracy in preparing estimate, omission of items, change in designs, improper rates, etc., are reasons for exceeding the estimate, though increase in the rates is one of the main reasons.

In framing a correct estimate, care should be taken to find out the dimensions of all the items correctly and to avoid omission of any kind of work or part thereof. The rate of each item should also be reasonable and workable. The rates in the estimate provide for the complete work, which consist of the cost of materials, cost of transport, cost of labour, cost of scaffolding, cost of tools and plants etc.

In case of estimates of road works, for labour and machinery charges, current rates as approved by Highways Department is being adopted. For NREG works (National Rural Employment Guarantee Scheme), Rural Schedule of Rates are being followed.

Survey and Site Inspection for Collecting Particulars for Estimate preparation

The survey includes reconnaissance, preliminary and detailed survey. Reconnaissance Survey means general examination of the ground by walking or riding along the probable routes and collecting all necessary information. Preliminary survey is relatively large scale instrument survey conducted for the purpose of collecting all physical information which requires to prepare site plan, longitudinal profile, cross section, contours and to ensure the type of proposal. Final location survey normally conducted along the alignment concurred by the competent authority to prepare General Arrangement Drawing.

Prior to estimate preparation, the site should be inspected first, preliminary survey to be conducted, the details such as topography, nature of soil and land, ground water table at site during various seasons, presence of water retaining structures and other structures/land marks

nearby, etc., are to be collected. The location of culverts, drains, retaining walls etc., are to be decided as per site conditions.

Avoid the following while taking survey:

1. At crossing of railway lines and water courses for in case of road works.
2. Submerged soil, marshy land and made up soil for building works.
3. Areas prone to seismic, land slide disturbances etc.
4. Land acquisition as far as possible.
5. Site below the crossing of EB lines

Testing of Soil Strata before Preparation of Estimates

The strength of soil is to be tested prior to estimate preparation. In case of major building works such as multistoried building or bridges, the plate load test or standard penetration test should be conducted to arrive at the safe bearing capacity of the soil. Based on SBC and nature of soil below foundation level, the foundation type and size are decided. In case of black cotton soil or of soil of poor strength necessary precautions should be taken to decide the type of foundation and to adopt necessary soil stabilization techniques.

In case of road works, undisturbed soil samples along the alignment have to be collected and should be tested in laboratory to arrive at soaked CBR value. Based on CBR value and traffic intensity, the crust thickness of road will be decided.

Implementation of Works

The implementation of a work is mainly confined to the following activities:

- a. Preparation of Detailed Project Report.
- b. Administrative approval and technical sanction.
- c. Invitation of tenders and award of contract (for the schemes to be executed through tenders).
- d. Executing Agreements,
- e. Execution of works.

Obtaining Administrative Sanction and Technical Sanction.

I) Administration Sanction

Administrative approval of the competent authority is a pre-requisite to take up any work. It is in effect an order to the department to execute a specified work at a stated cost.

Article 38 of Tamil Nadu Financial Code lays down that no Government Servant may incur any item of expenditure from public funds unless,

- a) The expenditure must have been sanctioned by a general or special order of the Authority Competent to sanction such expenditure and
- b) b. Sufficient funds must have been provided for the expenditure in the appropriation acts for the current financial year.

Before according the Administrative Sanction, the site plan, survey number of land, ownership of the land in which the work has to be carried out is to be verified.

II) Technical Sanction

On receipt of Administrative Sanction, detailed investigation is carried out and a detailed project estimate comprising,

- I) Report
- II) Specifications
- III) Detailed plans and drawings.

Before preparing the estimate, the site of work should be verified thoroughly. Detailed survey should be conducted such as field inspection, site soil exploration. Necessity and need of the work should be studied thoroughly.

During field inspection detailed enquiries with the local public should be conducted. During site investigation near by water bodies such as wells, local streams and the nature of ground should be verified carefully to decide the foundation details. The land mark of the area of work should be noted properly during the site inspection.

For site soil exploration, trial pits at the site of work may be dug to a considerable depth to fix the depth of foundation and to select type of foundation in case of buildings /bridges and culverts so as to minimize the settlement of foundation in case of black cotton soil or formation of any crack in future due to settlement and for an economical cost leading to stability of the structure.

Based on the enquiries made in detail, a comprehensive project report should be prepared.

a. Detailed Estimate

The estimates should be accompanied with the following :

- 1) Report accompanying Estimate.
- 2) Detailed Estimate.
- 3) Lead Statement.
- 4 Data.
- 5) Abstract.
- 6) Map.
- 7) Detailed drawings showing Plan, Elevation and Cross section.

b. Schedule of Rates

Schedule of Rates is approved every year by the TN Public Works Department and Highways Department for materials, labour, works, and conveyance of materials. Quarry chart is also approved every year by PWD and Highways department for HBG metal, sand, gravel etc.

c. Preparation of Key Map & Lead Statement

Key map is nothing but a map showing the shortest routes for the conveyance of materials from the approved source/quarry to the work etc.

Lead statement is the working sheet of the distance required to transport the materials from the source to the work site.

d. How to Prepare the Key Map

- 1) Location of site and quarry(s) of all required materials is to be marked in the Block or District map.
- 2) Identify the shortest route for transportation of materials from quarry(s) to work site.
- 3) Calculate the shortest distance in Kms from quarry(s) to work site for all the materials.

e. Standard Data and Data Preparation

The Standard Data book for civil work is available for TN PWD and Highways Department. The required data are prepared for civil works based on the above Standard data with reference to the current Schedule of Rates of PWD and Highways Department.

f. Preparation of Detailed Estimate

- 1) The detailed estimates are prepared for the works which are to be implemented for which Administrative Sanction has been given.
- 2) For each work, the site measurements have to be taken.
- 3) Trial pits have to be taken at the site for deciding the foundation.
- 4) Necessary Soil Test may be conducted to find out exact property of soil available at site.
- 5) Preliminary Dimensions are assumed for slabs, beams, & Columns for Buildings and incase for Irrigation structure based on Design as per site condition.

g. Preparation of Abstract Estimate

- 1) After preparation of detailed estimate, the abstract estimate is prepared by incorporating the quantities in the detailed estimate and also adopting the data already prepared.
- 2) The total cost of estimate will be finally arrived.

h. Specification Report

Every estimate is accompanied with detailed specification report with the details of name of work, name of programme, necessity and need of the proposed work, administrative sanction details, estimate cost, location of the proposed work, nature of topography, details of items proposed along with their material specifications, year of schedule of rates followed and other salient features if any are furnished in the specification report.