

## H. PREPARATION OF PROJECTS-IRRIGATION WORKS.

### I. GENERAL.

390. The preliminary investigation of a project by the Public Works Department should be limited to the collection, by inspection, preliminary field work and enquiry, of the data required for arriving at an approximate estimate of cost and at a decision whether the project is likely to be feasible and should be further investigated with a view to its eventual execution. The report on the preliminary investigation should include a general description of the

proposed work and an approximate estimate of the cost of the project and if the complete investigation of the project is recommended a general description of the lines of the investigation to be made and an estimate of their cost considering the work to be done in all the departments concerned and not only in the Public Works Department.

The following points should be dealt with particularly in the reports:—

(a) The amount of water available, having regard, when necessary, to the possible claims of other States, to the interests of existing irrigation under the source proposed to be tapped whether in this or in other States, and to the rights of other riparian owners of lands irrigated lower down.

(b) The approximate extent of the ayacut of the project and its general location:

(c) The existing sources of irrigation in the proposed ayacut (e. g., tanks and wells), the suitability of the soil for irrigation.

(d) The rainfall and its distribution throughout the year.

(e) The level of sub-soil water at various seasons as indicated by wells in the proposed ayacut.

(f) The nature of the crops to be irrigated, the duty of water at the field and at the head works and the allowance made for seepage and evaporation in the channels.

(g) A description of the distributory channels which, in the case of larger works, should be accompanied by a longitudinal section;

(h) Any measures which may be necessary for the protection of the ayacut from floods from outside it, such as river flood banks;

(i) The existing drainage facilities in the ayacut and the works to be undertaken—

(1) To ensure that the drainage courses are made sufficient to carry off not only the floods which occur from time to time owing to local rainfall but also the additional water which will be placed on the land by the proposed project; and

(2) To enable the drainage water from the fields in the ayacut to reach the drainage courses without having to pass over cultivated land for an undue length;

(j) The adequacy of the existing communications and the provision of additional communications and the agency by which they should be provided;

(k) A rough estimate of the cost of Special Staff in the various departments concerned:—

(1) for making a complete investigation,

(2) for carrying out the works, and

(3) for expediting the development of irrigation after the works are completed.

(l) The sources from which labour can be obtained.

(m) A description of the healthiness of the tract in which the works are to be carried out and the need for and cost of special measures to safeguard the health of those to be employed on the construction of the works, and of housing accommodation and other amenities for them.

In the case of a storage work, the report should include—

(n) a general description of the catchment;

(o) the run-off at the site of the proposed reservoir with data on which the available supplies are calculated;

(p) the approximate capacity of the reservoir;

(q) a general description of the soil and sub-soil of its bed and porosity of the bed;

(r) the materials of which it is proposed to construct dam;

(s) a longitudinal section and a few cross-sections of dam with sketches of the profiles proposed for adoption;

(t) A general description of the soil and sub-soil at the site of the proposed dam and their porosity, the suitability of the foundations of the proposed dam and the possibility of leakage under it or round its flanks;

(u) the proposed surplus works;

(v) the materials required and those available for the construction and the localities from which they can be obtained; and

(w) a recommendation whether an examination of the site by a geological expert is necessary or not.

The report should also include a preliminary financial forecast including an estimate of the rate of water-cess, which will have to be charged in order to make the project remunerative, provision being made for the acquisition of land and the excavation of channels at the cost of the Government for large blocks of land and for the acquisition of land alone for field channels to be excavated by ryots at their own cost within those blocks; and for any works that may be necessary to ensure adequate protection from floods and drainage of the land to be irrigated. The maximum area of a block to which the channels are, under the proposals made, to be excavated at the cost of the Government and the normal area to be served by a field channel should also be given. These should be estimated on the understanding that the Government will control the distribution of water only in and from the channels to be excavated and maintained at the cost of Government and not and from the field channels and that land for field channels is acquired by Government only to facilitate and expedite to the development of the project by mitigating the difficulty which ryots may have in obtaining permission from upper ryots to take water through or over their land. The preliminary investigation should be made in close collaboration with the local Revenue and Agricultural Officers. The opinion of the local Revenue Officers should particularly be obtained as to the desirability or necessity of the projected work, the fairness of the rate of water-cess proposed and the probability of the anticipated financial result being realised. The opinion of the local Agricultural Officers should be particularly obtained as to the kind of crops that are and could be raised in the area and the suitability of soils and the adequacy of their irrigation with the supplies that the project will make available as also on the question whether from an economic point of view the ryot could pay for such irrigation the rate of water-cess proposed; in this connection the cost of the ryot of preparing his land for irrigation should be considered. The question whether legislation would be necessary to ensure the realisation of the water-cess at the rate proposed should be examined and there should be definite recommendation on this question. The views of the ryots in general on the proposed work and on the proposed rate of water-cess should also be incorporated in the report. For this purpose, large meeting of the leading ryots concerned or representatives of them including village officers should be convened at central places in the project area, and the details of the benefits of the project should be explained by officers



of the three departments to the ryots of the area to be benefited by the project. If, at any stage of the investigation, it is considered that the work is not physically, or from an agricultural point of view, feasible or that its costs will be so high as to be unremunerative unless water-cess is levied at a prohibitive rate of that negotiations should be undertaken first with any other Government or that, for any other reasons, the orders of Government should be obtained before further expenditure is incurred, the investigation should be stopped and a report submitted to Government for orders, whether it should be proceeded with.

391. Should it be decided that a complete investigation should be undertaken, a fuller investigation of all the points mentioned in Paragraph 390 should be undertaken and reports, plan and estimates should be prepared with full details as required under Paragraphs 392, 393, 395 and 396 below. Levels must be taken in sufficient detail over the whole area. The ayacut should be definitely, fixed and delimited by the Public Works Department and Revenue Staff on the assumption that all the ryots concerned will agree to have their lands included in the ayacut after making due allowance for the reservation, if necessary of land for new roads, village sites or other public purposes. The main and minor distributory channels including field channels should be aligned; the concurrence of the ryots for the inclusion of their lands in the ayacut and the proposed rate of water-cess should be obtained in the form of written statements or agreements by the Revenue Divisional Officer or any other Revenue Officer deputed to work with the Public Works Department for this purpose the situation of the sluice or pipe through which it is proposed that water should be supplied by the Public Works Department for the irrigation of each field, the proposed alignment of the field channel and the level at which the water will be supplied must be indicated approximately to the ryot concerned. Several ryots may sign one statement relating to several fields in one village, provided it is made clear to which field or fields the signature of each ryot relates. Should a small group of ryots be, generally unwilling to have their lands included in the ayacut, the question of including another area in the ayacut instead, should be considered. Should there be a general unwillingness on the part of all or a great majority of the ryots in the proposed ayacut to agree to the inclusion of their lands in the ayacut and to the proposed rate of water-cess, the orders of Government should be obtained as to whether the investigation of the scheme should be proceeded with or not.

If there is a general desire on the part of the ryots, as evidenced by their written statements, that the project should be carried out or should the Government order that the investigation be proceeded with, the ayacut should be definitely fixed by the Public Works Department Staff and marked in the Survey Plans with the land of ryots who have expressed unwillingness to have their land included in the ayacut being excluded as far as possible and ayacut registers being prepared together with arrangements for permanent permits to be tendered to the ryots by or in the presence of an officer of the Public Works or Revenue Department. When the ayacut is finally settled, the alignment of canals, channels and distributaries and field channels should be revised, if necessary, the cost of all main canals and branch channels exceeding 32 kilometres in length should be estimated in detail the cost of other typical branch channels and distributaries should be estimated so as to obtain an average rate per kilometre which can be applied to other branch channels and distributaries, the cost of which is not estimated in such detail. During the investigation, land plans and schedules for lands to be acquired for channels etc., may be prepared and preliminary notifications under the Land Acquisition Act may be issued, but care should be taken to see that no measures are adopted which would actually commit Government to the expenditure of money on the execution of the project. The sites of bridges over irrigation canals etc. should be settled in consultation with the Highways and Rural Works Department. The Chief Markets for the agricultural products of the district as well as the existing trade routes and Railways should be enumerated and definite proposals made as to the additional communications and facilities for marketing required as well as the agencies by which these should be provided. The report on the complete investigation should include a revised financial forecast.

It is very necessary that the local Public Works Department Officers should exercise very careful foresight in framing estimates of the cost of works. It is the duty of the Superintending Engineer and Executive Engineer in preparing or scrutinising an estimate to consider carefully the local conditions and the details of the methods by which it is proposed to carry out the work and to satisfy himself that the estimate makes adequate provision for all requirements which can be foreseen. The exercise of special care is necessary in the case of estimates for productive work since the decision to proceed with them or not most greatly depend on the estimates cost of carrying them out.

392. A general description of the proposed works should follow, including the sources from which the supply of water is to be drawn, the quantity of water available at different periods of the year, and the quantity it is proposed to utilise; also the character of the sediment brought down, whether likely to fertilize or the reverse, the area of land commanded, the average area usually cultivated, and the area probably irrigable; the lengths of main channels and distributaries and if navigation be also contemplated; the length of the navigable portion.

The quantity of water allotted to each main channel and the area irrigable there from in tabular form, the dimension of the channels and the work on each being entered in P.W.D. Form No. 155-A.

The reasons for the adoption of the particular scheme recommended in preference to any others and a full account of the bases on which the alignments of channels and other portions of the design have been projected with a careful analysis of any engineering questions involved.

The question of labour and the sources when it is obtainable, and the probable effects of the operations on the existing rates.

The localities whence materials are obtainable, and the facilities for manufacture, with probable rates; the results of any experiments on the quality of lime, the character of brick, clay etc.

The method proposed of carrying out the work, and the establishment probably required.

The executive divisions into which it is proposed that the works should be divided and the time which will probably be occupied in construction.

## II. PARTICULAR INSTRUCTIONS AS REGARDS STORAGE PROJECTS.

393. The report should, in addition to the formation specified in Paragraph 302, give the area of the tank, and contents when full, the area of land commanded and irrigable, the length of the dam, its maximum height, materials of which it is proposed to construct it, form etc, length of surplus weir or weirs, and the mode in which the water is to be let off for irrigation. The questions of the

available water-supply number of times the reservoir will probably fill during the year, rainfall and proportion flowing off the catchment, character of soil and general slopes of the country losses by evaporation and absorption and issue of compensation, water, quality of the water, depreciation of storage capacity owing to silt, deposit etc, should be fully dealt with, as well as the quantity of flood water for which provision must be made and the water-ways of the escape weirs.

### III. IRRIGATION PROJECTS AFFECTING INDIAN STATES.

394. *Deleted.*

### IV. FLOOD CONTROL.

395. In the case of new flood control works, it is necessary that the report should show clearly the financial responsibilities of Government in connection therewith and the manner in which it is proposed that the outlay shall be recovered.

### V. PROJECT ESTIMATES.

396. The complete estimates for a project should include indirect as well as direct charges. The main headings are as follows.—

#### Direct charges—

- (1) Works (including surveys and special tools and plant)
- (2) Establishment (including leave allowances).
- (3) Tools and Plant (Ordinary).
- (4) Pensionary charges.

#### Indirect charges —

Capitalization of abatement of land revenue on area occupied by works calculated twenty-years purchase.

The items included under the head "Works" should be classified under the prescribed main and sub-head of account. The cost of surveys including expenditure incurred, prior to the submission of the project, should be included in the estimate.



Provision should be made in the estimate for establishment, tools and plant and pensionary charges as follows.—

*Establishment.*—(including leave allowances) 25 per cent on the estimated works outlay.

*Tools and Plant.*—Two per cent on the estimated works outlay (ordinary).

Pensionary charges—

(a) In the case of large projects for which special establishments are employed and charged to the projects, such percentage as may be fixed by the Government from time to time on the total salary and leave allowances of the pensionable establishment employed on the project, and

(b) In the case of small projects or open capital works which are carried out by the regular Public Works Department Establishment and which in consequence are debited with the “*pro-rata*” charges for establishment calculated under the rules in Appendix 7 to the Tamil Nadu Public Works Account Code, such percentage as may be fixed by the Government from time to time on the gross establishment charges.

NOTE.—The term ‘Pensionable Establishment’ referred in (a) above also includes all temporary staff employed on emergency basis.

Provision should also be made in the project estimate for the levy of one per cent on the estimated works outlay for audit, although this levy is made only in the *proforma* accounts of the works and not in the regular accounts of the State.

NOTES.—(1) These orders will take effect from 1st April 1933.

(2) In the case of irrigation projects for which neither capital nor Revenue Accounts are kept, it is unnecessary, except in the case of large surveys, for new irrigation projects referred to in rule 13 of Appendix 7, Tamil Nadu Public Works Account Code, to enter provision for establishment and tools and plant in the estimate unless, for any reason, it may be deemed desirable to do so in order to forecast the ultimate result of the project.

(3) In respect of projects costing Rs. 10·00 crores and more a lesser percentage for levy of audit and accounts charges based on actuals may be adopted in consultation with the Accountant-General, Tamil Nadu.

## VI. SANCTION TO PROJECTS.

397. The powers of sanction of the State Government have been defined in Chapter VI. Projects beyond their power require the sanction of Union Government.

398. Superintending Engineers and Executive Engineers to the extent specified in Paragraphs 420 (b), 423 (a), 430 (b) and 432 (a) are authorised to sanction detailed working estimates against the provision under each head sanctioned in the project. For this purpose, ascertained savings in the provision for works may be transferred from one sub-head to another of the same main head under orders of the Superintending Engineer, and from one Main 'Head' to another under those of the State Government except that savings under the head 'Distributaries' may not be diverted to any other head.

NOTE.—As audit of the charges for establishment and tools and plant (ordinary) is not conducted against the provision made in project estimates such provision will not be available for transfer to other heads.

## VII. CLOSURE OF CONSTRUCTION ESTIMATE (PRODUCTIVE AND UNPRODUCTIVE).

399. It is not possible to define exactly the period at which the construction estimate of an 'Irrigation or Navigation' work for which capital accounts are kept should be closed; but unless specially ordered otherwise, it should be closed as soon as the project is practically in full operation, although there may be works such as drainage cuts, protective embankments, distributaries, etc., provided in the construction estimate, which it is not desirable or economical to construct at once.

A date for the completion of the construction, on which the sanction lapses, unless extended, must be assigned with each sanction.

NOTE.—Executive Engineers are empowered to sanction the extension of the dates of completion of works the estimates for which have been sanctioned by the State Government or the Chief Engineer for Irrigation, as the case may be, under the Open Capital Account Rules, a report of each such extension sanctioned by them being made to the Superintending Engineer.

400. For the purpose of providing for expenditure debitable to Capital after the closing of the construction estimate of an irrigation project such works will be classified into two classes.—

(i) Works which are necessary for the full development of the project but which are not in themselves directly remunerative, e.g., drainage cuts, protective embankments, overbridges, inspection houses, etc.

(ii) Works which are directly remunerative in themselves.

Examples.—New distributaries, facilities for navigation works to increase the canal discharge, etc.

### VIII. COMPLETION REPORTS.

401. When the construction estimate is closed, a completion report of the project should be submitted to Government within 12 months or such earlier period as the Chief Engineer may prescribe comprising the following documents:—

(a) A statement (Schedule A) showing, by main heads and sub-heads of the Capital Account, the actual expenditure on works completed upto the date of the closure of the construction estimate.

(b) A statement (Schedule B) of works which are within the scope of the sanctioned estimate and of which detailed estimates have been prepared and sanctioned by competent authority, but which were incomplete or had not been begun on the date of the closure of the construction estimate.

(c) A statement (Schedule C) of works sanctioned between the date of closing of the construction estimate and the time of submitting completion report.

(d) A statement (Schedule D) of works for which no estimates have been sanctioned upto the date of the submission of the completion report, but the probable expenditure on which can be foreseen and which are necessary to complete the project.

(e) A statement (Schedule E) compiled as a combination of statements A, B, C and D showing revised forecast of expenditure. This statement should also show, for purposes of comparison the sanctioned estimate by main heads and sub-heads of the Capital Account.

(f) A report on the works executed upto the time of the closure of the construction estimate. This report will discuss the financial results already attained and expected in the future and the general prospects of the project and should be accompanied by forecast

financial statements I—IV in Public Works Department Form No. 155 based on Schedule E above, i.e. on the total anticipated ultimate expenditure on the project.

(g) An index map showing the canals and distributaries as completed.

NOTE.—It is essential that all important uncommenced works which are within the scope of the sanctioned estimate should be included in Schedule B, C or D, as the case may be, except that works included in a substantial section of project, which may have been abandoned eventhough provisionally, may be omitted provided that the total amount of the sanctioned estimate as entered in Schedule E is reduced by the aggregate assumed cost (including contingencies) of the works included in that section—*vide* Paragraph 182.

402. The Schedule E will be treated as revised forecast of expenditure against the sanctioned project. The completion report will be passed by the Government.

403. and 404. *Deleted.*

405. The State Government should maintain a register (Public Works Department—Form No. 154) with reference to each project showing the approval accorded by them and each subsequent sanction against capital and the date when each sanction lapses.

**IX, RULES GOVERNING THE SUBMISSION OF ESTIMATES FOR AND THE CONSTRUCTION OF IRRIGATION WORKS. THE COST OF WHICH EXCEEDS THE POWERS OF SANCTION OF PROVINCIAL GOVERNMENTS.**

406. *Deleted.*