WATER RESOURCES DEPARTMENT
GOVERNMENT OF BIHAR

GUIDE LINES FOR THE PREPARATION OF COST ESTIMATES

JUNE 2005

FOREWORD

The Department of Water Resources, Government of Bihar, has updated and compiled detailed guidelines for the preparation of cost estimates of various types of projects of restoration and new construction which it normally undertakes.

Compilation of comprehensive guidelines in one booklet will go a long way in accurate and timely preparation of estimates and hence completion of projects.

I am sure apart from being very useful to the officers of all levels of the department; this compilation will also serve as a ready reckoner to other works departments of the State.

Patna
25-06-2005

(G. S. Kang)
Chief Secretary

PREFACE

The pace of execution of Water Resources Development Projects of Bihar need to be accelerated manifold to bring the State at par with other states of the Union, which have attained relatively a very high rate of economic growth. Our experience have shown that poor quality of estimates which are short of requisite provisions and prepared without due vision are prime reasons due to which the execution of projects lingers on endlessly.

Concerted efforts are being made by the State Government to reverse the trend and see that the milestones identified for timely execution of projects are strictly attained. Now projects are being financed also by Banks and Financial Institutions and hence the State can no longer afford any Time and Cost Overruns.

The Department is bringing out these detailed Guidelines to facilitate preparation of exact and precise estimates of various Projects executed by the W R Department. It needs to be made explicit that these Guidelines only supplement previous Government orders issued from time to time and are not intended to supercede them.

I hope that these Guidelines will prove useful and facilitate our field officers in their work.

Patna
25th June 2005

(V. Jayashankar)
Commissioner & Secretary

ACKNOWLEDGEMENT

It has been experienced that flaws, omissions and lack of precision in the estimates of the river valley projects have been a major hurdle in timely and efficient execution of the projects. This leads to an unending process of repeated approvals and sanctions. Also, the department is at times caught in litigations, which could be avoided with a little foresight and a better application at the time of preparation of the estimates. An exact and precise estimate is a prerequisite for timely completion of projects. This guide lines for preparation of Estimates is an endeavor by the department towards this end.

This guidelines is comprehensive and strict adherence to its provisions by the field officers would facilitate preparation of a more exact, precise and accurate estimates of the projects. In addition to the provisions in the Guidelines & those laid down in different Rules and Circulars issued by the Government from time to time, the points given below also needs to be considered while framing the estimates of projects .

i. The CWC Guidelines for the preparation of the Project Estimates for River Valley Projects must be strictly followed. All the components and activities constituting the work must be properly provided for in the estimate.

ii. The Index Plan of the Project site and adequate drawing(s), clearly showing the details of the structure should be a part of the estimate.

iii. The provisions of the clause 201 of the Bihar Finance Rules Vol-I should be adhered to and the Technical Sanction of the estimates must be obtained before the works are commenced.

iv. The Estimates and Works Programme should be prepared in a way, so as to avoid the repeated need of Revised Estimates subsequently. In case, the estimates require approval at the Government level, the Chief Engineer concerned must furnish a certificate to the effect that the estimate, including quantities of different items have been checked in detail and that provision for all the components of the works have been made in the estimate. Also, that the rates in the estimate are as per the prevalent Schedule of Rates and for items outside the Schedule of Rates, the Rate Analysis has been enclosed separately with the estimate. The certificate would also state that all the components of the projects are included in the estimate and after the completion of the project the objectives of the project would be attained fully. This certificate is

required on all the estimates by the sanctioning authority even if they are not submitted at the Government level.

vi. Provisions of turning platforms at every kilometer would be desirable and such provisions must be made in the estimates of canals and embankments. The platforms should be 15-30 m long and 3 m wide with a side slope of 1:3 in the country side (Refer IS:12094-2000) to facilitate unhindered movement of vehicles during construction and maintenance.

vii. To facilitate movement and swift transportation during emergency the roads over canals/ embankment should be made pucca roads and such provisions be made in the estimate.

viii. To provide shelter to the flood affected during the flood period, raised platforms should be constructed on chat lands adjacent to the embankment under the flood proofing programme. This would help stop undesirable encroachment of the embankment. The selection of the site should be made with due consultation with the people's representatives and the administration, so as to include people's needs in these provisions.

ix. Provision of a shed be made at every 5 Kilo-Metres on the countryside of embankments and Main / Branch Canals for use by those engaged in the maintenance works. In case of such sheds being already in existence provision for its repair & maintenance be provided for in the estimate. The existing nearby departmental inspection bunglow also should be repaired and maintained properly.

x. As far as possible provision of Kutcha/ Pucca Cattle-crossings should be made in embankments and canals.

xi. Provisions of steps on the side slopes of the embankments should be made for use by the villagers, in such stretches where the population is dense.

xii. At the inter-section of a village road and the canal/ embankment, the canal/ embankment slopes should be made pucca for safe and smooth flow of traffic on village roads.

xiii. There should be proper arrangement to drain out the rain water so that it does not accumulate on the embankment top (formation).

xiv. The DPR/ Estimate for renovation work of canals should clearly mention the following and should be based on studies, surveys and drawings prepared accordingly:–

a) Assessment of silt deposition in canal bed and identification of weak sections of canal banks which require repairs.

b) Report on present condition of various canal structures, viz Head Regulators / Cross Regulators / Cross drainage works / Falls/ Bridges etc vis-à-vis their design provisions.

c) Condition of Silt Ejector and Escape channel.

d) Assessment of commands of canal systems and water availability in them.

e) The condition of outlet and commands of the canal.

f) General conditions of the mechanical components, problems encountered by them and remedial measures proposed.

g) Deterioration in various components of the head regulator and measures proposed.

xv. A signed check list as indicated in Table – 1 in the guidelines would be put-up before the sanctioning authority after the estimate has been checked by the proposing authority.

xvi. The period of execution of work, formation of groups of works and requirement of work shall all be decided in accordance with the provisions of circulars issued by Cabinet Secretariat and Coordination Department from time to time.

A strict adherence to the standards laid down for the preparation of estimates in these guidelines should help attain the objectives of preparation of exact and precise estimates by the project officials and thus avoid time and cost over runs of the Water Resources Development Projects.

We express our thanks to the officers and staff of the Department, and WALMI whose efforts made possible the preparation of this guidelines in a rather short time. The notable among them are Sarvshri Mahendra Prasad, Retired CE, Sushil Kumar Singh, Executive Engineer, Gandak Cell, Amaresh Chandra Sahay Verma, Executive Engineer, P & M Circle-1, A. K. Jha, Assistant Engineer, P & M Circle-5 Nand Kumar Jha, Yogeshwar Dhari Singh both Assistant Engineer, P & M Circle-1 and Md. Sohail, Under Secretary, CADA. The service rendered by them is deeply acknowledged.

The Water Resources Department would appreciate any suggestion from its field officers engaged in the execution of the Projects, so that it could be considered by the Department for being incorporated in future improved editions.

25/06/2005

(Braj Bhushan Prasad Singh)
Chief Engineer,
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Guide Lines

for the Preparation of Cost Estimates

Whenever we want to undertake any work/scheme(Existing or New one) it becomes necessary to know the cost to be incurred on the work/scheme.

So, evaluation of the cost estimates for any work is very important. Hence care should be taken that all items of work/ scheme are covered, otherwise the completion of the work/scheme in time would be delayed due to discrepancies of the same. This would lead ultimately rise in cost of the work/ scheme. So, while preparing cost estimates of any work/scheme, it is necessary to know:-

(i) The work/scheme is new;

(ii) The work/scheme is existing and requires renovation, special repair or of the nature of annual repair and maintenance.

(iii) The estimate to be framed is supplementary or revised one.

Once the above information are known the preparation of the estimate becomes easy.

NATURE OF PROJECT COSTS.

The capital cost of a project includes all costs associated with investigations, design, construction and maintenance during construction period of the project.

Investigation costs include cost of collection of necessary physical, hydrological, geological, topographical and structural data to give the engineers the basis for design and estimation.

Design costs include the cost of all necessary analysis of data and studies (geological, structural and economic) to support the layout and dimensions of structures, the layout of construction plant and facilities, the specification of materials and the method of construction.

Construction costs are the costs of bringing the project into being. These costs should include all the work and supply items required for the supervision and the construction of permanent project along with engineering supervision and administrative services and costs of all activities such as colonies, roads, water supply and sanitary systems, camps etc.

Whatever may be the nature of estimate to be prepared, the cost estimate should contain the following details.

1. **Check list**
2. **Report**
3. **Estimate cost**
4. **Details of evaluation of quantities of different items of works.**
5. **Requirements of construction materials**
6. **Analysis of rates with lead chart/ disposal plan as the case may be.**

(1) Check-list :-

A check-list should be enclosed with every estimate whether the estimate is original, revised or supplementary. A typical check list is enclosed as Table-1 for all estimates. But in the case of rehabilitation or modernization of canal systems, an additional check-list, in addition to Table-1 should be enclosed as shown in Table-2, 3 and 4.

In the case of Head-Works, like Barrages, Spillways and other important Regulatory system, additional information as shown in Table-5 required to be furnished.

(2) Report:-

The report to be furnished with estimate, should clarify the following points :-

(a) What is the purpose of estimate ?
(b) Whether the estimate for the work was previously prepared or not ?
(c) If the estimate was framed in the past for the same work then reason for preparing the estimate again ?
(d) Whether the estimate is revised one ?
(e) Whether the estimate is supplementary one ?
(f) What benefit would be derived on the completion of the work/ scheme ?
(g) Whether the scheme is cleared by State TAC and CWC as the case may be ?
(h) Administrative Approval is required or already given ?

(3) Cost Estimate :-

3.1 CLASSIFICATION OF ESTIMATES INTO UNITS AND ACCOUNT HEADS ;

3.1.1 Units:-

The Bureau of Indian Standards has published a standard numbered IS:4877-1968 entitled "Guide for preparation of estimate for river valley projects" on this subject. According to this standard the project works have to be grouped into the following units :

a) Unit-I Headworks including main dam and auxiliary dam, dykes, spillway, outlet works, energy dissipation devices, barrages, weirs, regulators including intake structures and diversion works.

b) Unit II- Main canals, branches, and distribution system inclusive of all pucca works;

c) Unit-III-Hydro-electric installation

1)Power Plant and appurtenant works :

i) Civil works, and

ii) Power equipment

2) Transmission lines.

3) Sub-Stations

d) Unit IV – Navigation works.

e) Unit V – Water supply works.

3.1.2 ACCOUNTS HEAD

Minor Heads:-Each unit and if necessary each sub-unit, should be covered under the following minor heads classified as direct and indirect charges.

Direct charges.

These shall include the following :

I. Works
II. Establishment
III. Tools and Plant
IV. Suspense
V. Receipts and recoveries on capital account.

Indirect charges

These shall include the following :

a) capitalized value of abatement of land revenue, and
b) Audit and account charges.

3.1.2.1 Detailed Heads under I-Works :

The provisions under the Minor head I-Works will be sub-divided under the following detailed sub-heads :

A- Preliminary
B- Land
i) Acquisition & Compensation
ii) Rehabilitation and resettlement
C- Works
D- Regulators and measuring devices (for canals only)
E- Falls (for canals only)
F- Cross drainage works (for canals only).
G- Bridges (for canals only)
H- Escapes (for canals only)
I- Navigation works.
J- Power Plant civil Works.
K- Buildings.
L- Earthwork (for canals only)
i) Earthwork;
ii) Lining and
iii) Service Road
M- Plantation.
N- Tanks and reservoirs
O- Miscellaneous
P- Maintenance.
Q- Special T & P.

R- Communications
S- Power Plant and electrical Mechanical system.
T- Water Supply works
U- Distributaries, minors and sub-minors.
V- Water Courses
W- Drainage (to be clubbed with Environment)
X- Environment and ecology
Y- Losses on stock

3.1.3. ABSTRACT OF COST

3.1.3.1 Detailed Abstract of cost :

To work oust the total cost of the project in detail the cost of various units mentioned in para 3.1.1 should be complied in a tabular form according to the various accounts heads indicated in para 3.1.2.

3.1.3.2 General Abstract of cost:-

On the basis of the detailed abstract of cost as in 3.1.3.1, a general abstract of cost for the whole project tabulating all the units together may be compiled by minor and detailed heads.

3.2 DETAILED ESTIMATE OF COSTS :

(A) DIRECT CHARGES:

I-WORKS:
The various items under minor and detailed sub heads for which estimates should be prepared are indicated in following paras. Explanatory note regarding the basis of provisions should be given for each item.

3.2.1 A -PRELIMINARY :

3.2.1.1 The important items to be considered are :

a) Expenditure incurred on previous investigations.
b) Detailed surveys for final location;
c) Contour survey for reservoir basin (including establishment of permanent bench marks);
d) Geological surveys and geophysical surveys;
e) Hydrological and Metrological surveys including establishment of rain gauges/ and river gauge and discharge, sedimentation stations and their running charges;
f) Investigations for foundations and rock testing;
g) Investigations for availability of construction materials
h) Construction of access roads to facilitate investigations;
i) Model experiments;
j) Computer and telecommunication facilities

k) Preparation and printing of project reports;
l) Vehicles for inspecting officers for site investigation
m) Camp equipment;
n) Preliminary soil tests, establishing soil testing laboratory;
o) Consultants fees (including charges for preliminary design work or advice);
p) Training of engineers during investigation & preparation of project reports.
q) Ground water studies.
r) Environmental and Ecological studies.

For canal works:

i) Command survey (contouring).
ii) Detailed alignment survey (cross sectional survey)
iii) Establishing and fixing bench marks
iv) Taking trial pits or trenches and trial bores for foundation investigation of structures.
v) Taking auger holes for soil survey of command area.
vi) Field tests for soil classification.

3.2.1.2 The amounts required against each of the above items will vary from project to project, and no general yardsticks can be laid down. It has, however, been the experience that the overall provision under 'A-Preliminary' in a project estimate should be limited to 1 to 2% of the total cost of I-Works.

3.2.2 B -LAND:-

3.2.2.1 This sub head covers the following items :

a) Acquisition of land (private and Government) for works and that coming under submergence);
b) Compensation for other properties like houses, wells, trees etc;
c) Compensation for standing crops
d) Compensation for prospective mineral deposits, if any;
e) Rent for use of land;
f) Interest charges on the amount of award for the period between taking over possession of the land and the date of award;
g) Solarium charges for compulsory acquisition;
h) Legal charges;
i) Relocation of communications like roads, railways, telegraph lines etc;
j) Staff for Demarcation/ Measurement of Land; and
k) Establishment charges for land acquisition and compensation.

3.2.2.2. The probable rate for acquisition of different types of lands should be enquired from and got certified by the district revenue,. forest or other competent authorities and their certificate appended with the project estimate. Only such cost that will actually be paid for Government land shall be included in the estimates. However, quantities for Government land taken on transfer shall be indicated.

The cost of wells should be based on the evaluation of their numbers and present day costs; but the cost of structures such as buildings, temples etc. should be based on plinth area rates at present day cost less value of usable materials.

The norms for crop compensation and interest charges are not uniform. The provision of crop compensation is normally made at a suitable rate per hectare on a percentage of cultivated land being acquired. It is seen that this percentage generally ranges between 25% to 50% of the agricultural land being acquired.

The interest charges on compensation may also be necessary in view of the likely time lag in taking possession of the land properties and actual payment of compensation. For estimating this provision may be considered on about 25% of the total compensation for a period of about 2 years @ 12% per annum.

Solarium charges may be provided @ 30% of the cost of permanent acquisition of private land. Establishment charges are provided @ 6.25% of the cost of total compensation

In addition to LA establishment charges, provision is also required for labour and materials for demarcation and measurements for land and properties. This is generally provided @ 1% of the cost of land acquisition. Provision for legal charges may also be considered as requirements on this account have been on the increase. For the purpose of estimation, this may also be considered as 1% of the total compensation.

Following information/statements should be furnished in the estimate for B-Land.

1. Level up to which land is to be acquired for submergence and construction works.
2. Statement showing villages submerged along with total area of the villages and the area to be acquired and also the percentage of the total area of the village.
3. Statement of village-wise structures such as buildings, stables, Temples, other Religious Buildings and wells.
4. Statement of persons displaced and their occupation village-wise.
5. Alternative means of employment for the oustees.
6. No. of trees, girth at 3' above GL, fruit bearing etc. and their usefulness.

3.2.2.3 ii) Rehabilitation & Resettlement :

The provision for rehabilitation would depend on the number of persons displaced and the rehabilitation measures proposed to be adopted which should be clearly indicated in the project report. Broadly, the following provisions need to be considered.

a) Acquisition of lands for new village sites and allotment of plots for housing to the villagers at suitable rates.
b) Making the acquired land fit for habitation and providing facilities such as village roads, wells, school buildings, post offices, dispensaries, panchyat ghars etc
c) Providing free transport for conveyance of dismantled materials and household articles from old place to new sites.
d) Development of lands (including reclamation, if needed) to be allotted to agriculturist displaced persons
e) Cost towards implementation of Rehabilitation & resettlement plan.

3.2.2.4 In 1975 a Committee was appointed by the Central Board of Irrigation and Power to consider the desirability of fixing norms for acquisition of land and structures on the projects throughout the country. The relevant extract from the recommendations of this Committee concerning the extent of land to be acquired is given below :

"Generally acquisition may be done upto FRL only. The area between FRL & MWL may be acquired only if the submerged land is fertile and the duration of

submergence beyond FRL upto MWL is long enough to cause damage to crops i.e. over 15 days duration. (for acquisition of land the effect of back water need not be taken into consideration).

All structures coming under submersion between FRL and MWL should be acquired. If the structures coming under submersion are of religious or archaeological interest, provision must be made for re-establishing these structures above MWL"

The provision for acquisition of land and structures should be made accordingly.

Provision should also be made for establishment charges towards implementation of R&R @ 6.25% of its total cost.

3.2.3 C -Works :

This head is intended to cover the provisions for various components of which the Head works are composed of viz. Dam, spillway, energy dissipation works, outlets (irrigation, power, water supply and scour sluices), pick up, barrage, head regulator etc. The list of pay items to be considered for different works are given below :

Details of C-Works :

3.2.3.1 Embankment Dam (earth and rock fill)

This includes the following important components :

a) River management during construction including such items such as coffer dams and diversion tunnels.

b) Foundations- These shall include the following:

1) Site Clearance

2) Excavations :

i) Stripping for dam seat.

ii) Stripping for horizontal blanket

iii) Stripping if any for upstream blanket

iv) Longitudinal, cross and toe drains

v) Key for upstream riprap and

vi) Cut off trench.

3) Dewatering arrangements (with details)

4) Foundation treatment

i) Guniting/shotcreting

ii) Drilling in rock or in soil with casing.

iii) Foundation/grouting tunnel

iv) Filling cut off trench with selected

- from excavated
- from borrow areas.

v) Grouting (cement, bentonite, chemicals)

vi) Construction Diapharagm wall (concrete, plastic).

vii) Relief wells

viii) Upstream horizontal impervious blanket sheet

ix) Pile

x) Pile driving.

xi) Other treatments.

5) Foundation drainage –
This shall consist of ;
i) Drilling drainage holes, and
ii) Making drainage and grouting tunnels.
6) Filling cut-off trench with selected impervious material;
i) from excavated material, and
ii) from borrow area.
C) Dam
1) Earthwork (in core, shell, random zones and upstream blanket);
i) Impervious :
ii) Semi-pervious, :Quantity to be indicated
iii) Pervious, :Separately for excavated
iv) Random fill :materials and borrow areas
2) Rock fill including rock toe ;
i) from excavated materials
ii) from quarries.
3) Filters (at downstream toe or hearting);
i) Fine filter (sand) – sloping, vertical of horizontal.
ii) Coarse filter (gravel or crusted stone) sloping, vertical or horizontal.
4) Upstream sealing :
i) R.C.C. membrance
ii) Blanket of special materials like Geomembrane or non dispersive soil layer.
5 Rip rap (dumped or hand placed)
6) Downstream slope protection :
i) Turfing
ii) Rip rap
iii) Geo-textile etc (woven fibres)
iv) Surface Drainage System (cross drains, longitudinal drains/pipes collecting and toe drain).
7) Instrumentation
8) Laying of open jointed pipes for drainage.
9) Manholes
10) Parapet wall;
(i) Masonry or concrete with coping.
(ii) Railing, and
(iii) Wheel guard stones
11) Road over the dam
12) Gauge posts.

3.2.3.2 Masonry Dam;
This will include the following items :
a) Diversion works during construction, such as coffer dams, diversion tunnels/channels
b) Foundations;
1) Clearing site.
2) Dewatering in foundations.
3) Excavation for main dam, energy dissipation arrangements, approach and tail channels, training/divide/retaining walls in :

i) Over-burden of soft strata,
ii) Overburden of hard strata, and
iii) Hard rock.
4) Preparation of dam seat.
5) All works relating to shear zones/faults/weak zones, treatment, wherever applicable.
6) Cement grouting including curtain and consolidation grouting.
7) Drilling holes:
i) for grouting
ii) for drainage, and
iii) for anchor rods.
8) Anchor rods.
c) Dam:
1) Masonry for :
i) hearting;
ii) upstream face;
iii) downstream face(non-overflow section and overflow sections);,
iv) training/divide/retaining walls
v) parapets; and
vi) gallaries, adits and other openings..
2) Cement concrete in
i) filling crevices and levelling course, overfoundation
ii) training/divide/retaining walls
iii) parapets,
iv) gallaries,adits and other openings
v) upstream concrete/sandwiched concrete
3) Form-work (if not included in rate for concrete) for items mentioned in 2.
4) Steel for reinforcement.
5) Guniting for the upstream face of masonry
6) Drilling for Anchors.
7) Anchor rods.
8) Instrumentation.
9) Joints and seals
10) Drilling and grouting of masonry,
11) Porous pipe for drainage.

3.2.3.3 Concrete Dam

The various items of works in the construction of concrete dams are :

a) Diversion works during construction, such as coffer dams, diversion tunnels/channels etc.
b) Foundations (items same as under masonry dam(b).
c) Dams :
1) Cement concrete in :
i) hearting (with or without plums),
ii) Upstream facing,
iii) downstream facing which shall include the overflow section and non-overflow section,
iv) training/divide/retaining walls

v) parapet,
vi) gallaries, adits and other openings, and
vii) any other structures.
2) Form-work (if not already included in rate for concrete) for items mentioned in (1) above.
3) Joints and seals.
4) Drilling for anchors.
5) Anchor rods
6) Instrumentation

3.2.3.4 Spillway :

The spillway structures may generally be of masonry or of concrete and the items, therefore, are respectively the same as for masonry or concrete dam. Following additional items need to be estimated :

a) Cement concrete for :
1) Spillway piers,
2) bridge beams and slabs
3) tunnel lining wherever applicable,
4) spillway crest, downstream glacis,
b) Miscellaneous items of bridge like bearings.
c) Tunnel excavation wherever applicable.
d) Crest gates with hoisting equipment and hoist bridge.
e) Stop logs for crest gates, and lifting arrangement.

3.2.3.5 Energy Dissipation Works :

Same items as for concrete dam with the addition of cement concrete for :

a) Stilling basin/bucket/Apron,
b) floor blocks, and
c) end sills and chute blocks.

3.2.3.6 Outlets :

This will include the following :

a) Excavation in soil and rock
b) Foundation treatment
i) lean concrete in foundation;
ii) drilling and grouting;
iii) short creating /guniting
c) Structural concrete for :
i) foundation, piers and abutments;
ii) conduit, cut off collars
iii) gate control structure, beams, floor slabs etc
iv) block ousts;
v) stilling basin including chute bocks, bafle, blocks and end sills;
vi) guide walls
vii) lining in approach channels.
d) Masonry in guide walls of approach channels or stilling basin.

e) steel for reinforcement.
f) Rubber/PVC seals at joints
g) Gates.
h) Hoisting equipment and auxiliary items.
i) Filters around conduit.
j) Trash rack.
k) Steel lining.
l) Stop logs

3.2.4 I-NAVIGATION WORKS :

Important items to be considered under this sub-head are :

a) Excavation of inter-connecting bye-pass channels etc
b) Construction of structures :
i) Wharfs
ii) Quays
iii) Jetties
iv) Navigation locks
v) Any other
c) Dredging operations
i) Equipment for maintenance dredging.
ii) Other operations involved in dredging.

The provision for (a) channels etc, (b) structures shall be made in line with the procedure discussed under D-Regulators etc. and L-Earth work. The provision for (c) dredging operations shall be made in consultation with the State Inland Water Authorities.

3.2.5 J -POWER PLANT CIVIL WORKS

This shall include intake structures, gates, silt exclusion arrangement, tunnels, power canal, and tail race channel/ tunnel, surge shaft, forebay, penstocks, power house, switch yard etc.

3.2.6 K-BUILDING

Requirement of buildings for execution of the project depends upon whether the works are to be carried out departmentally or on contracts.

This sub-head would include buildings for civil as well as electrical/mechanical works. The buildings may be classified into residential buildings and non-residential buildings. Residential buildings should be provided for all officers and staff (regular as well as workcharged) engaged on site of work as necessary.

Non-residential buildings shall include :-

a) Office buildings;
b) Testing laboratory;
c) Rest houses and field hostels;
d) Workshops including site workshops;
e) Stores including site stores;
f) Sheds; and
g) Other service buildings such as :
1) hospitals or dispensaries or both;

2) Welfare centre;
3) police station;
4) schools;
5) post offices, telegraph and telephone office
6) community centre;
7) diesel generating station and sub-station
8) canteens;
9) co-operative stores & markets;
10) bus stop;
11) public utility;
12) bank and treasuries
13) pump house and fire station etc.

3.2.6.1 The buildings, both residential and non-residential shall be further divided in two categories- permanent and semi-permanent or temporary. Permanent buildings may be considered only if these are required in the post construction period also.

4.2.6.2 The usual practice is to make the provision under this sub-head on the basis of plinth area and prevailing market rates per unit area for different types of buildings. The type of construction proposed should be clearly described.

It is observed that the total cost of buildings in a project generally amounts to 5% to 7% in plain region and 6% to 8% in hilly region of the cost of I-Works. Provision less than 5% is likely to be adequate only in cases where the project is located near urban areas or some existing project, where other buildings could be obtained for use.

3.2.6.3 Other items chargeable to buildings :

In addition to the cost of buildings, provision for following items is also required under this sub-head;

a) Land development (Levelling and filling)
b) Colony roads
c) Fencing/ Boundary walls, security/ observation booths
d) Service connection such as water supply, sanitation drainage and electrification.
e) Lawns, Gardens and Plantation (other than plantation under the head M-Plantation and Environment & Ecology).
f) Retaining walls, terracing etc.

The provision for the above items may be made per norms fixed by the State Governments. However, where such norms are not available, following table may be taken as a guide

TABLE SHOWING PERCENTAGE PROVISION AS COST OF BUILDINGS FOR VARIOUS SERVICES UNDER K-BUILDING

Item	Permanent		Temporary	
	Residential	Non-residential	Residential	Non-residential
Land development	1 to 2%	1 to 2%	1 to 2%	1 to 2%
Colony roads	2%	2%	2%	2%
Fencing, boundary walls & security/observation booths	1%	1%	1%	1%
Lawns, Gardens and Plantation	1%	1%	1%	1%
Internal water supply	5%	2.5%	4%	2%

Internal sanitation	5%	2.5%	4%	2%
Internal electrification	7%	3.5%	5%	2.5%
Retaining walls & terracing	8%	8%	8%	8%

*Depending upon the topography of the area to be developed.

3.2.6.4 While planning buildings, the scope for their use after the project construction should also be considered in consultation with the State Industries Department and the extra cost, if any, on this account clearly spelt out.

It is essential that labour employed on works is appropriately accommodated near the work site. Since the provision under buildings does not cover labour huts, provision for labour huts should be made under the individual works estimates.

3.2.7 L-EARTH WORK:

Important items to be considered under this sub head are :

a) Excavation
b) Embankment from
i) Excavated material
ii) Borrow areas
c) Lining
d) Pitching
e) Miscellaneous items, such as construction of drains, inspection and service road/path etc.

The provision under this sub-head shall cover main/branch canal(s) . The provision shall be based on detailed surveys of main/branch canal(s). The analysis of rates for major items of work shall be furnished indicating lead/lift involved and shall be in line with the procedure indicated under C-Works.

3.2.8 M-PLANTATION :

This item provides for establishing of avenue trees and arboriculture etc. The cost depends upon the plantation programme including gardens etc. required for beautification as considered necessary downstream of Dam and appurtenances around power house and other important structures as well as plantation of trees along main and branch canals. The provision made under this sub-head should not be included in X-Environment & Ecology. For main/branch canal(s) , the provision shall be made on the basis of per KM. rate of plantation for the total length of the canal(s) etc. The basis for adopting certain km. rate should be indicated. The provision shall include maintenance and protection for 2/3 years.

3.2.9 N-TANKS AND RESERVOIRS :

This sub-head is intended to cover remodelling of the Tank(s)/Reservoir(s) in the project area considered beneficial/economical for augmentation of the irrigation supplies. All items of work considered necessary for remodelling shall be provided.

Important items to be considered under this sub-head are :

a) Earth work in
   h) Excavation.
   i) Filling.
b) Repair of the spillway portion.

c) Repair of outlets.
d) Repair of the channels.
e) Any other work..

3.2.10 O-MISCELLANEOUS :

The main items to be considered under this sub-head are :

1. Capital cost of
i) Electrification
ii) Water supply, purification and distribution.
iii) Sewage disposal and storm water drainage works.
iv) Fire fighting equipment
v) Telephone, Telegraph, Post office and Wireless.
vi) Medical equipment for hospital/ dispensary(s) etc
vii) Any other item such as fountains, recreation facilities, special lighting arrangements for beautification of areas in the project.

2. Maintenance and Service of :
i) Electrification.
ii) Water supply, purification and distribution works
iii) Sewage disposal and storm water drainage works.
iv) Recreation.
v) Medical Assistance.
vi) Post Office, telephone and telegraph office
vii) Security Arrangements
viii) Fire fighting equipment
ix) Inspection Vehicles
x) Transport for labour and staff
xi) School bus.
xii) School.
xiii) Pay Van.
xiv) Ambulance.

3. Other Items
i) Visits of dignitaries.
ii) Technical record, photographic record, completion report & history of the project.
iii) Inaugural ceremonies.
iv) Compensation to workmen (for work-charged staff only)
v) Boundary pillars and stones, distance marks and bench marks
vi) Power supply
vii) Model and exhibits.
viii) Testing laboratory and exhibits
ix) Publicity information centres.
x) Subsidy for school bus.
xi) Publications, Pamphlets.
xii) Running of transit camps/rest sheds/guesthouse/rest house/inspection bungalow.
xiii) Training of Engineers
xiv) Canteen facilities.
xv) Cooperative Stores.
xvi) Library facilities.
xvii) Time keeping cabin.

xviii) Wireless communication system
xix) Inflow forecasting and flood warning system.
xx) Retrenchment compensation (for work-charged staff only)
xxi) Police Station.
xxii) Community Centre.
xxiii) Photographic and Cinematographic equipments, establishment and R/M charges.
xxiv) Creches
xxv) Maintenance of office equipment such as computer & reporographic facilities, fax, telex etc.

The above list is illustrative and not exhaustive. Provision should be made for all the items which are relevant to the project. The provision are meant for regular and work-charged staff and not for casual/contract labour.

3.2.9.1 The total provision under this sub head is generally of the order of 4% of I-Works.

3.2.11 P-MAINTENANCE

This sub-head is intended to cover the cost of maintenance of buildings, roads and other structures during the period of construction.

The usual norm for provision under this sub-head is 1% of the cost of I-Works less A-Preliminary, B-Land, O-Miscellaneous, M-Plantation, Q-Special T & P and X-Environment & Ecology and covers maintenance of all works during the construction period.

3.2.12 Q-SPECIAL T & P

The capital outlay on construction equipment on a project varies from 10 to 30 percent of the total cost of civil structure. This percentage is likely to go up with the increase in the mechanisation of construction methods. It is imperative that extreme care should be exercised in the selection of various machinery and equipment and as far as possible accurate provision for their depreciation and salvage value should be made.

Important items of equipment considered under this sub-head are given in Annexure-7.

The capital cost of the construction equipment will depend upon type and quantity of machinery (worked out on the basis of quantum of work contemplated to be carried out by machinery). For an economically planned project, the construction machinery should generally be so planned that it spends 75% of its life at project i.e. 75 % of its cost is recovered from the works as hourly use rates. The provision under the sub-head Q-Special T&P therefore, should be 25% of the capital cost of the production oriented special T&P and 75% of this provision should be shown under head V-Receipt and Recoveries towards resale/transfer value.

For highly specialised Capital Intensive Equipment like aerial cableways, tunnel boring machines etc. which cannot be planned on the criteria mentioned under para above, the anticipated cost chargeable to the sub-head C-Works should be calculated and the residual value should be shown under the sub head Q-Special T& P as well as the head V-Receipt and Recoveries

For inspection and transport vehicles (other than those required for construction material transportation) 100% of the capital cost should be provided under this sub-head . 20% of this value should be considered as resale/transfer value of the vehicles and shown under the head V-Receipts and Recoveries.

All the equipment required inclusive of capital intensive equipment should be provided on the basis of the latest rates including their transport cost upto the project site (insurance, taxes etc. included) and initial requirement of funds worked out. However, the provision for this sub-head should be worked out as under :-

Capital cost of production oriented construction plant & Machinery (other than specialised capital intensive equipment and inspection/transport vehicles).	P
Cost recoverable as hourly use rate (debited to works).	0.75 p
Capital cost of inspection/transport vehicles	Q
Capital cost of specialised capital intensive equipment	R
Cost of specialised capital intensive Equipment recoverable as hourly use rate (debitable to works)	Ra
Provision to be made under the sub-head Q-Special T&P	0.25 p+Q+R-Ra
Recoveries to be shown under head V-Receipt and Recoveries	0.75(0.25P)+ (R-Ra) + 0.2Q

In case of old machinery received on transfer, only 50% of its transfer value shall be charged to the works and balance 5% to the sub-head Q-Special T&P. Further, 25% of the provision under special T&P shall be shown under V-Receipts and Recoveries towards resale and transfer value.

Similarly in case of projects where 75% of scheduled life of equipment is not expected to be recovered during the execution of project (or in other words less than 75% of the cost of equipment shall be recovered through cost of works), the cost proportional to their unused life shall be booked under this sub-head and the same amount shall be shown under V-Receipt and Recoveries. This method is to be adopted to provide for funds for procuring the equipment. Same method shall also be followed in case where specialised capital Intensive Equipment is procured by the Govt. Department (owner of the project) and given to the contractors on hire. It may be mentioned here that practice of procurement of equipment is procured by the Government Department for hiring oust to contractors should be discouraged as far as possible, since this practice has been found to be neither economical nor conducive to efficient working. Therefore, no provision of job specific construction equipment should be kept under the sub-head Q-Spl T&P, when the works are proposed to be carried out through contracting agencies. In such cases, provision of general purpose equipment capable of taking up emergency works such as road clearance , earth work, hill cutting and inspection and transport vehicles etc. should be madeunder sub-head Q-Special T & P.

For privately owned and executed projects, however, no provision for production oriented and specialised capital intensive construction equipment is to be made under the sub-head Q-Special T&P . The cost incurred on account of deployment of such equipment on the project shall be directly recovered through the cost of works as hourly use rates. For inspection and transport vehicles on privately owned projects, only the cost equivalent to its life in years as would be spent on the project should be booked under this sub-head.

No provision should be made under this sub head for spares as they are directly covered under the hourly rate chargeable to the item of works.

3.2.13 CANAL STRUCTURES :

The provision for canal structures is split up under the following sub-heads :

D-Regulators.

E-Falls

F-Cross Drainage Works.

G-Bridges

H- Escapes.

It is seen that provision for canal structures is generally made on lumpsum basis. This practice is not only irrational but is one of the principal causes for steep rise in the costs of revised estimates. It is necessary that preliminary designs are made for all important structures after proper survey and for framing the estimates, typical structures of different capacity (three or more in number) should be analysed to work out unit cost for each type of structure in each sub-head as follows. (refer illustration at Annexure-8).

D-Regulators :	Cost per unit product of discharges of parent and offtaking canals.
E-Falls :	Cost per unit product of discharges of height of fall.
F-Cross Drainage Works :	Cost per unit product of discharges of drainage and canal.
G-Bridges :	Cost per metre span of bridge.
H-Escapes :	Cost of structures may be worked out as mentioned above and for escape channel procedure may be same as for canals.

Where the actual cost of similar structures constructed on other project(s) is know, the data could with advantage be used in the estimate. It should however, be ensured and justified that the structures considered are similar in nature. The differences in leads of materials in the two structures are accounted and escalations wherever necessary are taken into account. The basis for premium applied as well as the reference to the project where such costs were realised and the year of work should be mentioned in the estimate.

3.2.14 R-COMMUNICATION

Important items to be considered are :

a) Construction of the main approach road to dam site.
b) Construction of quarry roads.
c) Construction of temporary roads in the works area.
d) Construction of temporary or permanent river crossings.
e) Railways including sidings, bridges, connecting roads, water-ways and air strips/helipad.

The cost for each type of road should be provided on the basis of calculated road length and rate per km. Major items on this account should be supported by sub-estimates or rates certified by local state PWD.

For road bridges the provision should be made in line with canal structures.

For railway siding and railway bridges the provision should be made in consultation with the Railway Authorities.

For provision of airstrip/helipad, civil aviation authorities should be consulted.

For provision of water-ways State Inland Water Authority should be consulted.

3.2.15 S-POWER PLANT AND ELECTRICAL SYSTEM :

This sub-head is intended to cover the provision required for the equipment for power plant, switchyard etc. and other items connected with the installation.

The provision to be realistic should be based on budgetary offers or the latest market rates. The price level stating month/year for which the rates are applicable should be indicated.

The estimate for S-Power Plant and electrical system should cover the following items as provided in the guidelines of CEA :

1. Preliminary expenses including Design and consultancy charges.
2. Telephone, lights and power system including illumination of power house, switchyard and construction power.
3. Generating plant and equipment.

a) Supply of Generator, turbine and accessories (Annex 9(i))

b) Aux. Electrical equipment for power station (Annex. 9(ii))

c) Aux. Equipment and services for power station (Annex.9 (iii))

d) Central Sales Tax, Transportation, Handling and insurance charges on 3(a), (b) and (c)

e) Erection and Commissioning charges on 3(a), (b), (c) and (d)
Total Generating Plant and Equipment

4)

a) Supply of Transformaers, Circuit Breakers & Isolators etc (Sub-station equipment (Annex-9(iv))

b) Aux Equipment Services for Switchgear (Annex-9(v))

c) Miscellaneous Equipment and Services (Annex-9(vi))

d) Central Sales Tax, Transportation, Handling and Insurance charges on 4(a), (b) and (c)

e) Erection and Commissioning of the above equipment on 4(a), (b), (c) & (d) (Except on items of Fork lift trucks, Tractor Trailors etc. under item no. 4(c)

Total

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5. Losses on stock @ 0.25% on 3(a),(b),(c),(d), 4(a),(b),(c) and (d) . (if provided earlier).
6. Maintenance during construction @ 1% on 3(a),(b),c),(d), 4(a),(b),(c) and (d) .(if not provided earlier

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GRAND TOTAL

3.2.16 T-WATER SUPPLY WORKS :

This sub-head is intended to cover works required for delivering water to a point beyond which the supply system will be taken over by the Public Health Department. This should normally consist of water conductor system and pucca structures on open channels. The provision for various items of work should be made in line with that of canal structures.

3.2.17 U -DISTRIBUTARIES : MINORS AND SUB-MINORS

The cost is generally indicated on the basis of rate per ha. of CCA there is a very wide variation in the rates from project to project depending upon the local conditions. it is, therefore, necessary that for a realistic estimate the rate should be arrived at from a detailed estimate for a typical block of command area of the size of about 10% of CCA after detailed contour surveys and micro planning. The relevant drawings showing therein the alignment of channels, location of structures outlets, provision of lining etc. should be enclosed with the estimate.

3.2.18 V-WATER COURSES

The provision for water courses should be made for serving upto 5 to 8 ha. block. The cost may be assessed on the basis of rate per hectare of CCA. The rates per hectare should be arrived at on the basis of a sub-estimate of a representative sample area surveyed to cover about 10% of the culturable command area in a similar way as adopted for distributories and minors.

3.2.19 W- DRAINAGE

Provision should be made under X-Environment & Ecology-para 6.20 (h)

3.2.20 X-ENVIRONMENT AND ECOLOGY :

This sub head is intended to cover the provisions for the following important items concerning environment and ecological impact due to coming of the project into being.

a) Compensatory afforestation including cost of acquisition of forest/revenue land, payment to be made to forest Deptt. for compensatory afforestation. Provision made under M-Plantation should not be included under this sub-head.

b) Catchment area treatment : Cost of treatment of directly draining water sheds (which is to be borne as Environment & Ecology damage/mitigation works.

c) Establishment of fuel depots etc. to meet fuel requirement of labour force to prevent indiscriminate felling of trees.

d) Measures to salvage/rehabilitate any rare or endangered species of flora and fauna found in the affected area and relocation of archaeological monuments.

e) Control of aquatic weeds in submerged areas to provide improved habitant for aquatic life.

f) Public health measures to control spread of water and soil borne diseases, anti-malaria measures, studies relating to monitoring of water qualities and effect of pesticides, weedicides etc. on effluent water from irrigation system.

g) Restoration of land in construction areas by filling, grading etc. to prevent further erosion and to provide healthy surroundings.

h) Drainage in command area conjunctive use, ground water monitoring etc.

i) Seismological measurements and disaster management measures.

j) Provision of fish ladder if necessary (to be considered under sub-head C-Works)

Provision of the items should be ,made in consultation with the concerned deptts. as under :

1. Items a,b,c,d - Forest Deptt, Archaeology Deptt.
2. Items e & j Fisheries Deptt.

3.	Item f	Health Deptt
4.	Item h	Central/State Ground Water Board (See para below)
5.	Item i	Meteorological Deptt.

Provision for drainage should be made for improvement of existing drains and construction of new drains carrying a discharge of 50 litres/sec. and above in the command area. The other drains should form a part of the command Area Development Programme. Provision for drainage in the command area is indicated on the basis of rate per hectare of CCA. The rates per hectare should be arrived at on the basis of sub-estimates for sample area in line with U-Distributaries and Minors etc. taking into account land use mapping, soil surveys and ground water investigations. Further where apparently no drainage arrangements are considered necessary due to existing natural ground slope conditions, a minimum provision may kept on a suitable percentage basis.

3.2.21 Y-LOSSES ON STOCK

The provision under this sub-head is generally made at 0.25% of the cost of I-Works less A-Preliminary, B-Land, O-Miscellaneous, M-Plantation, P- Maintenance, Q-Special T&P and X-Environment and Ecology.

II- ESTABLISHMENT :

In case of works let out on contract, the provision for establishment including leave and pensionary charges is generally of the order of 8 to 10 % for concentrated works and 10 to 12 % for scattered works like canals.

For works to be executed departmentally the provisions could be highefr than those given above say 12 to 15 percent.

The above provision is inclusive of costs towards setting up of cost control cell at the project and Head Quarter level to exercise proper control over construction costs.

Since land acquisition staff is separately provided under the sub-head B-Land, the percentage provision for II-Establishment should be considered on the ccost of I-Works, less B-Land.

III-TOOLS & PLANTS.

The provision here as distinct from that under Q-Special T&P is meant to cover survey instruments, camp equipment, office equipment and other small tools. Expenses for small tools and plant are generally not charged directly to units of work but added as a percentage charge to the cost of the project. This percentage would depend on the class and value of the work. The general practice is to charge 1 percent of the cost of I-Works including cost of land.

IV-SUSPENSE :

The net provision under this minor head will be 'Nil' as all the outstanding suspense accounts are expected to be cleared by adjustment to appropriate heads on completion of the project.

V-RECEIPTS & RECOVERIES ON CAPITAL ACCOUNT :

This head is meant to account for estimated recoveries by way of resale or transfer of temporary buildings and special T & P./ Miscellaneous receipts like rent charges of buildings, electricity charges etc should also be accounted for under this head.

The recoveries on account of temporary buildings may generally be taken at 15 percent of the cost unless a higher recovery is anticipated due to some special reason (such as tubular construction, vicinity to an industrial undertaking etc) Such special reasons should be Special T&P indicated in the report. The recoveries on account of special T& P Credit on account of resale of electrical installations, water supply fittings etc. after execution of the project, if anticipated, should also be shown under the head.

(B) INDIRECT CHAREGES :

The complete estimate for a project besides including all anticipated direct charges should further include as indirect charges, the amount required to cover the capitalisation of abutment of land revenue on the area occupied by the works and allowance for the cost of Audit and Accounts Estt.

The provision for Audit and Account charges is generally made at one percent of the cost of I-Works.

Charges for capitalisation of abutment of cost of land revenue are generally calculated at either 5 percent of the culturable land cost or 20 times of the annual revenue lost.

REVISED ESTIMATE

(1) The original estimate may be required to be revised due to following reasons :-

(i) Due to price revision of materials, labours and royalty etc. by the Department
(ii) Due to delay in execution of the work/ scheme
(iv)Change in alignment, design, drawing and specification in course of execution
(v) Addition of new works or items.
(vi) Due to financial constraints, the period of construction is extended.
(vii) Due to natural calamities the construction is delayed
(viii) Due to public objection and legal litegacy, the execution is delayed.
(ix) Due to labour problems and interference of anti social elements etc.

Whatever may be the reason for revision of the estimate, it is prepared in the same fashion as the original estimate. The only difference is that estimation of quantities of works on pro-rata basis are not allowed. It is prepared strictly as per approved drawing and site condition Lump-sum provision is also avoided except in the exceptional cases.

The following information should also be furnished with the revised estimate :-

(a) A general report of the revised estimate should be prepared giving adequate reasons for the variation.
(b) A revised general abstract should be enclosed in the prescribed form giving details of the original as well as revised estimate.
(c) All required drawings, reports, estimate and abstract should be signed by the concerned field officers.
(d) Authority for change of design, drawing, alignment and specification should be enclosed.

(2) REVISED ESTIMATE & PROJECT COMPLETION REPORTS :

In the case of major and multipurpose projects which have been approved by the Planning Commission and where the revised estimates of the project have increased by more than 15% of the original estimates, excluding escalation due to price rise or where there is change in scope, will be required to be furnished to CWC for examination in the same way as new major and multipurpose schemes irrespective of the fact whether the revision is due to change in scope or not. The procedure for scrutiny for such revised project estimates shall be same as outlined in the proceeding chapters.

2.1 In respect of revised project estimates where there is no change in the scope and where the cost excluding escalation due to price rise has not changed by more than 15%, the State Government need not forward a detailed estimate for examination at Center. For such projects the State Government should send to CWC an excess note after obtaining the concurrence of the State Finance Department giving the abstract of cost under major sub-head indicating the excess cost over the sanctioned cost and giving reasons thereof. The note will include the salient features of the project as originally proposed and as being executed at site. The CWC will examine such estimates broadly and send its views to the Advisory Committee for consideration and recommendation of the Planning Commission.

2.2 In the case of projects which undergo modification and revision subsequent to their approval, the information required to be submitted to CWC/Planning Commission under the following paragraphs of these guidelines should be submitted in good time so that approval for the revised scheme is received from the Planning Commission before any additional commitments over and above the sanctioned project estimate are made in respect of them.

The revised estimate should also include variation statement showing the variation in cost of different sub head. Quantities and rates of important items should be furnished as per sample proforma at Annex-1(ii) & 1(iii). other items should be included as miscellaneous items in the same proforma indicating therein the total cost. The revised estimate should also include an analysis of the reasons for the increase in cost of different sub heads as detailed below :

1- rise in prices including variation due to exchange rate.
2- rise due to change in scope.
3- rise due to inadequate provisions in earlier estimate.
4- rise due to change in design
5- additional requirements/new items.
6- rise due to other causes such as inadequate plan allocation, arbitration, legal cases, poor performance of equipment, procurement problems etc.

2.3 When revised estimates are prepared during construction, the quantities of items completed should be indicated separately and the cost thereof assessed on the basis of actual expenditure. Any liability arising out of the contract for the completed work and effecting the cost should also be considered in the estimate.

For works in progress the estimates should be based on contract rates. If the contract document contains any clause for escalation on the prices of materials and labour wages subsequent to the award of contract, the amount involved should be assessed and included in the estimate.

For the balance work to be done, the cost should be estimated on the basis of rates prevalent at the time of the preparation of the revised estimate

Form of Comparative Statement

Sl.No.	Sub-head	Quantity as per original estimate	Unit	Rate	Amount as per original estimate	Quantity as per revised estimate	Unit Rate as per revised	Amounts as per revised	Increase due to quantity	Increase due to revised rate	Total Increase
1	2	3	4	5	6	7	8	9	10	11	12

ENVIRONMENT & ECOLOGY DAMAGE MITIGATION WORKS

The question of catchment area treatment as an integral part of the river valley project was considered by the Committee of Central Secretaries and it was decided to draw the attention of the State Governments for immediate necessary action on this important aspect of adopting a holistic approach in formulation of river valley project by simultaneously taking up preparation of the project reports for catchment area treatment, soil conservation, command area development, afforestation etc. Agricultural production and rural development area the ultimate goals under the command Area projects and several departmental activities are sought to be harmonized under

command area development projects which should synchronise with the progress on engineering head-works. Simultaneously soil conservation and treatment, afforestation, other anti-erosion measures, for reducing siltation, maintenance of ecological balance vegetation, animal life and water storage) should also viewed as an integrated whole at the stage of undertaking large river valley projects. However, while framing the cost estimate of river valley projects, only costs of the direct damage mitigation works should be included in the estimate. In this regard refer planning commission's circular dated Oct. 28th ,1985 of Annexure-11.

DEWATERING :

In order to drain water out of site of work and maintain the site of work in a normally dry condition where further activities of work can be taken up during the entire period of execution of the work, adequate measures are required to be taken. cost of all pumping, bailing out or any other works to dewater the foundation area during the entire period of execution of work including cost of all materials, labour, cost of machinery and equipment should be included in the provision for dewatering.

The provision for dewatering should be made on the basis of energy likely to be consumed for dewatering quantity of which can be worked out from the field permeability tests.

The unit of measurement may be in mandays if the nature of work is small. Dewatering by means of pumps may be by any one of the methods given below :

Electrical pumps
Diesel pumps
Pneumatic Pumps.

The unit of measurement in case of dewatering by electrical pumps shall be kilowatt hours (KWH). The unit of measurement in case of dewatering by Diesel pumps shall be horse-power hours. The unit of measurement in case of dewatering by pneumatic pumps shall be cubic metre of air per hour (m^3/h).

It is for guidance that the total outlay for dewatering may be about 3 to 5 percent of the cost of the structure for which dewatering is to be carried out.

The cost of dewatering may be added to the concerned item of work (Excavation under water & placing concrete etc.) or they may be shown separately. However it will be desirable to put binding clauses & upper limit for payment in staggered fashion to keep control over the payment on this item which if unfructuous, will lead to disproportionate extra cost.

CONTINGENCIES & WORK CHARGED ESTABLISHMENT

Contingencies are percentage allowances shown as a separate item to cover minor differences in actual and estimated quantities, omission of minor items of works, difficulties unforeseeable at site, possible minor changes in plans and other uncertainties. In no case should contingencies be allowed for by increasing estimated quantities or unit prices. The percentage to be used is based on consideration of major pay items in the estimate, availability of data, adequacy of the quantity computations and the general knowledge of the conditions at the site.

The cost of labour employed on work relates only to that form of labour which does the physical work. Such work may be done by skilled labourers, carpenters, masons, operators and others.

Work-charged establishment comprises of supervisory staff and foremen who do not work with their own hands but exercise immediate control over the quality and output of workers.

Provision for contingencies and W.C. Establishment is generally, considered up to 3% and 2% respectively of the works cost and provided in the detailed works estimates prepared on the basis of item rates and quantities of works to be executed. These percentage provisions should not be considered on lumpsum items. No allowance should be made for contingencies in contract estimates as these estimates are prepared from final design studies and represent the estimated cost of a specific contract based on detailed computations of quantities and detailed analysis of unit costs.

ANNEXURE-1(i)

CHECK FOR PERCENTAGE PROVISION

Name of the project :

Sl.No	Head/ Sub-head	Provision as per guidelines and percentage if any	Percentage of provision in the project estimate	Variation	Justification of variation
1	2	3	4	5	6
A-	Preliminary	1% to 2% of the total cost of I-Works			
B-	Land	a) Crop compensation :25% to 50% of Agricultural land to be acquired. b) Interest charges on compensation : 25% of compensation for 2 years @ 12% per annum c) Solatium & land acquisition establishment charges @ 30% and 6.25% of the cost of land respectively d) Land and material for demarcation and measurement charges : 1% of cost of land acquisition.			
K-	Building	Cost of buildings in a project : 5% in hilly regions.			
O-	Miscellaneous	4% of I-Works.			
P-	Maintenance	1% of the cost of I-Works minus A-Preliminary, B-Land, O-Misc., M-Plantation, Q-Special T & P and X-Environment & Ecology to cover maintenance during construction period			
Y-	Losses on Stocks	0.25% of the cost of (I-Works minus A-Preliminary, B-Land,O-Miscellaneous, M-Plantation, Q-Special T & P and X-Environment & Ecology. II-Establishment: a) Contract works : 8 to 10% for concentrated works.			

		ii)10 to 12% for scattered works(cost of I-Works minus B-Land) b)Departmental works : 15% of (cost of I-Works minus B-Land III-Tools & Plants : 1% of cost of I-Works including cost of land.			

Check List of Estimate (Table-1)

Sl.N0.	Particulars	To be filled by			
1	Name of the Scheme				
2	Nature of the Scheme				
3	Location of the Scheme				
4	District benefited				
5	C.E.Zone				
6		Abstract of the Estimate			
	Estimate Financial details:	Amount in lakh	Total No. of the scheme	No. Proposed in the Estimate	Reason for Shortfall
I	A-Preliminary				
ii	B- Land				
iii	C- Wporks				
iv	D- Regulators & measuring/ Devices				
v	E-Falls (for canal only)				
vi	F-C.D.Works (for canal only)				
vii	G-Bridges (for canal only)				
viii	H-Escape (for canal only)				
ix	I-Navigation works				
x	J-Power plant appurtenances(Civil work)				
xi	K-Building				
xii	L-E/W (for canal only)				
xiii	M-Plantation				
xiv	N-Tanks and Reservoirs				
xv	O-Miscellaneous				
xvi	P-Maintenance				
xvii	Q-Special T&P				
xviii	R-communications				
xix	S-Power plant and electrical system				
xx	T-Water supply works				
xxi	U-Distributories and Minors				
xxii	V-Water Cources				
xxiii	W-Drainage				
xxiv	X-Environment & Ecology				
xxv	Y-Losses on stock.				
	Toktal Estimated cost				
7		Physical details			
i	B.C. Ratio				
ii	Benefited Area(units in Th.Ha/Square K.M.)				
iii	Location of Bench Marks relied upon				
8		Clearance Details			
i	Status of AA				
ii	Status of TAC (CWC)				
iii	Status of EIA/EMP				
iv	L.A.Problem (if any)				
v	Local problem (if any)				

Declaration

I do here by declare that:-

(a) L./S & C/S has been drawn as per actual survey.
(b) The benefit envisaged is expected to be achieved after the successful complection of the Project.
(c) All the components of the scheme have been included in the estimate to give the desired result.

Executive Engineer Superintending Engineer Chief Engineer

चेक लिस्ट का प्रारूप

1. प्रमंडल का नाम :-

2. अंचल का नाम :-

3. अधिनस्थ नहरों की विवरणी

क ..... मुख्य नहर.....आर.डी. ..... से .....आर.डी.

ख .....शाखा नहर आर.डी..... से .....आर.डी.

ग .....वितरणी आर.डी. .....से .....आर.डी.

ध लघु नहरों की संख्या.....

च उप लघु नहरों की संख्या.....

छ आउटलेटों की संख्या (I/R) .....

4. अपूर्ण / अनिर्मित कार्यों की विवरणी

क अपूर्ण वितरणी का नाम ..... आर.डी. .....से .....आर.डी.

अनिर्मित वितरनणी का नाम..... आर.डी. .....से .....आर.डी.

ख अपूर्णा लघु नहरों की संख्या.....आर.डी. .....से.....आर.डी.

अनिर्मित वितरणी का नाम .....आर.डी.....से.....आर.डी.

ग अपूर्ण उप-लघु नहरों की संख्या.....आर.डी.....से.....आर.डी.

अनिर्मित उप-लघु नहरों की संख्या.....आर.डी.....से.....आर.डी.

घ अपूर्ण आउटलेटों की संख्या..... आर.डी.....से.....आर.डी.

अनिर्मित आउटलेटों की संख्या.....आर.डी.....से.....आर.डी.

सिंचाई क्षमता

क कुल संभावित.....हेक्टर

ख अब तक सृजित.....हेक्टर

6. वास्तविक सिंचाई- मौसम वर्ष .....की सिंचाई अधिकतम सिंचाई

खरीफ .....हेक्टर .....हेक्टर (वर्ष)

रब्बी .....हेक्टर .....हेक्टर (वर्ष)

गरमा .....हेक्टर .....हेक्टर (वर्ष)

7. पुनर्स्थापन कार्य हेतु वास्तविक सर्वेक्षण (30 मीटर के अन्तर पर L/S एवं C/S) के आधार पर प्रेषित प्राक्कलन की विवरणी ।

नहर का नाम वास्तविक सर्वेक्षण की लम्बाई ..... को प्रेषित प्राक्कलन की लम्बाई

मुख्य नहर .....RD से..... RD ----------RD से ..... RD

------शाखानहर .....RD से..... RD ----------RD से ..... RD

.....वितरणी .....RD से..... RD ----------RD से ..... RD

.....लघु नहर .....संख्या .....संख्या

उप लघुनहर .....संख्या .....संख्या

आउटलेट .....संख्या .....संख्या

8. क्या नहरों के बॉधों में कमजोर संवेदनशील स्थल तथा त्रुटियों को चिन्हित कर उनके सुदृढ़ीकरण/ निवारण का प्रावधान संबंधित प्राक्कलन में किया गया है या नहीं ?

9. क्या प्रत्येक नहरों में अवस्थित संरचनाओं का भौतिक निरीक्षण कर क्षतिग्रस्त संरचनाओं के क्षतियों को चिन्हित किया गया है या नहीं ?

10. क्या चिन्हित क्षतियों को नींव तक निरीक्षण कर वास्तविक स्थिति के अनुसार प्राक्कलन बनाया गया या W.L के नीचे की क्षति का अन्दाज के आधार पर फिलहाल Rough प्राक्कलन बनाया गया है ? यदि हॉ तो उन संरचनाओं की विवरणी संलग्न करें ।

11. क्या क्षतिग्रस्त संरचनाओं की मरम्मती का रूप रेखा, रूपांकण के निर्धारित मापदंड पर आधारित है या अन्दाज के आधार पर या फिलहाल Rough प्राक्कलन बनाया गया है ?

12. क्या H/R,C/R एवं E/R के फाटकों का भौतिक निरीक्षण कर क्षतिग्रस्त फाटकों को चिन्हित किया गया है ?

13. क्या सभी क्षतिग्रस्त फाटको का प्राक्कलन बनाकर प्रेषित कर दिया गया है या नहीं । यदि नहीं तो लम्बित प्राक्कलन की सूची संलग्न करें एव कब तक प्रेषित हो सकेंगे ?

14. अधिनस्थ E/R की विवरणी
नहर का नाम- किस RD पर स्थित- निस्सरण क्षमता- कार्यकारी है या नहीं ?

15. (क) क्या अकार्यकारी E/R एवं के स्कैप चैनल तथा outfall condition का निरीक्षण कर उसके त्रुटियों/ समस्याओं को चिन्हित किया गया ?

(ख) यदि हॉ तो उसका विस्तृत सर्वेक्षण्ध कर त्रुटियों/ समस्याओं के मरम्मती/ निवारण हेतु वांछित प्राक्कलन प्रेषित किया गया या नहीं यदि नहीं तो लम्बित प्राक्कलनों की संख्या एवं वे कब तक प्रेषित हो सकेंगे ?

16. (क) कृपया सम्पुष्ट करें कि अधीनस्थ अपूर्ण या अनियमित नहरें के शेष भाग एवं अनिर्मित नहरों के लिये भू-अर्जन हो चुका है या नहीं ?

(ख) यदि नहीं तो उन नहरों का विवरणी दें ।

क्रम संख्या	नहर का नाम-	किस आर.डी. से किस आर.डी. तक भू-अर्जन नहीं हुआ है ।

17. (क) बिल्कुल अनिर्मित नहरों का व्योरा दें ।

(ख) क्या उन नहरों का स्वीकृत अनुसंधान प्रतिवेदन उपलब्ध है या नहीं ।

18. (क) कृपया सम्पुष्ट करें कि जितने नहर प्रणाली का पुनर्स्थापन कार्य का प्राक्कलन समर्पित किया गया है उनसे आपके अधीन संभावित पूर्ण सिंचाई क्षमता का पुनर्स्थापन हो जायेगा या नहीं ?

(ख) यदि नहीं तो कितनी सिंचाई क्षमता का पुनर्स्थापन होगा तथा कमी रह जाने के कारण बतावें ।

कार्यपालक अभियन्ता

प्रमाणित किया जाता है कि नहरों के पुनर्स्थापन हेतु जो प्राक्कलन समर्पित किये गये है वे अपने आप में सम्पूर्ण है एवं उसमें ऐसे किसी कार्य को नहीं छोड़ा गया है जिससे प्रमंडल के अधीन पूर्ण सिंचन क्षमता का उपयोग बाधित हो ।

कार्यपालक अभियन्ता

Table-3
List & Details of Systems

Sl.No.	Name of System (Main canal to subdistributory)	Length of canal	Total Length of Minors	Total Length of sub-Minors	No of outlets	Design Discharge	Present Discharge Capacity	Ultimate C.C.A.	C.C.A. Created	Ultimate Irrigation Potential	Potential Under Utilisation 2002	Restoration of Irrigation Potential	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Executive Engineer						Superintending Engineer					Chief Engineer		

Table-4
Irrigation Details of System

Sl.No.	Name of System(Main Canal to sub-distributory)	Ultimate Irrigation Potential in Ha.				Potential Under Utilisation in Ha				Potential to be restored in Ha.			
		Kharif	Rabbi	Garma	Total	Kharif	Rabbi	Garma	Total	Kharif	Rabbi	Garma	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Executive Engineer						Superintending Engineer				Chief Engineer			

Additional Information (Table-5)

Name of Division	Name of Circle	Description of Head- works	Remarks
1	2	3	4
		(i) Whether all the piers and abutments have properly been inspected? (ii) What discrepancies are found ? Provision for removal of discrepancies has been made ? (iii) Protection works, if any damaged or not. If damaged provision for remedial measure is one or not ? (iv) Pressure galleries are functioning or not. If not, provision for removal of defect is done ? (v) Life of gates (usually 25 years) (vi) Gates require replacement or not ? Provision for their replacement made or not? (vii) Bed-plates, skin-plates and rubber seals are functioning well or not ? If require replacement, provision for replacement. (viii) Roller bearings are in good condition or not. If not, provision for their replacement is made ? (ix) Gate-spindles are in good working condition or require replacement ? Provision for replacement is made or not ?	

		(x) Main gear-box and secondary gear-box (as the case may be) are in good condition or require repair ? Provision for repair made. (xi) Hoisting plat form of the gates is in good condition or require repair or replacement ? In the case of repair or replacement, provision for them is done. (xii) Ropes of the gates are all right or require replacement ? In the case of replacement, provision for replacement is made . (xiii) Provision for lighting ;arrangement on the hoisting platform is made. (xiv) All the gats are operative in group/ individually or not.? If not, provision for their operation individually/ in group made. (xv) Control panel is in good condition or not ? If not, provision for proper functioning of control panel is made. (xvi) Operation table is strictly followed or not ? If not, the reason there of . (xvii) Gantry crane is operative or not ? If not, provision to make the crane operative is made.	