

CHAPTER - 10

CONSTRUCTION PROGRAMME, MAN POWER AND PLANT PLANNING

10.1 Construction programme

10.1.1 Working period

The rainfall in area, where Ken-Betwa link project is located, is mostly confined to the monsoon period from about middle of June to middle of October. The approximate discharge of Ken river in the beginning of November is about 2.285 cumecs (80.67 cusecs). The discharge further falls down from December and practically dries from February. Thus, it is possible to have a working season of 8 months from about middle of October to middle of June.

10.1.2 Period required for construction

The project is proposed to be completed in 8 years. In addition to this, there will be one pre-construction year for attending to the following items of works:

- (a) Pre-construction Investigation
- (b) Preparation of detailed designs
- (c) Building up of the organisation
- (d) Letting out works
- (e) Procurement of machinery and arranging for materials like cement and steel.
- (f) Initiating and completing, if possible, formalities of acquisition of land for projects including that for the construction of camps, quarries, haul and approach roads.

10.1.3 Items of works to be executed

The principal items of works to be executed in the project area are as under:

- (i) Excavation for gravity dam, spill channel, tunnel control shaft, surge tank, two power houses (one underground and one overground), two tail water pools, approach tunnel to power house No.1, tailrace tunnel from power house No.1 and link canal, branch canals, distributaries etc. and stripping for earth dam.
- (ii) Concreting for gravity dam (Overflow and Non-overflow).

- (iii) Concreting for spillway its sloping floor and ski jump bucket, power houses, intakes for power house No.1 and power house No.2, conduit and shaft, cross drainage works on link canal, lining of tunnels and surge tank.
- (iv) Earth work for earth dam, link canal and its branches etc.
- (v) Fabrication/installation of spillway gates and hoist equipment, penstock, gates for control of water supply to the two power houses.
- (vi) Grouting in concrete for concrete dam (overflow and non-overflow sections).
- (vii) Fabrication and reaction of draft-tube, draft tube gates scroll case, hoisting equipment butterfly valves, transmission yard and switchyard.
- (viii) Construction of transmission line for evacuation of power.
- (ix) Dewatering of foundation.
- (x) Erection of all electrical equipments including generators for both power houses, control panels, laying of cables, air-conditioning plants etc.
- (xi) All civil works of buildings in project colony and construction of roads and drainages.

10.1.4 Yearwise construction programme for the major component of work:

(A) Pre-construction year (One year)

- (i) To start and complete the river diversion arrangements.
- (ii) Pre-construction surveys and design of all civil works of dam, tunnel and canal will be taken in hand.
- (iii) To finalise the specifications for civil works and to invite tenders etc. after finalising the sources of collection of different construction materials.
- (iv) To take action for procurement of construction machineries including spare parts, cement, steel, P.O.L. etc.
- (v) To start some building works for construction staff and take up construction of access road, arrangement for powerline, water supply and electrification to colony and work sites.
- (vi) Initiate action for land acquisition for roads, colony building etc. and also for reservoir submergence area and canals.
- (vii) Set up organisation and recruit staff, including skilled and semi skilled personnel.
- (viii) Set up of field laboratory and testing laboratory.
- (ix) Start stripping of foundation, excavation of cut off trench, some earth work in flanks, complete with cut-off and pitching etc.
- (x) Carry out details surveys for the tunnel, main canals, branch canals, distributaries, minors, power houses etc. and finalise portions of canals for facilitating Irrigation and generation of power from power house No.2 as soon as partial storage is built up.
- (xi) To start construction of approach roads.

(B) First year

- (i) Completing approach roads, camp buildings etc.
- (ii) Start excavation for spillway power house, dam, tunnel, spill channel and approaches and take up foundation and concreting work for spillway portion and blocks in left bank of Ken river.
- (iii) Stripping and earth work for the main dam to be completed atleast upto the elevation of 248.0 m.
- (iv) Start land acquisition proceedings for the submergence area both for head works and canals.
- (v) First batch of construction machineries will arrive at site.
- (vi) Action for the procurement of sluice gate and radial gates for the spillway and other equipments to be finalized. Necessary arrangement should also to be made for procurement of Penstock for power houses and reversible turbines for Power House No.1 and other components for power generation.
- (vii) Continue detail surveys for the main canal, power houses and prepare designs for main canal, tunnel lining, penstock tunnel for Power House No.1 and other canal structures started from pre-construction year.
- (viii) Start work on tunnel, main canal, penstock, Power House-I and structures on the main canal and tunnel.
- (ix) Process of procurement of construction machineries and other components related to the generation of power by two power houses.
- (x) Setting up of concrete batching plant, setting up of ice cooling plant and aggregate cooling plant for construction of spillway.
- (xi) Construction of sluice and sluice gates in dam.

(C) Second year

- (i) Excavation for spill channel and approaches will be continued.
- (ii) Continue concreting work in spillway portion (overflow section) and raise it upto 245.0 m R.L.
- (iii) Land acquisition for the submergence area and main canals distributaries and minors (for command area) to be completed atleast upto 50%.
- (iv) Continue earth work on dam and to be achieved upto 253.0 m elevation.
- (v) Continue excavation of foundation for structures and work for main canal, tunnel and P.H. No. 1.
- (vi) Continue the detailed surveys and investigation for the distributaries and minors and prepare design of these canal and their structures for command area of K-B link canal.
- (vii) Machinery procurement will be completed.
- (viii) Constructions of transmission line including towers and construction of switch yard and transformer yards to be taken after developing the sites.

(D) Third year

- (i) Construction of spillway i.e. excavation and concreting work in a few blocks will be continued and achieved upto 252.0 m.
- (ii) Head regulator (sluice) will be completed in all respects except the installation of gates.
- (iii) Work of land acquisition for reservoir to be completed upto 60%.
- (iv) Earth work on N.O.F. section of the dam will be completed upto 259.0 m.
- (v) Continue earth work and construction of structures on canals.
- (vi) Continue canal surveys and prepare designs for canal system surveyed in previous years.
- (vii) Work on civil works of power house No.2 will be completed.
- (viii) Excavation and lining work of tunnel should be completed.
- (ix) Work on construction of surge tank for P.H. No.2 should be started.
- (x) Construction of transmission lines switchyard and transformer yards will be continued for evacuating power from both Power Houses upto the nearest grid.
- (xi) Preparation of model villages for displaced personnel from submergence area to be started.
- (xii) Excavation of tailrace tunnel for P.H. No.1 to be completed with lining work.
- (xiii) Design of canal and canal structures to be completed.

(E) Fourth year

- (i) Concreting work of spillway, non-over flow blocks and training works to be completed upto 258.0 m Excavation of approaches to spillway will be continued.
- (ii) Completion of land acquisition works for submergence area of reservoir.
- (iii) Earth work of non-over flow section to be completed upto 266.0 m elevation.
- (iv) Work on main link canal, distributaries and minors will be continued.
- (v) All civil works of P.H. No.1 will be completed.
- (vi) Installation of generating unit of P.H.- 1 will be completed so that power generation can be started with this water, which can be released for Irrigation in the Uttar Pradesh portion through L.B.C. of Bariyarpur canal constructed for KMPP command.
- (vii) The installation of penstocks for P.H. No.2 will be started, works of construction for surge tank will also be started and completed upto the end of this season.
- (viii) Civil works of canal structures continued.
- (ix) Construction of transmission lines, switch yards and transformer yards for power houses to be completed.
- (x) The works of construction of transmission lines, switch yards and transformer yards will be continued for P.H. No. 2.
- (xi) All equipments and machineries for P.H. No. 2 will reach at site.

- (xii) Construction of diversion tunnel for P.H. No. 2 to be started.
- (xiii) Preparation of model villages for resettlement of project affected person (PAP) of submergence area to be completed.

(F) Fifth year

- (i) Concreting work of over flow section, N.O.F. block continued and work should be achieved upto 265.0 m height.
- (ii) Installation work of gates in Head regulator should be completed.
- (iii) Earth work on non-overflow section should be achieved upto 273.0 m height.
- (iv) Earth work on canals, distributaries and minors will be continued. (v) Preparation of designs of canals and masonry structures and also actual construction of masonry structures will continue.
- (vi) Installation of generating unit of P.H.No.2 will be started.
- (vii) Installation of the embedded parts for the spillway gates to be completed.
- (viii) Construction of diversion tunnel for the P.H.No.2 to be completed with lining works.

(G) Sixth year

- (i) Land acquisition for the submergence area, main canals distributaries and minors (for command area) to be completed in all respect.
- (ii) Continue earth work on dam, which will be achieved upto 280.0 m elevation. The earth work and structural work of branch canals distributaries and minors should be completed in all respect.
- (iii) Concreting work of non-overflow blocks and of spillway will be continue.
- (iv) Construction work of canal structures will continue.
- (v) The work of installation of generating unit of P.H. No. 2 will be completed with tailrace attachment to open canal.
- (vi) Continue earth work on link canal.

(H) Seventh year

- (i) Completion of concreting work of remaining non-overflow blocks.
- (ii) Erection of gates of spillway to be started and completed.
- (iii) Continue earth work on Dam and will be achieved upto 285.0 m.
- (iv) Concreting work of spillway channel to be completed in all respect.
- (v) Construction work of canal structures will be continued.
- (vi) Plantation along the canal to be continued.

(I) Eighth year

- (i) Earth work on main dam to be completed.
- (ii) Construction of all canal structures to be completed.
- (iii) Plantation along the canal to be completed.

- (iv) Make payment for land compensation that may be carried over from previous years.
- (v) Earth work of canal system to be completed in all respects.
- (vi) Make adjustment for machinery and building materials to be transferred to other projects.

10.1.5 Elevations to be attained in different years of construction of Daudhan Dam

Years	Earth Dam NOF portion	Spillway portion NOF blocks
Pre-construction year	Stripping and excavation of cut off trench	
First year	248.0 m	Foundation work of spillway portion upto 241.0 m elevation
Second year	253.0 m	245.0 m
Third year	259.0 m	252.0 m
Fourth year	266.0 m	258.0 m
Fifth year	273.0 m	265.0 m
Sixth year	280.0 m	280.0 m
Seventh year	285.0 m	291.0 m
Eighth year	291.0 m	-

10.2 Special Tools and Plants for K-B link project

The following Key machineries will be required for K-B link project:

S.No	Name	Size	Qty.
1	Diamond core drilling machine	-	2 Nos.
2	Vibratory compactors	IOT	4 Nos.
3	Sheep foot rollers	Single drum	2 Nos.
4	Crawler tractor	50 HP	2 Nos.
5	Diesel Road roller	8 IOT	2 Nos.
6	Concrete Mixer	10/7	6 Nos.
7	Concrete Vibrator		3 Nos.
8	Trucks (Dumper)	IOT	6 Nos.
9	Tipper	IOT	3 Nos.
10	Water tanker	7000 lit	2 Nos.
11	Diesel Pump	50 H.P.	6 Nos.
		20 H.P.	6 Nos.
		10 H.P.	10 Nos.
12	Stone crusher	-	2 Nos.

13	Concrete Batching plant	-	1 Nos.
14	Weigh bridge	30 T	1 No.
15	Motor Grader	100 H.P.	1 No.
16	Car	Ambassador (Diesel)	6 Nos.
17	Diesel Jeep/Van	-	40 Nos.
18	Mini bus	-	4 Nos
19	Ambulance	-	2 Nos.
20	Small crane	-	1 No.
21	Ice plant	-	1 No.
22	Aggregate cooling plant	-	1 No.

10.3 Manpower Planning

10.3.1 Professional personnel

The following technical professionals are required for the construction and maintenance of the K-B link project.

Engineer-in-Chief or Project Manager: He will see all type of works related with project and will have direct connection with Ministry and agencies allotting funds for the project time to time. This office will have the following wings: -

- (i) Director technical: To look after all technical works in the office of the Engineer-in-Chief.
- (ii) Director Administration: To look after administration in the organisation during construction.
- (iii) Director Finance: To see all accounts matters in the organisation i.e. budget etc.
- (iv) One S.E. for quality control: Having two Divisions, one for canals and other for headworks.

Chief Engineer level-1 (Head works) : Chief Engineer will see all types of design works of headworks as well as canal and its structures and construction work of Dam, spillway. This office will have two circles.

- (1) S.E. Design: Will see all design works for headwork and canals.
 - (a) Division No.1: Design of Dam and spillway.
 - (b) Division No.2: Design of two power houses and tunnel gates etc.
 - (c) Division No.3: Design of canal and its structures.

- (2) S.E. Construction: Will look after the following divisions.
 - Division No.1 for tunnel work and Penstocks including surge tank.
 - Division No.2 for building roads and power houses etc. and civil works of switch yards and transformer yards.
 - Division No.3 for earth work of earth dam portion including filters etc.
 - Division No.4 for construction of spillway, non over flow blocks, spill channel.

Chief Engineer (Canal and Canal Structures) level-2: Chief Engineer will look after all types of construction works of canal and its structures and will do all civil works of canal portion. This office will have two Circles.

- (i) S.E. (East): will see canal works from P.H.No.2 to upto Dhasan river including all structures.
 - (a) Division No.1 Earth work of canal.
 - (b) Division No.2 Construction work of C.D. works.

- (ii) S.E. (West) : will see canal works from Dhasan to Barwa Sagar and upto Betwa river.
 - (a) Division No.1 Earth work of canal.
 - (b) Division No.2 Construction work of C.D. works.

Chief Engineer (Elect.) level 2 : All types of Design work as well as installation of power house plant, transmission of power etc. This office will have one circle.

- S.E. Design and Installation : will see design and installation of power houses.
- (a) Division No.1: Electrical Design works of both power houses.
 - (b) Division No.2: (P.H.-1) All types of electrical construction and installation works.
 - (c) Division No.3: (P.H.-2) All types of electrical construction, installation works and manpower planning for the project.

In addition to the above, one post graduate Doctor specialised in medicine shall be required to look after the preliminary health care of the employees and staff of the project authority residing in the project colony.

10.3.2 Other technical personnel

The following technical personnel will be required to look after the work as per their designations.

Draftsmen (Civil) Draftsmen (Elect./Mech.), Tracer, Ferro printer, Photo copier, laboratory assistant for quality control laboratory, compounder and nurses for the small dispensary in the project colony.

10.3.3 Administrative and Accounts personnel

In addition to the senior administrative and accounts personnel having specialised qualification in personnel management and accountancy, some other personnel like administrative Managers/Officers, Accounts Officer, Accountants etc. are to be required.

10.3.4 Skilled and semi-skilled labour

As the works of the project are to be carried out on contract basis through well experienced contractors, it shall be the duty of the contractor to engage the required type of labour for the required job. The departmental supervisors will closely monitor this matter.

10.3.5 Unskilled labour

There is no problem in engaging unskilled labour in the project area since a number of villages are there in and around the project work site.

10.4 Facilities and amenities

10.4.1 Regular staff: A project staff colony is to be constructed having different types of building for various categories of the employee with all basic amenities like drinking water, electricity etc. A small dispensary with a Doctor and assisting staff will also be there to look after the primary health of the employees residing in the colony. One branch of a nationalised bank and a sub-post office will also be there for the benefit of the people. An educational institution having standard right from class I to class V shall be located in the project colony. A school bus shall be provided to carry the children of the employees studying in higher classes in the nearby towns. Other recreational facilities like a children's park and a club for the adults are also to be provided.

10.4.2 Work charged staff and Daily wages staff

Since the labours are not other than the people residing in the nearby villages, hence only drinking water and temporary sheds for resting shall be provided at the site of works.

10.4.3 Contractors labour

A good location for a temporary colony for the contractors labour shall be provided with basic amenities like drinking water, sanitation and electrification etc.