# CHAPTER VIII – OPERATION AND MAINTENANCE OF IRRIGATION WORKS

## Section 1.- Maintenance of Head Works and Canals Head Works

8.001. Maintenance of dam should be done keeping in view the design assumptions and the completion drawings. The Division is charge of maintenance should have the following records :-

(1) The design reports.
(2) Geological reports.
(3) Completion drawings.
(4) Completion reports.
(5) Test reports.
(6) Operating instructions.
(7) Hydrological reports and,
(8) Area capacity table and curve.

The S.D.O./Sub –Engineer incharge shall have access to these records.

8.002. On completion of the construction phase, the Executive Engineer in charge of construction shall handover the above records to the maintenance Division. For major dams all such records shall be printed in several sets for permanent preservation and future reference. For smooth transition from construction to maintenance phase, at least a few officers connected with the construction should be retained for the initial stage of maintenance.

8.003. The Engineer-in-Chief shall constitute a "State Level Dam Safety Panel". For specific problems concerning the safety of the dam, the Chief Engineer in charge shall refer the matter and obtain advice from the dam Safety Panel. Wireless or radio telephone facility should be provided for all major dams.

8.004. Immediately after unusual events such as abnormal floods, earth quakes, rock-falls, mountain slides etc. which may affect the safety of the dam or cause down-stream floods, the Officer-in-Charge shall take the following action :-

(a) Inform the Collector of the district bringing out the anticipated hazards and the area likely to be affected so that suitable action for relief operations could be undertaken and the inhabitants down stream could be informed by him. He shall also inform the S.E./C.E., accordingly.
(b) Operate the spill-way and outlets judiciously in the best interest of public safety regard less of economic loss on account of loss in storage and power. Safety will over ride all considerations of economic loss.

8.005. Maintenance of minor irrigation works irrigating less than 40 hectares shall not be the responsibility of the Water Resources Department.

## Canals

8.006. Maintenance of canals shall be done keeping in view the design assumptions and the completion drawings. The Division incharge of maintenance should have the following records

(1) Design reports for canal sections and canal structures.
(2) Geological reports
(3) Completion drawings
(4) Completion reports
(5) Test reports
(6) Operating instructions for canals and canal structures
(7) Ground water survey reports
(8) Soil survey report and
(9) Commanded area survey plans.

8.007. On completion of the construction phase, the Executive Engineer in charge of construction shall handover the above records to the maintenance division. The maintenance staff shall have access to the above records.

## Canal Section

8.008. Beds shall be leveled and their gradients regularized by the removal of silt mounds and all mounds higher than correct bed level. Bed levels shall be fixed correctly at close intervals by means of bed stones. In case of main canals, branches and distributaries, silt at the junction of bed and slopes should not be removed if the section of water way is not unduly affected. In case of small minors and all tailreaches of canal, the practice of cutting the silt deposited at the junction of side slope and bed and throwing it on the bed to level it shall not be permitted except in case of filling the scoured portion.

8.009. If the water way at the designed full supply level decreases or increases by 20 percent, the S.D.O. shall prepare estimate for remodeling of the canal and submit it to the E.E. who will then obtain approval of the competent authority. While preparing the estimates for remodeling, instructions mentioned in para 8.008 shall be kept in view.

## Canal Structures

8.010. (a) All masonry structures shall be maintained thorugh proper repairs in a sound condition. Any damage noticed in these works shall be speedily rectified. Care shall be taken to ensure proper curing of repairs work.

(b) Wheel guards shall be properly maintained.

(c) Ramps for bridges over the canal shall be maintained in proper condition so as to ensure that the canal bank is not encroached upon.

(d) Down stream of canal structures where significant erosion persists due to turbulence or wave action, dumped riprap consisting of brick-bats or boulders

should be provided. However, if this provision does not improve the situation, the cause shall be investigated and suitable energy dissipating device provided down stream of the structure. Scour Charts showing the depth and extent of scour shall be maintained for all major canal structures where this tendency persists. The chart shall be replotted and revised at least once a year after the annual canal closure.

(e) The following canal structures should be given special attention:-

(1) Canal and drainage siphon.
(2) Aqueducts

(f) The junction of the masonry structures with the earthwork requires special attention as the canal is likely to breach at this point. The grouted pitching or lining provided at the junction should be maintained in proper shape.

**Gates/Karries**

8.011 (a) Planks/Karries at regulator head shall be kept in good condition. These shall be painted once a year to keep them in good condition.

(b) Planks/Karries shall always be kept near the works for which they are needed. They shall be stacked on edge of masonry walls built in shade if possible, and occasionally turned upside down to prevent their getting warped or destroyed by white ants.

(c) Mechanical gates shall be oiled, greased and kept in perfect working order. Exposed surfaces shall be kept properly painted to prevent rusting. Exposed surfaces which have been recently painted shall be occasionally examined and any patches of rust found shall be removed and surface painted.

(d) The lifting gear shall be properly lubricated to keep it in easy operating condition and to prevent rusting.

(e) The gates and their embedded parts shall be inspected during closure. They shall be repaired, painted and lubricated, wherever necessary.

**Outlets**

8.012 (a) Outlets shall be normally installed at right angles to the center line of channel and at the correct levels. The site for outlet shall be so chosen that water courses will run straight and at right angles to the distributory as for as possible and then continue along the selected alignment. When an outlet is abolished the water course shall be leveled for atleast first 15m length. Water courses shall not normally be allowed to run along the side of the channel.

(b) Where pipe outlets are used, the pipes shall be straight. Where two or more pipes are used and have to be joined to from an outlet, care shall be taken that

they meet accurately. To prevent their tampering, outlet pipe should rest on concrete or masonry face walls at each end.

(c) All outlets shall be regularly checked by S.D.O. and set right if found defective, in accordance with the detailed instructions issued by the Department.

8.013 Maintenance and operation of canal system unto 8 ha. chak shall be the responsibility of Water Resources Department. Maintenance of field channels shall be the responsibility of cultivators.

## Section 2.-Operation of Head Works and Canal Head Works

8.014 (a) For major/medium dams, the C.E./S.E. in charge of construction shall frame and issue guidelines for operation and maintenance before completion.

(b) Dam and appurtenant works shall be operated as per these guide lines. E.E./S.D.O. in charge shall maintain the following records for watching the performance of the head works:-

(1) Record of water passed over spillway (Appendix 8.01).
(2) Tank guage register (Appendix 8.02).
(3) Performance table (Appendix 8.03).

(c) S.D.O. shall submit two copies of the performance table to the E.E. at the end of the month. The E.E. will then submit one copy to the S.E. with his remarks every month immediately after receipt from the S.D.O. The S.E. will analyse the records submitted by the E.E. and send a copy of the same to the C.E. annually by 15$^{th}$ July.

### Canals

8.015. (a) Head regulator forms part of the canal system and will be maintained by Officer-in-charge of the head works. The regulation of the head regulator shall however be the responsibility of the Officer-in-Charge of the canals to facilitate releases of water for irrigation as per the demand.

(b) Irrigation of the command area depends upon the performance of the canal system. Performance of the canals shall therefore be watched as per the canal guage register and performance table for canals indicated in Appendix 8.04 and 8.05 respectively.

## Section 3:- Periodical (Bi-Annual) Inspection of Irrigation Works

8.016 The periodical inspection which the various officers shall carry out are as follows:-

### (A) Head Works

**Procedure for Periodical Inspections :**

1. Inspection of Dam will hence forth be carried out twice in a year.

2. The two inspections will be termed as :

(i) Pre- Monsoon Inspection, and

(ii) Post - Monsoon Inspection.

3. The Pre-Monsoon Inspection will be carried out by the Field Officers in charge of the dams between April & May and should be reviewed by the next higher officer. A consolidated report should be submitted by the Chief Engineer to the SE, BODHI Raipur by June each year.

4. The Post Monsoon inspection will be conducted by the Field Officers between October & November and after review by the next higher Officer a consolidated report should be submitted by the Chief Engineer to the SE, BODHI, Raipur by December each year.

5. The level of Officers for inspecting the dams shall be as under:

| | Size of Dam | Inspecting Officer | Reviewing Officer |
|---|---|---|---|
| 1) | Height $\geq$ 60m<br>Storage $\geq$ 1000 M.Cum. | Chief Engineer | - |
| 2) | Height $\geq$ 30 m < 60m<br>Storage $\geq$ 30 M.Cum <1000 M.Cum. | Superintending Engineer | C.E. |
| 3) | Height $\geq$ 15m < 30m<br>Storage $\geq$ 30 M.Cum < 300 M.Cum | Executive Engineer | S.E. |
| 4) | Height $\geq$ 10 m < 15 m | Assistant Engineer | E..E. |
| 5) | All Minor Dams<br>Height < 10 m | Sub Engineer | A.E. |

**Note:** Level of Inspection shall be decided on the basis of either Height or Storage whichever gives the higher category.

6 (a) Monitoring and reviewing of consolidated report of Pre-monsoon and Post-monsoon Inspection of dams of 10 m or above height prepared and submitted by the Chief Engineer will be carried out by the State Dam Safety Organisation.

6 (b) Monitoring and reviewing of consolidated report of Pre-monsoon and Post-monsoon Inspection of dams of less than 10 m prepared by Sub-Engineer & submitted by A.E. to E.E. will be carried out by the S.E.

7 (a) The Dam Safety Organisation will prepare a status report and forward it to the Secretary Water Resources Department, C.G. and the Chief Engineer concerned. The report would contain the following statements.
Statement No. 1 Dams with major Deficiencies (Name of Dam, nature of deficiencies)
Statement No. 2 Dams with minor rectifiable defects ( Name of Dam, nature of deficiencies)
Statement No. 3 Dams where no deficiency has been reported (name of dam)
Statement No. 4 Dams for which report not received (Name of dam)

7(b) The S.E. will prepare a status report of dams having height less than 10 m and forward to the Secretary, Water Resources Department, C.G. and Chief Engineer concerned. The report would contain the statements mentioned under para 7(a) above.

8. The Status Report compiled by the SE, Dam Safety Organisation for height 10 m and above, and by the S.E. for height less than 10 m should be issued by the following dates.
Pre-monsoon Status Report- October.
Pre-monsoon Status Report- April.

9. Incumbency of the officers in charge of the maintenance of the Dam must invariably be given.

**(B) Canal System**

1. **Schedule of Inspection:** Inspection of canal system according to the following schedule:

| S.No. | Category | S.D.O. | E.E. | S.E. | C.E. |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1. | Canal carrying:- | | | | |
| | (a) above 30 cumecs. | Annually | Annually | Annually | Annually |
| | (b) between 10 to 30 cumecs. | Annually | Annually | Annually | At least Once in 4 years. |
| | (c) between 3 to 10 cumecs. | Annually | Annually | At least Once in 4 years. | At least Once in 4 years. |
| | (d) below 3 cumecs. | Annually | At least Once in 4 years. | X | X |
| 2. | Water logged areas, and problem areas of major projects. | | .....during irrigation season..... | | |
| 3. | i) A portion of the command area of major & medium projects. | | ...A portion during each... irrigation seasion | | X |
| | ii) A portion of the command of project with CCA above 500 ha. | | do | | do |

2. All inspecting officers complete their assigned inspections between November-December each year and submit PROFORMA reports to all concerned latest by 10th January.

**(C) Flood Protection Schemes**

Like all irrigation schemes, these also need to be inspected once annually well before the onset of monsoon so that, the repairs if any required can be carried out in time to preclude the chances of the damage if any further, during rains.

It is likely that at some works pumping installation to dewater backside areas are also installed. These will therefore, need to be also simultaneously inspected by the E/M officials. To ensure, timely inspection and action towards repairs/overhaul, S.E. of the circle will prescribed dates for joint inspection of all such schemes. on permanent basis to preclude chance of any confusion or delay.

8.017. The results of periodical inspection of Irrigation works carried out as per Para, 8.016 shall be recorded by the inspecting officer in the Inspection Register. The proforma to be used is indicated in Appendix 8.06.

**Periodic Inspection Register**

8.018. Periodic Inspection Register is an important record. A movement register shall be maintained in Division Office to keep record of movement of the Periodic Inspection Registers. These registers shall be issued to the S.D.O. by the Executive Engineer after allotting it a number. Subsequently, whenever an officer in whose name the inspection register is registered, is relieved of his charge, the name of the relieving officer or subordinate shall be entered in the movement register. An officer or subordinate to whom the Periodic Inspection Register is issued is responsible for its safety unless he returns it to the Division Office and obtains acknowledgement. The E.E. granting the receipt then becomes responsible for the register and he should see that it is kept in safe custody in his office.

8.019. Longitudinal section and cross section of dam showing levels of top of dam and side slopes after each monsoon should also be appended in the Periodic Inspection Register at the end of each report.