

THE REMEDIAL MEASURES FOR REDUCTION OF LOSSES IN EXISTING CANAL SYSTEM

¹Prasad Pawar, ²Akshay Pondkule, ³Pranav Waychal, ⁴Sagar Borade, ⁵Akshay Nigade

⁶Asso.. Prof. S.S.Deshmukh.

^{1,2,3,4,5}Student & ⁶ Asso. Professor

Department of Civil Engineering

Savitribai Phule Pune university , TAE, Pune, India

Abstract : Canal is an artificially channel constructed on ground to carry water to fields either from river or from reservoir. The losses in canal comprise evaporation from surface and seepage through the bed and the side of the drain etc these types of losses can be reduced easily. In India many canals are unlined due to that measure seepage is to be found in unlined canal 40% -60% seepage is to be found in unlined canals. The purpose of this study is to reduced canal losses (leakage losses , seepage losses evaporation losses) by providing the various types of lining (cement concrete lining , stone pitching , lime concrete , synthetic rubber , polyethylene film) .

Key Words - : Lining evaluation , Water losses reduction , Lining cost analysis , Canal lining.

I. INTRODUCTION

Irrigation is defined as the process of artificially supplying water to soil for raising crops. It is science of planning and designing an efficient, low cost, economic irrigation system tailored to fit natural condition. India is basically an agricultural country and all its resources depends upon the agricultural output. Water is mostly the vital element in the plant life. In order to get maximum yield it is essential to supply optimum quantity of water, and to maintain correct timing water. This is possible only through systematic irrigation system. In this paper we are going to study about the various solutions to reduce the seepage and percolation losses ,leakage and evaporation losses of water through canal by using various methods like cement concrete lining , brick lining , plastic and synthetic rubber cover , low density polyethyelene film , covering the water surface by solar panels and plantation to do optimum use of canal water. We are taking case study of NLBC and checking economical benefits of the cost and material for lining. And estimating the cost required to canal lining or studying the various losses of the canal water. The electricity will be generated from solar panel covers and using this electricity for road lights near the canal .and checking the feasibility of various lining. Or trying to stop illegal use of water.

II. LITERATURE REVIEW

“ **Mr.Ashfaq A. memon**” (EA.TL) (2013): The seepage from the canal creates twin problems of salinity and water logging due this problem a large agriculture land has gone out of use, and this process is continued particularly in Sindh. They concluded on the proposed lining of dadu canal, seepage losses, water logging and maintenance cost of canal can be significantly decreased, consequently flow velocity, conveyence efficiency and cropping intensity can be increased.

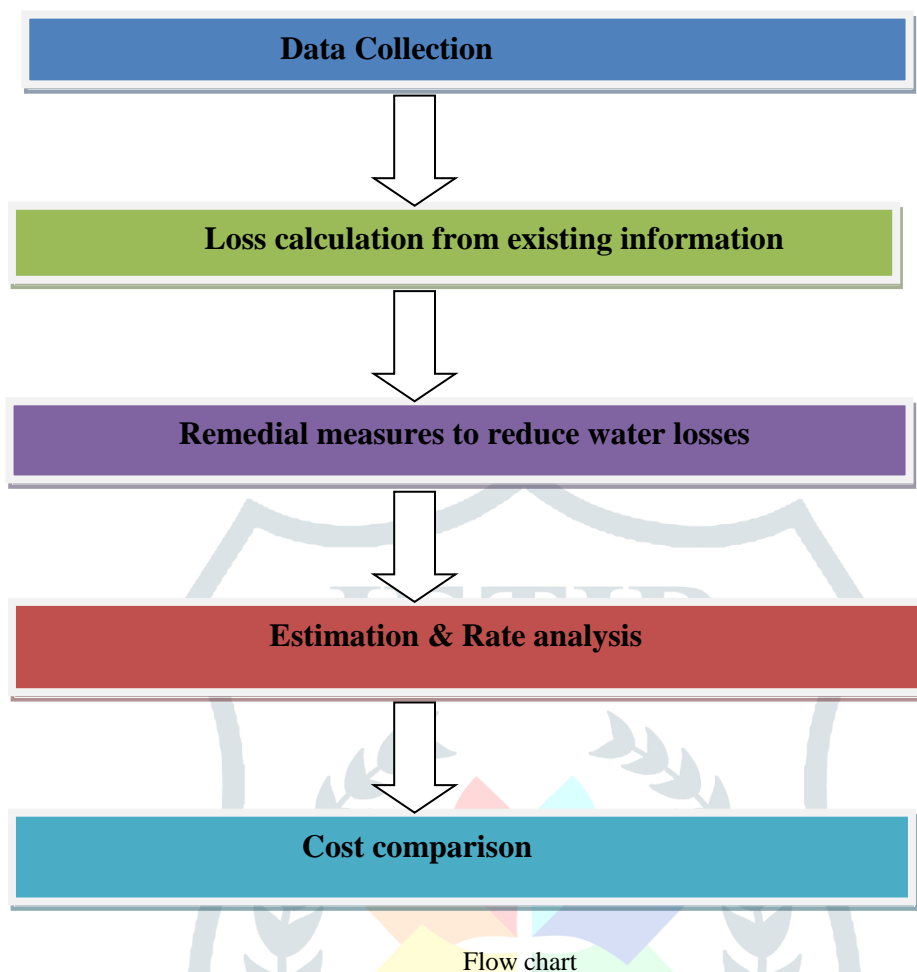
“ **A.K. Saxena**” (2014): The study revels irrigation canal lining and describe a number of various lining and their analysis. Requirement of line should be supported on analysis like water conservation, water work and suitable method of excavation, lower operational maintenance, structural safety and long life. They used various material like concrete lining, their study mainly focused on the detail of life cycle on the different type of lining and its durability.

“**Bikram Shah** ”(2015): The conveyance loss was calculated experimentally by different researcher on different canals around the world. He had tried to review some of the research work and recommend an average water loss from the canal irrespective of the soil and other environmental condition. There are different materials which have been used in canal lining to reduce this water loss.

III Problem statement

There are various types of water losses (leakage losses , seepage losses evaporation losses) in existing canal system and illegal use of water by farmers . Water is essential to sustaining life. There are numerous challenges concerning water that include Problems such as increasing local water supply associated with lifestyle changes, increasing water usage due to expansion in food production associated with increasing population, the virtual water related food self-sufficiency

IV. RESEARCH METHODOLOGY



4.1 Data collection: Existing data was collected from Irrigation department veer and carried a site visit to Nira left bank canal at veer dam for fining the canal properties .

4.2 Losses calculation from existing information: for losses calculations we have selected canal of 35 KM length , from Someshwar to Baramati. We had taken readings of inflow as well as outflow at canal gates with the help of gauge meter and calculate the seepage losses by using inflow-outflow method.

4.3 Remedial measures to reduce water losses :For water losses reduction from canal we are used various types of canal lining methods like cement concrete lining , stone pitching , lime concrete etc . for reduction of evaporation losses covering the water surface by solar panels and providing vegetation on the sides of canal bank.

4.4 Estimation & Rate analysis: estimate and rate analysis are prepared of various types of lining. and find out the total cost required for each type of lining.

4.5 cost comparison: after the estimation providing the most economical canal lining.

Sr. No.	Inflow (Q_{in}) in cusec	Water supply in outlet (Q_s) in cusec	Outflow (Q_{out}) in cusec	Seepage loss (Q_{loss}) in cusec
1	748	120	378	250
2	760	120	440	200
3	750	120	460	170
4	750	120	480	150
5	750	120	480	150
6	750	120	480	150

7	750	120	480	150
8	750	120	480	150
9	750	120	480	150
10	750	120	480	150

Table 4.1 Seepage loss calculation by inflow outflow method

Total seepage loss = 1670 cumec
 Average seepage loss = (1670\10)
 Total loss = 167.00
 Evaporation loss = 3%of total seepage loss
 = (3\100)* 1670
 = 50.10 lit/day.



Photo-4.1 gate near someshwar sugar factory

Photo-4.2 gate near Sub divisional office Irrigation department shardanagar

V. Remedial measures over seepage loss:

- 1) Lining of canals with Polyethylene Film .
- 2) Lining of canal with Cement Concrete.
- 3) Lining of canal with Lime Concrete.
- 4) Lining of canal with Stone Pitching.
- 5) Lining of canal with Synthetic Rubber.

Remedial measures over evaporation losses:

- 1) Covering water surface by solar panel.
- 2) Plantation.



Photo – Covering water surface by solar panel.

VI. Estimation & Rate analysis of cement concrete lining

MEASUREMENT SHEET

Sr no	Description	L (m)	B (m)	H (m)	Quantity	Total quantity	Rate per unit	cost
1	Excavation in soil in canal bed and side slopes for canal lining including dressing the profile and disposal of excavated material with 50 m lead and 1.5 m lift.	34960	22.56	0.3	236609.28 m ³	236609.2 8 m ³	60.60	14338522. 37
2	Compaction canal bed and side including saturation up to 30 cm depth for preparation of earthen sub-grade before laying.	34960	22.56	–	788697.6 m ²	788697.6 m ²	22.80	17982305. 28
3	Providing and laying in situ mechanised lining in M-15 a) Side lining b) Bed lining	34960 34960	14.96 7.60	0.15 0.15	78450.24 39854.4	118304.6 4 m ³	4505.63 4763.65	35346932 3.9 18985241 2.6
4	Providing and placing in position Reinforced cement concrete 1:3:6 with 40 mm graded stone a) Step V= (1.5 X 0.3 X 0.15) = 0.0675 m ³ b) Waist Slab / Soffit L= 3.35 m c) Guide wall Total quantity	10 3.35 3.35 25	 0.05 0.3	 1.5 0.3	 0.0675 m ³ 0.251 m ³ 0.302 m ³ 1.22 m ³	 0.675 m ³ 0.251 m ³ 0.302 m ³ = 1.22 m ³ 30.5 m ³	 2656	 81008

								Grand total	57572357 2.1
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VII. Conclusion

The following problems are found after the survey and observation of NLBC

1. The lining is not provided throughout the canal.
2. Weed growth is increased day by day.
3. Leakage through gates of distributaries and super passage
4. More amount of seepage through the embankment of canal
5. The bed slope of canal is not in good condition
6. Erosion and more amount of silting are occurred
7. Proper inspection and maintenance is not done by irrigation department
8. Increase in percentage of illegal use of water by the people.

From above this all problems there are more loss of water from canal is occurred. For above each problem following are the best solution for avoiding loss of water . the conservation of water in NLBC is need of time so that the canal lining technique is most advantages in this particular situation. There is a need to the attention by irrigation department on all problems occurred in NLBC system they can do the good work to minimizing this problem

The Following are the solutions for NLBC :

1. Seepage can be reduced by the reinforcing the canal bank, sealing or lining the canal bed and sides by concrete , stone pitching distributaries by plastic sheets.
2. Serious leakage can avoided when canal system is inspected frequently and when repairs are carried out immediately.
3. Erosion of embankment can be prevented be reduced by flow velocity , constructing canal lining .
4. In order to prevent major problems such as leakages and de-construction of embankments, the canal system should be regularly inspected throughout irrigation season.
5. For avoiding evaporation losses planting the trees nilgiri trees near to the canal, increasing the velocity of water.
6. For avoiding seepage losses side trenches are provided along length of canal .
7. Decrease the illegal use of water , the regular inspection of canal is carried out . as the surface of canal is protected from sunlight by constructing the solar panel .
8. Provide the venture meter on the distributaries and metering system on minor to measure the exact water supplied to the farmer

Cost comparison

Sr no :	Type lining	Total cost
1.	LDPE FILM/HDPE FILM	67707296.14
2.	CEMENT CONCRETE	575723572.1
3.	LIME CONCRETE	467841725.4
4.	STONE PITCHING	86689468.64
5.	SYNTHETIC RUBBER	67498878.64

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