An Experimental and Comparative Study on Canal Lining Exploitation Geosynthetic Material, Cement Mortar and Material Lining

PA. Prabakaran, G. L. Sathyamoorty, M. Adhimayan

Abstract: ***This project is principally supported water insufficiency, a serious cause for individuals for all functions chiefly for irrigation. to beat this and to boost the potency of water flow and discharge in canals, the lining ways for canals ought to be modified as less permeable , increase in velocity and discharge. Canal lining is that the method of reducing flow loss of irrigation water by adding an imperviable layer. Technological development and producing of recent materials helps in varied functions. One such issue was the event of geosynthetic materials that was wide employed in construction fields in conjunction with concrete or as a separate material because the replacement for concrete. we have a tendency to selected PVC geosynthetic material for lining the canal rather than concrete, brick masonry and traditional material lining for canals. we have a tendency to create a comparative study for 3 canal linings like PVC, brick masonry and material lining close to Pollachi of alittle paradigm model in Mr. Sekar farm and notice the foremost economical material appropriate for canal lining altogether forms***

Keywords: Canal Analysis's, Effective Discharge, Most Economical-Comparative Study.

I. INTRODUCTION

Canal lining is that the method of reducing flowing loss of irrigation water by adding Associate in Nursing impervious layer. The canal lining material can cause a number of the disadvantages for the availability of water in canals. So, the amendment in material of canal lining and also the comparative study was created during this project resembling concrete canal lining and PVC canal lining. atiny low image of canal was made in man. Ramesh farm in pollachi wherever this geosynthetic canal was additionally used for facility to their farms. the fabric checking for concrete and geosynthetic materials resembling water permeableness and abrasion check were done and also the hydraulic test resembling speed and discharge for every canal lining were created to envision that material attain the utmost potency permanently provide of water for irrigation in canals. Why the canal lining necessary and why it's necessary implies that to cut back the Wastage of water thanks to flowing, to cut back wearing away and Silt formation, Weeds growth that scale back water flow in canals and H2O contamination just in case of not providing canal lining ends up in a surround for mosquitoes and insects.

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II. OBJECTIVES

The main objective is to search out out the foremost economical methodology of canal lining supported the price criteria.

- •Seepage management
- •Prevention of water work
- •Increased hydraulic potency
- •Increased resistance to erosion and abrasion
- •Reduction in cross section of the structure
- •Low operation and maintenance price

III. PVC CANAL LINING

Material: PVC (300GSM), thickness=0.2mm

Function: imperviable,

Properties: producing method, material, Thickness tolerance, dimension of the roll.

A. Vinyl Polymer (PVC)

The PVC geomembrane is extremely versatile and retain its properties over a large temperature vary. this allows the liner to adapt to the subgrade higher than different accessible geomembrane materials. PVC even have superb puncture, abrasion, and tear resistant properties, that ar necessary in minimizing injury throughout installation. PVC encompasses a tested history of use in canal lining for over thirty years by the Bureau of Reclamation. A PVC canal was created to a length of 3m. The depth of the canal is 1ft and therefore the total space of the canal is zero.00097m2.

IV. BRICK MASONRY CANAL

Material: Bricks, cement, sand.

This type of lining has been extensively employed in Republic of India et al..this sort of lining is economical wherever aggregates for concrete lining don't seem to be on the market. Construction of Brick masonry canal. A brick masonry canal was created to a length of 3m. The depth of the canal is 1ft and also the total space of the canal is zero.00097m2.

V. EARTHEN CANAL

The stuff lining is thick compacted lining that is sturdy and face up to extensive external fluid mechanics pressure. however because of continuous flow of water and on throughout flooded time the soil can get scoured and cause land slippery , hill can get scoured and therefore the entire

canal can destroy.A lot of ooze can occur in stuff lining. Weeds growth square measure most which is able to cut back the speed of water.

VI. INITIAL TESTING

A. Fineness Test on Cement

Observation: weight of sample retained on the sieve =5gm
total weight of the sample=100gm
Calculation:
% weight of residue= weight of sample retained on the sieve*100
Total weight of the sample= (5/100) *100
= 5%

B. Specific Gravity Test of Fine Aggregate

Calculation: Specific Gravity of Fine Aggregate = (W2-W1)/ ((W2-W1) -(W3-W4))
= (6.93-3.93)/ ((6.93-3.93) -(12.60-10.74)
=2.63

Table I Specific Gravity Test of Fine Aggregate

S. No	W1(g)	W2(g)	W3(g)	W4(g)	G
1	3.93	6.93	12.60	10.74	2.63

C. Fineness Modulus Fine Aggregate

Weight of fine aggregate: 500g
Fineness modulus of Fine Aggregate =Sum of cumulative % of material retained on each sieve/100
= (1.2+6.4+25.2+61.2+88.8+98.8)/100
= 281.6/100
=2.816

Table II Fineness Modulus Test of Fine Aggregate

S. No	IS Sieve	Wt. Retained in each sieve (g)	Cumulative Wt. Retained (g)	Cumulative % Retained	Cumulative % passing
1	4.75mm	5	5	1.2	98.8
2	2.36mm	28	33	6.2	93.8
3	1.18mm	90	123	25.1	74.9
4	600µ	181	304	61.5	38.5
5	300µ	132	436	88.8	11.2
6	150µ	45	481	98.8	1.2
7	75µ	0	-	-	-
8	Pan	0	-	-	-

VII. DISCHARGE TEST FOR EACH CANAL LINING

The most speed or water flow and therefore the maximum discharge for every canal were tested to seek out the foremost economical canal for irrigation for the availability of water by avoiding water loss and increasing the speed of supply water for irrigation. Trial was taken for 3 times and therefore the average time for every canal was tabulated. The time was calculated victimisation stop watch.

Table III Discharge Test Results for Each Lining

Lining method/ test	Area (m^2)	Velocity (m/sec)	Discharge (m^3/sec)
PVC canal lining	0.00097	1.5	0.0018
Concrete canal lining	0.00097	0.75	0.00070
Earthen lining	0.00097	0.3	0.000265

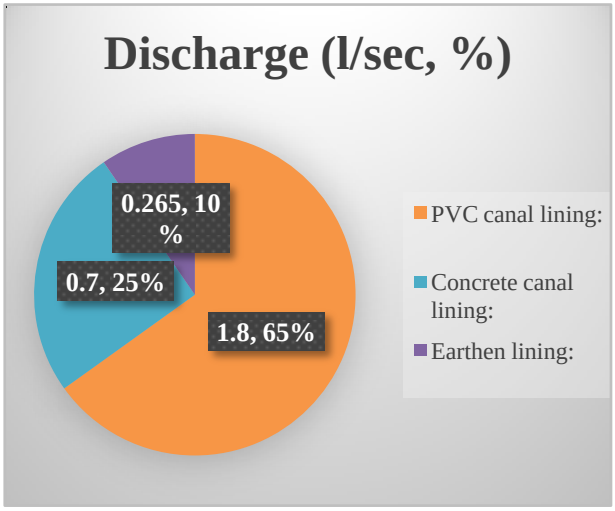

Chart 1: Discharge for Each Canal

VIII. WATER PERMEABILITY TEST

Water porousness take a look at is that the most quantity of water absorbed by brick masonry, PVC and soil. The procedure for locating the water porousness in brick masonry is by taking the dry weight of the sample and twenty four|for twenty-four} hours the sample ought to be unbroken in water and when 24 hours the wet weight of the sample is taken. The distinction in weight of the sample shows the water absorbed. For geosynthetic as per ASTM methodology D4716, the porousness is a smaller amount than 2x10-10 m/sec that equates to concerning 6mm/year ooze. For soil, the water absorption take a look at is created by constant head porousness and falling head porousness take a look at.

Table IV Water Absorbed By Cement Mortar

Description	Trial 1	Trial 2	Trial 3
Weight of mortar cube	790	795	795

IX. ESTIMATION FOR EACH CANAL

Materials used for brick masonry lining: cement, sand, bricks materials used for PVC lining: PVC material. The cost is very lower for earthen canal but it will cause all the disadvantages for canals and irrigation. Is increase seepage loss, weeds growth etc.

The brick masonry costs much higher and also the days for construction also increases. But in PVC lining the days for construction is minimum and total cost for construction of the canal lining is also minimum compared to other lining methods.

Table V. Total Cost Estimation

Lining methods	Area (m^2)	Material cost (rupees)	Labour cost (rupees)	Days	Total Cost estimation (rupees)
PVC canal liner	0.00097	660	200	1	860
Brick masonry lining	0.00097	1500	480	2	1760
Earthen lining	0.00097	-	300	1	300

X. COMPARATIVE STUDY

A comparative study was made for each canal in all forms includes maximum discharge, total cost of construction, days of construction, water permeability test. In discharge, construction days and cost, water permeability test PVC canal lining is more efficiency than cement mortar and earthen lining.

Table VI Comparative study for Each Canal

Canal lining	PVC	Cement mortar	Earthen
Maximum discharge (%)	59	29	12
Cost Estimation (rupees)	860	1760	300
Days of construction	1	2	1

XI. CONCLUSION

From all check results a comparative study is formed that shows that PVC lining is best than different canal lining employed in this project. In discharge, construction price and water permeableness the PVC is additional economical when put next to brick masonry and material lining. however PVC can get affected only get exposure to any chemical attack thence we have a tendency to area unit victimisation PVC solely in canals thus it stand up to over thirty years. the upkeep of this canal is a smaller amount. thence the foremost economical lining for canal altogether forms is PVC canal liner.

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