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To Study the Advance Techniques of Canal System For Irrigation: With Various Parameter

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ABSTRACT: India is basically an agrarian country and crop water is supplied through the system of canals from either dams or distribution chambers. Canal irrigation networks provide water supplies for agriculture and food products. The purpose of irrigation is to achieve an efficient and effective use of available Water sources.

To address these problems Prof P.K. Swamee has suggested an alternate design philosophy based on minimum seepage loss. Swamee presented an equations for computation or seepage losses for triangular, rectangular and trapezoidal sections of canal. In the design of canals both lined and unlined canals systems are generally used. An approximate estimate of seepage under the unlined canal is 7 cusec per meter.

1. INTRODUCTION

As we better knows" Water and Agriculture is undoubtedly the backbones of India". The relation of water and Agriculture define terms as irrigation by canals.

Not a current situation even from ancient period we give high rituals and values to water and resources like river e.g. Ganga, Yamuna.

In ancient way irrigation are found in Rigveda (chapter 1.55, 1.85 and others). In this Vedas led into surmi susira (brand channels) and from there into kanitrima (diverting channels) into fields. Then 3rd BCE the period of Lord Buddha and King Mourya period mention the irrigation system and state raised "revenue from changing farmer for irrigation service from river".

Then medieval period was most important for the canal system because great sultanate ruler Firoz Shah Tughlaq (1309-1388) build the most extensive canal irrigation system around region of west of river Yamuna in fourteen country. These canal provide want resource of water to agricultural land and supply urban to rural.

Most of the agriculture sector need to irrigation to growing themselves and also growing for nation, 58% has agriculture sector in India that's why the proper irrigation system and proper management is most important i.e. we modified the system with help of new techniques in canals.

OBJECTIVE

- To design most economical trapezoidal section.
- To compare open canal flow and underground canal flow.
- Design of canal for various discharge.

- Prevention of seepage by using various method.

LITERATURE REVIEW

Mahendra Umare and S. B. Thakare "Comparative Study of Canal Design"

Canal is the major conveys system for delivering the water for irrigation. But the seepage loss from the irrigation canal constitutes a substantial percentage of the usable water. The estimated seepage loss are 45% of the water supply from the head of the canal. According to IS loss of water from seepage from unlined canal is 0.3 to 7.0 cu. m/sec. If the seepage loss is prevented about 6000000 ha area to be irrigated. Due to seepage loss ground water contamination, water logging, salinition are formed. The perfect lining would prevent 99% of seepage losses but canal lining deteriorates with time therefore canal design in such a way that they may occur less percentage of seepage losses. When the water table occur at very large depth the maximum seepage losses are occur.

Seepage losses constitute a major portion of loss in an unlined canal. The seepage losses are due to Absorption of water in the upper layers of soil under the canal bed, and Percolation of water into the water table, thus raising the water table. If, however water table is much lower, seepage losses are only due to absorption. Percolation losses are always much more than the absorption losses. Water is lost in unlined canals through the soil/water interface.

Yousry Mahmoud Ghazaw "Design and analysis of a canal section for minimum water loss"

Seepage and evaporation are the serious forms of water loss in an irrigation canal network. Seepage loss depend on channel geometry. In this paper a methodology to determine the optimal canal dimension for a particular discharge is developed. The main objective function is based on minimum water loss form a canal cross section due to seepage and evaporation. The design procedure in the paper is using larynges method for the optimal canal dimensions obtained for minimum water loss, design charts, based on obtained results in terms of canal geometry have been given to facilitate design of the minimum water loss in canals.

The proposed method can be applied to other complicated canal cross section that cannot be solved by traditional method of variation.

Kartik Chandra Sahu and Ranendu Ghosh "Impact of canal irrigation"

An investigation on canal irrigation performance assessment monitoring of Halvad taluka surandernagar district of Gujarat. From July 2015, India conducted remote sensing GIS system at Bhaskaracharya Institute Gandhinagar, Gujarat and it observed that, Canal are the main source of irrigation in India. These techniques provide information to the farmer and irrigation professionals in the form of map using interpolations. It can be easily understood by farmer for irrigation planning. The problems of irrigation are eliminate by using these technology exist. This technique will help to farmer for management and decision making in water resource for agricultural and conservation purpose.

Abdu, TM[1], EIgarnri, T[1], Magid A.M, Magid, IM[2] "Design consideration of concrete lined channel"

To address the problem of high water losses due to seepage and wind-blown sand that buries the canal. In this they present canal hydraulic design by using manning's equations. By used wadi sand and coarse which collected for prepare fresh concrete with mix design ratio 1:2:3 for precasting of concrete slab. They had considered five design aspect for the lining of

Rawkeeb Research Station (RRS) canal. In this rectangular cross section design was selected to construct RRS canal, whole of the proposed design prove the required water tightness.

lsayed elkamhawy and martina zalenakova "A case study of the river Nile, Egypt"

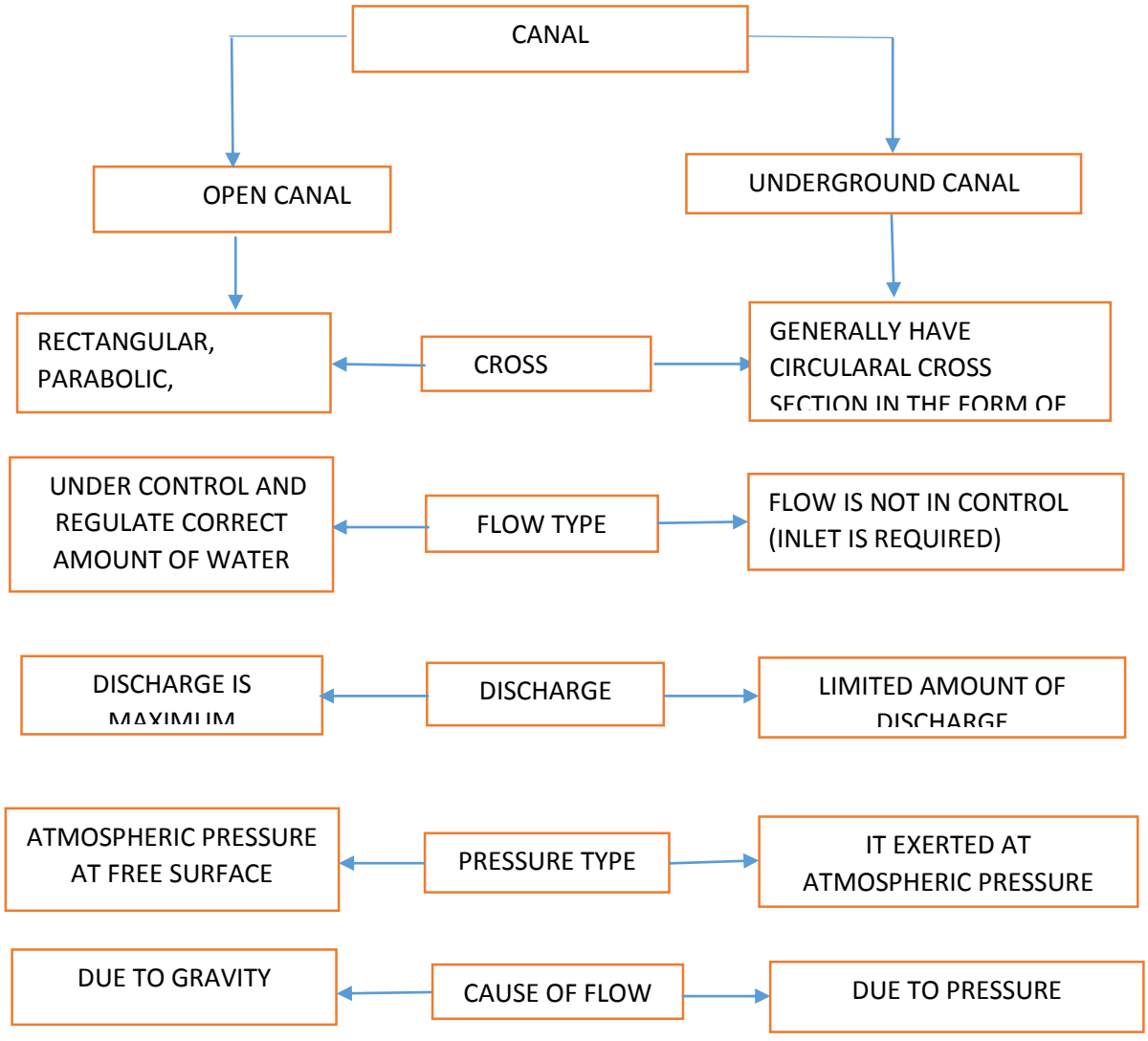
Due to global climate change, the Egypt have recently suffered from water scarcity. Mostly arid and semi-arid region was suffered from scarcity. To prevent scarcity and also grooming the agricultural and social civilization adopt lining canals.

In this lining canal, observed on seepage losses due to cracks in canal i.e. they follow the necessary precaution to prevent cracks in lining material during the implementation process. Using water- stop seals in the zone where the canal bed meets its vertical sites is also recommended, particularly in the case of using a rigid lining material to prevent leakage due to potential cracks in the linear material.

2. METHODOLOGY

COMPARE OPEN CHANNEL AND UNDERGROUND CHANNEL

Irrigation water is conveyed in either open channel or closed conduits. Open channel received water from natural stream or underground water and convey water to the farm for irrigation. Open channel have free surface.



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PREPARATION OF CANAL ALIGNMENT

The command area survey map shall be prepared showing the contours, spot levels and important land feature for whole to be irrigated. Alignment of canal shall be tentatively marked on the survey map. The alignment of contour canal shall be decide carefully consideration of economy, especially in higher elevation. The alignment of canal shall consist of straight line with circular curves.

MOST EFFICIENT / ECONOMICAL TRAPEZOIDAL CHANNEL

Most efficient / economical trapezoidal channel section, hydraulic radius is equal to half of depth of flow.

Hydraulic Radius

$R = A/P$

$R = \sqrt{3}y^2 / 2\sqrt{3}y$

$\square\ R = y/2$

Hydraulic depth

$D = A/T$

$T = B+2my$

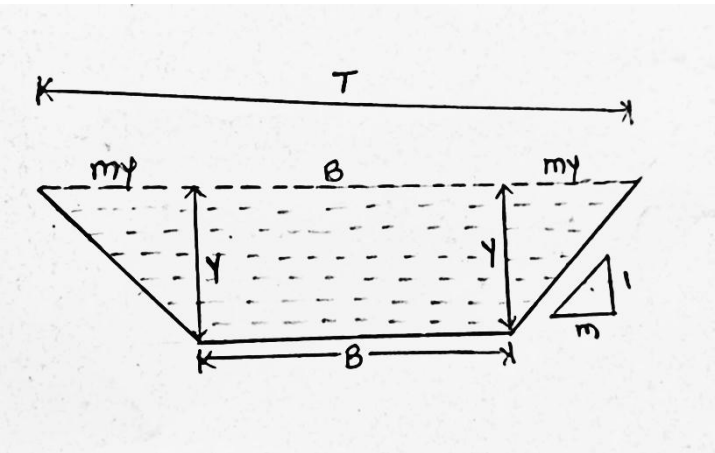
$T = 2y/\sqrt{3} + 2/\sqrt{3}y$

$T = 4y/\sqrt{3}y$

$D = \sqrt{3}y^2 / 4y/\sqrt{3}$

$D = \sqrt{3}y^2 /4y\sqrt{3}$

$D = ¾\ y$



Where, D = Hydraulic Depth
R = Hydraulic Radius
T = Top of Bed
P = Wetted Perimeter
B = Bed
A = Area of cross-section
m = Side Slope
Y = Depth of flow

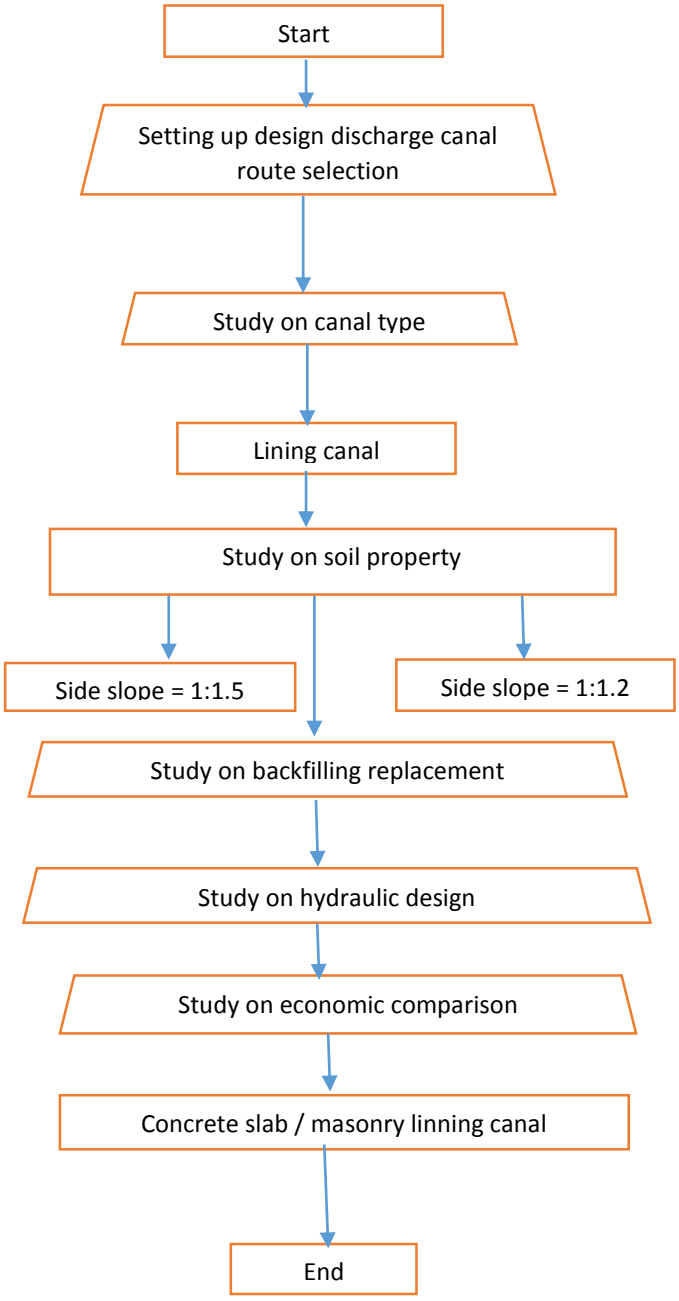
DESIGN OF CANAL FOR VARIOUS DISCHARGE:

As per the canal section is depend upon the quantity of water flow in the canal (discharge). As per the given discharge canal section are design whereas the maximum discharge is equal to the maximum canal dimension vice versa the minimum discharge is equal to the minimum canal dimension therefore the dimension in that section are depend upon discharge.

As per the given table below it shows the woods design table for use in Kennedy theory.

Discharge (m^3/sec)	B/D	B (m)	D (m)	Slope 1in	Kutter`s N	V/V_0	V (m/sec)
0.283	2.9	1.45	0.488	3333	0.0225	0.92	0.344
0.708	3.4	2.21	0.656	3636	0.0225	1.01	0.424
1.415	3.7	3.125	0.839	4000	0.0225	1.00	0.476
2.830	4.2	4.425	1.036	4444	0.0225	1.00	0.555
7.080	4.8	6.705	1.54	4444	0.0225	1.01	0.702
14.15	5.7	9.77	1.725	5000	0.0225	1.01	0.755
28.30	7.6	15.25	1.984	5000	0.0225	1.03	0.882
56.60	11.3	25.48	2.255	5714	0.0225	1.03	0.945
141.50	22.5	56.40	2.50	6666	0.0225	0.98	0.975
283.00	41.0	105.40	2.59	6666	0.0225	1.02	1.01
283.00	41.0	110.00	2.68	8000	0.0225	0.98	0.955

PROCEDURE FOR DESIGN FOR OPEN CANAL



PREVENTATION OF SEEPAGE BY USING VARIOUS METHOD

Look at the history we preferred unlined canal but as limited resources we gives the priority to lined canal. The lining canal is the most economical than unlined canal. Lined canal reduce the seepage loss 80% than unlined canal. Remaining 20% losses is occurred due to crack in lined canal and others, i.e. remodified a design of lined canal. In modification we used plastic film like materials. This is help to prevention of seepage. Different lining material we used to reduce the seepage loss are soil cement lining, bitumen lining, clay lining, cow dunk lining, brick cement lining, etc. lining with brick masonry or cement mortar lining is most expensive but effective among them.

Additionally we can try to reduce the seepage loss by using the porous rail and drain. Also by using the 20/40 mm of aggregate.

3. CONCLUSION

India is an agricultural country, the relation of water and agricultural define terms as irrigation of canal. The purpose of irrigation to achieve an efficient and effective use of available water resources. The advance technique of providing water from dams or distributor to the agricultural land is the canal system. In that we have seen about the various prevention techniques of seepage losses as well as evaporation losses. Also we compare about the open channel as well as the close/underground channel.

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