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Investigation of Sediment Depth-Volume and Seepage (With Using Water Stops Materials) in Canals of Irrigation Network

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Abstracts: At the Paper All Deposit sediment at Canal bottom of (Amir Kabir Irrigation Network) has been evaluated perfectly. (With using Sharc Software).This irrigation network is located of South of Ahwaz city (45 kilometer length) and near the Karoon River, All data and information related to sediment water assumption all. Network Hydraulic characteristics, have been gathered all. One: Numerical model were applied. All sediment volume networks have been determinate; at length of research (from 10/2008 to 2009/10) and its value is equal: 4867 cubic material maximum rate of is 2949.67 cubic meters at: 2008/11.Maximum deposit Depth is at left hand of AMC-L channel, that is equal to 344mm and at Right hand of AMC-R channel is equal 315mm. and overall sediment Depth at AMC-I channel is equal to 158 mm. More Irrigation channels have a great role at decreasing water seepage through channel so seepage at living- channel is because of expansion of joint at bottom and side wall of channels. Evaporation is casual at channels, but with using different methods. It is possible the significant section of deep infiltration have been. Controlled and stopped. With considering importance of water at different region of agriculture. And high cost of water providing. Its need all cost be normal after using supplement of concrete; discharge were been measured and analyzed. At section number 1: with using of polyurethane mastic, toss of water is equal to 0-0.15; at section 2: with using repair materials rate of increased is about 0.007 at finally at section number 3: with filling material with delay time, is equal 0.03 more over.

Key word: Sediment, Irrigation & Drainage Network · Sharc software · Polyurethane mastic · Super repair material and concrete supplement

INTRODUCTION

Water conveying with Karoon River have all of catastrophic results all. consolingly it may case many problem and these negative parameter for irrigation network management should been considered and Investigated, scientifically, large and developed farm of Sugarcane and because of flow with high suspended loads Rate Irrigation at karoon river were reason of this study. This research is based on Amir Kabir Hydraulic behavior sad its final destination is evaluating of sediment Deposit behavior through main channel of Irrigation networks. Because of complicity of sedimentation behavior through channel, One Dimensional computer model (Sharc Software) has been used of effectively. [22, 2].

Eater as the most important materials at Human life have very important role at society. Because of population Explosion, need of more scientific agricultural methods, may cause deep struggles. Besides; more scientist try to find renew solutions for keeping natural environment, daily. With considering of water limit throughout our country (Iran) and necessity of Increasing water conveying efficiency ad resign better quality of water network and distributions and from other side, un acceptable and none- suitable conditions of Irrigation network (quality and quantity); Its need to study about Irrigation network and their operations. New scientific methods have been presented for water resource. Managements one of this methods, using cover through channels and main water conveying path with using concrete material, Asphalt and petrochemical productions, they would been provided to Increase efficiency of water distributions systems, nowadays, those methods were used so much, specially. Concrete lining have a great development of country. Because of some practical problems (doing constructions) or at operation ad maintains, will appeared, the come problems are such as break failure of gap at length of corers. For this study, Industrial & agricultural zone of Amir kabir company were chosen case study.

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Different section (serially) with 100 meter of left channel at east zone where been electoral the length of this channel is about 14) kilometer first of Initial discharge of inlet of channel is about 6.16 (cms) and gradually because of pump station will decreased and fixed at 3.3 m3/s normally. Chanel shape is trapezoidal, side slope is about 1:1.15 and designing velocity is about 0.69 m/s.

METHODS AND MATERIALS

Method of work and study assumption: Investigation of sediment & flow behavior to Amir Kabir has been based on sharc software, (which is because of sediment procedure of network which is very hand) this model is suitable weapon to calculate: sediment transport bar and it's equipped with essential parameter in order to aching the goals. For this purpose, all statistical information and maps data from field and classified data such as: Hydraulic material, water Demand rate, area under control of network and also Hydraulic information from karoon river (from farsit station) have been gathered completely, they all information has been entered to mathematical software, after building sediment numerical model and doing some orders some results such as graphs and numeric quantities has been extracted and finally see conclusion of suggestions have been presented (in order to control and decrease sediment rate at channels).

Introduction of Amir Kabir agricultural and industrial, Irrigation network. This from is located at south of Ahwaz city (with 45 kilometer length) and west of karoon river and is limited to Ahwaz- khorramshahr highway from east. It's longitude is from 45'12" to 48'30" al latitude is from 31°15" to 31°40" agricultural area is almost 12000 Hectares, which 1000 Hectares so sugarcane farm and 2000 Hectares so including; Roads, channel and factory at figure (1,2) It's location has been illustrated All land

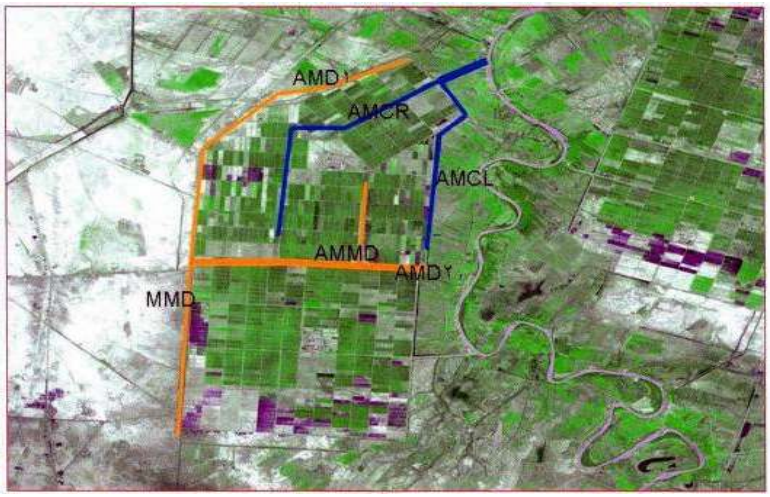

Fig. 1: local location

Fig. 2: planet Amir Kabir farm.

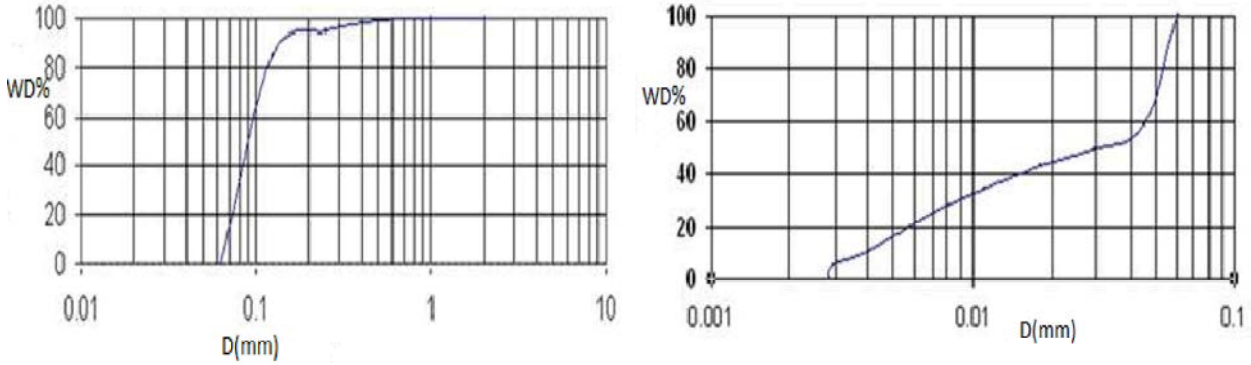

Fig. 3: Particles size curve (bed loads and Suspended load)

has been equally divided to regular seat as with 25 Hectares (100x250m) and this unit has 480 form with area equal to 25 Hectares). All divided section has been presented of figure (1). Water resource for this farm is Karoon River and Demand water has always been pumped from karoon and has been guide to conveying water channel. This convening channel was connected to mild slop canals (one right & one left channel). And finally sanat channel so connected to right channel.

Nowadays; different methods and program In order to channel corer were been used and totally, It should been said that almost of these methods are of below.

A never the lose this rate are maximized to 150 lit/m^2.day. This type of cover (Concrete living) for different topographic area, different weather conditions, are suitable but need a compact foundation and other facility. Operating these types of cover is possible with using machine. Totally, reason sat cover failure were been classified to two group.

Direct reasons 2- Indirect Reasons

In the other lards the baste causes of concrete of failure (cover) were been summarized as following:

- Geo- technique of soil (under cover)
- Break and failure because of material quality
- Break because of lack ability at constriction during.
- Failure because of environmental conditions.
- Failure because of operation & Installations

Supplement materials are known as blew:

- polyurethane mastic (comflex-lu)

Elastic filling junction materials are known as single substance.

- (S.P.A. plast-R)

Supplement methodic with high power at decreasing water per cement.

- (E.M. super repair)

Specific supplement; a kind of powder cement with very high cohesion and water quality.

Water Supply Characteristics (Karoon River): The length of this river from Ahwaz station to khorramshahr station is equal 190 kilometer. Average river slope near Amir Kabir Form is about 1.5 per thousand. Karoon river flow an normal situation is almost & tabled sediment rate is almost low fit length and depth has very rapid changing rate for example with is varying from 140 m to 750 m and length is changed from 6 to 20 m normally.

According to study, annual average discharge, from predate 1937~1987 observed data, at Farsit Hydrometric station, is equal to 680 m3/s and maximum rate is, form 1986/1, equal to 1965 cms. Sediment rate and behavior at river was divided to two sections (1) - bed load (2)- suspended load, all particles size curve of suspended load and Bed load have been presented as figure 3 (respectively). Bed form of this river is always fine size, Beside particles with size more than 1 mm is loss an rate, At flood period, sediment load is increasing largely and this rate is curve from middle area after large Dams or is come from erodible material and length of flood event so thus the rate of sediment from month 11 to 7 is so much and It's rate, from 7 to 11, is decreased gradually.

Introduction of Sharc Soft Ware: Sharc is one dimensional model that has been cased for Analysis of sediment Hydraulic behavior and also used for modifying and develop of channels this program is complete model of solving sediment problem at Irrigation networks this model is one Dimensional program while is more common to use to designing of settle basin, sediment extruder and

decreasing sediment rate. At channels some equation such as Ackers- white (1973); angalond henson (1972) has been utilities at this model (for estimation sediment) transport loads and loss equation is used for calculation concentrate and manning equation for discharge determination have been used this pattern include 6 modules as below (1)- finidy initial error at problem (2)- choosing and effect ion of encomic rate for first options (3)-Hydraulic simulation (4)- designing tools.(6) environmental analysis (7)- economic analysis [22].

DISCUSSION AND CONCLUSIONS

For building numerical model for considered network, all demand information such as: canal Dimension, regulating gate behavior, scads turnout, have entered to program and with using model guide, all network. Has been simulated scientifically. It's need to add. ARC and ALC near green square is known as secondary turnout of right and left channel.

Sediment Depth -Volume at Networks: All graphs are related to sediment depth of March, which has been driven like other graphs. (With respect to the other months) At these graphs, because of chain water demand at secondary intakes at difference lengths and different channels and also shape changing and it's elevation regulating gate, sediment rate and depth has been varying very much and behind the gate with more water level, because of decreasing flow velocity and relative settling, more semimetal (more depth) has been observed at channel with milder slope, because of decreasing effect of transport power; depth of sediment (and Its mixture with water) is more and more At similar graph of other months; the relative difference between sediment particle have been appear, (because of ching at concentration rate) with using all variation of different months; It could be possible that percentage of channel full has been predicted enormously. Maximum sediment yield at channel. AMC-L is about 344 mm and It's value for AMC-R is almost 315 and for AMC-I It has been measured about 158 mm thus; the risk of over flow phenomenon or decreasing of water conveying of total channel loads have been considered annually.

Concentration Rate for Total System (With Using Graph): At this graph; different concentration rate for inflow at main channel of Amir Kabir network; is with ppm (unit) Maximum concentration rate of intakes water is 1284 ppm and minimum rate is about 40 ppm. As it mentioned gap difference between inflows concentration were observed automatically. It need to add rain fall and river flood, may cause turbulent flow and bed sediment loads. Were increased normally and finally river concentration rate were been rise as jet, scientifically. Figure (5)-(8).

Seepage Rate: In order to study & Investigation of seepage one section of channel were been elected and 3 section (with 100 meter length as distance) were Chooser al before using supplement materials, discharge was measured as blow table (table 1).

At section (1), All junctions were been filled with polyurethane mastic and water measurement are as below.

As it is completely obvious; (table 4); the rate of seepage will decreased noticeably (about 68%): but at practical applying the fallowing problems will appeared.

(1)At deep break of junction, because of high cost, its need too junction will be full with fume materials, then mastic were been used. At small break; just up layer will been full with this material, it may be fenced with some difficulties. At situation of section (2) after using specific supplement seepage rate will decreased about 85%, but at section (3) just only 17% decreased rate will been seen.

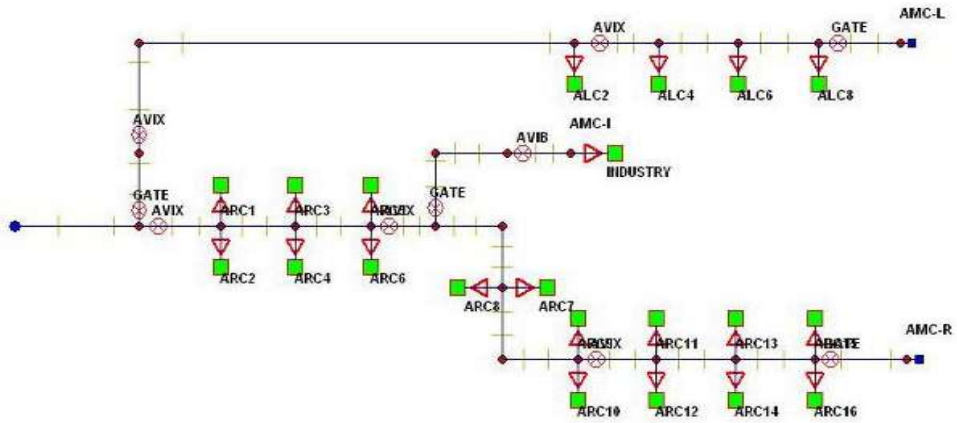

Fig. 4: Mathematical model of Amir Kabir network with using sharc software deposit

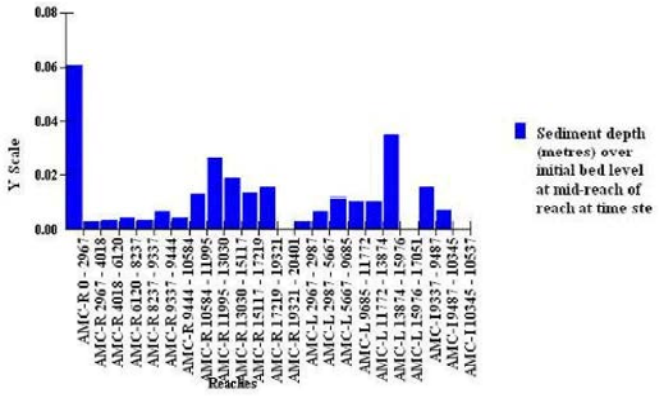

Fig. 5: Sediment depth of Amir Kabir irrigation network (at 2009/4)

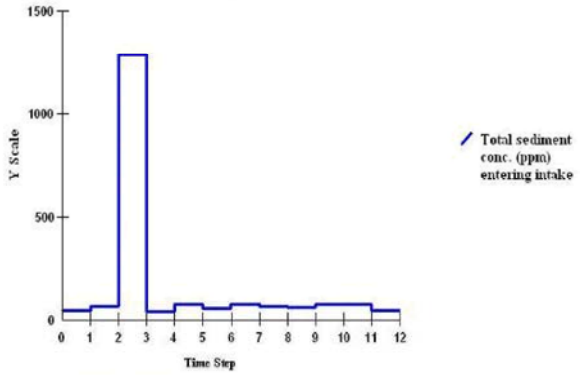

Fig. 6: Comparison of concentration of total system at study period

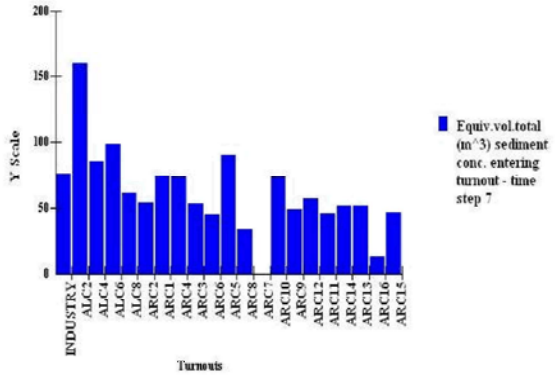

Fig. 7: Sediment volume of Amir Kabir irrigation network (at 2009/4)

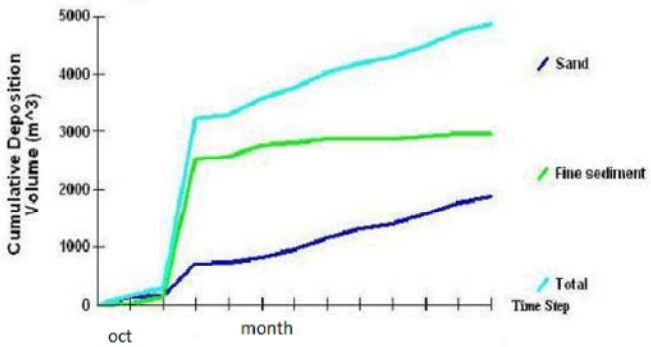

Fig. 8: input sediment volume of Amir Kabir irrigation network (at 2009/4)

Table 1: Discharges measurement at section (1) before water stopping operation

No	Inflow (cms)	Outflow (cms)	Initial less (100 kilometer)
1	6.13	5.84	0.047
2	5.17	5.37	0.058
3	6.1	5.85	0.041
4	4.5	4.3	0.044
5	5.6	5.34	0.047

Table 2: Discharge measurement at section (2) before using supplement materials

No	Inflow (cms)	Outflow (cms)	Initial less (100 kilometer)
1	5.92	5.6	0.54
2	5.7	5.48	0.038
3	5.72	5.45	0.047
4	5.22	4.95	0.052
5	5.64	5.37	0.047

DISCUSSION & CONCLUSIONS

Maximum deposit sediment depth of canal at AMC-L is about 42 mm and It's rate at AMC-R channel is about 61mm; and for AMC-I's rate were 20 mm.

With decreasing discharge at 2008/10, 11, 12 are 7.188, 1.966 and 0.97 m3/s respectively, concentration rise at recent months were 47, 67, 1284 mg per liter. Concentration rate and sediment trapped volume have been increasing parallel and it shows direct relation between sediment concentration and trapped volume. In conclusion, leakage and salt washing process had been done at winter and considered sediment rate have been accompany with water.

After investigation of results and its comparison at this network angalund- Hanson equation (1972) had better results than Ackers & white (1973).It's concluded that, super repair materials from both side from cost and salig have better results and from fusing materials mastic have first degree, but it's necessary to study along tom effect of using this materials to.

According to the studies, annual seepage at sugar cube network of Amir kabir, are about 4252207 m3 and with using water stop materials, the rate of Initial less are determined as below.

Table (7) and annual water demand of sugar about 30000 m3). The Irrigated area and production (at normal range 100 ton/1 hectare) and 10% from may cause pure sugar. The rate of annual selling is as table (8): and cost of 1 kilogram sugar is about (7000 rails ~ 0.71 $).

Its need to mention that, cost has been evaluated from selling production of sugar. Besides; with considering supplement & Injected cost of one year, but producing and quality time length have been taken for many tears. If it is assumed, fifteen years, similar production will appeared, the cost of sugar are determined as below.

About cost of fixing junctions, it should be esouid that; firstly total cost of buying materials has been considered, secondly; cost of human-water. Have grate in flounce or determination of cost total (10) shows test results.

Table 3: Discharge measurement at section (3) before using supplement materials

No	Inflow (cms)	Outflow (cms)	Initial less (100 kilometer)
1	5.6	5.38	0.039
2	5.2	4.95	0.048
3	5.9	5.7	0.034
4	5.2	4.98	0.042
5	5.47	5.25	0.041

Table 4: Water (volume) measurements after using supplement materials at section (1)

No	Inflow (cms)	Outflow (cms)	Initial less (100 kilometer)
1	5.8	5.69	0.019
2	6.1	6.02	0.013
3	5.2	5.1	0.019
4	5.1	5.04	0.012
5	5.55	5.46	0.015

Table 5: Water (volume) measurements after using supplement materials at section (2)

No	Inflow (cms)	Outflow (cms)	Initial less (100 kilometer)
1	5.4	5.34	0.011
2	6	5.97	0.005
3	4.93	4.9	0.006
4	5.4	5.36	0.007
5	5.43	5.39	0.007

Table 6: Water (volume) measurements after using supplement materials at section (3)

No	Inflow (cms)	Outflow (cms)	Initial less (100 kilometer)
1	5.6	5.45	0.027
2	4.9	4.7	0.041
3	6	5.94	0.026
4	5.5	5.36	0.025
5	5.52	5.36	0.03

Table 7: percentage preventing with using water pre of materials with casein

No	Type materials	Seepage control (%)	Volume of perception seepage at channel
1	Mastic	68	2891500
2	S.P.R. plaster	85	3614376
3	Super repair	17	722875

Table 8: study of production & sail After using supplement materials

No	Type materials	Irrigated area (Hectares)	Production (tones)	Sugar (tones)	Sailing (rails')
1	Mastic	96.4	9637	963.83	674683333
2	S.P.R. plaster	120.48	12048	1204.8	8433544000
3	Super repair	24.1	2409.6	240.96	1686708777

Table 9: benefit at Increasing rate of production with using different materials

No	Type materials	Annual production	Annual selling	10 year selling with fix flotation
1	Mastic	963.83	6.75	67.5
2	S.P.R. plaster	1204.8	8.43	84.3
3	Super repair	240.96	106.9	1609

Table 10: cost of junction fixing with chosen materials

No	Type materials	Cost of material (for one meter of canal)	Cost of ways (for one meter of canal)	Total cost for 1 meter	Total cost for Amir kabir network
1	Mastic	4000	2000	6000	2.9
2	S.P.R. plaster	3000	2000	3000	2.42
3	Super repair	1000	2000	3000	1.48

The comparison between on year sugar production at network of Amir kabir are as table (11).

Table (11): comparison of soling sugar against water stop cost

No	Type materials	Soiling production	Total volume cost of channel repeating	Ratio of soil sugar to water of cost
1	Mastic	6.75	2.9	2.33
2	S.P.R. plaster	8.43	2.42	3.48
3	Super repair	1.69	1.45	1.17

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