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Dumpy level survey for Irrigation bund in Batlakunta Village, Telangana state

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Abstract

Water is the main component for the agriculture. So to store and use the water effectively we need to develop good irrigation facilities. An irrigation bund is a main irrigation component in tank irrigation system. The present paper focus on the restoration of the irrigation bund near Batlakunta village, Rangareddy District, Telangana state. This bund is built in the eighteenth century accordingly with that requirement and population. Now the population is in the village is nearly 4000 and mainly depend on irrigation. Wheat , corn, rice etc. are cultivated under the bund. But due to improper maintenance, natural calamities and environmental factors the efficiency of the bund is decreased. Now there is a need to increase the efficiency of tank and bund. Hence this paper focuses on the finding out the amount of volume which is excavated in the bund area to increase the storing capacity by using dumpy level survey. It is achieved by comparing levels taken at the time of construction known as pre levels and levels taken now for the restoration is known as post levels.

Keywords: Irrigation bund, dumpy level, pre and post levels,surveying

1. INTRODUCTION

Water is the main component for the agriculture. So to store and use the water effectively we need to develop good irrigation facilities. The Telangana state people depend on mainly tank/bund irrigation due to uneven rainfall pattern and topography since olden days. Bunds are the most common techniques used in agriculture to collect surface run-off, increase water infiltration and prevent soil erosion. Due to the urban developmental activities minor tanks/bunds are gradually becoming inefficient in providing an assured supply of irrigation water because of changes occurring in the size and shape of the tank bed. Water bodies become shallower as a consequence of sedimentation. This result in drought in every facet of human life. There is a need to construct or to increase the restoring capacity of tank/bunds to meet agricultural needs.

Fig.1Batlakunta Lake

In the present study Batlakunta irrigation bund(Fig.1) is selected for planning to enhance the capacity of bund though dumpy level survey. The bund comes under Batlakunta village, Doma mandal, Rangareddyl district of Telangana state. The full tank level (FTL) of +1000m. The earthen bund has 3m long topwidth and 3m height above the lowest nala bed level. The proposed earthen bund is of zonal section and consist of an impervious core of slope ½:1 with casing shoulder of slope 2:1 upstream and 1.5:1 downstrem. This bund is built in the eighteenth century accordingly with that requirement and population. Now the population is in the village is nearly 4000 and mainly depend on irrigation. Wheat , corn, rice etc. are cultivated under the bund. But due to improper maintenance, natural calamities and environmental factors the efficiency of the bund is decreased. Now there is a need to increase the efficiency of tank and bund. hence this paper focus on the finding out the amount of volume which is excavated in the bund area to increase the storing capacity by using dumpy level survey.

2. METHODOLOGY

To collect the field data preliminary survey is conducted at project location. The survey help in design the shape of bund, laying foundations, making surplessing arrangements, cost estimation etc[1]. In the present paper a detailed dumpy level survey using collimation method is conducted at the bund to estimate area and volume. For the benchmarks are selected at every 100m and connected to the GTS bench mark station. Bench marks are located on flanks of the bund, water spread area and along the irrigation channals for carrying out the levels. Longitudinal section along the centre line of bund is taken for levels at every 10m interval and extended upto 160m beyond the top of dam[2],[3],[4]. In the gorge portion levels are taken at closer intervals.

Block levels are taken up at 5m interval extending upto 30m beyond and above the probable top of dam and about 160m on either side of the proposed centre line of dam. It covers the area sufficiently large to include bund and other appurtenant works. The block levels of the draft channel from the waste weir upto the confluence with the natural stream is taken at every 15m intervals and to cover the desired width of the draft channel plus 30m on either side. For designing of energy dissipating arrangements, a longitudinal section of about 500m along the stream with levels at every 15m intervals are taken. The cross section is taken from the bottom of the stream to the maximum water level. To compute storage capacity of the reservoir by drawing contour lines at suitable intervals and to assess the area of lands coming under submersion the block levels of the water spread area are taken at 15m intervals extending 30m beyond the probable top level of bund contour.

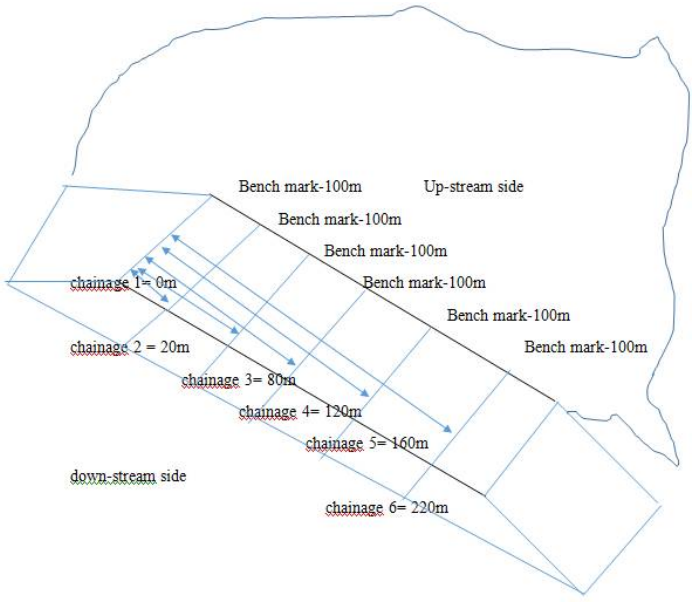

Fig.2 Layout Of Chainage Of Bund

The left side of the of the bund has downstream and the Right Side of the bund has upstream. The water will store in the upstream of the bund. The cross-sections derived from the interval defined at 'Stations' will be considered for quantity calculations. .In addition to the cross-sections derived from the interval defined at 'Stations', intermediate station and stations at surface break points can also be included using the radio button Extra Stations. All the intermediate stations defined on the tab Stations will also be considered for quantity calculation [5],[6].

Stations at surface break points: For every change in the road surface description and alignment elements (horizontal and vertical) surface breakpoints are added. Stations at these surface break points can also be considered for quantity calculation to increase the accuracy of calculations.

The chainages are taken for the bund is in internal of 1,2,3,4,5,6

The chain-age1 indicates the starting point of the bund which we taken the first point in the levelling. The chainage 0 is taken as 20m. the length of the chain is 20m.

The chainage 2 indicates the distance from the starting point of the bund is 2×20=40m

The chainage 4 indicates the distance from the starting point of the bund is 4×20=80m

The chainage 6 indicates the distance from the starting point of the bund is 6×20=120m

The chainage 8 indicates the distance from the starting point of the bund is 8×20=160m

The chainage 11 indicates the distance from the starting point of the bund is 11×20=220m

3. RESULTS

the existing levels of the bund are collected from the telangana irrigation department. The preposed levels are measured using dumpylevel. The difference between the existing levels and preposed levels are calculated. The average of difference in levels are converted into area. The obtained values for each chainage is given in below table.

Table 3.1 At chain age 0 =0.0m

Distance level in m	Existing levels in m	Proposed levels in m	Difference levels in m	Mean diffrencein m	Area in m^2
-3	99.80	99.80	0.00	0.00	0.00
0.00	100.55	101.80	1.25	0.65	1.88
1.5	100.55	101.80	1.25	1.25	1.88
3.00	100.10	101.80	1.70	1.48	2.21
5.00	99.40	100.47	1.07	1.38	2.77
7.00	99.13	99.13	0.00	0.53	1.07

Area=9.80sq.m

Table 3.2 At chain age 2 =20.0m

Distance level in m	Existing levels in m	Proposed levels in m	Difference levels in m	Mean diffrencein m	Area in m^2
-3.0	99.80	99.80	0.00	0.00	0.00
0.00	100.65	101.80	1.15	0.57	1.72
1.40	100.65	101.80	1.15	1.15	1.61
3.00	100.05	101.80	1.75	1.45	2.32
5.00	99.20	100.47	1.27	1.51	3.02
7.00	99.13	99.13	0.00	0.63	1.27

Area=9.94sq.m

Table 3.3 At chain age 4 =80.0m

Distance level in m	Existing levels in m	Proposed levels in m	Difference levels in m	Mean diffrencein m	Area in m^2
-3.0	99.80	99.80	0.00	0.00	0.00
0.00	100.70	101.80	1.10	0.55	1.65
1.40	100.70	101.80	1.10	1.10	1.54
3.00	100.05	101.80	1.75	1.43	2.28
5.50	98.80	100.13	1.33	1.54	3.85
8.00	98.47	98.47	0.00	0.67	1.67

Area=10.99sq.m

Table 3.4 At chain age6 =120.0m

Distance level in m	Existing levels in m	Proposed levels in m	Difference levels in m	Mean diffrencein m	Area in m^2
-3.0	99.80	99.80	0.00	0.00	0.00
0.00	100.67	101.80	1.13	0.56	1.69
1.20	100.67	101.80	1.13	1.13	1.36

3.00	100.05	101.80	1.75	1.44	2.59
5.50	98.80	100.13	1.33	1.54	3.85
7.50	98.80	98.80	0.00	0.67	1.33

Area=10.89sq.m

Table 3.5 At chain age8 =160.0m

Distance level in m	Existing levels in m	Proposed levels in m	Difference levels in m	Mean diffrencein m	Area in m^2
-3.00	99.80	99.80	0.00	0.00	0.00
0.00	100.85	100.80	0.95	0.48	1.43
1.50	100.85	100.80	0.95	0.95	1.43
3.00	100.10	100.80	1.70	1.33	1.99
5.50	98.70	100.13	1.43	1.57	3.92
8.00	98.47	98.47	0.00	0.72	1.79

Area=10.55sq.m

Table 3.6 At chain age11 =220.0m

Distance level in m	Existing levels in m	Proposed levels in m	Difference levels in m	Mean diffrencein m	Area in m^2
-2.50	100.13	100.13	0.00	0.00	0.00
0.00	100.80	101.80	1.00	0.50	1.25
1.40	100.80	101.80	1.00	1.00	1.40
3.00	100.10	101.80	1.70	1.35	2.16
6.00	98.60	99.80	1.20	1.45	4.35
8.00	98.47	98.47	0.00	0.60	1.20

Area=10.36sq.m

4. CONCLUSIONS:

By using dumpy level instrument the levels are taken. Graphs are prepared for distances to the reduced levels to find the area of the bund by different chainages (Fig.3). In the graph the point 'a' indicates the starting point of the bund which is in upstream side. b-c-d its indicates the length of bund is to increate 39 m. d-e-f its indicates the downstream side of the tank. a-b the bund is to raise 1m. These are the proposed levels for increasing the restoring capacity of tank(7). By using the measured levels a contour map is generated (Fig.4) and the boundaries of the bunds are fixed. The measured levels, chainages and points are used in the construction of the bund.

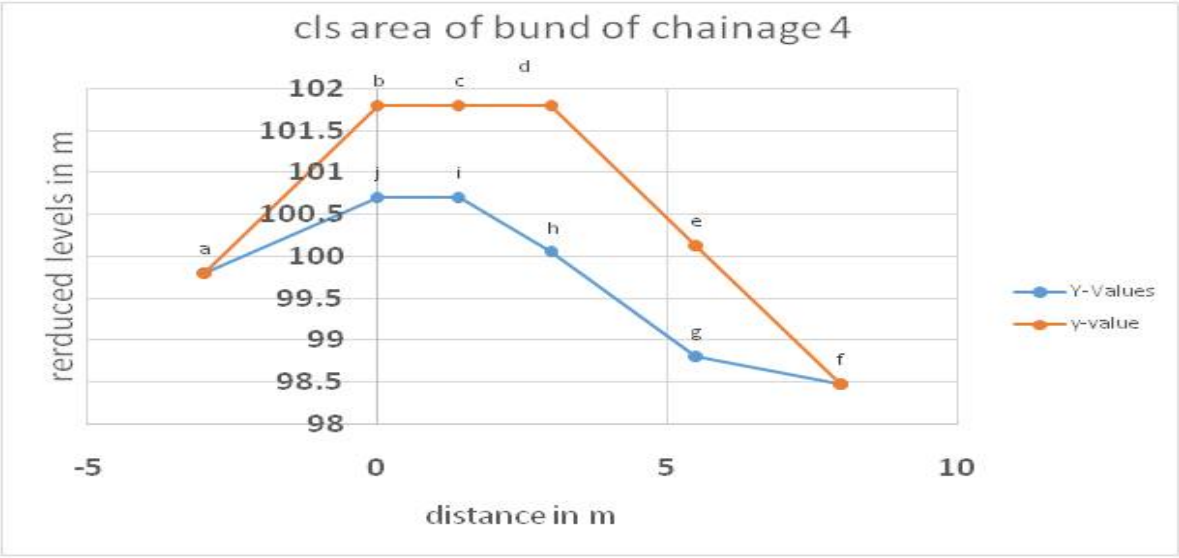

Fig.3 graph for chainage 4

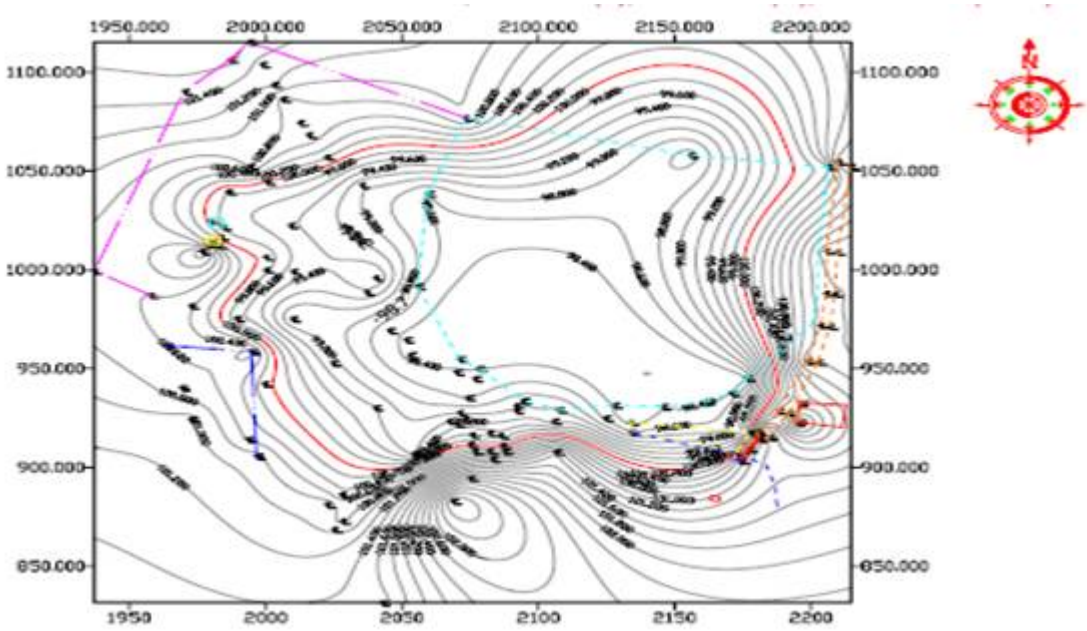

Fig.4 contour map of bund

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