Inter Linking of Rivers from Cauvery to Agniyar using Construction Techniques

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ABSTRACT *This Project aims to give a detail about the Inter linking of rivers from Cauvery to Agniyar using construction techniques .In a canal alignment from Cauvery to Agniyar the total length of canal is 94.150 Km. This thesis analysis only taken for 16 km from Ls 78.050 to 94.150 km. In this canal Alignment from L.S 84.350 to 90.350 Km near Pudukottai District. The deep of cutting more than 30M to overcoming the complication. The deep cutting portion in the proposed link canal alignment by various methods is choosen and compared Open excavation, Cut and cover and Tunneling.*

DETAILS OF INTER LINKING OF RIVERS

1.1 GENERAL

Water is a fundamental part of our lives. Existence of living things is possible in the world only because of the presence of water. Although three fourth of the Earth's surface is covered by water, the potable and immediately usable water is 3% of the total available water. In fact, the quantum of potable water reachable by human beings is very limited. It is less than 1% of the total water present in the universe. People need water for several purposes, such as domestic agriculture, industrial, power generation, recreation etc., India is blessed with a reasonable quantum of water. Water resources potential of the country is 690 Km3 surface water and 432 km3 of ground water. Unfortunately, it is unproportionately distributed with respect to space as well as in time. The geographical area of Tamil Nadu is 1, 30,058 km2 in which 6,24,05,679 people are living as per 2001 Census. The Tamil Nadu state receives 950 mm of rainfall per year on an average. The worse is that the spatial and temporal variations of rainfall across the state are very high. Consequently, high floods and severe droughts are very common and frequently occurring in several parts of the state. As much as 60% to 65% of the annual rainfall is due to Northeast monsoon during a short period of nearly 2 to 3 months (October – December). Another 20 to 25% of annual rainfall is due to southwest monsoon (June – August).

Therefore, the need for harnessing the water in thee most scientific and efficient manner and transferring of surplus and flood water to areas in need is indispensable.

1.2 DESCRIPTION OF THE PROJECT AREA
1.2.1 LOCATION
A) KATTALAI BARRAGE

The location of the proposed Kattalai barrage is at about 138 Km downstream of the Mettur dam on the river Cauvery. The latitude and longitude of the Kattalai barrage are 10 58' N and 78 14' E respectively. The drainage area of the Cauvery basin up to the proposed barrage site is 63694 km2. The barrage is proposed to be constructed 250 m downstream of the existing Kattalai Bed Regulator, which will be abandoned when the proposed barrage is constructed.

The barrage is accessible by road from Chennai, Coimbatore and Tirchirappalli, the distances being approximately 375 km, 175 km and 60 km respectively. Mayanur railway station located on Tirchirappalli – Erode Brode Gauge line is just adjoining the head works

b) CANAL HEAD REGULATOR

Taking in to account the physical and hydrological features of the existing South bank canal, the Kattalai high level canal Krishnarajapuram channel and the New Kattalai high level canal, it was certain that none of them could be used for the proposed link canal without extensive renovation, Hence, it is proposed to have an independent off-take for the proposed link canal at a location just upstream of the existing New Kattalai high level canal on the right bank of the river.

It has been proposed to provide a Head regulator in the right bank of river Cauvery at 350 m upstream side of the proposed barrage. The head regulator would have 4 no. of vents of size 10.75 m x 1.80 m to carry the proposed designed discharge of 180.30 cumecs. The F.S.L. at off-take point is 100.75 m and canal bed level at off-take point is 95.75 m. The Front and Rear M.F.L. are 103.30 m and 102.00 m respectively. An operation platform is provided with its top at 104.30 m.

C) THE LINK CANAL

The Cauvery (Kattalai) – Koraiyar-Agniyar –Link canal is proposed as a contour canal running for a length of 94.150 Km from Kattalai Barrage to Agniyar,

The canal is aligned through Krishnarayapuram, Kalithalaitaluks of Karur district; Srirangam, ThiruchirapalliTaluks of Thiruchirapalli District; Kulathur, Pudukottai.

1.3 CAUVERY(KATTLAI)- AGNIYAR, LINK PROJECT
The project comprises of the following components:
A barrage at Kattalai across the Cauvery River with pond level 101.20m. A head regulator on the flank of the extreme right bank with a design discharge capacity of 180.30 Cumecs.

It is proposed to divert a quantity of 180.30 cumecs from the Kattalai barrage through the proposed link canal. It is envisaged that this link canal will provide en route irrigation to a culativable command area of 36475.35 Hectare and also act as a flood carrier when Mettur Reservoir surpluses (The surplus of Mettur is given in Table 1.1) and when high floods occur in river Koraiyar during the South – West monsoon, accordingly transferring the surplus and flood water from the surplus basins to the deficit rain fed basin of Pudukottai thus protecting the Thiruchirapalli , Srirangam towns and Cauvery Delta areas from floods.

1.4 PROJECT DETAILS

In a canal alignment from Cauvery to Agniyar the total length of canal is 94.150 Km . This thesis analysis only taken for 16 km from Ls 78.050 to 94.150 km. In this canal

Alignment from L.S 84.350 to 90.350 Km near Pudukottai District.The deep of cutting more than 30 M to overcoming the complication. The deep cutting portion in the proposed link canal alignment by various methods are chosen and compared Open excavation, Cut and cover and Tunneling

LITERATURE REVIEW

JooHyoung (Jay) Lee, Bob G. McCullouch, August 2009 , in this paper Review Construction Techniques for, a schedule is a listing of a project's milestones, activities, and deliverables, usually with intended start and finish dates.

Literature survey of underground construction methods by U.S Army crop of Engineers Useful references on underground construction technology were identified from journals and government reports.

SCOPE AND OBJECTIVES

· To study about the Project.
· To study about the various activities.
· Identification of functioned responsibilities to ensure that all activities are accounted for repulses of personnel turn over .
· Minimizing the need for continuous improvement
· Identification of cost Analysis
· Identification of methodology for tread of analysis
· Early identification of problems so that corrective action may follow improved estimating capacity for future plan knowing when ejectives cannot be met (or) will be exceeded.

OBJECTIVES

1. Design the canal section
2. Land Acquisition survey numbers are noted and calculate the Total area.
3. Longitudinal section and cross section are draw in Autocad.
4. Find out the quantity of Earthwork Excavation
5. Find out the number cross masonry work and cross drainage work.
6. Detailed estimate and abstract estimate are prepared.
7. Compared the total amount of Open excavation, Cut and cover and Tunneling.

EXPERIMENTAL METHOD
DESCRIPTION CANAL SECTION

A uniform bed slope of 1 in 13000 is adopted for the entire alignment. The canal is designed as a trapezoidal section with bottom corners rounded and is to be lined. The velocity of water in the link canal is 1.173 m/s respectively. The full supply depth is 5 m at the head. Sections of the canal at the head are 20.4 m x 5.0 m and indeep cutting portions the full supply depth is taken as 6 m and the canal section at those points is 17.8 m x 6.0 m. The discharge of the canal is designed to be 180.30 cumecs. A free board of 1.0 m is provided throughout the length of the canal.

LINING

100 mm thick CC (1:2:4) lining is proposed for the both bed and sites throughout the length of the canal

CANAL STRUCTURES

A regulator across Agniyar River is proposed at L.S 93.650 km. The link canal is aligned as a contour canal and it crosses a number of major and minor rivers / streams enroute. It crosses a number of roads as it passes through fairly developed and densely populated areas. The type of cross drainage work is decided based upon the physical features of the stream such as its catchment area and bed level with reference to the bed and full supply levels of the link canal at crossing.

Based on field survey, the locations of the cross drainage works and cross masonry works have been identified. Syphon aqueducts are proposed across major rivers / streams and

under tunnels across small drains. Super passage has been provided where the drains are to be taken over the canal.

CROSS DRAINAGE WORKS
SYPHON AQUEDUCT

Syphon Aqueducts are proposed at the crossings of the major streams where the bed level of the canal is below the high flood level of the drain. There are 24 Syphon Aqueducts in total for the 16 KM.

SUPER PASSAGES

Super passages are proposed at the crossings of the major streams where the FSL of the canal is sufficiently below the bottom of the drain. No head loss has been assumed at each Super passage. There are 15 Super passages in total for the 16 KM.

CROSS MASONRY WORKS
Bridges

The link canal crosses a few district roads and number of village roads at various points. In order to facilitate free flow of traffic on these roads, four/ double lane bridges and single lane bridges are proposed depending upon the type and importance of the road. Double lane road bridges are provided on interstate and district roads and single lane road bridges are provided on all existing village roads crossing the canal alignment.

A total of 17road bridges have been proposed across the link canal, the longitudinal section of the link canal. No head loss is provided for these bridges, since they are considered as single span bridges.

LAND ACQUISITION

The lands required for forming link canal and its cross masonries have been assessed, village and survey No. wise. The lands required have been classified into patta and poromboke lands. The guidance value for the above patta lands has been obtained from the Sub –registrar office of the respective villages. A total of 198.599 hectares of land are to be acquired for the Link Canal. Out of the total land to be acquired, 169.668 ha is patta land and 28.931ha isporomboke land. The link canal does not cross any forest areas enroute. Suitable provision towards the cost of afforestation is made in the project for the link project. In addition to this Spoil banks of the link canal are proposed to be used for social forestry.

EARTH WORK

It is estimated that, a quantum of 38 Lakhs m^3 of earth is to be excavated for forming the canal section. It is considered that a part of earth so excavated could be used economically for forming embankments and other filling works.

The longitudinal section of the canal is plotted, adopting a horizontal scale of 1 cm = 50 m and vertical scale of 1 cm = 1 m and cross section of the canal is plotted, adopting both horizontal and vertical scale of 1 cm = 2 m.

Table 1 Salient features of the link canal at deep cutting portion

Link Canal At Head	
Type of Canal	Lined (Trapezoidal with rounded corners)
Design Discharge	6000 Cusecs
Bed width	17.8 m
Full supply depth	6.0 m
Velocity	1.173 m/s
Bed slope	1 in 13000
Side slope	0.25 H to IV
Manning's n	0.018

COST OF LAND ACQUISITION

ABSTRACT

SL. NO	DESCRIPTION	SUB TOTAL	TOTAL in Lakhs
1	Cost of land	851.34	
2	Add for variation during field survey for subdivision and year marking by Revenue Dept @ 10%	85.13	
3	Add 15% extra for escalation in guideline value compensation for open and bore wells and structure if any etc.	127.70	
		1064.17	1064.17
4	Solatium charges at 30%	319.251	
5	Establishment charges related to Revenue Dept for subdivision and year marking etc @ 6.25%	66.511	
6	Totwards fixing demarcation stones at the boundaries of link canal at 1%	10.642	
7	Provision for legal charges at 5%	53.209	
8	Provision towards interest charges at 10% for 5 years on 25% of cost of landed properties 5 X 0.10 X 0.25 X 680.30	133.021	
		582.63	582.63
	Total		1646.80

CROSS MASONRY WORKS

ABSTRACT

SL. No.	Description	Road / Railway Bridges	Amount in lakhs
1	Suriyur To Chettippatty @ LS. 78.453 Km.	Carriage width 5.25m	338
2	Chettyppatty To Mettuppatty @ LS. 79.615Km.	Carriage width 5.25m	338
3	Chettippatty To Uravikkadu @ LS. 80.740 Km.	Carriage width 5.25m	338
4	Chettyppatty To Puliyur @ LS. 81.170 Km.	Carriage width 5.25m	338
5	Chettyppatty To Puliyur @ LS.81.310 Km.	Carriage width 5.25m	338
6	Kayamppatty To Kalarippatty @ LS. 82.125 Km.	Carriage width 5.25m	338
7	Kayampatty To Puliyur @ LS. 83.0755 Km.	Carriage width 5.25m	338
8	Puliyur To Kannankudy @ LS. 83.575 Km.	Carriage width 5.25m	338
9	Keeranur To Kunnandarkoil @ LS. 84.625 Km.	Carriage width 5.25m	338
10	Puliyur To Veerapatty @ LS. 85.310 Km.	Carriage width 5.25m	338
11	Puliyur To Nallathangalpatty @ LS. 87.375 Km.	Carriage width 5.25m	338
12	Pallavankulam cart track @ LS. 87.935 Km.	Carriage width 5.25m	338
13	Themanipatty To Kovilpatty @ LS. 88.485 Km.	Carriage width 5.25m	338
14	Kovilpatty To Kunnandarkoil @ LS. 90.492 Km.	Carriage width 5.25m	338
15	Keeranur To Adhanakottai @ LS. 91.15 Km.	Carriage width 5.25m	338
16	Mangathevanpatty To Kunnandarkoil @ LS. 91.685 Km.	Carriage width 5.25m	338
17	Mangathevanppatty To Thirupur @ LS. 92.300 Km.	Carriage width 5.25m	338
		TOTAL	5746

CONDENSED ABSTRACT FOR OPEN EXCAVATION

Sl. No	Description	Total Amount in Lakhs
1	LAND	1646.80
2	CROSS DRAINAGE WORK	
A	REGULATOR	4179.00
B	CROSS DRAINAGE WORK	10514.50
		14693.50
3	BRIDGES	7694.50
4	EARTH WORK AND LINNING	19868.00
TOTAL AMOUNT FOR OPEN EXCAVATION		43902.80

CONDENSED ABSTRACT FOR CUT AND COVER

Sl. No	Description	Total Amount in Lakhs
1	LAND	1646.80
2	REGULATOR	4179.00
3	CUT AND COVER	178933.00
TOTAL AMOUNT FOR CUT AND COVER		184758.80

CONDENSED ABSTRACT FOR TUNNELING

Sl. No	Description	Total Amount in Lakhs
A	REGULATOR	4179.00

| B | TUN-NELING | 240000.00 | |
| TOTAL AMOUNT FOR TUNNELING | | 244179.00 | |

CONCLUSION

Modern Techniques are used in the construction field,it gives long term benefits. In the open Excavation the cost is low and the depth of cutting is 30 m it is very difficult to exavate and its maintance are also very difficult.cut and cover also same as open excavation.So Tunneling Technique is very efficient for the deep cutting.

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REFERENCE 1.PWD Codes | 2.The land acquisition act 1894 | 3.U.S Army crop of Engineers | 4.Times of India News Publications. |