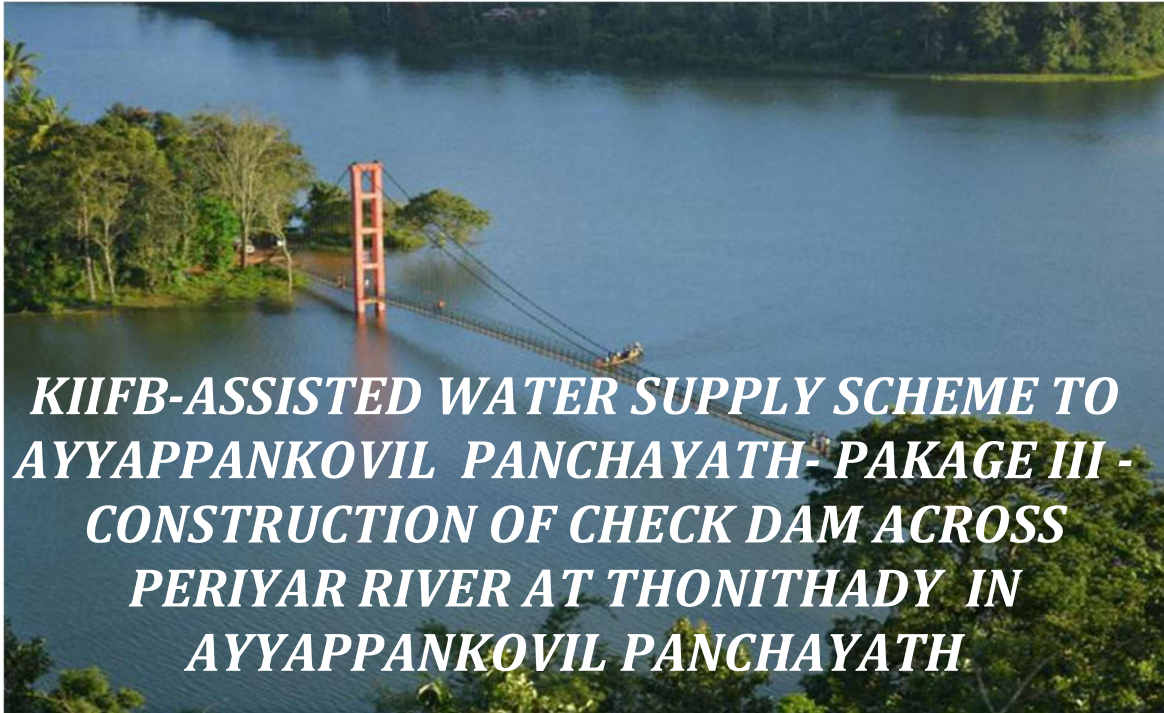




KERALA WATER AUTHORITY



DETAILED ENGINEERING REPORT

PROJECT DIVISION, KATTAPPANA , P.H. CIRCLE, MOOVATTUPUZHA

MAY – 2022-2023

KIIFB-ASSISTED WATER SUPPLY SCHEME TO AYYAPPANKOVIL PANCHAYATH-PACKAGE III - CONSTRUCTION OF CHECK DAM ACROSS PERIYAR RIVER AT THONITHADY IN AYYAPPANKOVIL PANCHAYATH

1.0 INTRODUCTION

“Water Supply Scheme to Ayyappankovil panchayath in Idukki district” envisage the extension of distribution system to the uncovered areas of Ayyappankovil panchayath. The proposed extension is from the ongoing water supply scheme “CWSS to Ayyappankovil and Kattappana villages” intended to provide water supply to entire area of Ayyappankovil, Kattappana and Kanchiyar panchayaths. Most of the components of the scheme have completed except providing electromechanical works such as providing pumpsets, transformers and allied works for which sanction was accorded in SLSC-2016 but could not take up due to paucity of fund. Even though the works of laying common gravity main for Kanchiyar and Kattappana panchayaths, Gravity main and pumping main to provide water supply to Kattappana panchayath were arranged under ARP; the same could only be partly completed due to paucity of funds, **insufficient intake water** and the balance work to be rearranged.

Hence the present project proposal (**Part I**) is mainly intended for solving the drinking water problems of the uncovered areas of Ayyappankovil panchayath ,especially the severely affected elevated areas coming under Anavilasom village with adequate drinking water facility by extension of distribution system and thus it is possible to cover entire 13 wards of the panchayath with protected water supply. For achieving this great impetus in the water supply, the remaining components of “CWSS to Ayyappankovil and Kattappana villages” have to be completed.

Certain modifications in some components of “CWSS to Ayyappankovil and Kattappana” are required for addressing the technical issues faced during the execution of various components which were not envisaged during the preparation of the project. The various technical as well as geographical barriers are overcame by suitable incorporation of additional components and redesign of existing components to make the project economically feasible and technically viable. The raw water for treatment is collected from Periyar river using the well situated Thonithady and pumped to the water treatment plant at the rate of 81 liters per second (lps). After treatment water is being fed to various service reservoirs to ensure supply of drinking water to the entire population of project area which has been **facing acute shortage of potable water during summer**.

2.0 NEED FOR CHECK DAM

As mentioned above the project area comprising Kanchiyar, Ayyappancovil and kattappana faces acute shortage of drinking water supply since there is no sustainable source of water in this area. The only reliable water source that can cater to the demand of the project area is the Periyar river, which also has a lean period during the months from February to May. From the data obtained from Dam Safety Department regarding the inflow of water it is understood that on certain days the **inflow almost touches zero**. Owing to the above fact, there arises a need to make provisions which will ensure that the minimum requirement of 7 million liters of water a day is available for pumping from the well cum pump house at Thonithady.

The existing intake well has its base at a level of 726.868 m and the leading channel to the well has its top level at 730.8 m. The rocky surface at the proposed location of check dam, which is visible throughout from the period marking the mid-summer to the starting of monsoon have its top level ranging below 729.99 m. So, in order to provide pumping at a rate of 81 lps there should be sufficient water available in the intake well and to ensure this, a water column of at least 1 m have to be maintained above the top level of the leading channel (i.e., 731.8 m). This is possible only by constructing a check dam having its crest level at 731.8m downstream the well cum pump house.

3.0 SALIENT FEATURES OF THE PROPOSED CHECK DAM

The 154 m long structure with its crest level at 731.8 m is being provided with 26 sluices of height 0.8 m and width 1.5 m, arranged at equal intervals of 3.65 m throughout its length. In addition to this, three full height sluices of 1.375 m height and 1.5 m width has been proposed at the middle and extreme end portions on either sides. Sluice shutters provided in the check dam will be completely opened except during the summer season. So when the reservoir starts approaching to its FRL, water can spread to the upstream portion of the check dam through the sluices provided, also, when the reservoir reaches the FRL water can spread over the check dam uninterruptedly. In short, the check dam will not offer any interruptions to the spreading of water in the Idukki reservoir all through the year.

4.0 THE SCOPE OF PROJECT PROPOSED CHECK DAM

A check dam of height 1.8 m and 154 m length is proposed at 300 m from the downstream side of the Intake well for creating an impounded reservoir for storage of water near source. Considering, the climatic variations, the above check dam is necessary for sustainability of the source. There is considerable demand for the check dam from public as well as peoples representatives and is highly essential for improving the sustainability of the source. This proposal was not included in the earlier proposal.

5.0 DESIGN CONSIDERATIONS

The weir is proposed to be constructed at a location approximately 300m the d/s of the existing intake well at Thonithadi near Upputhara for creating an impoundment for meeting the peak-summer requirements. The width of river at this location is about 150m. The location is about 500m off to the north along a branch road from ElapparaKattappana road. This branch road is passing along the right bank of the river and the bank is at a height of about 6m at this point and is dropping steeply. The left bank is at a lower level and sloping gradually. This stretch of Periyar is on the d/s of the Mullapperiyar dam discharging to Idukki reservoir.

As the release from Mullapperiyar dam is limited and highly regulated, the main source of flow in this stretch for the most part is a few streams in the locality. Unlike the other unregulated rivers in the state, the recorded maximum discharge every year occurs in the last months of the south-west monsoon as the result of the release of the surplus water from the Mullapperiyar. Because of this, the river in this stretch seldom flows full. The observed maximum flood discharge of 1050cumecs is quite low when compared to the width. The High Flood Level is reported as 734.30.

The height of impoundment adopted is 1.8m which is very moderate.

The bed is rocky although and so, the design is for impervious foundations and so the safety of the weir structure against sliding and overturning only are governing.

The weir has to be constructed for this length with abutments and retaining walls on either

side. On the right bank, the abutments and retaining walls are proposed to retain the bank up to a level of HFL plus AFFLUX ie. 734.500 as the bank here looks a little vulnerable and unstable and also has the road up above. On the left bank, abutments will be raised to a level of 733.50 as the bank is stable.

An average bed level of 730.00 is observed at the location. The total height of the weir is proposed to be 1.80m and that the FTL is 731.80. The weir sill level will be 730.90.

Available data as given in bidding documents

The design is based on the maximum flood discharge in 20 years.

Flood discharge	1050m ³ /s
Period/frequency	Once in 20 years
HFL	734.30m
Average Bed level	730.00m
Width of river	155.0m
Type of soil	rock ; SBC > 75 t/sqm
Height of impoundment	1.8.0m
Height of weir	0.9m
Height of shutters	0.9m
Type of shutters	MS plates with edges stiffened.

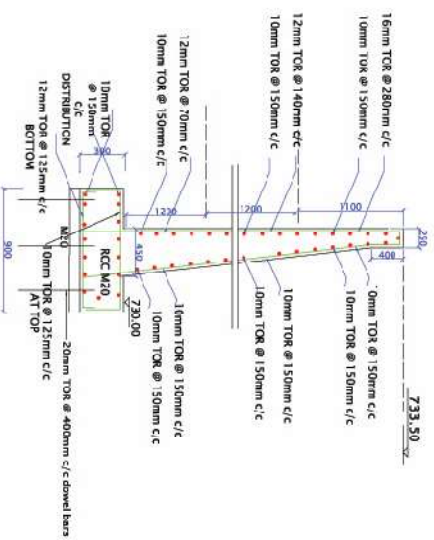
The flood discharge value of 900m³/s looks to be on a lower side. Therefore considering the conditions of Kadalundi river and referring an earlier design prepared by NIT Calicut for a weir at Edaipalam d/s of this one, a discharge of 1800m³/s is assumed. The width of channel adopted for design is 60m. The other data are also altered slightly as mentioned above to suite the site.

6.0 CONCLUSION

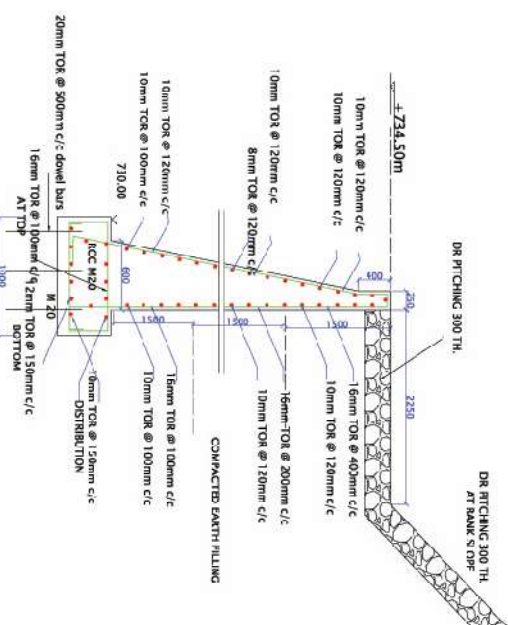
With the vision 'Har Ghar Jal' the Union Government along with the State and Local Self Governments aims to provide piped water supply to all the rural households by the end of 2024. This project once completed will serve as the pre-eminent catalyst in achieving this vision in Kanchiyar and Ayyappancovil Panchayaths as well as Kattappana Municipality by

ensuring adequate quantity of potable water to every households. The success of the project largely depends on the sustainability of the source and hence requires use of available methods like check dam for ensuring source sustainability

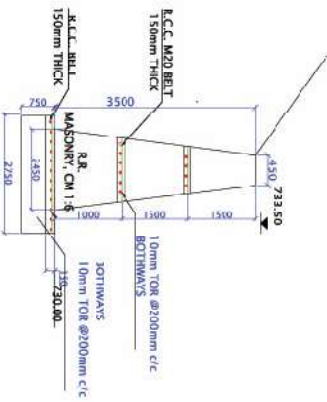




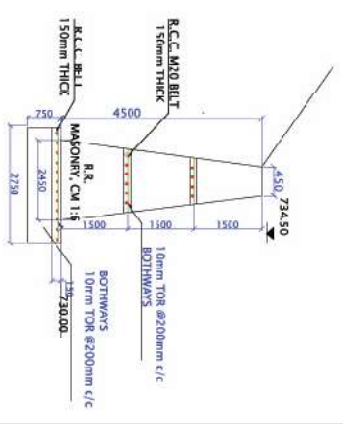
SECTION B-B
DETAILS OF ABUTMENT AND U/S
RETAINING WALL ON LEFT BANK



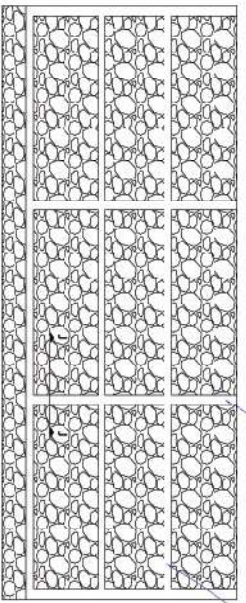
SECTION C-C
DETAILS OF RETAINING WALL ON
EITHER SIDE OF ABUTMENT AT THE RIGHT BANK



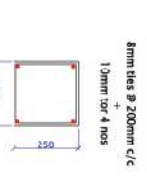
SECTION D-D
DETAILS OF R.R. RETAINING WALL AT THE LEFT BANK



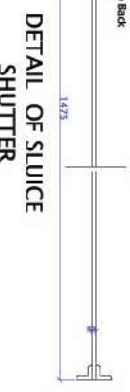
SECTION E-E
DETAILS OF R.R. RETAINING WALL AT THE RIGHT BANK



SIDE ELEVATION OF DR RETAINING WALL ON THE D/S

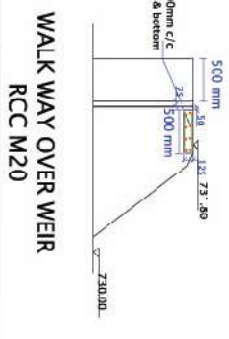


SECTION J-J
DETAILS OF VERTICAL BELT



DETAIL OF SLUICE
SHUTTER

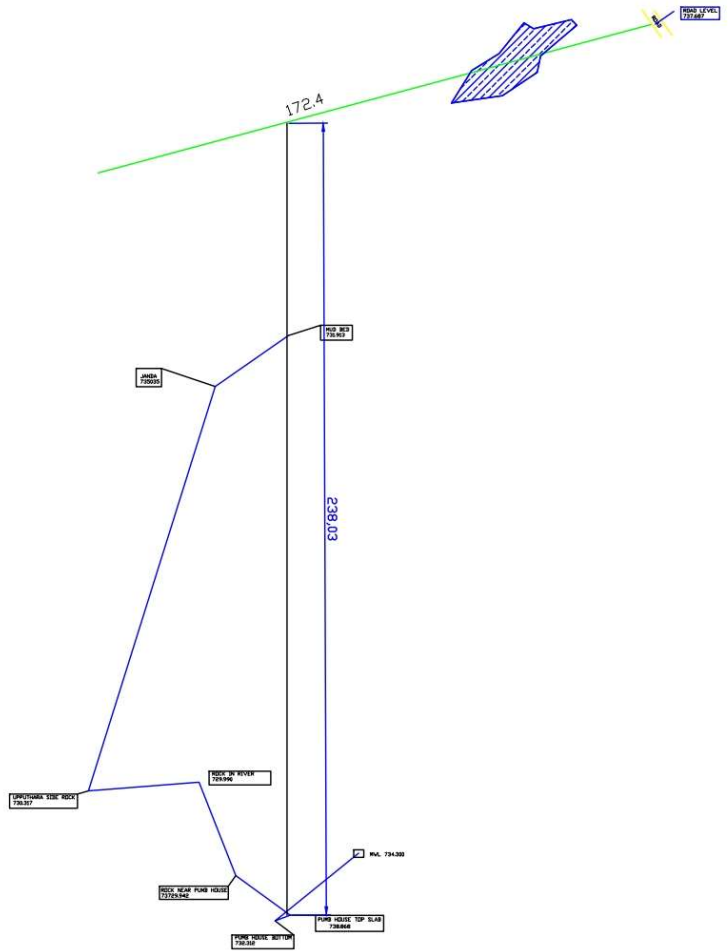
- SPECIAL NOTES**
1. Cover and development length as per IS 456:2000.
 2. All dimensions are in millimeters and the drawings are not to scale.
 3. RCC Reinforcing work shall be of grade M25.



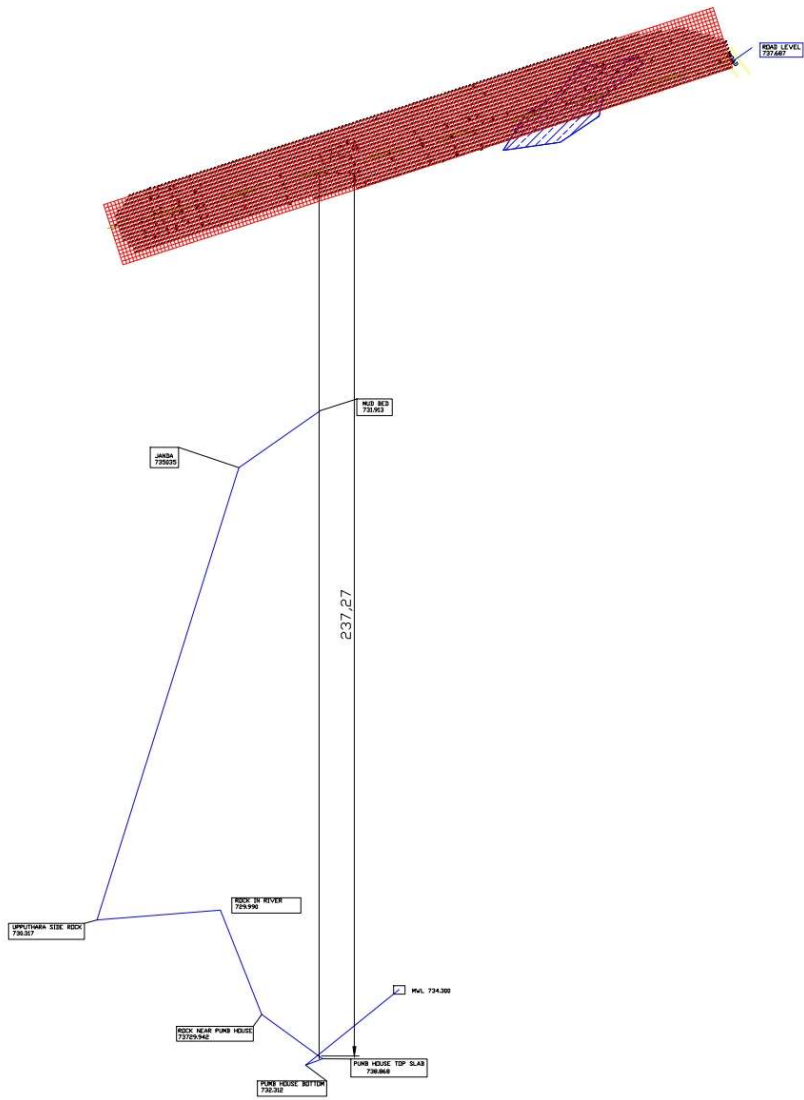
WALK WAY OVER WEIR
RCC M20

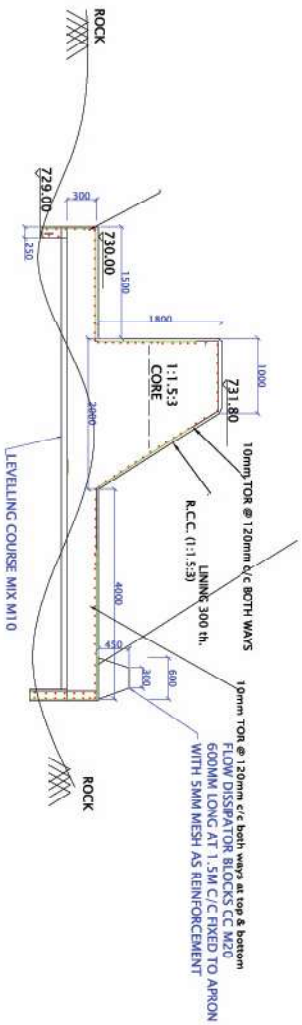
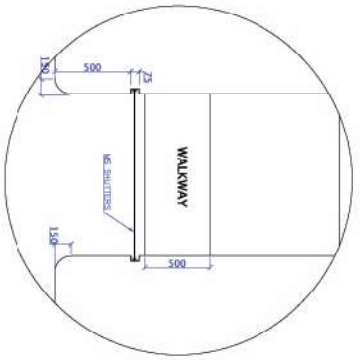
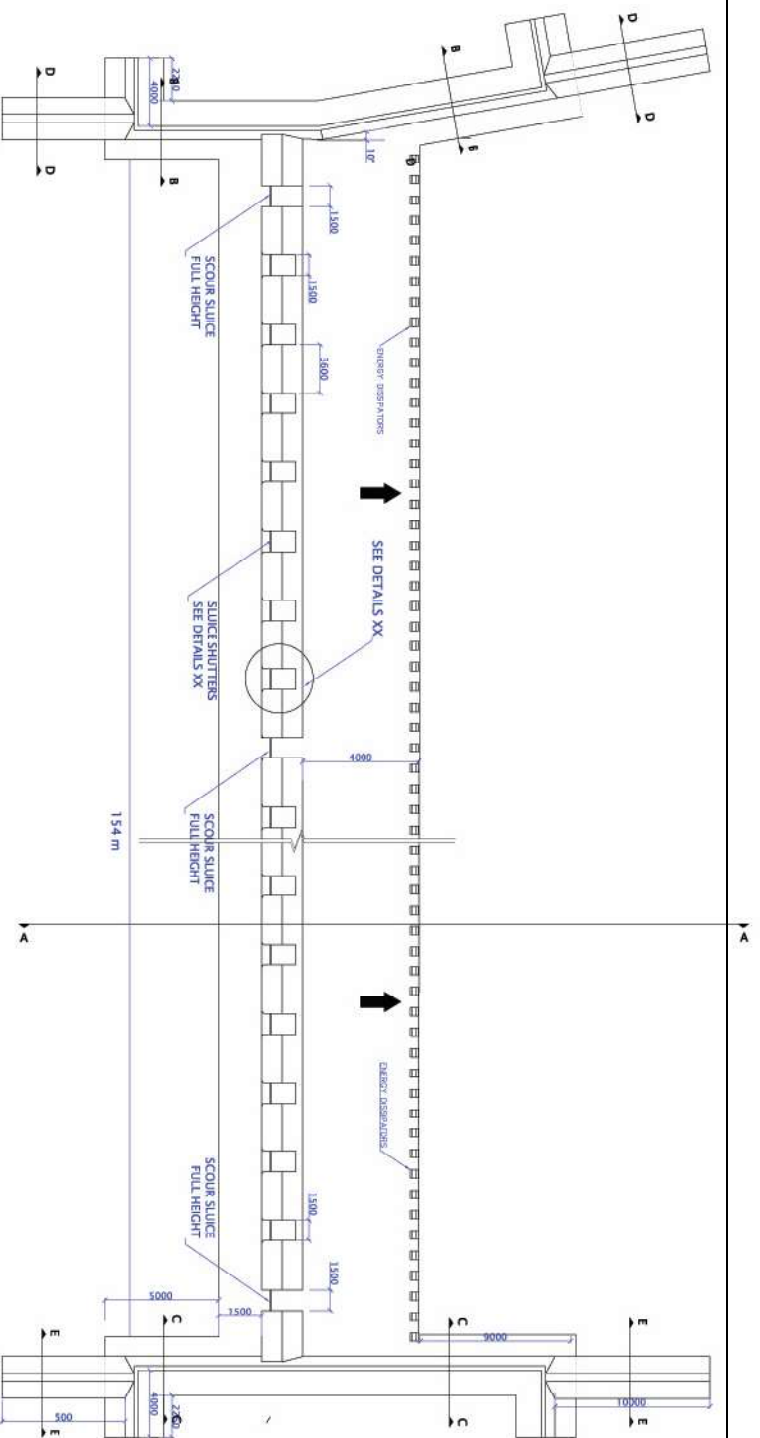
CLIENT	KERALA WATER AUTHORITY
PROJECT	KITEP-Anandhi Water supply scheme to Ayyappankovil Parachandy construction of check dam across Periyar river at Thombady In Ayyappankovil panchayath
CONTRACTOR	MHDAMMED SAIFAN, MK MALAYURAM
TITLE	STRUCTURAL DETAILS OF RETAINING WALLS
JOB NO	13/13
DRG NO	1/STR
SCALE	AS SHOWN
REVISIONS	Prepared by:

Survey Drawing showing proposed location of Check Dam



Grid Survey Drawing





SECTION A-A
GENERAL PROFILE OF THE WEIR

Note:
Orientation/alignment of retaining walls will have to be altered slightly during execution to suit the river bank pattern

CLIENT	KERALA WATER AUTHORITY		
PROJECT	KWRP-Assisted Water supply scheme to Ayyappanthesil Panchayath. Construction of a 4000 cum capacity Reservoir in the Thanthy in Ayyappanthesil panchayath		
CONTRACTOR	MCHAMMED SAFFAN, MK. MALAPPURAM		
TITLE	GENERAL ARRANGEMENT OF WEIR AND APRONS		
JOB NO.	1/G/A	REVISIONS	Prepared by :
DRG NO.			
SCALE	AS SHOWN		