

1. ORGANISATIONAL SET UP

The Kerala Engineering Research Institute is under the Directorate of Fundamental & Applied Research, KERI, Peechi headed by the Director in the rank of Superintending Engineer, with two divisions functioning at Peechi, i.e., the Hydraulic Research and the Construction Materials & Foundation Engineering Division and another division namely the Coastal Engineering Field Studies Division at Thrissur, each headed by a Joint Director, an officer in the rank of an Executive Engineer. Another two Divisions, QC Division Thrissur and Kottarakkara also functions under this Directorate.

The Directorate Institute is under I.D.R.B of Water Resources Department under the Chief Engineer, Investigation & Design (IDRB), Thiruvananthapuram.

The organizational set up of each Division is as follows:

I. Joint Director, Hydraulic Research

1. Hydraulics Division
2. Sedimentation Division
3. Coastal Engineering Division

II. Joint Director, CM&FE

1. Construction Materials Division
2. Soil Mechanics and Foundations Division
3. Instrumentation Division
4. Publications Division

III. Joint Director, Coastal Engineering Field Studies, Thrissur

1. Coastal Erosion studies Subdivision, Kozhikkode
2. Coastal Engineering Studies Subdivision, Ernakulam
3. Coastal Engineering Studies Subdivision, Kollam



IV Executive Engineer, Quality Control Division, Thrissur

1. Quality Control Sub Division, Kannur
2. Quality Control Sub Division, Kozhikkode
3. Quality Control Sub Division, Palakkad
4. Quality Control Sub Division, Thrissur
5. Quality Control Sub Division, Muvattupuzha

V Executive Engineer, Quality Control Division, Kottarakkara

1. Quality Control Sub Division, Kottayam
2. Quality Control Sub Division, Alappuzha
3. Quality Control Sub Division, Kottarakkara
4. Quality Control Sub Division, Thiruvananthapuram

The first three divisions are doing research works, laboratory testing and collection of field data related to their respective fields and present valuable results and also analyses results having significant implications in different fields of Civil Engineering and Water Resources Management. Each subdivision has a Deputy Director in the rank of an Assistant Executive Engineer as its head and one or two Assistant Directors in the rank of Assistant Engineer to assist in the research activities.

The Quality Control wing attached to this Directorate has been constituted for the purpose of quality assurance of works of Irrigation Department. The jurisdiction of this wing is all over Kerala. There are 18 sections, under 9 Sub divisions, at Thiruvananthapuram, Kollam, Kottarakkara, Pathanamthitta, Allappuzha, Idukki, Kottayam, Aluva, Moovattupuzha, Koothattukulam, Angamaly, Thrissur, Palakkad, Malappuram, Kozhikkode, Kalpetta, Kannur and Kasaragod.



2. PERSONNEL

The Executive officers who headed the various offices under KERI during the financial year 2018-19 are:

DIRECTORATE OF FUNDAMENTAL & APPLIED RESEARCH	
DIRECTOR	: Dr.Udayakumar A. from 1/04/2018 to 30/8/2018 AN
	Er.JamaludheenC.A.from 30/8/2018 AN Onwards
ASSISTANT DIRECTOR	Er. Deepa R.(from 1/04/2018 FN to 3/09/2018 FN)
	Er. Joy C. C.(In charge from 03/09/2018 FN to 19/02/2019 AN)
	Er. Naveen.C.L (from 20/02/2019 FN Onwards)
JOINT DIRECTOR, CONSTRUCTION MATERIALS & FOUADATION ENGINEERING	
JOINT DIRECTOR	: Er. Rajamma S. from 1/04/18 to 16/04/2018
	Er.Sheeja A. Andezhath (FAC) from 17/04/18 to 01/05/18
	Er. Rajamma S. from 02/05/18 to 31/07/18
	Er.Sheeja A. Andezhath (FAC) from 1/08/18 to 24/10/18
	Er. Maryam John M. from 25/10/18 to 27/10/18
	Er.Sheeja A. Andezhath (FAC) from 27/10/18 to 30/12/18
	Er.Bimole Abraham from 31/12/18 Onwards
ASSISTANT DIRECTOR	Er. Aswathy P.S.(from 1/04/18 to 5/11/18)
	Er. Joyal Scaria from 5/11/18 onwards
CONSTRUCTION MATERIALS DIVISION	
DEPUTY DIRECTOR	Er. Jaicy Joseph Palayakkara from 01/04/2018 to 31/05/2018
	Er. Sheeja A Andezhath (Full additional charge from 01/06/2018 to 25/10/2018)
	Er. Usha S from 26/10/2018 to 28/11/2018
	Er. Sheeja A Andezhath (Full additional charge from 29/11/2018 to 14/12/2018)



	Dr. Santhosh Kumar P. T. From 15/12/2018 Onwards
ASSISTANT DIRECTOR I	Er. Siji T.V. From 01.04.2018 Onwards
ASSISTANT DIRECTOR II	Er. Harith Suraj (From 01-04-2018 to 31-10-2018)
	Er. Siji T.V. Full additional charge from 01.11.2018 to 13.01.2019)
	Er. Lekshmy Suresh from 14.01.2019 onwards
SOIL MECHANICS AND FOUNDATIONS DIVISION	
DEPUTYDIRECTOR	Er. Geetha E.S. from 1/04/2018 to 15/09/2018 AN
	Er. Sheeja A. Andezhathu (Addl. Charge from 16/09/2018 to 02/12/2018
	Er. Miny T.M from 03/12/2018 to 15/12/2018
	Er. Sheeja A. Andezhathu Addl. Charge from 16/12/2018 to 30/12/2018
	Miny T.M from 31/12/2018 on wards
ASSISTANT DIRECTOR I	Er. Sreekumar. K.S. from 1/04/2018 to 31/10/2018
	Naveen C.L from 01/11/2018 to 19/02/2019 AN
	Valsalakumary. V. R. Addl Charge from 20/02/2019 to 31/03/2019
ASSISTANT DIRECTOR II	Er. Valsalakumary V.R. from 1/04/2018 to 19/05/2018
	Er.Sreekumar. K. S. Addl. Charge from 20/05/2018 to 30/05/2018
	Er.Valsalakumary V. R. from 31/05/2018 to 19/12/2018
	Er.Naveen C.L Addl. Charge from 20/12/2018 to 30/12/2018
	Er.Valsalakumary V. R. from 31/12/2018 onwards
INSTRUMENTATION DIVISION	
DEPUTY DIRECTOR	Er. Sheeja A Andezhathu.
ASSISTANT DIRECTOR	Er. Saju Varghese
PUBLICATIONS DIVISION	: Post Abolished



JOINT DIRECTOR, HYDRAULIC RESEARCH	
JOINT DIRECTOR	: Er. Basant K.B. (from 1/04/2018 FN to 2/04/2018)
	Er. Shini K.K. in charge from 03/04/2018 to 31/07/18
	: Er. Rema.M (from 1/08/2018 FN onwards)
ASSISTANT DIRECTOR	Er. Joy C.C. (from 01/04/2018 FN onwards)
HYDRAULICS DIVISION	
DEPUTY DIRECTOR	Er. Sujatha P (from 1/05/2018 to 17/09/2018 FN onwards)
	Er. Deepa.R. (FAC from 18/09/2018 to 23/11/2018 AN onwards)
	Er. Suhurban Begum (from 23/11/2018 FN onwards)
ASSISTANT DIRECTOR I	Er. Balu R. from 1/05/2018 to 15/11/2018 AN
	Er. Jacob P V (from 15/11/2018 AN onwards)
ASSISTANT DIRECTOR II	Er. Nandini S. Nair from 1/04/2018 to 31/10/2018 AN
	Er. Balu R. Addl charge from 31/10/2018 AN to 15/11/2018 AN
	Er. Jacob P V Addl. Charge from 15/11/2018 AN to 25/01/2019
	Er. Nisha Antony from 25/01/2019 AN onwards
SEDIMENTATION DIVISION	
DEPUTY DIRECTOR	Er. Shini K.K.
ASSISTANT DIRECTOR I	Er. Sreejith K. S. from 1/04/2018 to 14/11/2018
	Er. Roshni S.S In charge from 15/11/2018 to 18/01/2019 AN
	Er. K.S Dhanya from 19/01/2019 Onwards
ASSISTANT DIRECTOR II	Er. Roshni S.S



COASTAL ENGINEERING DIVISION	
DEPUTY DIRECTOR	Er.Saji Samuel from 1/04/2018 to 16/04/2018 Smt. Divya C.J. (Addnl. Charge)from 17/04/2018 to 30/07/2018 Er. Sujatha P. Addnl. Charge from 31/07/2018 to 02/09/2018 Er. Deepa R. from 03/09/2018 onwards
ASSISTANT DIRECTOR I	Er. Divya C.J. from 1/04/2018 to 30/07/2018 Er. Sufeera O.B from 31/07/2018 onwards
ASSISTANT DIRECTOR II	Er.Snisha T.B.
JOINT DIRECTOR, CEFS ,THRISSUR	
JOINT DIRECTOR	: Er. K.L. Thomas from 1/04/2018 to 31/05/2018 Smt. Sandhya .T (FAC)from 1/06/2018 to 1/072018 Smt. Prema C.K from 2/07/2018 onwards
ASSISTANT DIRECTOR	Er. Anitha B. Nair
C.E. SUB DIVISION, KOLLAM	
DEPUTY DIRECTOR	Er. HemaN.S. from 1/04/2018 to 1/10/2018 Smt. Anjana .S from 1/10/2018 onwards
C.E. SECTION, TRIVANDRUM	
ASSISTANT DIRECTOR	Er.Jayalal V.S. from 1/04/2018 to 4/12/2018 Er. Ajin Singh S from 4/12/2018 onwards
C.E. SECTION,KOLLAM	
ASSISTANT DIRECTOR	Er. Shillar S.J.
C.E.SECTION, THOTTAPPALLY	
ASSISTANT DIRECTOR	Er. Santhosh kumar C.
C.E. SUB DIVISION, ERNAKULAM	
DEPUTY DIRECTOR	Er. Sandhya T.
C.E.S. SECTION, ERNAKULAM	
ASSISTANT DIRECTOR	Er. Jisha A.
C.E. SECTION, CHERTHALA	
ASSISTANT DIRECTOR	Er. Anju G



C.E. SECTION, CHAVAKKAD	
ASSISTANT ENGINEER	Er. Sunitha T.M. Er. JishaA. Er.Ajantha V.D from 1/11/2018 onwards
COASTAL EROSION STUDIES SUB DIVISION, KOZHIKODE	
DEPUTY DIRECTOR	Er. Asha Begum L from 1/04/2018 to 11/07/2018 Er.Govindhanunni V.K from 11/07/2018 to onwards
C.E.S. SECTION, KOZHIKODE.	
ASSISTANT DIRECTOR	Er.SivadasanA. from 1/04/2018 to 31/05/2018 Rtd. Er. Anil Kumar .P from 1/06/2018 to 11/07/2018 Addl charge Er. Sreelatha L.C from 11/07/2018 to 8/11/2018 Er. Abdul Rasheed K.P from 8/11/2018 onwards.
C.E.S. SECTION, THALASSERY	
ASSISTANT DIRECTOR	Er. AnilKumarP. from 1/04/2018 to 31/12/2018 Sri. Abdul Rasheed K.P from 1/01/2019 onwards.(Addl. Charge)
C.E.S. SECTION, PARAPPANANGADI	
ASSISTANT DIRECTOR	Er. Abbas.M.T from 01/04/2018 7/09/2018 Sri.Anil Kumar .P from 7/09/2018 to 31/12/2018(Addl. Charge) Er. Abdhul Rasheed K.P from 1/01/2019 onwards (Addl. Charge)
QUALTY CONTROL DIVISION, THRISSUR	
EXECUTIVE ENGINEER	: Er. K.R Sajithkumar from 01-04-2018 to 15-02-19 Er. Sita Thankam V from 16-02-2019 onwards (Addl. Charge)



ASSISTANT EXECUTIVE ENGINEERS	
Q.C. DIVISION, THRISSUR	: Er. Sita Thankam V.
Q.C. SUB DIVISION, MOOVATTUPUZHA	: Er. Rosamma K.M from 1/04/2018 to 11/07/2018
	Prasanna AA in charge from 12/07/2018 to 30/08/2018
	Er.Jessy Skariah from 31/08/2018 FN to 31/08/2018 AN
	Prasanna AA in charge from 1//09/2018 to 24/11/2018
	Shaju Peeter from 26/11/2018 Onwards
Q.C. SUB DIVISION , THRISSUR	: Er.Jakadambikha C.K from 1/04/2018 to 31/07/2018
	Er.Suguda kumari K.R from 11/10/2018 onwards
Q.C. SUB DIVISION , PALAKKAD	: Er.Sivakumar .V
Q.C. SUB DIVISION , KOZHIKODE	: Er.Bindu P.B
Q.C. SUB DIVISION , KANNUR	: Er.T.K Rajesh from 1/04/2018 to 30/11/2018
	Er.Aravindakshan.Vfrom 1/12/2018 onwards
ASSISTANT ENGINEERS	
Q.C SECTION- 1,MOOVATTUPUZHA	Er.Prasanna A.A
Q.C SECTION-2, KOOHATTUKKULAM	Er.Anila K.T
Q.C SECTION-3, ANGAMALI	Er.Krishnakumar K.C
Q.C SECTION, THRISSUR	Er.Babu M.S
Q.C SECTION,ERNAKKULAM	Er.Radhamani K.C from 1/04/2018 to 25/102018
	Er.Mariya Jacob from 26/10/2018 onwards
Q.C SECTION,PALAKKAD	Er.C.V Leela
Q.C SECTION,MALAPPURAM	Er.Rasna Kalappadan from 1/04/2018 to 31/10/2018
	Er.Sulaiman .M from 31/10/2018 onwards.
Q.C SECTION, KOZHIKODE	Er.Domenic M.B
Q.C SECTION,WAYANAD	Er.Ajayan .C



Q.C SECTION,KANNUR	Er.Madhu K.P
Q.C SECTION,KASARKODE	Er.Raji C.T
QUALITY CONTROL DIVISION, KOTTARAKKARA	
EXECUTIVE ENGINEER	: Er. P.G. Harikumar (from 1/04/2018 to 23/07/2018)
	Er.Laila .V 24/9/2018 to 31/12/2018 (Rtd)
	Er.Sajith kumar.V Additional charge from 26/11/2018 to 11/01/2019
	Er. Jolly Susan Cheriyan Addl. Charge from 11/01/2019 to 22/03/2019
	Er. Anil Kumar .V from 22/03/2019 Onwards.
ASSISTANT EXECUTIVE ENGINEERS	
Q.C. SUB DIVISION, KOTTARAKKARA	: Er.P.N Mohammed Basheer from 1/04/2018 to 9/10/2018
	Er.JollySusan Cheriyan from 10/10/2018 Onwards
Q.C. SUB DIVISION, ALAPPUZHA	: Er.Sabu C.D
Q.C. SUB DIVISION, TVPM	: Er.V.S Rani Padmakumari from 1/04/2018 to 21/07/2018
	Er.K.R Beena from 17/09/2018 Onwards
Q.C. SUB DIVISION, KOTTAYAM	: Er.Mollykutty Emmanuel
ASSISTANT ENGINEERS	
Q.C SECTION,KOTTARAKKARA	Er.Saritha John Bosco from 1/04/2018 to 25/10/2018
	Er.Maya C.V from 25/10/2018 onwards
Q.C SECTION,ALAPPUZHA	Er.Latha Kumari.K
Q.C SECTION,PATHANAMTHITTA	Er.Sindu K.S
Q.C SECTION, TVPM	Er.S.Prasanna
Q.C SECTION, KOLLAM	Er. M.G Jiji kumari from 1/04/2018 to 26/10/2018
	Er.B.Deepa from 26/10/2018 onwards
Q.C SECTION,KOTTAYAM	Er.ManjushaN.K.
Q.C SECTION, IDUKKI	Er.AravindG.



3. HUMAN RESOURCES

The human resources of KERI comprise of both technical and non-technical personnel. During its prime, majority of the Engineers working in KERI were post graduates in different disciplines of Civil Engineering. The number of fundamental researches was carried out during the period, bear witness to this. KERI was well known all over India and abroad for the research works and experimental studies carried out in this institute, especially in the field of Coastal engineering. In the past three decades, no significant fundamental studies have been carried out and the labs have gradually degenerated to the status of mere testing centres.

At present, out of the fourteen posts of Assistant Engineers, One post is lying vacant. The number of supporting technical staff in the category of draftsman is Twenty one against a sanctioned strength of twenty-five. In the workers category, as it happens to be a vanishing category, just two workers are available at present. Workers are hired on contract basis or on daily wages as per requirement.

However, a sincere and commendable effort is being made by the staff to take up all the projects assigned to it. The vacancy position of KERI is attached as Appendix – I.

4. FUNCTIONING OF THE INSTITUTE

The Kerala Engineering Research Institute consists of seven divisions functioning at Peechi as well as Coastal Engineering and Field studies Division at Thrissur and Quality Control wing of the Irrigation Department. Generally, the activities of each division can be categorized as falling under Routine activities, Fundamental studies and Revamping and Modernization. The routine activities and fundamental studies conducted by each division are enumerated in this chapter.



A. HYDRAULICS DIVISION

A.1 Introduction

Studies on various problems in Applied Hydraulics, Irrigation Engineering and Flood Control are taken up by this division and propose solutions for the same. The works on Major Irrigation and Hydro electric project in the state are undertaken only after doing model studies /research studies by this division. The studies are conducted on a wide range of parameters related to spillways, sluices, chutes, energy dissipating arrangement, operation of gate, flow condition in tail-race, silt excluding arrangements, hydraulic behavior of canal structures, river training works etc. By these studies, we are able to provide hydraulically sound and economically viable solutions to various problems associated with projects.

Weather observations from Meteorological station are necessary to improve meteorological services in the state and enhance predictive capability of short and long term information for weather forecast and climatic changes. They are used for the real time preparation of weather analysis, forecasts and serve weather warnings, for the study of climates, for local weather dependent operations, for hydrology and agricultural meteorology and for research in meteorology and climatology. A meteorological station is functioning at Peechi dam site under the jurisdiction of this Division. It is located on the west bank of Peechi dam, near Peechi House at latitude of $10^{\circ} 31' 30''$ N, longitude $76^{\circ} 21' 59''$ E and height above MSL + 96.03 m. From the station measurements of weather parameters such as Atmospheric pressure, Temperature (Min.& Max), Humidity, Rainfall, Evaporation, Wind speed, Wind Direction and Sunshine are taken and recorded daily at 8.30 AM. The monthly weather data as obtained is submitting to the Joint Director, Director and SE Hydrology on every month. The study of rainfall and evaporation for the last 25 Years was conducted earlier. The graph of rainfall and temperature during the period from 1980 to 2018 has prepared at this office. An automatic weather station is also there in meteorological station for collecting data in every 30 minutes. The routine works



of Hydraulics office, lab, meteorological station, Kerala model, model area I and II are carried out in every year.

For the Desiltation of dams, Qualitative analysis study of sediment of Chulliyar, Kuttiyadi, Kallada, and Neyar dams are comes under this division. Qualitative analysis study of sediments of Chulliyar dam was completed in all respects and report submitted to government. The estimate for desiltation of other dams was submitted to government for A.S. The work will be started soon after obtaining A.S. Calibration of notches from various dams in Kerala is to be done under this division. Recently the calibration of notches from Pothundy and Kanjirapuzha dams were completed.

There are two Model Areas exists under this division, comprising a number of models. The maintenance work of these model areas are done by this division. If the models in these model areas are properly maintained, it will help the students to study about dams and also increase the tourism possibility.

The Model of Kerala under this division is a three dimensional model of Kerala and it is a centre of attraction in Peechi with lot of people visiting there. The current meter calibration was stopped here in KERI long years ago. The channel for calibration is completely damaged. An estimate for the renovation of channel for current meter calibration is under preparation. Doing the renovation work, calibration of current meter is to be done at KERI itself avoiding the dependence of other state for this. The duty of operating internet Infrastructure facilities of all offices in KERI is entrusted for this office.

A.2. Activities for the year 2018-19

- Measurement of meteorological data and maintenance of a Meteorological Station at Peechi Dam site.
- Maintenance of 3D model of Kerala and building housing model
- Upgradation of Meterological Station
- Routine Maintenance of Hydraulics Division Office and Meterological Station
- Maintenance of Hydraulics Division Office and Hydraulics Lab
- Maintenance of Model Area I and II



- Upgradation computer system capacity augmentation, Improvement of infrastructure -Firewall protection for regulation of BSNL FTTH internet usage,security system with router etc
- Calibration of notches.
- Other routine works suchas maintenance ofoutdoorModel Area I& Model Area II
- Model study of Pattissery dam

A.2.1 Meteorological Station, KERI, Peechi

Weather observations are necessary to improve Meteorological services in the state and enhance the predictive capability of short and long-term information for weather forecasts and climatic changes. They are used for the real-time preparation of weather analysis, forecasts and severe weather warnings, for the study of climates, for local weather dependent operations (for example local aerodrome flying operations, construction work on land and at sea) for hydrology and agricultural meteorology and for research in meteorology and climatology.The Meteorological Station under K E R I, Peechi is located on the west bank ofPeechi Dam, near the Peechi House at a Latitude of 10° 31'30'' N, Longitude 76° 21' 59'' E and height above MSL +96.03 m.





The station is equipped with the instruments for measuring manually the weather parameters namely Atmospheric Pressure, Temperature, Humidity, Rainfall, Evaporation, Wind speed, Wind direction and Bright Sunshine. As part of modernization, an automatic weather station was installed in June, 2014.

A.2.1.1 Automatic Weather Station

Time series observations are vital to improve the understanding of weather dynamics and its variability. The Automatic Weather Station plays an important role in providing short term and long-term time series weather observations. Automatic weather station is functioning in Meteorological Station with Remote transmission facility and a Solar Panel for uninterrupted power supply.



The Automatic Weather station collects data related to Air Temperature, Air Humidity, Barometric pressure, Ultrasonic Wind speed, Ultrasonic Wind Direction, Global radiation and Precipitation using different sensors. These data can be accessed via internet using a software HYDRAS. The data collected can be used to gauge current weather conditions and to make weather forecasts like temperature high/low, cloud cover and the probability of precipitation.

Components of Automatic Weather Station

1. Ultrasonic Wind speed and Direction sensor & Compass
2. Global Radiation Sensor
3. Temperature, Humidity, Barometric Pressure Sensors
4. Rain Gauge
5. Data Logger



ULTRASONIC WIND SPEED AND DIRECTION SENSOR



SOLAR RADIATION SENSOR



TEMPERATURE, HUMIDITY & PRESSURE SENSOR



RAIN GAUGE



IP DATA LOGGER

A.2.1.2 Manual Weather Station

Manual measurements of meteorological data are done using the following instruments and the readings are taken every day at 8.30 am.

- Temperature – Max.& Min. Thermometers & Bimetallic Thermograph
- Relative Humidity – Psychrometer (Dry & Wet bulb) & Hair Hygrometer
- Rainfall – Standard Rain Gauge, Self Recording Rain gauge
- Evaporation – Land Pan Evaporimeter
- Wind Direction – Wind Vane
- Wind Speed – Cup Anemometer
- Bright Sunshine – Sunshine Recorder

Max., Min. Thermometers and Psychrometer (Dry & Wet bulb)

The standard maximum and minimum thermometers are two separate thermometers mounted in a special wooden fully ventilated casing known as Stevenson screen small. The maximum and minimum Thermometers are placed in it in nearly horizontal position. The unit of measurement is degree Celsius. Recorded maximum and minimum



temperatures are the highest and lowest values occurring during a specified period of time, such as 24 hours.

Bimetallic Thermograph

This is used for measuring & recording atmospheric temperature as a function of time on recording chart.

Relative Humidity

Humidity measurements at the Earth's surface are required for meteorological analysis and forecasting, for climate studies, and for many special applications in hydrology, agriculture, aeronautical services and environmental studies, in general. They are particularly important because of their relevance to the changes of state of water in the atmosphere. The instruments used for measuring humidity are Psychrometer (Dry & Wet bulb) & Hair Hygrometer. Dry and wet-bulb temperature measurements are taken to calculate relative humidity.

A psychrometer consists essentially of two thermometers exposed side by side, with the surface of the sensing element of one being covered by a thin film of water or ice and termed the wet or ice bulb, as appropriate. The sensing element of the second thermometer is simply exposed to the air and is termed the dry bulb. In the figure, the psychrometer is placed vertically on either side of the box shelter.

Relative humidity is found out from the calibration graph (relative humidity table) connecting dry bulb temperature and the difference between wet bulb temperature and dry bulb temperature. It is expressed in percentage.

Hair Hygrometer

The most commonly used hair hygrometer is the hygrograph. This employs a bundle of hairs held under slight tension by a small spring and connected to a pen arm in such a way as to magnify a change in the length of the bundle. A pen at the end of the pen arm is in



contact with a paper chart fitted around a metal cylinder and registers the angular displacement of the arm. The cylinder rotates about its axis at a constant rate determined by a mechanical clock movement. The rate of rotation is usually one revolution per day. The chart has a scaled time axis that extends round the circumference of the cylinder and a scaled humidity axis parallel to the axis of the cylinder. The humidity scale is divided into 100 equal segments. Each segment corresponds to 1%. The cylinder normally stands vertically. So, humidity can be directly read from the recording chart.

Precipitation

Precipitation is defined as the liquid or solid products of the condensation of water vapor falling from clouds or deposited from air onto the ground. It includes rain, hail, snow, dew, rime, hoar frost and fog precipitation. The total amount of precipitation which reaches the ground in a stated period is expressed in terms of the vertical depth of water (or water equivalent in the case of solid forms) to which it would cover a horizontal projection of the Earth's surface. Snowfall is also expressed by the depth of fresh, newly fallen snow covering an even horizontal surface.

Precipitation is measured in millimeters. Precipitation gauges (or rain gauges if only liquid precipitation can be measured) are the most common instruments used to measure precipitation

Rain gauges are of two types: standard rain gauge (non recording type) and self recording rain gauge. Standard rain gauge consists of a collector placed above a funnel leading into a container where the accumulated water and melted snow are stored between observation times and the quantity is measured manually.

Three types of automatic precipitation recorders are in general use, namely the weighing-recording type, the tilting or tipping-bucket type, and the float type.

In the float type rain gauge, the level of the collected rain water is measured by the position of a float resting on the surface of the water. This instrument is used as a



recording rain gauge by connecting the float through a linkage to a pen that records on a clock driven chart.

Evaporation

The rate of evaporation is defined as the amount of water evaporated from a unit surface area per unit of time. Estimates of both evaporation from free water surfaces, from the ground and evapotranspiration from vegetation-covered surfaces are of great importance to hydrological modeling and in hydro meteorological and agricultural studies, for example, for the design and operation of reservoirs and irrigation and drainage systems.

Land Pan Evaporimeter is used for measurement of evaporation and is measured in millimeters.

Wind Direction & Wind speed

Wind observations or measurements are required for weather monitoring and forecasting, wind-load climatology, probability of wind damage and estimation of wind energy. It is taken at a fixed location using 2 parameters; wind speed and wind direction. Surface wind is usually measured by a wind vane and cup or propeller anemometer. Wind Vane is used to find the wind direction and it is measured in degrees clockwise from north. Cup anemometer is used to find the wind Speed and is measured in kilo meters per hour.

Bright Sunshine

Sunshine duration or sunshine hours is a climatological indicator, measuring duration of sunshine in given period for a given location on earth. An important use of sunshine duration is to characterize the climate of sites, especially of health resorts. It is often used to promote tourist destinations. For the specific purpose of sunshine duration recording, Campbell-Stokes sunshine recorders are used, which use a spherical glass lens to focus the sun rays on a specially designed tape. When the intensity exceeds a pre determined threshold, the tape burns. The total length of the burn trace is proportional to the number of bright hours. Duration of sunshine is in hours per day.





PSYCHROMETER



HAIR HYGROMETER



BIMETALLIC THERMOGRAPH



FLOAT TYPE SELF RECORDING RAIN GAUGE



STANDARD RAIN GAUGE



LANDPAN EVAPORIMETER



WIND VANE



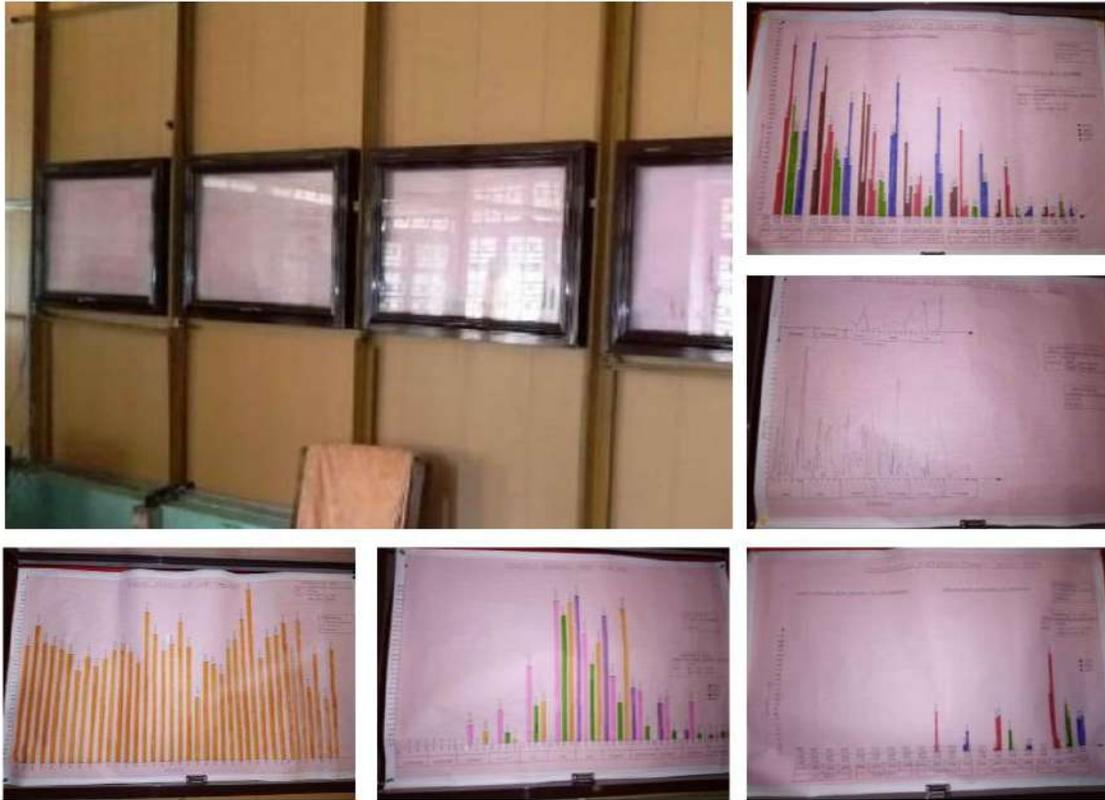
CUP ANEMOMETER



SUNSHINE RECORDER

An abstract of the Weather data collected from Weather Station for the period from April 2018 to March 2019 is given in Appendix II.





Graph for temperature, Annual Rain Fall, 10 days Chart for rainfall, Monthly Chart for Rain fall and etc.

A.2.2 Model Study of Pattissery Dam

The Chief Engineer, I&D had instructed KERI to conduct the model studies of stilling basin and river outlet work of Pattisseri dam and collected the available details from IDR B required to fix the scale of the physical model. The terms of reference for the study, DPR, Topographic survey details and longitudinal and cross-sectional details of canals were provided to this office by November 2017. As the division has not conducted any physical model studies for the past 15 years owing to different factors like retirement of experienced Engineers in this kind of work from the department and the division lacks skilled labourers on regular appointment, proposal for a proper regular guidance from an expert was sought for executing the study. Experts in field as well as academic institutions were contacted for assistance and guidance with regard to physical as well as numerical model study.

In order to carry out the numerical modelling for Pattissery dam, the faculty at Government Engineering College, Thrissur were contacted to explore the possibility of engaging M.Tech students to do this study as their M.Tech thesis and give us the result based on the hydraulic details to be provided by us. Subsequently, a part of the numerical model study of Pattissery dam was entrusted to a PG student in GEC Thrissur (with specific objectives of 2D and 3D analysis of the Pattissery dam spillway (revised design) for different spillway gate opening condition and optimization of the height of training walls in stilling basin by numerically stimulating the flow over the spillway and stilling basin using ANSYS FLUENT software) and 70% of that part of study was completed by h 2018. To get the analysis of all the remaining parameters, faculty at GEC Thrissur agreed in principle to assign these objectives as M.Tech thesis work for their students in coming batches.

Proposals were also put up for physical model study in collaboration with CWPRS Pune, IRI Roorkee, NIT Calicut, NIT Surathkal and College of Engineering Trivandrum. The faculty at Department of Civil Engineering, College of Engineering, Trivandrum expressed willingness in collaborating with KERI and also agreed to act as subject experts for the revival of physical model studies at KERI.



Physical Model of Pattissery Dam

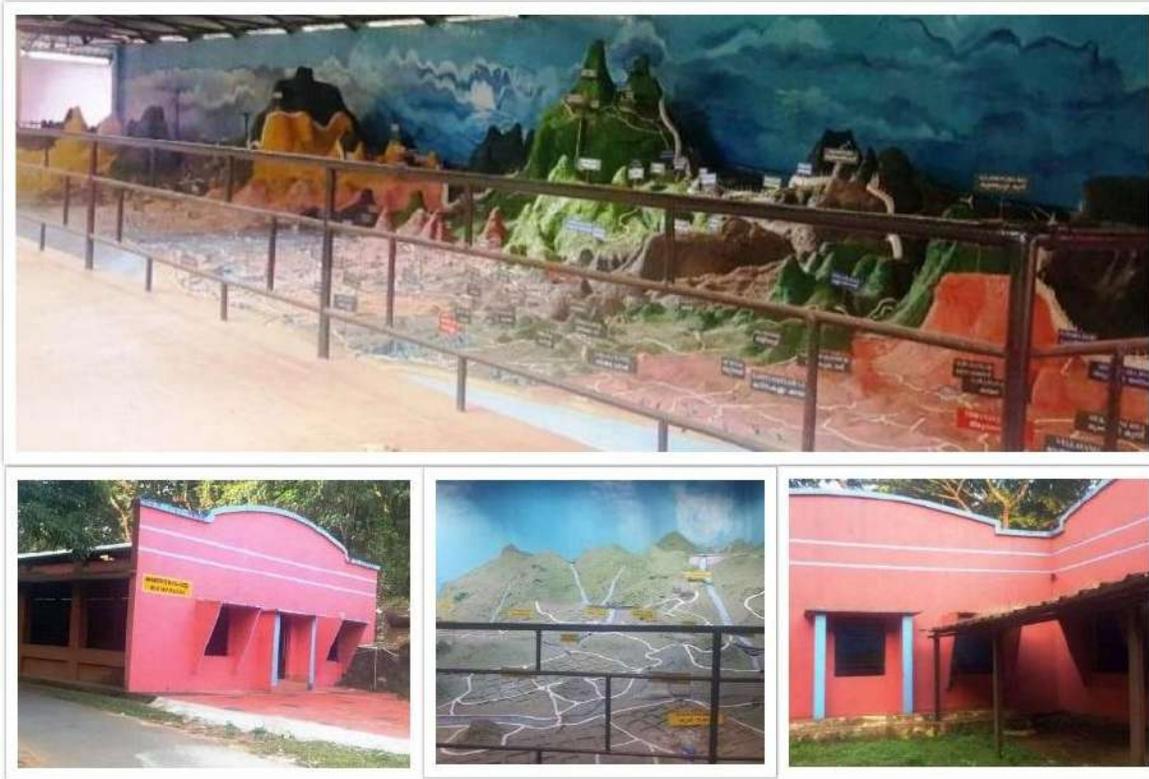


Physical Model of Pattissery Dam

As per the Memorandum of Understanding between Irrigation department and Government Engineering College, Thrissur Numerical Model Study of Pattissery dam was completed and with CET, Trivandrum another MoU signed and Physical model study is going on (Pattissery dam is to be constructed in Idukki district). At Thiruvananthapuram CET Preparation of model completed and experiment is going on and nearing completion. MoU between Irrigation Department and CET, Trivandrum is submitted for approval for the physical model study of Kuttiyadi dam at KERI LAB after renovation.

A.2.3 Maintenance of 3D model of Kerala and the building housing the model

The Relief map of Kerala (Kerala model) at K.E.R.I. is a three dimensional model of Kerala and a centre of attraction in Peechi, with lot of people visiting it on a daily basis. The building housing the model went to a distressed state with portions of the wall and roofing having collapsed in the rains. The repair and renovation of this model and the building housing it was done emphasizing on reconstruction of the dilapidated brick wall of building. Maintenance of building and replacing of name boards are also done in this period. Now this building was rectified and beautified and allowing tourist to visit them.



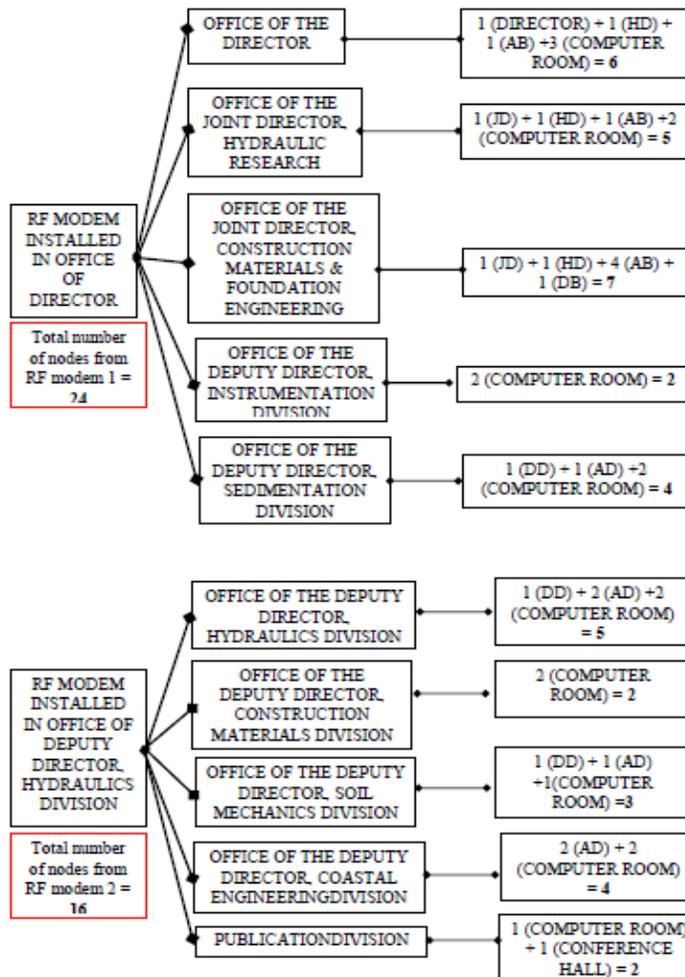
Kerala 3D Model after renovation

A.2.4 Upgradation computer system capacity augmentation,Improvement of infrastructure – Firewall protection for regulation of BSNL FTTH internet usage,security system with router etc.

The Kerala Engineering Research Institute, Peechi complex consist of Director's office, Office of the Joint Director (Hydraulic Research), Office of the Joint Director (Construction Materials & Foundation Engineering), Office of Deputy Director (Sedimentation Division), Office of Deputy Director (Instrumentation Division), Office of Deputy Director (Coastal Engineering Division), Office of Deputy Director (Soil Mechanics & Foundation Division), Office of Deputy Director (Construction Materials Division) and Office of Deputy Director (Hydraulics Division) functioning in five buildings. The offices are engaged in various Research, investigation and quality ensuring activities and contribute to the Government in the form of revenue. The institute is also engaged in organizing training programs in the seminar hall of KERI Building. Various Government agencies, Private agencies and other institutions utilize the resources at KERI

for ensuring quality in construction. Also, K.E.R.I. is in the process of accreditation from NABL which is expected to boost the status of the Labs and is likely to increase the revenue to Government. High speed and stable internet connection is essential for smooth functioning of these offices and their activities. Further, most of the processes of the Department are being switched over to the web platform. Thus, be it the estimation software (PRICE), or accounting software (BIMS/BAMS), employee transfer details (e-monitoring), plan expenditure and progress (PLANSPLACE), salary software (SPARK), HRMS etc., all are web based and need uninterrupted and high speed internet to work at optimum level. Thus a stable and sufficiently speedy internet infrastructure is a bare necessity for an institute like KERI.

BSNL FTTH DETAILS OF CONNECTION TO DIFFERENT OFFICES UNDER DIRECTOR, KERI



There were connectivity issues with the then internet connection plans subscribed by the aforementioned offices which hindered the routine activities. Hence proposal was given for high speed internet connectivity from BSNL through FTTH with RF link including LAN cabling and UPS. The provisions in the estimate were given as per recommendations from the Principal General Manager, BSNL, Thrissur and the execution of the work was monitored and completed under the charge of this division.



A.2.5 Calibration of notches

Notches are used for measurement of discharge through open channels by placing or constructing them across the stream or channel. The discharge over notch is measured by measuring the head acting over the notch. The actual discharge and theoretical discharge will be equated using a suitable coefficient of discharge and a factor for the head of flow. The process of assessing these constants is called calibration. Once the equation relating discharge and head of flow over the notch is established by calibration experiment, the discharge at any point in a channel can be estimated by fixing the notch across the channel and measuring the head of flow.

Notches can be of different shapes such as triangular, rectangular, trapezoidal, stepped notch, etc. The bottom of the notch over which the water flows is known as crest or sill and the thin sheet of water flowing through the notch is known as nappe or vein. The edges of the notch are bevelled on the downstream side so as to have sharp-edged sides and crest resulting in minimum contact with the flowing fluid. As water approaches the



notch, its surface becomes curved. Therefore, the head over the notch is to be measured at the upstream of the notch where the effect of curvature is least. Also, it should be close to the notch so that the loss of energy between head measuring section and notch is negligible. In practical, the head over notch is measured at a distance of 3 to 4 times the maximum head from the notch.

The notch calibration tank situated at outdoor Model Area I is generally used for the calibration of notches from received from various irrigation projects of Kerala. In 2018-19 span triangular notches received from Pothundy dam, Kanjirapuzha dam were calibrated.

The notch tank situated at Model area I is generally using for the calibration of notches which are given to KERI from various dams in Kerala. Due to ageing and wind attack the truss work was collapsed and a new roof had been constructed in last years. The remaining work had done in this period.

B.COASTAL ENGINEERING DIVISION

B.1 Introduction

Coastal Engineering Division was established for the purpose of conducting research works on behavior of Kerala Coast. This division has been started functioning from the beginning of the institute itself. Several research works on coastal protection measures, experimental study of wave run up on beaches, experiments to evolve suitable artificial blocks, study on mud banks, wave action on beaches, waves and currents, littoral drifts, artificial nourishment etc., had been conducted by this division. The model study of fishing gaps, design of fishing harbours like Mopla bay, Ponnani, Vizhinjam etc., were also conducted by this division during 70's and 80's. Collection of wave data and observation of beach characteristics have been carried out at several stations along the Kerala coast in the new moon day of all month for assessing the changes of Kerala Coast



over years. Among these stations, observations at two stations i.e., at Padinjare Vemballore and Anchangadi in Kodungallur Taluk used to be carried out by this division till December, 2013.

As a part of modernization of Kerala Engineering Research Institute (KERI), a Smart Station from Leica Geosystems has been purchased in the financial year 2013-14 which is a new revolutionary surveying system in which high performance Total Station (TS11) and a powerful GNSS Receiver (GS14 satellite receiver) are perfectly integrated. The main components of Smart Station are Base station GNSS and Smart Antenna, RTK Rover GNSS with Pole, Antenna and CS10 Field Controller (Smart Pole) and Total station with back sight Tripod kit. For the fast progressing of survey, one more Smart Pole has been purchased during this financial year 2016-17. Presently this division is engaged in conducting topographical survey works for investigations related to Kerala Irrigation Department.

The works carried out by this division under the action plan for the financial year 2018-19 can be grouped under two categories.

I. Fundamental studies using Smart Station –

All topographical survey works related to Kerala Irrigation Department carried out using Smart Station has been included in this category

II. Routine activities of the Coastal Engineering Division–

The works under this category include maintenance of the division office including maintenance of computers, purchase of essential furniture, consumable office supplies, small repair works to division office etc, maintenance of Director's and Joint Director, Hydraulic Research's Office including maintenance of computers, purchase of consumable office supplies etc and maintenance of an outdoor model area which was used for physical model studies on Kerala Coast in past years.



Apart from the works carried out in action plan works, investigation works under Head of account-4701-80-800-88-Formation of River Basin Organization scheme, Head of account 4700-80-005-99- Investigation of Irrigation scheme, a deposit work of Agricultural department at district Agricultural farm Neriya Mangalam and Conducting topographic Survey for water storage assessment of Vattai Quarry at Thekkumkara Panchayath had also been carried out during the financial year 2018-19.

The highlights of works taken up by this division during the year 2018-19 are as follows:-

I. Fundamental Studies using Smart Station

a) Conducting topographic survey for the right and left bank canal distributaries of Karappuzha Irrigation Project

The proposed site is at Arimula, Ponginithodi, Manivayal, Vallipatta. This work had been taken up as per the request of the Executive Engineer, Karappuzha Irrigation Project Division, Kalpatta, Wayanad. The proposal was to conduct topographical survey for the right and left bank canal distributaries of Karappuzha Irrigation Project. In the letter the project authorities requested to do survey for a length of 37km. But later the Project Authorities has given verbal direction to conduct survey for a length of nearly 16 km in the first phase where the land has been acquired. The work includes fixing of position (ie. latitude and longitude) of these sites, connecting these sites with Mean Sea Level (MSL) and carrying out survey for finding the required cross sections for the design of canals.

The highlights of the work are:

- Fixing of position (i.e., latitude and longitude) of these sites.
- Connecting the site with Mean Sea Level (MSL)
- Conducted survey at Arimula, Ponginithodi, Manivayal, Vallipatta at 30m interval.



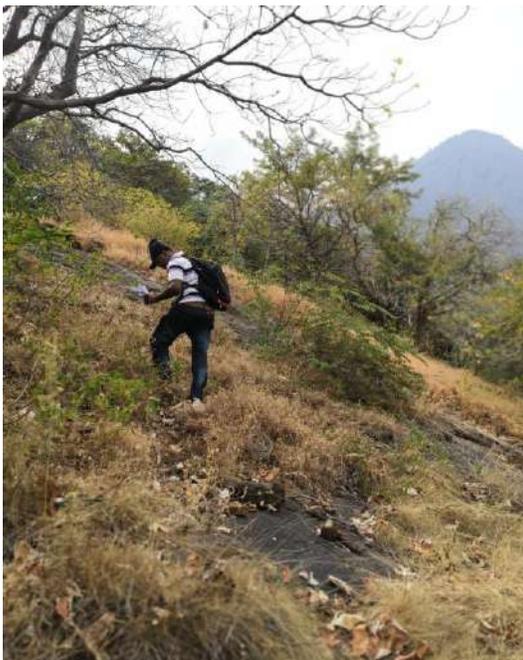


b) Conducting topographical survey for diverting the Seetharkundu waterfalls

This estimate had been prepared as per the verbal direction of the Chief Engineer, IDR, Thiruvananthapuram during the meeting conducted at KERI on 10/04/2018. The proposal was to connect the stream from Seetharkundu water falls of Nelliampathy hills to Chulliyar or Meenkara reservoir based on the efficiency and feasibility. After the site inspection and analysis of the GTS map of the area, the project authorities pointed out a location for diverting the stream within the forest. The project authorities had also shown an approximate alignment after the preliminary study of the contour pattern of the terrain from the GTS map.

The highlights of the work are:-

- Fixing of position (i.e., latitude and longitude) of these sites.
- Connecting the site with Mean Sea Level (MSL)
- Conducted survey of Canal from Meenkara Dam to Chulliyar Dam
- Conducted survey from location for diverting the stream within the forest to Chulliyar dam at 30m interval.



c) Fixing temporary benchmarks with respect to MSL for Investigation of Kaviyurpuncha in Thiruvalla constituency

This work had been taken up as per the request of the Assistant Executive Engineer, which was conveyed by the Joint Director, Hydraulic Research, KERI, Peechi through mail. The purpose of this estimate is to connect MSL at various points along Kaviyoor puncha for proper irrigation management and also at several lift irrigation pump houses situated along banks of Manimala and Pampa rivers. MFL prevailed during the month of August, 2018 was marked there. Connecting these levels with respect to MSL would have been a great advantage in the flood mitigation studies. The MSL is already connected at Kalloopara by this division so that these stations can be connected from this level.

The highlights of the work are:-

- Fixing of position (ie. latitude and longitude) of these sites.
- Connecting the site with Mean Sea Level (MSL)





d) Conducting topographic survey for data collection associated with coastal model studies

The proposal was to conduct coastal survey for data collection for coastal studies for model studies. Dr.K.V.Thomas, Rtd. Scientist, NCESS. (Member of Technical Committee to assess the feasibility of the proposal for construction of seawalls/gryones for protecting vulnerable reaches of Kerala sea coast), it was suggested to conduct survey at Kara-Eriyad, South of Kaipamangalam where mud banks were usually formed, and at Vatanappally and to collect profile upto a depth of 20m in the sea. Survey started from the CP stones in the coast. The same area has to be surveyed in post and pre-monsoon seasons. On the basis of above discussion it was decided to conduct survey for a length of 10km stretch (Eriyad-Kara 3.4 km, Perinjanam- Kaipamangalam-3km and vatanappally-3.6km) as an initial phase. Hydrographic Survey Wing will cover the portions inside the sea up to 2km. It is not possible for the hydrographic survey team to take reading near wave breaking zones. Topographic survey from CP stone to the shore line conducted using Smart station and Data collected in these areas.





2 Routine activities of the Coastal Engineering Division office and the Offices of Director, F&AR and Joint Director, Hydraulic Research for the year 2018-19

This work had been included in the action plan for meeting the routine activities of this office and offices of the Director, F & AR and Joint Director Hydraulic Research. Maintenance and repairing of computer and related accessories, purchase of computer related items, purchasing of Photostat machine, purchasing stationary items and also for additional works that will arise at the time of work etc had been done in this year.

3. Maintenance of the model area of the Coastal Engineering Division

A model area where physical model studies related to Kerala Coast had been conducted in previous years is maintained by this division. All works such as clearing the bushes, routine cleaning of model trays, overall upkeep of model sheds for keeping this area spick and span and also surroundings of Director's office building had been done.

4. Coastal Studies including model studies, surveys in co-ordination with Coastal Engineering Field Studies Division and other external agencies

The proposal was to conduct coastal survey for data collection for coastal studies for model studies. Dr. K.V.Thomas, Retd. Scientist, NCESS. (Member of Technical Committee to assess the feasibility of the proposal for construction of seawalls/gryones for protecting vulnerable reaches of Kerala sea coast) , it was suggested to conduct survey at Kara-Eriyad, South of Kaipamangalam where mud banks are usually formed, and at Vatanappally and to collect profile upto a depth of 20 m in the sea. Survey should start from the CP stones in the coast. The same area has to be surveyed in post and pre-monsoon seasons. On the basis of above discussion it was decided to conduct survey for a length of 10km stretch (Eriyad-Kara 3.4 km, Perinjanam Kaipamangalam-3 km and vatanappally- 3.6km) as an initial phase. Hydrographic Survey Wing will cover the portions inside the sea up to 2km. Topographic survey from CP stone to the shore line conducted using Smart station and Data collected in these areas has been done by this division.

5. Annual Maintenance and purchase of accessories for Smart Station

The aim of this work is for the annual maintenance of Smart station and for the purchase of accessories and any spare parts if required. As the Smart station is a sophisticated electronic equipment, annual calibration and maintenance are essential so as to ensure the accuracy of the position data given by the instrument. So provision is included in the estimate for Annual Maintenance Contract of the Smart Station. Provision for conveyance of the instrument to the service centre and back is also included. Batteries are one of the essential accessories for conducting the survey effectively. Any damage in batteries will delay the work. Hence as a precautionary measure, provision for purchase of additional batteries are included. Provisions are included for the purchase of car battery charger, cables and any other consumables if required in emergency. A lumpsum provision is also given for the purchase and maintenance of any spare parts of the instrument, consumables and miscellaneous items for survey if required in emergency.



ADDITIONAL WORKS USING SMART STATION.**1. Upgradation of the existing GS14 GPS Base and rover with tilt sensor at KERI to GS 18 with dual frequency GNSS processing system**

This Division is entrusted with investigation works using Smart Station which is a new revolutionary surveying system in which total station and GPS are perfectly integrated and has conducted many topographical surveys related to the existing and proposed projects in Irrigation Department and has possession of one base and two Leica GS14 GPS RTKrovers. Now Leica introduced GS 18 T model GPS which is the world's fastest and simplest to use GNSS smart antenna and RTK rover. Using this, the survey can be progressed quickly and easily. This division has been conducted several Investigation works during the past years. As the new GS 18T device helps to focus on the task at hand and save time, this division can conduct more investigation works in future. Hence provision has been included for upgrading the existing base and rover GPS GS14 to GS 18T.

2. Purchase of Desktop computer of high precision and graphic capacity for preparation of drawings of the survey works using smart station.

This division is conducting investigation works of emergency nature for the construction of water retaining structures and other topographical surveys which involves processing of large volume of data and drawings of autocad files of large size. The available laptops and desktops in the office are not having enough capacity to handle large files and take much time to prepare and check the drawings. This makes delay in submission of reports. So a high end system with high precision and graphic capacity is essential for speedy preparation of the drawings. A new Desktop with above specifications purchased.



Deposit works**1. Conducting topographic Survey for water storage assessment of Vattai Quarry at Thekkumkara Panchayath**

The Sedimentation Division of KERI has been conducted a bathymetric survey to determine the capacity of Vattai quarry during the year 2012. The Secretary, Thekkumkara grama panchayath requested to conduct a survey to assess the enhanced maximum water storage capacity of Vattai quarry after constructing sidewall vide Lr.No.A2-1001/17 dated 27/12/2017. After the site inspection the Joint director, Hydraulic Research verbally directed to prepare an estimate for the Topographic survey at Vattai Quarry for estimating the storage capacity for planning a water supply scheme to Thekkumkara panchayath and Medical College.

2. Survey at District Agricultural farm Neryamangalam using Smart Station.

This estimate is prepared based on the request from Agricultural Department for the Topographic survey at District Agricultural farm, Neriamangalam at the construction site of Check dam at 2m interval as per direction from Chief Engineer, IDRB. The survey has been done at 2m interval from proposed section to 10m upstream and downstream side.





Additional works

Sand Budgeting in Chaliyar River Basin

Sand is used extensively in construction and the amount being mined is increasing exponentially, mainly as a result of rapid economic growth and the resulting boom in construction. Due to the heavy demand, sand trading is a lucrative business, and there is evidence of illegal trading such as the case of the influential mafias in Kerala. Lack of proper scientific methodology for river sandmining, monitoring systems, regulatory policies and environmental impact assessments have led to indiscriminate mining, triggering severe damage to the environment and related ecosystem services. As this issue is a major emerging one, there is a need for in-depth research. Sand Auditing is the procedure to evaluate the process of sand mining in a river or part of the river after a specific period of mining- with an aim to maintain the overall environmental quality of the river. Government of Kerala has directed KERALA ENGINEERING RESEARCH INSTITUTE (KERI) to formulate scientific studies to generate data on the mineable sand in 44 rivers in Kerala State. During a meeting convened by at Secretary's (Water

Resources) chamber on 05.12.2016 for reviewing the methods available to assess the quantity of silt/sediment etc being deposited in the river beds and for assessing the quantity that can be allowed to be mined, Director, KERI opined that the sand auditing being conducted by the NGOs for Department of Revenue is not scientific as it is based merely on the level of water without taking into consideration the reduction in bed levels. Hence the volume of sand accounted for mining is not correct. Direction has been given to Chief Engineer, IDRIB and Director, KERI to submit a proposal specifying the technical method by which an assessment of the quantity of sand available in the river bed, the quantity of sediments being deposited and hence the quantity that can be allowed for mining.

KERI has decided to take Chaliyar River Basin for a pilot study. The objectives of this study are, To ensure that sand and gravel extraction is carried out in a sustainable way, To maintain the river equilibrium with the application of sediment transport principles in determining the locations, period and quantity to be extracted. The Chaliyar River is an essential element of life in Malappuram and Kozhikode Districts of Kerala State sustaining unique biotic assemblages, human communities, industry, and agriculture. It is the fourth longest river in Kerala having a length of 169 km and a total drainage area of 2,923 sq km out of which 2,535 sq km is in Kerala and the rest in Tamil Nadu. It originates in the Western Ghats range at Elambalari Hills located near Cherambadi town in the Nilgiris district of Tamil Nadu and empties into the Arabian Sea. The river has a few prominent tributaries: Cherupuzha River, Iruvanjippuzha River, Kuruvanpuzha River, Neerppuzha River etc. Chaliyar is one of the rivers which doesn't get dried up in the drought season. Many other rivers in Kerala get dried up during March and April. This river was in the news a few years ago because of the ecological damage caused by a pulp factory at Mavoor that released effluents into the river and affected the marine life. The purpose of this study is to provide a rigorous scientific foundation that quantifies the association between sand mining and equilibrium of riverbed in Chaliyar River Basin.



The methodology followed for sand auditing in these rivers are Mapping of the river channel, Ascertaining Pristine Condition of the Rivers, Sediment Sampling, Sediment Transport Model, Model Simulation, Result Analysis includes Sediment Spatial Plot, Sediment Time Series, Sediment Cross section Plot and Monitoring Plan. The mapping of the rivers can be performed by using modern equipments in Kerala Engineering Research Institute. River survey can be carried out by using Integrated Bathymetric System (IBS) and Sub bottom Profiler and banks can be surveyed by Smart Station. The most time consuming activity of river mapping (approximately 80% of the area) using sub bottom profiler can be conducted in monsoon season because it requires a minimum draft of 1m for boat. The suitable time for conducting mapping using Smart Station (remaining 20%) is non-monsoon period. Soil sampling can be carried out simultaneously with river mapping, determining pristine condition of the river using GIS techniques and Sediment Transport Modelling etc will take another one year. Hence duration of atleast 2years is required for the completion of the study provided that no other investigation works has to be carried out during this period. Since KERI is new to the field of Sediment Transport Modelling and this portion of the proposal is decided to outsource. NIT Kozhikode has already been involved in such studies using MIKE software. Our Institute had discussed with NIT Kozhikode and they expressed their willingness to collaborate with our Institution for a pilot study, which includes capacity building of our Engineers. KERI entrusted to do this works and the estimate has been prepared in collaboration with Sedimentation Division and Soil Mechanics Division of KERI, Kerala Land use board, rates attained from budgetary estimates from NIT Kozhikode, and approved estimates from IDRBN No. CE - 05 / 2008 Dated.04.05.2019.



C. SEDIMENTATION DIVISION

C.1 Introduction

The Kerala Engineering Research Institute, (KERI) Peechi, one of the pioneering research institutions of its kind in our country, plays a vital part in fundamental and applied research studies in the field of Civil Engineering. KERI conducts studies and research in the field of Civil Engineering for the State Government, Quasi Government Institutions and Private Organizations. The institute also undertakes project funded by organizations like Central Board of Irrigation and Power (CBIP), Indian National Committee for Hydraulic Research (INCH).

Sedimentation Division conducts studies to compute the present capacity of reservoirs and other water bodies. Such studies are conducted using modern electronic method called 'Integrated Bathymetric System' (IBS). In order to ascertain the underwater profile of the sediment layer a modern sophisticated instrument called 'Sub Bottom Profiler' is used. From 2004 onwards, KERI has completed 37 studies using IBS studies, which includes Mullaperiyar, Vembanad Lake and Kattampally Wetland. Sub Bottom profiler was used for 12 of the above studies, KERI constituted a team consisting

THE SURVEY TEAM

Director	Er.C.A.Jamaludheen
Joint Director	Er.M.Remma
Team Leader	Er.Shini K.K, Deputy Director
Technical Team	
Er.Roshni S S	Assistant Director
Francy V Antony	Research Assistant
Devidath S Punnakkal	Research Assistant
Ashok Kumar K S	Dept. Jeep Driver
Jayakumar T.R	Boat Driver



Equipments used

Sub Bottom Profiler

The system SES-2000 sub-bottom profiler, which is mobile parametric sediment sounder, was used for bathymetric and sub-bottom profiling survey. The SES- 2000 hardware component and transducers are shown in Fig 1 & 2.



Fig.1 Top- side Unit

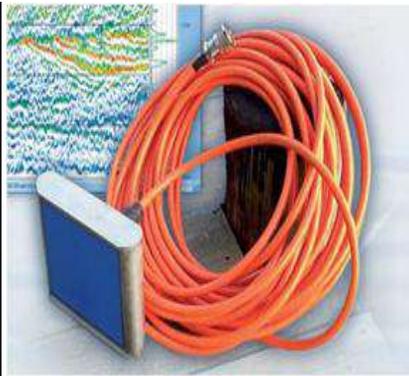


Fig.2 Transducer

DGPS SIMRAD MX-610

DGPS MX- 610 (refer Plate 1) is highly reliable and it receives correction from a permanent reference station, which is approved by Govt. of India, Dept. of Light house and Light ship. It can also track up to 12 satellites to achieve maximum positional accuracy. The received position is transferred to Echo Sounder.



Fig.3 MX610 Navigation System



MIDAS Surveyor Echo-sounder

The MIDAS Surveyor is a revolution of small boat survey work with an integral GPS receiver (plate 2). It logs and displays DGPS position data in WGS 84 or Local Grid. This Echo-sounder is designed to measure under water depth up to 1200m. Accuracy of instrument is 1centimeter. A dual frequency echo-sounder is specified to distinguish between fluff top depth and the consolidated bottom. The high frequency (200 KHz) is used to detect the top of the mud/sediment. Under favorable conditions the low frequency signal (33 KHz) can penetrate into the bottom and reveal information about the bottom structure.



Fig.4 MIDAS Surveyor Echo Sounder

FRP Boat (mobile station)

A Fibre Reinforced Plastic (FRP) boat with two 60 HP petrol out board engines is used as the Survey Boat. The boat has dimension of 7.5mX 2.66mX 1.20m and 8 persons capacity with the equipment. The boat with all the survey equipment is referred as the 'mobile station'. For the power supply, two solar panels of 80Watt each are mounted on the roof of the boat.





Fig.5 FRP Boat

Mobile station set up for data collection is shown in fig.6



Fig.6 Equipment set up inside the Boat

Software

- ❖ **Navisoft survey software**
- ❖ **Surfer software**
- ❖ **SESWIN for data acquisition in SES 2000**
- ❖ **I.S.E. 2.9.2 Post Processing Software**

DATA COLLECTION

The mobile station consists of the DGPS and its antenna, Echo sounder, Sub Bottom Profiler and the transducers, etc., is mounted on the FRP boat. The transducer of Sub Bottom Profiler is permanently fixed at the center of the boat. The transducer of Echo sounder is connected to the left side of the boat and is detachable. Proper connections are made between these equipment and the laptops for the data collection. The boat is sailed along the planned track with a speed of 3 to 4 knots. The data from the Echo sounder and Sub Bottom Profiler is collected simultaneously through two laptops as shown in fig.7 For IBS Survey, the laptop loaded with QINSY survey software is used. There are three modules in the Qinsy Software. Data Acquisition, Data Processing and Data export/import.



Fig.7 Data Collection set up inside the Boat

The system **SES-2000** (Sediment Echo Sounder) Sub Bottom Profiler is a parametric (non-linear) dual frequency echo sounder. The instrument simultaneously transmits two signals of slightly different high frequencies; their interaction creates a new low frequency signal. It has a large bandwidth and a short signal length, which allows good use in very shallow water and results a high (~15 - 20 cm) vertical resolution at acceptable sub-bottom penetration up to 10 m or more. Some favourable near sub-bottom seismic and geological conditions permit to achieve a vertical resolution up to 10 cm. Parametric (non-linear) sound generation allows designing acoustical systems with small transducer dimensions



and narrow sound beams at low frequencies. An Innomar SES-2000 parametric transducer has an active area of 20 by 20 cm and provides a beam width of less than four degrees (at 3dB), valid for all adjustable low frequencies between 5kHz and 15 kHz. The transmit directivity of the parametric sound beam does not show any significant side lobe characteristic, which reduces ambiguities during the interpretation of individual reflectors. Short transmit signals of single sinusoidal cycles without any ringing and high ping rates of up to 50 pings per second are further advantages. They contribute to a high spatial resolution of this acoustical system and permit to apply it in a shallow basin. Innomar's software tool ISE provides near real-time processing of the collected SES data. The operation procedure can be tuned on-line. A value of the sound velocity in water is used to convert sound travel time to the depth. The depth values are screened online.

Works carried out during 2018

Bathymetric Study of Biyyam Kayal in Malappuram District Using Integrated Bathymetric System

Sedimentation Division, of KERI conducts studies to compute the present capacity of reservoirs and other water bodies.

- *To quantify or determine the present capacity of Biyyam Kayal using IBS Integrated Bathymetric System (IBS).*

The work was started on 26/12/2018 and completed 16/1/2019.

STUDY AREA

Biyyam Kayal

Biyyam Kayal is a spread of backwaters near Ponnani town. This water body has high biological, ecological and socio economic relevance as far as the Malabar region of Kerala is concerned. Biyyam Kayal is in the downstream end of the kole lands. Kanjiramukku River originates from this Kayal and joints Arabian Sea at Puduponani through the 'Veliyancode Azhi. This backwater is connected to others by an artificial canal called 'Canoli Canal' formed for the navigation purpose. Biyyam Kayal is considered as the



earlier mouth of Bharathappuzha, which enters into the Arabian Sea at Munambam, 8km south of the present-day river mouth.

At the starting point of the river, there is a regulator with 24 shutters, which was constructed by the British in 1937, and since the installation of this regulator, Biyyam Kayal formed as a fresh water lake and it is one of the freshwater sources for the domestic and agricultural purposes of the people dwelling in this locality. This regulator at the upstream side of the river prevents saline water intrusion in to the kole lands. This kayal consists of about five islands (locally known as ‘Thuruthu’) in which ‘Alam Dweep’ is the largest. One small island called ‘Kakka Thuruthu’ which consists of only craws. In the monsoon season, this Kayal connects the Bharathapuzha through Canal called ‘Kundayar Thodu’.

Biyyam Bridge is a bridge that connects the Marancheri Panchayath and Ponnani Municipality (plate 7).



Fig.8 Biyyam RCB

During summer season, this Kayal is isolated from the Arabian Sea by the development of sand bar at the Kanjiramukku puzha river mouth, popularly known as ‘Veliyancode Azhi’. Due to this, during monsoon season the banks of Biyyam Kayal will be affected by flood and the local people breaks the barrier and allows the surface flow to the sea. (plate 8 & 9).

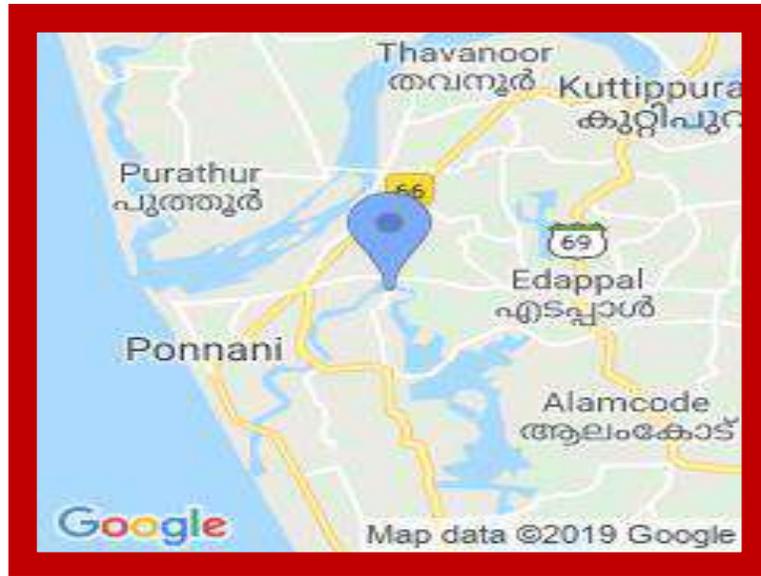


Fig.9

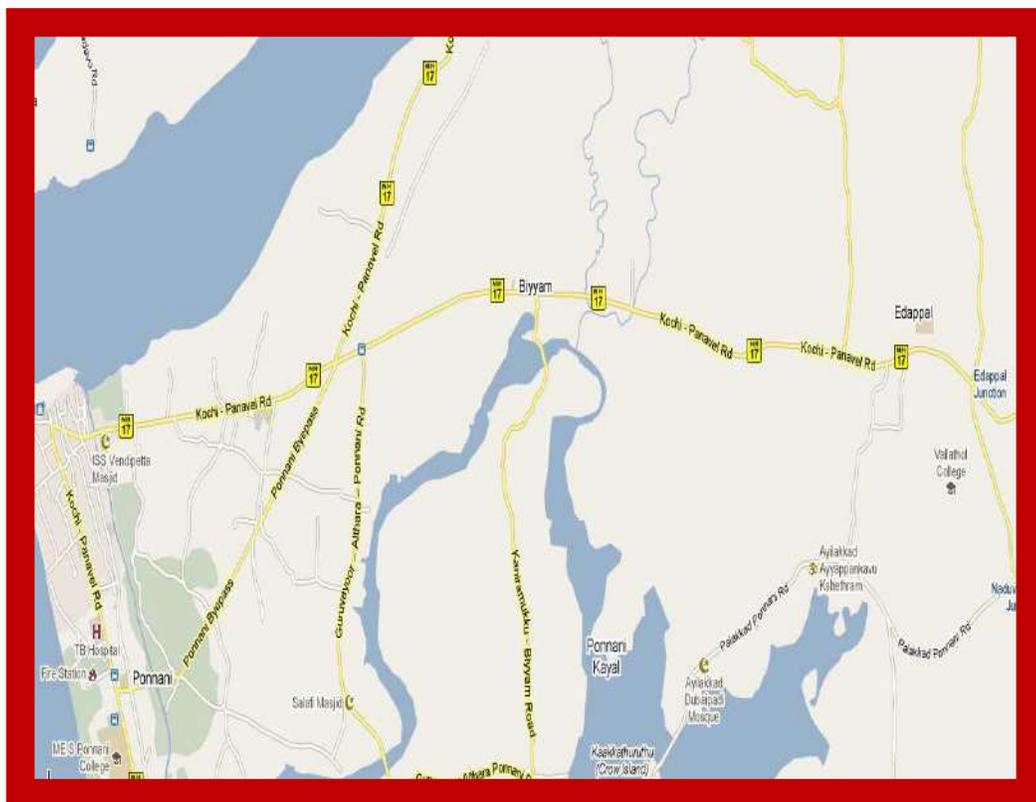


Fig. 10 Location Map of Biyyamkayal



Fig 11 View of Biyyam Kayal

4.1 HYDROGRAPHIC SURVEY

All the settings were done in the mobile station for the survey. Accurate positioning of the boat was reached using Global Positioning System (GPS).

By using the Qinsy software, chart is prepared by taking UTM co –ordinates, (Universal Transverse Mercator: -A special transverse Mercator grid which divides the world in to 6°zones of Longitude) at the two known points. With these co-ordinates of two points reference line is drawn. Segment lines are drawn parallel to this reference line at a particular interval such that the entire reservoir area can be covered.

The survey was conducted along the predetermined segment lines after setting the data logging software to record the data from the Echo Sounder at 2m intervals. The boat was sailed along the track maintaining a speed of 3 to 4 knots. The depth of water and its corresponding position is recorded successively at each point. The software enables generation of depth profile and overviews using the data recorded (fig 4.1).



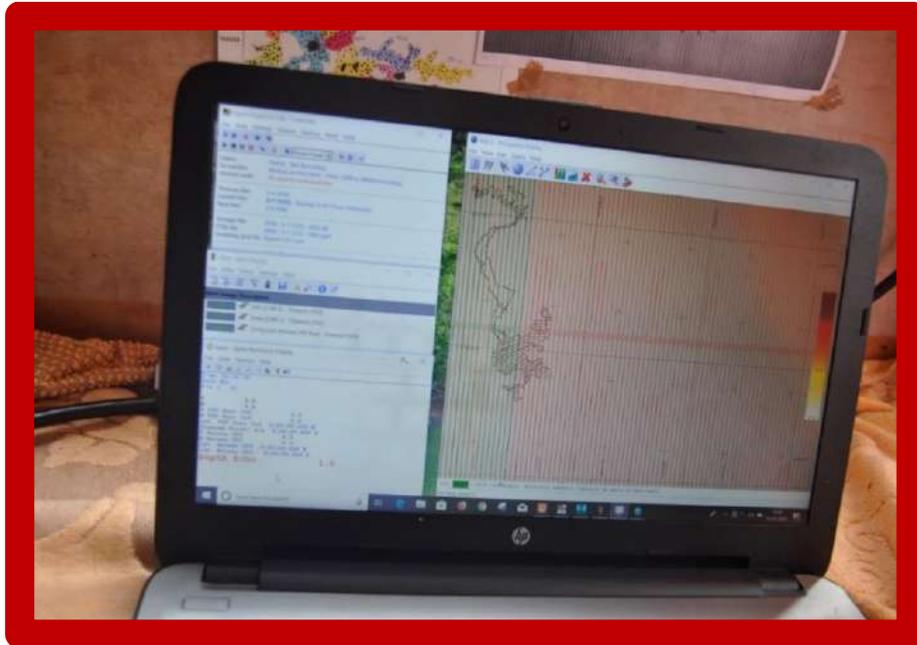


Fig.4.1 Data Acquisition in Qinsy

The data is then edited to eliminate spurious readings caused due to violent winds and waves using the Validator in Qinsy (fig 4.2,4.3,4.4, 4.5).

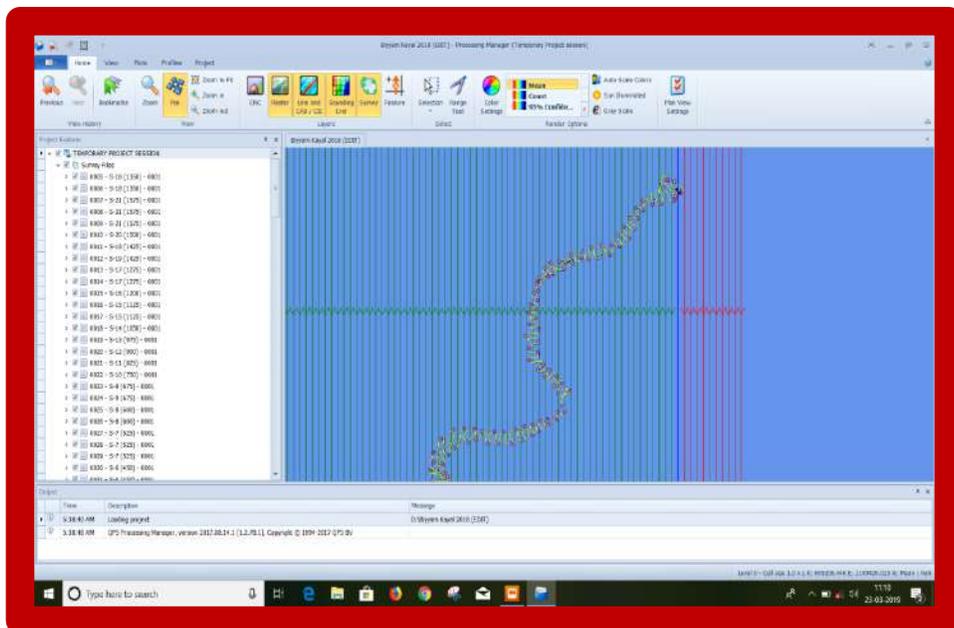


Fig.4.2 Down Stream side Data Processing



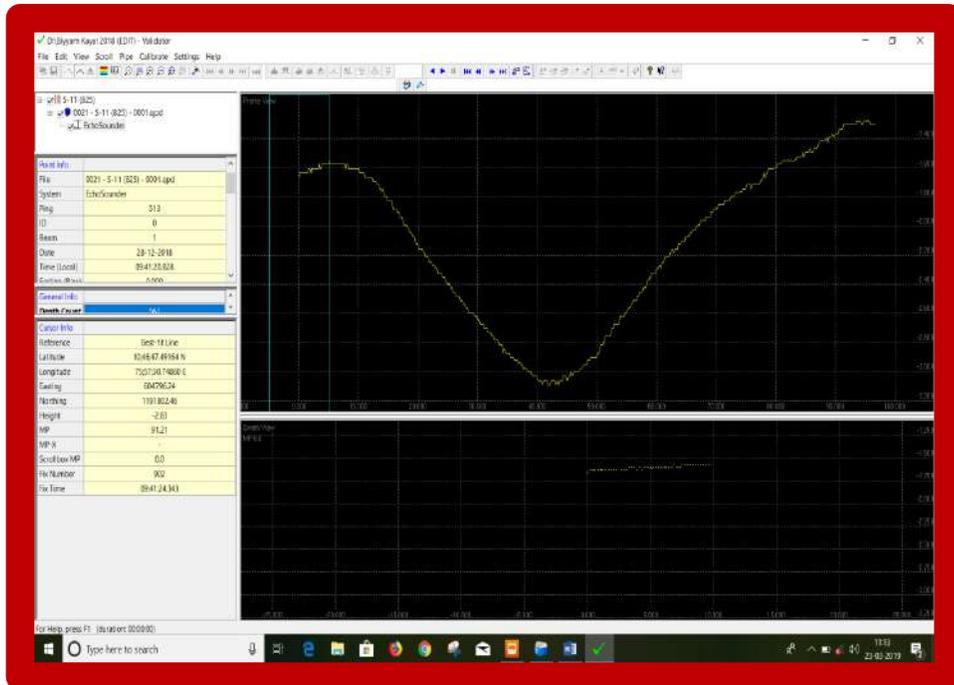


Fig.4.3 Data Validating in Qinsy

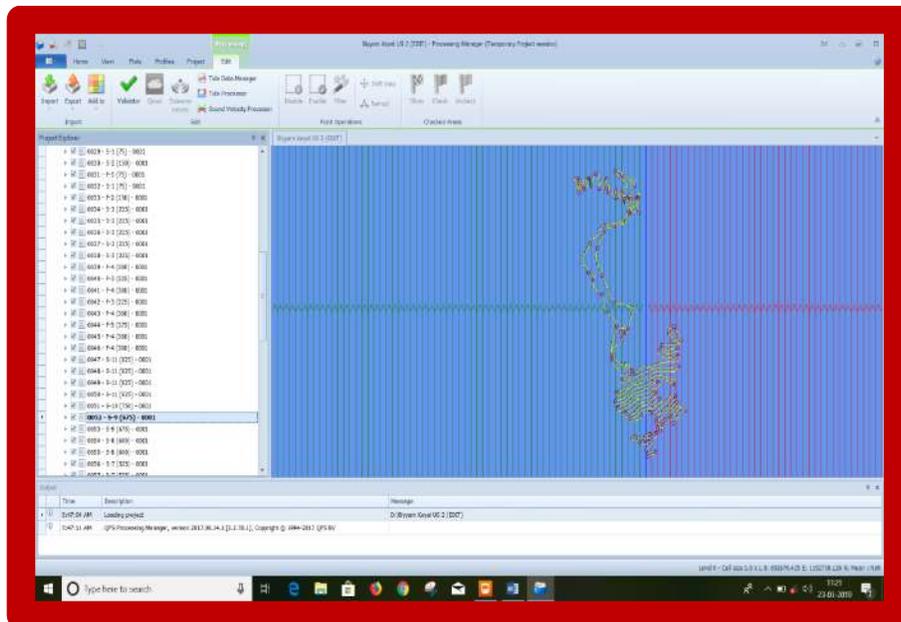


Fig.4.4 Up Stream side Data Processing



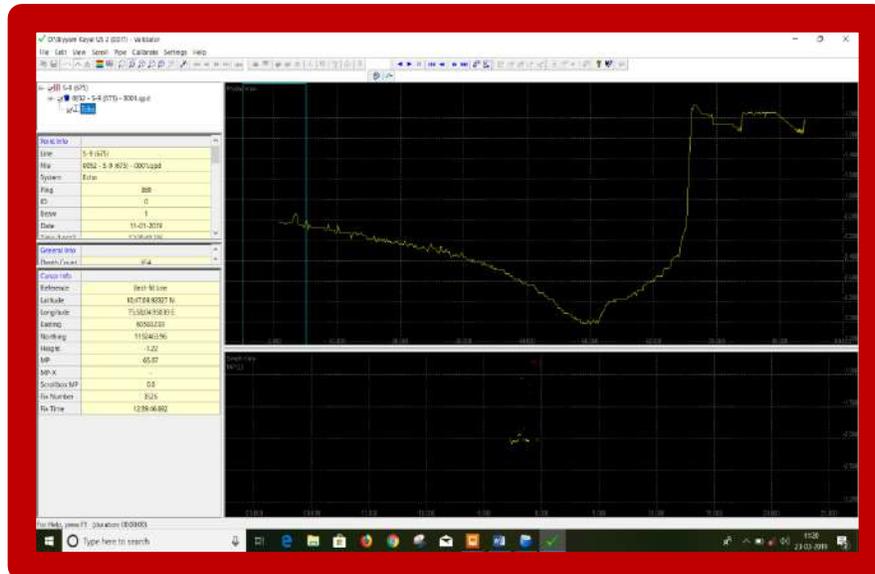


Fig.4.5 Data Validating in Qinsy

All the validated data are exported using Data Export program and it is processed in Surfer Software. This exported data converts in to grid data by triangulation with linear interpolation method.

Using the grid data contour maps are drawn and volume was calculated at specified intervals. Some portions, boat could not be sailed due to hyacinth etc. Hence a small motor fitted rowing boat has been used for the survey of balance portion. In this boat DGPS and depth measuring arrangements were fitted for the data collection(fig.4.6,4.7).



Fig.4.6 Data collection in motor fitted boat



Fig.4.7 KERI & CWRDM team at survey work

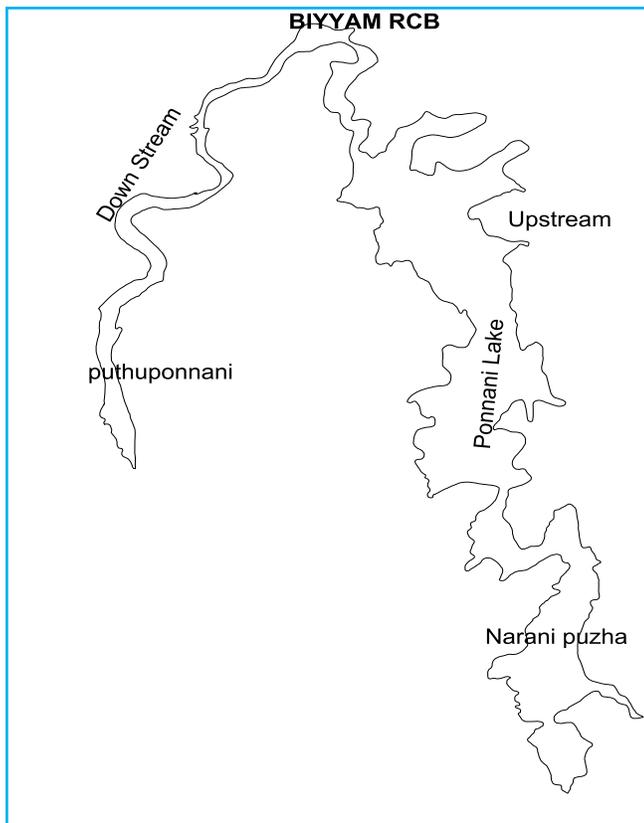


Fig.4.8 Water Spread area map of Biyyam Kayal

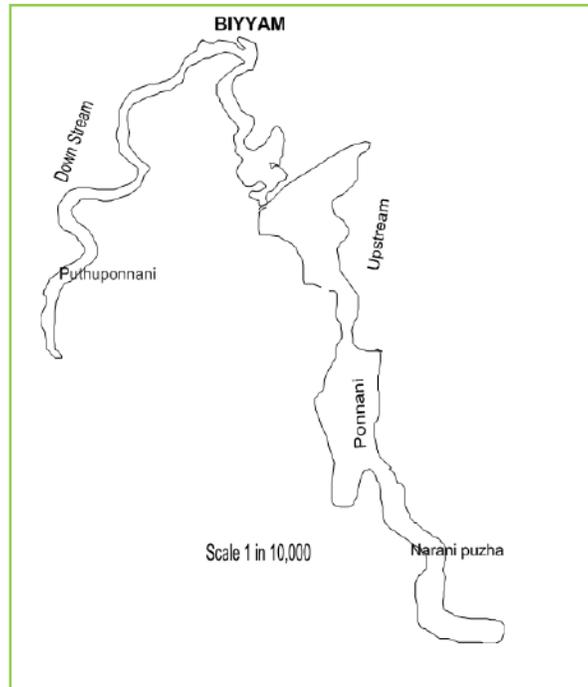


Fig.4.9 Water Spread area map of surveyed portion

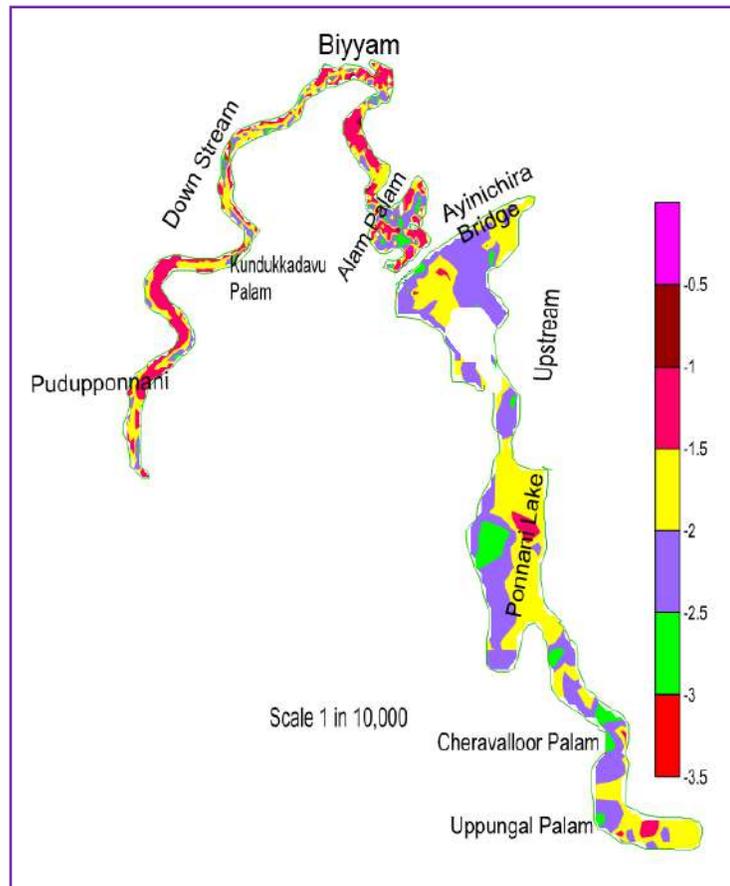


Table-1 Present capacity of the Surveyed portion

Level (m)	Capacity (Mm ³)	Area (Sq.km)
1.14	23.706	7.79

5. ESTIMATION OF CAPACITY

The Water Spread area of the surveyed portion at water level 1.14m from MSL is estimated as 7.79 Sq.km and the corresponding volume is 23.706 Mm³.

The survey could not be carried out through the entire portion due to low water level, hindrance of hyacinth, existing damaged bund road etc. From the geo referenced toposheet of whole area of Biyyam Kayal is 15.28Sq.km.

7 CONCLUSION

The Bathymetric survey of Biyyam Kayal is conducted from 26th of December, 2018 to 16th January, 2019. The survey was conducted using IBS and the results are reported here in. The survey was carried out at the water level 1.14m from MSL and the volume has been found out the same level.

2. Sedimentation Study of Peechi Reservoir Using Integrated Bathymetric System & Sub Bottom Profiler (Repeat study)

Sedimentation Division, of KERI conducts studies to compute the present capacity of reservoirs and other water bodies

- ✚ *To quantify or determine the present capacity of Peechi reservoir using IBS.*
- ✚ *To find the quantity of sediment and its Distribution in the reservoir using Sub Bottom Profiler.*
- ✚ *To compare the present result with the previous study result, for analyzing the chronological sedimentation behavior of the reservoir.*



SALIENT FEATURES OF PEECHI RESERVOIR

Dam

Length of Dam	:	213.360 m
Bed Level of Dam Site	:	+ 29.620m
Crest Level of Spillway	:	+ 76.200m
Top Level of Dam	:	+ 80.470m
Top Width of Dam	:	4.270m
Full Reservoir Level	:	+ 79.250m
Maximum Water Level	:	+ 79.250m
Number of spillway Gates	:	4 Nos.
Size of Spillway	:	10.06mX3.95m
Type of Spillway	:	Ogee overflow type
Type of Dam	:	Gravity type with RubbleMasonry
Catchment Area	:	107.09 Sq.km.
Water spread Area	:	12.95 Sq.km
Maximum Storage	:	110.436 M.cum
Live storage	:	108.150 M.cum.
Dead storage	:	2.28.M.cum.
Dead storage Level	:	53.34 M.

Irrigation Outlets	Sill Level	Size of Outlet	Discharge
Right Bank	+56.390.m	1.220m@	7.08 cum.
Left Bank	+67.060.m	0.910.m@	3.54 cum
Thrissur Water Supply	+53.340.m	0.610.m@	

Canal System

i	Right Bank Canal	:	
	Total Length of Main Canal	:	37Km
	Bed Width of Main Canal	:	3.66m
	Total Length of Branch Canal	:	75.64Km
ii	Left Bank Canal	:	
	Total Length of Main Canal	:	45.06Km
	Bed Width	:	3.66 to 2.74.m
	Total Length of Branch Canal	:	65.98Km



Data collection completed. Report under preparation

3. Sedimentation Study of Chimmoni Reservoir Using Integrated Bathymetric System & Sub Bottom Profiler

Sedimentation Division, of KERI conducts studies to compute the present capacity of reservoirs and other water bodies

To quantify or determine the present capacity of Chimmony Reservoir using IBS.

- *To find the quantity of sediment and its Distribution in the reservoir using Sub Bottom Profiler.*
- *To compare the present result with the previous study result, for analyzing the chronological sedimentation behavior of the reservoir.*
- *To Study the soil particledistribution from the various parts of the reservoirs*

SALIENT FEATURES

1	Name	:	CHIMONI DAM
2	Location	:	
	Longitude	:	76° 28' E
	Latitude	:	10° 26' N
3	Year of starting	:	
4	Year of completion	:	1996
5	Type of Dam	:	Gravity type with Rubble Masonry dam & Earthen dam
6	Full Reservoir level (FRL)	:	79.400 MSL
7	Catchment area	:	72.13 Sq.km
8	Dead storage	:	2.85Mm ³
9	Water spread area at FRL	:	10.10.Sq.km
10	Maximum Storage	:	176.78M.Cum
11	Maximum water level	:	79.700 MSL
12	Live Storage	:	176.39 M.Cum
13	Dead Storage level	:	40.00 MSL
14	Length of Masonry Dam	:	495.00 m
15	Length of Earthen Dam	:	686.50 m
16	Bed level of Dam	:	28.380 MSL
17	Crest level of Spill way	:	72.20 MSL
18	Top level of Masonry Dam	:	81.200 MSL
19	Top level of Earthen Dam	:	82.700 MSL
20	Top width of Dam	:	5.000m
21	Spillway length	:	40.00 m
22	Type and size of shutter	:	4 No's Radial 10.00 X 7.50m each
23	Purpose	:	Irrigation



Data collection completed. Report under preparation

4. Sedimentation Study of Walayar Reservoir Using Integrated Bathymetric System & Sub Bottom Profiler (Repeat study)

Sedimentation Division, of KERI conducts studies to compute the present capacity of reservoirs and other water bodies

- ✚ To quantify or determine the present capacity of Walayar reservoir using IBS.
- ✚ To find the quantity of sediment and its Distribution in the reservoir using Sub Bottom Profiler.
- ✚ To compare the present result with the previous study result, for analyzing the chronological sedimentation behavior of the reservoir.
- ✚ To Study the soil particledistribution from the various parts of the reservoirs.

Salient Features

1	Name	:	Walayar
2	Location		
	Longitude		76° 42'E and 76° 50'E
	Latitude		10° 43'N and 10° 52'N
3	Year of starting		1953
4	Year of completion		1956
5	Type of Dam		Masonry dam flanked by earthen dams
6	Length of Earth Dam		1329.00m
7	Length of Masonry Dam		150.00m
8	Catchment area		106.355 Sq.Km
9	Maximum storage		18.40 Mm ³
10	Dead storage		3.212Mm ³
11	Water spread area		2.59 Sq.Km
12	Maximum water level		203.00m from MSL
13	Purpose		Irrigation and drinking

Data collection completed. Report under preparation



5. Sedimentation Study of Kuttiyadi Reservoir Using Integrated Bathymetric System & Sub Bottom Profiler (Repeat study)

Sedimentation Division, of KERI conducts studies to compute the present capacity of reservoirs and other water bodies

- ❖ *To quantify or determine the present capacity of Kuttiyadi reservoir using IBS.*
- ❖ *To find the quantity of sediment and its Distribution in the reservoir using Sub Bottom Profiler.*
- ❖ *To compare the present result with the previous study result, for analyzing the chronological sedimentation behavior of the reservoir.*
- ❖ *To Study the soil particledistribution from the various parts of the reservoirs*

Salient Features

1	Name	:	Kuttiyadi
2	Location		
	Longitude		75° 49' 27" E
	Latitude		11° 36' 45" N
3	Year of starting		1962
4	Year of partially commissioning		1973
5	Year of completion		1993
6	Type of Dam		Masonry dam flanked by earthen dams
7	Length of Earth Dam		1844.00m
8	Length of Masonry Dam		170.00m
9	Catchment area		108.78 Sq.km
10	Maximum storage		120.520 Mm ³
11	Dead storage		7.28Mm ³
12	Water spread area		10.52 Sq.km
13	Maximum water level		44.41m from MSL
14	Purpose		Irrigation and drinking

Data collection completed. Report under preparation



6. Sedimentation Study of Bhoothathankettu Reservoir Using Integrated Bathymetric System & Sub Bottom Profiler

Sedimentation Division of KERI conducts studies to compute the present capacity of reservoirs and other water bodies

- ☞ *To quantify or determine the present capacity of Boothathankettu reservoir using IBS.*
- ☞ *To find the quantity of sediment and its Distribution in the reservoir using Sub Bottom Profiler.*
- ☞ *To compare the present result with the previous study result, for analyzing the chronological sedimentation behavior of the reservoir.*
- ☞ *To Study the soil particledistribution from the various parts of the reservoirs*

Data collection completed. Report under preparation

D. CONSTRUCTION MATERIALS DIVISION

D.1 Introduction

Construction Materials Division is one of the sub units of Kerala Engineering Research Institute (KERI) basically engaged in material testing. Testing of construction materials is an essential part for ensuring quality in construction. In addition to the testing of Irrigation dept works, other Government agencies and Private agencies such as Indian Railways, Cochin Shipyard, P.W.D., C.P.W.D., Cap India construction etc., are utilizing the facilities of lab for ensuring quality construction. The CM Laboratory continued to contribute healthy revenue every year to the Government through various tests conducted for clients. The Lab is also functioning as a training centre of the Irrigation Department and providing training programmes and refresher courses for the benefit of department engineers. The training facility extends to other department engineers also. In



addition, the Lab is on the process of accreditation from NABL which will boost up the status of the Lab and likely to increase the revenue to Govt.

Construction materials division of KERI deals with testing of construction materials such as cement, aggregates, steel, tiles, bricks, rock, concrete etc and design of concrete mixes. Also research activities are conducting at this division as and when required. The essentials tests for getting the physical properties of above materials are carrying out at this lab. During the year 2018-19, tests were conducted for 396 samples of concrete cubes, 84 samples of steel rods, 32 samples of aggregates, 9 samples of rock core, 40 samples of solid blocks, 64 samples of paver blocks, 16 samples of cement, 32 samples of bricks, 15 samples of tiles, 5 samples of GI Pipes, 9 samples of hollow circular galvanized steel in this lab. 11 nos Mix designs were carried out for various agencies.

Modernizing the lab will come true through with the addition of modern instruments which is a must for any Material Testing Lab. The modern equipments for ascertaining the strength of concrete structures using Non Destructive Techniques were available and will help to solve the practical problems arising in the field and creating awareness among the engineering fraternity. The lab is equipped with basic NDT instruments like Pile Integrity Test, Rebound hammer etc. These non destructive tests are being conducted to check the strength and deformation characteristics of the existing structures. Pile Integrity tests were carried out for 9 piles.

Two Hundred and fifty nine test reports were shaped from this division during the Financial year 2018-2019 earning a revenue of Rs. **6,93,586/-** (Rupees Six lakh ninety three thousand five hundred and eighty six only). These materials were brought by various government as well as private entities.

D.2 Test conducted

Details of test conducted during the year 2018-19 are given in Appendix-III

D.3 Field work conducted during the year 2018-19



1. Testing of Pile echo test in Bhavikkara ,Kasargode
2. Testing of Pile echo test in Palayivalavu,Kasargode

D.4 Other Activities

1. Participated in the DPR preparation of Attappady Valley Irrigation Project.
2. Process of NABL Accreditation
3. Completed Steel structural roofing over KERI Laboratory building
4. Completed Works required for NABL accreditation of Construction Materials Division- Renovation works



View of KERI Lab building **before** completion of Works required for NABL accreditation of Construction Materials Division



View of KERI Lab building **after** completion of Works required for NABL accreditation of Construction Materials Division



View of KERI Lab building **after** completion of Steel structural roofing

E. SOIL MECHANICS AND FOUNDATIONS DIVISION

E.1 Introduction

Soil, the most unpredictable of all engineering materials also happens to be the all important material in civil engineering because all structures need to be founded on earth. In addition to being the founding medium, soil is also used as a material of construction. As in the case of other materials, properties of soil cannot be generalized since basically soil is a combination of different constituents having different properties. Therefore the study of the technical and structural aspects of soil is all important.

Major difficulties encountered in foundation work are due to the nature of soil. The investigation for any foundation engineering problem may range from a simple examination of soil to a detailed study of the soil and ground water by means of bore holes and laboratory tests on the materials encountered. The extent of the work depends on importance and foundation arrangement of structures, the complexity of the soil conditions and already available information of existing foundations on similar type of soils.

The physical characteristics of soils can be investigated by means of laboratory tests on samples taken from boreholes or trial pits. Results from lab tests can be used to derive important parameters in the design of substructure. The results of shear strength tests can be used to calculate the ultimate bearing capacity. Soil parameters so obtained by means of investigations can be utilized to design safe structures.

Soil Mechanics Laboratory under K.E.R.I. is fully equipped to determine the index as well as the engineering properties of soil samples. It covers Soil Mechanics, Soil Dynamics, and Ground improvement Techniques. The soil



mechanics laboratory undertakes work from Government agency and private agencies.

Analysis of engineering problems such as bearing capacity computations, settlement analysis, stability analysis of slopes etc. are taken up by this Division.

During investigation, the soil samples are collected and tested in the laboratory, for finding out index properties and engineering properties like Maximum Dry Density, Optimum Moisture Content, Permeability, Shear parameters, Consolidation and Swelling characteristics and relevant parameters are furnished to design the proposed structures. The laboratory is assisted by the Instrumentation Division which is equipped with field testing equipment for boring to collect undisturbed soil samples.

All the tests on soil samples received from various projects of Irrigation Department, Roads and Buildings, Panchayat Raj, Public Health, Kerala State Electricity Board, Housing Board and Non-Government bodies are being tested as per the codes of Bureau of Indian Standards.

Twenty four test reports were shaped from this division during the Financial year 2018-2019, earning a revenue of Rs.5,10,000/- (Rupees Five lakh Ten thousand only).

E.2 INFRASTRUCTURE

The important equipments available in the laboratory are

- i) Direct Shear Test apparatus
- ii) Tri-axial Shear Apparatus
- iii) Consolidation Apparatus



- iv) Uni-axial testing Apparatus
- v) Constant head permeability test apparatus
- vi) Variable head permeability test apparatus
- vii) Laboratory CBR test apparatus
- viii) Automatic Compactor
- ix) Casagrande Apparatus

E.3 LABORATORY INVESTIGATION

The list of works carried out in the lab during the current year is given in Appendix IV.

E.4 ONGOING WORKS

- E.4.1. Testing of soil samples – Sedimentation study of Bhoothathankettu Reservoir using IBS & sub Bottom profiler



F. INSTRUMENTATION DIVISION

F.1 Introduction

Instrumentation Division acts as the mobile unit of Soil Mechanics Division and conducts various field tests. The foundation is the lowest part of a structure. It transmits the load to the soil below. The extent of exploration depends on the importance of the structure, the complexity of the soil conditions and the budget available for exploration. A detail soil exploration programme involves deep boring, field tests and laboratory tests for determination of different properties of soils required for the design of any structure. Site investigation is essential for judging soil suitability for proposed engineering work and preparing adequate design. It also helps for selecting suitable and economic construction materials as well as methods. Site exploration reveals reliable information about soil and ground water which will help the Engineer for an intelligent planning.

Bore hole drilling:– Making Bore holes is commonly used method for field investigations and they are executed by various devices ranging from simple hand operated augers to drilling machines.

1) Instrumentation division is in possession of two rotary type clayx type drilling machines. These machines are used for drilling in soil, soft rock and hard rocks for a depth of 50 m to 60m. SPT Tests are also conducted during the process of drilling. Disturbed and undisturbed samples are also collected during the course of drilling. Drilling in rocks is carried out by using diamond core bit. The samples collected are transferred to SM& F Division for carrying out various tests in soil for finding the engineering properties.

2) Insitu vane shear test apparatus – Insitu vane shear test apparatus instrument is used for conducting insitu vane shear tests to determine the shear characteristics of the soil.



3) Permeability tests – Instrumentation division also in possession of screw pumps and other related accessories for conducting field permeability tests of hard rock strata. Permeability tests have not yet been carried out by this division.

Soil samples are taken from sites on request and are transferred to Soil Mechanics and Foundation Division for testing. The following field tests are conducted by this division.

1. Standard Penetration Test.
2. Dynamic Cone Penetration Test.
3. Collection of disturbed and undisturbed soil samples by hand auger and machine boring.
4. In situ Vane Shear test

F.2. Activities of the division during the current year

This Division took part in the following work.

F.2.1. Construction of Regulator across Ummanchira River at Chekku Palam in Pinarayi Grama Panchayath in Kannur District – Balance works for two bore holes

The above investigation work has been carried out during the year 2017 – 2018. But the work could not be finished due to field conditions and hence the balance portion is taken up during this year. AS and TS was for an amount of Rs.1,55,000/- and the expended amount for the work was 139456/- under the head of account 4700-80-005-99-02-00-V (INVESTIGATION OF MAJOR IRRIGATION SCHEMES).

F.2.2. Soil Investigation works for the Proposed structure at ch 4800 m of Left Bank Main Canal of Karapauzha Dam in Wayanad District

The above investigation work has been taken on the Site available for the construction of proposed structure in ch 4800 m of left bank main canal of karapauzha dam where canal



and retaining wall breached during the flood in 2019. Total investigations were carried in 8Nos. of Bore holes. The Investigation work was carried out from 14/11/2018 to 8/12/2018. Total amount expended for the works is Rs 2,76,002/-. FS, AS, TS was for an amount of Rs 3,15,000/- under the head of account 4700-80-005-99-02-00-V (INVESTIGATION OF MAJOR IRRIGATION SCHEMES).

F.2.3 Soil Investigation works for the proposed aqueduct chainage 19/600 to 20/600, LBMC, Peechi Irrigation Project

The above investigation work was carried out as per the letter of assistant executive engineer, Head works Sub Division, Thrissur no.D3-1175/2018/ Flood Damage dated 6/10/2018. The above works were carried for the proposed aqueduct chainage 19/600 to 20/600, LBMC, Peechi Irrigation Project where canal is breached due to the land sliding. Total no of bore holes is 5. The Investigation work was carried out from 9/12/2018 to 25/12/2018. Total amount expended for the works is Rs.1,28,481/-. FS, AS and TS was for an amount of Rs.1,80,000/- under the head of account 4700-80-005-99-02-00-V (INVESTIGATION OF MAJOR IRRIGATION SCHEMES).

F.2.4. Investigation for proposed project Reconstruction of damaged bund of Ettadi Kulam- Chullimada branch canal of Kaundan Canal at Chullimada, Pudussery Panchayath, Walayar, Palakkad

The above investigation work was carried out as per the letter of Executive Engineer, Irrigation Division, Chittoor No.A5-3105/2018 Dated 14/12/2018. The above investigation work has been taken in damaged bund of Ettadi Kulam-Chullimada branch canal of Kaundan Canal at Chullimada, Pudussery Panchayath, Walayar, Palakkad. 5 bore holes were drilled during the period from 5/02/2019 to 14/02/2019. Total Amount Expended is Rs. 94,281/-. FS, AS & TS was for an amount of Rs 95,000/- under the head of account 4700-80-005-99-02-00-V (INVESTIGATION OF MAJOR IRRIGATION SCHEMES).



F.2.5. Soil investigation of various works for irrigation Department-Construction of river regulator in the downstream of Enamakkal regulator at Kolumad.

The above investigation work was carried out as per the letter of executive engineer, Additional irrigation Division, Thrissur no.D5-61/2016 (Vol-9) dated 26/04/2017. The above investigation work has been taken to the construction of river regulator in the downstream of Enamakkal river cum bridge at Kolumad. The total no of bore hole drilled is 12 NOS. Investigation work was carried out from 19/01/19 to 23/03/2019. AS and TS was for an amount of Rs 6,00,000/- Amount expended for this works is 5,96,983/- Under Head of A/C – 4701-80-800-99-00-00-PV- Development of KERI .

F.2.6. Soil investigation works in the breached portion of main canal in Poomala Dam

This work was entrusted with KERI vide letter No.D3-2529/2018 Dated 11/10/2018 received from Executive Engineer, Minor Irrigation Division, Thrissur for carrying out Soil Investigation in the breached portion of the main canal of Poomala dam. Amount expended was for the work was from the saving in the works “Demonstration work for sampling from reservoirs using assembled sampler including labourers”.

F.2.7 Assembling and Allied works for works on trial basis like sample collection unit for Desiltation of Reservoirs etc in coordination with Mechanical wing.

Fabrication of gravity corer indigenously in coordination with mechanical wing was done for sample collection from reservoirs. AS and TS was for an amount of Rs.2,50,000/-, Amount expended for the works is Rs.1,92,340/- Under Head of A/c – 4701-80-800-99-00-00-PV-Development of KERI .

F.2.8 Demonstration work for sampling from reservoirs using Assembled sampler including labourers.

Demonstration of the Gravity core sampler was done in Koulmad area. Necessary modification and rectification were need to carried out in the equipment for these sample collection unit area. AS and TS was for an amount of Rs 1,00,000/- Amount expended for



this works is 97,539/- under Head of A/C – 4701-80-800-99-00-00-PV- Development of KERI .

F.2.9 Redesign and Development of Official website of Kerala Engineering and Research Institute

Website was designed in the CMF version of Joomla 1.5 which had become outdated. It was found that our website is vulnerable to external attacks and there are chances of the website being hacked. Provision has been provided for to publish the results of various Divisions in the digital platform. Therefore Redesign and Development of official website is essential. AS and TS was for an amount of Rs 2,00,000/- Amount expended for this works is 1,56,940/- under Head of A/C – 4701-80-800-99-00-00-V- Development of KERI .

F.3. Infrastructure

The important equipments available in the Division are

- Equipments for hand augering.
- In situ Vane shear test apparatus
- Diesel boring plant.- 2 No.s
- Gravity corer sample collector unit





Boring works in KARAPAUZHA



Boring works in KARAPAUZHA



Boring works in KARAPUZHA



Setting of plant in PEECHI



Setting of plant in PEECHI



Boring works in PEECHI



Boring works in WALAYAR



Boring works in WALAYAR



Boring works in WALAYAR



Boring works in KOLUMAD



Boring works in KOLUMAD



Boring works in KOLUMAD



Boring works in POOMALA



Demonstration work in sampling



G. PUBLICATIONS WING

G.1 Introduction

Publications Wing is acting as the information bureau of the Kerala Engineering Research institute. This wing provides necessary technical information to all other divisions through its technical library containing around 10000(ten thousand) books and a number of latest periodicals. This wing conducts seminars and training programmes for the benefit of staff of the Institute. Also, the wing conducts Trainings and Refresher courses for the staff of the Irrigation Department. Publications Division was deployed with effect from 31/01/2017 and the activities are now being taken up under Instrumentation Division.

G.2 Activities of the Wing

During the financial year 2018-19 the main areas of work attended by this wing are:

- ❖ Maintenance and development of Library.
- ❖ Editing and publishing of Annual Report 2017-18.
- ❖ Conducting Seminars for the benefit of the technical hands and staff in the institute.
- ❖ Conducting training programme for the Engineers and technical staff of the department.
- ❖ Routine works of Publications Wing.

G.3 Library Service

This Wing has an excellent technical library attached to it. Latest publications on topics of interest to research workers are being regularly added. The library is being used by many technical persons in different Government Departments and also by a number of students from different Engineering Colleges and Polytechnics. Books are issued to officers attached to KERI using Library software. The card system is also being



maintained. However, facilities are extended to Engineers working in various Departments and Institutions for referring the books.

The books are arranged in different shelves according to the subjects



G.3.1 Library Books

15 books were purchased to the library during this financial year.

G.3.2 Periodicals

A total of 7 numbers of Indian periodicals were subscribed by this Wing. The following journals were purchased by subscription during the year.

G.3.2.1. Indian Periodicals

1. Indian Concrete Journal
2. Electronics for You
3. Indian Journal of Power & River Valley Development
4. Civil Engineering and Construction Review
5. Master builder
6. Down to earth



G.4 Publication of Annual reports

Annual Reports for 2017-18 was published and copies were sent to important institutions and personnel.

G.5 Seminar Programme

Sl. No.	Title of paper	Name of speaker	Date
1	“Hydrological Analysis for Assessing Safety of Peechi Dam”	Er.Sufeera O.B, Assistant Director I, Coastal Engineering Division, KERI,Peechi.	18/09/2018
2	Malayalam Typing	AjayakumarV.N., LD Typist,SM & F Division, KERI,Peechi.	26/09/2018
3	Coastal reservoirs –A novel strategy for future water resource department	Er. Siji T.V, Assistant Director I , CM Division,KERI,Peechi.	12/12/2018
4	Launching of KERI MIX a product of KERI by Director, followed by a presentation.	Dr. Santhosh Kumar, Deputy Director, CM Division, KERI,Peechi.	21/02/19
5	Training programme on GST Assesment	Sri.Biju Jacob, Superintendent (CGST).	5/03/19



H. TRAINING PROGRAMME CONDUCTED BY KERI

H.1. Training programme on “Engineering Seismograph and Tomography” was conducted at KERI, 2 days on 31-01-2019 & 1/02/2019 for the Overseers and Engineers in KERI. The classes were taken by Er. Jessy Ann Francis, HOD, Civil Engineering department, Lourdes Matha College of science and Technology.





H.2. One day workshop on “Quality Aspects on works” was conducted at KERI on 7/03/2019 for the Overseers, under Quality control Divisions, of Irrigation Department. Fifty two (52) Delegates participated in the Programme. The classes were taken by Er. Babu M.S, Assistant Engineer, Quality Control Section, Thrissur and Er. Siji T.V., Assistant Director, Construction Materials Division, KERI, Peechi.





H.3 Conducting training on Smart Station to the Engineers of Irrigation department

The Director, F& AR, KERI, Peechi has given direction to conduct training to Engineers of Irrigation Department about Smart station equipment in the Coastal Engineering Division, its relevance in the field of investigation surveys. So this work proposed for conducting specialized training on Smart Station with theory and practical sessions to the Engineers of Irrigation Department. The training was planned for 3 batches of 30 nos each at three locations to accommodate engineers from all zones. 1st training programme on Total Station Survey for 2 days to engineers in Irrigation Department at KERI, as per the order no. PL6(B) 40529/2018 dated 01.12.2018 of Chief Engineer, Irrigation and Administration, Thiruvananthapuram. As the program was scheduled for two days, only an introduction to the instruments could be done. At present there is only one Total station instrument is available in this division, hence we hired a Total station instrument for practical session. As per the feedback from the participants, they got a brief idea but they required a practical real field survey with more duration from start to end with an output file and also a group of 4 to 5 members shall be limited to one instrument. 2nd training conducted with total 20Nos. participants for 3days. A practical class with an assignment has been done and drawings of the area surveyed were also plotted and presented.





H.4. Training programme on “ Modern Sophisticated Electronics System- IBS & Sub Bottom Profiler was conducted by Sedimentation Division, KERI Peechi, 2 days on 12-03-2019 to 13/03/2019 for the Engineers of Piravom Circle at IB ,Boothathankettu.





The following Officers attended training during the year 2018 - 2019, KERI, Peechi

Sl. no	Name	Designation	Name of Training course
1.	Dhanya .K.S	Assistant Director I, Sedimentation division, KERI, Peechi.	Training on Applied hydrology on 23/2/2019
2.	Deepa .R	Deputy director , Coastal Engineering Division, KERI, Peechi	HEC-HMS and HEC-RAS at Hydrology Training Center Thrissur(NHP) on 18/12/2018 to 22/12/2018
			Tomography Training, KERI Peechi on 31/01/2019



3.	Sufeera O B,	Assistant Director I,Coastal Engineering Division, KERI,Peechi.	Modellers Meet at Delhi on 26/07/2018 to 27/07/2018
			HEC-HMS and HEC-RAS at Hydrology Training Center Thrissur(NHP)on 18/12/2018 to 22/12/2018
			Training on Applied Hydrology at Hydrology Training Center Thrissur 23/02/2019
			Tomography Training, KERI Peechi on 31/01/2019
4.	Snisha.T B	Assistant Director ,Coastal Engineering Division, KERI,Peechi.	Tomography Training, KERI Peechi on 31/01/2019
			Training on Applied Hydrology at Hydrology Training Center Thrissur 23/02/2019
5.	Sri.P.V.Jacob	Assistant Director ,Hydraulics Division,KERI,Peechi.	Training in Hydrology From 2018 November 27 to November 29
6.	Smt. Sheeja P.K	Third Grade Overseer,Hydraulics Division, KERI,Peechi	Induction Training program From 2018 July 9 to July 13
7.	Dr. Santhosh Kumar P.T.	Deputy Director, CM Division, KERI,Peechi.	Design of dams and appurtenance structures at NIT Kozhikkode during 07.01.19 to 09.01.19.
			Micro Irrigation at Hydrology Training Centre during 07.02.19 to 08.02.19.
			training on Applied Hydrology at Hydrology Training Centre on 23.02.19.
8	Siji T.V	Assistant Director, CM Division, KERI,Peechi.	HEC-HMS and HEC-RAS at Hydrology Training Center Thrissur(NHP)on 18/12/2018 to 22/12/2018
9.	Vinitha K.	IIIrd Grade Overseer, CM Division, KERI,Peechi	Induction training to overseers at IMG, Thiruvananthapuram during 11.02.19 to 16.02.19.
10	Joyal Scariya	Assistant Director, SM Division, KERI, Peechi	“e-SWIS and Discharge Measurement Techniques” at Irrigation Management Training Institute,Trichy during 24/10/2018 to 27/10/2018



11	Saju Varghese	Assistant Director, Instrumentation Division, KERI, Peechi.	HEC-HMS and HEC-RAS at Hydrology Training Center Thrissur(NHP)on 18/12/2018 to 22/12/2018 Training on Applied hydrology at Hydrology Training Center Thrissur on 23/2/2019
----	---------------	---	---

Er. Saju Varghese, Assistant Director, Instrumentation, KERI was the trainer for the one day workshops on ‘Soil Investigation’ conducted at IDR, Thiruvananthapuram on 14/12/2018 and 27/02/2019.

Following officers CEFS, Thrissur attended Training during 2018 – 2019.

SI No.	Name	Designation and Office	Name of Training course
1.	Ajinsingh.S	Assistant Director, Coastal Engineering section Thiruvananthapuram.	1) Training on Total station survey at KERI, Peechi during 13-12-2018 to 14-12-2018 2) Training on Basic Hydrology- Data Collection, validation and Analysis at PWD Rest House, Thycaud, Thiruvananthapuram., during 04-02-2019 to 06-02-2019 3) Training for 6th MI Census at Jalavinjanan Bhavan, Ambalamukku, on 07-03-2019.
2.	Shillar.S.J	Assistant Director, Coastal Engineering section kollam	1. QGIS Training program organised by KERI, Peechi at Nila Palace Ezhukone, Kottarakkara., 2018 2. Bathymetric survey Training at KERI, Peechi, on 02-11-2018.



3.	Santhoshkumar.C	Assistant Director ,Coastal Engineering section, Thottappally	1. QGIS Training program organized by KERI, Peechi at RIMB Punnapra. On 26/07/2018
			2. Bathymetric survey Training organised by The Director KERI, Peechi at KERI, Peechi on 02-11-2018 .
4.	Jisha A	Assistant Director Coastal Engineering Section Ernakulam	1) Training on Coastal Erosion and Protection at National Water Academy Pune. During 16-07-2018 to 20-07-2018
			2) AICTE Sponsored Short Term Course (Quality Improvement Program) on Research Avenues in Coastal Engineering at TKM College of Engineering, Kollam. During 14-01-2019 to 19-01-2019
5.	Ajantha V D	Assistant Director, Coastal Engineering Section Chavakkad	Training on Basic Hydrology, Data Collection, Validation and Analysis, at Hydrology Training Center, Thrissur. during 07-11-2018 to 09-11-2018
6.	Anju G	Assistant Director Coastal Engineering Section Cherthala	Training on Basic Hydrology, Data Collection, Validation and Analysis at PWD Rest House, Thycaud, Thiruvananthapuram during 04-02-2019 to 06-02-2019



I. COASTAL ENGINEERING FIELD STUDIES, THRISSUR



I.1 Introduction

The Coastal Engineering Field Studies was formed in 1973 and is engaged in the collection of data and field studies on Coastal Erosion along the Kerala Coast. The coast of Kerala extending 576Km in the south west coast of India, is Characterized by a narrow longitudinal barrier strip of low-lying land, sandwiched between the Arabian Sea and a continuous chain of lagoons and back waters with connection to sea at several points. This strip is formed of alluvial deposits. In considerable stretches, the space between the sea and the back waters is very narrow and even less than a few hundred meters at many places. Any break in this narrow strip would expose the back water to the fury of the waves and could endanger the entire disappearance of the barrier beaches.

The coastal zone has the maximum concentration of population and is even many times the State average at several places. Many of the foreign exchange earning industries,



residential localities, a number of district headquarters, good number of ports, fishing harbours and extensively cultivated land also exist along this narrow coastal zone.

The coastline of Kerala is subjected to severe erosion in a major portion of its length during the monsoons, when the sea becomes rough due to consistent attack of waves. The coastline is sometimes subject to tidal overflow also, when adjoining low lying lands get submerged. Erosion is very severe in the coastal areas during the south west monsoon period. During the worst monsoon period, the highest waves between 1.5 to 2.5metres and wave periods range from 6 to 12seconds and they come mostly from west. Storm tides occur all along the coast during the monsoon season. During the monsoon, the high waves coupled with storm surges, cause overflow and flooding of the low lying backshore lands all along the coast, resulting in considerable loss of property, destruction of private and Government buildings, communications, dislocation of life of lakhs of population and disruption of other activities affecting economy. The influence of saline water through mouth of rivers also affects agriculture and industry.

New CP stones have been planted throughout the Kerala coast except about 25km length of north extreme end at Manjeswaram. The GPS Co-ordinates of all CP stones have been recorded.

All aspects of the coastal erosion problems of the State, the necessity for immediate protection of vulnerable stretches, efforts made in collection of coastal data for long periods in conducting studies and in getting expert advice from all over the world and achievements made so far in tacking the erosion problem.

Many experts who visited this State, to study the behavior of the coast and also for periodical evaluation of the performance of completed sea walls, were all of the same opinion that the sea wall damage, mostly due to improper maintenance is as important as the construction of sea wall.



For proper construction and to understand the performance of the sea wall during and after construction, proper monitoring is necessary. This requires consideration of the field staff with the staff engaged in coastal erosion studies. Whenever a new sea wall is to be constructed, the research staff must be informed of the different stages of construction, starting from alignment of the sea wall forming filter, core, armour layers, etc, so that the performance of it during construction and after construction can be watched.

The field staff also must keep a date-wise record of construction details starting from alignment, excavation, putting filter, forming core, armour layer, etc, as per lines and level. The distance and levels of stones in front of sea wall also must be watched regularly with the progress of construction of sea wall. All chainages of sea wall must be made with reference to the Km/C.P stone available at site.

The concerned Assistant Engineers must give all relevant details to the concerned Assistant Directors in charge of Coastal Erosion Studies from time to time, as per the above guideline and also keep a copy of the same for reference. The offices under this office are

1. Coastal Engineering Sub Division Kollam

- a) Coastal Engineering Section, Thiruvananthapuram: The jurisdiction of coastal area comprises of Kollamkode to Paravoor pozhi (CP 0000 to CP 0287).
- b) Coastal Engineering Section, Kollam: Jurisdiction of coastal area comprises of Paravoor pozhi to Kayamkulam pozhi (CP 0288 to CP 0499).
- c) Coastal Engineering Section, Thottappally: Jurisdiction of coastal area comprises of Kayamkulam pozhi to Alapuzha pier. (CP 0500 to CP 0710).

The total coastal area of Kollam Sub Division is **164.596Km.**



2. Coastal Engineering Sub Division Ernakulam

- a) Coastal Engineering Section, Cherthala:Jurisdiction of coastal area comprises of Alappuzha pier to Chellanam. (CP 810 to CP 975).
- b) Coastal Engineering Section, Ernakulam:Jurisdiction of coastal area comprises of Chellanam to Munambam. (CP 975 to CP 1187).
- c) Coastal Engineering Section,Chavakkad:Jurisdiction of coastal area comprises of Azhikode to Ponnani.(CP 1188 to CP 1549).

The total coastal area of Ernakulam Sub Divisionis **152.635Km.**

3. Coastal Erosion Studies Sub Division Kozhikode

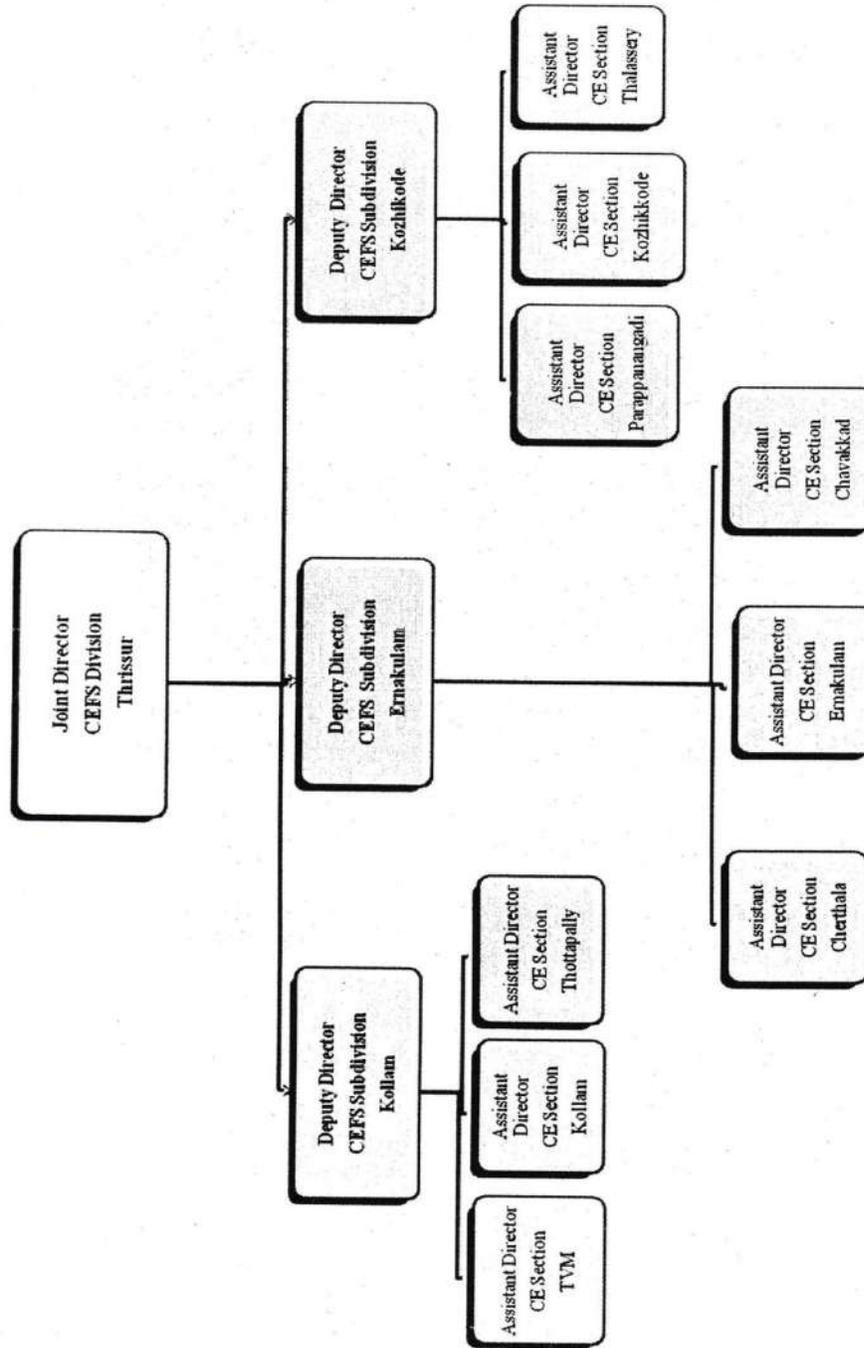
- a) Coastal Erosion Studies Section, Parappanangadi:Jurisdiction of coastal area comprises of Padinjarekkara to Kadalundi.(CP 1555 to CP 1743).
- b) Coastal Erosion Studies Section, Kozhikode:Jurisdiction of coastal area comprises of Kadalundi to Poozhithala Mahipalam.(CP 1745 to CP 2120).
- c) Coastal Erosion Studies Section, Thalassery:Jurisdiction of coastal area comprises of MahiRiver to Thalapady river manjeswaram.(CP 2140 to CP 2412 in Kannur District and CP 2507 to 2750 of old CP in Kasargode District).

The total coastal area Kozhikode Sub Divisionis**259.1Km.**



ORGANISATIONAL SET UP

Name of Sub Divisions and Sections Under Coastal Engineering Field Studies Division, Thrissur



II. INCUMBENCY DETAILS

III. PROGRAMME OF STUDY

In coastal environment, waves, tides, currents and winds are the important parameters which need to be considered for any development. It is very much essential to understand the physics of these processes. Coastal erosion is the wearing away of land by the action of waves, current and wind. Coastal erosion is accompanied with landward recession of the sea shore and loss of land area. It is a common problem faced in almost all coastal areas. Only the magnitude and nature of erosion changes from place to place. Along the most part of Kerala coast, the erosion observed is seasonal in nature, that is, beach gets eroded during monsoon and regains its original profile during fair weather season. However, at some places erosion is of permanent nature.

1. Simultaneous Wave Observations

Simultaneous wave observations are being conducted at 18 specified location along Kerala Coast on all new moon days to understand characteristics of wind, wave and tide details such as width of back shore, fore shore, slope of fore shore, composition of beach materials, characteristics of littoral drifts, shore history and they are recorded on standardized format.

1.1 Study of littoral drift

Littoral transport is the movement of sediments in the near shore zone by waves and currents. This transport of suspend and bed load particles are both in parallel to the sea shore and perpendicular to sea shore. This transport of suspended materials is called littoral drift. It has been ascertained from the past studies that the dominant direction of littoral drift in Kerala coast is from north to south. However the directions, an annual quantity of net and gross quantity are important in developing shore protection arrangements. Now only the direction of drift is being studied at selected points along the shore.



1.2 Study of Wind and Waves

Winds are the natural generators of wave and their study is necessary. An understanding of the nature of the tidal phenomenon is necessary for the study of coastal behaviors. The top level of the coastal protection structures depend on the tidal level and their data must be collected.

Wave causes sand to move along the coast as well as on to or off a beach. Due to refraction, wave energy is concentrated in certain reaches of the coast where erosion became naturally severe. Hence the design of coastal protection structures primarily depends on wave characteristics and since these studies are essential (Predominant direction of waves is from West or North West).

2. Study of Mud banks

Mud banks, a phenomenon peculiar to the coast of Kerala are those in shore region where wave energy is dissipated completely as a result of the colloidal mud suspension mud bank protect the coast immediately near it, but causes erosion in the down-drift side due to diffraction of waves.

Many rivers in Kerala exhibit a continuous migrating tendency. Such migration influences the beach characteristics in the adjacent areas considerably.

3. Periodical measurement of shore line changes:

Periodical surveys are taken to determine the shore line changes of the coast. The offset measurement of the shore line with respect to Control point and Alignment stones are taken every month and recorded. It provides very important data to understand the shore line fluctuation of the coast.



4. Collection and Study of beach samples

Pre-monsoon and post-monsoon beach samples are collected from specified places for testing grain size distribution and specific gravity since the erosion and accretion of coast depends up on the nature of beach material to a certain extent. Also for natural nourishment materials can be supplemented to the beach and thereby the erosion can be reduced. Beach samples are important variables determining the beach characteristics. Study of beach materials, characteristics and sources is essential for the evolution of a long term shore protection plan.

5. Report on Coastal damages and Taking photographs

The details of damages at various places in the coastal beaches have been collected from time to time and photographs are taken to understand the details of erosion, and submitted to the higher level in the form of a report for inspection and observation purpose. Coastal damages occurred during monsoon and drastic changes in the shore line.

6. Taking cross section profile of the beach

Cross section profiles taken using leveling instrument and leveling staff (Taken up to the depth of waters using wading)

7. Alignment fixation of sea walls

The Joint Director inspected the sites for fixing alignment of sea wall (construction and reformation) with the concerned Irrigation officials, Deputy Director and Asst. Director of the Coastal Engineering Sub Division & Sections concerned, and approved the alignments of sea walls along Kerala Coast, considering the last 5 year shore line measurements and the alignment of the sea.



IV. PERFORMANCE OF WORK DONE DURING 2018-19

Within the limitations of availability of funds, availability of field staff and modern instrument, this division has taken up all the possible studies in the year 2018-19. The performance can be summarized as follows.

Types of works

1.	Topographic survey conducted for determining beach profiles	:	Nil
2.	Periodical measurement of shoreline changes	:	4299.468 Km
3.	Simultaneous observations	:	199 Set
4.	Soil sample collected	:	46Set.
5.	Cross section profiles	:	Nil
6.	Levels connected	:	Nil
7.	C.P Stones planted	:	Nil
8.	Alignment stones planted	:	Nil
9.	Kilometre stones planted	:	Nil
10.	Bench mark stones plant	:	Nil
11.	Alignment fixed by Joint Director	:	1 No.
12.	Details of damages at various places in the Coastal beaches collected	:	75 Nos.
13.	Mud bank study	:	Nil

Sub Division-wise Coastal studies performance are as follows ;

1. Topographic survey conducted

Kollam sub Division	:	Nil
Ernakulam Sub Division	:	Nil
Kozhikode Sub Division	:	Nil



2. Periodical measurement of shoreline changes

a.	Coastal Engineering Section, Thiruvananthapuram	:	540 Km
b.	Coastal Engineering Section, Kollam		468 Km
c.	Coastal Engineering Section, Thottappally		456 Km
d.	Coastal Engineering Section, Cherthala		338.4 Km
e.	Coastal Engineering Section, Ernakulam		244.668 Km
f.	Coastal Engineering Section, Chavakkad		536.4 Km
g.	Coastal Erosion Studies Section,Parappanangadi		324Km
h.	Coastal Erosion Studies Section, Kozhikode		528 Km
i.	Coastal Erosion Studie Section, Thalassery		864 Km
j.	Total		4299.468 Km

3. Taking simultaneous observation

1.	Coastal Engineering Section, Thiruvananthapuram	:	12 sets.
2.	Coastal Engineering Section, Kollam	:	24 sets.
3.	Coastal Engineering Section, Thottappally	:	24 sets.
4.	Coastal Engineering Section, Cherthala	:	12 sets.
5.	Coastal Engineering Section, Ernakulam	:	24 sets.
6.	Coastal Engineering Section, Chavakkad	:	36 sets.
7.	Coastal Erosion Studies Section,Parappanangadi	:	11 sets.
8.	Coastal Erosion Studies Section, Kozhikode	:	30 sets.
9.	Coastal Erosion Studies Section, Thalassery	:	26 sets.
	Total		199 sets



i) Dates and places of observations

In order to have more detailed idea of the behavior of factors affecting the shore line changes, three consecutive points are taken for reference. At a particular study reach five readings are taken in all three points at definite timing. Nearly 20 to 25 Km apart straight reaches without much external disturbances are selected for taking these simultaneous observations. The places of observations with timing and CP Nos. are listed below. The dates in the year 2018 are shown in appendix V

ii) Details of Simultaneous observations

The details are shown in appendix VI

4. Taking photograph

Kollam Sub Division	:	45Nos
Ernakulam Sub Division	:	22 Nos
Kozhikode Sub Division	:	79 Nos.

5. Collecting and testing soil samples

1.	Coastal Engineering Section, Thiruvananthapuram	:	4 sets.
2.	Coastal Engineering Section, Kollam	:	8 sets.
3.	Coastal Engineering Section, Thottappally	:	8 sets.
4.	Coastal Engineering Section, Cherthala	:	2 sets.
5.	Coastal Engineering Section, Ernakulam	:	4 sets.
6.	Coastal Engineering Section, Chavakkad	:	6 sets.
7.	Coastal Erosion Studies Section, Parappanangadi	:	2 sets.
8.	Coastal Erosion Studies Section, Kozhikode	:	6 sets.
9.	Coastal Erosion Studies Section, Thalassery	:	6 sets.
	Total		46 sets



6. Alignment fixation of sea walls

Alignment approval has been given to the following works by the Joint Director, Coastal Engineering Field studies, Thrissur during the year 2018

Sl.No.	Name of sub Division	Alignment approved during 2018	Essentiality certificate issued during 2018
1	CE SubDivision, Kozhikode	1 No	1 No
2	CE SubDivision, Kollam	Nil	Nil
3	CE SubDivision, Ernakulam	Nil	Nil

7. Cross section profiles

Kollam Sub Division	:	Nil
Ernakulam Sub Division	:	Nil
Kozhikode Sub Division	:	Nil

8. Levels connected

Kollam Sub Division	:	Nil
Ernakulam Sub Division	:	Nil
Kozhikode Sub Division	:	Nil



9. C.P Stones, Alignment stone, KM stones, Guard stones and BM stones planted

Kollam Sub Division	:	Nil
Ernakulam Sub Division	:	Nil
Kozhikode Sub Division	:	Nil

10. Details of damages & taking Photographs

Many of the places in Thiruvananthapuram and Kollam District have been affected by Ockhi.

TRIVANDRUM SECTION

During this year, the sea wall at CP No: 0000 to 0001 has been dilapidated and spread due to severe sea attack and overtopping. The sea wall at CP 0059 to 0061 has been dilapidated and spread due severe sea attack and overtopping. The sea wall from CP No: 0075 to 0095 is almost in a dilapidated condition and this condition is becoming worse day by day. The abutment of Valiyathura Bridge has been damaged due to severe coastal attack (between CP 0094 and 95). The sea wall from CP No: 0211 to 0220 is also in the same condition. The Varkala cliff, a beautiful place, is slowly disappearing due to severe sea attacks. Hence, some urgent protection work is needed. The sea wall at CP 0268 to 0273 is partially damaged due to severe sea attack and overtopping during this monsoon.

This year during monsoon the famous Sangumugham beach was severely damaged due to the sea attack and the portion of the road was eroded heavily and not suitable for transporting through this road. But after the monsoon season now the beach is formed well (The following figure shows the damage caused during this monsoon(fig.1) and beach formation now a days(fig2)).







Fig1(damage caused during this monsoon)



Fig2(present condition of beach)



Although heavy flood occurred during the month of August of this year, no heavy damages reported in the coastal region. At the time of OCKHI, the entire region both sea wall and nearby houses were damaged severely. This portion is now under the construction of 15 numbers of groins to avoid further damages. The damaged houses are still in the condition as such.

Photos show the damaged houses.



KOLLAM SECTION

During Flood this year 8 numbers of houses of fishermen, 13 numbers of coconut trees and 5 numbers of other trees were damaged during the heavy rain period. Due to heavy wave action during day-time and night-time continuously, severe damages occurred in the Eravipuram - Thanny - Kollam beach. Around 2 kilometers of coastal road were damaged due to the second term of monsoon, and it resulted in traffic block throughout the route. Local fishermen blocked the road for around two weeks. Due to heavy wave action, seawall in various places scattered and found small boulders throughout the sea shore and tips of many groynes were damaged. Accretion of sea sand occurred in various places.

Due to heavy flooding in the Paravoor pozhi from nearby backwaters, the coastal road was cut for a length of 40 meteres (between Control Point 290 and 291) to drain the excess water to the sea, it resulted in road block through Paravoor - Eravipuram road. The local fishermen could not go for fishing around three weeks due to heavy discharge of seawater and huge wave action. Also they served very sincerely, saved many lives with their boats, in various flood affected regions in the Alappuzha, Kottayam and Pathanamthitta districts.

THOTTAPALLY SECTION

During the monsoon period May-June 2018 , damages occurred in between Valiazheekal and Alappuzha Pier, Several coconut trees were uprooted, 4 No. of houses were damaged and an approximate length of 4.650 km of sea wall damaged.

Due to flood during August - December 2018, no significant variations occurred in the coastal area from CP 500 to CP 710) Valiazheekkal to Alappuzha pier.(There is no variation in height of waves.No severe damages occurred through out the sea shore due to flood.No accretion as well as erosion occurred during the flood along the sea shore.



CHERTHALA SECTION

During monsoon season, heavy attack occurred in Kattoor (CP 848) and Thaikkal to Ottamassery (CP 912 to 935). In Andhakaranazhi (CP 940 to 942), heavy overtopping occurred.

ERNAKULAM SECTION

During monsoon season, heavy attack occurred in South Chellanam (CP 975 to 979), Company padi (CP 983 to 986), Kandakadavu (CP 1002 to 1012), Puthenthodu (CP 2018-2019), Kannamaly (CP 1022 to 1024), Cheriya Kadavu (CP 1028 to 1029 and 1033 to 1037), Saudi (CP 1048 to 1051), Fort Kochi (CP 1067 to 1068), Njarakkal to Nayarambalam (CP 1113 to 1121), Aniyil (CP 1125 to 1130) and Edavanakkad (CP 1132 to 1139).

CHAVAKKAD SECTION

During monsoon season, heavy attack occurred in Eriyad to Anchangadi (CP 1201 to 1230), Vadanappally to Chettuva South (CP 1352 to 1380) and Palappetty to Veliyancode (CP 1489 to 1513). Heavy overtopping occurred in Ponnani (CP 1530 to 1548).

KOZHIKODE SUB DIVISION

During monsoon season, heavy attack occurred in Musodi- Adhika Kadappuram, Saradha Nagar Kadappuram in Kasargod District. Also, heavy attack occurred in Tanur (CP 1653 to 1655), Puthiya Kadappuram (CP 1638 to 1640), Anangadi Turtle Hatchery (CP 1724), Koottayi South (CP 1585 to 1590) and Nayarthodu near Padinjarekkara Azhimugham (CP 1564 to 1567). Photo attached.







10. Study of Mudbank

Kollam Sub Division	:	Nil
Ernakulam Sub Division	:	Nil
Kozhikode Sub Division	:	Nil

The coastal data of Periodical measurements, which backs upto 1990 has been digitized and the digitization of available data of sled survey.

V. CIVIL WORKS - NIL

VI. DETAILS OF DIFFERENT STONES

Sl. No.	Description	Thiruvananthapuram	Kollam	Thottappally	Cherthala	Ernakulam	Chavakkad	Parappanangadi	Kozhikode	Thalassery	Total
1.	C. P. Stones	288	212	211	166	212	332	189	372	524	2506
2.	Alignment Stones	288	212	211	166	212	345	189	372	524	2519
3.	Guard Stones		36	32	28	36	56	28	64	84	364
4.	K. M. Stones	58	42	42	30	43	71	39	76	105	506
5.	B. M. Stones	12	9	8	7	9	14	7	16	21	103

VII. LIST OF IMPORTANT STRUCTURES

A. C. E. Section, Thiruvananthapuram

Sl.No.	Important structures	Sl.No.	Important structures
1.	Church CP 0000	33.	Vettukadu Chaurch CP 0116
2.	Nursery School CP 0008	34.	Veli Tourism Village CP 0126 & 0127
3.	Kurishadi CP 0010	35.	ISRO Compound CP 0138 to 0149
4.	Coastal Police Station CP 0011	36.	Church & School CP 0158
5.	Police Aid Post & Mosque CP 0016	37.	Resort CP 0168
6.	Kurishadi CP 0018	38.	Resort CP 0175
7.	Kurishadi CP 0020	39.	Kurishadi CP 0182
8.	Peeling Shed CP 0025	40.	Mariyanadu Fishmarket CP 0190
9.	Kurishadi CP 0028	41.	Perumathura Bridge (Muthala Pozhi) Break Water & Fishing



			Harbour CP 0210 & 0211
10.	Electric Transformer CP 0030	42.	Church CP 0211
11.	Electric Transformer CP 0035	43.	Electric Transformer & Port Office CP 0212
12.	Kurishadi & Fishmarket CP 0036	44.	Kurishadi CP 0214
13.	Temple, Kurishadi, Vizhinjam Harbour, Adhani Port & Krishadi, Vizhinjam Mazjid, Light House & Transformer CP 0044 to CP 0054	45.	Nursery School CP 0215
14.	Tourism Police Aid Post CP 0055	46.	Church CP 0221
15.	Temple & Mazjid CP 0056	47.	Anjuthengu Light House Port Court CP 0223 & 0224
16.	Temple & Mazjid CP 0062	48.	Fish Landing Point CP 0224
17.	Panathura Temple CP 0065	49.	Community Health Center CP 0234
18.	Pulimuttu CP 0070	50.	Karikkara Asan smarakam CP 0238
19.	Poonthura Church & School CP 0075	51.	Mazjid CP 0246
20.	Church CP 0078	52.	Arivalam Tourist village & Mazjid CP 0250
21.	Beemapally Mazjid CP 0088	53.	Mazjid & Bridge CP 0254
22.	Cheriyathura Church CP 0091	54.	Vettoor Mazjid CP 0257
23.	Valiyathura Bridge & Pot Directorate CP 0094 & 0095	55.	Mazjid CP 0260
24.	Valiyathura Church CP 0096	56.	Mazjid & Varkala Cliff CP 0259 to 0260
25.	F.C Godown & Kochuthoppu School CP 0100	57.	Mazjid CP 0274
26.	Airport Domestic TVPM CP 0102	58.	Mazjid CP 0275
27.	Air Force Station & Park CP 0103	59.	Mazjid CP 0279
28.	Shangumugham Palace CP 0104	60.	Mazjid Vadakkumbhagam CP 0281
29.	Sangumugham Kalamandapam CP 0106	61.	Mazjid Kongalmalappuram CP 0282
30.	Hollycross Convent & Hospital Sangumugham CP 0109	62.	Paravoor Chillakkal mazjid CP 0283
31.	St.Peters Church semithery CP 0110	63.	Pzhikkara Temple CP 084
32.	St.Peters Community Hall & TDC Bank CP 0111		



B. C. E. Section, Kollam.

Sl.No.	Important structures	Sl.No.	Important structures
1.	PWD Kadavu at Mukkam CP 0292	17.	P.B.M and M.C Health Centre at Neendakara CP 0393
2.	Temple at Thanni CP 0302	18.	St. Francis Church at Karithura CP 0402
3.	Church at Thanni CP 0303	19.	Light House and IRE Company at Karithura CP 0408
4.	Church near Eravipuram CP 0315	20.	KMML Ltd at Kovilthottam CP 0409
5.	Pier of Port Department at Garfill Nagar CP 0317	21.	Church at Kovilthottam CP 0414
6.	Gandhi Park at Kochupilamoodu CP 0331	22.	St. Francis Church at Karithura CP 0415
7.	Church at Pallithottam CP 0336	23.	Temple at Kattilkadavu CP 0421
8.	Kollam Port CP 0336	24.	Parayakadavu Church CP 0437
9.	Church at Vadi (Moothakkara Palli) CP 0341	25.	Parayakadavu Bridge CP 0439
10.	Fishing Harbour at Thankasseri CP 0343	26.	Temple at Cheriyaazheekkal CP 0446
11.	Light House at Thankasseri CP0347	27.	Cheriyazheekkal Football Association Club CP 0452
12.	Temple at Thirumullavaram CP 0357	28.	Govt. Homoe Dispensary at Kuzhithura CP 0463
13.	Church at Thirumullavaram CP 0359	29.	Sree Amruthanandamayee Matt and Ayurveda Treatment Centre CP0470
14.	Church at Sakthikulangara CP 0376	30.	Pachimeswaram Temple CP 0477
15.	GTS Benchmark at Neendakara CP 0381	31.	Govt. LP School at Srayikadu CP 0490
16.	Fishing Harbour Port (Breakwater and Bridge) at Neendakara CP 0381	32.	Fishing Harbour Port (Breakwater near Kayamkulam Pozhi) CP 0499



C. C. E. Section, Thottappally

Sl.No.	Important structures	Sl.No.	Important structures
1.	Port building at Alappuzha - CP 710	13.	Thottappally Harbour - CP 609
2.	W&C Hospital - CP 708	14.	Health Centre at Thottappally - CP 609
3.	Village office building - CP 706	15.	Coastal Engineering Section at Thottappally - CP 604
4.	ESI hospital – CP 703	16.	Spillway at Thottappally - CP 605
5.	SSV LP School Vadakkal - CP 697	17.	Mosque and Church at Chelakkad - CP 578
6.	Catholic church Paravoor - CP 687	18.	Thrikkunnappuzha Temple - CP 573
7.	Catholic church Punnapra - CP 680	19.	Mosque at Pathiyankara - CP 563
8.	Industrial unit Khadi and Village Industries-Punnapra - CP 676	20.	Mangalam Water Tank - CP 557
9.	Auction hall of Harbour Engineering -Valanjavazhi - CP 656	21.	Corporation Bank, Arattupuzha - CP 547
10.	Railway line at Kakkazham - CP 651	22.	Nallanickkal Church - CP 535
11.	Malsyafed building at Ambalappuzha - CP 646	23.	Break Water at Valiyazheekal - CP 50
12.	LP School at Anandeswaram - CP 619		

D. C.E.Section ,Cherthala.

Sl.No.	Important structures	Sl.No.	Important structures
1.	Light house at Alappuzha CP 810	6.	Arthungal Church at ArthunkalCP 904-905
2.	Bishop house at Alappuzha CP 811-812	7.	Church at Ottamassery CP 926
3.	Recreation club at AlappuzhaCP 810	8.	Church at ThankeyCP 929-930
4.	Fish landing centre at PollatheCP 857-858	9.	Light house at Andhakaranazhy CP 951-952
5.	Fish landing centre at Arthunkal CP 910-911	10.	Church at South Chellanam CP 975



E. C.E.Section,Ernakulam

Sl.No.	Important structures	Sl.No.	Important structures
1.	Fishing Harbour at Chellanam CP 979-981	8.	Fisheries university building at Njarackal CP1108
2.	Church at Kannamaly CP 1025	9.	Fish landing Centre at Aniyil CP 1122
3.	INS Dhronacharya CP 1057-1067	10.	Mosque at Kuzhippilly CP 1140
4.	Boilers at Fort Kochi CP 1070	11.	Beach at KuzhippillyCP1147
5.	LNG TerminalCP 1073-1081	12.	Club Mahindra Resort at South CheraiCP 1162
6.	Light House at Puthuvype CP 1082	13.	Beach at Cherai CP 1164
7.	BPCL at Puthuvype1083-1086	14.	Park at Munambam CP 1186

F. C.E.Section,Chavakkad.

Sl.No.	Important structures	Sl.No.	Important structures
1.	Coastal Police Station at Azhikkode CP 1188	7.	A MultyStoryed Lodge Building At Blangad CP 1419-1420
2.	Light House At Azhikkode CP 1201-1202	8.	Single Storey Building Of Fisheries Department CP 1499-1500
3.	Beach Park At Snehathiram Near Thalikkulam CP 1334-1336	9.	MultyStorey Building Hatchery at Veliancode for Fisheries CP 1510-1512
4.	Groyne At Chettuva CP 1380	10.	BeeviJaram At Puduponnani CP 1514
5.	Groyne at Chettuva (N) CP 1381	11.	Light House At Ponnani CP 1548-1549
6.	Light House at Thottappu Near Blangad CP 1406-1407		



G. C. E.S Section, Parappanangadi

Sl.No.	Important structures	Sl.No.	Important structures
1.	Azhimugham CP 1555 (Estuary of Bharatha puzha)	12.	Puthiya Kadappuram CP 1640
2.	MMM HS Koottai CP 1575	13.	Puthiya Kadappuram North CP 1650
3.	Koottai School CP 1581	14.	Tanur harbor CP 1660,1661,1662,&1663
4.	Kootaiyi Town CP 1585	15.	Pandara Kadappuram CP 1668
5.	Koottai Badar Masjid CP 1595	16.	Poorapuzha Azhi CP 1684
6.	Vakkad CP 1604	17.	Parappanangadi CP 1705
7.	Malayalam Univercity CP 1606	18.	Chettipadi CP 1711
8.	Arikkanchira CP 1613	19.	Anangadi Turtle hatchery CP 1724
9.	Paravanna Beach CP 1617	20.	Kadalundy Nagaram CP 1730
10.	Unniyal Beach CP 1626	21.	Kadalundy CP 1743
11.	Puthiyakadappuram South CP 1631		

H. C. E. S Section, Kozhikode

Sl.No.	Important structures	Sl.No.	Important structures
1.	Kadalundi CP 1745	40.	Koyilandy CP 1935
2.	Nechkkattu Paramba CP 1750	41.	Valiyath Palli Beach CP 1940
3.	Kappalangadi CP 1755	42.	Kollam Beach CP 1945
4.	Anchukudikkal CP 1760	43.	Parappally Beach CP 1951
5.	Thai Kadappuram CP 1765	44.	Manda Mangalam CP 1955
6.	Chaliyar CP1770 & CP1771	45.	Urupunya Kavu Beach CP 1960
7.	Beypore Port CP 1772	46.	Moodadi Beach CP 1965
8.	Savakandy paramba CP 1775	47.	Muthayam Kadapuram CP 1970
9.	Gotheeswaram Beach CP 1780	48.	Kunhi-Thayyil Palli CP 1975
10.	Kaithavalappu CP 1785	49.	Palliparamba,Kadalur CP 1980
11.	Marad S Beach CP 1790	50.	Kodikkal South CP 1985
12.	Marad N Beach CP 1795	51.	Kodikkal CP 1990
13.	Payyanakkal Beach CP 1800	52.	Kodikkal UP School CP 1995
14.	Chamundi Valappil CP 1805	53.	Kodikkal North CP 2000
15.	Kothi Beach CP 1810	54.	Thikkodi CP 2005
16.	Mukhadar Beach CP 1815	55.	Melady Beach CP 2010
17.	Kozhikode South Beach CP 1820	56.	Bhagavan -Mukku-CP 2020
18.	Kozhikode Beach CP 1825	57.	Ayanikkad CP 2025



19.	Kozhikode North Beach CP 1830	58.	Kolavi –Palam Road CP 2030
20.	Thoppayil Beach CP 1835	59.	Kolavi Palam CP 2035
21.	Konad Beach CP 1840	60.	Iringal CP 2040
22.	Butt Road CP 1845	61.	Moorad CP2043, CP2044& CP 2045
23.	Puthiyangadi Beach CP 1850	62.	Sandbanks Vadakara CP 2046
24.	Edakkal Beach CP 1855	63.	Kottakkal CP 2050
25.	Puthiyappa CP 1860	64.	Vadakara CP 2055
26.	Puthiyappa Harbour CP 186	65.	Anati-Bhagam CP 2060
27.	Narachal Beach CP 1850	66.	Mukachery CP 2065
28.	Elathur CP 1875	67.	Kuriyadi CP 2070
29.	Elathur Azhi CP 1880 (Estuary of Korapuzha)	68.	Thazhe Palli CP 2075
30.	Korappuzha CP1883, CP1884 &CP 1885	69.	Muttungal Beach CP 2080
31.	Kannankadavu CP 1890	70.	Maliyekkal Beach CP2085
32.	Munambath Beach CP 1895	71.	Karuvachalil CP 2090
33.	Kakkachikandi CP 1900	72.	Madakkara Beach CP 2095
34.	Kappad Beach CP 1905	73.	Mukkali Beach CP 2100
35.	Kappad North Beach CP 1910	74.	Avikkara Beach CP 2105
36.	Thuvappara CP 1915	75.	Erikkal Chalil CP 2110
37.	Parakkal Thazhe CP 1920	76.	Azhiyur Chungam CP 2115
38.	Ezhuku-dikkal CP 1925	77.	Poozhithala Mahi CP 2120
39.	Cheriya-Mangad CP 1930		

I. C. E. Section, Thalassery

Sl.No.	Important structures	Sl.No.	Important structures
1.	Mahi - CP 2140	45.	River-CP 2413 toCP 2417
2.	Mahi azhi (Parimadam) - CP 2145	46.	Valiya kadappuram-CP 2420
3.	Kurichiyil - CP 2150	47.	Ezhimala Naval Aacadamy-CP 2430 to CP 2506
4.	Pettipalam – CP 2155	48.	Valliyaparamba-CP 2510
5.	Makkottam - CP 2160	49.	Pattel kadappuram-CP 2515
6.	Chakyath Mukku - CP 2165	50.	Padanna kadappuram-CP-2520
7.	Gopal petta - CP 2170	51.	Beechad Kadappuram-CP 2525
8.	Customs road - CP 2175	52.	Mavila kadappuram-CP 2530,CP 2535&CP 2540
9.	Overburry folly cliff - CP 2179	53.	River –CP 2544toCP 2546
10.	Overburry folly - CP 2180	54.	Neeleswaram-CP 2547
11.	Nr Thalassery court - CP 2185	55.	Thai kadappuram-CP 2550,CP 2555,CP 2560,CP 2565&CP 2570



12.	PWD Guest house - CP 2190	56.	Marakkap kadappuram-CP 2575
13.	Koduvally river - CP 2192&CP 2193	57.	Poonchavi kadappuram-CP 2580
14.	Koduvally river Dharmadam - CP 2195	58.	Poonchavi colany Kanchangad-CP 2595
15.	Pareekadavu - CP 2201	59.	Kanchangad puthiyavalappu-CP 2600
16.	Mathottam - CP 2205	60.	Puthiyavalappu-CP 2605
17.	River - CP 2209 ,CP 2210	61.	Hosdurg kadappuram –CP 2610,CP 2615
18.	Dharmadam - CP 2211	62.	Ajanoor kadappuram-CP 2620
19.	Muzhuppilangad - CP 2215&CP 2220	63.	Chittari kadappuram-CP 2630
20.	Muzhuppilangad Beach - CP 2224	64.	Chittari kadappuram anjaneya madam -CP 2636
21.	Pachakkara –CP 2230	65.	Chavoake plantation Chettukundu-CP-2641
22.	Cliff portion-CP-2236 toCP 2239	66.	Pupuchakad cheriya palli –CP 2646
23.	Ezhara kadappuram - CP 2240	67.	Compound wall tourism –CP 2650
24.	Kizunnappara –CP 2245&CP-2250	68.	Southern end of bekal port railway platform-CP 2651
25.	Thottada kadappuram - CP 2255	69.	Pallikkara fish landing centre-CP 2656
26.	Aadikadalayi - CP 2260& CP 2265	70.	Bakel fort –CP 2658 toCP 2661
27.	Maithan palli - CP 2270	71.	North side of Bakel fort –CP 2662
28.	Neerchal mukkadavu–CP 2275	72.	River-CP 2665
29.	Ayikkara-CP-2280	73.	Bakel thaban valappu – CP2666
30.	Kannur fort military area - CP 2282 toCP 2298	74.	Chirammal tharavad- CP 2671
31.	Payyambalam-CP 2302&CP 2305	75.	Thrkkannad new temple-CP 2676
32.	Chalad-CP 2310	76.	Cliffare- CP 2678
33.	Palliyanmoola-CP 2315	77.	Chavokke-CP 2679
34.	Azheekode south-CP 2320	78.	River –CP 2680
35.	Neerkkadavu-CP 2325	79.	Kappil beach-CP 2681
36.	Chalil south-CP 2335	80.	Koppal padinjare veettil- CP 2686
37.	Meenkunnu -CP 2339	81.	Udmapadihare - CP 2691
38.	Azheekal- CP 2344	82.	Nompilever –CP 2692
39.	River-CP 2355to CP 2358	83.	Kallan valappu- CP 2695
40.	Mattool-CP 2360,CP 2365,CP 2370&CP 2375	84.	Chembarikka- CP 2696&CP 2701
41.	Mattool North-CP 2380 ,CP 2385	85.	Keezhoor –CP 2706



42.	Puthiyangadi-CP 2390 ,CP 2395	86.	Kasaba-CP 2720&CP 2725
43.	Puthiyangadi beach-CP 2400&CP 2405	87.	Cheerankai kadappuram –CP 2735
44.	Puthiyangadi-CP 2410	88.	CPCRI Compound - CP 2740

LIST OF IMPORTANT STRUCTURES

A. CES Section, Thalassery

1.	Thalai-Gopalpetta Fishing Harbour	:	432 to 433 KM
2.	Thalassery Government Hospital, Fort and tourism projects under construction	:	436 KM
3.	Tourism development projects at Dharmadam beach	:	442 KM
4.	-do- at Muzhappilangad beach	:	446KM
5.	Mappila bay Fishing Harbour, District Hospital, Kannur, Fort Kannur, D.S. C. Centre, Kannur	:	456 to 459.8 KM
6.	Burial ground, Payyambalam	:	460.400KM
7.	Tourism Development Project, Meenkunnu	:	467.800 KM
8.	Light House Azheekal	:	470.40 KM
9.	Azheekal Brake water and Fort	:	470.800KM
10.	Naval Academy, Ezhimala	:	486.00KM
11.	Light House, Kasargode	:	--

B. CES Section, Kozhikode

1.	Fishing Harbour, Chombal at Azzhiyur	:	420.40 KM
2.	Tourism Development Project, Sandbanks, Vatakara	:	409 KM
3.	Turtle Hatchery, Kolavipalam	:	407 KM
4.	Light House, Thikodi	:	398 KM
5.	Fishing Harbour under construction, Koyilandi	:	387 KM
6.	Tourism Development Project, Kappad	:	380 to 382.60 KM
7.	Fishing Harbour, Puthiyappa	:	372 KM
8.	Light House, Tourism Development Project, Government Hospital, Kozhikode	:	364 to 369 KM
9.	Brake water and Port, Bepore	:	354 KM
10.	Light House and 'NIRDESH' Defence ship building Design Institute, Chaliyam, Kozhikode	:	353.60 KM
11.	Bird Sanctuary, Kadalundi and Vallikkunnu	:	348 and 349 KM



TOURISM DEVELOPMENT PROJECTS UNDER KOZHIKODE SUBDIVISION

Sl. No.	Particulars	District	Nearby Town/City	Old CP No	New CP No	Controlling Authority	Status (Existing or to be developed)	Remarks
1	Purathoor Azhimugham Beach	Malappuram	Padinjarekkara	3365	1555	Tourism Dept	Existing Tourism project	River Bharathapuzha & Tirur Puzha joins Arabian sea. Jankar service available to Ponnani
2	Poorapuzha Azhimugham Beach	Malappuram	Thanoor	3116	1682	Tourism Dept	Tourism to be developed	River Poorapuzha joins Arabian sea.
3	Kadalundi Beach	Malappuram & Kozhikode	Kadalundi	2997	1742	Tourism Dept	Existing Tourism project	River Kadalundi joins Arabian sea. This is a bird sanctuary with more than 60 species of migratory birds
4	Beypore Beach	Kozhikode	Kozhikode	2948	1769	Harbour Engineering & Tourism Dept	Existing Tourism project	Walk way (Pulimuttu) constructed into the sea for 1 km. Has traditional Ship Building centre, famous for Beypore Uru. & Dolphin view point



5	Kozhikode Beach	Kozhikode	Kozhikode	2840	1826	Tourism Dept	Exising Tourism project	Famous for sunset view. Has light house and two damaged iron screw pile pier platform, ,run into the sea for 120m . Adjacent to beach is Lions Park and marine water aquarium
6	Korappuzha Estuary	Kozhikode	Kozhikode	2727	1882		Tourism to be developed	Korapuzha backwaters joins sea. Offers a splendid and scenic view of natural beauty
7	Kappad Beach	Kozhikode	Kozhikode	2695	1910	Tourism Dept	Exising Tourism project	16 km from Kozhikode towards north. Portuguese explorer Vasco-Da Gama landed here in 1498. This is a rock studded beach



8	Velliyamkal lu	Kozhikode	Payyoli	2483	2025		Tourism to be developed	A massive rock called Velliamkallu associated with Kunhali Marakkar situated 13km off sea cost (into the sea). This was the hiding ground for Marakkar to attack the invading Portuguese
9	Kolavipala m beach	Kozhikode	Iringal	2451	2041	Forest Dept	Tourism to be developed	Also called turtle beach. Every year olive ridley turtle comes from Pacific ocean to lay the eggs here. Turtle hatchery centre
10	Muzhippila ngad Drive- in Beach	Kannur	Thalassery	1057/62	2224	Tourism Dept	Exising Tourism project	Largest drive in beach in Asia.15 km south of the town. Has beach festival
11	Dharmadam Island	Kannur	Dharmadam		2208	Private	Tourism to be developed	The island has backwaters covered with coconut groves and dense bushes .During low tide one can walk from the Muzhippilangad beach



12	Kizhunna Ezhara beach	Kannur	Kizhunna		2245		Tourism to be developed	11 km from kannur , Good tourist spot to spend vacations and relish beautiful surroundings
13	St Angelo's Fort	Kannur	Kannur cantonment		2282	Archeologica l survey	Exising Tourism project	Built in 1505 by Don Francisco de Almeida, the first portuguese viceroy of India. important historical monument and beautiful tourist spot
14	Payyambala m Beach	Kannur	Kannur	1046 to 1031	2302 to 2309		Tourism to be developed	Has approx. 4 km of shore line, a flat laterite cliff and beautifully landscaped sculpture of mother and child .Mappila bay, the harbor, has boat rides which offers spectacular view



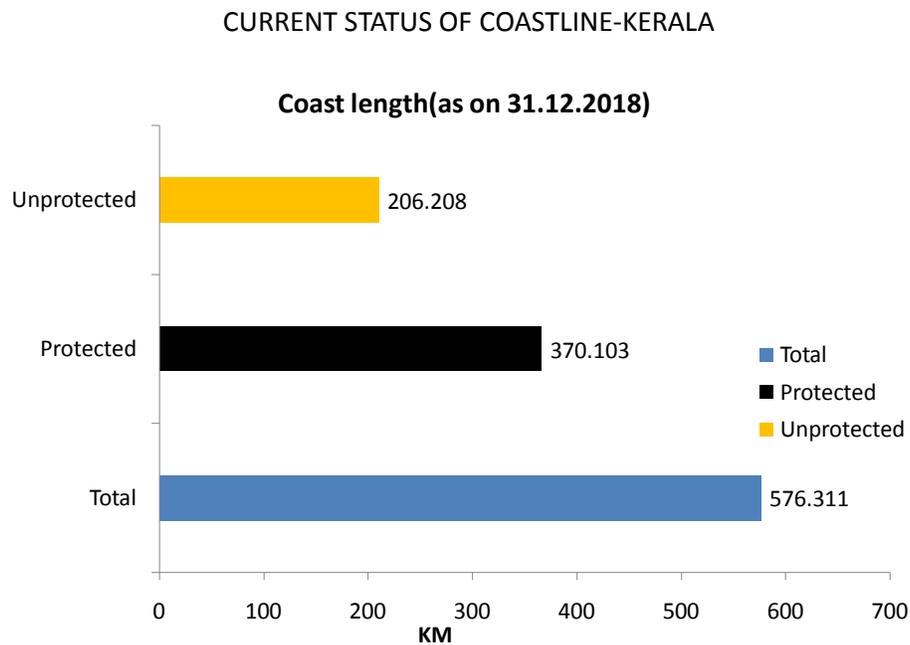
15	Meenkunnu beach	Kannur	Meenkunnu		2339		Tourism to be developed	Located in Azhikode village. Got vast stretch of golden sand and coconut trees. Famous for fish (meen -fish kunnu -small hill)
16	Ezhimala beach	Kannur	Ezhimala		2430	Naval Academy	Tourism to be developed	about 55 km from Kannur. Between Payannur and Payangadi route. Serene environment and good for peace loving visitors
17	Bekal Fort	Kasaragode	Bekal		2657	Archeologica l survey	Exising Tourism project	Fort spread over 40 acres has massive walls of 12 m height runs into the sea with fine bay towards south. Voids in walls were used for placing cannons



VIII. Bathymetric survey

We were conducting the bathymetric survey manually using sled in 1990s. But it was stopped due lack of fund. Now, in this year in January 2018, in addition to the regular works we are conducting bathymetric study, as a pilot study using the fish finder in Alapuzha District. In continuation to this bathymetric survey, contour maps had been prepared and the details were submitted to NIOT, Chennai. For studying the salient features of Kuttanad regions, a team of experts from Netherland has visited the state and for their assessment, the details of coast from Thottappally to Cochin inlet have been submitted. The details include the shoreline changes, wave details, details of groynes, study of impact of groynes along the Alappuzha coast, Beach sample study results. The preparation of quality manual pertaining to Anti sea erosion works are in progress.

IX. COASTAL STATUS



14



X. BOTTLENECK

As far as Kerala coast is concerned the sea is turbulent, especially during monsoon and coastal erosion is a common phenomenon along the sea coast for which continuous field study in all respects is essential. But in the budget provision, which was around 100 lakhs during the nineteen nineties, has got reduced considerably in the recent years to 5 lakhs bringing the survey works to almost stand still.

Training programmes on Coastal Engineering and allied subjects to update and train the technical personnel of the department regarding the latest development in this field is essential. No training has been conducted under this wing due to lack of funds. The study wing now follow old conventional method of observations like visual observations, tape measurements etc. High derivative modern instruments are now available in this field. Now a proposal for tidal observation and research centre at Thottappally has been put forward from this office.

25 kms of stones are not planted on the Northern side of Kerala ie, in North of Kasargode District. So no details of sea have been taken in that area. That is to be rectified immediately. Also some stones are missing in the rest of the area, and it should be replanted immediately. Maintenance of the stones are not done till date. It is also to be done urgently.

XI. CONCLUSION

Sufficient fund has to be made available in time for conducting the entire study of coastal erosion. The coastal length coming under the jurisdiction of Thalassery section is 148km, and for studying the entire reach an additional section is to be formed.



The construction of new international Vizhinjam harbor was started in between CP NO 0045 to 0055 and the construction work is in progress. The construction authority formed artificial shore and road work by using drilled materials from the sea and break water construction is also going on. This area needs some specific studies for changing the shore before and after construction of harbor. The CP stones were not planted in the above area due to the terrain of land.

Specific studies are necessary for studying the behavior of shore protection works like seawall, groynes and break water. Fifteen numbers of groynes have been proposed and the construction work is going on at Beemapally between CP No.0085 to 0090. The study has to be conducted for analyzing the shore particulars before and after the construction of the groyne field. The main constrains is the lack of modern equipments and the shortening of fund for the study work of Coastal Engineering Department. It is also required to study the possibility of artificial nourishment and other protection works like geo tube construction. The existing coastal protection works are being watched. The general behavior including its failure if any, is studied for modification. Since the study of the coastal characteristics is the base for all constructions of anti-sea erosion structures and also for the other construction work, the data collection could not be stopped. If it is stopped the entire data collected till date will be futile.

Some of the CP stones have been swallowed by the sea waves and some got destroyed by the weathering actions. As the new CP stones have not been planted for the continuous stretch, that profile could not be adopted for aligning sea walls etc. Hence CP stone planting and its timely maintenance is essential.

For getting the sufficient staff strength and for their maximum efficiency this wing is to be made permanent, considering the importance of this Division. Sufficient fund should be allocated for the training of technical staff and for procuring the modern scientific equipments for the collection of coastal data.



J.QUALITY CONTROL DIVISION,THRISSUR

1 Introduction

The quality control wing under Irrigation Department was formed in 1995 as per G.O.(MS)No. 87/1995/Irrgn dated 13.06.1995 to ensure quality of the works executed by Irrigation Department (WRD)There are two division offices under the wing one at Thrissur with jurisdiction extending from Ernakulam to Kasargod (8 districts) and the other at Kottarakkara with jurisdiction extending from Thiruvananthapuram to Kottayam (6 districts).

Quality Control Division, Thrissur.

Quality Control Division, Thrissur was formed with effect from 15-11-2000 for Checking and maintaining the quality of works under taken by the Irrigation

The Quality Control Division, Thrissur comprises of a division office at Thrissur and 5 Sub Division Offices at Muvattupuzha, Thrissur, Palakkad, Kozhikode and Kannur. Monitoring of works executed by the Irrigation Department in Ernakulam, Thrissur, Palakkad, Malappuram, Kozhikode, Wayanad, Kannur and Kasargod are carried out by Quality Control Division, Thrissur.

The main objectives of the formation of 5 subdivisions under the Quality Control Division, Thrissur and its functions.

1. **Thrissur** Sub Division and its two sections at Thrissur and Ernakulam are envisaged to check the quality of works under taken by the various Execution divisions and subdivisions of the irrigation department in Thrissur and Ernakulam Districts.



2. **Palakkad** Sub Division and its two sections at Palakkad and Malapuram are intended to check the quality of works under taken by the various Divisions and sub divisions of the Irrigation Department in Palakkad and Malapuram Districts.

3. **Kozhikode** Sub Division and its sections namely Kozhikode and Kalpetta are intended to check the quality of works under taken by the various Divisions and sub divisions of the Irrigation Department in Kozhikode and Wyanad Districts.

4. **Kannur** sub division and its two sections at Kannur and Kasargod are intended to check the quality of works undertaken by the various Divisions and subdivisions of Irrigation department in Kannur and Kasargod districts.

5. **Muvattupuzha** Sub Division was formed on deploying the Chimoni Dam Project in Thrissur District on 1-1-1992 as per GO(Rt) 717/91 Dt. 07-10-1991. The main object of this sub division is to check the quality of works in two divisions of MuvattupuzhaValley Irrigation Project and two divisions of Idamalayar Irrigation Project. There are three sections at Muvattupuzha, Koothattukulam, and Angamaly for this purpose. The quality of works of Muvattupuzha division of Muvattupuzha Valley Irrigation project is checked by the Muvattupuzha Quality Control Section. The quality works under taken by the Piravam Division of Muvattupuzha Valley Project is done by the Koothattukulam Quality Control Section. Quality Control Section Angamaly is checking the quality of works undertaken by the Angamaly Division and Chalakudy Division of Idamalayar Irrigation Project. Two laboratories at koothattukulam and Angamaly are functioning with nominal equipments for this purpose.

6. **Division office at Thrissur**

Apart from compiling monthly and quarterly inspection reports received from the five subdivisions, comparing test results with IS and other approved standards, recommending necessary suggestion if any are the duties of Division office. Random inspections of major and important woks are to be done by the Division office.



Duties of the Division office also include effective coordination and supervision of these sub divisions which have such a vast area of operation in the field of quality maintenance of works under Irrigation Department and smooth functioning of the day to day activities such as personnel and official needs of the staff of the sub divisions, especially at the present scenario of introducing the new scheme 'Modernization of Quality Control Wing'.

Present functional activities of the Division and Sub divisions

Apart from inspections conducted by the Quality Control sections and Quality Control Sub Division offices, random inspection in major and important works are also being conducted by the Division Office. Irregularities noticed are brought into the notice of the execution wing with clear direction to rectify the same.

One of the major projects coming under WRD is Dam Rehabilitation and Improvement Project (DRIP) of major dams of Kerala. Since 2013, the wing is engaged in the Quality Control testing of DRIP works also. DRIP is implementing with financial assistance of World Bank. As per the direction of the Chief Engineer (I & D) IDR, we are participating in the discussions conducted by CWC Consultant at DRIP sites. As per the norms of DRIP, KWRD is to conduct timely inspection and certify the quality of work executed under the projects.

The list of dams that are coming under the Dam Rehabilitation and Improvement Project (DRIP) are as follows.

Sl. No.	DAM	Name of District
1	Pothundy	Palakkad
2	Malankara	Muvattupuzha
3	Vazhani	Thrissur
4	Peechi	Thrissur
5	PeriyarVallyBerrage	Ernakulam
6	Chulliar	Palakkad
7	Meenkara	Palakkad
8	Walayar	Palakkad



9	Pazhassi	Kannur
10	Kanhirapuzha	Palakkad
11	Chimoni	Thrissur
12	Kuttiadi	Kozhikode
13	Malampuzha	Palakkad
14	MoolatharaRegulater	Palakkad (Chitturpuzha)

As part of modernization of quality control wing, setting up of full-fledged laboratories with most modern equipments and machineries, mobile quality control unit etc. is in progress. Details of Modernization works are as follows.

Sl. No	Financial Year	Name of Work	Head of Account	Estimate PAC	Remarks
1	2018-19	Modernization of Quality Control Wing – Phase I at Kozhikode AS– G.O.(Rt)No.801/2015/WR D dt. 22.09.2015.	2701-80-005-97-00-00-V (Investigation and Design)	65,53,000	One part bill and Two final bills paid. Bill of 5 works submitted in EMLI for payment.
2	2018-19	Modernization of Quality Control Wing – Phase II at Palakkad FS–No. QCD TSR/2016/400/IDRB dt. 18.03.2017. AS – No. QCD TSR/2016/400/IDRB dt. 30.03.2017.	2701-80-005-97-00-00-V (Investigation and Design)	23,81,800	Work in progress.
3	2018-19	Modernization of Quality Control Wing –Phase III at Thrissur FS – QCD/TSR/2017/110/IDRB dt. 29.09.2017 AS – QCD TSR/2017/110/IDRB dt. 01.03.2018	2701-80-005-93-00-00-V (Modernization of Design wing)	43,30,000	Work in progress.



4	2018-19	Modernization of Quality Control Wing –Phase IV at Angamaly FS- QCDTsr/2018/243/IDRB Dt. 07.02.2019	2701-80-005-93	45,00,000	Submitted in PRICE for according Administrative Sanction.
5	2018-19	Modernization of Quality Control Wing – Phase V at Kannur	2701-80-005-93	37,00,000	Proposal submitted.

Inspection conducted:

Sl. No.	Name of Sub Division	Number of Inspections conducted.
1	Quality Control Sub Division, Palakkad	120 Nos.
2	Quality Control Sub Division, Muvattupuzha	127 Nos.
3	Quality Control Sub Division, Thrissur	205 Nos.
4	Quality Control Sub Division, Kozhikode	108 Nos.
5	Quality Control Sub Division, Kannur	79 Nos.

Formulation of Quality Control Manual

Since there is no Quality Control Manual in our department initiatives have been taken for the formulation of the same. Even though PWD Quality Control Manual is currently followed, separate manual for Irrigation Department is essential as the conditions and nature of water retaining structures are entirely different from other structures like buildings, roads, bridges etc.



The work has been entrusted with Quality Control Sub Division Thrissur and sanction for the same has been accorded as follows.

Name of work	Irrigation Department – Preparation of Irrigation Quality Control Manual 2018.
Head of Account	2701-80-005-93-00-00-V (Modernization of design wing)
Financial Sanction	Order No. QCDSr/2018/246/IDRB Dt. 30.01.2019.
Administrative Sanction	Order No. QCDSr/2018/246/IDRB Dt. 27.02.2019.
Technical Sanction	Order No. QCDSr/2018/246/IDRB Dt. 03.03.2019.
TS Amount	3,50,000.00

Budget Allotments and expenditure

No separate budget allocation to the Quality control Wing. The needs of this division is met with the provisions allotted under the head of account 2701-80-005-97 & 2701-80-005-93 Investigation & Design under Plan and from 2701-80-004-96 for Non Plan wing. Budget allotments for Plan and Non Plan heads of accounts for the last 3 years are as follows

i) BUDGET ALLOTMENT

Plan / Non Plan	Heads of A/c	2018-19
Plan (for IDR B)	2701-80-005-97	Nil
	2701-80-005-93 For Modernization of Design wing	150 lakhs
Non Plan(For Thrissur and Kottarakara Quality Control Divisions)	2701-80-004-96	1214.26 lakhs



ii) EXPENDITURE (For Thrissur Division only)

Plan / Non Plan	Heads of A/c	2018-19
Plan	2701-80-005-97	13 lakhs
	2701-80-005-93	Nil
Non Plan	2701-80-004-96	669.3 lakhs

Details of inspection conducted by Executive Engineer, Irrigation Division Thrissur in connection with the reformation works of sea wall using Geo textile tube – product approval and quality tests of material.

As per GO(Rt)No. 29/2018/WRD, Dated 16.01.2018, government have accorded AS for 5 nos. of works for coastal protection at Chellanam Island using Geo textile tube, where the Okhi cyclone hit during November 2017. The work was arranged and as part of the supply of material, quality assurance from the department as prescribed in the tender schedule, Executive Engineer of Quality Control Division along with other 5 senior engineers of department, visited the factory producing the Geo Textile Tube – “M/s Fexituff” at New Delhi on 28.11.2018 for product approval.

The various stages of production of geo textiles material and their in-house quality control activities were witnessed and samples of Geo textile tube and scour apron were collected and sent to Ahmedabad Textile Industries Research Association Lab (ATIRA) for quality control tests. Later witnessed the Quality Control tests conducted at Ahmedabad Textile Industries Research Association Lab along with the Assistant Engineer, Irrigation Section, Manassery on 10th & 11th December 2018 to witness all tests except for Abrasion and UV resistance. The samples for Abrasion tests were sent to BTRA, Bombay, since the facility of testing the same is not available there.



K.QUALITY CONTROL DIVISION,KOTTARAKKARA

1. Introduction

Quality Control Division, Kottarakkara has jurisdiction over six districts namely Thiruvananthapuram, Kollam, Alappuzha, Pathanamthitta, Kottayam and Idukki. It is formed as a separate independent wing to ensure and examine strictly the quality of various works being executed under Irrigation Department.

At present Quality Control Division, Kottarakkara has four subdivisions at Thiruvananthapuram, Kottarakkara, Alappuzha and Kottayam and seven sections under its control. The field investigations, enquiries, and regular quality tests are conducted under the supervision of the Assistant Executive Engineers of Quality Control Wing in ordinary routine cases and report submitted to the Executive Engineer of respective Quality Control Wing. The Executive Engineer will submit a detailed report to the Director, F & AR, KERI, Peechi.

The field officers will intimate the respective Quality Control Subdivisions regarding the work. Routine inspections and collection of samples are carried out accordingly. Samples of sand and metal are collected from sites and sieve tests are conducted to ensure the quality of coarse aggregate and fine aggregate. Concrete cubesamples also collected in standard moulds and compressive strength is tested after proper curing. Water samples are also collected for testing the quality.

Quality Control Subdivision, Thiruvananthapuram

There are two section offices under this Subdivision one is at Thiruvananthapuram and other is at Kollam. Inspection of all works and checking the quality of materials are carried out by these section offices at Thiruvananthapuram and Kollam districts respectively.



During 2018-19, 73 works were inspected and 57 samples were collected for testing compressive strength. Out of these 57 samples, 44 test results are submitted to this office. Remaining samples are waiting for getting results. A detailed estimate for an amount of Rs.88 lakhs is included in the Budget for the Proposal of setting up of a Quality Control Lab at Vamanapuram Irrigation Project Campus.

Quality Control Subdivision, Kottarakkara

There is only one section under this Subdivision at Kottarakkara KIP campus and Inspection of all works pertaining to Irrigation Department in Kallada Irrigation Project is carried out in this office.

During 2018-19, 36 works were inspected and 10 samples were collected for testing compressive strength. Out of this, 8 test results are submitted to this office. Work for an amount of Rs.62.08 lakhs for the Modernisation of Quality Control Lab in the existing Recreation Club building at Kottarakkara is going on, and 13% of the above work has been completed.

Quality Control Subdivision, Alappuzha

There are two section offices under this subdivision, each at Alappuzha and Pathanamthitta. All major and minor works including ASE works of Alappuzha districts are inspected by Quality Control Section, Alappuzha and under Pathanamthitta section office, all major, minor and Pampa Irrigation Project works at Pathanamthitta districts are inspected.



During 2018-19, 123 works were inspected and 111 samples of cement concrete cube were collected for testing compressive strength. Results are submitted to this office. Detailed estimate for an amount of Rs. 81 lakhs is submitted to higher authorities through PRICE for construction of modern Quality Control Lab at Alappuzha.

Quality Control Subdivision, Kottayam

There are two section offices under this subdivision, one at Kottayam for Kottayam District works and another at Muttom for Idukki District works. Samples of sand and metal are collected from sites, sieve tests to ensure the quality of course and fine aggregate, concrete samples for testing compressive strength are also conducted.

During 2018-19, samples were collected from 59 sites of Irrigation works. Out of this 59 samples, 45 test results are submitted to this office. Remaining samples are under curing. A detailed project report has been prepared for constructing a fully equipped Lab at MVIP premises at Muttom for an amount of RS. 86 lakhs and submitted to higher authorities through PRICE for obtaining Financial Sanction.



5. FINANCE

In the budget for the financial year 2018-19 an outlay of Rs.85 Lakh (Rupees Eighty Five lakhonly) had been allotted under the Head of Account '4701-80-800-99-Development of KERI Stage II'. The proposal for the amount was grouped under three heads viz., Routine activities, modernization and revamping. The details of sanctioned amount and expenditure are given below. From the routine works carried out in the laboratories an amount of Rs.12,03,586/- (Rupees twelve lakh three thousand five hundred and eighty six only) has been collected as test charges and the amount was remitted in the treasury.

Details of sanctioned Amount and Expenditure

Sl. No.	Divisions	A.S. Amount
I	Joint Director, C.M.&F.E., KERI, Peechi.	
1	Construction Materials Division	16.35lakh
2	Soil Mechanics and Foundations Division	15lakh
3	Instrumentation Division	17.50lakh
	Total amount received	48.85 lakh
	Expenditure	32,04,894 /-
II	Joint Director, Hydraulic Research, KERI, Peechi.	
1	Coastal Engineering Division	23 lakh
2	Hydraulics Division	13.15 lakh
3	Sedimentation Division	17 lakh
	Total amount received	53.15 lakh
	Expenditure	39,05,142/-



Details of Expenditure statement for the year 2018 -19 had been allotted under the Various **Head of Account** are given below.

Sl.No.	Head of Account	Division	A.S Amount	Expenditure
I	Joint Director, C.M.&F.E., KERI, Peechi			
1	4700-80-005-99-02-00-V “Investigation of Major Irrigation Schemes.” (Including balance work of Mangalam dam Desiltation)	Instrumentation Division	7,45,000/-	9,25,561/-
II	Joint Director, Hydraulic Research, KERI, Peechi.			
1	Head of Account ‘2701-01-101-98-00-18-NV “Maintenance of Peechi Schemes”	Hydraulics Division	5,19,852/-	3,39,994/-
2	2701-80-005-93-00-00-00-PV “Modernization of design wing”	Coastal Engineering Division	38,00,000/-	2,63,727/-
		Sedimentation Division	1,20,000/-	80,769/-
3	4700-80-005-99-02-00-PV “Investigation of Major Irrigation Schemes”	Hydraulics Division	99,828/-	99,828/-
4	4701-80-800-99-00-00-00PV formation of river basin organization	Coastal Engineering Division	28,00,000/-	15,206/-



6. SUMMARY

In the annual report for the current financial year a general introduction about the Institute, organization set up, division wise functioning of the institute, implementation of modernization scheme and details regarding budget allotment and expenditure have been explained in detail.

The bottlenecks or hindrance in the development of the institute as a full-fledged research organization are

- ✚ *Insufficient number of technical personnel.*
- ✚ *Transfer of Experienced Technical Personnel from the Institution*
- ✚ *Lack of up-gradation of technical knowledge of Engineers through training.*
- ✚ *Insufficient number of projects/underutilizations of the facilities available at the institute.*
- ✚ *Procurment of Equipments – monopoly of the firm, need of advance payment, existing bid norms for the lowest bid offer etc.*
- ✚ *Limitation of withdrawal of advance amount to carry out departmental execution works*
- ✚ *In the case of Field studies division, sufficient fund has to be made available in time for conducting the study of coastal erosion and high derivative modern equipments has to be made available.*
- ✚ *Lack of vehicles for inspection of site to the quality control wing.*

All these require intervention from the part of the Government and it is hoped that the up gradation of the personnel of the institute will be taken up as a continuation of the modernization scheme.



Appendix – I**Vacancy Position as on 31/03/2019, KERI, Peechi**

Sl. No	Designation	Sanctioned Strength							No of Posts Vacant							Remarks
		O/o Director	CM&FE	Hydraulic Research	CEFS	Q.C. Division, Tsr	QC Div., kottarakkara	Total	O/o Director	CM&FE	Hydraulic Research	CEFS	QC, TSR	QC, Kottarakkara.	Total	
1	Director	1	-	-	-			1	-	-	-	-			-	
2	Joint Director/ Executive Engineer	-	1	1	1	1	1	5	-	-	-	-	1	-	1	
3	Deputy Director/Asst. Exe. Engineer	-	3	3	3	6	4	19	-	-	-	-	-	-	-	
4	Assistant Director/Asst. Engineer	1	6	7	10	11	7	42	-	1	-	1	-	-	2	
5	Divisional Accountant	-	-	1	-	-	-	1	-	-	1	-	-	-	1	
6	Junior Superintendent	-	1	1	-	-	-	2	-	-	1	-	-	-	-	
7	Fair Copy Superintendent	-	-	1	-	-	-	1	-	-	-	-	-	-	-	
8	Selection Grade Typist/ UD Typist	-	2	1	1	-	-	4	-	1	-	-	-	-	1	
9	Senoir Grade typist	-	-	-	3	-	-	3	-	-	-	-	-	-	-	
10	Research Assistant/Ist Grade Draftsman	1	8	7	9	9	14	48	-	1	2	1	-	-	4	
11	2 nd Grade Overseer	1	4	4	15	13	7	44	-	1	-	-	1	-	2	
12	3 rd Grade Overseer	-	3	2	-	12	14	31	-	1	-	-	-	-	1	
13	Scientific Assistant	-	1	1	-	-	-	2	-	1	1	-	-	-	2	
14	Tracer	-	-	1	-	-	-	1	-	-	-	-	-	-	-	
15	Blue Printer	-	-	1	-	-	-	1	-	-	1	-	-	-	1	
16	Driver	-	1	1	4	4	4	14	-	-	-	-	4	2	6	
17	Boat Driver	-	-	1	-	-	-	1	-	-	1	-	-	-	1	
18	Lab Attender	-	1	1	-	-	-	2	-	1	1	-	-	-	2	



19	Modeler	-	-	1	-	-	-	1	-	-	1	-	-	-	1	
20	Mason	-	-	1	-	-	-	1	-	-	1	-	-	-	1	
21	Worker Grade I/II	-	9	8	-	-	-	17	-	7	8	-	-	-	15	
22	Lascar	-	-	-	-	4	8	12	-	-	-	-	3	-	3	
23	Head Clerk	-	-	-	1	5	5	11	-	-	-	-	-	1	1	
24	UD Clerk	2	1	-	2		13	19	-	-	-	-	-	1	1	
25	Senior clerk	-	1	4	7	22	-	34	-	-	-	-	-	-	-	
26	LD Clerk/clerk	2	7	3	4			16	-	1	-	-			1	
27	LD Typist	1	2	1	-	7	5	16	-	1	-	-	1	-	2	
28	Typist Clerk	-	1	1	-	-	-	2	-	1	-	-		-	1	
29	Office Attendant	2	6	3	13	13	9	37	-	-	-	2	1	-	3	
30	Part Time Sweeper	-	4	2	3	4	2	15	-	-	1	-	-	-	1	
31	Lab Assistant	-	2	-	-	-	-	2	-	2	-	-	-	-	2	
32	Information Assistant	-	1	-	-	-	-	1	-	1	-	-	-	-	1	



Appendix – II

An abstract of the Weather data collected from Automatic Weather Station for the period from April 2018 to March 2019 is given below

Abstract of the weather data from April, 2018 to March, 2019

STATION: K.E.R.I,PEECHI

Latitude- 10° 31' 30" N Longitude- 76° 21' 59" E MSL- +96.03 M.

Sl.No	Weather Elements	Range of the weather data
1.	Atmospheric pressure	Data from August 2018 to March 2019 not recorded due to sensor complaint. Maximum Atmospheric Pressure observed was 1004milli barsin May,July -2018 and Minimum Atmospheric Pressure was 1000milli bars inApril,June-2018
2.	Temperature	The maximum temperature was 40.52°C in March-2019 and the minimum temperature was 20.5°C in y-2018
3.	Relative Humidity	Maximum relative humidity recorded was 96% in all the months and minimum relative humidity was 70% in May, 2018
4.	Precipitation	Annual rainfall was 4012.9 mm and the maximum rainfall was 284mm in August 2018and minimum rainfall 0.40mm in May, 2018.
5.	Wind-Direction	The main wind directions observed were from South East and North East directions.
6.	Wind Speed	Maximum daily mean wind speed was 7.2 km/hrin December, 2018 and minimum daily mean wind speed was 0.14 km/hr in October, 2018.
7.	Evaporation	Maximum Evaporation was 8 mm in February&2019 and minimum of 3.6 mmin February,January, 2019.
8.	Sunshine Recorder	The maximum duration of bright sunshine was 11 Hours in February– 2019 and minimum 0.3 Hours in May,June,July,August,October, 2018



Appendix – III**List of tests conducted in the CM laboratory**

Sl No	Details of Routine test during April, 2018 – March, 2019
1	Compressive strength of Concrete cubes supplied by the Assistant Engineer, Nirmithi Kendra, Thrissur.
2	Compressive strength test of concrete cubes supplied by M/s HPCL, Kozhikode
3	Compressive strength of concrete cubes supplied by the Assistant Engineer Quality control Sn, Thrissur
4	Compressive strength of concrete cubes supplied by the Assistant Engineer Quality control Sn, Palakkad.
5	Testing of tiles supplied by the Assistant Executive Engineer, Special buildings Sub Division, Thrissur.
6	Crushing strength of Aggregates supplied by the Assistant Engineer, Head Works Sn, Peechi.
7	Compressive strength of concrete cubes supplied by the Assistant Engineer Quality control Sn, Palakkad.
8	MIX Design for the Assistant Engineer, PWD buildings Sn, Wadakkanchery, Thrissur.
9	Testing of steel bars supplied by the Assistant Engineer, PWD buildings Sn, Wadakkanchery, Thrissur
10	Compressive strength test of concrete cubes supplied by Senior Section Engineer, Southern railway, Thrissur.
11	Compressive strength of concrete cubes supplied by the Assistant Engineer Quality control Sn, Thrissur
12A	Compressive strength test of concrete cubes supplied by Assistant Engineer, Quality control Sn Thrissur.



- 12B Compressive strength test of concrete cubes supplied by Assistant Engineer, Quality control SnThrissur.
- 13 Compressive strength of Concrete cubes supplied by the Supervisor, District Nirmithi Kendra, Thrissur.
- 14 Compressive strength test of concrete cubes supplied by Assistant Engineer, PWD buildings Sn, Irinjalakkuda for the construction of New Block for Govt. Ayurveda Hospital Perambra in Kodakara.
- 15 Compressive strength test of core samples supplied by the Assistant Engineer, PyIP Sn, Veliyambra, for the work Rectification of breached portion of Mamcanal at Ch. 1300m.
- 16 Compressive strength test of concrete cubes supplied by Assistant Engineer Quality control Sn, Thrissur
- 17 Compressive strength test of concrete cubes supplied by Assistant Engineer Quality control Sn, Thrissur
- 18 Compressive strength test of concrete cubes supplied by Assistant Engineer Quality control Sn, Thrissur.
- 19 Compressive strength test of concrete cubes supplied by Assistant Engineer, KSEB
- 20 Testing of steel bars supplied by the Project Coordinator,KIDC.
- 21 Testing of steel bars supplied by Fins Engineers & Contractors (P) Ltd.
- 22 Compressive strength test of concrete cubes supplied by the Tekton Transcending Times
- 23 Testing compressive strength of concrete cubes by the Assistant Engineer, PWD Road Section, Puzhakkal.
- 24 Testing compressive strength of concrete cubes by Tekton
- 25 Testing compressive strength of concrete cubes by Southern Railway
- 26 Testing compressive strength of concrete cubes by Southern Railway
- 27 Compressive strength test of concrete cubes supplied by the Assistant Engineer, MI Sn, Wadakanchery .
- 28 Compressive strength test of concrete cubes supplied by the Assistant Engineer, MI



- Sn, Wadakanchery
- 29 Compressive strength test of concrete cubes supplied by Assistant Engineer Quality control Sn, Thrissur.
 - 30 Compressive strength test of concrete cubes supplied by Assistant Engineer Quality control Sn, Thrissur.
 - 31 Compressive strength of Concrete cubes supplied by the Project Manager, District Nirmithi Kendra, Thrissur.
 - 32 Compressive strength test of concrete cubes supplied by Assistant Engineer, KSEB, Chalakkudy.
 - 33 Sieve Analysis of M Sand supplied by the Assistant Engineer, KSEB, Chalakkudy..
 - 34 Testing of cement supplied by the Assistant Engineer, KSEB, Chalakkudy.
 - 35 Testing compressive strength of concrete cubes by Tekton Builders & Contractors, Thrissur.
 - 36 Compressive strength test of concrete cubes supplied by Assistant Engineer Quality control Sn, Thrissur
 - 37 Compressive strength test of concrete cubes supplied by Assistant Engineer Quality control Sn, Thrissur.
 - 38 Compressive strength test of concrete cubes supplied by Assistant Engineer Quality control Sn, Thrissur.
 - 39 Compressive strength test of concrete cubes supplied by Assistant Engineer Quality control Sn, Thrissur.
 - 40 Testing compressive strength of concrete cubes by AE Quality control SnThrissur
 - 41 Testing compressive strength of concrete cubes by AE Quality control SnThrissur
 - 42 Compressive strength test of concrete cubes supplied by Assistant Executive Engineer, 220KV Substation, Kallippadam, Shornur.
 - 43 Compressive strength test of concrete cubes supplied by Sri. Tony Francis,



- Chirayath, Angamaly.
- 44 Testing of steel bars supplied by the Assistant Engineer, PWD buildings Sn, Kodungallur,
 - 45 Testing of steel bars supplied by the Assistant Engineer, PWD buildings Sn, Wadakkanchery.
 - 46 Tests on Coarse Aggregates by the Powergrid corporation of India Ltd, Kozhikkode
 - 47 Testing of steel bars supplied by the Assistant Engineer, Cochin Central Sub Division III, Lashadweep.
 - 48 Testing of steel bars supplied by the Assistant Engineer, Cochin Central Sub Division III, Lashadweep.
 - 49 Testing compressive strength of concrete cubes supplied by CEECON Readymix Concrete Ltd
 - 50 Testing compressive strength of concrete cubes by Tekton Builders & Contractors, Thrissur.
 - 51 Compressive strength of bricks supplied by the Assistant Engineer, Paulose George Construction Company, Kochi.
 - 52 Testing of cement supplied by Vishram Builders.
 - 53 Compressive strength of Concrete cubes supplied by the Project Manager, District Nirmithi Kendra, Thrissur.
 - 54 Testing compressive strength of concrete cubes by AE Quality control Sn, Thrissur
 - 55 Tests on Fine Aggregates by Southern Railway, Poonkunnam
 - 56 Testing of cement supplied by the Southern Railway, Poonkunnam.
 - 57 Tests on Coarse Aggregates by the Southern Railway, Poonkunnam.
 - 58 Testing compressive strength of concrete cubes supplied by CEECON Readymix Concrete Ltd.



- 59 Testing compressive strength of concrete cubes by the Trichur Cooperative Spinning mill, Thrissur.
- 60 Testing compressive strength of concrete cubes by Tekton Builders & Contractors, Thrissur.
- 61 Testing compressive strength of concrete cubes by Assistant Engineer, CDP Sn, Echippara.
- 62 Testing compressive strength of concrete cubes Assistant Engineer, PWD buildings Sn, Wadakkanchery.
- 63 Compressive strength, Dimension, flatness, perpendicularity, Wet transverse strength, Resistance to wear & Water absorption tests of paving Tiles supplied by Southern Railway, Poonkunnam
- 64 Compressive strength of Concrete cubes supplied by the Project Manager, District Nirmithi Kendra, Thrissur.
- 65 Testing compressive strength of Concrete cubes supplied by the Assistant Executive Engineer, KSEB, Madakkathara, Thrissur.
- 66 Testing of cement supplied by the Southern Railway, Poonkunnam.
- 67 Testing compressive strength of paver blocks supplied by Sri. Shibu P E, PWD contractor, Peechi.
- 68 Testing compressive strength of concrete cubes by Tekton Builders & Contractors, Thrissur.
- 69 Testing compressive strength of concrete cubes by AE, Quality control Sn, Thrissur
- 70 Testing compressive strength of concrete cubes by the Trichur Cooperative Spinning mill, Thrissur
- 71 Testing compressive strength of Concrete cubes supplied by the Assistant Executive Engineer, KSEB, Madakkathara, Thrissur
- 72 Tests on cement supplied by the Assistant Engineer, Quality control Sn, Palakkad.



- 73 Tests on steel rods supplied by the Assistant Engineer, Quality control Sn, Palakkad.
- 74 Tests on Coarse aggregates supplied by the Assistant Engineer, Quality control Sn, Palakkad.
- 75 Testing compressive strength of concrete cubes by Tekton Builders & Contractors, Thrissur.
- 76 Testing compressive strength of concrete cubes by the Assistant Engineer, PWD buildings Sn, Chalakkudy
- 77 Testing of steel rods supplied by the Assistant Engineer, PWD buildings Sn, Chalakkudy
- 78 Testing compressive strength of concrete cubes supplied by the Assistant Engineer, PWD buildings Sn, Chalakkudy
- 79 Testing of concrete cubes supplied by Govt Higher School, Mupliyam.
- 80 Testing compressive strength of concrete cubes supplied by the Assistant Executive Engineer, KSEB, Madakkathara, Thrissur
- 81 Tests on Fine Aggregates supplied by the HPCL, Kozhikkode.
- 82 Tests on Solid blocks supplied by the HPCL, Kozhikkode.
- 83 Tests on Coarse Aggregates supplied by the HPCL, Kozhikkode.
- 84 Tests on Coarse Aggregates supplied by the HPCL, Kozhikkode
- 85 Testing of steel rods supplied by the HPCL, Kozhikkode
- 86 Testing compressive strength of concrete cubes by AE PWD Building section Chalakkudy.
- 87 Testing compressive strength of concrete cubes by Senior Sn Engineer Southern Railway Thrissur
- 88 Testing of compressive strength of concrete cubes by Assistant Engineer, Quality control Sn, Palakkad .



- 89 Testing compressive strength of concrete cubes by AE Quality control Sn, Thrissur
- 90 Mix Design by Assistant Engineer, QC sn, Irrgn Dept, Palghat.
- 91 Testing compressive strength of concrete cubes supplied by the Coordinator, Amma Aged for the Destitute, Holy Family Convent, Mothirakkany, Chalakkudy.
- 92 Testing compressive strength of concrete cubes supplied by HPCL, Kozhikode.
- 93 Testing compressive strength of Paver blocks supplied by AE, Peechi Sn, Peechi.
- 94 Testing compressive strength of concrete cubes supplied by HPCL, Edappal.
- 95 Testing compressive strength of concrete cubes supplied by HPCL, Edappal
- 96 Testing compressive strength of concrete cubes by Tekton Builders & Contractors, Thrissur.
- 97 Confirmity tests on wire rope supplied by the Assistant Engineer, Thannermukkom, Alappuzha
- 98 Confirmity tests on wire rope supplied by the Assistant Engineer, Thannermukkom, Alappuzha
- 99 Testing of steel rod supplied by AE PWD Building section, Puzhakkal.
- 100 Tests on cement supplied by Kairali Cements, Kanjikkode.
- 101 Testing compressive strength of concrete cubes supplied by Head Mistress, Sacred Heart High School, Chalakkudy.
- 102 Testing compressive strength of concrete cubes by AE Quality control Sn, Thrissur for the work Improvement works to Killimangalam branch canal b/w Bridge over Irrigation canal, ward No. 4 of Pananchery Panchayath.
- 103 Testing compressive strength of concrete cylinders by AE Quality control Sn, Thrissur for the work Improvement works to Killimangalam branch canal b/w Bridge over Irrigation canal, ward No. 4 of Pananchery Panchayath
- 104 Mix design by the Assistant Executive Engineer, IIP Sub Division No.1, Angamali



- 105 Testing compressive strength of concrete cubes supplied by Assistant Engineer, Quality control Sn, Palakkad.
- 106 Testing of gauge of GI rectangular square pipes, sheets for roofing supplied by the AE, Quality control Sn, Thrissur.
- 107 Testing compressive strength of concrete cubes by AE PWD Building section Chalakkudy.
- 108 Mix design by the Southern Railway.
- 109 Testing of Bricks by the Power Grid corporation of India, Madakathara.
- 110 Testing compressive strength of concrete cubes supplied by the Assistant Engineer, CDP Section, Chimmony dam Project Section.
- 111 Testing of compressive strength of concrete cubes by AE Quality control Sn, Thrissur
- 112 Testing of compressive strength of concrete cubes by the Assistant Engineer, Quality control Sn, Thrissur
- 113 Testing of compressive strength of concrete cubes by Tekton Builders & Contractors, Thrissur.
- 114 Testing of compressive strength of concrete cubes by the HPCL, Kozhikode.
- 115 Testing compressive strength of concrete cubes supplied by the HPCL, Kozhikode.
- 116 Tests on Fine Aggregates supplied by the AE PWD Building section, Chalakkudy.
- 117 Tests on Coarse Aggregates supplied by the AE PWD Building section, Chalakkudy
- 118 Testing of steel rod supplied by AE PWD Building section, Chalakkudy.
- 119 Testing of Cement blocks supplied by AE PWD Building section, Chalakkudy.
- 120 Testing of steel rod supplied by the Kerala Agricultural University, Vellanikkara.



- 121 Testing of compressive strength of concrete cylinders by the Assistant Engineer, Quality control Sn, Thrissur
- 122 Testing of compressive strength of concrete cubes by the Assistant Engineer, Quality control Sn, Thrissur
- 123 Testing of Bricks by the Power Grid corporation of India, Madakathara.
- 124 Testing of Bricks by the Power Grid corporation of India, Madakathara.
- 125 Testing of Bricks by the Sree Mahalakshmy Tiles, Elamthuruthy, Kuttanellur..
- 126 Testing compressive strength of concrete paver blocks supplied by the Assistant Engineer, LSGD Section, Pananchery GP.
- 127 Testing compressive strength of concrete paver blocks supplied by the Assistant Engineer, LSGD Section, Pananchery GP
- 128 Testing of compressive strength of concrete cubes by Tekton Builders & Contractors, Thrissur.
- 129 Testing of compressive strength of concrete cubes by the JOS Alukkas Jewellery, Thrissur.
- 130 Testing of steel rod supplied by the Kerala State Housing Board
- 131 Testing compressive strength of concrete paver blocks supplied by the Assistant Engineer, LSGD Section, Pananchery GP
- 132 Testing of Cement supplied by the Sobha Silver Estate Thrissur.
- 133 Testing compressive strength of concrete blocks supplied by Sobha Silver Estate Thrissur.
- 134 Testing compressive strength of concrete cubes supplied by the Sobha Silver Estate Thrissur
- 135 Testing compressive strength of concrete cubes supplied by the Sobha Silver Estate Thrissur



- 136 Testing compressive strength of concrete cubes supplied by the Kerala State Housing Board, Thrissur.
- 137 Testing compressive strength of concrete cubes supplied by Chungath Jewellery Dormitory site at MG Road Thrissur.
- 138 Testing of steel rod supplied by the Kerala State Housing Board, Thrissur.
- 139 Testing compressive strength of concrete solid blocks supplied by Sri PM Abdul Ashraf, Pokkakkillath House, PO Ariyannur, Guruvayur.
- 140 Testing of cement supplied by the Vishraam Builders.
- 141 Testing of cement supplied by the Vishraam Builders.
- 142 Testing of steel rod supplied by the Assistant Engineer, Irrigation Section, Kodakara.
- 143 Testing of Cement, Fine Aggregates, Coarse Aggregate, Steel supplied by the Assistant Engineer, Quality control Sn, Thrissur
- 144 Testing of compressive strength of concrete cubes by Kerala State Housing Board
- 145 Testing of compressive strength of Interlock cement blocks by Kerala State Housing Board
- 146 Testing of compressive strength of concrete cubes by the Assistant Engineer, Quality control Sn, Thrissur
- 146A Testing of compressive strength of concrete cubes by the Assistant Engineer, CDP Section, Thrissur
- 147 Testing compressive strength of concrete cubes supplied HPCL, Edappal.
- 148 Testing compressive strength of concrete cubes supplied by Chungath Jewellery Dormitory site at MG Road Thrissur.
- 149 Testing compressive strength of concrete cubes supplied the Electrical Circle, KSEB, Vyduthi Bhavan, Thrissur.



- 150 Testing of compressive strength of concrete cubes by the Assistant Engineer, Quality control Sn, Thrissur
- 151 Testing of compressive strength of concrete cubes by the Assistant Engineer, Quality control Sn, Thrissur
- 152 Testing of compressive strength of concrete cubes by the Assistant Engineer, Quality control Sn, Thrissur
- 153 Testing of cement and steel supplied by the Assistant Engineer, Quality control Sn, Thrissur
- 154 Testing compressive strength of concrete cubes supplied by the Assistant Engineer, Quality control Sn, Thrissur.
- 155 Testing compressive strength of concrete cubes supplied by the Assistant Engineer, Quality control Sn, Thrissur.
- 156 Testing compressive strength of concrete cubes supplied by the Assistant Executive Engineer, LSGD SubDivision, Mathilakam Block Panchayath
- 157 Testing of coarse aggregates supplied by the Power grid corporation, Kozhikode
- 158 Testing of coarse aggregates supplied by the Power grid corporation, Kozhikode
- 159 Testing of coarse aggregates supplied by the Power grid corporation, Kozhikode
- 160 Testing compressive strength of concrete cubes supplied by the Assistant Executive Engineer, LSGD Sub Division, Chalakkudy Block Panchayath.
- 161 Mix Design by Kerala State Construction CorporationLtd
- 162 Testing compressive strength of concrete cubes supplied by the Kerala State Housing Board.
- 163 Mix Design by Salim Associates Builders and Developers.
- 164 Testing compressive strength of concrete cubes supplied by Chungath Jewellery Dormitory site at MG Road Thrissur.
- 165 Testing of compressive strength of concrete cubes by the Assistant Engineer, CDP Section, Chimmony, Thrissur



- 166 Testing of compressive strength of concrete cubes by Tekton Builders & Contractors, Thrissur.
- 167 Tensile Strength of steel rods supplied by Assistant Engineer, MI section, Thrissur.
- 168 Testing of cement and steel supplied by the Assistant Engineer, Quality control Sn, Thrissur.
- 169 Testing of cement and steel supplied by the Assistant Engineer, Quality control Sn, Thrissur
- 170 Testing of cement and steel supplied by the Assistant Engineer, Quality control Sn, Thrissur
- 171 Testing of cement and steel supplied by the Assistant Engineer, Quality control Sn, Thrissur.
- 172 Testing of aggregates, Particle size Supplied by Power Grid corporation, Kozhikode.
- 173 Testing of aggregates, Particle size, Flakiness, Impact Supplied by Power Grid corporation, Kozhikode.
- 174 MIX Design for the Assistant Engineer, PWD Building Section, Kunnamkulam.
- 175 Tensile Strength of steel rods supplied by Assistant Engineer, PWD Building Section, Kunnamkulam.
- 176 Mix Design supplied by the Kerala State Housing Board, Thrissur.
- 177 Mix Design supplied by the Kerala State Housing Board, Thrissur.
- 178 Compressive strength of concrete paver blocks supplied by the Terraware, Avanoor, Thrissur.
- 179 Testing Coarse Aggregates supplied by the Assistant Executive Engineer, LSGD SubDivision, Mathilakam Block Panchayath
- 180 Testing of steel rods supplied by the Assistant Executive Engineer, LSGD Sub Division, Mathilakam Block Panchayath



- 181 Testing Solid blocks supplied by the Assistant Executive Engineer, LSGD Sub Division, Mathilakam Block Panchayath
- 182 Tensile Testing of steel supplied by FINS Engineers and Contractors P (Ltd), West Fort, Thrissur.
- 183 Compressive strength of concrete cubes supplied by the Assistant Engineer, PWD, Building Sn, Chalakkudy.
- 184 Testing of gauge of Rolling Shutter supplied by Sri. Rajiv M. T, Mundaplanthottiyil House, Chettupuzha, Thrissur..
- 185 Compressive strength of concrete cubes supplied by Kerala State Housing Board, Thrissur.
- 186 Testing of Vitrified Tiles supplied by The Assistant Engineer, CDP Section, Chimmony, Thrissur.
- 187 Testing compressive strength of concrete cubes supplied by the Assistant Engineer, Quality control Sn, Thrissur.
- 188 Testing compressive strength of concrete cubes supplied by the Assistant Engineer, Quality control Sn, Thrissur.
- 189 Testing compressive strength of concrete cubes supplied by the Assistant Engineer, Quality control Sn, Thrissur.
- 190 Testing compressive strength of concrete cubes supplied by the Assistant Engineer, CPWD, Thrissur Central Sub Division.
- 191 Testing of cement supplied by the Kerala State Housing Board.
- 192 Testing of cement, coarse aggregates, fine aggregates supplied by the Assistant Engineer, MI Sn, Thrithala.
- 193 Testing compressive strength of concrete cubes supplied by Chungath Jewellery Dormitory site at MG Road Thrissur.
- 194 Testing compressive strength of cement blocks supplied by the Assistant Engineer, Quality control Sn, Thrissur.



- 195 Testing compressive strength of concrete cubes supplied by Power Grid Corporation, Kozhikode.
- 196 Testing compressive strength of concrete cubes supplied by Power Grid Corporation, Kozhikode.
- 197 Testing compressive strength of cement blocks supplied by the Assistant Executive Engineer, KSEB, Chalakkudy.
- 198 Testing compressive strength of concrete cubes supplied by Sri. Sudarsanan, KSEB contractor
- 199 Compressive strength of Rock core samples supplied by the Assistant Engineer, MI Section, Cherpu, Thrissur.
- 200 Testing of compressive strength of concrete cubes by the Assistant Engineer, CDP Section, Chimmony, Thrissur
- 201 Testing of steel supplied by the AE ,CDP section Echippara
- 202 Testing of cement supplied by the Santhoshkumar,Qualitylab,Sobha ltd Thrissur
- 203 Testing of 8”hollow block supplied by the Santhoshkumar ,Quality lab, Sobha Ltd, Thrissur
- 204 Testing of 8”solid block supplied by the Santhoshkumar ,Quality Lab,SobhaLtd,Thrissur
- 205 Testing of compressive strength of concrete cubes supplied by Santhoshkumar,Q.C. lab, Sobha Ltd.,Thriisur.
- 206 Testing of compressive strength of concrete cubes supplied by Sri. Santhosh kumar, Q.C. lab, Thriisur.
- 207 Testing of steel supplied by the Hilite Project Pvt Ltd
- 208 Testing of aggregates supplied by the Hilite Project Pvt Ltd
- 209 Testing of Mix Design materials supplied by the AE,PWD Building section, Kunnamkulam
- 210 Testing of solid block supplied by the AE,PWD Building section , Kunnamkulam.
- 211 Testing of Aggregate (12mm)supplied by the Power grid corporation Kozhikode



- 212 Testing of Aggregate (20mm) supplied by the Power grid corporation Kozhikode.
- 213 Testing of Aggregate (40mm) supplied by the Power grid corporation Kozhikode
- 214 Testing of M.sand supplied by the Power grid corporation Kozhikode
- 215 Testing of Aggregates(90-45mm) supplied by the Power grid corporation Kozhikode
- 216 Testing of aggregates (90-45mm) supplied by the power grid corporation Kozhikode.
- 217 Testing of compressive strength of concrete cubes supplied by the Quality control Thrissur.
- 218 Testing of compressive strength of concrete cubes supplied by the Quality control Thrissur.
- 219 Testing of steel supplied by the CPWD, Thrissur
- 220 Testing of steel supplied by the CPWD, Thrissur
- 221 Testing of cement supplied by the CPWD, Thrissur.
- 222 Testing of cement supplied by the CPWD, Thrissur.
- 223 Testing of 20mm aggregate supplied by the CPWD, Thrissur
- 224 Testing of 20mm aggregate supplied by the CPWD, Thrissur
- 225 Testing of woven aviary mesh supplied by the CPWD, Thrissur
- 226 Testing of hollow circular galvanized steel supplied by the CPWD, Thrissur
- 227 Testing of compressive strength of concrete cubes supplied by the Assistant Executive Engineer, LSGD, Chalakudy Block Panchayath.
- 228 Testing of compressive strength of concrete cubes supplied by the CPWD, Thrissur.
- 229 Testing of compressive strength of concrete cubes supplied by the Nirmithy Kendra Ayyanthole.



- 230 Testing of compressive strength of concrete cubes supplied by the Assistant Engineer, Quality Control section, Thrissur.
- 231 Testing of Floor Tiles supplied by the AE, K.S.H.B., Thrissur.
- 231A Testing of compressive strength of concrete cubes AE,K.S.H.B., Thrissur
- 232 Testing of compressive strength of concrete cubes supplied by the Global constructions, Chalakkudy.
- 233 Testing of compressive strength of concrete cubes supplied by the Global constructions, Chalakkudy.
- 234 Testing of compressive strength of concrete cubes supplied by the Power grid corporation, Kozhikode.
- 235 Testing of fine aggregates supplied by the Power grid corporation Kozhikode
- 236 Testing of Coarse Aggregates supplied by the Power grid corporation Kozhikode
- 237 Testing of compressive strength of concrete cubes supplied by the AEE, IIP sub division, Angamali.
- 237A Testing of compressive strength of concrete cubes supplied by the AE, Quality control section, Angamali
- 238 Testing of compressive strength of concrete cubes supplied by the AE, Quality control sn, Angamali
- 239 Testing of steel supplied by the Mr.Moidunny,Falcon MALL, Perumbilavu, Kunnamkulam.
- 240 Testing of Mix design supplied by the CPWD, Thrissur
- 241 Testing of Cement supplied by the CPWD, Thrissur.
- 242 Testing of cement supplied by the CPWD, Thrissur.
- 243 Testing of Bi-Axial extruded high modular poly propylene geogrid supplied by the CPWD, Thrissur.
- 244 Testing of Drianage composite supplied by the CPWD



-
- 245 Testing of compressive strength of paver blocks supplied by the LULU International convention Centre, Puzhakkal.
- 246 Testing of Steel supplied by the Hilite, Thrissur
- 247 Testing of compressive strength of concrete cubes supplied by the AE, Quality control sn, Angamali.
- 248 Testing of aggregate 20mm supplied by the CPWD Thrissur
- 249 Testing of compressive strength of concrete cubes supplied by the CPWD Thrissur.
- 250 Testing of steel supplied by the CPWD Thrissur.
- 251 Testing of compressive strength of concrete cubes supplied by the Asst.Ex.Engineer, Transmission subdivision, KSEB office complex, Chalakkudy.
- 252 Testing of Pile echo test in Bhavikkara ,Kasargode
- 253 Testing of Pile echo test in Palayivalavu,Kasargode
- 254 Testing of compressive strength of concrete cubes supplied by the Quality control section Thrissur.
- 255 Testing of compressive strength of concrete cubes supplied by the Quality control section Thrissur.
- 256 Testing of compressive strength of concrete cubes supplied by the Quality control section Thrissur.
- 257 Tensile test of steel supplied by Assistant Engineer, MI section, Chalakkudy.
- 258 Testing of compressive strength of concrete cubes supplied by the Asst. Ex. Enginneeer, IIP sub division,Angamali
- 259 Testing of compressive strength of concrete cubes supplied by the Quality control section Angamali



Appendix – IV**List of tests conducted in the SM Laboratory during April 2018-March2019**

Soil samples analysis for undisturbed and disturbed samples were tested for the following works:-

1. Testing and Analysis of River Sand for Building Construction, M/s Scope Solutions International, Cherthala
2. Grain size analysis of soil – Palakappandy Canal System
3. PYIP – Rectification of breached portion of main canal at Ch 1300m- Soil investigation work.
4. Testing of specimen soil samples of Pattissery dam
5. Soil investigation – Arresting leakage of Pathazhakkundu Dam – Phase II works Improvement works to barrel.
6. Construction of Bay Extension at 400/220 KV sub station, Kozhikode – Testing of construction materials
7. Soil investigation – Improvements to natural drainage canals in Jaiva Vipin Project Desilting of Veerampuzha and 9 other thodu.
8. Testing of soil samples – Taneermukkom Bund Third stage work
9. Soil Tests for Students Project work, Vidya Academy of Science & Technology
10. Testing of soil samples – Engineering Structure Studies or setting up of an integrated Port cum ship Building Center at Azhikkal Port in Kannur District.
11. Testing of soil samples for the proposed building for State Warehouse Thalai, Thalassery.
12. Soil investigation - Investigation for Regulator cum Bridge across Ummenchira Puzha at Chekkupalam I Pinarayi Panchayath.
13. Construction of Bay Extension at 400/220 KV sub station, Kozhikode – Testing of construction materials.



14. Construction of Bay Extension at 400/220 KV sub station, Kozhikode – Testing of construction materials.
15. Testing of soil samples – KSEB - Maripuzha SHEP Kozhikode District.
16. KSEB Limited – Maripuzha SHEP (2 x 3 MW) – Soil Parameters – Conducting Laboratory Tests
17. Sedimentation Study of Chemmoni Reservoir using IBS & Sub Bottom Profiler – Testing of soil samples
18. Soil Investigation works for the proposed structure at ch 4800 m of Left Bank Main Canal of Karapuzha Dam in Wayanad District
19. Sedimentation Study of Walayar Reservoir using IBS & Sub Bottom Profiler Testing of soil samples.
20. Construction of Path way at 400/220 KV substation Kozhikode – Testing of construction materials
21. Soil Sample Testing – Educational Purpose (M.Tech) – Department of soil and Water Engineering, Kerala Agricultural University, KCAET, Tavanur
22. Construction of Path way at (WBM)400/220 KV substation Kozhikode – Testing of construction materials
23. Testing of Moorum – Construction of Pathway - Soil Testing – Najeeburahman P.P
24. Testing of soil samples – Sedimentation study of Kuttiyadi Reservoir using IBS & sub Bottom profiler



Appendix – V**Times and Places of observation**

Serial No.	Month	Date of observation
1.	April	16/04/2018
2.	May	15/05/2018
3.	June	13/06/2018
4.	July	13/07/2018
5.	August	11/08/2018
6.	September	09/09/2018
7.	October	09/10/2018
8.	November	07/11/2018
9.	December	07/12/2018
10.	January	05/01/2019
11.	February	04/02/2019
12.	March	6/03/2019



Appendix-VI**Details of Simultaneous Observations**

Sl. No.	Name of Station	Time and C. P. Nos.				
		9 AM	10 AM	11 AM	11.45 AM	12.30 PM
1	Vettukadu	112	114	116	114	112
2	Anjengo	223	228	233	228	223
3	Eravipuram	317	322	327	322	317
4	Thottappilly	597	600	602	600	597
5	Alapuzha	704	707	710	707	704
6	Thanki	926	930	935	930	926
7	Kannamaly	1025	1037	1047	1037	1025
8	Kuzhupilly	1140	1147	1149	1147	1140
9	Perinjanam	1269	1274	1279	1274	1269
10	Nattika	1323	1330	1333	1330	1323
11	Blangad	1418	1421	1428	1421	1418
12	Vakkad	1595	1599	1605	1599	1595
13	Calicut	1830	1826	NCP	1826	1830
14	Melody	2013	2009	2004	2009	2013
15	Thalassery(Old CP)	Back of Bishop's house	1067	1075	1067	Back of Bishop's house
16	Kanhangad	2608	2603	2598	2603	2608
17	Kasargod(Old CP)	531	541	550	541	531
18	Kannuvatheertha (Old CP)	103	111	121	111	103

¥®¥®¥®¥®¥
 ¥®¥®¥®¥
 ¥®¥®¥
 ¥®¥
 ¥

